

The Long-Run Effects of Fiscal Rebalancing in a Heterogeneous-Agent Model

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ABSTRACT

This paper examines the long-run macroeconomic effects of a Fiscal Rebalancing reform that shifts taxation from payroll to consumption under a balanced-budget constraint. Using a heterogeneous-agent model calibrated to French data, we compare pre- and post-reform steady states. The reform increases both aggregate labor and capital, with a stronger impact on capital in the heterogeneous-agent model than in its representative-agent counterpart. It also heightens wealth inequality, as a disproportionate share of the increase in aggregate wealth accrues to wealthier households. A welfare analysis that accounts for the transition dynamics reveals a positive average welfare effect overall, although high-wealth and, separately, low-productivity households experience welfare losses. The results are robust across alternative calibrations and model specifications.

Keywords: Fiscal Policy, Fiscal Rebalancing, Income and Wealth Distributions, Heterogeneous-Agent Models

JEL classification: E62, D31, C54

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NON-TECHNICAL SUMMARY

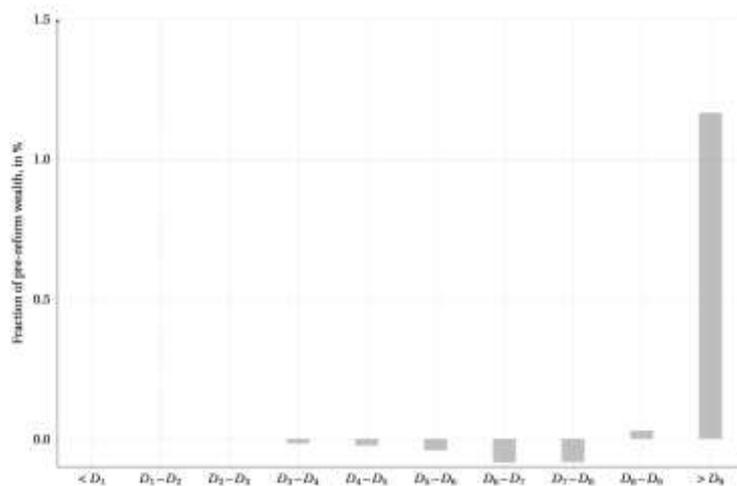
This paper studies a class of tax reforms that lower the overall fiscal wedge on labor by shifting part of the tax burden from labor income to consumption under a strict budget-neutrality requirement. We call such reforms Fiscal Rebalancing policies. Such reforms aim to reduce the fiscal wedge on labor while preserving budgetary discipline, a key constraint in high-debt economies.

Focusing on France, we assess whether Fiscal Rebalancing can increase equilibrium employment, output, and capital. We develop a quantitative heterogeneous-agent model calibrated to French data, capturing labor-income risk, borrowing constraints, and wealth inequality. Results are compared with those from a representative-agent benchmark.

Analytically, we show that in the representative-agent economy, employment rises when the consumption-tax base is sufficiently larger than the labor-income tax base. This condition provides a benchmark for the quantitative analysis.

We then consider a reform that increases the consumption-tax rate by three percentage points and uses the additional revenue to cut payroll taxes, broadly in line with the French policy debate. The reform has a limited effect on employment, raising hours worked by about 0.3 percent in the long run in both models. The main macroeconomic effect operates through capital accumulation. In the heterogeneous-agent economy, aggregate capital increases by around 1.3 percent, about four times more than in the representative-agent case.

Figure 1. Change in net wealth per pre-reform deciles



Note: Post reform increase in wealth (in percentage of pre-reform aggregate wealth) accruing to each decile of the pre-reform wealth distribution.

The stronger capital response reflects increased saving incentives, driven by higher consumption taxes and stronger precautionary-saving motives following wage increases. As a result, wealth inequality rises markedly, with the top decile capturing more than the entire increase in aggregate wealth.

From a welfare perspective, the reform generates clear gains in the representative-agent economy. In the heterogeneous-agent model, average welfare, which depends positively on consumption and negatively on labor, increases modestly, but distributional effects are significant: high-wealth, very-high-productivity, and low-productivity households experience welfare losses, largely due to transition dynamics. Indeed, on average, wealth-rich agents and low-productivity agents expect an

increase in their labor supply and a decrease in their consumption (relative to the status quo) along the initial phase of the transition, which translates into a welfare loss.

Overall, Fiscal Rebalancing reforms are unlikely to deliver large employment gains but can substantially increase savings and capital accumulation, at the cost of higher inequality. These findings highlight the importance of accounting for household heterogeneity when evaluating tax reforms implemented under strict budget constraints.

Les effets de long terme du rééquilibrage budgétaire dans un modèle à agents hétérogènes

RÉSUMÉ

Cet article analyse les effets macroéconomiques de long terme d'une réforme de rééquilibrage budgétaire consistant à réduire les cotisations sociales en contrepartie d'une hausse de la fiscalité sur la consommation, sous une contrainte de budget équilibré. À l'aide d'un modèle à agents hétérogènes calibré sur des données françaises, nous comparons les états stationnaires avant et après la réforme. Celle-ci accroît à la fois l'offre de travail et le capital agrégé, avec un effet plus marqué sur l'accumulation du capital dans le modèle à agents hétérogènes que dans sa contrepartie à agent représentatif. Elle entraîne également une hausse des inégalités de patrimoine, une part disproportionnée de l'augmentation du patrimoine agrégé revenant aux ménages les plus aisés. Une analyse de bien-être tenant compte des dynamiques de transition met en évidence un gain moyen de bien-être globalement positif, bien que les ménages les plus riches et, séparément, les ménages à faible productivité subissent des pertes de bien-être. Les résultats sont robustes à différentes calibrations et spécifications du modèle.

Mots-clés : politique budgétaire, rééquilibrage budgétaire, distribution des revenus et du patrimoine, modèle à agents hétérogènes.

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1 Introduction

In a widely cited paper, Prescott (2004) argues that high labor taxation accounts for the lower hours worked in continental Europe relative to the United States. This conclusion was later corroborated by Rogerson (2006) and Ohanian, Raffo, and Rogerson (2008), and it carries direct policy implications: to increase hours worked, European policymakers should substantially reduce labor taxes. However, several continental European countries, including France and Italy, have experienced persistently high public debt over the past decades, which leaves limited scope for uncompensated tax cuts.

Yet there remains scope for a class of balanced-budget policies that reduce the fiscal wedge on labor by raising consumption taxes and using the revenues to lower payroll taxes, thereby exploiting the relative sizes of the tax bases. We refer to these policies as “Fiscal Rebalancing.” They have attracted considerable attention in European policy debates over the years. A prominent example is the “TVA Sociale,” enacted in France on March 14, 2012, repealed on July 17 of the same year, and reintroduced under a different label in January 2014. Other instances include similar reforms implemented in Denmark in 1987 and in Germany in 2007.¹ In this paper, we study the macroeconomic consequences of such a reform in the French context, taking France as a representative case of a fiscally constrained European economy.

To this end, we develop a heterogeneous-agent model with endogenous labor supply in the spirit of Aiyagari and McGrattan (1998) and Pijoan-Mas (2006), adapted to approximate the French fiscal system, in particular by allowing for progressive taxation. While the model is relatively parsimonious, we strive to discipline it with French data and, following Kydland and Prescott (1996), use it as a laboratory to study the effects of a Fiscal Rebalancing reform. In our analysis, we impose a strict form of budget neutrality: we rule out any short- or long-run adjustment in either public debt, government consumption, or transfers, reflecting the policy constraints currently faced by France and other European countries, such as Italy.

We contrast the effects of the reform in the heterogeneous-agent (HA) model with those in its representative-agent (RA) counterpart. Although the RA model is no longer the standard framework in fiscal policy analysis, it remains a useful benchmark for at least two reasons. First, it formed the basis of influential contributions such as Prescott (2004), Rogerson (2006), and Ohanian et al. (2008). Second, it has been widely used to study reforms of a similar nature in policy contexts (e.g., Coenen, McAdam, and Straub, 2008; Gauthier, 2009). From this perspective, the RA model provides a natural point of departure for our analysis.

We begin by deriving conditions under which a Fiscal Rebalancing reform reduces the endogenous fiscal wedge and thereby promotes equilibrium labor in the RA model. The reform has a positive effect on labor whenever the consumption–output ratio (inclusive of consumption taxes) exceeds the labor share (net of taxes), *provided* that labor supply is characterized by sufficiently low elasticity and a sufficiently strong income effect. In the limiting case where the elasticity is zero and the income effect is infinite, this require-

¹This reform can also be interpreted as a first step toward the Fair Tax proposal in the United States; see, for instance, Bachman, Haughton, Kotlikoff, Sanchez-Penalver, and Tuerck (2006) and Correia (2010). It also resembles a fiscal devaluation, as studied by Farhi, Gopinath, and Itskhoki (2014) and Erceg, Prestipino, and Raffo (2023), although the “devaluation” component of the policy is likely to have only short-term effects.

ment collapses to a simple accounting condition: the tax being increased must rest on a broader base than the tax being reduced.

Next, we conduct a quantitative analysis of a range of Fiscal Rebalancing policies, focusing on a benchmark scenario with a 3 percentage point increase in consumption taxes, as in the French debate of 2012 and in the Danish and German reforms. We find that the long-run effect on *labor* is of similar magnitude in the HA and RA models, with only a modest increase in labor (about 0.3 percent in the benchmark scenario), at the cost of lower labor efficiency. By contrast, the long-run effect on *capital* is substantially larger in the HA economy than in its RA counterpart—by a factor of about four in our benchmark policy experiment.

Two mechanisms drive this result in the HA economy. First, at the individual level, a higher consumption tax raises the price of consumption, so achieving a given degree of consumption smoothing requires higher savings. Second, and more importantly, if the reform reduces payroll taxes, it stimulates labor demand, leading to higher wages. Higher wages increase the share of stochastic income in the household budget, thereby strengthening the precautionary saving motive. This channel further raises capital accumulation, which in turn reinforces the wage increase. In equilibrium, these forces are offset by the decline in the real interest rate, but this general-equilibrium effect is ultimately dominated by the two mechanisms just described. The distributional implications are striking: wealth gains are highly concentrated, leading to greater inequality. In our benchmark policy scenario with a 3 percentage point increase in consumption taxes, aggregate wealth rises by about 1%, with the richest decile capturing more than this entire increase.

We complement the quantitative analysis with a welfare assessment. Given the frequent concern that consumption taxes are regressive, a careful evaluation of the welfare effects of Fiscal Rebalancing is warranted.² When accounting for the transition between the pre- and post-reform steady states, we find that the benchmark Fiscal Rebalancing policy consistently delivers a welfare gain in the RA economy. In the HA economy, by contrast, the results are less clear-cut. Under our benchmark calibration, the reform yields a positive utilitarian welfare effect. Consistent with this finding, a majority of agents experience individual welfare gains, and the average welfare effect across agents is also positive. Nevertheless, households in the top quintile of the wealth distribution unambiguously lose from the reform and would vote against it. Likewise, low-productivity households experience, on average, a welfare loss, driven largely by the transition itself.

Our paper contributes to a large literature on the macroeconomic effects of lowering the fiscal wedge on labor. As noted above, our starting point builds on Prescott (2004), Rogerson (2006), and Ohanian et al. (2008). These studies, however, abstract from the fiscal constraints that are central to our analysis. In particular, the labor tax cuts they consider imply large short-run increases in public debt, which we view as incompatible with the current policy context in continental Europe. Our contribution is to incorporate such constraints explicitly and to provide an analytical characterization of the conditions under which a Fiscal Rebalancing reform raises equilibrium labor in a RA framework.

²Consumption taxes are typically viewed as regressive because poorer households devote a larger share of their income to consumption than richer households. Relative to income, the implied tax burden is therefore higher for poorer households; see, for example, Thomas (2020).

The previous literature has extended this analysis to HA settings, notably Alonso-Ortiz and Rogerson (2010) and Ljungqvist and Sargent (2006), among others. A key advantage of this extension is that it allows the identification of the winners and losers from fiscal reforms. In particular, as emphasized by Alonso-Ortiz and Rogerson (2010), HA and RA models can generate similar macroeconomic outcomes while delivering sharply different welfare implications. We build on this literature but depart from it by considering policies in which both public debt and transfers are fixed at their pre-reform levels. Under this balanced-budget constraint, any cut in payroll taxes must be offset by an increase in consumption taxes. Ignoring this constraint may distort the analysis.

Our paper is most closely related to Correia (2010). In a model with fixed heterogeneity in income and wealth amenable to Gorman aggregation, she studies a reform that closely resembles our Fiscal Rebalancing experiment. Because of the specific form of heterogeneity, the macroeconomic effects in her framework are identical to those of the corresponding RA model—yet another reason why studying the RA version of our model provides a useful benchmark. Our approaches differ, however, in how budget neutrality is enforced. Correia (2010) considers reforms that leave the intertemporal government budget constraint unchanged, which allows for large short-run fluctuations in public debt during the transition. By contrast, we hold both debt and transfers fixed at their pre-reform steady-state levels. Our experiment therefore imposes an additional layer of fiscal discipline, which we view as more consistent with the current policy context in continental Europe. A further difference is that in our model, the Fiscal Rebalancing reform affects the wealth distribution, whereas in her framework, by construction, it does not. In our analysis, the endogeneity of wealth concentration has important implications for both aggregate and welfare outcomes.

The rest of the paper is organized as follows. Section 2 provides a brief history of the French debate over the so-called “TVA Sociale” reform, with particular attention to the fiscal context in which the debate recently resurfaced. Section 3 presents our benchmark heterogeneous-agent model. Section 4 analyzes the effects of the Fiscal Rebalancing policy, including a robustness analysis with a small-open economy extension. Section 5 turns to the welfare implications. Section 6 concludes.

2 Institutional Details: France’s “TVA Sociale” (2007–2024)

This section examines the French “TVA Sociale,” an example of a Fiscal Rebalancing reform that shifts employer social-security contributions (SSC) toward a higher value-added tax (VAT). We begin with a chronology of the political debate and the legislative developments that have shaped this reform. We then document how the “TVA Sociale” has recently resurfaced in French policy discussions, and situate France within the broader OECD tax structure.

2.1 Political Chronology in France

We summarize the main stages of the French debate surrounding the “TVA Sociale” fiscal reform. For ease of reference, Table 1 reports the key legislative milestones and the corresponding policy chronology related to the French Fiscal Rebalancing reform.

2007 (June–September) First Debate. Following the June 2007 legislative elections, the government floated the idea of substituting VAT for employer contributions. Two official reports were released: Arthuis (2007) and Besson (2007). After internal controversy and concerns about inflation and employment effects, the Economy Minister announced on September 11, 2007 that the measure would not proceed “in the present conditions”.³

2011–2012 (January–March): Proposal and Enactment. On January 29, 2012, the French President, Nicolas Sarkozy, announced a package pairing a 1.6 pp increase in the standard VAT with cuts in employer family-benefit contributions, plus a higher levy on capital income. Parliament enacted the package in the First Supplementary Finance Law for 2012 (Law n° 2012-354 of 14 March 2012). The law also earmarked a fraction of net VAT to the family-benefits branch (CNAF) and created a Treasury account to channel VAT fractions to social security.

2012 (July–August): Repeal Before Implementation. The Second Supplementary Finance Law for 2012 (Law n° 2012-958 of 16 August 2012) abrogated the VAT increase and the contribution-relief schedule *before* their planned 1 October 2012 start date. The Constitutional Council (decision 2012-654 DC) did not censure the repeal.

2012 (November–December): Pivot to CICE. A different instrument, the *Crédit d’impôt pour la compétitivité et l’emploi* (CICE), in the form of a corporate tax credit was adopted in Law n° 2012–1510 of 29 December 2012 (effective 2013 at 4% of eligible wages; 6% from 2014). At that time, this was not touted as a VAT-financed swap.

2014 Onward: VAT Rate Reform. From 1 January 2014, France applied 20% (standard), 10% (intermediate), and 5.5% (reduced) VAT rates. While no formula-linked reduction in employer SSC accompanied this rate change, the measure was seen (and touted) as a financing scheme for the new version of the CICE in its press coverage.⁴

2.2 TVA Sociale Strikes Back in 2024

The debate over “TVA Sociale” resurfaced in France in 2024, following the publication of a book by then Finance Minister Bruno Le Maire (Le Maire, 2024). The proposed measure involved shifting social security contributions (SSC), levied on employers and/or employees, onto consumption through an increase in VAT. The envisaged scale amounted to roughly 5 percentage points of SSC shifted to VAT, corresponding to about 60 billion euros.⁵

³See for instance *Le Monde* — Sep 12, 2007: “The government invokes growth to bury the ‘TVA Sociale’ ”.

⁴See for instance *Le Monde* — Dec 30, 2013. This piece discusses the combined VAT/CICE effect ahead of the 2014 rate change; *Reuters* — Nov 6, 2012. “France will ease payroll taxes... funding that with spending cuts and sales tax rises... raise consumer taxes from 2014.” (CICE design & funding mix); *Bloomberg* — Nov 6, 2012. “...raise France’s main sales-tax rates to finance a cut in payroll charges...” (the CICE mechanism).

⁵The “TVA Sociale” resurfaced once again in 2025; see LegiFiscal, May 27, 2025, “François Bayrou : le retour de la TVA sociale.” This piece reports how François Bayrou, then prime minister, relaunched the debate on Fiscal Rebalancing.

Table 1: History of Debates and Measures Related to “TVA Sociale” in France

Date	Event / Measure	Official Reference
2007	Debate launched by the Fillon government on introducing a “TVA Sociale” to fund the social protection system	Policy speech by François Fillon, National Assembly (July 3, 2007)
2012 (January)	President Nicolas Sarkozy announces the implementation of a “TVA Sociale” as of October 1, 2012: 1.6-point VAT increase	Law No. 2012-354 of March 14, 2012
2012 (June)	The Ayrault government repeals the measure before its planned implementation	Law No. 2012-958 of August 16, 2012 (Amending Finance Law for 2012), Article 1
2014 (January)	VAT standard rate increased from 19.6% to 20% to help fund the CICE (Tax Credit for Competitiveness and Employment), seen as a form of “TVA Sociale”	Law No. 2012-1510 of December 29, 2012 (Amending Finance Law for 2012), Article 68

The idea of Fiscal Rebalancing re-emerged against a backdrop of a large fiscal deficit (5.8% of GDP in 2024) and high public debt (113% of GDP in 2024), combined with an already elevated ratio of compulsory levies to GDP, around 43% in 2023 and 2024—the highest in the OECD in 2023 and well above the OECD average of 33.9% (INSEE, 2025).⁶ According to European Commission (2022), labor income taxation accounted for 51.5% of total tax revenue in 2022, while consumption taxation accounted for slightly more than 25%.

In this context, it is worth emphasizing France’s heavy reliance on social contributions. Relative to the OECD average, France collects a larger share of revenue from SSC and a smaller share from recurrent property taxes. For instance, according to European Commission (2022), the implicit tax rate on labor was about 40% in 2022, including an implicit rate of roughly 6% for employee contributions and 23% for employer contributions. This pattern provides a strong motivation for proposals to shift part of the financing base toward consumption.

3 A Benchmark Heterogeneous-Agent Model

In this section, we develop a quantitative model to study the macroeconomic effects of a Fiscal Rebalancing reform.⁷ Time is discrete and indexed by $t \in \mathbb{N}$.

3.1 Households

The economy is populated by a unit mass of ex-ante identical, infinitely lived agents. Each agent is endowed with one unit of time per period, which can be allocated either to market work or to leisure. In each period,

⁶European Commission (2022) report a slightly higher figure, around 45%, though it remains in the same range. For comparison, the average EU-27 ratio was 39.5% in 2023.

⁷For brevity, full model details, including the formal definition of equilibrium, are relegated to the Online Appendix.

agent $i \in [0, 1]$ is subject to an idiosyncratic labor-efficiency shock z_t^i , which follows a discrete Markov process with support \mathcal{Z} and transition matrix Π . These shocks are assumed to be *i.i.d.* across agents. In the absence of contingent claims markets, households cannot insure against idiosyncratic risk and must rely on self-insurance.

Agent $i \in [0, 1]$ has lifetime utility

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{(c_t^i)^{1-\sigma}}{1-\sigma} - \nu \frac{(h_t^i)^{1+\eta}}{1+\eta} \right)$$

where c_t^i and h_t^i denote, respectively, the consumption and labor supply of agent i in period t ; $0 < \beta < 1$ is the subjective discount factor; $\sigma > 0$ is the coefficient of relative risk aversion; $\eta > 0$ is the inverse of the Frisch elasticity of labor supply; $\nu > 0$ is a scale parameter; and \mathbb{E}_0 denotes the expectation operator induced by the stochastic process for individual productivity, conditional on the agent's initial state at the beginning of period $t = 0$.

Agent i faces the sequence of budget constraints

$$(1 + \bar{\tau}_C + \Delta_C)c_t^i + a_t^i - a_{t-1}^i = w_t z_t^i h_t^i - \tau(w_t z_t^i h_t^i) + (1 - \bar{\tau}_A)r_t a_{t-1}^i + \bar{T}, \quad \forall t \in \mathbb{N},$$

where a_t^i denotes the stock of assets held by agent i at the end of period t , yielding a real interest rate r_{t+1} in period $t + 1$; w_t is the real wage per efficiency unit of labor; $\bar{\tau}_C + \Delta_C$ is the consumption tax rate; $\bar{\tau}_A$ is the capital income tax rate; \bar{T} denotes constant transfers rebated by the government; and $\tau(\cdot)$ is the labor income tax schedule, following the functional form proposed by Feldstein (1969) and Bénabou (2002):⁸

$$\tau(x) = x - \frac{1 - \bar{\tau}}{1 - \gamma} x^{1-\gamma},$$

where $0 \leq \gamma < 1$ governs the progressivity of labor taxation and $\bar{\tau}$ determines the intercept of the tax function. In the limiting case of no progressivity ($\gamma = 0$), $\bar{\tau}$ corresponds to the linear tax rate on labor income. This tax structure is designed to approximate the French fiscal system, in which labor income bears most of the progressivity while capital income is largely subject to a flat tax.

Finally, while agents may reduce their asset holdings, borrowing is not allowed, implying $a_t^i \geq 0$.

3.2 Firms

The final good is produced by a large number of perfectly competitive firms with constant returns to scale. The representative firm has technology

$$Y_t = K_{t-1}^\theta (\Omega N_t)^{1-\theta}$$

⁸See also Guner, Kaygusuz, and Ventura (2014), Heathcote, Storesletten, and Violante (2014), Heathcote, Storesletten, and Violante (2017), and Ferriere and Navarro (2024), among others.

where Y_t is the production of final good at t , K_{t-1} is the (aggregate) capital stock available for production in period t , N_t is the input of efficient labor, $0 < \theta < 1$ is the elasticity of production with respect to capital, and $\Omega > 0$ is a productivity parameter.

Because the production process entails capital depreciation at rate $0 < \delta < 1$, firms pay the capital stock the rental rate $r_t + \delta$. We assume that firms pay payroll taxes and social security contributions (SSC) at rate $\bar{\tau}_S - \Delta_{S,t}$, so that a unit of efficient labor is actually paid $(1 + \bar{\tau}_S - \Delta_{S,t})w_t$.

3.3 Government, Fiscal Reform, and Market Clearing

The economy starts from a steady state with $\Delta_C = \Delta_{S,t} = 0$, constant government consumption \bar{G} , constant transfers \bar{T} , and a fixed level of public debt \bar{B} . At date t_0 , the government implements a Fiscal Rebalancing reform: it permanently and immediately raises consumption taxes by an exogenous amount Δ_C and uses the proceeds to reduce payroll taxes and social contributions by an endogenous amount $\Delta_{S,t}$. The reform is designed to be fiscally neutral, with payroll tax cuts adjusted each period to maintain a balanced budget while keeping \bar{B} , \bar{T} , and \bar{G} fixed at their pre-reform steady-state levels. This assumption of strict budget neutrality captures the current policy constraints faced by France, where lowering debt, increasing the overall tax burden, or cutting expenditures remains politically infeasible.

Accordingly, $\Delta_{S,t}$ is adjusted so that

$$(1 - \bar{\tau}_A)r_t\bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C)C_t + (1 + \bar{\tau}_S - \Delta_{S,t})w_tN_t + \bar{\tau}_Ar_tK_{t-1} - \frac{1 - \bar{\tau}}{1 - \gamma} \int_0^1 (w_t z h_t^i)^{1-\gamma} di,$$

where $C_t \equiv \int_0^1 c_t^i di$ denotes aggregate consumption.

The market clearing conditions on the labor and capital markets are⁹

$$N_t = \int_0^1 z_t^i h_t^i di, \quad K_t + \bar{B} = A_t \equiv \int_0^1 a_t^i di.$$

3.4 The Representative-Agent Version of the Model

For comparison, we also consider a version of the model in which (i) idiosyncratic labor-income shocks are shut down by setting $z_t^i = 1$ for all $i \in [0, 1]$, thereby eliminating ex post heterogeneity, and (ii) the borrowing constraint is relaxed. We refer to this environment as the “representative-agent” (RA) economy. In this RA setting, the distinction between effective labor, $H_t \equiv \int h_t^i di$, and efficient labor, N_t , becomes immaterial, since the two coincide.

3.5 Calibration to the French Economy and Model’s Fit

The model is calibrated to the French economy, taken as a representative case of a fiscally constrained European country. One period corresponds to one year. We distinguish between two groups of structural parameters: those set ex ante and those calibrated to match selected moments.

⁹A formal definition of the equilibrium is relegated in the Online Appendix, together with a full-length description of how the model is solved.

3.5.1 Pre-Set Parameters

For the preference parameters, we set $\sigma = 1.5$, as is conventional in the literature. In the benchmark calibration, we take $\eta = 2$, which implies a Frisch elasticity of labor supply of 0.5. In the robustness section, we consider alternative values for σ and η .

Fiscal parameters are chosen to match 2022 data from the European Central Bank Statistical Data Warehouse. Specifically, we set \bar{B} and \bar{G} to replicate the debt-to-output ratio $s_B \equiv B/Y = 111.36\%$ and the government consumption-to-output ratio $s_G \equiv G/Y = 24.62\%$.

Tax rates are calibrated to effective rates reported in European Commission (2022) for 2020,¹⁰ yielding $\bar{\tau}_A = 0.35$, $\bar{\tau}_C = 0.18$, and $\bar{\tau}_S = 0.23$. The progressivity parameter γ is taken from Malmberg (2024). Given these values, transfers \bar{T} are endogenously determined to balance the government budget in the initial steady state, resulting in a transfer-to-output ratio of $T/Y = 0.126$. In all post-reform steady states, \bar{T} is held fixed at this level.

We set θ such that the labor share is 66 percent (i.e., $\theta = 0.34$) and normalize labor productivity to $\Omega = 1$.

3.5.2 Calibrated Parameters

We assume that (logged) individual productivity $\log(z_t^i)$ follows an AR(1) process for all $i \in [0, 1]$

$$\log(z_t^i) = \rho_z \log(z_{t-1}^i) + \sigma_z e_t^i, \quad e_t^i \sim N(0, 1).$$

We approximate this AR(1) process via the Rouwenhorst (1995) method, as advocated by Kopecky and Suen (2010), using $n_z = 7$ points. This yields a transition matrix $\tilde{\Pi}$ and a discrete support for individual productivity levels $\{z_1, \dots, z_{n_z}\}$.

As is well known, a simple AR(1) process cannot reproduce the degree of wealth concentration observed in U.S. data. France also exhibits a high level of wealth concentration, albeit less extreme than in the United States, and the same limitation arises with French data. The consensus in the literature is that matching such high levels of concentration in HA models requires departures from the Gaussian assumption. Following Boar and Midrigan (2022), Castañeda, Diaz-Gimenez, and Rios-Rull (2003), Fève, Matheron, and Sahuc (2018), and Kindermann and Krueger (2022), we therefore introduce an additional state corresponding to “exceptional” circumstances, associated with very high labor productivity. As argued by Kindermann and Krueger (2022), this provides a simple way to capture entrepreneurial or artistic opportunities yielding exceptionally high labor income. This approach is closely related to Rosen (1981), who emphasized arts, entertainment, and sports, among other fields, as domains where a small number of individuals display extraordinary productivity. Following his lead, we refer to this exceptional state as the “superstar” state.¹¹

The “superstar” state can be reached from any “normal” state with probability p_{ns} . Conditional on having reached the “superstar” state, an agent stays in this state with probability p_{ss} . By contrast, with

¹⁰This corresponds to the latest edition of Taxation Trends in the European Union.

¹¹See Gabaix and Landier (2008) for evidence on CEOs. See also Korinek and Ng (2019) for examples of superstars in the tech sector.

Table 3: Calibration Summary

Parameter	Interpretation	Value
Calibrated Parameters		
δ	Depreciation rate	0.0783
$\bar{\tau}$	Scale parameter of labor tax schedule	0.4258
β	Subjective discount factor	0.9656
ν	labor disutility scale parameter	39.2512
ρ_z	Persistence of individual productivity shock	0.9333
σ_z	Standard deviation of individual productivity shock	0.2345
p_{ns}	Probability of reaching superstar state	0.0004
p_{ss}	Probability of staying in superstar state	0.4981
z_{n_z+1}/z_{n_z}	Superstar productivity as a fraction of previous productivity level	17.2973
Pre-Set Parameters		
σ	Coefficient of relative risk aversion	1.5000
η	Inverse of Frisch elasticity	2.0000
θ	Share of capital	0.3400
Ω	Labor productivity	1.0000
γ	Progressivity parameter	0.1380
$\bar{\tau}_C$	Pre-reform consumption tax	0.1796
$\bar{\tau}_S$	Pre-reform payroll tax	0.2309
$\bar{\tau}_A$	Capital income tax	0.3523
s_G	Government expenditures-output ratio	0.2462
s_B	Government debt-output ratio	1.1136

probability $1 - p_{ss}$, the agent goes all the way down to intermediate state $\ell = 4$. Letting $\tilde{\Pi}_{ij}$ denote the (i, j) element of $\tilde{\Pi}$, the final transition matrix is then

$$\Pi = \begin{pmatrix} \tilde{\Pi}_{1,1}(1 - p_{ns}) & \cdots & \tilde{\Pi}_{1,\ell}(1 - p_{ns}) & \cdots & \tilde{\Pi}_{1,n_z}(1 - p_{ns}) & p_{ns} \\ \vdots & & \vdots & & \vdots & \vdots \\ \tilde{\Pi}_{n_z,1}(1 - p_{ns}) & \cdots & \tilde{\Pi}_{n_z,\ell}(1 - p_{ns}) & \cdots & \tilde{\Pi}_{n_z,n_z}(1 - p_{ns}) & p_{ns} \\ 0 & \cdots & 1 - p_{ss} & \cdots & 0 & p_{ss} \end{pmatrix}.$$

This specification of labor-productivity shocks leaves five parameters $(\rho_z, \sigma_z, p_{ns}, p_{ss}, z_{n_z+1})$, which, together with the subjective discount factor β , the capital depreciation rate δ , and the scale parameters ν and $\bar{\tau}$, are chosen to match the following empirical targets as closely as possible: (i) the Gini coefficient (29.40%) and the inter-decile ratio (3.38) of the standard-of-living distribution in 2022, reported by INSEE (2024);¹² (ii) the Gini coefficient of wealth (70.37%) and the shares of total wealth held by the richest 10 percent (53.73%) and 5 percent (40.15%) in 2022, from the ECB *Distributional Wealth Accounts*¹³; (iii) average hours worked, $H \equiv \int h^i di$, measured as the ratio of total hours worked to total discretionary hours, equal

¹²The standard of living is defined as household disposable income divided by the number of consumption units (CU), with CU computed using the modified OECD equivalence scale: 1 CU for the first adult, 0.5 CU for other individuals aged 14 or older, and 0.3 CU for children under 14. Ordinary dwellings exclude residential facilities offering specific services (e.g., nursing homes, student residences, tourist housing, or social housing for the disabled). Since the model features one agent per household, the concept of standard of living maps directly into disposable income; henceforth, we use the two terms interchangeably. In the model, disposable income is defined as $w_t z_t^i h_t^i - \tau(w_t z_t^i h_t^i) + (1 - \bar{\tau}_A)r_t a_{t-1}^i + \bar{T}$.

¹³See ECB (2024a) and ECB (2024b).

to 29.19% over 1965–2022 (OECD Economic Outlook); (iv) the average capital-output ratio over the same period, $K/Y = 2.94$ (AMECO); (v) the average investment-output ratio, $\delta K/Y = 23.06\%$ (AMECO); and (vi) the implicit tax rate on labor, $ITR = 40.01\%$ in 2020 (European Commission, 2022).¹⁴ A summary of the calibration is provided in Table 3.

Several points are worth noting. First, the probability of entering the superstar state is very low, about 0.04%. Conditional on entry, the probability of remaining in the state is approximately 0.5, implying an expected duration of slightly less than two years. By permanent-income logic, this transitory nature explains why individuals in the superstar state accumulate large savings. Second, productivity in the superstar state is roughly 424 times higher than at the lowest productivity level. While large in absolute terms, this value is much smaller than the corresponding U.S. figure of about 1,000 reported by Castañeda et al. (2003), reflecting the higher concentration of wealth in the United States. Finally, the parameters ρ_z and σ_z lie within the range of available estimates for France; for example, Fonseca, Langot, Michaud, and Sopraseduth (2023) report $\rho_z = 0.9588$ and $\sigma_z = 0.2150$.

3.5.3 Calibration of the RA Economy

In the RA economy, the parameters governing the individual productivity process are no longer relevant. All other parameters are set to the values reported in Table 3, with two exceptions: the productivity index in the production function, Ω , and the subjective discount factor, β . These two parameters are adjusted so that the HA and RA economies share the same initial values for the interest rate r , output Y , and capital K .

As discussed earlier, in the RA model total hours worked H coincide with aggregate efficient labor N , whereas the two differ in the HA economy. To account for this discrepancy, we set Ω in the RA model such that $\Omega H_{RA} = N_{HA}$, where H_{RA} denotes total hours worked in the pre-reform steady state of the RA model and N_{HA} denotes aggregate efficient labor in the pre-reform steady state of the HA economy.

Similarly, all else equal, the real interest rate differs between the RA and HA economies. We therefore set β in the RA model so that both frameworks yield the same real interest rate in their respective pre-reform steady states. Imposing these restrictions on β and Ω ensures that the HA and RA models share identical pre-reform steady-state values for the interest rate, output, and capital.¹⁵

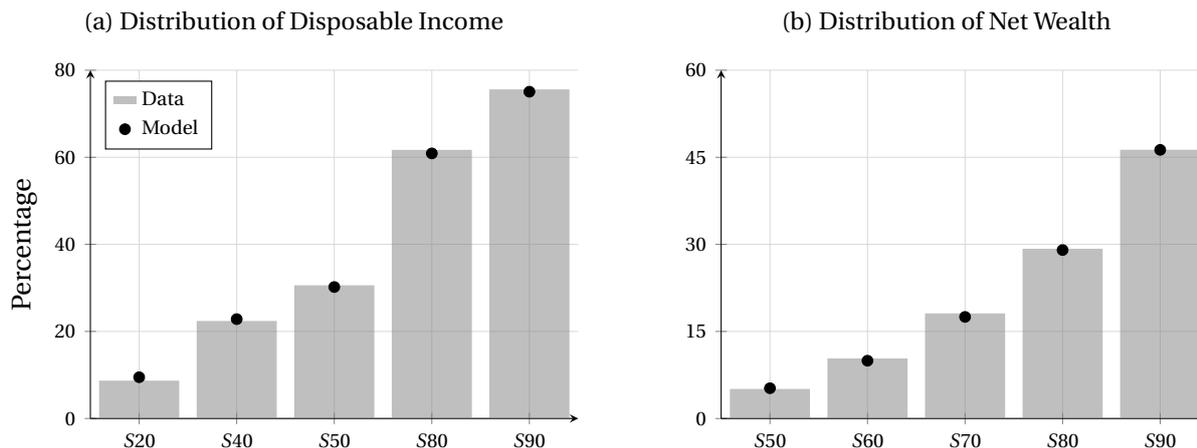
3.5.4 Assessing the Model's Fit

Figure 1a reports the pre-reform shares of total disposable income held by the 20%, 40%, 50%, 80%, and 90% poorest (black dots), together with their empirical counterparts (grey bars). Let S_j denote the share of total disposable income held by the $j\%$ poorest. None of these moments are directly targeted in the calibration. The only moments from the distribution of disposable income (per consumption unit) that we target are

¹⁴The most recent fiscal data from the European Commission (notably implicit tax rates) are for 2020. The most recent Insee data on income distribution are for 2022. Other databases extend to 2024. We therefore take 2022 as the reference year for calibration, except for fiscal data, for which we fall back to 2020.

¹⁵In the robustness analysis, we vary certain parameters, which alters the steady-state values of r and N/H in the HA model. Accordingly, we recalibrate β and Ω in the RA model in each case.

Figure 1: Model Fit



Note: S_j denotes the share of total disposable income per unit of consumption (left chart) or net wealth (right chart) held by the j percent poorest in terms of disposable income or in terms of wealth. The grey bars correspond to the data, drawn from INSEE (2024) for the left chart and from the ECB *Distributional Wealth Accounts* for the right chart, both for the year 2022. The black dot is the model outcome.

the Gini coefficient and the inter-decile ratio. In other words, we discipline the slope of the Lorenz curve but not the Lorenz curve itself.

Overall, the model fits the data well. It slightly overpredicts the shares at the bottom of the distribution and underpredicts the shares at the top, but the model-generated shares remain broadly consistent with their empirical counterparts.

Figure 1b reports the pre-reform shares of net wealth held by the 50%, 60%, 70%, 80%, and 90% poorest (black dots), together with their empirical counterparts (grey bars).¹⁶ Recall that the share S90 is explicitly targeted at the calibration stage.

It is therefore unsurprising that the model reproduces S90 closely. More importantly, it also provides a good fit at the lower end of the distribution. Overall, the model is remarkably consistent with the data.¹⁷

4 Long-Run Effects of the Reform

In this section, we analyze the long-run effects of the reform. We begin by deriving analytical results in the RA model. We then quantify the effects of the reform in both the RA and HA economies and examine its distributional implications in the HA setting. Finally, we conduct robustness exercises, including a small-open economy variation of our baseline model.

4.1 Basic Lessons from the RA Case

The main advantage of the RA setup, relative to the HA case, is its tractability, which allows us to derive a condition for a successful Fiscal Rebalancing reform in the long run. Specifically, we obtain a non-trivial condition on equilibrium labor (and thus output, given that the capital–output ratio is unaffected by this

¹⁶The ECB does not provide the breakdown of net wealth shares within the bottom 50%.

¹⁷Additional results on the model's fit are reported in the Online Appendix.

reform in the RA setup) that incorporates the full set of general-equilibrium effects and the government budget constraint. This condition is derived in the neighborhood of the pre-reform steady state. While the RA model abstracts from adjustments in the real interest rate—since it is invariant to the policy reform, unlike in the HA case—it nevertheless yields useful insights into the conditions for a successful reform. The condition is stated in Proposition 1.

Proposition 1 *Let us define the average tax rate $\hat{\tau}(X) \equiv \tau(X)/X$. In the context of the RA version of the model, letting $s_C \equiv C/Y$ and $s_K \equiv K/Y$, both evaluated in the pre-reform steady state, we have:*

$$\begin{aligned} \frac{\partial \log(H)}{\partial \Delta_C} > 0 &\iff \text{Sign} \left((1 + \bar{\tau}_C) s_C - \frac{1 - \hat{\tau}(wH)}{1 + \bar{\tau}_S} (1 - \theta) \right) \\ &= \text{Sign} \left(\frac{1 - \hat{\tau}(wH)}{1 + \bar{\tau}_S} (1 - \theta) \left(\frac{s_C + s_G}{s_C} \sigma + \eta + 1 \right) - \bar{\tau}_C (1 - \delta s_K) - \bar{\tau}_A r s_K - (1 - \theta) \right). \end{aligned}$$

Proof. See Appendix A ■

Although appealing in that it provides an analytical characterization, Proposition 1 is rather technical and requires clarification. Ultimately, it reduces to conditions on consumption and labor-supply elasticities under which the fiscal reform is successful, given the tax code.

First, consider the left hand-side of the condition. The sign of this expression is positive if

$$(1 + \bar{\tau}_C) s_C - \frac{1 - \hat{\tau}(wH)}{1 + \bar{\tau}_S} (1 - \theta) > 0.$$

In other words, the sign is positive whenever the consumption share inclusive of taxes exceeds the labor share net of taxes. This condition is likely to hold in practice, since in France and other developed countries the adjusted consumption share of GDP is larger than the net-of-tax labor share. Given the positivity of the left-hand side, the right-hand side must also be positive for equilibrium labor to rise in the long run.

The right-hand side of Proposition 1 is positive when labor supply is sufficiently inelastic (i.e., η is high) and/or the income effect on labor supply is strong (σ is high, implying a high degree of consumption smoothing), as in our calibration. Put differently, it holds whenever consumption and labor supply are not overly reactive. In the fully inelastic limit ($\sigma \rightarrow \infty, \eta \rightarrow \infty$), the expression is necessarily positive. In this case, consumption and labor are quasi inertial, and Proposition 1 reduces to a simple accounting condition on the fiscal bases.

It is instructive to consider a simplified setting without capital or consumption taxes, i.e. $\bar{\tau}_C = \bar{\tau}_A = 0$. In this case, the positivity restriction of the expression in right-hand side simplifies to

$$\frac{s_C + s_G}{s_C} \sigma + \eta > \frac{\bar{\tau}_S + \hat{\tau}(wH)}{1 - \hat{\tau}(wH)}.$$

This condition amounts to restricting σ and η to be sufficiently large.

In the special case $\eta = 0$, the Frisch elasticity of labor supply is infinite, implying a maximal Laffer effect. Even so, the condition above places only mild restrictions on σ under standard parameterizations. With

our calibration, we obtain $(\bar{\tau}_S + \hat{\tau}(wH))/(1 - \hat{\tau}(wH)) \approx 1/2$ and $s_C/(s_C + s_G) \approx 3/4$, so the condition holds whenever $\sigma > 0.375$.

Conversely, in a highly elastic economy (low σ , low η), the right-hand side becomes negative. This can be readily verified for the limit case $\sigma = \eta = 0$. In this case, because the left-hand side of the expression stated in Proposition 1 is not likely to be negative, we expect a decline in long-run equilibrium labor after the Fiscal Rebalancing reform.

Taken together, these observations suggest that inelastic economies are likely to experience an increase in aggregate labor following a Fiscal Rebalancing reform, whereas very elastic economies may instead face a contraction in labor. Proposition 1, however, remains silent on the quantitative magnitude of these effects.

4.2 Effects on Aggregate Variables and Capital Accumulation

Figure 2 reports the steady-state effects of Fiscal Rebalancing in the HA economy (dark curves) together with those in the RA economy (grey curves), for values of Δ_C ranging from 0 percentage points (no reform) to 5 percentage points. While a 5 percentage-point increase in consumption taxes is admittedly extreme, we consider this range primarily to examine whether the reform generates any non-monotonic effects on macroeconomic variables. In practice, no such non-monotonicity arises. Since we pay particular attention to the case $\Delta_C = 3$ percentage points, Table 4 summarizes key macroeconomic outcomes for both the HA and RA economies.

For each Δ_C , we compute the associated steady-state equilibrium. Efficient hours N , actual hours H , labor efficiency N/H , capital K , output Y , consumption C , net wage purchasing power $w/(1 + \bar{\tau}_C + \Delta_C)$, and gross wages $(1 + \bar{\tau}_S - \Delta_S)w$ are reported in percentage deviations from their pre-reform steady-state values. The payroll tax cut Δ_S is reported in percentage-point deviations, while the effect on the real interest rate r is expressed in basis-point deviations. Black dots mark the benchmark reform with $\Delta_C = 3$ percentage points.

Let us consider first the RA case. Given the selected calibration, the right-hand side of the condition stated in Proposition 1 is positive, so that the reform will result in higher labor if and only if

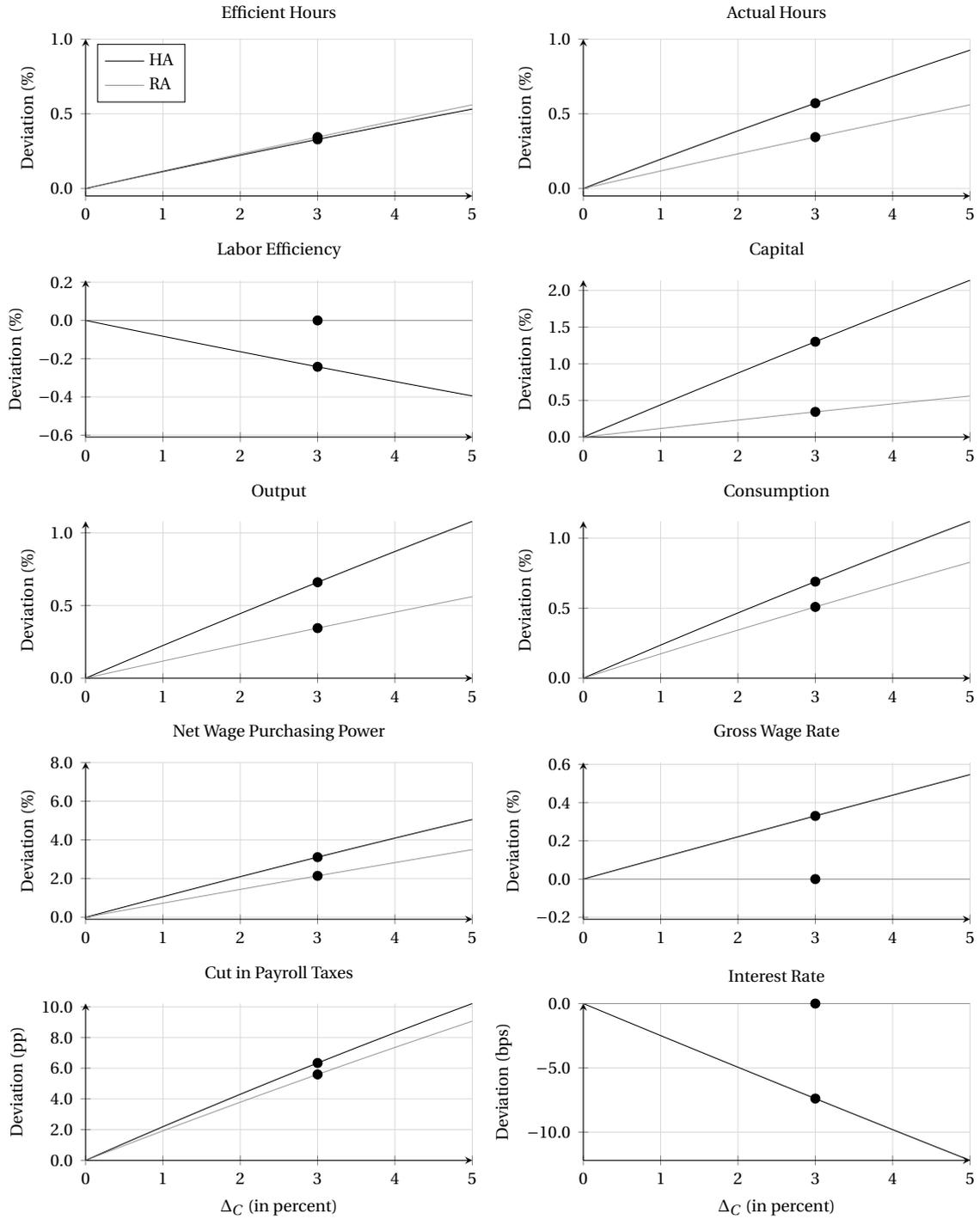
$$(1 + \bar{\tau}_C)s_C - \frac{1 - \hat{\tau}(wH)}{1 + \bar{\tau}_S}(1 - \theta) > 0.$$

This condition holds as well, so that we expect a positive impact of the reform on labor.

In this environment, the real interest rate r is fully determined by $\bar{\tau}_A$ and β , as shown in Appendix A. As a result, the reform does not affect the steady-state capital-labor ratio, so that N , K , and Y exhibit identical relative deviations. In the benchmark policy with $\Delta_C = 3$ percentage points, the relative impact on capital is about 0.34%. Because government expenditures \bar{G} are held constant, the effect on consumption is slightly larger than that on output, amounting to about 0.51%. The payroll tax cut is approximately 5.6 percentage points, leading to a relative increase in net wage purchasing power of about 2.1%.

Consider now the HA case. The effects on Δ_S and N are of similar magnitude to those in the RA model. In the benchmark policy with $\Delta_C = 3$ percentage points, the relative impact on labor is about 0.33% and the

Figure 2: Long-Run Effects of Fiscal Reform



Note: For each value of Δ_C , the associated steady-state equilibrium is computed. Efficient hours N , actual hours H , labor efficiency N/H , capital K , output Y , consumption C , net wage purchasing power $w/(1 + \bar{\tau}_C + \Delta_C)$, and gross wages $(1 + \bar{\tau}_S - \Delta_S)w$ are reported in percentage deviation from their pre-reform steady-state value. The cut in payroll taxes Δ_S is reported as percentage points deviations, while the impact on the real interest rate r is stated as basis points deviation. The black dots indicate the benchmark reform with $\Delta_C = 3$ percentage points.

Table 4: Summary of Results

	HA	RA
Cut in payroll taxes	6.30	5.60
Capital	1.30	0.34
Efficient hours	0.33	0.34
Output	0.66	0.34
Consumption	0.69	0.51
Welfare gain	0.22	0.25
Welfare gain w/o transition	0.37	0.30

Note: For $\Delta_C = 3$ percentage points, we compute the new steady-state equilibrium. Efficient hours N , capital K , output Y , and consumption C are reported in percentage deviation from their pre-reform steady-state value. The cut in payroll taxes is reported as percentage points deviations. The welfare gain, with or without transition, is expressed in percent of pre-reform consumption. Details pertaining to welfare are in Section 5.

payroll tax adjustment is approximately 6.3 percentage points. By contrast, the impact on capital is much larger in the HA economy than in its RA counterpart: for $\Delta_C = 3$ percentage points, steady-state capital rises by about 1.3%—nearly four times the increase observed in the RA model. This translates into an output effect of about 0.66%, compared to 0.34% in the RA case.

To understand why the increase in capital differs between the RA and HA setups, it is useful to note that the difference must originate in the household sector. In the HA model, three terms in the household budget constraint are directly affected by the Fiscal Rebalancing reform: τ_C , w , and r . Accordingly, the steady-state effect on capital in the HA economy can be decomposed as follows:

$$dK = \left(\frac{\partial K}{\partial \tau_C} + \frac{\partial K}{\partial r} \frac{\partial r}{\partial \tau_C} + \frac{\partial K}{\partial w} \frac{\partial w}{\partial \tau_C} \right) d\tau_C.$$

This decomposition corresponds to the impact of the reform on different components of the household budget constraint. It represents a general equilibrium decomposition, as we interpret changes in r and w as being driven by variations in τ_C . Letting

$$dr \equiv \frac{\partial r}{\partial \tau_C} d\tau_C, \quad dw \equiv \frac{\partial w}{\partial \tau_C} d\tau_C,$$

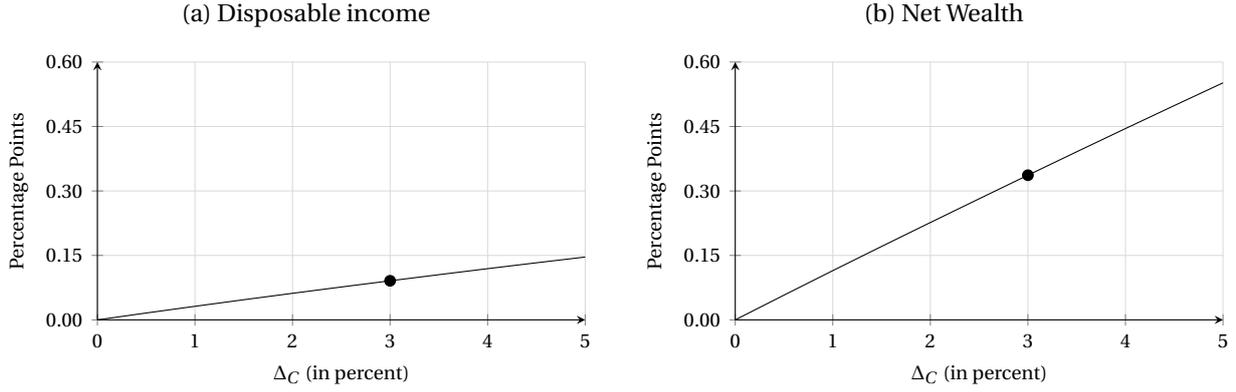
we can reinterpret this decomposition in a partial equilibrium perspective, where we treat each of r , τ_C , and w parametrically:

$$dK = \frac{\partial K}{\partial \tau_C} d\tau_C + \frac{\partial K}{\partial r} dr + \frac{\partial K}{\partial w} dw$$

where dK , $d\tau_C$, dr , and dw are the differences between the post- and pre-reform capital stocks, consumption tax, interest rates, and wage rates, respectively. With this partial-equilibrium interpretation, we can vary τ_C , r and w in isolation, allowing us to quantify the strength of each channel.

An increase in τ_C induces agents to accumulate more capital. Although their desire to smooth consumption is unchanged, consumption becomes more expensive, so a higher level of savings is required. Next, assuming for now that the marginal product of labor is initially unaffected by the reform, the wage rate rises mechanically as Δ_S is reduced. This raises the share of income subject to idiosyncratic risk in the

Figure 3: Impact of the Reform on the Gini Coefficients of Disposable and Wealth Distributions



Note: This figure illustrates the change in Gini coefficients for disposable income (left panel) and wealth (right panel) resulting from the Fiscal Rebalancing reform described in the main text. For each value of Δ_C , the corresponding steady-state equilibrium is computed. Gini coefficients are then calculated based on the resulting equilibrium distributions of disposable income and wealth. The changes are expressed in percentage points relative to the pre-reform case. Black dots indicate the benchmark reform scenario, where Δ_C equals 3 percentage points.

household budget constraint and strengthens the precautionary saving motive. Together, these channels increase capital accumulation. In equilibrium, higher capital raises the marginal product of labor, reinforcing these effects. At the same time, a larger capital stock lowers the real interest rate, which in turn reduces incentives to save.

To summarize, in partial equilibrium, an increase in τ_C or w induces agents to accumulate assets at a faster pace while a decrease in r goes in the opposite direction. Which of these forces dominates in the context of our calibration is a quantitative question.

We use the above formulas to disentangle the channels just described. In practice, we evaluate these formulas for a small $d\tau_C$. For this small increase in consumption taxes, we obtain $dK/d\tau_C \approx 0.70$. The impact on $dK/d\tau_C$ decomposes according to

$$\frac{\partial K}{\partial \tau_C} \approx 0.30, \quad \frac{\partial K}{\partial w} \frac{dw}{d\tau_C} \approx 4.12, \quad \frac{\partial K}{\partial r} \frac{dr}{d\tau_C} \approx -3.72.$$

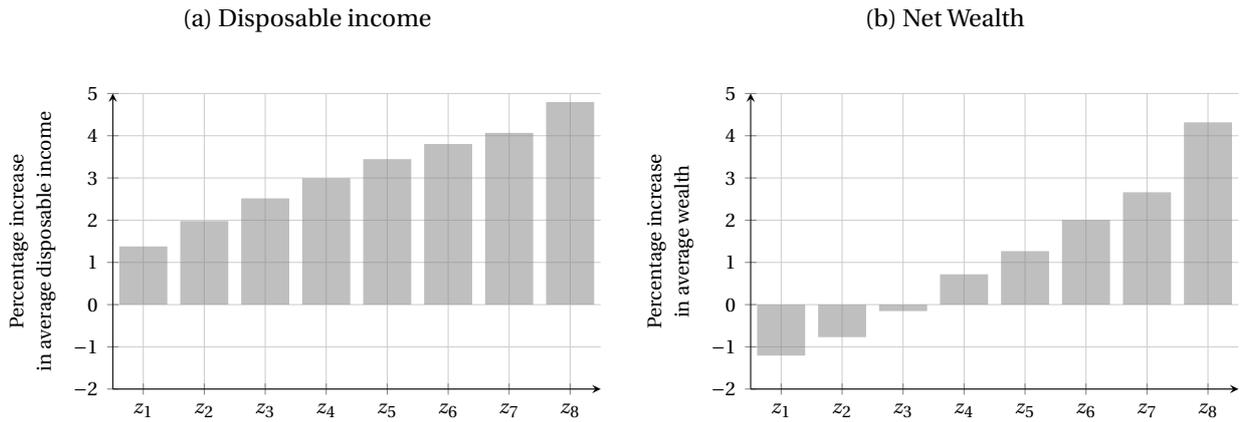
Thus the labor income uncertainty effect together with the increase in the relative price of consumption dominate the negative impact of the decline in r on capital accumulation.

In passing, we note that the size of the government, defined as the ratio $(\bar{G} + \bar{T} + (1 - \tau_A)r\bar{B})/Y$ decreases with Δ_C , as a result of the increase in Y and the decrease in r . In the benchmark scenario, we find that the total size of the government shrinks by approximately 0.8 percent.

4.3 Distributional Effects of the Reform

We now examine the distributional effects of the Fiscal Rebalancing reform. In particular, we ask whether the substantial increase in capital is broadly shared across the population or concentrated among a specific segment of the wealth distribution.

Figure 4: Distribution of Changes in Income and Wealth Across Individual Productivity Levels



Note: For each individual productivity level z_i , $i \in \{1, \dots, 8\}$, we compute the percentage variation in the average disposable income (left chart) or in the average wealth (right chart) after a Fiscal Rebalancing reform with $\Delta_C = 3$ percentage points.

Figure 3 reports the change in the Gini coefficients of disposable income (Figure 3a) and net wealth (Figure 3b) for different values of the consumption tax increase Δ_C . Each change is expressed in percentage points. For example, starting from a pre-reform Gini coefficient of wealth of 70.0%, a reform with $\Delta_C = 3$ percentage points raises the Gini to about 70.34%.

The Gini coefficient of disposable income is barely affected by changes in Δ_C . In the benchmark reform, it rises by only 0.1 percentage points. This modest increase reflects the offsetting forces of higher real wages, the decline in r , and the progressivity of labor income taxation.

The Gini coefficient of wealth increases with Δ_C , indicating that larger Fiscal Rebalancing reforms are associated with greater wealth inequality. For instance, with $\Delta_C = 3$ percentage points, the net wealth Gini rises by about 0.3 percentage points. At first glance, this increase may appear modest. However, it amounts to roughly two thirds of the historical standard error of its empirical counterpart from the Distributional Wealth Accounts for France over 2009Q4–2023Q3 (0.455). Hence, relative to historical variability, the increase is not negligible. Figure B.1 in Appendix B provides a graphical illustration.

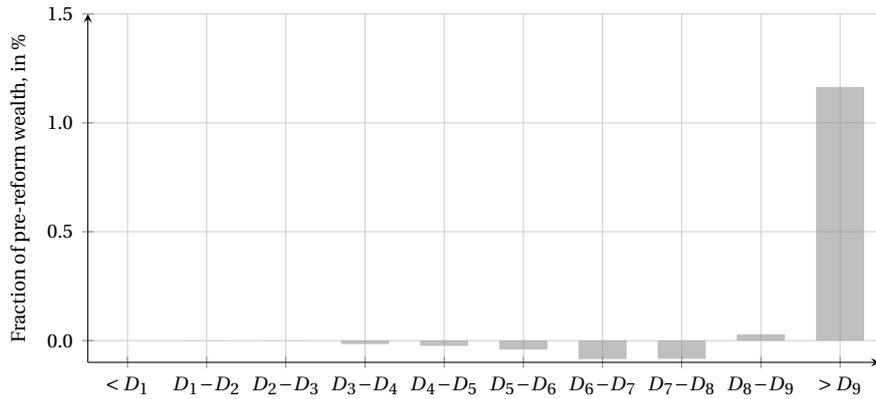
To investigate the sources of the variation in the Gini coefficients, we begin by examining the distribution of net wealth and disposable income across individual productivity levels. Although the z 's do not directly map into observable characteristics, they are by construction invariant to the reform (unlike labor earnings or wealth), which facilitates the analysis. Figure 4 displays the distribution of relative changes in average disposable income (Figure 4a) and in average wealth (Figure 4b) across productivity levels, expressed in percent, following a Fiscal Rebalancing reform with $\Delta_C = 3$ percentage points.

Figure 4a shows that the relative change in average disposable income is uneven across productivity levels, with higher z experiencing larger gains. This pattern reflects two forces: changes in after-tax labor income and changes in after-tax capital income.¹⁸

First, the labor-income component displays the opposite pattern: lower z benefit from larger relative increases in labor income. This stems from the progressivity of the tax schedule and from the fact that

¹⁸Charts illustrating these components are provided in the Online Appendix.

Figure 5: Change in Net Wealth per Decile



Note: The deciles are computed on the pre-reform net wealth distribution and held fixed after the reform. This delimits 10 bins: lower than the first decile, between two consecutive deciles from D1 to D8, and higher than the last decile. For each bin, we compute the increase in wealth expressed in units of the pre-reform aggregate wealth.

high- z agents are typically wealthier, so that the negative wealth effect on labor supply produces a declining profile of labor income gains across z .

Second, the capital-income component shows falling financial income for low z and rising financial income for high z . For high-productivity agents, the increase in wealth more than offsets the decline in the interest rate, generating higher capital income.

Figure 4b illustrates these mechanisms. For the lowest three productivity levels, average wealth falls. These agents already had decision rules on assets below the 45-degree line in the pre-reform steady state, and after the reform their policy functions shift further down, leading to faster decumulation. The logic is straightforward: these agents already sought to borrow to smooth consumption, and with higher post-reform labor income they can afford to reduce wealth even further.

By contrast, wealth rises for higher z , with gains increasing in z . These agents were net savers prior to the reform, and the reform raises their perceived individual risk, strengthening the precautionary saving motive. Hence, high- z agents drive the overall increase in capital accumulation. Since these agents are also disproportionately wealth-rich, the rise in aggregate capital is highly concentrated.¹⁹

Figure 5 confirms this expected pattern in our benchmark policy scenario with $\Delta_C = 3$ percentage points. The chart is constructed as follows. We first identify the deciles of the pre-reform wealth distribution. For each decile, we then compute the increase in total wealth as a percentage of pre-reform aggregate wealth. By construction, the sum of these changes equals the relative increase in aggregate wealth after the reform.

With deciles fixed, if the reform raises aggregate wealth by about 0.95%, the entire distribution should shift to the right, yielding larger bins on the right-hand side of Figure 5.²⁰ This rightward shift, however, need not be uniform. In the benchmark scenario, the richest 10% capture more than the entire increase in aggregate wealth, while most other bins experience a decline (with the exception of the ninth, which shows a mild gain). This illustrates the strong wealth concentration in the French data.

¹⁹The Online Appendix further discusses post-reform asset policy functions.

²⁰Note that the relative increase in wealth is not equal to the relative increase in capital because public debt does not vary.

4.4 Robustness Analysis

Proposition 1 highlights the central role of the inverse of the intertemporal elasticity of substitution, σ , and the inverse of the Frisch elasticity, η , in determining whether a Fiscal Rebalancing reform has a positive impact on labor in the RA model. Presumably, these parameters also matter in the HA model. Likewise, the degree of labor-income progressivity, γ , is relevant, since a less progressive tax system amplifies the effect of increased labor-income risk on asset accumulation.

We begin our robustness analysis by examining how changes in these parameters affect our earlier conclusions. Specifically, we consider two alternative calibrations with less elastic agents and a third one with much lower progressivity: (i) $\eta = 4$; (ii) $\sigma = 3$; and (iii) $\gamma = 0$. All other parameters are kept unchanged, with one exception. Under each alternative calibration, the ratio of efficient labor N to effective hours H changes in the HA model, and we recalibrate Ω in the RA model so that it starts with the same levels of capital and efficient labor as its HA counterpart.

Figure 6 reports the results. The top row shows the impact of higher η on labor and capital (solid curves), both expressed as percentage deviations from the pre-reform steady state. For comparison, the baseline calibration is also displayed (dashed curves). As before, black curves refer to the HA model and grey curves to the RA model. The middle and bottom rows present analogous exercises for higher σ and lower γ , respectively.

Overall, our results are robust to changes in η , σ , or γ . In all three cases, the Fiscal Rebalancing reform has a similar impact on labor in the HA and RA economies, while its effect on capital is much larger in the HA model. As expected, a higher η dampens the response of labor and capital relative to the benchmark calibration.

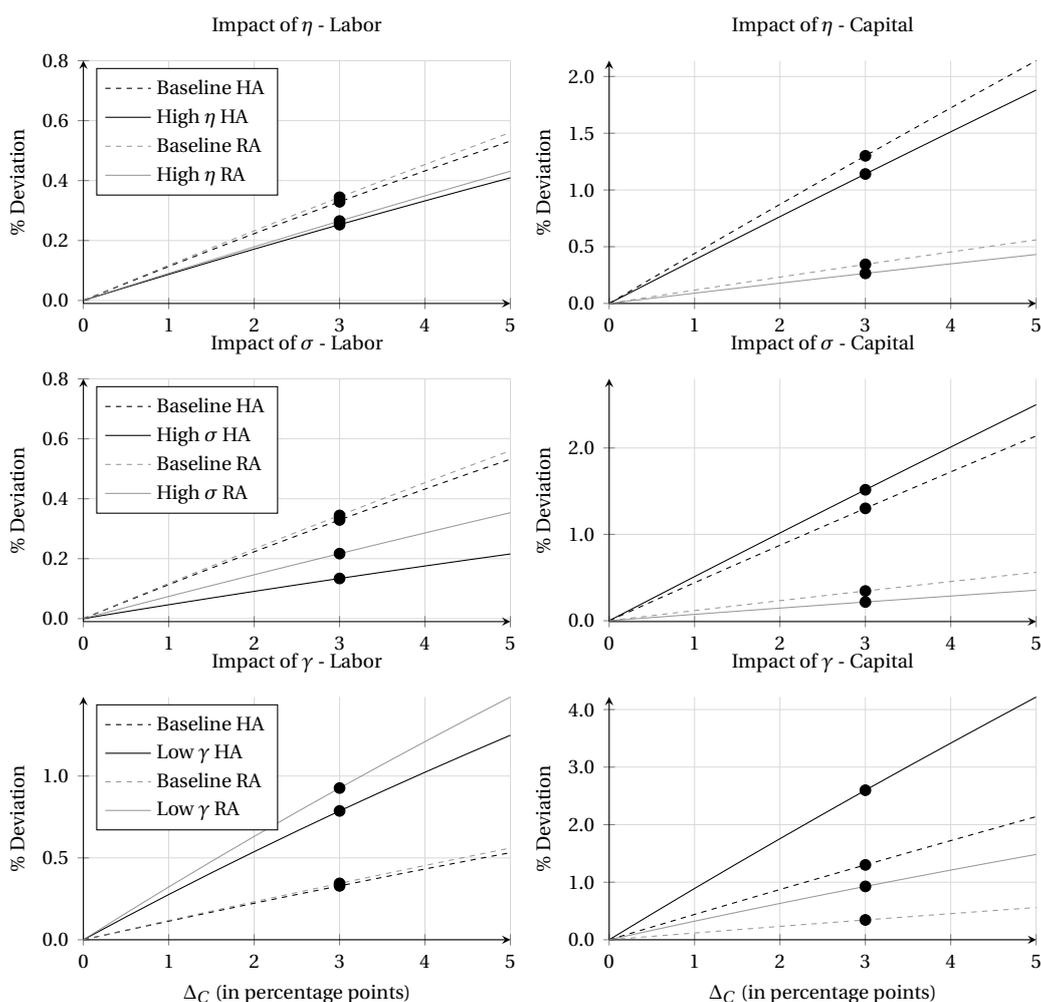
In the case of higher σ , the difference in capital between the RA and HA setups widens further. On the one hand, higher σ reduces the labor response to an increase in consumption taxes in the RA model.²¹ On the other hand, higher risk aversion also amplifies the wage effect in the HA model, since agents become more sensitive to the increase in the stochastic component of income. This leads to stronger capital accumulation in the HA economy.

A similar logic applies to a lower γ . With less progressivity, the impact of a larger stochastic share of income on asset accumulation is magnified, further reinforcing the desire to save and widening the gap in capital responses between the RA and HA models.

Another natural robustness concern is the calibration of the idiosyncratic productivity shock. While our baseline specification follows standard practice, it could bias the distribution of the additional wealth generated by the reform and thus overstate capital accumulation. To address this concern, we adopt the specification estimated for France (among other countries) by Fonseca et al. (2023). This process takes the form of the same AR(1) as our pre-superstar specification, but with $\rho_z = 0.9588$ and $\sigma_z = 0.2150$. We discretize it into an 8-state Markov chain using the method of Rouwenhorst (1995), as recommended by

²¹This follows directly from Proposition 1.

Figure 6: Robustness: η , σ , γ



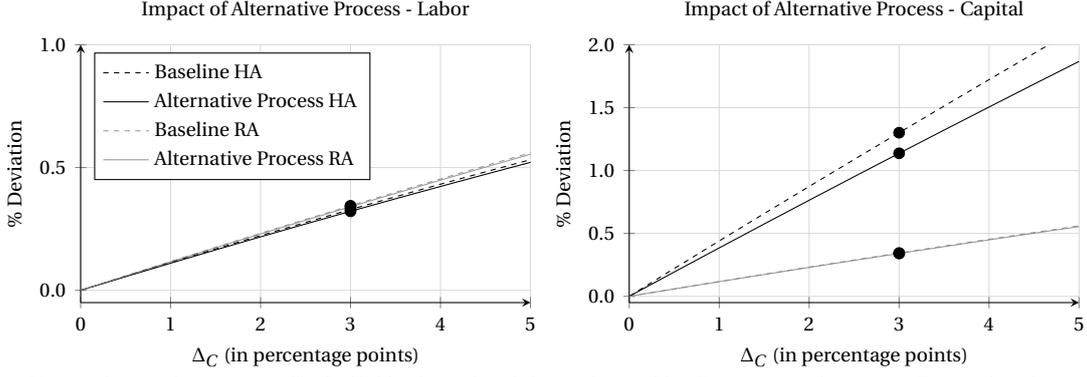
Note: High η corresponds to $\eta = 4$, a value twice as high as in the benchmark calibration. High σ corresponds to $\sigma = 3$, here too a value twice as high as in the benchmark calibration. Low γ corresponds to $\gamma = 0$. For each value of Δ_C , the associated steady-state equilibrium is computed. Efficient hours N and capital K are reported in percentage deviation from their pre-reform steady-state value. The black dots indicate the benchmark reform with $\Delta_C = 3$ percentage points. To ensure that the HA and RA models are on an equal footing, we recalibrate the parameter Ω in the RA model to account for the change in the ratio N/H in the HA model.

Kopecky and Suen (2010). As before, we recalibrate Ω in the RA model so that it matches the pre-reform levels of efficient labor and capital in the HA economy.

Figure 7 reports the outcome of this robustness exercise. The left panel shows the impact of the alternative process on labor and the right panel on capital (solid curves), both expressed as percentage deviations from the pre-reform steady state. For comparison, the baseline results are also displayed (dashed curves). As before, black curves correspond to the HA model and grey curves to the RA model.

Overall, the conclusions are qualitatively unchanged. The reform's effect on labor remains very similar in the HA and RA economies, though its magnitude is somewhat larger under the alternative process. Turning to capital, the reform continues to generate a stronger response in the HA economy than in the RA one, but

Figure 7: Robustness: Alternative Process for Individual Productivity



Note: Alternative process for individual productivity estimated by Fonseca et al. (2023). For each value of Δ_C , the associated steady-state equilibrium is computed. Efficient hours N and capital K are reported in percentage deviation from their pre-reform steady-state value. The black dots indicate the benchmark reform with $\Delta_C = 3$ percentage points. To ensure that the HA and RA models are on an equal footing, we recalibrate the parameter Ω in the RA model to account for the change in the ratio N/H in the HA model.

the over-accumulation effect is less pronounced. Indeed, the gap between the solid black and grey curves is smaller than the corresponding gap between the dashed curves.²²

A final robustness concern pertains to our treatment of France as a closed economy. As an alternative, we now consider a version of the model in which France is a small open economy. In this formulation, the real interest rate \bar{r} is taken as exogenously given. Following Correia, Neves, and Rebelo (1995), we assume a single good and impose the law of one price.²³

Against this backdrop, the aggregate resource constraint rewrites

$$C_t + K_t + \bar{G} + NX_t = (1 - \delta)K_{t-1} + Y_t$$

where NX_t stands for net exports. As usual, net exports and the net foreign asset position NFA_t are linked through the dynamic equation

$$NFA_t = (1 + \bar{r})NFA_{t-1} + NX_t.$$

Finally, the presence of NFA_t modifies the equilibrium condition on the asset market

$$A_t = K_t + \bar{B} + NFA_t.$$

In this economy, the capital–output ratio is invariant to the reform, since \bar{r} is assumed to remain unaffected. It follows that capital, output, and efficient hours exhibit identical relative responses to the reform.

We ensure that the pre-reform steady state of the small-open-economy model coincides exactly with that of the closed-economy benchmark. This is achieved by imposing an exogenous value of \bar{r} equal to the

²²One explanation for this smaller over-accumulation effect is that the alternative process does not capture the high degree of wealth concentration observed in the French data. Figure I.4 in the Online Appendix illustrates this point by comparing Lorenz curves for net wealth in the data and in the model under the alternative calibration: the model assigns an excessively large share of wealth to the bottom 90% relative to the data.

²³A full-length exposition of the small-open-economy version of the model together with details on how the model is solved are provided in the Online Appendix.

real interest rate obtained in the closed economy. Consequently, the small-open economy begins with zero net exports and zero net foreign assets. After the reform, however, these restrictions are relaxed, and both NX_t and NFA_t are allowed to adjust.

The results are reported in Figure 8. As before, we consider values of Δ_C ranging from 0 percentage points (no reform) to 5 percentage points. For each case, we compute the steady-state equilibrium of the small-open economy. Efficient hours, actual hours, labor efficiency, capital, output, consumption, net wage purchasing power $w/(1 + \bar{\tau}_C + \Delta_C)$, and gross wages $(1 + \bar{\tau}_S - \Delta_S)w$ are expressed as percentage deviations from their pre-reform steady-state values. The payroll tax cut Δ_S , the net-exports-to-output ratio, and the net-foreign-asset-to-wealth ratio are reported in percentage-point deviations, while the effect on the real interest rate r is expressed in basis points. Black dots indicate the benchmark reform with $\Delta_C = 3$ percentage points.

Several results stand out. First, efficient hours, capital, and output barely respond to the reform—and, if anything, react slightly negatively. This contrasts sharply with the closed-economy version, where capital and output responded more strongly. By contrast, consumption reacts much more in the small-open economy. This requires a fall in net exports to sustain the higher domestic demand, consistent with the aggregate resource constraint. In steady state, this in turn implies a substantial increase in net foreign assets to finance the trade deficit.

The payroll tax cut is almost identical to that in the closed economy, and the increase in net wage purchasing power is also comparable. Gross wages, however, remain invariant, since the capital–output ratio is unchanged.

In this extreme version of the model, because the real interest rate is exogenously given, several dynamic adjustments are shut down, notably the capital accumulation channel. Yet agents still feel wealthier after the reform and therefore accumulate more assets, now in the form of net foreign assets (NFA_t). In the spirit of Schmitt-Grohe and Uribe (2003), if the real interest rate were allowed to respond to foreign indebtedness—through an ad hoc feedback rule, for example—we would partially recover some of the results from the closed-economy version.²⁴

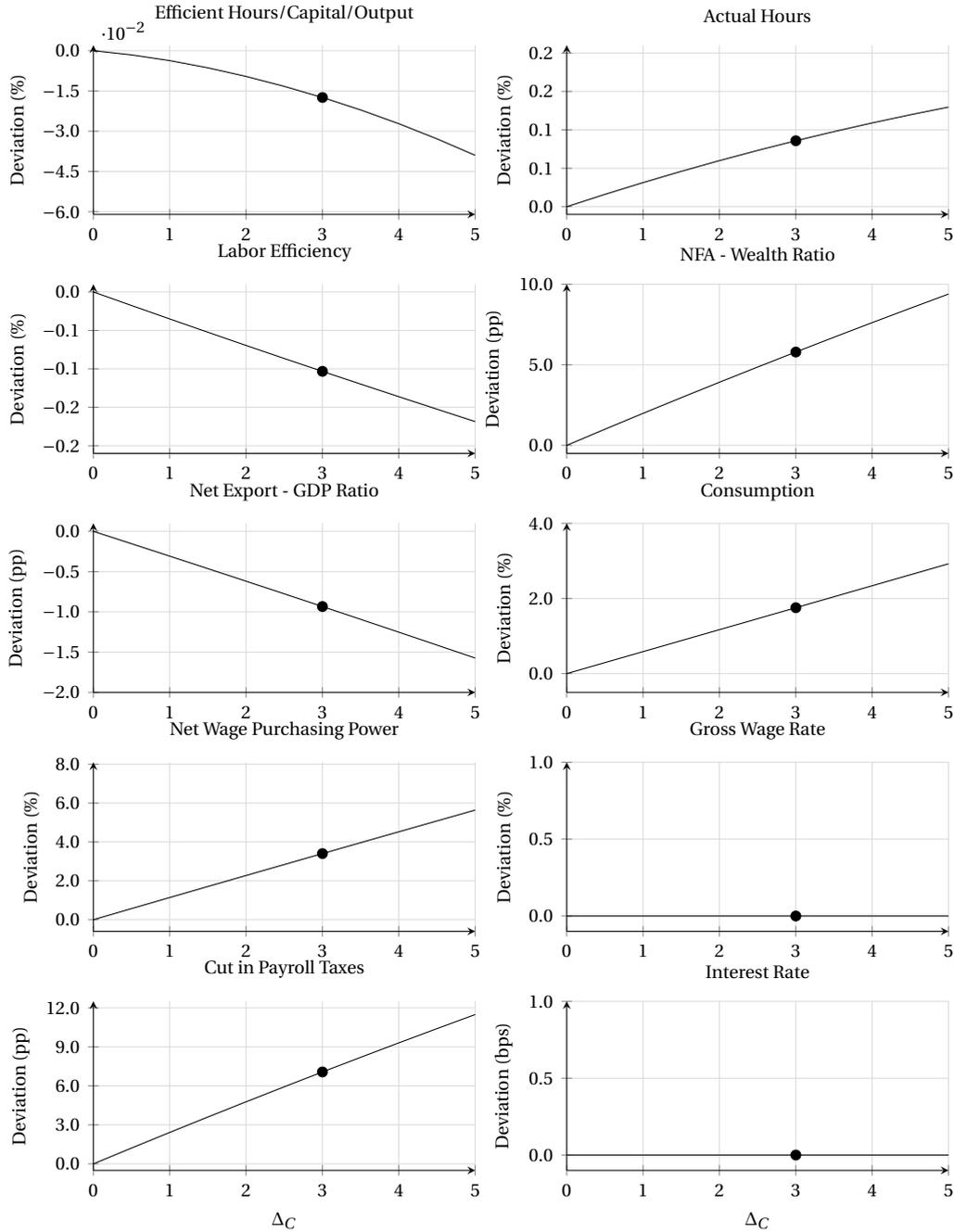
5 Welfare Analysis

So far, we have shown that a Fiscal Rebalancing reform produces modest effects on capital in the RA model but substantially larger ones in the HA setup—about four times greater, as summarized in Table 4. To assess whether this increase in capital, together with the rise in wealth concentration, is ultimately beneficial or detrimental, we turn to a welfare analysis. In particular, we aim to identify which agents benefit from the reform, conditional on their initial states.

As is well known, steady-state welfare levels are not directly comparable because the reform induces a potentially costly transition between the pre- and post-reform steady states. Anticipating our results, we

²⁴To be clear, in our HA setup, the Schmitt-Grohe and Uribe (2003) device is not necessary to compute the equilibrium.

Figure 8: Long-Run Effects of Fiscal Reform in the Small Open Economy Version of the Model



Note: For each value of Δ_C , the associated steady-state equilibrium is computed. Efficient hours N , actual hours H , labor efficiency N/H , capital K , output Y , consumption C , net wage purchasing power $w/(1 + \bar{\tau}_C + \Delta_C)$, and gross wages $(1 + \bar{\tau}_S - \Delta_S)w$ are reported in percentage deviation from their pre-reform steady-state value. The cut in payroll taxes Δ_S , the net-export to output ratio, and the net foreign asset position to wealth ratio are reported as percentage points deviations, while the impact on the real interest rate r is stated as basis points deviation. The black dots indicate the benchmark reform with $\Delta_C = 3$ percentage points.

find that this transition proves painful for agents, so neglecting it would severely bias the welfare assessment. We therefore begin by computing the full transition path between the two steady states.

5.1 Transitional Dynamics

As before, prior to period $t = t_0$ the economy is in the pre-reform steady state. The Fiscal Rebalancing policy is implemented in t_0 , triggering a transition toward the new steady state.²⁵

For all $(a, z) \in \mathbf{A} \times \mathbf{Z}$, we compute the sequence of value functions $\{V_t^R(a, z)\}_{t=t_0}^\infty$ along the transition. By construction, $V_{t_0}^R(a, z)$ is the value function immediately after the reform, which we compare to its pre-reform steady-state counterpart $V_*^N(a, z)$. Let $\chi(a, z)$ denote the indicator function equal to one if $V_{t_0}^R(a, z) \geq V_*^N(a, z)$ and zero otherwise. An agent initially in state $s = (a, z)$ benefits from the reform whenever $\chi(a, z) = 1$. Accordingly, given the pre-reform distribution λ_{t_0-1} , the expression $\int_{\mathbf{A} \times \mathbf{Z}} \chi(s) \lambda_{t_0-1}(ds)$ measures the total mass of agents who benefit from the reform at $t = t_0$.

5.2 Distribution of Welfare Gains

We begin our investigation by analyzing the welfare implications of the Fiscal Rebalancing reform in the RA economy. To this end, as is now classic in the literature, we compute the compensation parameter in the RA economy ω_{RA} such that

$$\frac{1}{1-\beta} \left(u((1+\omega_{RA})C_*^N) - v(H_*^N) \right) = \sum_{t=t_0}^{\infty} \beta^{t-t_0} \left(u(C_t^R) - v(H_t^R) \right), \quad (1)$$

where C_*^N and H_*^N denote consumption and labor, respectively, in the pre-reform steady state and $\{C_t^R\}_{t=t_0}^\infty$ and $\{H_t^R\}_{t=t_0}^\infty$ denote the consumption and labor sequences along the transition triggered by the reform. Thus ω_{RA} is the consumption compensation that makes the representative agent equally happy in the pre-reform steady state and along the transition triggered by the reform.

Next, we turn to the HA economy. This time, we define the Utilitarian compensation parameter ω_{HA} as the solution to the equation

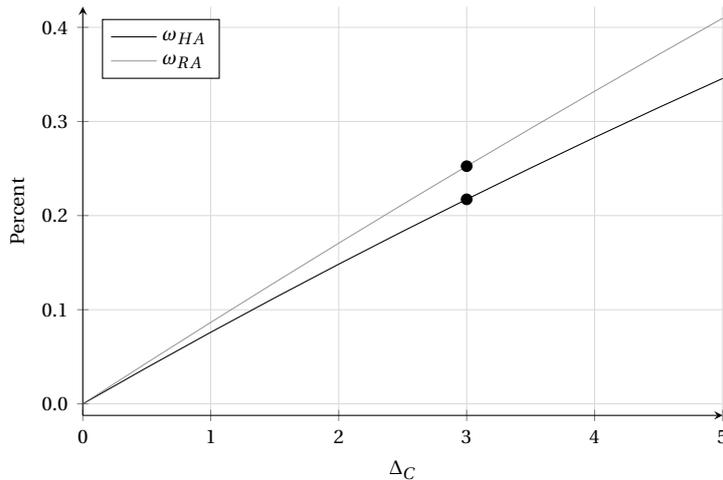
$$\int_{\mathbf{A} \times \mathbf{Z}} \mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} \left(u((1+\omega_{HA})c_t^N) - v(h_t^N) \right) \middle| a, z \right] \lambda_{t_0-1}(ds) = \int_{\mathbf{A} \times \mathbf{Z}} V_{t_0}^R(s) \lambda_{t_0-1}(ds), \quad (2)$$

where $\{c_t^N\}_{t=t_0}^\infty$ and $\{h_t^N\}_{t=t_0}^\infty$ denote feasible paths for individual consumption and labor supply, respectively, starting from the initial state $s = (a, z)$ in the pre-reform steady state. Thus ω_{HA} is the compensation parameter that equalizes the Utilitarian welfare in the pre-reform steady state with the Utilitarian welfare immediately after the reform.

Figure 9 shows ω_{HA} (black curve) and ω_{RA} (grey curve) for various values of Δ_C , ranging from 0 percentage points (no reform) to 5 percentage points. For all the reforms considered, the figure shows that ω_{HA} and

²⁵The transition is computed using Auclert, Bardóczy, Rognlie, and Straub (2021). Appendix C reports transition paths for a number of aggregate variables in both the HA and RA economies. Further details are provided in the Online Appendix.

Figure 9: Welfare Cost/Gain of Fiscal Rebalancing for Alternative Values of Δ_C



Note: The black line corresponds to the Utilitarian welfare gain/cost ω_{HA} in the HA economy, given in Equation (2). The grey line corresponds to the welfare gain/cost in the RA economy, given in Equation (1). For each value of Δ_C , we compute the transition between the initial steady state and its post-reform counterpart, from which we compute ω_{HA} and ω_{RA} . The black dot indicates the benchmark reform with $\Delta_C = 3$ percentage points.

ω_{RA} are positive. Put differently, in both economies, the reform is welfare-improving from the standpoint of a benevolent social planner.

As before, focusing on the benchmark reform with $\Delta_C = 3$ percentage points (black dot), we find ω_{RA} is about 0.25%. This means that the representative agent would demand an increase in pre-reform steady-state consumption by 0.25 percent in all periods to be as well off in this situation as under the fiscal reform. We note in passing that the transition per se is mildly painful since the compensation parameter obtained by comparing steady-state welfare levels is about 0.30%.²⁶

In the HA economy, ω_{HA} is about 0.22%, broadly similar to the RA case. By contrast, the transition is substantially more costly: the compensation parameter based on steady-state welfare levels is about 0.37%.

Figure C.1 in the Appendix helps explain why the transition triggered by the Fiscal Rebalancing reform reduces welfare in the HA economy relative to the no-transition case. In the early stages of the transition, agents on average increase their labor supply more than the representative agent, while raising their consumption at a much slower pace. Together, these patterns help explain why the transition to the post-reform steady state can be welfare-reducing.

A limitation of average consumption or utilitarian welfare is that they mask potential heterogeneity in how individual agents perceive the reform. To address this, we define the individual consumption compensation $\omega(a, z)$ as the solution to

$$\mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} (u((1 + \omega(a, z))c_t^N) - v(h_t^N)) \mid a, z \right] = V_{t_0}^R(a, z). \quad (3)$$

²⁶The compensation parameter computed while ignoring the transition is best interpreted as the compensation that would make the representative agent indifferent between living in the pre-reform economy or moving without cost to another economy in which the Fiscal Rebalancing reform was implemented years ago. The Online Appendix contains an analog of Figure 9 ignoring the transition.

Thus $\omega(a, z)$ is the consumption compensation that would make an individual agent with initial condition $s = (a, z)$ indifferent between staying in the pre-reform steady state or going through the transition triggered by the reform. Whenever $\omega(a, z) > 0$, the individual agent would have to be compensated to stay in the pre-reform steady state.

We find that the average welfare gain $\int_{\mathcal{A} \times \mathcal{Z}} \omega(s) \lambda_{t_0-1}(ds)$ amounts to 0.17 percent. In other words, the average agent broadly agrees with the utilitarian social planner. Ignoring the transition yields an average welfare gain of 0.30%, confirming that the transition is costly in the HA model. Moreover, when we compute average individual welfare by z group, we find that for z_1 , z_7 , and z_8 the average compensation parameter is negative. It is worth emphasizing that, when the transition is ignored, the compensation parameter associated with z_1 turns positive.²⁷

Figure 10 illustrates how the individual compensation parameter $\omega(a, z)$ varies with a and z . Each panel corresponds to a given productivity level z , with $\omega(a, z)$ plotted against a on the left axis (dark curve). In all cases, $\omega(a, z)$ is decreasing in a .

To facilitate the interpretation of these charts, we also report a horizontal line corresponding to a zero level for the individual compensation parameter (dash-dot). Whenever $\omega(a, z)$ crosses this horizontal line, a cut-off asset level a is identified, corresponding to a wealth level such that this particular agent is indifferent between the reform and the status quo. We can read the fraction of the population (within the sub-population with the particular productivity level z) with a wealth level below the cut-off value, as reported on the right axis. By construction, this corresponds to the fraction of this sub-population that would benefit from the reform.

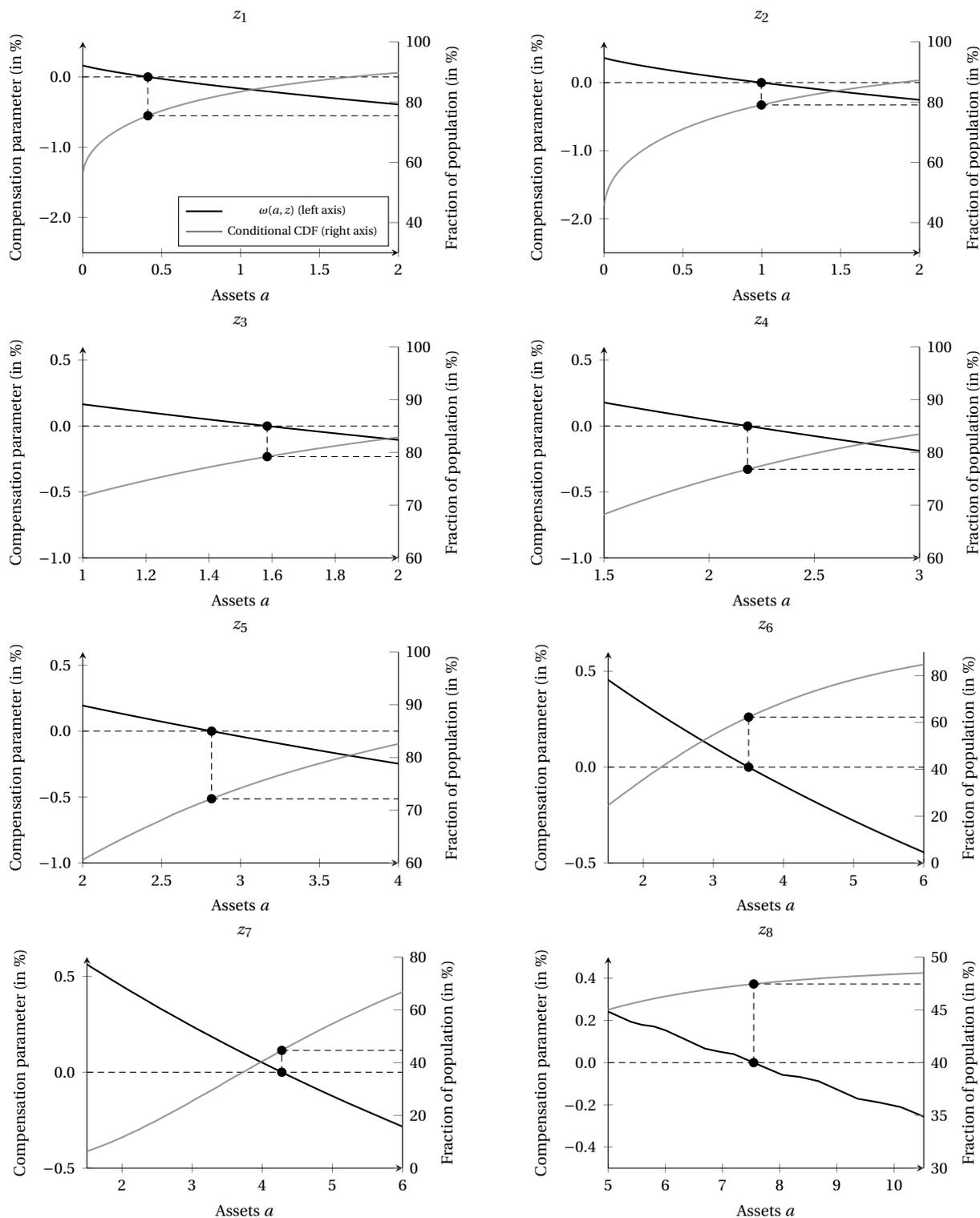
Three findings emerge. First, the mass of agents below the cut-off level associated with a particular z is not a monotonic function of z . It is increasing at low levels of z and decreasing at higher levels of z . Note that while a majority of agents with $z = z_1$ at the time of the reform would benefit from the reform, the average individual welfare gain in this population is negative. This suggests that most agents with $z = z_1$ experience small welfare gains while a handful of them experience a very large welfare loss. Second, more than half of the agents with any of the last two productivity levels z_7 and z_8 would vote against the fiscal reform. Third, because $\omega(a, z)$ is decreasing in a , we expect wealth-rich agents to be hostile to the reform, irrespective of their individual productivity z . Overall, Figure 10 suggests that the welfare gains from the reform are not evenly distributed. Agents with very high productivity levels would reject the reform. Similarly, agents with large asset detention are in general more likely to reject the reform. As we already saw with Figure 5, wealth-rich agents in the initial steady-state capture more than the total post-reform increase in aggregate wealth. To achieve this, they must lower their consumption and increase their labor supply persistently along the transition, resulting in a deteriorated welfare.²⁸

Nevertheless, the aggregate mass of agents who benefit from the reform, $\int_{\mathcal{A} \times \mathcal{Z}} \chi(s) \lambda_{t_0-1}(ds)$, is about 74.1% of the population. Ignoring the transition, this share rises to 76.6%.

²⁷See the Online Appendix for additional details on the distribution of individual welfare gains across productivity levels.

²⁸Figure I.6 in the Online Appendix shows the expected post-reform paths of consumption and labor supply for different initial individual states $s = (a, z)$ relative to their pre-reform counterparts.

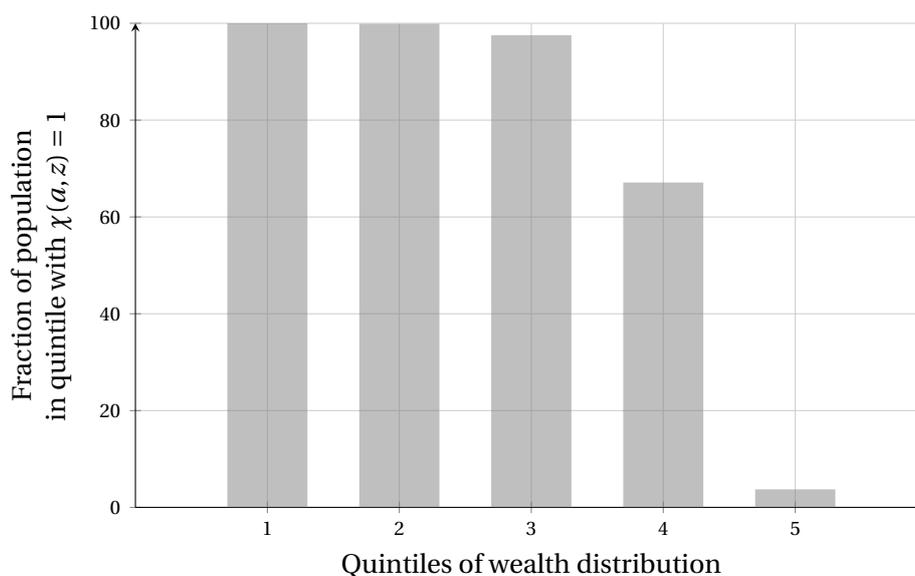
Figure 10: Individual Compensation Parameters



Note: Each panel is attached to a particular value of the individual productivity z . In each panel, the black curve corresponds to compensation parameter $\omega(a, z)$ given in Equation (3), viewed as a function of assets a , measured in percent, on the left axis. The black dot, if any, identifies the critical value of assets a such that $\omega(a, z) = 0$. This dot is reported on the grey curve corresponding to the CDF of distribution of assets within the sub-population with the individual productivity level under consideration, on the right axis.

To conclude this section, we examine the distribution of individual votes $\chi(s)$. Figure 11 reports the results by net wealth quintiles for the benchmark reform with $\Delta_C = 3$ percentage points. Each grey bar

Figure 11: Distribution of Votes Pooled by Net Wealth Quintiles



Note: for each quintile of the net wealth distribution, the grey bar shows the average value of $\chi(s)$ within the particular population in the considered quintile, where $\chi(s)$ is the indicator variable taking value 1 if the agent with initial individual state s benefits from the reform, and zero otherwise.

shows the fraction of the corresponding quintile voting in favor of the reform. The first three quintiles are overwhelmingly supportive, whereas the top quintile rejects the reform almost unanimously, as the previous discussion suggested.

6 Conclusion

In this paper, we develop a heterogeneous-agent model calibrated to French data to assess the long-run macroeconomic effects of Fiscal Rebalancing—that is, a balanced-budget policy that raises consumption taxes while lowering payroll taxes, keeping debt, transfers, and government consumption fixed at their pre-reform levels. Our results show that the reform increases equilibrium labor and, more importantly, generates substantial capital accumulation, with wealth gains highly concentrated among richer households. From a utilitarian perspective, the reform yields an overall welfare gain, though welfare losses arise at the top of the wealth distribution and for low-productivity agents.

These macroeconomic results are robust to alternative calibrations, including changes in labor supply elasticity, the income effect on labor supply, a lower progressivity of labor taxation, and individual productivity processes. Nonetheless, our analysis abstracts from several important dimensions. First, the model features a single concept of wealth, ignoring the distinction between liquid and illiquid assets, which may be relevant. Second, life-cycle considerations are absent, obscuring potential heterogeneity in responses across age groups. Finally, given the central role of capital accumulation in our results, it would be valuable to investigate how bequest taxation might reshape the findings within our dynastic framework. We leave these questions for future research.

A Proof of Proposition 1

The steady-state equilibrium system is

$$C + \delta K + \bar{G} = K^\theta (\Omega H)^{1-\theta}, \quad (\text{A.1})$$

$$r + \delta = \theta \left(\frac{K}{\Omega H} \right)^{\theta-1}, \quad (\text{A.2})$$

$$w = \frac{1}{1 + \bar{\tau}_S - \Delta_S} (1 - \theta) \Omega \left(\frac{K}{\Omega H} \right)^\theta, \quad (\text{A.3})$$

$$(C)^{-\sigma} \frac{1 - \bar{\tau}}{1 + \bar{\tau}_C + \Delta_C} (w)^{1-\gamma} = \nu H^{\eta+\gamma}, \quad (\text{A.4})$$

$$\beta [1 + (1 - \bar{\tau}_A) r] = 1, \quad (\text{A.5})$$

together with an extra equation that stipulates how Δ_S is determined

$$0 = (1 - \bar{\tau}_A) r \bar{B} + \bar{G} + \bar{T} - (\bar{\tau}_C + \Delta_C) C - (1 + \bar{\tau}_S - \Delta_S) w H - \bar{\tau}_A r K + (1 - \bar{\tau}) (w)^{1-\gamma} \frac{H^{1-\gamma}}{1 - \gamma}. \quad (\text{A.6})$$

Equation (A.1) is the economy's resource constraint. Equation (A.2) and (A.3) are the representative firm's first order conditions for profit maximization. Equation (A.4) is the representative household's first-order condition on labor supply. Equation (A.5) is the Euler equation on capital. Finally, Equation (A.6) is the revenue-neutrality constraint on the fiscal reform.

We consider a small variation of Δ_C in the neighborhood of the initial steady state with $\Delta_C = 0$. Let $k \equiv K/(\Omega H)$. Combining Equations (A.2) and (A.5), we conclude that k does not depend on Δ_C , so that it is invariant to the reform.

Combining Equations (A.3) and (A.4), we obtain

$$(C)^{-\sigma} (1 - \bar{\tau}) ((1 - \theta) \Omega k^\theta)^{1-\gamma} = (1 + \bar{\tau}_C + \Delta_C) (1 + \bar{\tau}_S - \Delta_S)^{1-\gamma} \nu H^{\eta+\gamma}.$$

Differentiating this expression with respect to Δ_C in the neighborhood of the initial steady state yields

$$(1 - \gamma) \frac{1}{1 + \bar{\tau}_S} \frac{\partial \Delta_S}{\partial \Delta_C} - \frac{1}{1 + \bar{\tau}_C} = \sigma \frac{\partial \log(C)}{\partial \Delta_C} + (\eta + \gamma) \frac{\partial \log(H)}{\partial \Delta_C}$$

Now, using Equation (A.1), we obtain

$$\frac{\partial \log(C)}{\partial \Delta_C} = \frac{1 - \delta s_K}{s_C} \frac{\partial \log(H)}{\partial \Delta_C}.$$

So that we get

$$\frac{1 - \gamma}{1 + \bar{\tau}_S} \frac{\partial \Delta_S}{\partial \Delta_C} - \frac{1}{1 + \bar{\tau}_C} = \left(\frac{1 - \delta s_K}{s_C} \sigma + \eta + \gamma \right) \frac{\partial \log(H)}{\partial \Delta_C}.$$

The government budget constraint rewrites

$$(1 - \bar{\tau}_A)r\bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C)C + (1 - \theta)\Omega k^\theta H + \bar{\tau}_A r K - \frac{1 - \bar{\tau}}{1 - \gamma} \left(\frac{1}{1 + \bar{\tau}_S - \Delta_S} (1 - \theta)\Omega k^\theta H \right)^{1 - \gamma}.$$

Let us now differentiate this expression with respect to Δ_C in the neighborhood of the initial steady state.

This yields

$$s_C + \left[\bar{\tau}_C(1 - \delta s_K) + (1 - \theta) + \bar{\tau}_A r s_K - (1 - \gamma) \frac{\frac{1 - \bar{\tau}}{1 - \gamma} \left(\frac{1}{1 + \bar{\tau}_S} (1 - \theta) Y \right)^{1 - \gamma}}{Y} \right] \frac{\partial \log(H)}{\partial \Delta_C} = \frac{\frac{1 - \bar{\tau}}{1 - \gamma} \left(\frac{1}{1 + \bar{\tau}_S} (1 - \theta) Y \right)^{1 - \gamma}}{Y} \frac{1 - \gamma}{1 + \bar{\tau}_S} \frac{\partial \Delta_S}{\partial \Delta_C}.$$

Recall that we can define

$$\tau(X) = X - \frac{1 - \bar{\tau}}{1 - \gamma} X^{1 - \gamma}$$

and note that

$$wH = \frac{1}{1 + \bar{\tau}_S} (1 - \theta) Y.$$

Thus, the above expression can be re-arranged

$$s_C + \left[\bar{\tau}_C(1 - \delta s_K) + (1 + \bar{\tau}_S) \frac{wH}{Y} + \bar{\tau}_A r s_K - (1 - \gamma) \frac{wH - \tau(wH)}{Y} \right] \frac{\partial \log(H)}{\partial \Delta_C} = \frac{wH - \tau(wH)}{Y} \frac{1 - \gamma}{1 + \bar{\tau}_S} \frac{\partial \Delta_S}{\partial \Delta_C}.$$

Hence

$$s_C - (1 - \hat{\tau}(wH)) \frac{wH}{Y} \frac{1}{1 + \bar{\tau}_C} = \left[(1 - \hat{\tau}(wH)) \frac{wH}{Y} \left(\frac{1 - \delta s_K}{s_C} \sigma + \eta + 1 \right) - \bar{\tau}_C(1 - \delta s_K) - \bar{\tau}_A r s_K - (1 - \theta) \right] \frac{\partial \log(H)}{\partial \Delta_C}$$

We conclude that the reform has a positive impact on the equilibrium labor supply if and only if

$$\text{Sign} \left((1 + \bar{\tau}_C) s_C - [1 - \hat{\tau}(wH)] \frac{wH}{Y} \right) = \text{Sign} \left([1 - \hat{\tau}(wH)] \frac{wH}{Y} \left(\frac{1 - \delta s_K}{s_C} \sigma + \eta + 1 \right) - \bar{\tau}_C(1 - \delta s_K) - \bar{\tau}_A r s_K - (1 - \theta) \right).$$

Replacing $1 - \delta s_K$ by $s_C + s_G$ and wH/Y by $(1 - \theta)/(1 + \bar{\tau}_S)$ completes the proof.

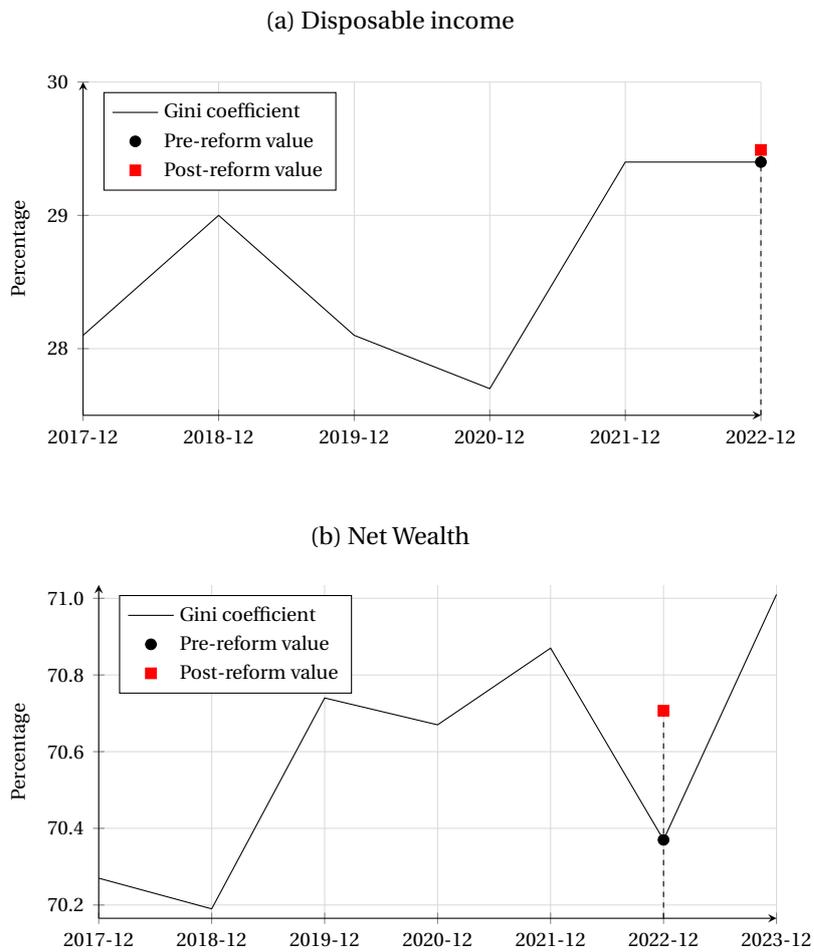
B Historical Path of Gini Coefficient on Net Wealth

To illustrate the size of the impact of the Fiscal Rebalancing reform on the Gini coefficient of the wealth distribution, we extract historical data from the ECB's *Distributional Wealth Accounts* showing the dynamics

of this coefficient over the period 2017–2023. We use data from INSEE (2024) to show the dynamics of the Gini coefficient on the distribution of disposable income (per unit of consumption).

Figure B.1 shows the result. Compared to the historical movement over the selected time window, the impact of the reform on the Gini coefficient of the distribution of disposable income seems negligible. By contrast, the impact on the Gini coefficient of the wealth distribution seems large.

Figure B.1: Historical Gini Coefficient for Disposable Income and Net Wealth



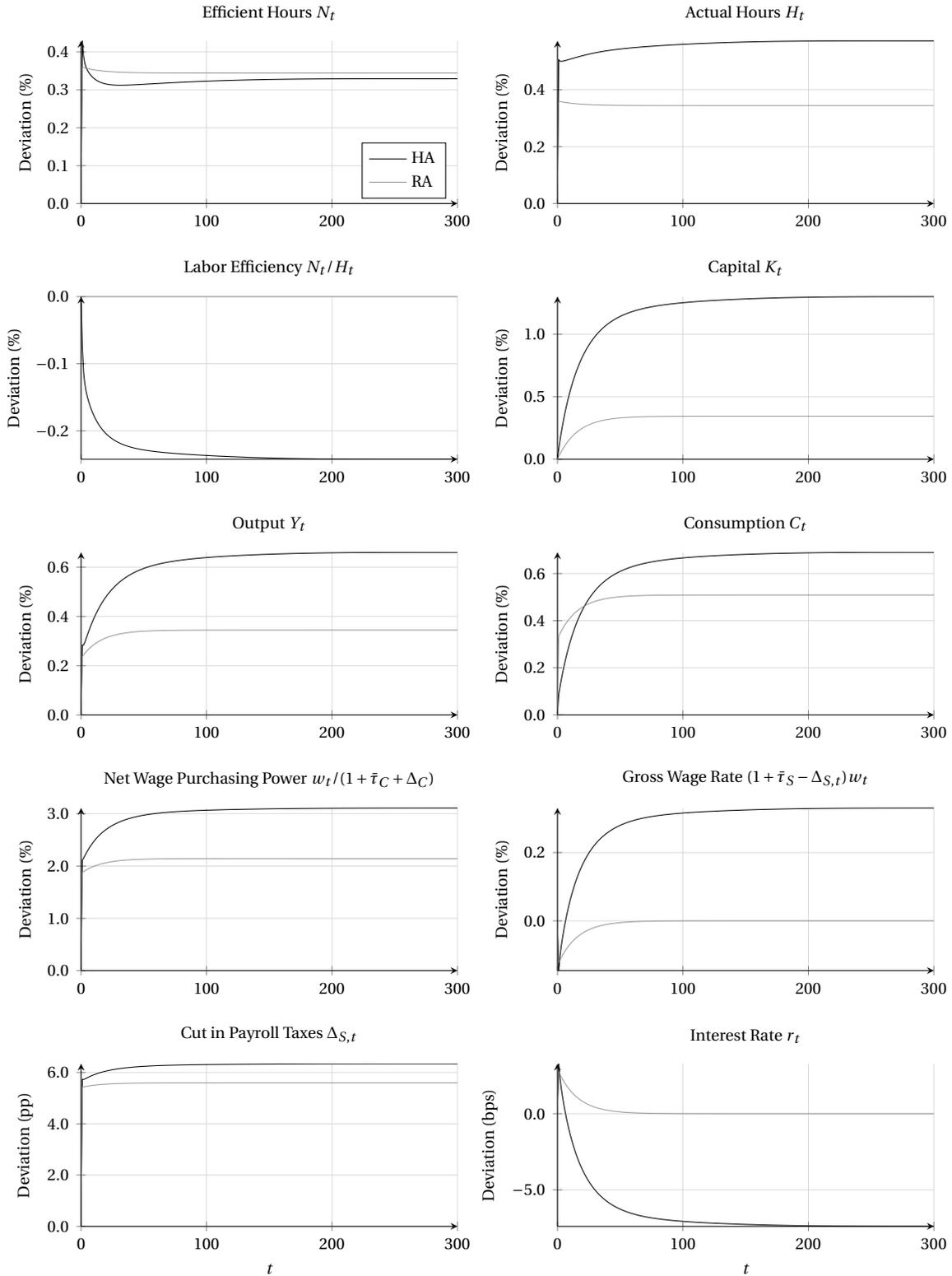
Note: The solid line shows the corresponding Gini coefficient over the 2017-2023 period. The black circle corresponds to the calibration year used in the paper, interpreted as period t_0 just before the reform. The red rectangle corresponds to the steady-state impact of the reform on each of the Gini coefficients.

C Transition

Complete details concerning how the transition between the pre- and post-reform steady states is computed are provided in the Online Appendix. Here, we simply mention that we rely on methods suggested by Auclert et al. (2021).

Figure C.1 shows the transition of key macroeconomic variables after a Fiscal Rebalancing reform with $\Delta_C = 3$ percentage points.

Figure C.1: Transition



Note: Transition triggered by a Fiscal Rebalancing reform with $\Delta_C = 3$ percentage points. The dark curves correspond to the HA economy and the grey curves to the RA economy. Efficient hours, actual hours, labor efficiency, capital, output, consumption, net wage purchasing power, and the gross wage rate are reported in percentage deviation relative to their pre-reform value. The cut in payroll taxes is reported as deviations from their initial values, stated in percentage points. The interest is reported as a deviation stated in basis points.

D Economic Environment

D.1 Sequential Representation of the Model and Equilibrium Definition

This section presents the sequential representation of the model economy. The choice set for assets is $\mathbf{A} = \mathbb{R}_+$. An individual state is given by $s = (a, z)$ with $s \in \mathbf{S} \equiv \mathbf{A} \times \mathbf{Z}$. Let $\mathcal{B}(\mathbf{S})$ denote the Borel subsets of \mathbf{S} . For any $\mathbf{S}_0 \in \mathcal{B}(\mathbf{S})$, $\lambda_t(\mathbf{S}_0)$ denotes the mass of agents with state in \mathbf{S}_0 at the end of period t .

- Aggregate production

$$Y_t = K_{t-1}^\theta (\Omega N_t)^{1-\theta} \quad (\text{D.1})$$

- Demand for capital

$$r_t + \delta = \theta \left(\frac{K_{t-1}}{\Omega N_t} \right)^{\theta-1} \quad (\text{D.2})$$

- Labor demand

$$(1 + \bar{\tau}_S - \Delta_{S,t}) w_t = (1 - \theta) \Omega \left(\frac{K_{t-1}}{\Omega N_t} \right)^\theta \quad (\text{D.3})$$

- Resource constraint

$$C_t + K_t + \bar{G} = (1 - \delta) K_{t-1} + Y_t \quad (\text{D.4})$$

- Individual problem in state $s = (a, e)$

$$\begin{aligned} V_t(a, z) &= \max_{c, h, a'} \left\{ \frac{c^{1-\sigma}}{1-\sigma} - v \frac{h^{1+\eta}}{1+\eta} + \beta \sum_{z' \in \mathbf{Z}} V_{t+1}(a', z') \Pi(z, z') \right\} \\ \text{s.t. } (1 + \bar{\tau}_C + \Delta_C) c + a' &= [1 + (1 - \tau_A) r_t] a + \frac{1 - \bar{\tau}}{1 - \gamma} (w_t h z)^{1-\gamma} + T_t, \\ a' &\geq 0, \quad c > 0, \quad h \geq 0. \end{aligned} \quad (\text{D.5})$$

The solution to the individual problem yields decision rules on assets $g_{a,t}(a, z)$, consumption $g_{c,t}(a, z)$, and labor supply $g_{h,t}(a, z)$. The next section details how we approximate the solution to the individual problem.

- Markov transition

$$\forall \mathbf{S}_0 = \mathbf{A}_0 \times \mathbf{Z}_0 \in \mathcal{B}(\mathbf{S}), \quad P_t(s, \mathbf{S}_0) = \mathbb{1}[g_{a,t}(a, z) \in \mathbf{A}_0] \times \sum_{z' \in \mathbf{Z}_0} \Pi(z, z') \quad (\text{D.6})$$

- Law of motion of distribution

$$\forall \mathbf{S}_0 = \mathbf{A}_0 \times \mathbf{Z}_0 \in \mathcal{B}(\mathbf{S}), \quad \lambda_t(\mathbf{S}_0) = \int_{\mathbf{S}} P_t(s, \mathbf{S}_0) \lambda_{t-1}(ds) \quad (\text{D.7})$$

- Aggregate savings

$$A_t = \int_{\mathbf{S}} g_{a,t}(s) \lambda_{t-1}(ds) \quad (\text{D.8})$$

- Aggregate labor supply

$$N_t = \int_{\mathcal{S}} z g_{h,t}(s) \lambda_{t-1}(ds). \quad (\text{D.9})$$

- Equilibrium on the capital market

$$A_t = K_t + \bar{B} \quad (\text{D.10})$$

- Government budget constraint

$$(1 - \bar{\tau}_A) r_t \bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C) C_t + (1 + \bar{\tau}_S - \Delta_{S,t}) w_t N_t + \bar{\tau}_A r_t K_{t-1} - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathcal{S}} [w_t z g_{h,t}(s)]^{1-\gamma} \lambda_{t-1}(ds). \quad (\text{D.11})$$

For later reference, it is useful to define the aggregate proceeds of labor income taxation

$$Q_t \equiv w_t N_t - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathcal{S}} [w_t z g_{h,t}(s)]^{1-\gamma} \lambda_{t-1}(ds).$$

so that the government budget constraint rewrites:

$$(1 - \bar{\tau}_A) r_t \bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C) C_t + (\bar{\tau}_S - \Delta_{S,t}) w_t N_t + \bar{\tau}_A r_t K_{t-1} + Q_t$$

In the fiscal reform considered here, transfers, debt, and government consumption are set to \bar{T} , \bar{B} , and \bar{G} , respectively. The quantities \bar{G} , \bar{T} , and \bar{B} correspond to the pre-reform steady-state values of government expenditures, transfers, and debt, respectively. In the pre-reform steady state, we set $\Delta_C = 0$, $B = s_B Y$, $G = s_G Y$, where s_B and s_G are share parameters, and we let T adjust so that

$$T = \bar{\tau}_C C + (1 + \bar{\tau}_S) w N + \bar{\tau}_A r K - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathcal{S}} [w_t z g_h(s)]^{1-\gamma} \lambda(ds) - [(1 - \bar{\tau}_A) r s_B + s_G] Y.$$

D.2 Equilibrium Definition

We now state the formal definition of a sequential equilibrium.

Definition 1 *Given a policy vector $(\Delta_C, \bar{\tau}_C, \bar{\tau}_S, \bar{\tau}_A, \bar{\tau}, \gamma, \bar{T}, \bar{G}, \bar{B})$, an initial distribution of agents λ_{-1} over the state space \mathcal{S} , and an initial capital stock K_{-1} , a sequential equilibrium is a sequence of prices $\{r_t, w_t\}_{t=0}^{\infty}$, a sequence of value functions $\{V_t(s)\}_{t=0}^{\infty}$, a sequence of decision rules for an individual's assets holdings, consumption, and labor supply $\{g_{a,t}(s), g_{c,t}(s), g_{h,t}(s)\}_{t=0}^{\infty}$, a sequence of fiscal adjustment rule $\{\Delta_{S,t}\}_{t=0}^{\infty}$, a sequence of measures $\{\lambda_t\}_{t=0}^{\infty}$ of agents over the state space \mathcal{S} , and a sequence of aggregate quantities $\{K_t, N_t\}_{t=0}^{\infty}$ such that for all $t \in \mathbb{N}$:*

1. *Given $V_{t+1}(s)$, the value function $V_t(s)$ solves the agent's problem stated in Equation (D.5), with associated decision rules $g_{a,t}(s)$, $g_{c,t}(s)$ and $g_{h,t}(s)$ and Markov transition P_t induced by $g_{a,t}$ and Π , as given by Equation (D.6);*

2. Given the price system and the fiscal adjustment at t , firms maximize profits so that

$$(1 + \bar{\tau}_S - \Delta_{S,t}) w_t = (1 - \theta) \Omega \left(\frac{K_{t-1}}{\Omega N_t} \right)^\theta, \quad r_t + \delta = \theta \left(\frac{K_{t-1}}{\Omega N_t} \right)^{\theta-1};$$

3. The fiscal rule ensures the government runs a balanced budget

$$(1 - \bar{\tau}_A) r_t \bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C) \int_{\mathcal{S}} g_{c,t}(s) \lambda_{t-1}(ds) + (1 + \bar{\tau}_S - \Delta_{S,t}) w_t N_t \\ + \bar{\tau}_A r_t K_{t-1} - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathcal{S}} [w_t z g_{h,t}(s)]^{1-\gamma} \lambda_{t-1}(ds);$$

4. Aggregate savings equal firms' demand for capital plus government debt

$$\int_{\mathcal{S}} g_{a,t}(s) \lambda_{t-1}(ds) = K_t + \bar{B};$$

5. The labor market clears

$$\int_{\mathcal{S}} z g_{h,t}(s) \lambda_{t-1}(ds) = N_t;$$

6. The distribution λ_t evolves according to

$$\forall \mathcal{S}_0 = \mathcal{A}_0 \times \mathcal{Z}_0 \in \mathcal{B}(\mathcal{A} \times \mathcal{Z}), \quad \lambda_t(\mathcal{S}_0) = \int_{\mathcal{S}} P_t(s, \mathcal{S}_0) \lambda_{t-1}(ds).$$

In the paper, we focus on steady-state equilibria, the definition of which is stated below.

Definition 2 Given a policy vector $(\Delta_C, \bar{\tau}_C, \bar{\tau}_S, \bar{\tau}_A, \bar{\tau}, \gamma, \bar{T}, \bar{G}, \bar{B})$, a steady-state equilibrium is a constant system of prices $\{r, w\}$, a value function $V(s)$, time-invariant decision rules for an individual's assets holdings, consumption, and labor supply $\{g_a(s), g_c(s), g_h(s)\}$, a fiscal adjustment rule Δ_S , a measure λ of agents over the state space \mathcal{S} , aggregate quantities N , and K such that:

1. The value function $V(s)$ solves the steady-state version of the agent's problem, with associated decision rules $g_a(s)$, $g_c(s)$ and $g_h(s)$;
2. Given the price system at t and the fiscal adjustment, firms maximize profits and factor markets clear so that

$$(1 + \bar{\tau}_S - \Delta_S) w = (1 - \theta) \Omega \left(\frac{K}{\Omega N} \right)^\theta, \quad r + \delta = \theta \left(\frac{K}{\Omega N} \right)^{\theta-1};$$

3. The fiscal rule ensures the steady-state government budget constraint holds

$$(1 - \bar{\tau}_A) r \bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C) \int_{\mathcal{S}} g_c(s) \lambda(ds) + (1 + \bar{\tau}_S - \Delta_S) w N + \bar{\tau}_A r K - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathcal{S}} [w z g_h(s)]^{1-\gamma} \lambda(ds);$$

4. Aggregate savings equal firms' demand for capital plus government debt

$$\int_{\mathcal{S}} g_a(s) \lambda(ds) = K + B;$$

5. The labor market clears

$$\int_{\mathbf{S}} z g_h(s) \lambda(ds) = N;$$

6. The distribution λ is invariant

$$\forall \mathbf{S}_0 = \mathbf{A}_0 \times \mathbf{Z}_0 \in \mathcal{B}(\mathbf{A} \times \mathbf{Z}), \quad \lambda(\mathbf{S}_0) = \int_{\mathbf{S}} P(s, \mathbf{S}_0) \lambda(ds),$$

where P is the transition induced by g_a and Π .

E Solution Procedure

E.1 Solving for the Decision Rules

In this section, we detail how we solve for the sequence of individual decision rules $g_{a,t}$, $g_{c,t}$, and $g_{h,t}$ over the transition from the pre-reform to the post reform steady states. The aggregate variables relevant to the individual decision problem, namely r_t and w_t , are taken as given.

E.1.1 Statement of the Problem

We consider an individual starting period t with individual state $s = (a, z)$. At an interior solution, his consumption c and his labor supply h must obey the first-order conditions associated to the consumer problem are

$$\beta \sum_{z' \in \mathbf{Z}} V_{a,t+1}(a', z') \Pi(z, z') = \frac{1}{1 + \bar{\tau}_C + \Delta_C} c^{-\sigma}$$

$$c^{-\sigma} \frac{1 - \bar{\tau}}{1 + \tau_C + \Delta_C} (w_t z)^{1-\gamma} = v h^{\eta+\gamma}.$$

together with the envelope condition is

$$V_{a,t}(a, z) = \frac{1 + (1 - \bar{\tau}_A)r_t}{1 + \bar{\tau}_C + \Delta_C} c^{-\sigma},$$

Where $V_{a,t}$ is the partial derivative of V_t with respect to a .

E.1.2 Endogenous Grid Method

We specify a grid of values for next period's assets G_a , with N_a elements, and we let $G_z = \mathbf{Z}$, with N_z elements. We seek to compute period- t decision rules $g_{a,t}(a, z)$, $g_{c,t}(a, z)$, and $g_{h,t}(a, z)$ on assets, consumption, and labor, respectively, given period- $t+1$ partial derivative of the value function $V_{a,t+1}(a', z')$, evaluated on $G_a \times G_z$.

Given $V_{a,t+1}(a', z')$, we obtain

$$\hat{c}_t(a', z) = \left(\beta (1 + \bar{\tau}_C + \Delta_C) \sum_{z' \in \mathbf{Z}} V_{a,t+1}(a', z') \Pi(z, z') \right)^{-\frac{1}{\sigma}}$$

Where $\hat{c}_t(a', z)$ is the consumption level that a household would chose if its individual productivity in period t were z and if it had chosen an asset level for period $t + 1$ equal to a' .

For each $(a', z) \in G_a \times G_z$, knowing $\hat{c}_t(a', z)$, we solve the following equation for $\hat{h}_t(a', z)$

$$(\hat{c}_t(a', z))^{-\sigma} \frac{1 - \bar{\tau}}{1 + \tau_C + \Delta_C} (w_t z)^{1-\gamma} = v(\hat{h}_t(a', z))^{\eta+\gamma}.$$

Then, given $\hat{c}_t(a', z)$ and $\hat{h}_t(a', z)$, we use the budget constraint to solve for the endogenous grid $(1 + (1 - \tau_A)r_t)\hat{a}_t(a', z)$:

$$(1 + (1 - \bar{\tau}_A)r_t)\hat{a}_t(a', z) = (1 + \bar{\tau}_C + \Delta_C)\hat{c}_t(a', z) + a' - (1 - \bar{\tau})(w_t z)^{1-\gamma} \frac{\hat{h}_t(a', z)^{1-\gamma}}{1 - \gamma} - \bar{T}.$$

Here, $\hat{a}_t(a', z)$ and $\hat{h}_t(a', z)$ are the asset level and the labor supply of the household if individual productivity in period t is z and if the household had chosen an asset level for period $t + 1$ equal to a' .

Having solved for $\hat{c}_t(a', z)$, $\hat{h}_t(a', z)$, and $\hat{a}_t(a', z)$, we obtain two mappings $((1 + (1 - \bar{\tau}_A)r_t)\hat{a}_t(a', z), e) \mapsto \hat{h}_t(a', z)$ and $((1 + (1 - \bar{\tau}_A)r_t)\hat{a}_t(a', z), e) \mapsto \hat{c}_t(a', z)$. We then use linear interpolation techniques to obtain *preliminary* decision rules on labor and consumption $((1 + (1 - \bar{\tau}_A)r_t)a', z) \mapsto \tilde{g}_{h,t}(a', z)$ and $((1 + (1 - \bar{\tau}_A)r_t)a', z) \mapsto \tilde{g}_{c,t}(a', z)$.

Using these preliminary decision rules, we obtain $\forall (a', z) \in G_a \times G_e$:

$$\tilde{g}_{a,t}(a', z) = [1 + (1 - \bar{\tau}_A)r_t]a' + (1 - \bar{\tau})(w_t z)^{1-\gamma} \frac{\tilde{g}_{h,t}(a', z)^{1-\gamma}}{1 - \gamma} + \bar{T} - (1 + \bar{\tau}_C + \Delta_C)\tilde{g}_{c,t}(a', z).$$

The preliminary decision rule on assets may be such that for certain $(a', z) \in G_a \times G_z$, $\tilde{g}_{a,t}(a', z) < 0$. Formally, let us define

$$\mathcal{C} \equiv \{(a', z) \in G_a \times G_z : \tilde{g}_{a,t}(a', z) < 0\}.$$

We thus obtain the decision rule on assets $g_{a,t}$ as follows

$$\forall (a', z) \in G_a \times G_z, g_{a,t}(a', z) = \begin{cases} \tilde{g}_{a,t}(a', z) & \text{if } (a', z) \in \mathcal{C} \\ 0 & \text{otherwise.} \end{cases}$$

Notice that $\tilde{g}_{h,t}$ and $\tilde{g}_{c,t}$ cannot determine the labor supply and the consumption of an agent with an individual state in \mathcal{C} . This is so because under such circumstances, the consumption-labor choices of such an agent are no longer linked to the expectation at t of $V_{a,t+1}$ (put another way, such an agent is not on the Euler equation).

Generically, for $(a', z) \in \mathcal{C}$, the c and the h attached to a constrained problem are solution to:

$$\begin{aligned} & \max_{c,h} \left\{ \frac{c^{1-\sigma} - 1}{1 - \sigma} - v \frac{h^{1+\eta}}{1 + \eta} \right\} \\ \text{s.t. } & c = \mathcal{W}_t \frac{h^{1-\gamma}}{1 - \gamma} + \mathcal{T}_t, \\ & c > 0, h \geq 0. \end{aligned}$$

where we defined “financial” income \mathcal{I}_t and the “wage rate” \mathcal{W}_t as:

$$\mathcal{W}_t = \frac{1 - \bar{\tau}}{1 + \bar{\tau}_C + \Delta_C} (w_t z)^{1-\gamma}, \quad \mathcal{I}_t = \frac{[1 + (1 - \bar{\tau}_A)r_t]a' + \bar{T}}{1 + \bar{\tau}_C + \Delta_C}.$$

The associated first-order conditions imply

$$c = u_c^{-1/\sigma}, \quad h = \left(u_c \frac{1}{v} \mathcal{W}_t \right)^{1/(\eta+\gamma)}.$$

It follows that

$$\frac{\partial c}{\partial \log(u_c)} = -\frac{1}{\sigma} c, \quad \frac{\partial h}{\partial \log(u_c)} = \frac{1}{\eta + \gamma} h.$$

The solution procedure consists in finding the marginal utility of consumption u_c such that the associated net expenditures $E \equiv c - \mathcal{W}_t \frac{h^{1-\gamma}}{1-\gamma} - \mathcal{I}_t$ is zero.

We can then compute

$$\frac{\partial E}{\partial \log(u_c)} = -\frac{1}{\sigma} c - \frac{1}{\eta + \gamma} \mathcal{W}_t h^{1-\gamma}.$$

The algorithm is then as follows. Given a postulated $u_c^{(0)}$, we can compute c and h . Using these, we compute E . If E is sufficiently close to zero, we can stop. Otherwise, we define $\ell^{(0)} \equiv \log(u_c^{(0)})$. We use a simple Newton-Raphson procedure to update ℓ :

$$\ell^{(1)} = \ell^{(0)} - \left(\frac{\partial E}{\partial \log(u_c)} \right)^{-1} E.$$

We then set $u_c^{(0)} = \exp(\ell^{(1)})$ and start over again until convergence.

We repeat this procedure for each $(a', z) \in \mathcal{C}$. This yields the marginal utility of a constrained agent with individual state (a', z) , denoted $u_{c,t}^*(a', z)$. We can then back out the consumption $c_t^*(a', z)$ and the labor supply $h_t^*(a', z)$ of this constrained agent.

Once this system is solved, we obtain the decision rules on labor $g_{h,t}$ and on consumption

$$\forall (a', z) \in G_a \times G_z, \quad g_{h,t}(a', z) = \begin{cases} \tilde{g}_{h,t}(a', z) & \text{if } (a', z) \in \mathcal{C}^c \\ h_t^*(a', z) & \text{otherwise,} \end{cases}$$

$$\forall (a', z) \in G_a \times G_z, \quad g_{c,t}(a', z) = \begin{cases} \tilde{g}_{c,t}(a', z) & \text{if } (a', z) \in \mathcal{C}^c \\ c_t^*(a', z) & \text{otherwise.} \end{cases}$$

Once we have obtained the decision rules, we update the derivative of the value function according to

$$V_{a,t}(a', z) = \frac{1 + (1 - \bar{\tau}_A)r_t}{1 + \bar{\tau}_C + \Delta_C} (g_{c,t}(a', z))^{-\sigma}.$$

We use the same procedure to compute the steady-state decision rules. Starting from a candidate $V_a^{(0)}$, we use the steps outlined before to iterate on $V_a^{(i)}$ and we stop whenever the distance between two succes-

sive derivatives of the value function $V_a^{(i)}$ and $V_a^{(i+1)}$ is sufficiently small compared to a pre-set tolerance value.

E.2 Iterating on the Distribution

Next, we compute an approximation of the stationary distribution λ_t given an approximation of λ_{t-1} . Since we work with a discrete state space $G_a \times G_z$, the approximation takes the form of a matrix $\hat{\lambda}_t$, where each element $\hat{\lambda}_t(a, z)$ represents the mass of agents with assets $a \in G_a$ and productivity $z \in G_z$. To construct $\hat{\lambda}_t$, we follow the method of Young (2010).

The main difficulty is that, except in special cases, even if the current state (a, z) lies on the grid $G_a \times G_z$, the next-period asset choice $g_{a,t}(a, z)$ will not generally belong to G_a .

However, given $(a, z) \in G_a \times G_z$, one can find the integer $j_t(a, z)$ such that

$$\bar{a}_{j_t(a,z)} \leq g_{a,t}(a, z) < \bar{a}_{j_t(a,z)+1}.$$

If an individual state (a, z) is such that $g_a(a, z) > \bar{a}$, we impose $j_t(a, z) = N_a$.

Given $(a, z) \in G_a \times G_z$, we would like to assign a fraction of $g_{a,t}(a, z)$ to the $j_t(a, z)$ th element of G_a , denoted $\bar{a}_{j_t(a,z)}$, and the remaining fraction to $\bar{a}_{j_t(a,z)+1}$. To this end, we define the ‘‘lottery’’

$$\chi_t(a, z) = \frac{\bar{a}_{j_t(a,z)+1} - g_{a,t}(a, z)}{\bar{a}_{j_t(a,z)+1} - \bar{a}_{j_t(a,z)}} \iff g_{a,t}(a, z) = \chi_t(a, z)\bar{a}_{j_t(a,z)} + (1 - \chi_t(a, z))\bar{a}_{j_t(a,z)+1}.$$

In the particular case $j_t(a, z) = N_a$, $\chi_t(a, z)$ is not well defined. In this case, we set $\chi_t(a, z) = 1$.

Once we have identified all the $j_t(a, z)$ and constructed the lottery $\chi_t(a, z)$, we initialize our algorithm with an initial distribution $\hat{\lambda}_t$ as an $N_a \times N_z$ matrix filled with zeros. Then, $\forall (a, z) \in G_a \times G_z$ we iterate on the allocations

$$\hat{\lambda}_t(\bar{a}_{j_t(a,z)}, z) \leftarrow \hat{\lambda}_t(\bar{a}_{j_t(a,z)}, z) + \hat{\lambda}_{t-1}(a, z)\chi_t(a, z)$$

$$\hat{\lambda}_t(\bar{a}_{j_t(a,z)+1}, z) \leftarrow \hat{\lambda}_t(\bar{a}_{j_t(a,z)+1}, z) + \hat{\lambda}_{t-1}(a, z)(1 - \chi_t(a, z)).$$

Notice that, given $g_t(a, z)$, different $(a, z) \in G_a \times G_z$ can yield the same $j_t(a, z)$. This is the reason why in the above sequential allocations, we iterate on $\hat{\lambda}_t$. Next, we take the exogenous transition into account, yielding $\hat{\lambda}_t \leftarrow \hat{\lambda}_t \Pi$.

Once this is done, we approximate generic integrals as follows

$$\int_{A \times Z} f(a, z) \lambda_t(ds) \approx \sum_{z \in G_z} \sum_{a \in G_a} f(a, z) \hat{\lambda}_t(a, z).$$

We use this procedure to compute the steady-state distribution. In this case, we initialize the algorithm with

$$\hat{\lambda}^{(0)}(a, z) = \pi(z)/N_a.$$

Then, we compute the $j_*(a, z)$ and the $\chi_*(a, z)$ associated with the steady-state decision rule $g_*(a, z)$. Then given $\hat{\lambda}^{(i)}$, we iterate on the distribution as follows

$$\hat{\lambda}^{(i+1)}(\bar{a}_{j_*(a,z)}, z) \leftarrow \hat{\lambda}^{(i+1)}(\bar{a}_{j_*(a,z)}, z) + \hat{\lambda}^{(i)}(a, z)\chi_*(a, z)$$

$$\hat{\lambda}^{(i+1)}(\bar{a}_{j_*(a,z)+1}, z) \leftarrow \hat{\lambda}^{(i+1)}(\bar{a}_{j_*(a,z)+1}, z) + \hat{\lambda}^{(i)}(a, z)(1 - \chi_*(a, z)).$$

Next, we take the exogenous transition into account, yielding $\hat{\lambda}^{(i+1)} \leftarrow \hat{\lambda}^{(i+1)}\Pi$. We stop whenever the distance between two consecutive iterates is smaller than a pre-set tolerance.

E.3 Computing the Initial Steady State

In the initial steady state, we assume that $B = s_B Y$ and $G = s_G Y$. We postulate initial values for r , N and T . Given (r, N) , we can compute the demand for capital

$$K = \left(\frac{r + \delta}{\theta} \right)^{\frac{1}{\theta-1}} \Omega N.$$

This allows us to compute the wage rate w

$$w = \frac{1 - \theta}{1 + \bar{\tau}_S} \Omega \left(\frac{K}{\Omega N} \right)^\theta.$$

We can also compute a number of aggregate variables. Using K and N , we can back out output

$$Y = K^\theta (\Omega N)^{1-\theta}.$$

Finally, the aggregate resource constraint implies

$$C = Y - (s_G Y + \delta K).$$

Since we have r , T , and w , we can solve the individual problem, as described in the previous subsection. Once the individual problem is solved, we can find the stationary distribution λ . This allows us to compute the labor supply

$$N^s = \int_{\mathcal{S}} g_h(s) z \lambda(ds)$$

and the asset supply

$$A^s = \int_{\mathcal{S}} g_a(s) \lambda(ds).$$

We can then compute the excess demand of capital

$$e_K = K - (A^s - s_B Y)$$

and the excess labor demand

$$e_N = N - N^s.$$

The steady-state government budget constraint yields the implied value for transfers

$$T^s = \bar{\tau}_C C + (1 + \bar{\tau}_S) w N + \bar{\tau}_A r K - (s_G - (1 - \bar{\tau}_A) r s_B) Y - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathcal{S}} [w z g_h(s)]^{1-\gamma} \lambda(ds)$$

so that we can compute the “excess demand” on transfers

$$e_T = T - T^s.$$

In other words, we have constructed a mapping

$$(r, N, T) \mapsto (e_K(r, N, T), e_N(r, N, T), e_T(r, N, T))$$

the zeros of which are the solution to the pre-reform steady state. In practice, we use a numerical solver to iterate on (r, N, T) until (e_K, e_N, e_T) is sufficiently close to 0.

E.4 Computing the Post-Reform Steady State

In the post-reform steady state, we freeze government consumption, debt, and transfers to their pre-reform steady-state values, \bar{G} , \bar{B} , and \bar{T} , respectively. We postulate initial values for r , N and Δ_S . As before, we can back out the capital stock

$$K = \left(\frac{r + \delta}{\theta} \right)^{\frac{1}{\theta-1}} \Omega N.$$

We can also compute output

$$Y = K^\theta (\Omega N)^{1-\theta},$$

and aggregate consumption

$$C = Y - (\bar{G} + \delta K).$$

The demand for labor obeys

$$w = \frac{1}{1 + \bar{\tau}_S - \Delta_S} (1 - \theta) \Omega \left(\frac{K}{\Omega N} \right)^\theta.$$

We can thus compute w . Since we have r , \bar{T} , and w , we can solve the individual problem. Once the individual problem is solved, we can find the stationary distribution λ . This allows us to compute the labor supply

$$N^s = \int_{\mathcal{S}} g_h(a, z) z \lambda(ds)$$

the asset supply

$$A^s = \int_{\mathcal{S}} g_a(a, z) \lambda(ds).$$

We can then compute the excess demand of capital

$$e_K = K + \bar{B} - A^s$$

and the excess labor demand

$$e_N = N - N^s.$$

The steady-state government budget constraint yields the implied value for Δ_S^s

$$\Delta_S^s = \frac{1}{wN} \left[(1 + \bar{\tau}_S)wN + (\bar{\tau}_C + \Delta_C)C + \bar{\tau}_A rK - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathcal{S}} [wz g_h(s)]^{1-\gamma} \lambda(ds) - r\bar{B} - \bar{G} - \bar{T} \right].$$

so that we can compute the “excess demand” on payroll tax cuts

$$e_\Delta = \Delta_S - \Delta_S^s.$$

In other words, we have constructed a mapping

$$(r, N, \Delta_S) \mapsto (e_K(r, N, \Delta_S), e_N(r, N, \Delta_S), e_\Delta(r, N, \Delta_S))$$

the zeros of which are the solution to the pre-reform steady state. In practice, we use a numerical solver to iterate on (r, N, Δ_S) until (e_K, e_N, e_Δ) is sufficiently close to 0.

E.5 Solving for the Transition

Once implemented, the fiscal reform that we consider in this paper triggers a transition between the initial steady state and the new steady state featuring higher consumption taxes and possibly lower payroll and SSC taxes on labor. We solve for the transition through the following steps.

We assume that the transition takes a finite number of periods T^f . To be clear, in period $t = t_0 - 1$ the economy is in the initial steady state; at $t = t_0$, the policy reform is enacted; at $t = t_0 + T^f$, the economy is supposed to have reached its final steady state. Our task is then to find approximate paths for the endogenous variables for $t \in \{t_0, t_0 + 1, \dots, t_0 + T^f - 1\}$

We postulate paths $\{K_t\}_{t=t_0}^{t_0+T^f-1}$, $\{N_t\}_{t=t_0}^{t_0+T^f-1}$, $\{C_t\}_{t=t_0}^{t_0+T^f-1}$, and $\{Q_t\}_{t=t_0}^{t_0+T^f-1}$, where we recall that

$$Q_t \equiv \int_{\mathcal{S}} g_{q,t}(s) \lambda_{t-1}(ds),$$

and where

$$g_{q,t}(s) \equiv w_t z g_{h,t}(s) - \frac{1 - \bar{\tau}}{1 - \gamma} [w_t z g_{h,t}(s)]^{1-\gamma}.$$

In any given period, given (K_{t-1}, N_t, C_t, Q_t) , we can back out all the other aggregate variables, namely

$$Y_t = K_{t-1}^\theta (\Omega N_t)^{1-\theta},$$

$$\hat{K}_t = Y_t + (1 - \delta)K_{t-1} - \bar{G} - C_t,$$

$$r_t = \theta \left(\frac{K_{t-1}}{\Omega N_t} \right)^{\theta-1} + \delta,$$

$$Z_t = \frac{(1 - \bar{\tau}_A)r_t \bar{B} + \bar{G} + \bar{T} - (\bar{\tau}_C + \Delta_C)C_t - \bar{\tau}_A r_t K_{t-1} - Q_t}{(1 - \theta)Y_t},$$

$$\Delta_{S,t} = \bar{\tau}_S - \frac{Z_t}{1 - Z_t},$$

$$w_t = \frac{1}{1 + \bar{\tau}_S - \Delta_{S,t}} (1 - \theta) \Omega \left(\frac{K_{t-1}}{\Omega N_t} \right)^\theta.$$

Note that, there is a difference between the end of period t capital stock \hat{K}_t deduced from K_{t-1} in the above relations and the beginning of period $t + 1$ capital stock K_t . Obviously, upon convergence, it must be the case that $\hat{K}_t = K_t$. Yet this need not be the case initially.

As a consequence, given $V_{a,t+1}$ and (K_{t-1}, N_t, C_t, Q_t) , we have all the required ingredients to compute the decision rules $(g_{a,t}, g_{c,t}, g_{h,t}, g_{n,t}, g_{q,t})$, where $g_{n,t} = z g_{h,t}$.

Thus starting from V_{a,t_0+T^f} and the postulated sequences $\{K_{t-1}\}_{t=t_0}^{t_0+T^f-1}$, $\{N_t\}_{t=t_0}^{t_0+T^f-1}$, $\{C_t\}_{t=t_0}^{t_0+T^f-1}$, and $\{Q_t\}_{t=t_0}^{t_0+T^f-1}$, one can compute sequences of decision rules $\{g_{a,t}, g_{c,t}, g_{h,t}, g_{n,t}, g_{q,t}\}_{t=t_0}^{t_0+T^f-1}$.

Next, given the sequence of decision rules on assets $\{g_{a,t}\}_{t=t_0}^{t_0+T^f-1}$, one can compute a sequence of stochastic kernels $\{P_t\}_{t=t_0}^{t_0+T^f-1}$, from which, starting from the distribution at the beginning of period t_0 λ_{t_0-1} (i.e. the initial steady-state distribution), one can iterate on

$$\forall S_0 = \mathbf{A}_0 \times \mathbf{Z}_0 \in \mathcal{B}(S), \quad \lambda_t(S_0) = \int_S P_t(s, S_0) \lambda_{t-1}(ds)$$

to obtain a sequence of beginning-of-period distributions $\{\lambda_{t-1}\}_{t=t_0}^{t_0+T^f-1}$.

Using all the above ingredients, we can compute sequences of residuals for all $t \in \{t_0, t_0+1, \dots, t_0+T^f-1\}$, defined according to the formulas

$$e_t^K = \hat{K}_t + \bar{B} - \int_S g_{a,t}(s) \lambda_{t-1}(ds),$$

$$e_t^N = N_t - \int_S g_{n,t}(s) \lambda_{t-1}(ds),$$

$$e_t^C = C_t - \int_S g_{c,t}(s) \lambda_{t-1}(ds),$$

$$e_t^Q = Q_t - \int_S g_{q,t}(s) \lambda_{t-1}(ds).$$

All in all, we have constructed a mapping

$$F : (\{K_{t-1}, N_t, C_t, Q_t\}_{t=t_0}^{t_0+T^f-1}) \mapsto (\{e_t^K, e_t^N, e_t^C, e_t^Q\}_{t=t_0}^{t_0+T^f-1}).$$

We borrow SSJ tools from Auclert et al. (2021) to compute the Jacobian of F in the neighborhood of final steady state, \mathcal{J}_F . Letting

$$\vec{Z} \equiv \{K_{t-1}, N_t, C_t, Q_t\}_{t=t_0}^{t_0+T^f-1},$$

we then iterate on the quasi-Newton scheme

$$\vec{Z}^{(k+1)} = \vec{Z}^{(k)} - \mathcal{J}_F^{-1} F(\vec{Z}^{(k)}).$$

We stop the process whenever $\|F(\vec{Z}^{(k)})\| < \epsilon_F$ and $\|\vec{Z}^{(k+1)} - \vec{Z}^{(k)}\| < \epsilon_Z$, where ϵ_F and ϵ_Z are pre-set numerical tolerances.

F The Representative-Agent Model

In the RA version of the model, the dynamic system simplifies to

- Euler equation

$$C_t^{-\sigma} = \beta C_{t+1}^{-\sigma} (1 + (1 - \tau_A) r_{t+1}). \quad (\text{E1})$$

- Labor supply

$$C_t^{-\sigma} \frac{1 - \bar{\tau}}{1 + \tau_C + \Delta_C} (w_t)^{1-\gamma} = \nu H_t^{\eta+\gamma}. \quad (\text{E2})$$

- Aggregate production

$$Y_t = K_{t-1}^\theta (\Omega H_t)^{1-\theta}. \quad (\text{E3})$$

- Demand for capital

$$r_t + \delta = \theta \left(\frac{K_{t-1}}{\Omega H_t} \right)^{\theta-1}. \quad (\text{E4})$$

- Labor demand

$$(1 + \bar{\tau}_S - \Delta_{S,t}) w_t = (1 - \theta) \Omega \left(\frac{K_{t-1}}{\Omega H_t} \right)^\theta. \quad (\text{E5})$$

- Resource constraint

$$C_t + K_t + \bar{G} = (1 - \delta) K_{t-1} + Y_t. \quad (\text{E6})$$

- Government budget constraint

$$(1 - \bar{\tau}_A) r_t \bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C) C_t + (1 + \bar{\tau}_S - \Delta_{S,t}) w_t H_t + \bar{\tau}_A r_t K_{t-1} - \frac{1 - \bar{\tau}}{1 - \gamma} [w_t H_t]^{1-\gamma}. \quad (\text{E7})$$

F.1 Calibration Restrictions

Because of incomplete markets and precautionary savings, the capital stock in the HA model is expected to exceed that in the RA model. Likewise, since individual productivity is set to one in the RA model, there is no distinction between H and N , unlike in the HA case. These differences complicate direct comparisons between the two frameworks. We therefore impose parameter restrictions in the RA economy to ensure that the pre-reform steady states are comparable.

First, we adjust the discount factor so that $r_{HA} = r_{RA}$. Using the Euler equation evaluated in steady state, this imposes the restriction

$$\beta = \frac{1}{1 + (1 - \tau_A)r_{HA}}.$$

Second, we adjust Ω so that $\Omega H_{RA} = N_{HA}$. To this end, we define $c \equiv C/N_{HA}$, $k \equiv K/N_{HA}$, and $y \equiv Y/N_{HA}$. Note that our restriction on r yields

$$k = \left(\frac{\theta}{r_{HA} + \delta} \right)^{\frac{1}{1-\theta}},$$

$$y = k^\theta$$

and

$$c = (1 - s_G)y - \delta k.$$

The labor supply condition then boils down to

$$(cN_{HA})^{-\sigma} \frac{1 - \bar{\tau}}{1 + \tau_C + \Delta_C} \left(\frac{1}{1 + \bar{\tau}_S} (1 - \theta)yN_{HA} \right)^{1-\gamma} = \nu H^{\eta+\gamma}.$$

We solve this equation for H , from which we deduce $\Omega = N_{HA}/H$.

Finally, note that even if the pre-reform steady-state values of r , w , C , Y , K coincide in the HA and RA economies, the level of transfers which balances the government budget constraint will differ, due to the Jensen inequality.

In the RA economy, the value of \bar{T} obeys the restriction

$$\bar{T} = (\bar{\tau}_C c + (1 - \theta)y + \tau_A r_{HA} k - (1 - \bar{\tau}_A)r_{HA} s_B y - s_G y) N_{HA} - \frac{1 - \bar{\tau}}{1 - \gamma} \left(\frac{1}{1 + \bar{\tau}_S} (1 - \theta)yN_{HA} \right)^{1-\gamma}.$$

F.2 Pre-Reform Steady State

In the pre-reform steady state, we impose $G = s_G Y$ and $B = s_B Y$, exactly as in the calibration procedure above. The system then boils down to

$$1 = \beta(1 + (1 - \tau_A)r), \tag{F8}$$

$$C^{-\sigma} \frac{1-\bar{\tau}}{1+\tau_C} (w)^{1-\gamma} = \nu H^{\eta+\gamma}, \quad (\text{E9})$$

$$Y = K^\theta (\Omega H)^{1-\theta}, \quad (\text{E10})$$

$$r + \delta = \theta \left(\frac{K}{\Omega H} \right)^{\theta-1}, \quad (\text{E11})$$

$$(1 + \bar{\tau}_S) w = (1 - \theta) \Omega \left(\frac{K}{\Omega H} \right)^\theta, \quad (\text{E12})$$

$$C + K = (1 - \delta)K + (1 - s_G)Y. \quad (\text{E13})$$

This system has a closed-form solution. Using Equation (E8), we can solve for r . Then, using Equation (E11), we can solve for $k \equiv K/(\Omega H)$. Then, using Equation (E12), we can solve for w . Using Equations (E10) and (E13), we can solve for $y \equiv Y/(\Omega H)$ and $c \equiv C/(\Omega H)$.

It follows that Equation (E9) can be rewritten as

$$(c\Omega H)^{-\sigma} \frac{1-\bar{\tau}}{1+\tau_C} (w)^{1-\gamma} = \nu H^{\eta+\gamma} \iff H = \left(\frac{1}{\nu} (c\Omega)^{-\sigma} \frac{1-\bar{\tau}}{1+\tau_C} (w)^{1-\gamma} \right)^{\frac{1}{\eta+\gamma+\sigma}}.$$

Having solved for H , we can back out C , Y , and K .

E3 Post-Reform Steady State

In the post-reform steady state, the system is

$$1 = \beta(1 + (1 - \tau_A)r). \quad (\text{E14})$$

$$C^{-\sigma} \frac{1-\bar{\tau}}{1+\tau_C + \Delta_C} (w)^{1-\gamma} = \nu H^{\eta+\gamma}. \quad (\text{E15})$$

$$Y = K^\theta (\Omega H)^{1-\theta}. \quad (\text{E16})$$

$$r + \delta = \theta \left(\frac{K}{\Omega H} \right)^{\theta-1}. \quad (\text{E17})$$

$$(1 + \bar{\tau}_S - \Delta_S) w = (1 - \theta) \Omega \left(\frac{K}{\Omega H} \right)^\theta. \quad (\text{E18})$$

$$C + \bar{G} = Y - \delta K. \quad (\text{E19})$$

$$(1 - \bar{\tau}_A)r\bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C)C + (1 + \bar{\tau}_S - \Delta_S)wH + \bar{\tau}_A rK - \frac{1 - \bar{\tau}}{1 - \gamma}[wH]^{1-\gamma}. \quad (\text{E20})$$

This system does not admit an analytical solution. Yet, we can use a numerical procedure to solve it. To begin with, let us restate this system as a simpler two-equation-two-unknown system.

We first note that r and $k \equiv K/(\Omega H)$ are both invariant to the reform. We henceforth treat them simply as composite parameters. Then, using Equation (E.19), we can express C as a function of H

$$C : H \mapsto (k^\theta - \delta k)\Omega H - \bar{G}.$$

The problem then boils down to finding the roots of the system

$$(H, \Delta_S) \mapsto (\epsilon_H(H, \Delta_S), \epsilon_{\Delta_S}(H, \Delta_S))$$

where

$$\begin{aligned} \epsilon_H(H, \Delta_S) &= C(H)^{-\sigma} \frac{1 - \bar{\tau}}{1 + \bar{\tau}_C + \Delta_C} \left(\frac{(1 - \theta)\Omega k^\theta}{1 + \bar{\tau}_S - \Delta_S} \right)^{1-\gamma} - \nu H^{\eta+\gamma}, \\ \epsilon_{\Delta_S}(H, \Delta_S) &= (\bar{\tau}_C + \Delta_C)C(H) + \left[(1 - \theta)k^\theta + \bar{\tau}_A r k \right] \Omega H - \frac{1 - \bar{\tau}}{1 - \gamma} \left[\frac{(1 - \theta)k^\theta}{1 + \bar{\tau}_S - \Delta_S} \Omega H \right]^{1-\gamma} - (1 - \bar{\tau}_A)r\bar{B} + \bar{G} + \bar{T}. \end{aligned}$$

Once this is achieved, we can back out all the other aggregate variables.

F4 Solving for the Transition in the Representative-Agent Version of the Model

We use the EGM to solve the model. We begin by specifying a grid G_K of values for K_i . Next, we postulate initial decision rules on capital $g_K^{(0)}$ and on labor $g_H^{(0)}$. Thus, for each $K_i \in G_K$, $g_K^{(0)}(K_i)$ and $g_H^{(0)}(K_i)$ are the associated capital stock for next period and the current labor supply.

We initially freeze the decision rule on labor. Then, for each $K_i \in G_K$, we define

$$\Xi_i = (1 - \delta)K_i + K_i^\theta (\Omega g_H^{(0)}(K_i))^{1-\theta} - \bar{G}$$

$$R_i = 1 + (1 - \tau_A) \left(\theta \left(\frac{K_i}{\Omega g_H^{(0)}(K_i)} \right)^{\theta-1} - \delta \right).$$

Using the Euler condition, Equation (E.1), we can then back out an analog version of Ξ on the endogenous grid, labelled $\hat{\Xi}$, the i -th element of which is defined for each $K_i \in G_K$ as

$$\hat{\Xi}_i = \left(\beta R_i (\Xi_i - g_K^{(0)}(K_i))^{-\sigma} \right)^{-\frac{1}{\sigma}} + K_i.$$

Thus, given $g_H^{(0)}$, we obtain a mapping $\hat{\Xi}_i \mapsto G_K(i)$. Using linear interpolation techniques, we can evaluate this mapping on Ξ , yielding an updated decision rule on capital $g_K^{(1)}$. We iterate on these steps until convergence to g_K (still conditional on $g_H^{(0)}$).

Given g_K and $g_H^{(0)}$, we use Equation (F.19) to back out consumption on the grid for each $K_i \in G_K$

$$C_i = \Xi_i - g_K(K_i)$$

Next, defining for each $K_i \in G_K$

$$k_i \equiv \frac{K_i}{\Omega g_H^{(0)}(K_i)}$$

and using Equation (F.7), we obtain

$$\Delta_{S,i} = 1 + \bar{\tau}_S - \frac{(1 - \theta)k_i^\theta \Omega g_H^{(0)}(K_i)}{\left[\frac{1-\gamma}{1-\bar{\tau}} \left((\bar{\tau}_C + \Delta_C)C_i + (1 - \theta)k_i^\theta \Omega g_H^{(0)}(K_i) + \bar{\tau}_A (\theta k_i^{\theta-1} - \delta) K_i - ((1 - \bar{\tau}_A) (\theta k_i^{\theta-1} - \delta) \bar{B} + \bar{G} + \bar{T}) \right) \right]^{\frac{1}{1-\gamma}}}. \quad (\text{F.21})$$

Finally, we update $g_H^{(0)}$. We use Equation (F.2) yielding

$$H_i = \left(\frac{1}{v} C_i^{-\sigma} \frac{1 - \bar{\tau}}{1 + \bar{\tau}_C + \Delta_C} \left(\frac{1}{1 + \bar{\tau}_S - \Delta_{S,i}} (1 - \theta) \Omega^{1-\theta} K_i^\theta \right)^{1-\gamma} \right)^{\frac{1}{\eta+1-(1-\theta)(1-\gamma)}}.$$

Hence, we obtain a mapping $K_i \mapsto H_i$, which defines an updated decision rule $g_H^{(1)}$. If $\|g_H^{(1)} - g_H^{(0)}\| < \epsilon_H$, where ϵ_H is a preset tolerance, we can stop. Else, we repeat the same steps as before, using $g_H^{(1)}$ in lieu of $g_H^{(0)}$.

Upon convergence, we obtain decision rules on K , H , and Δ_S , namely g_K , g_H , and g_{Δ_S} . Setting the initial condition to the pre-reform capital stock, we can iterate on these decision rules to obtain paths for labor, capital, and the cut in payroll taxes, from which we can reconstruct paths for all the aggregate variables.

G Welfare Analysis

G.1 Welfare Analysis in the HA Version of the Model

We now turn to the computation of the different welfare measures considered in the paper. In each case, the key object is the value function associated with the individual problem. Let $V_*^N(s)$ denote the value function of an agent with state s in the pre-reform steady state, and $V_*^R(s)$ the corresponding function in the post-reform steady state. Finally, $V_t^R(s)$ denotes the value function of an agent with state s at time t along the transition to the post-reform steady state.

We approximate these value functions as follows. Generically, given the sequence of decision rules on assets, consumption, and labor, the sequence of value functions obeys the backward induction recursion

$$V_t(a, z) = \frac{1}{1-\sigma} (g_{c,t}(a, z))^{1-\sigma} - \frac{\nu}{1+\eta} (g_{h,t}(a, z))^{1+\eta} + \beta \sum_{z' \in \mathbf{Z}} V_{t+1}(g_{a,t}(a, z), z') \Pi(z, z'), \quad \forall (a, z) \in \mathbf{S}.$$

We use this fact to devise an algorithm to compute V_t . Formally, we define each value function on the grid $G_a \times G_z$. Since a given value function V_{t+1} is evaluated on $G_a \times G_z$, we can use interpolation techniques to evaluate $V_{t+1}(g_{a,t}(a', z), z')$.

We start by computing $V_*^N(s)$ and $V_*^R(s)$ by iterating on the above recursion, using the corresponding steady-state decision rules. We then use $V_*^R(s)$ as the initial condition of the recursion required to compute $\{V_t^R(s)\}_{t=t_0}^{t_0+T^f-1}$ for all $s \in G_a \times G_z$.

By construction, $V_{t_0}^R(s)$ is the value function just after the reform. We can thus compare $V_{t_0}^R(s)$ with its pre-reform steady-state counterpart $V_*^N(s)$. We are also interested in comparing the post-reform steady-state individual welfare $V_*^R(s)$ with $V_*^N(s)$.

We define the individual consumption compensation $\omega(a, z)$ as the solution to the equation

$$\mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} (u((1+\omega(a, z))c_t^N) - v(h_t^N)) \mid a, z \right] = V_{t_0}^R(a, z),$$

where $\{c_t^N\}_{t=t_0}^{\infty}$ and $\{h_t^N\}_{t=t_0}^{\infty}$ denote feasible paths for individual consumption and labor supply, respectively, starting from the initial state $s = (a, z)$ in the pre-reform steady state. Thus $\omega(a, z)$ is the consumption compensation that would make an individual agent with initial condition $s = (a, z)$ indifferent between staying in the pre-reform steady state or going through the transition triggered by the reform.

Note that by construction:

$$V_*^N(a, z) = \mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} (u(c_t^N) - v(h_t^N)) \mid a, z \right].$$

Thus

$$((1+\omega(a, z))^{1-\sigma} - 1) \mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} u(c_t^N) \mid a, z \right] = V_{t_0}^R(a, z) - V_*^N(a, z).$$

We then define

$$U_*^N(a, z) \equiv \mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} u(c_t^N) \mid a, z \right],$$

and note that

$$U_*^N(a, z) = \frac{1}{1-\sigma} (g_{c,t}(a, z))^{1-\sigma} + \beta \sum_{z' \in \mathbf{Z}} U_*^N(g_{a,t}(a, z), z') \Pi(z, z'), \quad \forall (a, z) \in \mathbf{S}.$$

We use this expression to compute $U_*^N(a, z)$, using the same techniques as those used to compute $V_*^N(a, z)$.

Hence, we obtain

$$\omega(a, z) = \left(1 + \frac{V_{t_0}^R(a, z) - V_*^N(a, z)}{U_*^N(a, z)} \right)^{\frac{1}{1-\sigma}} - 1, \quad \forall (a, z) \in \mathbf{S}.$$

Finally, we are also interested in the Utilitarian compensation parameter ω_{HA} , defined as the solution to the equation

$$\int_{\mathcal{S}} \mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} (u((1 + \omega_{HA})c_t^N) - v(h_t^N)) \middle| a, z \right] \lambda_{t_0-1}(ds) = \int_{\mathcal{S}} V_{t_0}^R(s) \lambda_{t_0-1}(ds)$$

Thus ω_{HA} is the compensation parameter that equalizes the Utilitarian welfare in the pre-reform steady state with the Utilitarian welfare immediately after the reform.

By the same logic as above, we obtain

$$((1 + \omega_{HA})^{1-\sigma} - 1) \int_{\mathcal{S}} \mathbb{E} \left[\sum_{t=t_0}^{\infty} \beta^{t-t_0} u(c_t^N) \middle| a, z \right] \lambda_{t_0-1}(ds) = \int_{\mathcal{S}} (V_{t_0}^R(s) - V_*^N(s)) \lambda_{t_0-1}(ds),$$

so that

$$\omega_{HA} = \left(1 + \frac{\int_{\mathcal{S}} (V_{t_0}^R(s) - V_*^N(s)) \lambda_{t_0-1}(ds)}{\int_{\mathcal{S}} U_*^N(s) \lambda_{t_0-1}(ds)} \right)^{\frac{1}{1-\sigma}} - 1.$$

We can also compute the individual and Utilitarian compensation parameters, this time ignoring the transition. These are best interpreted as the compensations that would make an individual agent or the social planner indifferent between (i) staying in the initial steady state or (ii) moving to another country/economy in which the reform was enacted ages ago. This time, the individual compensation would be given by

$$\omega^{\text{nt}}(a, z) = \left(1 + \frac{V_*^R(a, z) - V_*^N(a, z)}{U_*^N(a, z)} \right)^{\frac{1}{1-\sigma}} - 1.$$

Likewise, the Utilitarian compensation would be given by

$$\omega_{HA}^{\text{nt}} = \left(1 + \frac{\int_{\mathcal{S}} (V_*^R(s) - V_*^N(s)) \lambda_{t_0-1}(ds)}{\int_{\mathcal{S}} U_*^N(s) \lambda_{t_0-1}(ds)} \right)^{\frac{1}{1-\sigma}} - 1.$$

G.2 Welfare Analysis in the RA Version of the Model

Our final step is to compute welfare immediately after the reform. The approximate solution provides finite paths for post-reform consumption $\{C_t^R\}_{t=t_0}^{t_0+T^f-1}$ and labor $\{H_t^R\}_{t=t_0}^{t_0+T^f-1}$. Let C_*^R and H_*^R denote the post-reform steady-state levels of consumption and labor, and C_*^N and H_*^N their pre-reform counterparts.

As before, we assume that the transition takes T^f periods, from $t = t_0$ to $t = t_0 + T^f - 1$. From period $t = T_0 + T^f$ on, we assume that the economy has reached its final (post-reform) steady state. Hence, the level of welfare reached immediately after the reform is enacted can then be approximated as

$$\mathcal{W}_{t_0}^R = \sum_{t=t_0}^{t_0+T^f-1} \beta^{t-t_0} \left(\frac{(C_t^R)^{1-\sigma}}{1-\sigma} - v \frac{(H_t^R)^{1+\eta}}{1+\eta} \right) + \frac{\beta^{T^f}}{1-\beta} \left(\frac{(C_*^R)^{1-\sigma}}{1-\sigma} - v \frac{(H_*^R)^{1+\eta}}{1+\eta} \right).$$

Now, imagine, as before, that all the agents in the pre-reform steady state see their consumption inflated by a factor $1 + \omega$, where ω is selected to that the representative agent is indifferent between the status quo

and the reform, i.e.

$$\mathcal{W}_{t_0}^R = \frac{1}{1-\beta} \left(\frac{((1+\omega)C_*^N)^{1-\sigma}}{1-\sigma} - v \frac{(H_*^N)^{1+\eta}}{1+\eta} \right).$$

Finally, consider an agent in the initial, uncompensated steady state, with welfare

$$\mathcal{W}_*^N = \frac{1}{1-\beta} \left(\frac{(C_*^N)^{1-\sigma}}{1-\sigma} - v \frac{(H_*^N)^{1+\eta}}{1+\eta} \right).$$

The compensation ω that would make the representative agent indifferent between (i) staying in the pre-reform steady state (holding the labor supply constant to the pre-reform steady-state level) and (ii) going through the transition toward the post-reform steady state is then

$$\omega = \left(\frac{\mathcal{W}_{t_0}^R - \mathcal{W}_*^N}{\frac{1}{(1-\beta)(1-\sigma)} (C_*^N)^{1-\sigma} + 1} \right)^{\frac{1}{1-\sigma}} - 1.$$

Equivalently, we have

$$\omega = \frac{\left[(1-\sigma) \left((1-\beta) \mathcal{W}_{t_0}^R + v \frac{(H_*^N)^{1+\eta}}{1+\eta} \right) \right]^{\frac{1}{1-\sigma}}}{C_*^N} - 1.$$

We can also compute the compensation parameter, this time ignoring the transition. Again, this is best interpreted as the compensation that would make the representative agent indifferent between (i) staying in the initial steady state or (ii) moving to another economy in which the reform was enacted very long ago. This time, ω would be given by

$$\omega^{\text{nt}} = \frac{\left[(1-\sigma) \left((1-\beta) \mathcal{W}_*^R + v \frac{(H_*^N)^{1+\eta}}{1+\eta} \right) \right]^{\frac{1}{1-\sigma}}}{C_*^N} - 1.$$

where

$$\mathcal{W}_*^R = \frac{1}{1-\beta} \left(\frac{(C_*^R)^{1-\sigma}}{1-\sigma} - v \frac{(H_*^R)^{1+\eta}}{1+\eta} \right).$$

H The Small-Open Economy Version of the HA Model

This section expounds the sequential representation of the model economy. Because we are considering a small-open-economy version of our setup, we let \bar{r} denote the *exogenous* world interest rate.

H.1 Sequential Representation of the Model

The dynamic system is:

- Aggregate production

$$Y_t = K_{t-1}^\theta (\Omega N_t)^{1-\theta} \tag{H.1}$$

- Demand for capital

$$\bar{r} + \delta = \theta \left(\frac{K_{t-1}}{\Omega N_t} \right)^{\theta-1} \tag{H.2}$$

- Labor demand

$$(1 + \bar{\tau}_S - \Delta_{S,t})w_t = (1 - \theta)\Omega \left(\frac{K_{t-1}}{\Omega N_t} \right)^\theta \quad (\text{H.3})$$

- Resource constraint

$$C_t + K_t + \bar{G} + NX_t = (1 - \delta)K_{t-1} + Y_t \quad (\text{H.4})$$

- Individual problem in state $s = (a, z)$

$$\begin{aligned} V_t(a, z) &= \max_{c, h, a'} \left\{ \frac{c^{1-\sigma}}{1-\sigma} - v \frac{h^{1+\eta}}{1+\eta} + \beta \sum_{z' \in \mathbf{Z}} V_{t+1}(a', z') \Pi(z, z') \right\} \\ \text{s.t.} \quad (1 + \bar{\tau}_C + \Delta_C)c + a' &= [1 + (1 - \bar{\tau}_A)\bar{r}]a + \frac{1 - \bar{\tau}}{1 - \gamma} (w_t h z)^{1-\gamma} + \bar{T}, \\ a' &\geq 0, \quad c > 0, \quad h \geq 0. \end{aligned} \quad (\text{H.5})$$

The solution to the individual problem yields decision rules on assets $g_{a,t}(a, z)$, consumption $g_{c,t}(a, z)$, and labor supply $g_{h,t}(a, z)$.

- Markov transition

$$\forall \mathbf{S}_0 = \mathbf{A}_0 \times \mathbf{Z}_0 \in \mathcal{B}(\mathbf{S}), \quad P_t(s, \mathbf{S}_0) = \sum_{z' \in \mathbf{Z}_0} \Pi(z, z') \mathbb{1}[g_{a,t}(a, z) \in \mathbf{A}_0] \quad (\text{H.6})$$

- Law of motion of distribution

$$\forall \mathbf{S}_0 = \mathbf{A}_0 \times \mathbf{Z}_0 \in \mathcal{B}(\mathbf{S}), \quad \lambda_t(\mathbf{S}_0) = \int_{\mathbf{S}} P_t(s, \mathbf{S}_0) \lambda_{t-1}(ds) \quad (\text{H.7})$$

- Aggregate savings

$$A_t = \int_{\mathbf{S}} g_{a,t}(s) \lambda_{t-1}(ds) \quad (\text{H.8})$$

- Aggregate labor supply

$$N_t = \int_{\mathbf{S}} z g_{h,t}(s) \lambda_{t-1}(ds). \quad (\text{H.9})$$

- Aggregate consumption

$$C_t = \int_{\mathbf{S}} g_{c,t}(s) \lambda_{t-1}(ds). \quad (\text{H.10})$$

- Equilibrium on the capital market

$$A_t = K_t + \bar{B} + NFA_t \quad (\text{H.11})$$

- Government budget constraint

$$\bar{r}\bar{B} + \bar{G} + \bar{T} = (\bar{\tau}_C + \Delta_C)C_t + (1 + \bar{\tau}_S - \Delta_{S,t})w_t N_t + \bar{\tau}_A \bar{r} A_{t-1} - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathbf{S}} [w_t z g_{h,t}(s)]^{1-\gamma} \lambda_{t-1}(ds). \quad (\text{H.12})$$

Note that the previous equations taken together imply the dynamics of net foreign assets

$$NFA_t = (1 + \bar{r})NFA_{t-1} + NX_t. \quad (\text{H.13})$$

As before, in the fiscal reform considered here, transfers, debt, and government consumption are set to \bar{T} , \bar{B} , and \bar{G} , respectively. The quantities \bar{G} , \bar{T} , and \bar{B} correspond to the pre-reform steady-state values of government expenditures, transfers, and debt, respectively.²⁹

H.2 Solving for the Pre-Reform Steady State

In the pre-reform steady state, we impose

$$G = s_G Y, \quad B = s_B Y.$$

Since the real interest rate is constant, we have

$$\frac{K_{t-1}}{\Omega N_t} = k \equiv \left(\frac{\theta}{\bar{r} + \delta} \right)^{\frac{1}{1-\theta}}.$$

Hence

$$w = \frac{1}{1 + \bar{r}_S} (1 - \theta) \Omega k^\theta.$$

We postulate a value for T . Using this value, we can solve the individual problem:

$$\begin{aligned} V_t(a, z) &= \max_{c, h, a'} \left\{ \frac{c^{1-\sigma}}{1-\sigma} - v \frac{h^{1+\eta}}{1+\eta} + \beta \sum_{z' \in \mathcal{Z}} V_{t+1}(a', z') \Pi(z, z') \right\} \\ \text{s.t.} \quad (1 + \bar{r}_C)c + a' &= [1 + (1 - \tau_A)\bar{r}]a + \frac{1 - \bar{r}}{1 - \gamma} (whz)^{1-\gamma} + T, \\ a' &\geq 0, \quad c > 0, \quad h \geq 0. \end{aligned}$$

The solution to the individual problem yields decision rules on assets $g_a(a, z)$, consumption $g_c(a, z)$, and labor supply $g_h(a, z)$. We can then compute the Markov transition

$$\forall \mathcal{S}_0 = \mathcal{A}_0 \times \mathcal{Z}_0 \in \mathcal{B}(\mathcal{S}), \quad P(s, \mathcal{S}_0) = \sum_{z' \in \mathcal{Z}_0} \Pi(z, z') \mathbb{1}[g_a(a, z) \in \mathcal{A}_0].$$

²⁹Note that in the above list, we are imposing the individual budget constraint for each possible $s \in \mathcal{S}$. Integrating these constraints yields

$$(1 + \bar{r}_C + \Delta_C)C_t + A_t = w_t N_t + [1 + (1 - \tau_A)\bar{r}]A_{t-1} - (Q_t) + \bar{T}.$$

Combining this with the government's budget constraint and after straightforward manipulations, we arrive at

$$(A_t - K_t - \bar{B}) = (1 + \bar{r})(A_{t-1} - K_{t-1} - \bar{B}) + NX_t.$$

We thus conclude, as expected, that

$$NFA_t = A_t - K_t - \bar{B},$$

confirming our earlier definition.

The steady-state distribution then obeys

$$\forall \mathbf{S}_0 = \mathbf{A}_0 \times \mathbf{Z}_0 \in \mathcal{B}(\mathbf{S}), \quad \lambda(\mathbf{S}_0) = \int_{\mathbf{S}} P(s, \mathbf{S}_0) \lambda(ds).$$

After having solved for λ , we can then back out

$$N = \int_{\mathbf{S}} z g_h(s) \lambda(ds), \quad A = \int_{\mathbf{S}} g_a(s) \lambda(ds), \quad C = \int_{\mathbf{S}} g_c(s) \lambda(ds).$$

Hence, we know

$$K = kN, \quad Y = K^\theta (\Omega N)^{1-\theta}.$$

We can then back out the trade balance

$$NX = Y - \delta K - C - \bar{G}.$$

Note that

$$NX = -\bar{r} NFA.$$

Finally, using the government's budget constraint, we obtain

$$T^s = \bar{\tau}_C C + (1 + \bar{\tau}_S) w N + \bar{\tau}_A \bar{r} A - \frac{1 - \bar{\tau}}{1 - \gamma} \int_{\mathbf{S}} [w z g_h(s)]^{1-\gamma} \lambda(ds) - (\bar{r} s_B + s_G) Y.$$

We thus define $e(T) = T - T^s$. Hence we defined a mapping $T \mapsto e(T)$, the zero of which is the solution to the steady state problem.

H.3 Solving for the Post-Reform Steady State

Since the real interest rate is constant, we have

$$\frac{K_{t-1}}{\Omega N_t} = k \equiv \left(\frac{\theta}{\bar{r} + \delta} \right)^{\frac{1}{1-\theta}}.$$

We postulate a value for Δ_S . Hence

$$w = \frac{1}{1 + \bar{\tau}_S - \Delta_S} (1 - \theta) \Omega k^\theta.$$

We can solve the individual problem:

$$\begin{aligned} V_t(a, z) &= \max_{c, h, a'} \left\{ \frac{c^{1-\sigma}}{1-\sigma} - \nu \frac{h^{1+\eta}}{1+\eta} + \beta \sum_{z' \in \mathbf{Z}} V_{t+1}(a', z') \Pi(z, z') \right\} \\ \text{s.t.} \quad & (1 + \bar{\tau}_C + \Delta_C) c + a' = [1 + (1 - \tau_A) \bar{r}] a + \frac{1 - \bar{\tau}}{1 - \gamma} (w h z)^{1-\gamma} + \bar{T}, \\ & a' \geq 0, \quad c > 0, \quad h \geq 0. \end{aligned}$$

The solution to the individual problem yields decision rules on assets $g_a(a, z)$, consumption $g_c(a, z)$, and labor supply $g_h(a, z)$. We can then compute the Markov transition

$$\forall S_0 = A_0 \times Z_0 \in \mathcal{B}(S), \quad P(s, S_0) = \sum_{z' \in Z_0} \Pi(z, z') \mathbb{1}[g_a(a, z) \in A_0].$$

The steady-state distribution then obeys

$$\forall S_0 = A_0 \times Z_0 \in \mathcal{B}(S), \quad \lambda(S_0) = \int_S P(s, S_0) \lambda(ds).$$

We can then back out

$$N = \int_S z g_h(s) \lambda(ds), \quad A = \int_S g_a(s) \lambda(ds), \quad C = \int_S g_c(s) \lambda(ds).$$

Hence, we know

$$K = kN, \quad Y = K^\theta (\Omega N)^{1-\theta}.$$

We can then back out the trade balance

$$NX = Y - \delta K - C - \bar{G}.$$

Note that

$$NX = -\bar{r}NFA.$$

Finally, using the government's budget constraint, we obtain

$$\Delta_S^s = \frac{1}{wN} \left[(\bar{\tau}_C + \Delta_C)C + (1 + \bar{\tau}_S)wN + \bar{\tau}_A \bar{r}A - \frac{1 - \bar{\tau}}{1 - \gamma} \int_S [wz g_h(s)]^{1-\gamma} \lambda(ds) - (\bar{r}\bar{B} + \bar{G} + \bar{T}) \right].$$

We thus define $e(\Delta_S) = \Delta_S - \Delta_S^s$. Hence we defined a mapping $\Delta_S \mapsto e(\Delta_S)$, the zero of which is the solution to the steady state problem.

I Calibration and Additional Details

I.1 Calibration

In this subsection, we describe our calibration targets, details concerning the associated data sources, and how we implement the calibration procedure per se..

I.1.1 Data Limitations

- The most recent available fiscal data (concerning, notably, the implicit tax rates, ITR's henceforth) from the European Commission end in 2020

- The most recent available Insee data on the distribution of revenues end in 2022
- All the other sources allow us to go up to 2024

Our strategy is then to use 2022 as the reference year for the calibration, except for fiscal data, for which we fall back to 2020 as the reference year.

I.1.2 Total Hours Worked

- Total hours worked per worker in level on average 1960-2022 $H^l = 1704.45$ hours per year
- Source: OECD Economic Outlook
- Available discretionary hours in a year $D * H^m = 365 * (24 - 8)$
- Hence our target for hours is $H = 0.2919$

I.1.3 Capital-Output Ratio Data

- Average K/Y over 1960-2021 period $k = 2.9415$
- Source: AMECO, 2022

I.1.4 Investment-Output Ratio Data

- Average I/Y over 1960-2021 period $\iota = 0.2306$
- Source: AMECO, 2022.

Note that since k and ι are both calibration targets, this puts an immediate restriction on δ .

I.1.5 Net Wealth Inequality Data

- Gini coefficient $G_a = 0.7037$
- Share of wealth held by the 10% richest $S_{10} = 0.5373$
- Share of wealth held by the 5% richest $S_{05} = 0.4015$
- Source: ECB-DWA, in 2022

I.1.6 Income (per consumption unit) Inequality Data

- Gini coefficient $G_y = 0.2940$
- Interdecile ratio $D9/D1 = 3.38$
- Source: Insee, “Niveau de vie et pauvreté”, 2024, with data for 2022.

I.1.7 Public Debt and Government Consumption Data

- Government debt / GDP (annual) $s_B \equiv B/Y = 1.11365$
- Government consumption / GDP (annual) $s_G \equiv G/Y = 0.24625$
- Source: ECB-SDW, in 2022

I.1.8 Taxation Data for France

- Main source: Taxation Trends in the European Union, European Commission, DG Taxation & Customs Union, 2022
- We strive to match the various ITR reported in this document

Consumption Taxes

- In 2020, the ITR on consumption is $\bar{\tau}_C = 0.1796$
- This is drawn from graph 12 in the 2022 edition of Taxation Trends.

Capital Income Taxes

- In 2020, the ITR on capital income is $\bar{\tau}_A = 0.3523$
- This is drawn from graph 19 in the 2022 edition of Taxation Trends.

ITR on Labor Income

- From graph 16, in 2020, we have $ITR_E = 0.4001$
- From graph 16, in 2020, we also have $\bar{\tau}_S = SSC_E + \text{Payroll taxes} = 0.2309$
- In the model, ITR is defined as

$$ITR_E = \frac{\int \tau(wzh(s))\lambda(ds) + \bar{\tau}_S wN}{(1 + \bar{\tau}_S)wN}$$

Table I.1: Model and Data Moments

Target	Data	Model
Total hours worked ^a	0.2919	0.2926
Capital-output ratio K/Y ^b	2.9415	2.9415
Investment-output ratio I/Y ^b	0.2306	0.2303
100 – S90 wealth ^c	0.5373	0.5372
100 – S95 wealth (%) ^c	0.4015	0.4015
Gini coefficient, wealth (%) ^c	0.7037	0.7075
Gini coefficient, disposable income (%) ^d	0.2940	0.2992
$D9/D1$ disposable income (%) ^d	3.3800	3.3797
Implicit tax rate on labor ^e	0.4001	0.4001

Note: $D9/D1$ stands for interdecile ratio, 100 – S90 is the share of total wealth held by the 10% richest, while 100 – S95 is the share held by the 5% richest. Disposable income in the model is defined as $wzh(s) - \tau(wzh(s)) + (1 - \bar{\tau}_A)ra + \bar{T}$.

Source: ^a OECD Economic Outlook, ^b AMECO, ^c ECB Distributional Wealth Accounts, ^d Insee, ^e European Commission.

- Recall that

$$\tau(y) = y - \frac{1 - \bar{\tau}}{1 - \gamma} y^{1-\gamma}$$

- Hence

$$ITR_E = 1 - \frac{1 - \bar{\tau}}{1 - \gamma} \frac{\int (wzh(s))^{1-\gamma} \lambda(ds)}{(1 + \bar{\tau}_S)wN}$$

- Note that since λ is an equilibrium object, it depends on $\bar{\tau}$. Hence, the above equation is not analytical.

I.1.9 Empirical Performance

Having defined the calibration targets, we collect them in a vector m . The model-implied moments are denoted $m(\theta)$, where $\theta \in \Theta$ is the vector of calibrated parameters. This vector includes the depreciation rate δ , the scale parameter in the labor income tax schedule $\bar{\tau}$, the discount factor β , the disutility-of-labor scale parameter ν , the persistence of individual productivity shocks ρ_z , their standard deviation σ_z , the probability of reaching the “superstar” state p_{ns} , the probability of remaining in the “superstar” state p_{ss} , and the highest productivity level expressed as a fraction of the preceding one, z_{n_z+1}/z_{n_z} (with $n_z = 7$).

Notice that we also directly calibrate s_G , s_B , $\bar{\tau}_C$, and $\bar{\tau}_A$ from the data listed above. However, there is no numerical procedure involved here as these calibration targets can be matched perfectly without solving for the equilibrium.

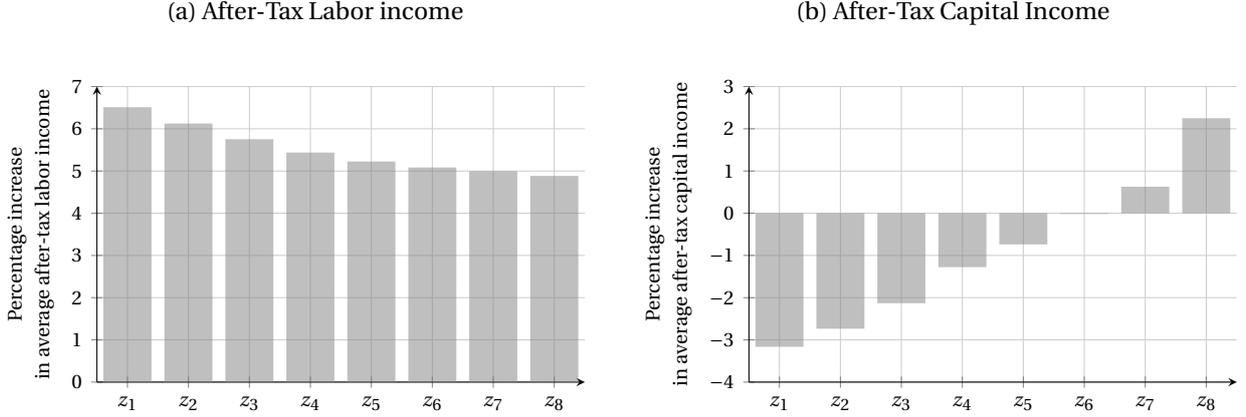
The vector of calibrated parameters is then

$$\hat{\theta} = \operatorname{argmin}_{\theta \in \Theta} (m - m(\theta))' W (m - m(\theta))$$

where W is a weighting matrix, which we take as the identity in the present case.

Table I.1 reports the nine moments used in the calibration procedure, together with their model counterpart, showcasing the overall quality of the model’s fit.

Figure I.1: Distribution of Changes in After-Tax Labor and Capital Incomes Across Individual Productivity Levels



Note: For each individual productivity level z_i , $i \in \{1, \dots, 8\}$, we compute the percentage variation in the average after-tax labor income (left chart) or in the average after-tax capital income (right chart) after a Fiscal Rebalancing reform with $\Delta_C = 0.03$.

I.2 Decomposing the Relative Change in Disposable Income Per Individual Productivity Levels

Figure 4a in the main text shows the relative change in average disposable income. As argued there, the associated declining pattern is the result of two different forces: changes in after-tax labor income and changes in after-tax capital income. In this appendix, we provide the associated decomposition.

For an individual in state $s = (a, z)$, after-tax labor income is

$$\frac{1 - \bar{\tau}}{1 - \gamma} (wz g_h(a, z))^{1-\gamma}.$$

The average after-tax labor income associated with a particular z is simply the integral of the above expression with respect to a , divided by the mass of agents with the particular z , i.e. $\pi(z)$.

Likewise, for an individual in state $s = (a, z)$, after-tax capital income is

$$(1 - \bar{\tau}_A) r a.$$

As before, the average after-tax capital income associated with a particular z is simply the integral of the above expression with respect to a , divided by the mass of agents with the particular z , i.e. $\pi(z)$.

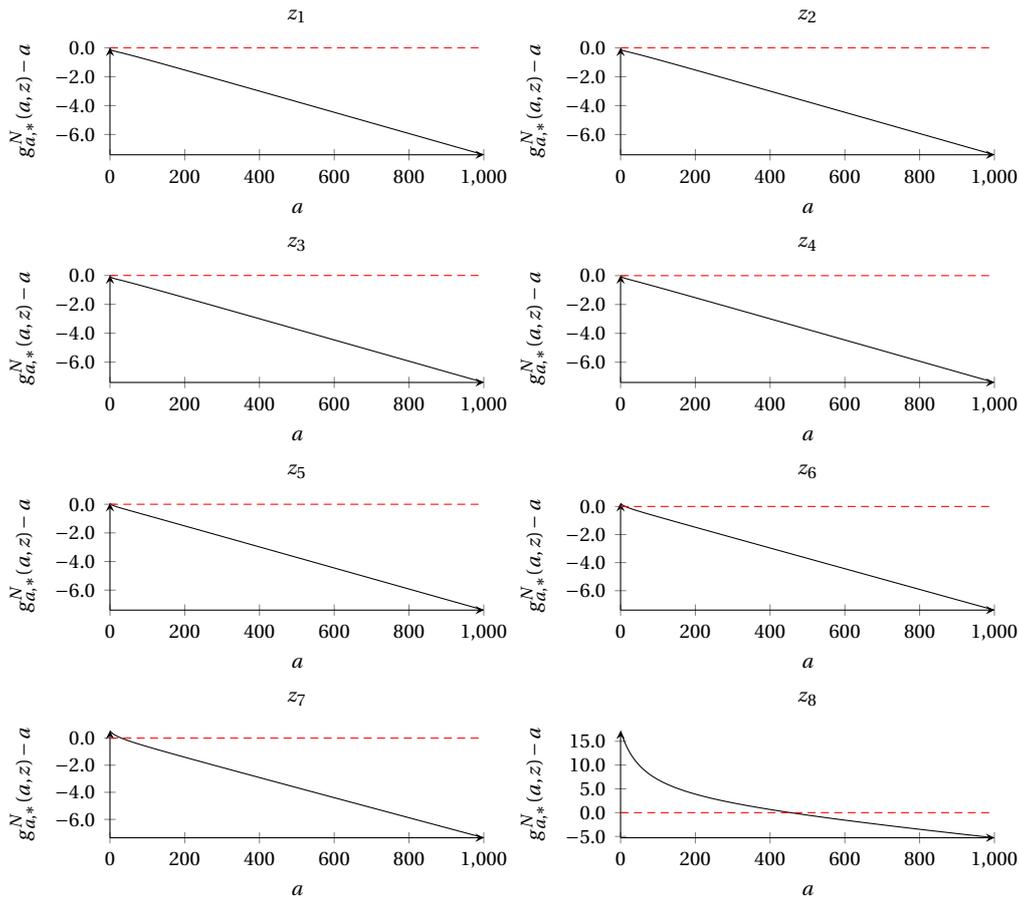
Figures I.1a and I.1b decompose disposable income into its labor and capital components. Figure I.1a reports the relative change in average after-tax labor income by productivity level, while Figure I.1b shows the corresponding change in after-tax capital income.

The change in average after-tax labor income declines with z : agents with lower productivity levels experience larger relative gains. This pattern reflects both the progressivity of the tax schedule and the fact that high- z agents are, on average, wealthier, so that the negative wealth effect on labor supply dampens their gains.

By contrast, the change in average after-tax capital income is negative for low- z agents but positive for higher z . For high productivity levels, the increase in wealth more than offsets the decline in the interest rate, generating relative gains in financial income.

Finally, as argued in Section 4.3, low- z agents were already decumulating assets in the pre-reform steady state (their decision rules lay below the 45-degree line), and the reform amplifies this behavior. Figures I.2 and I.3 confirm this mechanism.

Figure I.2: Decision Rules on Assets (in Deviation from the 45-Degree Line)

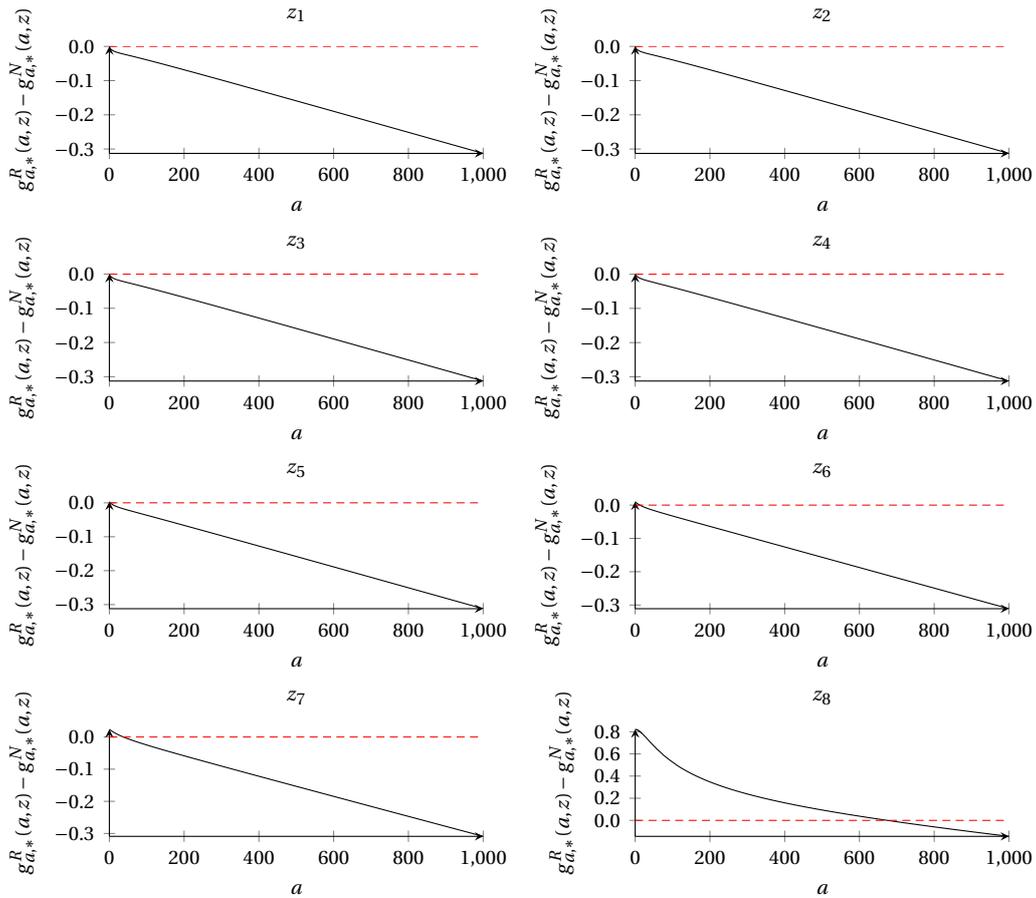


Note: For each $z \in \mathcal{Z}$, we report $g_a(a, z) - a$. Whenever this quantity is negative, the agent in state (a, z) is depleting their stock of assets. The zero line is dashed and red.

Figure I.2 plots $g_{a,*}^N(a, z) - a$ for $a \in \mathcal{A}$, with each panel corresponding to a particular $z \in \mathcal{Z}$. Here, $g_{a,*}^N(a, z)$ denotes the asset decision rule in the pre-reform steady state. Values below zero indicate that agents in state $s = (a, z)$ are decumulating assets. For z_1, z_2, z_3 , and z_4 , agents decumulate across the entire state space, consistent with our earlier discussion.

Figure I.3 plots $g_{a,*}^R(a, z) - g_{a,*}^N(a, z)$ for $a \in \mathcal{A}$, with each panel corresponding to a particular $z \in \mathcal{Z}$. Here, $g_{a,*}^R(a, z)$ denotes the post-reform asset decision rule. Negative values indicate that agents in state $s = (a, z)$ accumulate assets more slowly than before the reform. If they were already decumulating in the pre-reform steady state, this implies an even faster rundown of assets. For z_1, z_2, z_3 , and z_4 , agents decumulate at a faster pace across the entire state space, consistent with our earlier discussion.

Figure I.3: Difference in Decision Rules on Assets After and Before the Reform



Note: For each $z \in \mathcal{Z}$, we report $g_a^R(a, z) - g_a^N(a, z)$. Whenever this quantity is negative, the agent in state (a, z) is accumulating assets at a slower pace after the reform than before the reform. The zero line is dashed and red.

I.3 Alternative Process for Individual Productivity

In the robustness analysis, we considered an alternative process for individual productivity, based on the estimation on French data reported by Fonseca et al. (2023). It consists of the same AR(1) process as our pre-superstar process, this time with $\rho_z = 0.9588$ and $\sigma_z = 0.2150$.

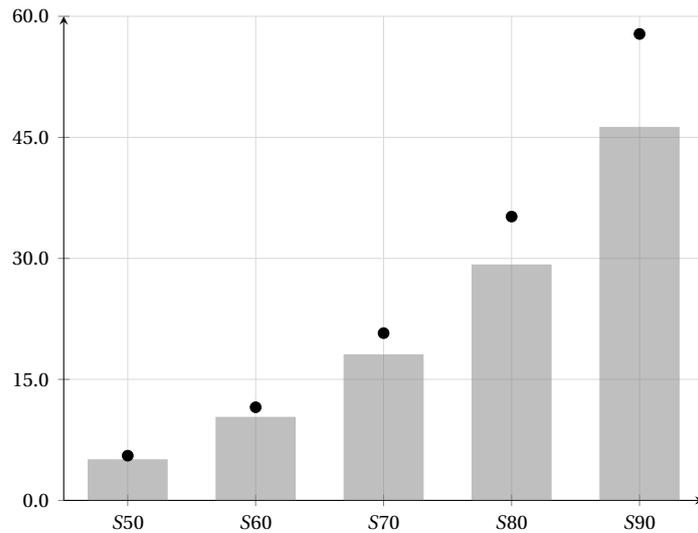
While our results are robust to this perturbation, it is important to emphasize that under this alternative calibration, the model no longer reproduces the high degree of wealth concentration seen in French data. This is illustrated in Figure I.4.

We see in particular that under this alternative calibration, the model now overpredicts S90, which means that it underpredicts the share of wealth held by the 10% richest.

I.4 The Welfare Cost of the Reform Ignoring the Transition

In the paper, we reported welfare gains/costs of the fiscal reform obtained by ignoring the transition between the pre- and post-reform steady states. We argued that the compensation parameter thus computed is best interpreted as the compensation that would make the representative agent indifferent between liv-

Figure I.4: Counterfactual Distribution of Net Wealth under Alternative Process for Individual productivity



Note: S_j denotes the share of net wealth held by the j percent poorest in terms of wealth. The grey bars correspond to the data, drawn from the ECB *Distributional Wealth Accounts*. The black dot is the model outcome under the alternative calibration.

ing in the pre-reform economy or moving without cost to another economy in which the Fiscal Rebalancing reform was implemented years ago.

Figure I.5 shows an analog of Figure 9 in the paper when ignoring the transition.

This figure is interesting because it reveals the extent to which the transition is painful. In the main text, we reported that the welfare gain of the reform in the HA economy was always below its RA counterpart. Now, we obtain the reverse configuration. Recall that in the HA economy, agents asymptotically accumulate more capital than in the RA economy. With approximately the same long-run impact on efficient labor in both settings, this means that output and consumption will be higher in the HA framework than in its RA analog.

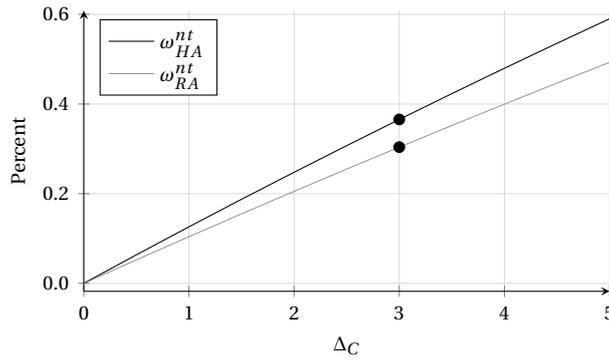
Clearly, ignoring the transition, we are comparing two economies with different steady-state levels of consumption and it does not come as a surprise that the welfare gain of the reform is higher in the HA economy.

I.5 Individual Expected Paths Along the Transition

At first glance, the fact that agents with very low productivity levels experience on average a welfare loss after the reform is somewhat counter-intuitive. Indeed, as Figure 10 suggests, these agents mostly hold few assets. Thus the reform, by increasing their average labor income, should be positive. To resolve this apparent paradox, it may be useful to inspect the expected paths of consumption and labor supply after the reform and contrasting these paths with their counterparts from the pre-reform steady state.

The top panel of Figure I.6 reports the expected path of individual consumption after the reform, $\mathbb{E}_{t_0}\{c_{t_0+j}^R|a, z\}$, in relative deviation from the expected path absent the reform, $\mathbb{E}_{t_0}\{c_{t_0+j}^N|a, z\}$, in each case starting from the same initial condition $s = (a, z)$. We consider three asset levels:

Figure I.5: Welfare Cost/Gain of Fiscal Rebalancing for Alternative Values of Δ_C – Ignoring the Transition



Note: The black line corresponds to the Utilitarian welfare gain/cost ω_{HA}^{nt} in the HA economy, given in Equation (2). The grey line corresponds to the welfare gain/cost in the RA economy, given in Equation (1). For each value of Δ_C , we ignore the transition between the initial steady state and its post-reform counterpart. The black dot indicates the benchmark reform with $\Delta_C = 3$ percentage points.

- In the “low wealth” case, we simply consider an initial condition $a = 0$ (the minimal wealth level);
- In the “medium wealth” case, we consider $a = A$ as an initial condition (the average wealth level);
- In the “high wealth” case, the initial condition is $a = \bar{a}$ (the maximal wealth level).

For each wealth level, we also consider three productivity levels: z_1 , z_4 , and z_8 . Similarly, the bottom panel reports the expected path of labor after the reform $E_{t_0}\{h_{t_0+j}^R|a, z\}$ in deviation from the expected path under the status quo $E_{t_0}\{h_{t_0+j}^N|a, z\}$.

Consider first agents starting in the low productivity–low wealth individual state (black solid curves, left-most charts in Figures I.6a and I.6b). Clearly, an agent starting with this initial individual state would experience a painful transition after the reform, with a initial drop in consumption relative to the pre-reform expected path by approximately 0.5 percent and an increase in labor supply by about 1 percent.

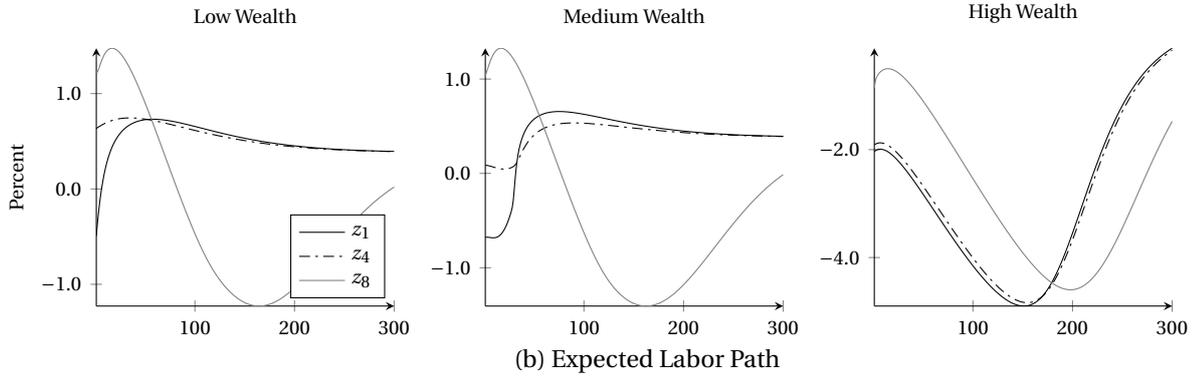
Ultimately, this agent will consume more than in the status quo but thanks to discounting, the initial drop in consumption weighs more in utility. Inspecting the columns associated with higher levels of wealth, we see that we obtain the same conclusion. Thus irrespective of their initial wealth level, low-productivity agents expect to reduce their consumption and increase their labor supply, relative to the status quo, along the transition toward the new steady state. Clearly, for these agents, the transition must be costly.

Consider next agents with medium productivity at the time the reform is implemented (black, dash-dotted curves). Those with low and medium wealth expect an increase in consumption together with an increase in labor supply relative to the pre-reform situation. For those agents, Figure 10 suggests that the expected relative increase in consumption will dominate in utility terms the expected relative increase in labor supply.

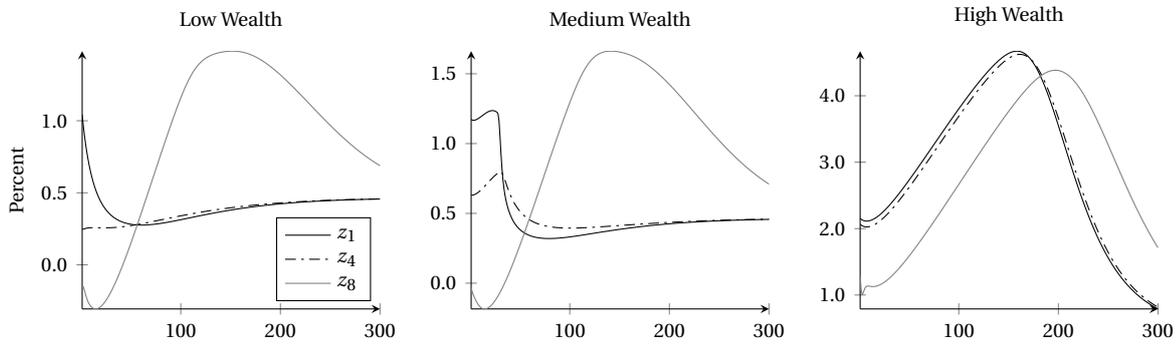
At higher levels of initial wealth, medium-productivity agents would all expect a relative decrease in consumption and a relative increase in labor supply, translating into a smaller post-reform welfare than under the status quo.

Figure I.6: Individual Expected Paths

(a) Expected Consumption Path



(b) Expected Labor Path



Note: Expected consumption (panel a) and labor supply (panel b) paths along the post-reform transition, expressed in percentage of the expected paths in the pre-reform steady state. In each chart, three initial individual productivity levels are highlighted, z_1 (solid black curve), z_4 (dash-dot black curve), and z_8 (solid grey curve). Each subplot correspond to an initial wealth level. Low wealth corresponds to $a = 0$; medium wealth corresponds to $a = A$, and high wealth corresponds to $a = \bar{a}$.

I.6 Distribution of Average Individual Welfare Gains Across Productivity Levels

Figure I.7 shows the distribution of average individual welfare gains across productivity levels. Figure I.7a considers the case when the transition is fully taken into account when computing $\omega(a, z)$ while Figure I.7b corresponds to the case when the transition is ignored.

Concretely, for each $z \in \mathcal{Z}$, we compute

$$\bar{\omega}(z) = \int_{\mathcal{A}} \omega(a, z) \lambda_{t_0-1}(da, z) / \pi(z).$$

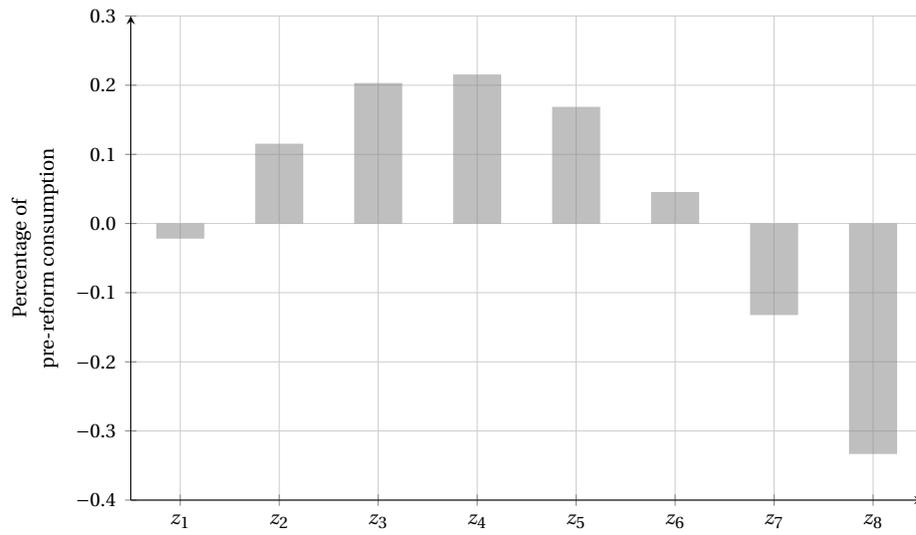
Likewise, Figure I.8 shows the distribution of average votes in favor of the reform across productivity levels. Figure I.8a considers the case when the transition is fully taken into account when computing $\chi(a, z)$ while Figure I.8b corresponds to the case when the transition is ignored.

Concretely, for each $z \in \mathcal{Z}$, we compute

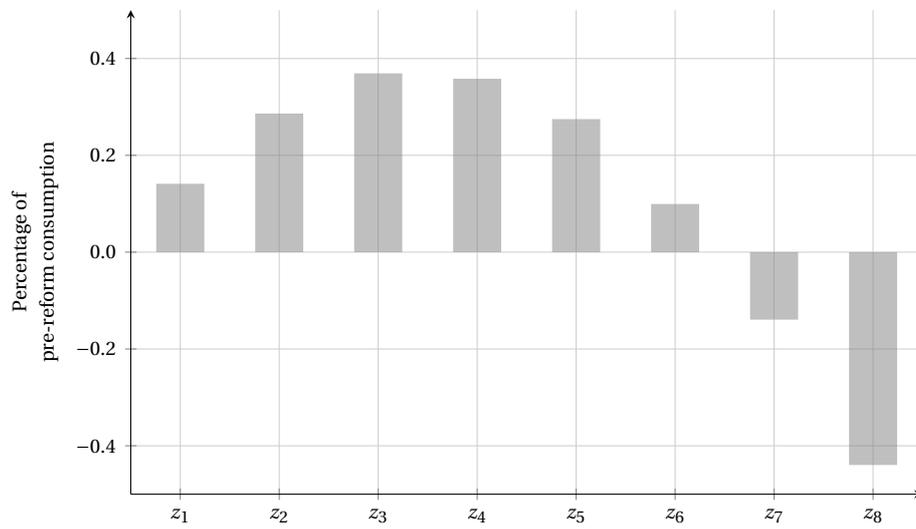
$$\bar{\chi}(z) = \int_{\mathcal{A}} \chi(a, z) \lambda_{t_0-1}(da, z) / \pi(z).$$

Figure I.7: Distribution of Average Individual Welfare Gains Across Productivity Levels

(a) With Transition



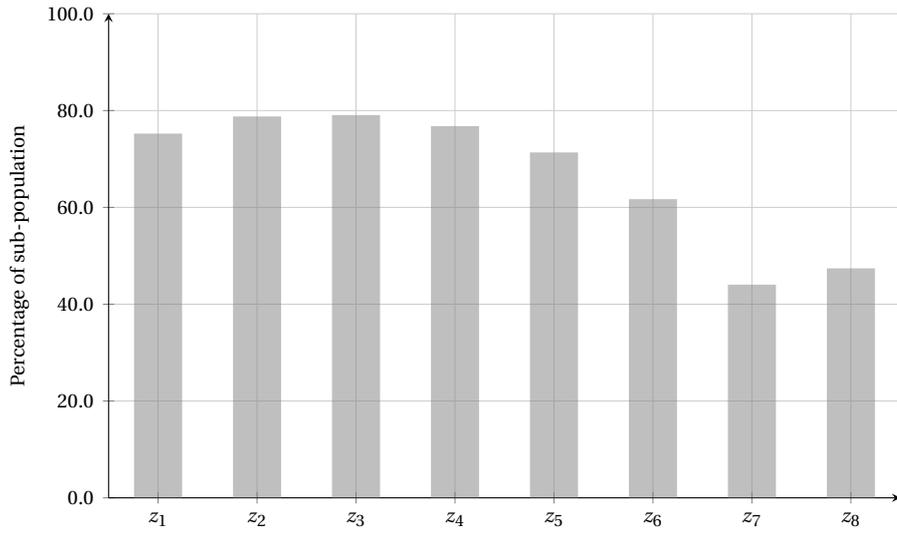
(b) Without Transition



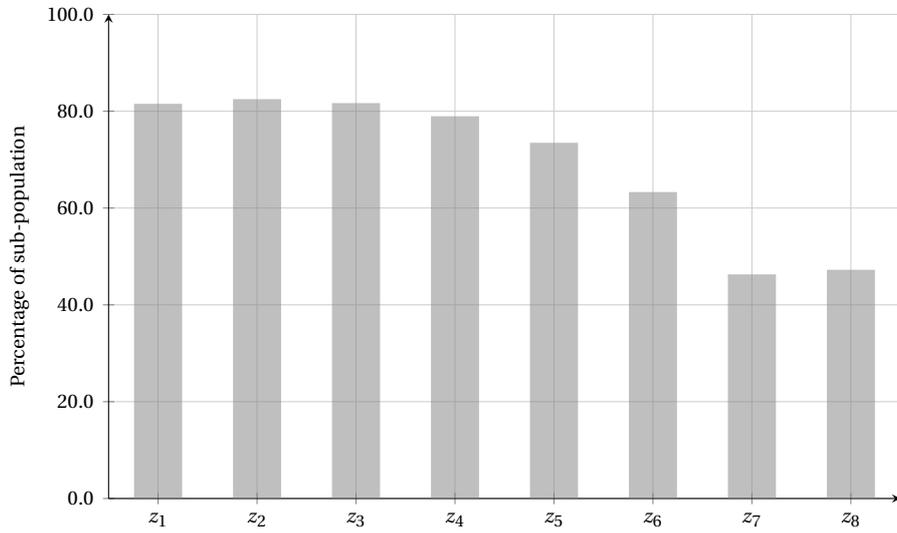
Note: For each $z \in Z$, we compute the average value of the individual welfare gain/cost $\omega(a, z)$ in the case $\Delta_C = 3$ percentage points.

Figure I.8: Distribution of Average Votes Across Productivity Levels

(a) With Transition



(b) Without Transition



Note: For each $z \in Z$, we compute the average value of the individual vote in favor of the reform $\chi(a, z)$ in the case $\Delta_C = 3$ percentage points.

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