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Political Economy of Climate Change Adaptation

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Political Economy of Climate Change Adaptation*

Loss of Habitat and Rising Inequality

Yasmine van der Straten[†] Enrico Perotti[‡] Frederick van der Ploeg[§]

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Abstract

We study the evolution of voter support for climate policies aimed at containing the effect of climate risk, as weather conditions worsens at a time of rising economic inequality. Households differ in age, beliefs and income, and the scale of intervention to preserve habitable land reflects the preference of the majority coalition. Economic polarization tightens conditions for more households, while rising climate risk increases support for public adaptation. If beliefs on attainable impact are not too dispersed, an initially coalition of young and old pessimists might tip towards a coalition of old optimists and young pessimists, leading to a jump in support for public action.A steady rise in inequality may ultimately induce a second political tipping point, towards a coalition of the low-income old and young pessimists, although the effects on public adaptation are weaker. Public intervention is undermined by pessimism about the efficacy of public adaptation and the *"tragedy of the horizon"* effect, as voters only partially internalize benefits for future generations. This prevents public adaptation from converging to the long-term social optimum even when political support is highest.

Keywords: Climate Change Adaptation, Economic Inequality, Tragedy of the Horizon, Political Tipping Points

JEL classifications: D63, H23, Q54, Q58

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1 Introduction

Climate change leads to a gradual rise in global temperatures, and may destabilize the weather system. Rising sea levels, floods, and extreme weather events undermine living conditions. Various parts of the world are particularly exposed to climate damage, and will over time become inhabitable. Yet the challenge to coordinate a response to mitigate climate change is immense, as policy suffers from time inconsistency problems (e.g., Besley and Persson, 2023; Hsiao, 2023). With climate risks such as a rising sea level expected to rise for some time, what degree of public investment in adaptation will be supported by voters in the future? Individuals and corporations can seek to adapt their habitat to a changing climate (e.g., Van der Straten, 2023), but political support is required for public investment in protective infrastructure.

Our main interest is, however, in the changing political support for *public* adaptation. Preferences for public adaptation differ across young and old, beliefs on policy effectiveness, and income groups. Political resistance to drastic public adaptation measures can thus arise from different beliefs and time horizons for different voters, and can persist even as the impact of climate change becomes visible. We examine the evolving majority coalition in an overlapping generation model of redistributive technological change (Döttling and Perotti, 2017).

Public climate adaptation evolves over time as climate risk and inequality rise, shifting political alliances across age and class cohorts. Our focus is on the transitional period when climate risk rises exogenously (e.g., a gradual rise in the sea level), while technological change increases economic inequality. We find that majority coalitions invest little initially. The change in climate induces a political tipping point as the winning coalition shifts from young and old pessimists towards young pessimistists and old optimists in response to habitat loss and climate change, leading to more public adaptation. Distinguishing low and high income households, we also show that there may be a second political tipping point towards a coalition of low-income old and young pessimistists when inequality becomes high enough, but the effects of public adaptation will be weaker.

Households in our overlapping generation framework are young and old. They differ in income, as well as in their beliefs about the effectiveness of public adaptation (beliefs about actual risk or the efficiency of public adaptation). Household obtain utility from income, and from consuming housing. Additionally, households value near-future climate conditions. Both generations work. The young buy a house (land) and sell it when old. Climate shocks damage houses and reduce their supply (e.g., due a higher sea level). Thus habitat tends to shrink over time, but its loss can be contained by public measures which are financed by taxes.

In each period, both cohorts vote for the scale of public adaptation, and for the cost of financing this.[1] Households vote under a Rawlsian veil of ignorance, thus before they know the realization of their incomes. However, they are aware of the rising inequality driven by technological change, which affects their preferences for public adaptation. The equilibrium climate policy is chosen by a majority. Over time, the equilibrium policy will reflect the impact of a rising climate risk and growing inequality. We show that both trends tend to increase investment in public adaptation.

We focus on the situation where pessimistic voters constitute a majority in each cohort, and there are more old than young voters. The set of feasible coalitions then includes a political majority of the older cohort, an intergenerational coalition of pessimists, or a coalition of old optimists and young pessimists. Our key results are as follows:

1. If beliefs about the efficacy of public adaptation are sufficiently dispersed, a coalition of the old is ruled out and the pessimistic young emerge as pivotal group.

2. Provided that climate risk is sufficiently low, the pessimistic young have weak incentives to support public intervention. Hence, the winning coalition consists of the pessimistic young and old leading to less public adaptation.

3. The rise in climate risk over time increases the value of habitat and hence the value of preventive measures. The pessimistic young gain an additional advantage from this compared to old households, since the youth own the habitat which is to be protected by public investment. Provided beliefs are not too dispersed, the political equilibrium may tip after some time towards a compromise coalition of old optimists and young pessimists that prefer an intermediate degree of adaptation and taxation. While public adaptation rises with climate risk and the beliefs about the efficacy of public intervention, it only peaks when the political equilibrium tips.

We extend our analysis and allow for a role for income inequality. Old households now know their income level, and adjust their preferences over adaptation and taxation. This yields an additional result: a steady rise in inequality increases the preferred adaptation rate of the low-income old relative to the high-income old, as the net benefits of public adaptation are higher for low-income households. This may lead to an additional political tipping point from a coalition of the pessimistic young and old (high- and low-income) optimistic households towards a coalition of the pessimistic young and low-income old. However, as this coalition

[1] This formulation may also stand for risk mitigation measures.

consists of both optimistic and pessimistic low-income old households, the politically feasible level of intervention only increases for very high levels of economic inequality; else it reduces public adaptation. These results highlight the role of controlling inequality in the efforts to protect the economy against climate change.

Finally, while households care about the present and near future supply of habitat, they do not internalize the benefits of public adaptation (habitat protection or recovery) for all future generations. This creates a disconnect between the individual benefits derived from public intervention and its broader societal value. As a result, the "tragedy of the horizon" effect undermines public intervention, preventing adaptation from converging to the long-term social optimum.

1.1 Related Literature

The normative literature on climate policy studies mitigation policies such as optimal carbon pricing (e.g., Nordhaus, 2008; Golosov et al., 2014; Dietz and Stern, 2015). Our particular framing studies political support for the adaptation process in a context of rising inequality. Our contribution is related to earlier work on adaptation to climate change (e.g., Lasage et al., 2014; Muis et al., 2015); Fried, 2022). Van der Straten (2023) focuses on adaptation to floods and suppose that households differ in age and income, and have differing abilities to respond to rising physical climate risks. We extend this framework to allow for public adaptation, and introduce heterogeneity in beliefs about the efficacy of public adaptation.

Fried (2022) also studies investments in seawalls, stilts, or other forms of adaptation to cope with severe storms in the US. Importantly, it treats damages from storms as idiosyncratic shocks, whereas our analysis allows the gradual sea level rise and flooding-related stochastic shocks to affect the economy. Fried (2022) shows that the idiosyncratic risk component of climate damages significantly impacts adaptation and the welfare cost of climate change.

Hong et al. (2023) show that mitigation of emissions alone cannot deal with the effects of global warming on weather disasters (tropical cyclones) and the economy. They analyze how the private and public sectors should adapt to manage disaster risks to the capital stock when they learn about the adverse consequences of global warming for disaster arrivals. They show that adaptation is more valuable under learning. We do not allow for learning, but we do allow for differences in subjective beliefs about the effectiveness of public adaptation.

Since we allow for subjective beliefs about effectiveness of public adaptation, our results are related to recent studies on how climate risk belief affect coastal housing markets. Bakkensen and Barrage (2021) show that heterogeneity in beliefs reconciles the mixed empirical evidence on how flood risk is capitalized in house prices. They find that there is significant underestimation of flood risks and sorting based on flood risk beliefs and amenity values.[2]

Our analysis also relates to Acemoglu and Autor (2011) who show that secular stagnation with declining overall growth can lead to a more concentrated income distribution and greater polarization of society. This calls for an explicit dynamic political economy approach, making explicit the differential impact of climate change across generations. Intuitively, more extreme weather events or sea rise will slowly induce more support for adaptation but also increase preference divergence across age cohorts.

Besley and Persson (2023) study the joint evolution of environmental values, technologies and policies. Their analysis indicates that the transitions of values and technologies create a dynamic complementarity which can promote the green transition. However, such complementarities could also create a vicious circle, which can lead to a climate trap. Delfgaauw and Swank (2024) also develop a political-economy model of a climate trap. Our analysis differs in that we focus on climate change adaptation policies and the interplay between age, income and beliefs. Since we compute the political equilibrium by considering possible coalitions of subgroups (old versus young, optimists versus pessimists, high and low income), this framework is more broadly related to Razin and Sadka (1999), Razin and Sadka (2000), Razin et al. (2002), and Razin (2021), who study the political economy of migration and pensions in an overlapping-generations model with high- and low-income households. We also use an OLG framework to study shifts in the political majority, i.e., political tipping, in response to gradually rising sea levels and the need for public intervention to supply public adaptation.

2 Baseline Model

Time is discrete and denoted by $t \in \{0, 1, ..., \infty\}$. The economy is characterized by two overlapping generations, each consisting of a unit mass of households. Households are heterogeneous in terms of skills, which are exogenous, and use their wage income to finance consumption consisting of housing (in fixed supply) and a numeraire good (in abundant supply). At the start of each period, an extreme weather event occurs, which hits a fraction of households and damages their housing capital. All risk is idiosyncratic, and the economy's climate risk exposure rises deterministically over time due to gradual sea level rise. The government can reduce risk exposure of households by investing in public adaptation (e.g., building of seawalls, dykes, or stilts) which is financed by a flat-tax on labour income.

[2] In a related study Ikefuji et al. (2022) use a hedonic pricing model to study how subjective perception of earthquake risks in five Japanese cities affect real estate prices in the short and in the long run.

Political parties propose an adaptation rate and compete for votes in each period's electoral competition. Households have heterogeneous beliefs about the efficacy of public adaptation and vote for the party which proposes an adaptation rate closest to their preferred rate.

2.1 Households

Households live for two periods and derive utility from consuming housing and a non-durable consumption good. When young, households purchase housing capital, denoted by L, from the old generation at a relative price p. Once old, households channel the proceeds from selling the house, as well as the return earned on their savings to the purchase of a numeraire good, denoted by c. There is an initial generation at $t = 0$, which is endowed with the supply of houses, $\bar{L}_0$. We abstract from housebuilding, so that the supply of houses is fixed.

2.1.1 Skills and Wages

Households have heterogeneous (and exogenous) skills, which determine household income. We denote two skill levels and denote high skills and income by h and low skills and income by l. A fraction ϕ of households is high-income, denoted by h, where

Assumption 1. *The fraction of high-skill households, ϕ, is less than or equal to 50%.*

Households supply one unit of labour. High-skill workers have income $y_{h,t} = q$ and low-skill workers have $y_{l,t} = w$, where the high-skill wage q exceeds the low-skill wage w.[3].

2.1.2 Preferences

Households have quasi-linear preferences over housing and non-durable consumption, and also care about the housing stock, $\bar{L}$ that they leave behind after their lifetime. Households maximize expected lifetime utility,

$$U\left(L_{i,t}, c_{i,t+1}, \bar{L}_{t+1}\right) = v\left(L_{i,t}\right) + c_{i,t+1} + f\left(\bar{L}_{t+1}\right), \tag{1}$$

where $v\left(L_{i,t}\right)$ is the utility for young household i in period t from owning $L_{i,t}$ units of housing capital with $v'(\cdot) > 0$ and $v''(\cdot) < 0$. The utility that an old household i obtains in period $t+1$ from knowing that a housing stock of size $\bar{L}_{t+1}$ remains available for the next generation equals $f\left(\bar{L}_{t+1}\right)$ with $f'(\cdot) > 0$ and $f''(\cdot) < 0$.

[3] As the economy is open, wages are exogenous. Through the factor price frontier they are ne a decreasing function of the world interest rate.

2.2 Climate Change

The probability that a given household is hit by a (climate-related) extreme weather event in period, t is denoted by γ_t, and increases deterministically over time (cf. Van der Straten, 2023). By the law of large numbers, γ_t is the fraction of households that suffers climate-related damages in any period t. The average loss to housing capital conditional on being hit by an extreme weather event is μ while the losses suffered by a given household, i, in period, t are $\xi_{i,t}$. These losses are idiosyncratic, and $\xi_{i,t}$ is stochastic with distribution, $F(\xi_{i,t})$, which is i.i.d. across households. We then have

$$\mathbb{E}_t(\xi_{i,t+1}) = \mathbb{E}_t\left(\xi_{i,t+1}\middle|\text{Hit by Extreme weather event}\right) \cdot \mathbb{P}(\text{Hit by Extreme weather event}) = \mu\gamma_{t+1}. \tag{2}$$

Housing capital of household i after an extreme weather event is reduced to

$$L_{i,t+1} = (1-\mu\gamma_{t+1}) L_{i,t}. \tag{3}$$

The aggregate supply of houses, $\bar{L}_{t+1}$, thus evolves endogenously according to[4]

$$\bar{L}_{t+1} = \int_0^1 (1-\xi_{i,t+1})\, di L_t \tag{4}$$

$$\stackrel{\text{LLN}}{=} (1-\mu\gamma_{t+1}) \bar{L}_t. \tag{5}$$

2.3 Housing Market Dynamics

The housing market opens after any extreme weather events take place. Since destroyed housing capital has zero liquidation value, households with a mortgage risk default and pay the risky rate of return, $\hat{r} > r$, where the interest rate r is given on world markets and exogenous. Net savings of a household i in period t is defined as

$$S_{i,t} \equiv y_{i,t} - p_t L_{i,t}, \tag{6}$$

where $S_{i,t} \geq 0$ indicates that household i is a net lender and $S_{i,t} < 0$ implies it is a net borrower. Default occurs once losses become sufficiently large, i.e.,

$$p_{t+1} L_{i,t+1} \leq (1+\hat{r})(-S_{i,t}). \tag{7}$$

[4] As habitat is destroyed due to extreme weather events, the materialization of climate risk translates into a decline in the supply of inhabitable houses over time (cf. Burzyński et al., 2019). Since adaptation preserves housing capital, it reduces the rate at which the supply of inhabitable houses declines. Since adaptation does not change the supply, $\bar{L}_{t+1}$, it does not increase the utility from owning housing capital. Rather, adaptation increases household utility by raising the stock of undamaged housing capital which can be sold in the next period.

The loan-to-value ratio is defined by

$$LTV_{i,t+1} \equiv \frac{(1+\hat{r})(-S_{i,t})}{p_{t+1}L_{i,t}}. \tag{8}$$

This implicitly defines the threshold of losses above which a homeowner defaults by

$$\hat{\xi}_{i,t+1} = 1 - LTV_{i,t+1}, \tag{9}$$

while the probability of default is

$$\chi_{i,t} = \left(1 - F\left(\hat{\xi}_{i,t+1}\right)\right). \tag{10}$$

2.4 Public Policy Intervention

Government intervention is called for to (i) prevent a sharp fall in supply of habitat and (ii) to alleviate any underinvestment in private protection (cf. Van der Straten, 2023). There are various measures available for government intervention, such as public adaptation (e.g., the Deltawork in the Netherlands after the flood of 1953), subsidizing private adaptation, and bailing out households in case of large adverse shocks. The first two policy measures are *preventive*. The third measure is a form of *corrective* action. Corrective action may not always be effective, however, as bailouts may trigger moral hazard.[5] We focus on the first measure.

2.4.1 Public Adaptation

To protect households from idiosyncratic losses when an extreme weather event occurs, the government invests in public adaptation (e.g., building of seawalls or dykes). Since large-scale adaptation investments can take substantial time to realize, we assume that the pay-off is only realized in the next period. Define $X_{G,t} \in [0,1)$ as the public choice of protection or public adaptation. It represents the percentage by which households' idiosyncratic losses from climate shocks are curbed in period $t+1$. For a given choice of public adaptation, the distribution of household losses $F(\xi_{i,t+1})$ is shifted to the left by $X_{G,t}\mu\gamma_{t+1}$, so that

$$\mathbb{E}_t\left(\xi_{i,t+1}\right) = \left(1 - X_{G,t}\right)\mu\gamma_{t+1}. \tag{11}$$

This embeds the assumption that public intervention cannot be targeted but instead reduces the losses of all households. For each household, the expectation of the housing capital that remains preserved after the extreme weather event is then

[5] Another form of corrective action is the restoration of habitat. This may be more difficult than preventing its loss ex ante and we therefore assume that it is prohibitively costly to do.

$$L_{i,t+1} = \left(1 - \left(1 - X_{G,t}\right)\mu\gamma_{t+1}\right) L_{i,t}. \tag{12}$$

Furthermore, public adaptation reduces the speed at which the supply of houses falls as

$$\bar{L}_{t+1} = \int_0^1 \left(1 - \xi_{i,t+1}\right) di L_t \tag{13}$$

$$\overset{\text{LLN}}{=} \left(1 - \left(1 - X_{G,t}\right)\mu\gamma_{t+1}\right) \bar{L}_t. \tag{14}$$

2.4.2 Finance of Public Adaptation

Investments in public adaptation come at a cost, $\psi\left(X_{G,t}\right) = \frac{1}{2}\bar{L}_t X_{G,t}^2$, which is proportional to the aggregate housing stock, $\bar{L}$. Public adaptation is financed with a flat labour income tax, τ_t, called the adaptation rate. The tax burden is shared among young and old households, and taxes cannot be targeted[6] The budget constraint for household i in each period t is

$$\left(1 - \tau_t\right) y_{i,t} \leq p_t L_{i,t} + S_{i,t}. \tag{15}$$

2.4.3 Optimistic and Pessimistic Beliefs about the Efficacy of Public Intervention

The government invests in public adaptation before young households purchase housing capital. So, when choosing demand for housing capital, households take account of the benefits of public adaptation (i.e., curbing idiosyncratic losses in the next period).[7] We assume households have different views on the effectiveness of public adaptation, where $\theta_j \in \{\underline{\theta}; \bar{\theta}\}$, $j \in \{P, O\} \leq 1$ denote beliefs of a household of type j about the effectiveness of public adaptation. Individuals with $\theta_P = \underline{\theta} > 0$ are pessimists, and those with $\theta_O = \bar{\theta} > \underline{\theta}$ are optimists.

Assumption 2. *Society is dominated by pessimists, so the fraction of pessimists is* $\omega > 0.5$.

Beliefs of households, θ_j, are independent of household income, but capture the ideological beliefs or (perceived) quality of public institutions of a given household. E.g., if $\underline{\theta} = 0$, pessimists maximizes utility assuming that public adaptation is fully ineffective.[8] But, if $\bar{\theta} = 1$, optimists maximize utility assuming that public adaptation is fully effective and internalize the

[6] If neither government spending nor taxes can be targeted to specific voters or groups of voters and politicians cannot appropriate tax revenues, policy preferences become monotonic in the parameter that distinguishes households with richer households wanting a smaller government as taxes are proportional to income (cf. Persson and Tabellini, 2002).

[7] For simplicity, we focus for the time being at the unconstrained case. The case of constrained household is more cumbersome due to the binding financial constraints.

[8] For example, Douenne and Fabre, 2022 use survey data to show that French households reject a carbon tax - and dividend policy, because these households overestimate their monetary losses after the protests of the Yellow Vests movement. Moreover, the authors show that these households do not perceive the policy as environmentally effective, and tend to discard positive information about it - which highlights their mistrust.

full benefits of public adaptation from reducing idiosyncratic losses. Households put more weight on public intervention as the housing stock diminishes due to climatic shocks.

Definition 1. *Households j's beliefs scaled by the housing stock in period t are* $\tilde{\theta}_{j,t} \equiv \frac{\theta_j}{\bar{L}_t}$.

The expectation of household i with beliefs j of losses suffered due to an extreme weather event in the next period are

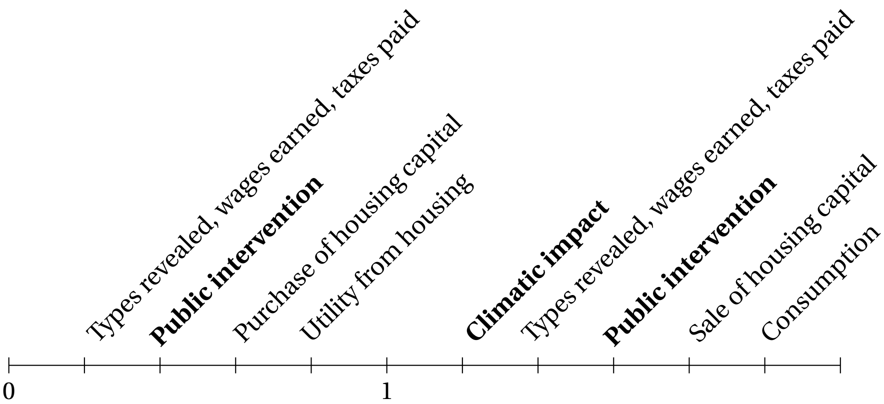
$$\mathbb{E}_{j,t}\left(\xi_{i,t+1}\right) = \left(1 - \tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1} \tag{16}$$

and the expected housing capital that remains after the extreme weather event is

$$\mathbb{E}_{j,t}\left(L_{i,t+1}\right) = \left(1 - \left(1 - \tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}\right)L_{i,t}. \tag{17}$$

2.5 Timing of Events

The time-line of each individual household in the baseline model is



where in period $t = 0$ the household is young, and in period $t = 1$ it is old.

3 Equilibrium

Households maximize expected utility subject to their budget constraints and limited liability constraint, i.e.,

$$\begin{aligned} \max_{L_{i,t}, S_{i,t}, c_{i,t+1}} \; & \mathbb{E}\left(U\left(L_{i,t}, c_{i,t+1}, \bar{L}_{t+1}\right)\right) = v\left(L_{i,t}\right) + \mathbb{E}_{j,t}\left(c_{i,t+1}\right) + f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right) \\ s.t. \quad & \left(1 - \tau_t\right) y_{i,t} \le p_t L_{i,t} + S_{i,t} \\ & c_{i,t+1} \le \left(1 - \tau_{t+1}\right) y_{i,t+1} + \max\left\{p_{t+1}\left(1 - \xi_{i,t+1}\right)L_{i,t} + \left(1 + \hat{r}\right)S_{i,t}, 0\right\} \\ & L_{i,t}, c_{i,t+1} \ge 0, \end{aligned} \tag{18}$$

where $c_{i,t+1}$ denotes the consumption of household i in period $t+1$.

3.1 Demand for Housing Capital

Housing demand is (due to the assumption of quasi-linear preferences) identical for each household, and determines the housing price.

Lemma 1. *Demand for housing in period t equals*

$$L_t^* = L_{i,t}^* = v'^{-1}\left((1+r)p_t - \left(1-\left(1-\tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}\right)p_{t+1}\right). \tag{19}$$

The resulting price of housing capital in period t equals

$$p_t = \frac{\left(1-\left(1-\tilde{\theta}_{j,t} X_{G,t}\right)\mu\gamma_{t+1}\right)p_{t+1} + v'(L_t^*)}{1+r}. \tag{20}$$

The price of housing capital equals the expected present discounted value of the benefits from owning housing capital. These benefits comprise the marginal benefit of owning housing, $v'\left(L_t^*\right)$, plus the revenue from selling the undamaged housing capital in the next period. This revenue falls in future climate risk, γ_{t+1} (cf. Van der Straten, 2023), and increases in the level of public adaptation.

3.2 Demand for Household Debt

Household debt follows residually. Households with net savings lend to others households while households with negative savings take out a mortgage.

3.3 Equilibrium and Market Clearing

A competitive equilibrium is an allocation $\{c_{t+1}, L_t, S_t\}_{t=0}^T$ and prices $\{p_t, \tau_t\}_{t=0}^T$, so that in each period, t, given prices, households maximize lifetime utility and all markets clear.

Housing market Total housing demand equals total housing supply, so that $\int_0^1 L_{i,t}^* di = \bar{L}_t$. Using Lemma 1, housing market equilibrium requires

$$\bar{L}_t = \left(1-\left(1-X_{G,t-1}\right)\mu\gamma_t\right)\bar{L}_{t-1}. \tag{21}$$

Financial market Aggregate after-tax income of young households must in equilibrium equal aggregate investment in housing. Hence,

$$(1-\tau_t)\cdot\int_0^1 y_{i,t}^Y di = p_t\left(X_{G,t}\right)\bar{L}_t, \tag{22}$$

where aggregate gross labour income of the young is

$$\int_0^1 y_{i,t}^Y di = \phi q + \left(1-\phi\right)w. \tag{23}$$

Government budget balance Government tax revenues income must equal the convex costs of public adaptation,

$$\tau_t \cdot \left(\int_0^1 y_{i,t}^Y di + \int_0^1 y_{i,t}^O di \right) = \frac{1}{2} X_{G,t}^2 \bar{L}_t, \tag{24}$$

where aggregate gross income of the old is the same as that of the young,

$$\int_0^1 y_{i,t}^O di = \int_0^1 y_{i,t}^Y di = \phi q + (1-\phi) w. \tag{25}$$

3.3.1 Housing Market Clearing Condition

The housing market clearing condition pins down the equilibrium price of housing capital:

$$p_t^* = \frac{\left(1 - \left(1 - \int_0^1 \theta_{i,t} di X_{G,t}^*\right) \mu \gamma_{t+1}\right) p_{t+1} + v'(\bar{L}_t)}{1+r}. \tag{26}$$

While exposure to future climate risk curbs house prices (see Section 3.1), the materialization of climate risk puts *upward* pressure on the contemporaneous house prices, since the cut in supply of inhabitable houses increases the marginal benefit of owning a house. If beliefs about efficacy of public adaptation are correct ($\theta_j = 1, \forall j$), this general equilibrium effect dominates if households are sufficiently risk averse with respect to their consumption of housing,

$$\underbrace{-\frac{v''(\bar{L}_j) \cdot \bar{L}_j}{v'(\bar{L}_j)}}_{RRA} \geq 1. \tag{27}$$

In that case, climate disasters increase house prices (cf. Van der Straten, 2023).

Public adaptation reverses the effects of climate change on house prices, since it reduces the exposure to climate risk and the supply of inhabitable houses. However, if the efficacy of public adaptation is disputed (i.e. $\theta_j < 1, \forall j$), households' perceived exposure to climate risk is larger than their true exposure to climate risk. This strengthens the risk-exposure effect (which puts downward pressure on the price), while it leaves the supply effect (which puts upward pressure on the housing price) unchanged. As a result, the condition under which house prices rise with climate risk becomes more stringent (see Appendix A.1). Hence, if there is dispersion in the beliefs on the efficacy of public adaptation, the coefficient of relative risk aversion (RRA) must be higher than one for house prices increase with climate risk.

3.3.2 Financial Market Clearing

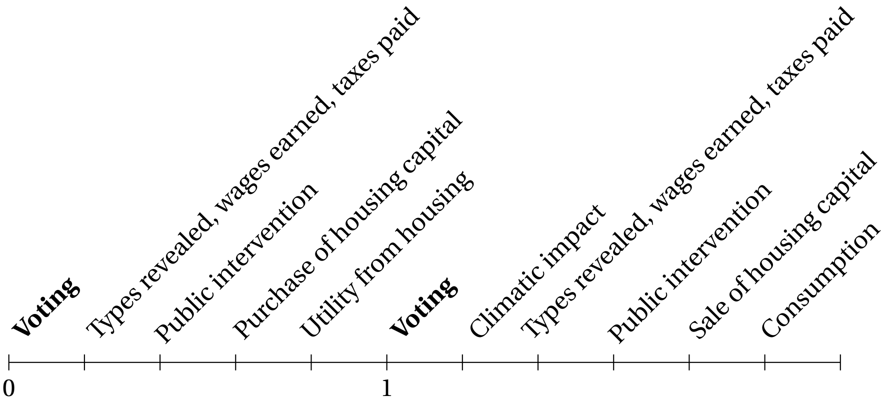
If labour income is insufficient to cover the purchase of a house, some agents need to borrow. Because at least one type of workers must have positive savings (cf. Döttling and Perotti (2017)), the volume of mortgage credit in the economy, m, is

$$m_t = \max\left\{0, \left(1-\phi\left(\eta\right)\right) p_t \bar{L}_t - \left(1-\tau_t\right) w\right\}. \tag{28}$$

If households are sufficiently risk averse, public adaptation curbs the housing price. This price effect dominates the reduction in the fall of the housing stock, so public adaptation reduces the total amount spent on housing. However, because taxation reduces disposable income, the net effect of public adaptation on mortgage credit demand is ambiguous.

4 Political Economy

Public adaptation is the outcome of electoral competition in which young and old households vote. Households are heterogeneous in terms of their beliefs about the efficacy of public adaptation and vote for the party which proposes a adaptation rate closest to their preferred adaptation rate. Households vote under a Rawlsian veil of ignorance, hence before types are revealed ($t = 0$) and before the impact of the climate shock ($t = 1$). The time-line is thus



4.1 Adaptation Rate Preferred by the Young

A young household prefers a adaptation rate that maximizes its expected lifetime utility.

Proposition 1. *The preferred adaptation rate of a young household i with beliefs θ_j is*

$$\tau_t^{Yj*} = \frac{1}{\bar{L}_t} \cdot \frac{1}{\phi q + \left(1-\phi\right) w} \cdot \left(\frac{\theta_j \mu \gamma_{t+1} \left(p_{t+1} + \frac{\partial f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)} \right)}{(1+r)} \right)^2 . \tag{29}$$

Proof: See Appendix A.2.

The preferred adaptation rate of the young is high if beliefs about the efficacy of public adaptation (θ_j)is high, since then they internalize a larger part of public adaptation benefits. Additionally, the young's preferred adaptation rate is high if the marginal utility of the expected future housing stock is high $\left(\frac{\partial f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)}\right)$, because then households internalize to a larger extent the effect that climate change has on the welfare of the next generation.

The young's preferred adaptation rate falls in the level of individual income, as the tax is proportional to income, but rises in aggregate labour income, as this increases their capacity to bear the tax-burden. Furthermore, the young's preferred adaptation rate rises as climate risk (γ_{t+1}) becomes higher and the supply of houses ($\bar{L}_t$) become smaller, since both increase the need for protection and hence increase the support public adaptation. Finally, the young's preferred choice of adaptation rate rises in the expected future house price (p_{t+1}), since this increases the value that is potentially lost upon a climatic impact.

4.2 Adaptation Rate Preferred by the Old

Old households pay taxes and care about the supply of houses, $\bar{L}$, that remains after their lifetime ends. Hence, an old household, i with beliefs $j \in \{O, P\}$, maximizes expected utility.

Proposition 2. *The preferred adaptation rate by the old with beliefs θ_j is*

$$\tau_t^{Oj*} = \frac{1}{\bar{L}_t} \cdot \frac{1}{\phi q + (1-\phi)\, w} \cdot \left(\theta_j \mu \gamma_{t+1} \frac{\partial f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)} \right)^2. \tag{30}$$

Proof: See Appendix A.3.

As for the young, the old's preferred adaptation rate is high if efficacy of adaptation is believed to be high, the aggregate housing stock is low, aggregate labour income is low, climate risk is high, and the marginal utility obtained from the expected future stock of housing is high. Furthermore, comparing Propositions 2 and 3 indicates that the adaptation preferred by the old is less than that of the young as they have less to gain from public adaptation.

4.3 Feasible Coalitions

To win elections, parties must receive the majority of the votes. Voters differ along two dimensions: age (young versus old) and beliefs (optimists versus pessimists). None of the groups is large enough to constitute a majority, hence voters must form a coalition to ensure that their preferred policy is implemented. The preferred adaptation rates of the different groups are stated in Table 1. The adaptation rates follow from Propositions 2 and 3, where $\theta_O = \bar{\theta}$, $\theta_P = \underline{\theta}$ and $y_{i,t} = \phi q + (1-\phi)\, w$.

Because $\tau^{YO*} > \tau^{OO*}$ and $\tau^{YP*} > \tau^{OP*}$, we rule out a coalition of young optimists and old pessimists, as these groups are too ideologically dispersed.[9] We rule out the young forming

[9] For the adaptation rate preferred by young optimists to be strictly larger than the adaptation rate preferred by old optimists (i.e. $\tau^{YO*} > \tau^{OO*}$), $p_{t+1} \left[\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})} \right]^{-1} > r$ must hold. Due to the concavity of the utility function of housing, $v(\bar{L}_t)$, the price of housing capital rises faster than the housing stock falls and this condition is always satisfied. A similar condition ensures that the adaptation rate preferred by young pessimists is strictly larger than the adaptation rate preferred by old optimists (i.e. $\tau^{YP*} > \tau^{OP*}$). This is the case if $p_{t+1} \left[\frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})} \right]^{-1} > r$.

a majority by assuming that there are more old people in society. This implies that young optimists are never part of a successful coalition, since Assumption 2 ensures that a coalition of young optimists and old optimists never constitutes a majority. For this reason, we do not report the preferred adaptation rate of the young optimists in Table 1.

	Optimists	Pessimists
Young	n.a.	$\tau_t^{YP*} = A \cdot \left(\frac{\underline{\theta} \cdot \left(p_{t+1} + \frac{\partial f(\mathbb{E}_{YP,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{YP,t}(\bar{L}_{t+1})} \right)}{(1+r)} \right)^2$
Old	$\tau_t^{OO*} = A \cdot \left(\bar{\theta} \cdot \frac{\partial f(\mathbb{E}_{OO,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{OO,t}(\bar{L}_{t+1})} \right)^2$	$\tau_t^{OP*} = A \cdot \left(\underline{\theta} \cdot \frac{\partial f(\mathbb{E}_{OP,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{OP,t}(\bar{L}_{t+1})} \right)^2$

Table 1: ***Adaptation rates for various coalitions.***

Key: The share of pessimists in society is denoted by ω. Common terms in the adaptation rates are defined by $A \equiv A(\bar{L}_t, \gamma_{t+1}, \phi) = \frac{(\mu\gamma_{t+1})^2}{\bar{L}_t} \cdot \frac{1}{[\phi q + (1-\phi) w]}$.

We assume that coalitions choose a adaptation rate that maximizes their joint utility subject to their budget constraints and expected amount of housing left after the climate disaster.

Proposition 3. *If there are fewer young than old households, pessimists constitute a majority ($\omega > 0.5$), and each coalition maximizes joint utility. The set of feasible coalitions is then either (i) a coalition of old optimists and young pessimists with preferred adaptation rate,*

$$\tau_t^{YP,OO*} = A \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + (\omega\underline{\theta} + (1-\omega)\bar{\theta}) \cdot \frac{\partial f(\mathbb{E}_{YP,OO,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{YP,OO,t}(\bar{L}_{t+1})} \right]}{(1+\omega r)} \right)^2, \tag{31}$$

or (ii) a coalition of young pessimists and old pessimists with preferred adaptation rate,

$$\tau_t^{YP,OP*} = A \cdot \left(\frac{\underline{\theta} \cdot \left[\frac{1}{2} p_{t+1} + \frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})} \right]}{\left(1 + \frac{1}{2} r\right)} \right)^2, \tag{32}$$

or (iii) a coalition of old optimists and old pessimists with preferred adaptation rate,

$$\tau_t^{OO,OP*} = A \cdot \left[(\omega\underline{\theta} + (1-\omega)\bar{\theta}) \cdot \frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)} \right]^2. \tag{33}$$

Proof: See Appendix A.4.

The adaptation rate chosen by each coalition falls in the housing stock ($\bar{L}_t$) and aggregate labour income ($\phi q + (1-\phi)\, w$), but rises in climate risk (γ_{t+1}), future house prices (p_{t+1}), and the marginal utility from the expected future stock of housing $\left(\frac{\partial f(\mathbb{E}_t(\bar{L}_{t+1}))}{\partial \mathbb{E}_t(\bar{L}_{t+1})}\right)$. Furthermore, the adaptation rate proposed by a coalition of old optimists and young pessimists and by a coalition of old optimists and pessimists rises in the share of optimists, $1-\omega$.

4.4 Political Tipping

Proposition 4 suggests that the political equilibrium depends on (i) whether old optimists prefer to form a coalition with young pessimists or old pessimists, and (ii) whether young pessimists prefer to form a coalition with old optimists or old pessimists. Define by $\Theta \equiv \bar{\theta}/\underline{\theta}$ the dispersion in beliefs between optimists and pessimists. To ensure that the old optimists prefer a coalition with young pessimists rather than old pessimists, we assume that beliefs of optimists and pessimists are sufficiently dispersed.

Assumption 3. $\Theta > \frac{p_{t+1} \cdot \left[\frac{\partial f\left(\mathbb{E}_{O,t}(\bar{L}_{t+1})\right)}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})} \right]^{-1} + \frac{\partial f\left(\mathbb{E}_{P,t}(\bar{L}_{t+1})\right)}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})} \cdot \left[\frac{\partial f\left(\mathbb{E}_{O,t}(\bar{L}_{t+1})\right)}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})} \right]^{-1}}{1+r}.$

Assumption 3 ensures that the adaptation rate preferred by old optimists is larger than the one preferred by young pessimists ($\tau^{OO*} > \tau^{YP*}$). To understand the need for sufficiently dispersed beliefs, we must recognize that young pessimists gain an additional advantage from public adaptation compared to old households. This is because young households still need to sell their housing capital, and public adaptation increases the remaining amount that can be sold. Consequently, the preferred adaptation rate of a young household with beliefs j, is higher than the one preferred by an old household with the same beliefs. Then, to ensure that the adaptation rate preferred by young pessimists is smaller than the one preferred by old optimists, the beliefs of optimists and pessimists must be sufficiently dispersed. If this is not the case , a coalition of the old always dominates.

The condition in Assumption 3 becomes more stringent over time as climate risk rises for two reasons. First, a rise in climate risk increases house prices and this increases the preferred adaptation rate of only the young pessimists.[10] Second, a rise in climate risk curbs the expected future stock of houses. But, the expectation formed by optimists is higher than the expectation formed by pessimists. This is because public adaptation scales with the level of climate risk, and optimists perceive public adaptation as more effective.

Proposition 4. *Under Assumption 3, the preferred adaptation rates satisfy*

$$\tau_t^{YO*} > \tau_t^{OO*} > \tau_t^{YP*} > \tau_t^{OP*} \tag{34}$$

and

$$\tau_t^{OO,YP*} > \tau_t^{OO,OP*} > \tau_t^{YP,OP*}. \tag{35}$$

If and only if the additional condition,

[10] Due to the concavity of the utility function of housing, $v(\bar{L}_t)$, house price rises faster than the (expected) housing stock falls. As a result, the total value of the (expected) future housing stock increases in climate risk.

$$\frac{(1-\omega)\bar{\theta}+\omega\underline{\theta}}{\underline{\theta}} > \frac{p_{t+1}\cdot\left[\frac{\partial f(\mathbb{E}_{OO,OP,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{OO,OP,t}(\bar{L}_{t+1})}\right]^{-1} + \frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})}\cdot\left[\frac{\partial f(\mathbb{E}_{OO,OP,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{OO,OP,t}(\bar{L}_{t+1})}\right]^{-1}}{(1+r)}, \tag{36}$$

holds, the adaptation rates satisfy

$$\tau_t^{YO*} > \tau_t^{OO*} > \tau_t^{OO,YP*} > \tau_t^{OO,OP*} > \tau_t^{YP*} > \tau_t^{YP,OP*} > \tau_t^{OP*}. \tag{37}$$

Otherwise, the adaptation rates satisfy

$$\tau_t^{YO*} > \tau_t^{OO*} > \tau_t^{OO,YP*} > \tau_t^{YP*} > \tau_t^{OO,OP*} > \tau_t^{YP,OP*} > \tau_t^{OP*}. \tag{38}$$

Proof: See Appendix A.5.

Corollary 1. *Under Assumption 3, old optimists prefer a coalition with young pessimists.*

Assumption 3 ensures that old optimists prefer to form a coalition with the young rather than the old pessimists. The reason is that the adaptation rate that is best for old optimists, τ_t^{OO*}, satisfies $\tau_t^{OO*} > \tau_t^{OO,YP*} > \tau_t^{OO,OP*}$. Given that utility of old optimists is concave in the adaptation rate and rises for $\tau_t \leq \tau_t^{OO*}$, forming a coalition with young pessimists provides higher utility for old optimists than a coalition with old pessimists. As a result, young pessimists emerge as the pivotal group in the political economy equilibrium. The equilibrium hinges on whether young pessimists prefer to form a coalition with old optimists or old pessimists.

Proposition 5. *Let there be less young than old, pessimists then represent a majority ($\omega > 0.5$), and Assumption 3 is satisfied. Also, assume that*

$$\Theta < \frac{\omega}{(1-\omega)}\cdot\left(\left[\frac{\partial f(\mathbb{E}_{YP,OO,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{YP,OO,t}(\bar{L}_{t+1})}\right]^{-1}\cdot\left(\frac{(1+\omega r)}{\omega}\cdot\sqrt{\left(\frac{B}{\underline{\theta}^2}+\frac{1}{\left(1+\frac{1}{2}r\right)^2}\cdot\left(\frac{1}{2}p_{t+1}+\frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})}\right)^2\right)}-p_{t+1}\right)-1\right) \tag{39}$$

holds. The political economy equilibrium is then characterized by a coalition of young pessimists and old optimists. The adaptation rate proposed by this coalition equals

$$\tau_t^{YP,OO*} = A\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1}+\left(\omega\underline{\theta}+(1-\omega)\bar{\theta}\right)\cdot\frac{\partial f(\mathbb{E}_{YP,OO,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{YP,OO,t}(\bar{L}_{t+1})}\right]}{\left(\frac{1}{2}(1+\omega r)\right)}\right)^2. \tag{40}$$

If condition (39) on the dispersion of beliefs is not satisfied, the political economy equilibrium is characterized by a coalition of young and old pessimists with adaptation rate

$$\tau_t^{YP,OP*} = A\cdot\left(\frac{\underline{\theta}\cdot\left[\frac{1}{2}p_{t+1}+\frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})}\right]}{\left(1+\frac{1}{2}r\right)}\right)^2. \tag{41}$$

Parameter	Description	Value	Source
μ	Conditional expectation of losses to housing capital	1	Normalization
$\bar{L}$	Housing stock	1	Normalization
ϕ	Fraction of high skilled labour	0.20	Van der Mooren and De Vries (2022)
ω	Fraction of pessimists	0.51	
q	Wage of high-income households	0.167	Van der Straten (2023)
r	Rate of interest	0.718	Van der Straten (2023)
w	Wage of low-income households	0.089	Van der Straten (2023)

Table 2: ***Parameter Values.***

Proof: See Appendix A.6.

Hence, if beliefs are not too dispersed, an equilibrium exists in which the political equilibrium tips from a coalition of all the young and old pessimists to a coalition of young pessimists and old optimists. This latter coalition favours a higher adaptation rate.

5 Quantitative Assessment of Political Equilibrium Tipping

To illustrate the equilibrium effects of rising climate risk on the political equilibrium, we use the illustrative parameter values stated in Table 2 (cf. Van der Straten, 2023).[11] We take the Netherlands as example, since it has a long history in flood risk management and faces an increase in its exposure to flood risk as sea levels rise. We run our model for the periods 2010-2040, 2040-2070, and 2070-2100. We conduct counterfactual analysis to demonstrate the effects of different scenarios of sea level rise, based on low (RCP 2.6), medium (RCP 4.5), and high (RCP 8.5) greenhouse gas concentration trajectories (IPCC, 2013).[12] [13]

We let γ_t represent the fraction of the currently flood-safe houses that a future rise in sea levels would put at risk of flooding) (cf. Van der Straten, 2023). The relationship between

[11] Parameters are reported for the Netherlands as of 2010, or based on the terminal values in Van der Straten (2023).

[12] The Representative Concentration Pathways (RCP) trajectories describe different climate futures depending on the volume of future greenhouse gas emissions (IPCC, 2014). Under the RCP 2.6 (RCP 4.5 respectively RCP 6.0) trajectory, emissions peak in 2020 (2040 respectively 2080) and the rise in global mean temperatures is likely to stay between 0.3 to 1.7 (1.1 to 2.6 respectively 1.4 to 3.1) degrees Celsius, relative to the reference period. This translates into a rise in global mean sea levels from 2100 of 0.26 to 0.55 (0.32 to 0.63 respectively 0.33 to 0.63) meters. Under RCP 8.5, emissions continue to rise throughout the 21^{st} century and global mean temperatures are likely to rise by approximately 2.6 to 4.8 degrees Celsius. This translates into a rise in global mean sea levels of 0.45 to 0.82 meters.

[13] The rate of interest over a period of 30 years is r. This corresponds to $(1+0.718)^{1/30}-1 = 1.18\%$ per year.

this fraction and various levels of sea level rise follows from Bosker et al. (2019)[14] and we use the projections of global mean sea level rise from IPCC (2013).[15]. The evolution of the share of flood-safe houses that future sea level rise would put at risk of flooding (γ_t) under the different RCP trajectories is shown in Figure 1. The figure indicates that more severe global warming scenarios put more houses at risk of flooding. Finally, we assume that $v(L) = ln(L)$ and $f(\bar{L}) = ln(\bar{L})$.

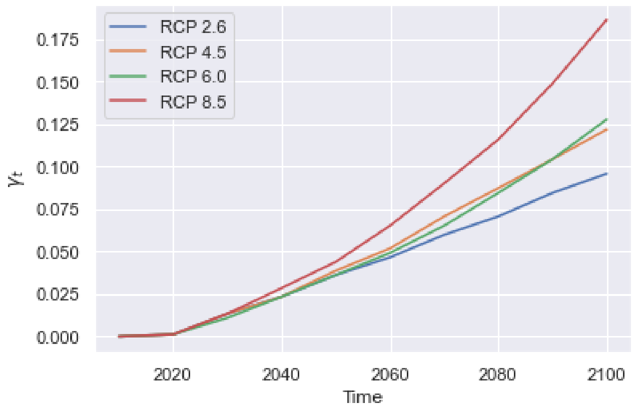


Figure 1: ***Evolution of the share of flood-safe houses that future sea level rise puts at risk of flooding (γ_t) under the RCP 2.6, RCP 4.5, RCP 6.0 and RCP 8.5 trajectories***

To check for robustness, we present additional model simulations with (i) constant climate risk (constant γ_t); (ii) a more concentrated income distribution (lower ϕ); and (iii) a higher fraction of pessimists (higher ω). The results are reported in Appendices A2 and A3.

5.1 Results

Here we give the results for an initial stage without public adaptation, $X_{G,t} = 0$. We conduct counterfactual analysis for different Representative Concentration Pathway (RCP) trajectories. Since projections of global mean sea level rise are only available up to 2100, we assume that a steady state is reached in 2100 and solve the model backwards from then on.

5.1.1 Evolution of the Housing Stock and House Prices

The supply of inhabitable houses falls exogenously in the model with climate risk, leading to a reduction in the housing stock by approximately half at the end of the century in the RCP 8.5

[14] Bosker et al. (2019) provides estimates of the number of the currently flood-safe houses that a future rise in sea levels would put at risk of flooding in a best-, medium-, and worst-case scenario with sea levels rising by 24, 100 or 150 cm respectively based on Dutch elevation data.

[15] The Climate Scenario Tables provide projections of global mean sea level rise for every decade from 2000 to 2100 with 1986-2005 as the reference period.

trajectory (see left panel of Figure 2). In accordance with Van der Straten (2023), the supply effect dominates the discount effect due to climate risk exposure, translating into a sharp rise of house prices over time (right panel, Figure 2).

Figure 2: ***Evolution of the housing stock and housing prices***

Key: The steady-state of supply of inhabitable houses (left panel, indexed to 1 in 2010) and house prices (right panel, indexed to 1 in 2010) for different RCP trajectories.

5.1.2 Evolution of the Political Equilibrium

Figure 3 plots the time paths of the upper and lower bounds on the dispersion in beliefs (i.e. Θ) for which a coalition of young pessimists and old optimists prevails for various RCP trajectories. Assumption 3 provides the lower bound on Θ, and gives the smallest dispersion in beliefs for which old optimists prefer to form a coalition with young rather than old pessimists. The blue-shaded area highlights the values of Θ for which Assumption 3 is *not* satisfied. Here the dispersion in beliefs is not high enough to ensure that the adaptation rate of old optimists is higher than the one preferred by young pessimists. Old optimists are then better off if they form a coalition with the old pessimists.

On the other hand, the pink- and yellow-shaded areas highlight the values of Θ for which Assumption 3 *is* satisfied. Here the dispersion in beliefs is sufficiently high to ensure that the preferred adaptation rate of old optimists is higher than the one of young pessimists. Old optimists are then strictly better off if they form a coalition with young pessimists.

Proposition 6 provides the lower bound for Θ, and gives the maximum dispersion in beliefs for which young pessimists prefer to form a coalition with old optimists, rather than old pessimists.[16] The yellow-shaded area shaded highlights the values of Θ for which the condition in Proposition 6 is *not* satisfied. Here the utility of young pessimists is higher if they form a

[16] If utility of young pessimists, $\mathbb{E}_t(U^{YP})$ is symmetric around the optimal adaptation rate, τ_t^{YP*}, the bound in Proposition 6 can be approximated by $\tau_t^{YP,OO} - \tau_t^{YP*} \leq \tau_t^{YP*} - \tau_t^{YP,OP}$. We use this approximation in Figure 3.

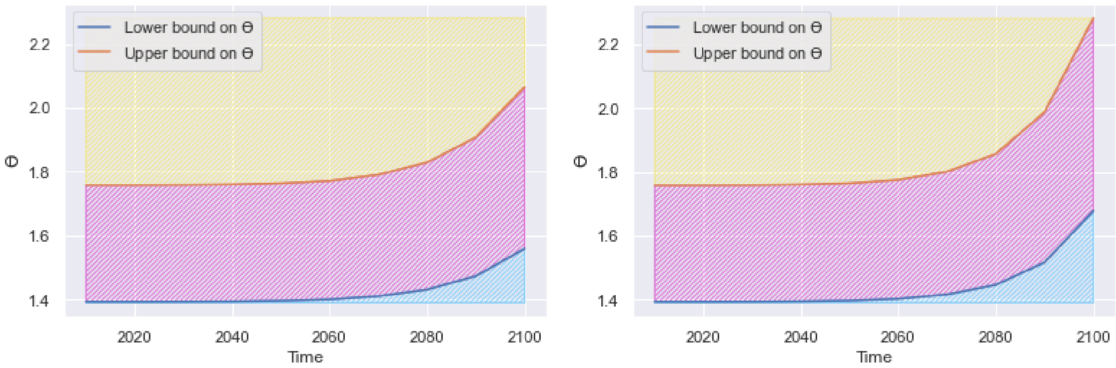


Figure 3: ***Evolution of the political equilibrium***

Key: Joint evolution of the upper (Proposition 6) and lower (Assumption 3) bounds on dispersion in beliefs for which a coalition of young pessimists and old optimists prevails (pink-shaded area). If the dispersion in beliefs is below the lower bound (blue-shaded area), a coalition of the old prevails. A coalition of the pessimists prevails if the dispersion in beliefs is above the upper bound (yellow-shaded area). The left panel shows the evolution of the bounds under RCP 4.5 and the right panel shows the evolution of the bounds under RCP 8.5.

coalition with old pessimists. The pink- and blue-shaded area highlights the values of Θ for which the condition in Proposition 6 *is* satisfied. In this region, the utility of young pessimists is strictly higher if they form a coalition with old optimists.

The region for which Assumption 3 is satisfied becomes smaller as climate risk becomes more pressing, both over time and as we move to a more severe climate change scenario. The reason is that the rise in house prices increases the preferred adaptation rate of young pessimists relative to that of the old. To ensure that the adaptation rate preferred by old optimists remains higher than that of young pessimists, the dispersion in beliefs must be increasingly larger. Moreover, as the rise in house prices increases the preferred adaptation rate of young pessimists, they will become more likely to favour a coalition with old optimists rather than old pessimists. This weakens the condition in Proposition 6, so the upper bound on the dispersion in beliefs increases. The region in which a coalition of young pessimists and old optimists prevails thus widens as climate risk becomes more urgent, both over time and as we move to a more severe climate change scenario.

As the pink-shaded area widens over time and move to a more severe climate change scenario, the panels (each representing a distinct RCP trajectory) indicate that it becomes more likely for a coalition of young pessimists and old optimists to prevail as climate risk becomes more urgent. Note that the likelihood of a coalition of the old (highlighted by the blue-shaded area) also increases as climate risk becomes more urgent. However, a coalition of the old only prevails for a sufficiently low dispersion in beliefs.

5.1.3 Political Tipping in Adaptation Rates

Using the insights from Figure 3, we focus on a value for Θ such that the political equilibrium tips from a coalition of pessimists to a coalition of young pessimists and old optimists. So, we set $\Theta = 1.775$ and accordingly $\bar{\theta} = 0.85$ and $\underline{\theta} = 0.48$.

Figure 4 plots the adaptation rates of the young and old under this specification of beliefs. The adaptation rates preferred by young and the old increase as climate risk rises over time, and more steeply the more severe the RCP trajectory. There is, however, a substantial difference between the adaptation rate preferred by young and old. By the end of the century and under the most severe climate change scenario, the young prefer a adaptation rate of approximately 0.4, while the old prefer one of only 0.15.

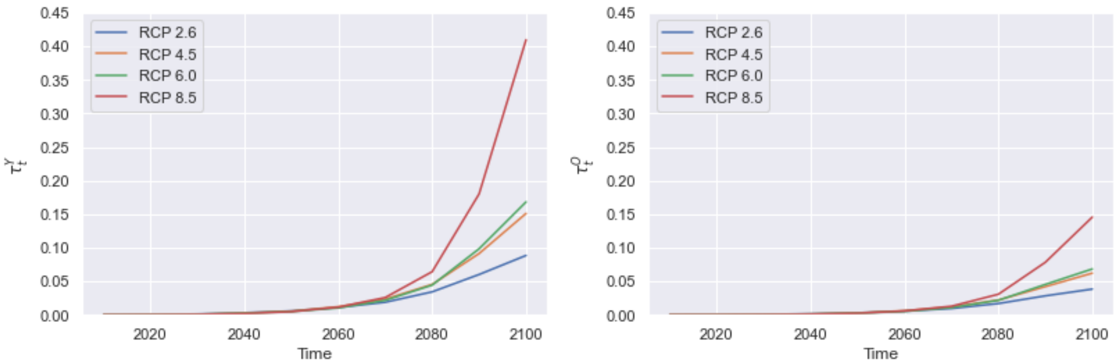


Figure 4: ***Adaptation rates preferred by young and old households***

Key: Adaptation rate preferred by the young (left panel) and the old (right panel) with $\bar{\theta} = 0.85$, $\underline{\theta} = 0.48$, *and* $\omega = 0.51$ *for different RCP trajectories.*

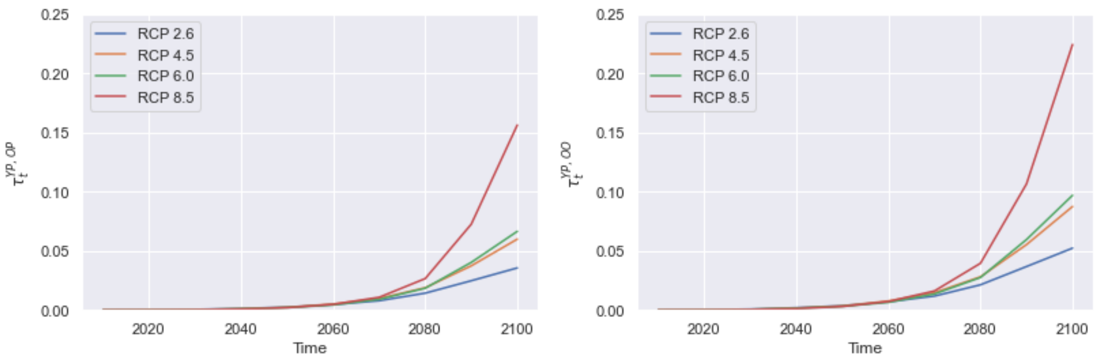


Figure 5: ***Adaptation rates proposed by different coalitions***

Key: The adaptation rate proposed by a coalition of pessimists (left panel) and a coalition of young pessimists and old optimists (right panel) for different RCP trajectories.

Figure 5 plots the time paths of the proposed adaptation rates of each coalition. The adaptation rates increase as climate risk rises over time, and rise more steeply the more severe the RCP trajectory. Moreover, the adaptation rate proposed by a coalition of young pessimists and old optimists is strictly higher than the adaptation rate proposed by a coalition of pessimists.

For $\Theta = 1.775$, the political equilibrium tips from a coalition of only pessimists to a coalition of young pessimists and old optimists around 2070. Figure 6 depicts the evolution of the adaptation rate prevailing in the economy over time when the political equilibrium tips with each panel representing a distinct RCP trajectory.

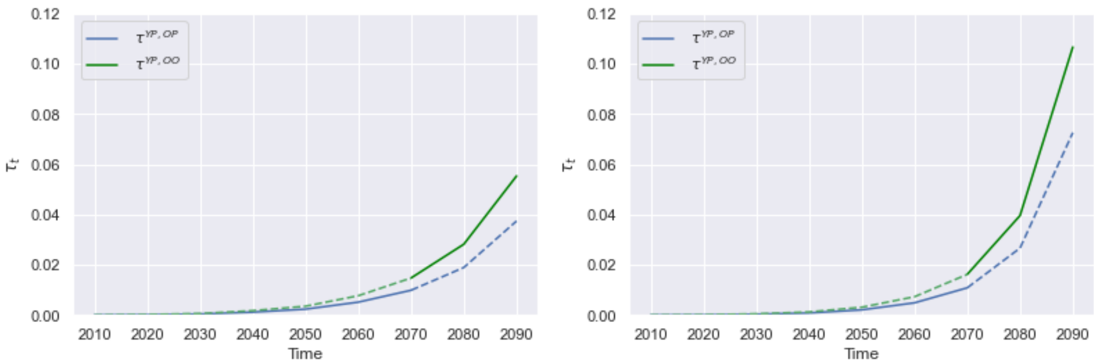


Figure 6: ***Political tipping***

Key: The prevailing adaptation rate in the economy over time over time when the political equilibrium tips around 2070, under RCP 4.5 (left panel) and RCP 8.5 (right panel).

6 Comparison of Political Equilibria and Optimal Policy

To compare the political economy equilibrium to the social optimum, we determine the optimal public policy where the social planner chooses $X_{G,t}$ to maximize utilitarian social welfare and fully internalizes the benefits of public adaptation, i.e. $\theta_j = 1 \forall j$:

$$\max_{X_{G,t}} \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t \left((1+r)\left((1-\tau_t)\left[\phi q + (1-\phi) w\right]\right) + v(\bar{L}_t) + f(\bar{L}_{t+1})\right)$$
$$s.t. \quad \frac{1}{2} X_{G,t}^{2*} \bar{L}_t = \tau_t \cdot \left[\phi q + (1-\phi)\, w\right]$$
$$\bar{L}_j = \bar{L}_t \prod_{\iota=t}^{j-1} \left(1 - \left(1 - X_{G,\iota}\right) \mu \gamma_{\iota+1}\right). \tag{42}$$

Proposition 6. *The socially optimal level of public adaptation equals*

$$X_{G,t}^{FB*} = \frac{\mu_L \gamma_{t+1}}{(1+r)} \cdot \sum_{j=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{j-t} \left[-\frac{1}{2}(1+r) X_{G,j}^2 + v'(\bar{L}_j)\right] \prod_{\iota=t+1}^{j-1} \left(1 - \left(1 - X_{G,\iota}\right) \mu_L \gamma_{\iota+1}\right)$$
$$+ \frac{\mu_L \gamma_{t+1}}{(1+r)} \cdot \left(f'\left(\bar{L}_{t+1}\right) + \sum_{j=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{j-t} \left(f'(\bar{L}_{j+1})\right) \prod_{\iota=t+1}^{j} \left(1 - \left(1 - X_{G,\iota}\right) \mu_L \gamma_{\iota+1}\right)\right). \tag{43}$$

The optimal adaptation rate follows from government budget balance and equals

$$\tau_t^S = \frac{\left(X_{G,t}^*\right)^2 \cdot \bar{L}_t}{2 \cdot \left[\phi q + (1-\phi)\, w\right]} \tag{44}$$

Proof: See Appendix A.7.

A comparison between the socially optimal adaptation rate with the preferred adaptation rate of the young and old reveals that households do not fully internalize the benefits of public adaptation. The social planner thus favours a higher adaptation rate (see Figure 4). Since the old do not own housing capital, they do not take into consideration that public adaptation increases the remaining amount that can be sold. While the young internalize in part the effect of adaptation on the evolution of the housing stock due to its capitalization in house prices (Van der Straten, 2023), they do not internalize the effect of public adaptation on the utility that *other* generations obtain from the expected future stock of houses (as captured by $f(\bar{L}_{j+1}), j \in [t, \infty]$). In contrast, the social planner internalizes its effect on the utility obtained by *each* subsequent generation from the expected stock of houses in the future. Hence, the private choice of adaptation does not equal the social optimum, even if beliefs about the efficacy of public adaptation are correct ($\theta_j = 1, \forall j$).

6.1 Public Adaptation Gap

To quantify the public adaptation gap, we plot and compare the socially optimal adaptation rate with the adaptation rate that the prevailing coalition proposes over time. We use the same characterization of dispersion in beliefs as before, so that the coalition of the pessimists prevails from 2010 - 2070 and then tips to a coalition of young pessimists and old optimists from 2070 onward. The adaptation gap is in part driven by the failure of households to internalize the benefits of public adaptation to each subsequent generation. The other part of the adaptation gap is due to incorrect beliefs above the efficacy of public adaptation.

To decompose the adaptation gap into the effects from imperfect internalization and from incorrect beliefs, we determine the second-best adaptation rate which is chosen by a social planner who takes into account the beliefs of households about efficacy of public intervention (see Appendix A.7.) The adaptation gap under second-best is thus fully explained by the imperfect internalization of the benefits of public adaptation. The adaptation gaps under the first- and second-best policy choice are depicted in Figure 7 with each panel representing a distinct RCP trajectory. While the adaptation rate chosen by the social planner who takes beliefs of households into consideration is approximately half the socially optimal adaptation rate, a large adaptation gap remains under the second-best policy choice. This gap widens as climate risk rises over time.

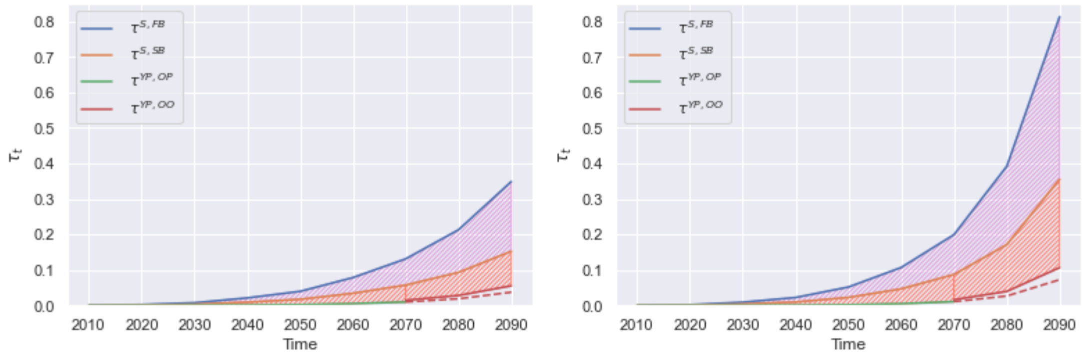


Figure 7: ***Decomposition of the public adaptation gap***

Key: Evolution of the time path of the adaptation gap under the second-best policy choice (red-shaded area) and first-best policy choice (red- and purple-shaded area) when the dispersion in beliefs about efficacy of public intervention is characterized by $\Theta = 1.775, \bar{\theta} = 0.85, and \underline{\theta} = 0.48$*, under RCP 4.5 (left) and RCP 8.5 (right panel).*

7 Extended Model

We provide an extension our analysis in which types are known to old households once they vote. In this case, there are four groups of old households and the preferred adaptation rate of each is determined by both their beliefs and income. This distinction matters for voting outcomes and consequently affects the political equilibrium that prevails.

7.1 Old Households' Choice of Adaptation Rate

A high-income, old household, h, with beliefs $j \in \{O, P\}$, maximizes

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{h,t},, \bar{L}_{t+1}\right)\right) = \mathbb{E}_t\left(c_{h,t}\right) + f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right) \tag{45}$$

$$s.t. \quad c_{h,t} \leq (1-\tau_t)\, q + \max\left\{p_t\left(1-\xi_{h,t}\right) L_{h,t-1} + (1+\hat{r})\, S_{ht-1}, 0\right\}$$

$$\tau_t \geq 0.$$

and a low-income, old household, l, with beliefs $j \in \{O, P\}$, maximizes

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{l,t},, \bar{L}_{t+1}\right)\right) = \mathbb{E}_t\left(c_{l,t}\right) + f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right) \tag{46}$$

$$s.t. \quad c_{l,t} \leq (1-\tau_t)\, w + \max\left\{p_t\left(1-\xi_{l,t}\right) L_{l,t-1} + (1+\hat{r})\, S_{l,t-1}, 0\right\}$$

$$\tau_t \geq 0.$$

Proposition 7. *The optimal adaptation rate of a high-income, old household h with beliefs* θ_j *is*

$$\tau_t^{Ohj*} = \frac{1}{\bar{L}_t} \cdot [\phi q + (1-\phi) w] \cdot \left(\frac{\theta_j \mu \gamma_{t+1} \frac{\partial f(\mathbb{E}_{j,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{j,t}(\bar{L}_{t+1})}}{q} \right)^2 \tag{47}$$

and the optimal adaptation rate of a low-income, old household l with beliefs θ_j is

$$\tau_t^{Olj*} = \frac{1}{\bar{L}_t} \cdot [\phi q + (1-\phi) w] \cdot \left(\frac{\theta_j \mu \gamma_{t+1} \frac{\partial f(\mathbb{E}_{j,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{j,t}(\bar{L}_{t+1})}}{w} \right)^2. \tag{48}$$

If the wage gap is smaller than the dispersion in beliefs (scaled by the marginal utilities of the future housing stock), i.e.,

$$\frac{q}{w} < \frac{\bar{\theta}}{\underline{\theta}} \cdot \frac{\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})}}{\frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})}} \tag{49}$$

then we have

$$\tau^{OOl*} > \tau^{OOh*} > \tau^{OPl*} > \tau^{OPh*}.$$

Otherwise, we have

$$\tau^{OOl*} > \tau^{OPl*} > \tau^{OOh*} > \tau^{OPh*}.$$

Proof: See Appendix A.8.

Since high-income, old households sell their house prior to public adaptation becoming effective, the difference in the preferred adaptation rates of high- respectively low-income households is fully explained by the difference in wages. Then, as low-income, old households bear an smaller fraction of the investment costs associated with public adaptation, they favour a higher adaptation rate than high-income households.

7.2 Feasible Coalitions

Income is a distinguishing factor among old households, influencing the preferred adaptation rate of the old. As a consequence, the size of old household groups is smaller compared to the baseline model and coalitions must include (at least) three groups of households to form a majority. The wage gap, which determines the relative ordering of the adaptation rates preferred by the various groups of old households (see Proposition 8), also affects the set of feasible coalitions. In particular, a rise in economic inequality, as reflected by an increase in the wage gap, q/w, increases the adaptation rate preferred by the low-income, old pessimists relative to the adaptation rate preferred by the high-income, old optimists.[17] This occurs as

[17] If economic inequality declines, this does not lead to a change in the relative ordering of the preferred adaptation rates of the old, unless economic inequality is very large at the onset. If the latter is the case, the political equilibrium tips between the same coalitions as outlined below, although in reverse order.

the disproportionate reduction in their income causes the fraction of the investment costs borne by the low-income households to become increasingly smaller. Consequently, if the wage gap is sufficiently large, the adaptation rate preferred by low-income, old pessimists is higher than the one preferred by the high-income, old optimistic households ($\tau_t^{OOl*} > \tau_t^{OOh*}$) We again focus on a realistic subset of coalitions - those that emerge if young pessimists are pivotal - and we make the following assumption.

Assumption 4. *If inequality is sufficiently small (see Proposition 8), beliefs between optimists and pessimists must be sufficiently dispersed:*

$$\Theta > \underbrace{\frac{p_{t+1} \cdot \left[\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})}\right]^{-1} + \frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})} \cdot \left[\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})}\right]^{-1}}{(1+r)}}_{\text{Assumption 3}} \cdot \underbrace{\frac{q}{\phi q + (1-\phi) w}}_{\text{Inequality multiplier}} . \tag{50}$$

If economic inequality is sufficiently large (see Proposition 8), beliefs between optimists and pessimists must be not too dispersed:

$$\Theta < \underbrace{\frac{p_{t+1} \cdot \left[\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})}\right]^{-1} + \frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}(\bar{L}_{t+1})} \cdot \left[\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}(\bar{L}_{t+1})}\right]^{-1}}{(1+r)}}_{\text{Assumption 3}} \cdot \underbrace{\frac{q}{\phi q + (1-\phi) w}}_{\text{Inequality multiplier}} . \tag{51}$$

Assumption 4 ensures that the adaptation rate preferred by the high-income, old optimists is larger (smaller) than the adaptation rate preferred by the young pessimists ($\tau_t^{OOh*} > (<) \tau_t^{YP*}$) if economic inequality is low (high). As a result, the young pessimists emerge as the pivotal group for determining the political equilibrium.[18]

Proposition 8. *If the young are less in number than the old, pessimists are in the majority ($\omega >$ 0.5), high-income households are a minority ($\phi < 0.5$), and economic inequality is sufficiently low, then*

$$\tau_t^{YO*} > \tau_t^{OOl*} > \tau_t^{OOh*} > \tau_t^{YP*} > \tau_t^{OPl*} > \tau_t^{OPh*} \tag{52}$$

and the young pessimists are pivotal. The set of feasible coalitions is then:

(i) ***"High Ambition Coalition"****: Low-income, old optimists ($(1-\phi)(1-\omega)$), high-income, old optimists ($\phi(1-\omega)$) and young pessimists (ω). This is a coalition of the young pessimists and old optimists.*

(ii) ***Mixed Coalition*** *($2(\omega-\phi\omega)+\phi$): high-income, old optimists ($\phi(1-\omega)$), young pessimists (ω), and low-income, old pessimists ($(1-\phi)\omega$). We refer to this as the "mixed coalition".*[19]

[18] In both cases a coalition of the old is never large enough to be pivotal.

[19] Under Assumption 2, i.e. $\omega > 0.5$, a successful mixed coalition is always larger - and thus politically more powerful than a successful high ambition coalition. Moreover, under Assumption 3, a successful mixed coalition is always larger than the low-ambition coalition.

(iii) ***"Low Ambition Coalition"*** *(2ω): Young pessimists (ω), low-income, old pessimists ($(1-\phi)\omega$), and high-income, old pessimists ($\phi\omega$). This is a coalition of the young pessimists and old pessimists.*[20]

If economic inequality is sufficiently high and Assumption (ii) holds, then

$$\tau_t^{YO*} > \tau_t^{OOl*} > \tau_t^{OPl*} > \tau_t^{YP*} > \tau_t^{OOh*} > \tau_t^{OPh*} \tag{53}$$

and, the young pessimists are pivotal. The set of feasible coalitions is then:

(i) ***"High Ambition Coalition"*** *($1-\phi+\omega$): low-income, old optimists ($(1-\phi)(1-\omega)$), young pessimists (ω), and low-income, old pessimists ($\omega(1-\phi)$). This is a coalition of the young pessimists and the low-income old.*

(ii) ***Mixed Coalition*** *($2(\omega-\phi\omega)+\phi$): high-income, old optimists ($\phi(1-\omega)$), young pessimists (ω), and low-income, old pessimists ($(1-\phi)\omega$) households. We refer to this as the "mixed coalition".*[21]

(iii) ***"Low Ambition Coalition"*** *($\omega\phi$): Young pessimists (ω), high-income, old optimists ($(1-\omega)\phi$), and high-income, old pessimists ($\phi\omega$). This is a coalition of the young pessimists and high-income, old.*[22]

Finally, if Assumption 4 ((i) respectively (ii)) is not satisfied, the high-income, old optimists emerge as pivotal group and the political equilibrium is always characterized by the prevailing of the mixed coalition.

Proof: See Appendix A.9.

Proposition 9 highlights that the rise in economic inequality changes the composition of the high- and low-ambition coalition. The composition of the mixed coalition remains unchanged. Additionally, if Assumption 4 ((i) respectively (ii)) is not satisfied, the political equilibrium is always characterized by the mixed coalition prevailing. We summarize the preferred adaptation rates of the various coalitions in Appendix A.10.

[20] Under Assumption 2, i.e. $\omega > 0.5$, a successful low-ambition coalition is always larger than a successful high ambition coalition. Hence, a successful high-ambition coalition always has the least political power.

[21] For $\phi < \omega$, a successful high ambition coalition is always larger and thus politically more powerful than a successful mixed coalition.

[22] Note that the low-ambition coalition could constitute a majority under Assumption 1 and Assumption 2, but not necessarily.

Time	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Inequality multiplier	1.000	1.005	1.020	1.050	1.110	1.200	1.340	1.450	1.505	1.527
q	0.127	0.127	0.127	0.127	0.127	0.127	0.127	0.117	0.117	0.117
w	0.127	0.126	0.123	0.119	0.111	0.100	0.086	0.071	0.068	0.066
q/w	1	1.006	1.025	1.063	1.141	1.263	1.464	1.634	1.722	1.759

Table 3: ***The values of the income parameters for the simulations of the extended model***.

7.3 Evolution of the Political Equilibrium and Equilibrium Tipping

While some coalitions are politically feasible, the political equilibrium that emerges depends on the preferences of young pessimists. The equilibrium hinges on whether the young pessimists prefer to form the high ambition coalition, the mixed coalition or the low ambition coalition. We want to evaluate the viability of the high-ambition coalition, so we determine the condition under which young pessimists prefer to form this coalition, rather than the mixed coalition.

As in the baseline model, if beliefs are not too dispersed, an equilibrium exists in which the economy tips to political equilibrium characterized by the prevailing of the high-ambition coalition. In Appendix A.11, we provide an implicit definition the upper bound on the dispersion of beliefs of optimists and pessimists for which the young pessimists prefer to form the high-ambition coalition, rather than the mixed coalition.

To study the evolution of the political equilibrium over time, we simulate the model. We use a fairly similar parameterization as for the baseline model. We again have $\bar{\theta} = 0.85$ but set $\underline{\theta}$ slightly higher, at 0.52. With regards to wages, we start from a case in which the wage of high- and low-income workers is equal, and reduce the wage of low-income workers disproportionately over time (see Van der Straten (2023)). To study the effect of rising inequality on the political equilibrium, we let the inequality multiplier increase in such a way over time that q/w becomes slightly higher than $\bar{\theta}/\underline{\theta}$ by the end of the century. The evolution of the multiplier, to which we fit an S-curve, is plotted in Figure 25 in Appendix A4. This curve is subsequently used to determine the evolution of the low-income wage over time. The evolution of the income variables is summarized in Table 3. The values of other parameters can be found in Table 2.

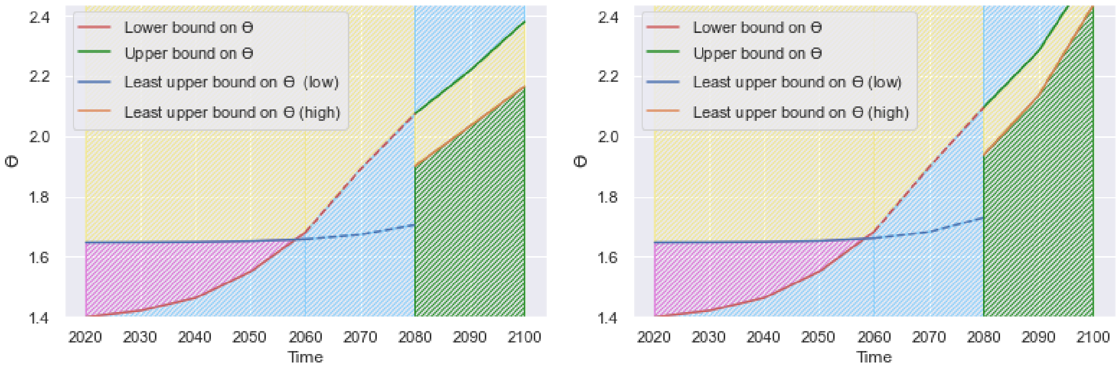


Figure 8: ***Evolution of the political equilibrium***

Key: Joint evolution of the bounds on the dispersion in beliefs. Between 2010 - 2060, the upper bound is determined by Proposition 11, (i), and the lower bound by Assumption 4. If the dispersion of beliefs falls within these bounds, a coalition of young pessimists and old optimists prevails (pink-shaded area). A mixed coalition prevails if the dispersion in beliefs is above the upper bound (yellow shaded area, Proposition 11 (ii)) or if the dispersion in beliefs falls below the lower bound (blue shaded area, Assumption 4). From 2080 onwards, the (least) upper bound is determined by Proposition 11, (ii). If the dispersion of beliefs falls below this bound, a coalition of young pessimists and low-income, old prevails (green shaded area). When above this bound, the mixed coalition prevails. However, if beliefs fall above the bound determined by Assumption 5, the Assumption is not satisfied. The panels show the evolution of the bounds over time and under the different RCP trajectories. The left panel shows the evolution of the bounds under RCP 4.5, while the right panel shows the evolution of the bounds under RCP 8.5.

The evolution of the political equilibrium is displayed in Figure 8. The panels reveal that a coalition of young pessimists and old optimists prevails (pink region) if beliefs are sufficiently dispersed but not too dispersed, and inequality is sufficiently low. If beliefs are too dispersed, young pessimists have a preference to form the mixed coalition as this gives them a higher utility (yellow region, Proposition 11 (i)). If beliefs are not sufficiently dispersed, the relative ordering of the adaptation rates changes, which leads to the prevailing of the mixed coalition (blue region, see Proposition 9). As inequality rises over time, the region in which the mixed coalition prevails expands. This occurs due to the rise in the wage gap, which translates into a rapid increase in the inequality multiplier over time (see Figure 26 in Appendix A4). Then, the coalition of young pessimists and old optimists only prevails between 2010 and 2060, and the political equilibrium shifts to the mixed coalition between 2060 - 2080. Once inequality is sufficiently high (see Proposition 8), and the dispersion in beliefs is sufficiently high as well, the political equilibrium tips to one in which the coalition of young pessimists and low-income, old prevails (green region). If beliefs are too dispersed, however, the mixed coalition prevails since young pessimists obtain a higher utility than if they were to form a coalition with the low-income, old (yellow region; see Proposition 11 (ii).

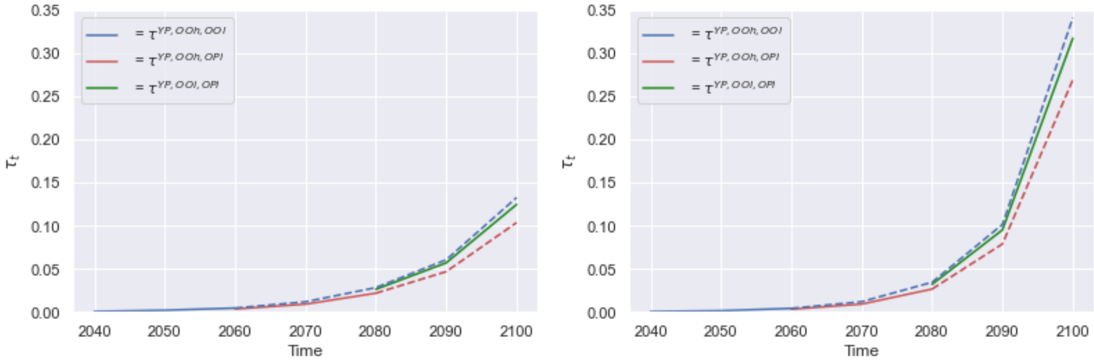


Figure 9: ***Tipping of the adaptation rate***

Key: The time path for the adaptation rate when the political equilibrium tips around 2050, and 2080, under RCP 4.5 (left panel) and RCP 8.5 (right panel).

Figure 9 plots the tipping of the prevailing adaptation rate over time. As in the baseline model, the adaptation rate proposed by each coalition rises in climate risk. Figure 9 further reveals that the tipping of the prevailing coalition has a non-monotonic effect on the scale of public intervention. Specifically, the adaptation rate increases due to the political shift from a mixed coalition to a coalition of young pessimists and old optimists, but declines due to the tipping from a coalition of young pessimists and old optimists to a coalition of young pessimists and low-income old. This result depends crucially on the level of economic inequality. If economic inequality were to rise at an increasing rate, the second tipping point would have a positive effect on public intervention. Nevertheless, the effect would remain much smaller than the effect of the first tipping point, thus highlighting the importance of controlling economic inequality in the fight against climate change.

8 Conclusion

We have studied the evolution over time of the public response to physical climate risk, where political preferences are affected by rising climate risk and growing economic inequality. Our political economy analysis of public adaptation has led to the following insights.

First, the preferred adaptation rate of both young and old households rises in climate risk and the beliefs about the efficacy of public intervention. Furthermore, the preferred adaptation rate is higher if young and old households internalize to a larger extent that climatic damages reduce the housing stock available to the next generation.

Second, the preferred adaptation rate of each feasible coalition (i.e., old optimists and young pessimists, young pessimists and old pessimists, old optimists and old pessimists) also rises as economic inequality grows, and the adaptation rate preferred by a coalition of old optimists and young pessimist or of old optimists and old pessimists rises in the fraction of optimists.

Third, the utility old optimists obtain from forming a coalition with young pessimists is higher than they would obtain from forming a coalition with old pessimists if beliefs of optimists and pessimists are sufficiently dispersed. This is necessary as young pessimists gain an additional advantage from public adaptation compared to old households, since young households sell their house after public intervention takes place, and public adaptation increases the remaining amount left to be sold. Hence, only a sufficiently large dispersion in beliefs rules out a coalition of the old and, as a result, the young pessimists emerge as the pivotal group for determining the political economy equilibrium.

Our analysis highlights the phenomena of multiple equilibria and political tipping, which occurs when the prevailing coalition changes due to gradual climate change. In particular, the equilibrium hinges on whether young pessimists prefer to form a coalition with old optimists or old pessimists. When climate risk is sufficiently low, young pessimists prefer to form a coalition with old pessimists. However, as climate risk rises, the support of young pessimists for public intervention increases. This occurs as the rise in climate risk increases house prices and hence public adaptation becomes more valuable for those that sell their house after the intervention - the young households. Then, if beliefs are not too dispersed, the coalition of young pessimists and old optimists prevails.

Finally, we provide an extension in which old households know their type when they vote. As low-income households rely to a larger extent on public intervention, the rise in economic inequality may lead to an additional tipping point, favouring a coalition of the pessimistic young and low-income old. This might reduces the scale of public intervention, thus highlighting the importance of controlling economic inequality in the fight against climate change. While the adaptation rate proposed by each coalition rises in climate risk, and in economic inequality, households fail to internalize long term benefits of public adaptation for future generations. As a consequence, public intervention is undermined by a "tragedy of the horizon" effect, which prevents adaptation from converging to the long term social optimum.

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A1 Proof of Propositions

A1.1 Proof of Proposition 1

Proposition 9. *Suppose climate risk in period t, γ rises in all future periods by a factor $\zeta > 1$, so that $\{\zeta\gamma_{t+1},...,\zeta\gamma_\infty\}$. Then, house prices rise in this factor ζ if*

$$-\frac{\frac{\partial v'(\bar{L}_j)}{\partial \bar{L}_j}\cdot \mathbb{E}\left(\bar{L}_j\right)}{v'\left(\bar{L}_j\right)}\cdot\frac{\sum_{\iota=t}^{j-1} X_{G,\iota}\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\zeta X^*_{G,\iota'}\right)\mu\gamma_{\iota'+1}\right)}{\sum_{\iota=t}^{j-1}\int_0^1\theta_{j,\iota}diX_{G,\iota}\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}di\zeta X^*_{G,\iota'}\right)\mu\gamma_{\iota'+1}\right)}\geq 1. \tag{A1}$$

This condition is more stringent than the condition under $\theta_j = 1, \forall i, j$.

The price of housing capital in a given period, t, is given by

$$p^*_t = \frac{\left(1-\left(1-\int_0^1\theta_{i,t}diX^*_{G,t}\right)\mu\gamma_{t+1}\right)p_{t+1}+v'(\bar{L}_t)}{(1+r)} \tag{A2}$$

Forward substitution gives

$$p^*_t = \sum_{j=t}^{\infty}\left(\frac{1}{1+r}\right)^{j-t+1}\left[v'\left(\bar{L}_j\right)\right]\prod_{\iota=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,t}diX^*_{G,t}\right)\mu\gamma_{\iota+1}\right) \tag{A3}$$

where

$$\bar{L}_j = \bar{L}_t\prod_{\iota=t}^{j-1}\left(1-\left(1-X^*_{G,t}\right)\mu\gamma_{\iota+1}\right) \tag{A4}$$

Suppose climate risk, γ, increases in all future periods, i.e. $\{\gamma_{t+1},...,\gamma_\infty\}$ by some factor $\zeta > 0$, i.e. $\{\zeta\gamma_t,...,\zeta\gamma_\infty\}$. Then, the price of house capital is given by

$$p_t = \sum_{j=t}^{\infty}\left(\frac{1}{1+r}\right)^{j-t+1}\left[v'\left(\bar{L}_j\right)\right]\prod_{\iota=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota}diX^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right) \tag{A5}$$

Then, the FOC of p_t with respect to ζ is given by

$$\frac{\partial p_t}{\partial\zeta} = \sum_{j=t}^{\infty}\left(\frac{1}{1+r}\right)^{j-t+1}\left[\frac{\partial v'(\bar{L}_j)}{\partial\bar{L}_j}\cdot\frac{\partial\bar{L}_j}{\partial\zeta}\cdot\prod_{\iota=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota}diX^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right)+v'\left(\bar{L}_j\right)\cdot\frac{\partial}{\partial\zeta}\left(\prod_{\iota'=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)\right)\right] \tag{A6}$$

Remark that

$$\bar{L}_j = \bar{L}_t\prod_{\iota=t}^{j-1}\left(1-\left(1-X^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right) \tag{A7}$$

where

$$\frac{\partial\bar{L}_j}{\partial\zeta} = -\mu\bar{L}_t\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right) \tag{A8}$$

and

$$\frac{\partial}{\partial\zeta}\left(\prod_{\iota'=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\gamma_{\iota'+1}\right)\right)=-\mu\sum_{\iota=t}^{j-1}\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right) \tag{A9}$$

then

$$\frac{\partial p_t}{\partial\zeta}=-\mu\sum_{j=t}^{\infty}\left(\frac{1}{1+r}\right)^{j-t+1}\frac{\partial v'(\bar L_j)}{\partial\bar L_j}\cdot\bar L_t\cdot\prod_{\iota=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota}diX^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right)\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)$$
$$+v'\left(\bar L_j\right)\cdot\sum_{\iota=t}^{j-1}\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right) \tag{A10}$$

Define

$$\mathbb{E}\left(\bar L_j\right)=\bar L_t\cdot\prod_{\iota=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota}di\zeta X^*_{G,\iota}\right)\mu\gamma_{\iota+1}\right) \tag{A11}$$

Then, this becomes

$$\frac{\partial p_t}{\partial\zeta}=-\mu\sum_{j=t}^{\infty}\left(\frac{1}{1+r}\right)^{j-t+1}\frac{\partial v'(\bar L_j)}{\partial\bar L_j}\cdot\mathbb{E}\left(\bar L_j\right)\cdot\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)$$
$$+v'\left(\bar L_j\right)\cdot\sum_{\iota=t}^{j-1}\left(\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right) \tag{A12}$$

This is positive if

$$-\frac{\partial v'(\bar L_j)}{\partial\bar L_j}\cdot\mathbb{E}\left(\bar L_j\right)\cdot\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)\geq v'\left(\bar L_j\right)\cdot\sum_{\iota=t}^{j-1}\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right) \tag{A13}$$

or, equivalently, if

$$-\frac{\frac{\partial v'(\bar L_j)}{\partial\bar L_j}\cdot\mathbb{E}\left(\bar L_j\right)}{v'\left(\bar L_j\right)}\cdot\frac{\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)}{\sum_{\iota=t}^{j-1}\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)}\geq 1 \tag{A14}$$

This condition is more stringent than Condition 1 if

$$\mathbb{E}\left(\bar L_j\right)\cdot\frac{\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)}{\sum_{\iota=t}^{j-1}\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)}\leq\bar L_j \tag{A15}$$

or, equivalently, if

$$\frac{\bar L_j}{\mathbb{E}\left(\bar L_j\right)}\geq\frac{\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)}{\sum_{\iota=t}^{j-1}\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\gamma_{\iota+1}\right)\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)} \tag{A16}$$

Substituting the expressions for $\bar L_j$ and $\mathbb{E}\left(\bar L_j\right)$ and rewriting gives

$$\frac{\sum_{\iota=t}^{j-1}\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota'}diX^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)}{\prod_{\iota=t}^{j-1}\left(1-\left(1-\int_0^1\theta_{i,\iota}diX^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right)}\geq\frac{\sum_{\iota=t}^{j-1}(1-X_{G,\iota})\gamma_{\iota+1}\cdot\prod_{\iota'=t,\iota'\neq\iota}^{j-1}\left(1-\left(1-X^*_{G,\iota'}\right)\mu\zeta\gamma_{\iota'+1}\right)}{\prod_{\iota=t}^{j-1}\left(1-\left(1-X^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right)} \tag{A17}$$

This becomes

$$\sum_{\iota=t}^{j-1}\left(\frac{\left(1-\int_0^1\theta_{i,\iota}diX_{G,\iota}\right)\gamma_{\iota+1}}{\left(1-\left(1-\int_0^1\theta_{i,\iota}diX^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right)}\right)\geq\sum_{\iota=t}^{j-1}\left(\frac{(1-X_{G,\iota})\gamma_{\iota+1}}{\left(1-\left(1-X^*_{G,\iota}\right)\mu\zeta\gamma_{\iota+1}\right)}\right) \tag{A18}$$

which is always satisfied as $\theta\leq 1,\forall i$.

A1.2 Proof of Proposition 2

Young households favour a adaptation rate that maximizes their expected lifetime utility:

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{i,t}, c_{i,t+1}, \bar{L}_{t+1}\right)\right) = v\left(L_{i,t}\right) + \mathbb{E}_t\left(c_{i,t+1}\right) + f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right) \tag{A19}$$

$$s.t. \quad (1-\tau_t)\, y_{i,t} \leq p_t L_{i,t} + S_{i,t}$$

$$c_{i,t+1} \leq (1-\tau_{t+1})\, y_{i,t+1} + \max\left\{p_{t+1}\left(1-\xi_{i,t+1}\right) L_{i,t} + (1+\hat{r})\, S_{i,t}, 0\right\}$$

$$\tau_t \geq 0$$

where $c_{i,t+1}$ is the consumption of household i in period $t+1$ and $\mathbb{E}_t$ denotes expectations formed at date t.

Given the probability of default, the expectation of household i's consumption in period $t+1$, $c_{i,t+1}$, as formed at date t, becomes:

$$\mathbb{E}_t\left(c_{i,t+1}\right) = G\left(\hat{\xi}_{i,t+1}\right)\left(p_{t+1}\left(1-\mathbb{E}\left(\xi_{i,t+1}|\xi_{t+1} \leq \hat{\xi}_{i,t+1}\right)\right) L_{i,t} + (1+\hat{r}) S_{i,t}\right) \tag{A20}$$

No arbitrage requires that the expected payoff of holding household debt to be equal to the riskless return earned on savings:

$$(1+r)(-S_{i,t}) = G\left(\hat{\xi}_{i,t+1}\right)(1+\hat{r})(-S_{i,t}) + \left(1-G\left(\hat{\xi}_{i,t+1}\right)\right) p_{t+1}\left(1-\mathbb{E}\left(\xi_{i,t+1}|\xi_{i,t+1} > \hat{\xi}_{i,t+1}\right)\right) L_{i,t} \tag{A21}$$

where the expected payoff of holding household debt is equal to the repayment of the loan with interest in case the household does not default and the revenue from selling the collateral in case of default.

The no-arbitrage condition can be rewritten as

$$G(\hat{\xi}_{i,t+1})\left(p_{t+1}\left(1-\mathbb{E}\left(\xi_{i,t+1}|\xi_{i,t+1} \leq \hat{\xi}_{i,t+1}\right)\right) L_{i,t} + (1+\hat{r})(S_{i,t})\right) = (1+r)(S_{i,t}) + p_{t+1}\left(1-\mathbb{E}\left(\xi_{i,t+1}\right)\right) L_{i,t+1} \tag{A22}$$

and the expectation of household i's consumption in period $t+1$, $c_{i,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{i,t+1}\right) = (1+r)(S_{i,t}) + p_{t+1}\left(1-\mathbb{E}\left(\xi_{i,t+1}\right)\right) L_{i,t} \tag{A23}$$

Using that $\mathbb{E}\left(\xi_{i,t+1}\right) = \left(1-\tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}$, the household optimization problem can be written as

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{i,t}, c_{i,t+1}, \bar{L}_{t+1}\right)\right) = (1+r)(S_{i,t}) + p_{t+1}\left(1-\left(1-\tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}\right) L_{i,t} + v\left(L_{i,t}\right) + f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right) \tag{A24}$$

$$s.t. \quad (1-\tau_t)\, y_{i,t} \leq p_t L_{i,t} + S_{i,t}$$

$$\tau_t \geq 0$$

and the budget constraint is substituted to obtain

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{i,t}, c_{i,t+1}, \bar{L}_{t+1}\right)\right) = (1+r)\left((1-\tau_t)\, y_{i,t} - p_t L_{i,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}\right) L_{i,t} + v\left(L_{i,t}\right) + f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right) \tag{A25}$$

$$s.t. \quad \tau_t \geq 0$$

The FOC for τ_t is given by

$$-(1+r)\, y_{i,t} + \tilde{\theta}_j \mu\gamma_{t+1} p_{t+1} L_{i,t} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} + \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)} \cdot \frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} + \underbrace{\left[-(1+r)\, p_t \cdot + p_{t+1}\left(1-\left(1-\tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}\right) + \frac{\partial v(L_{i,t})}{\partial L_{i,t}}\right]}_{=0} \cdot \frac{\partial L_{i,t}}{\partial \tau_t} = 0 \tag{A26}$$

where

$$\frac{\partial X_{G,t}}{\partial \tau_t} = \sqrt{\frac{\left[\phi q + \left(1-\phi\right) w\right]}{\tau_t \bar{L}_t}} \geq 0 \tag{A27}$$

and

$$\frac{\partial L_{i,t}}{\partial \tau_t} = -\tilde{\theta}_j \mu\gamma_{t+1} p_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \cdot \underbrace{\left(\frac{\partial v'^{-1}}{\partial L_{i,t}}\right)^{-1}}_{<0} > 0 \tag{A28}$$

i.e. a higher adaptation rate implies a higher level of public intervention and therefore lower idiosyncratic losses suffered in the wake of an extreme weather event. Given prices, this increases demand for housing capital.

Now, using that

$$\frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \theta_j \mu\gamma_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \tag{A29}$$

and that in equilibrium $L_{i,t} = \bar{L}_t$, the FOC can be rewritten as

$$\theta_j \mu\gamma_{t+1}\left(p_{t+1} + \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}\right) \cdot \sqrt{\frac{\left[\phi q + \left(1-\phi\right) w\right]}{\tau_t \bar{L}_t}} = (1+r)\, y_{i,t} \tag{A30}$$

Then, the optimal choice of adaptation rate of a young household with beliefs θ_j is

$$\tau_t^{Y*} = \frac{1}{\bar{L}_t} \cdot \left[\phi q + \left(1-\phi\right) w\right] \cdot \left(\frac{\theta_j \mu\gamma_{t+1}\left(p_{t+1} + \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}\right)}{(1+r)\, y_{i,t}}\right)^2 \tag{A31}$$

A1.3 Proof of Proposition 3

Old households maximize their expected utility, as given by

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{i,t},, \bar{L}_{t+1}\right)\right) = \mathbb{E}_t\left(c_{i,t}\right) + f\left(\mathbb{E}_{i,t}\left(\bar{L}_{t+1}\right)\right) \tag{A32}$$

$$s.t. \quad c_{i,t} \leq (1-\tau_t)\, y_t + \max\left\{p_t\left(1-\xi_{i,t}\right) L_{i,t-1} + (1+\hat{r})\, S_{i,t-1}, 0\right\}$$

$$\tau_t \geq 0$$

where $c_{i,t}$ is the consumption of household i in period t and $\mathbb{E}_t$ denotes expectations formed at (the start of) date t.

Using the no-arbitrage condition as in Proof of Proposition 1, the maximization problem can be rewritten as

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{i,t+1}, \bar{L}_{t+1}\right)\right) = (1-\tau_t)\, y_t + (1+r) S_{i,t-1} + p_{t+1}\left(1-\left(1-\tilde{\theta}_j X_{G,t-1}\right)\mu\gamma_t\right) L_{i,t-1} + f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right) \tag{A33}$$

$$s.t. \quad \tau_t \geq 0$$

The FOC for τ_t is given by

$$-y_{i,t} + \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)} \cdot \frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = 0 \tag{A34}$$

where

$$\frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \theta_j \mu \gamma_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \tag{A35}$$

and

$$\frac{\partial X_{G,t}}{\partial \tau_t} = \sqrt{\frac{\left[\phi q + \left(1-\phi\right) w\right]}{\tau_t \bar{L}_t}} \geq 0 \tag{A36}$$

Then, the optimal choice of adaptation rate of an old household with beliefs θ_j is given by

$$\tau_t^{O*} = \frac{1}{\bar{L}_t} \cdot \left[\phi q + \left(1-\phi\right) w\right] \cdot \left(\frac{\theta_j \mu \gamma_{t+1} \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}}{y_{i,t}}\right)^2 \tag{A37}$$

A1.4 Proof of Proposition 4

We assume that coalitions choose a adaptation rate that maximizes their joint utility function. Consider first the coalition of young pessimists and old optimists. This coalition maximizes

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{YP,t}, c_{OO,t}, c_{YP,t+1}, \bar{L}_{t+1}\right)\right) = \omega \cdot \left(v\left(L_{YP,t}\right) + \mathbb{E}_t\left(c_{YP,t+1}\right)\right) + (1-\omega)\cdot\left(\mathbb{E}_t\left(c_{OO,t}\right)\right) + f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right) \tag{A38}$$

$$\begin{aligned} s.t. \quad (1-\tau_t)\, y_{YP,t} &\le p_t L_{YP,t} + S_{YP,t} \\ c_{YP,t+1} &\le (1-\tau_{t+1})\, y_{YP,t+1} + \max\left\{p_{t+1}\left(1-\xi_{YP,t+1}\right) L_{YP,t} + (1+\hat{r})\, S_{YP,t}, 0\right\} \\ c_{OO,t} &\le (1-\tau_t)\, y_{OO,t} + \max\left\{p_t\left(1-\xi_{OO,t}\right) L_{OO,t-1} + (1+\hat{r})\, S_{OO,t-1}, 0\right\} \\ \tau_t &\ge 0 \end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a young pessimists' consumption in period $t+1$, $c_{YP,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{YP,t+1}\right) = (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t} + (1-\tau_{t+1})\, y_{YP,t+1} \tag{A39}$$

and the expectation of an old optimists' consumption in period t, $c_{OO,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{OO,t}\right) = (1-\tau_t)\, y_{OO,t} + (1+r) S_{OO,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OO} X_{G,t-1}\right)\mu\gamma_t\right) L_{OO,t-1} \tag{A40}$$

Then, the maximization problem can be rewritten to

$$\begin{aligned} \max_{\tau_t} \mathbb{E}\left(U\left(L_{YP,t}, c_{OO,t}, c_{YP,t+1}, \bar{L}_{t+1}\right)\right) = {} & \omega \cdot \left(v\left(L_{YP,t}\right) + (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t}\right) \\ & + (1-\omega)\cdot\left((1-\tau_t)\, y_{OO,t} + (1+r) S_{OO,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OO} X_{G,t-1}\right)\mu\gamma_t\right) L_{OO,t-1}\right) + f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right) \\ s.t. \quad \tau_t \ge 0 & \end{aligned} \tag{A41}$$

The FOC for τ_t is given by

$$\omega\left(-(1+r)\, y_{YP,t} + \tilde{\theta}_{YP}\mu\gamma_{t+1} p_{t+1} L_{YP,t} \cdot \frac{\partial X_{G,t}}{\partial \tau_t}\right) + (1-\omega)\left(-y_{OO,t}\right) + \frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)} \cdot \frac{\partial \mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = 0 \tag{A42}$$

where

$$\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right) = \left(1-\left(1-\int_0^1 \tilde{\theta}_j X_{G,t} di\right)\mu\gamma_{t+1}\right)\bar{L}_t \tag{A43}$$

and

$$\frac{\partial \mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \left(\omega\underline{\theta} + (1-\omega)\bar{\theta}\right)\mu\gamma_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \tag{A44}$$

Then, this becomes

$$\frac{\partial X_{G,t}}{\partial \tau_t}\left[\omega\underline{\theta}\mu\gamma_{t+1}p_{t+1}+\left(\omega\underline{\theta}+(1-\omega)\bar{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}\right]=\omega\cdot(1+r)\,y_{YP,t}+(1-\omega)\cdot y_{OO,t} \tag{A45}$$

Using that

$$\frac{\partial X_{G,t}}{\partial \tau_t}=\sqrt{\frac{[\phi q+(1-\phi)\,w]}{\tau_t\bar{L}_t}} \tag{A46}$$

The adaptation rate preferred by a coalition of young pessimists and old optimists is given by

$$\tau_t^{YP,OO*}=\frac{1}{\bar{L}_t}\cdot[\phi q+(1-\phi)\,w]\cdot\left(\frac{\mu\gamma_{t+1}\left[\omega\underline{\theta}p_{t+1}+\left(\omega\underline{\theta}+(1-\omega)\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)\,[\phi q+(1-\phi)\,w]}\right)^2 \tag{A47}$$

$$=\frac{\left(\mu\gamma_{t+1}\right)^2}{\bar{L}_t}\cdot\frac{1}{[\phi q+(1-\phi)\,w]}\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1}+\left(\omega\underline{\theta}+(1-\omega)\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)}\right)^2 \tag{A48}$$

Now, consider the coalition of young pessimists and old pessimists. This coalition maximizes

$$\max_{\tau_t}\mathbb{E}\left(U\left(L_{YP,t},c_{OP,t},c_{YP,t+1},\bar{L}_{t+1}\right)\right)=\frac{1}{2}\cdot\left(v\left(L_{YP,t}\right)+\mathbb{E}_t\left(c_{YP,t+1}\right)\right)+\frac{1}{2}\cdot\left(\mathbb{E}_t\left(c_{OP,t}\right)\right)+f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right) \tag{A49}$$

$$\begin{aligned} s.t.\quad &(1-\tau_t)\,y_{YP,t}\le p_tL_{YP,t}+S_{YP,t}\\ &c_{YP,t+1}\le(1-\tau_{t+1})\,y_{YP,t+1}+\max\left\{p_{t+1}\left(1-\xi_{YP,t+1}\right)L_{YP,t}+(1+\hat{r})\,S_{YP,t},0\right\}\\ &c_{OP,t}\le(1-\tau_t)\,y_{OP,t}+\max\left\{p_t\left(1-\xi_{OP,t}\right)L_{OP,t-1}+(1+\hat{r})\,S_{OP,t-1},0\right\}\\ &\tau_t\ge 0\end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a young pessimists' consumption in period $t+1$, $c_{YP,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{YP,t+1}\right)=(1+r)\left((1-\tau_t)\,y_{YP,t}-p_tL_{YP,t}\right)+p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\right)\mu\gamma_{t+1}\right)L_{YP,t}+(1-\tau_{t+1})\,y_{YP,t} \tag{A50}$$

and the expectation of an old optimists' consumption in period t, $c_{OP,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{OP,t}\right)=(1-\tau_t)\,y_{OP,t}+(1+r)S_{OP,t-1}+p_t\left(1-\left(1-\tilde{\theta}_{OP}X_{G,t-1}\right)\mu\gamma_t\right)L_{OP,t-1} \tag{A51}$$

Then, the maximization problem can be rewritten to

$$\begin{aligned}\max_{\tau_t}\mathbb{E}\left(U\left(L_{YP,t},c_{OP,t},c_{YP,t+1},\bar{L}_{t+1}\right)\right)=&\frac{1}{2}\cdot\left(v\left(L_{YP,t}\right)+(1+r)\left((1-\tau_t)\,y_{YP,t}-p_tL_{YP,t}\right)+p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\right)\mu\gamma_{t+1}\right)L_{YP,t}\right)\\ &+\frac{1}{2}\cdot\left((1-\tau_t)\,y_{OP,t}+(1+r)S_{OP,t-1}+p_t\left(1-\left(1-\tilde{\theta}_{OP}X_{G,t-1}\right)\mu\gamma_t\right)L_{OP,t-1}\right)+f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)\\ s.t.\quad&\tau_t\ge 0\end{aligned} \tag{A52}$$

The FOC for τ_t is given by

$$\frac{1}{2}\left(-(1+r)y_{YP,t}+\tilde{\theta}_{YP}\mu\gamma_{t+1}p_{t+1}L_{YP,t}\cdot\frac{\partial X_{G,t}}{\partial\tau_t}\right)+\frac{1}{2}\left(-y_{OP,t}\right)+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\cdot\frac{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t}=0 \tag{A53}$$

where

$$\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)=\left(1-\left(1-\tilde{\theta}_P X_{G,t}di\right)\mu\gamma_{t+1}\right)\bar{L}_t \tag{A54}$$

and

$$\frac{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t}=\underline{\theta}\mu\gamma_{t+1}\cdot\frac{\partial X_{G,t}}{\partial\tau_t} \tag{A55}$$

Then, this becomes

$$\frac{\partial X_{G,t}}{\partial\tau_t}\left[\frac{1}{2}\underline{\theta}\mu\gamma_{t+1}p_{t+1}+\underline{\theta}\mu\gamma_{t+1}\cdot\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right]=\frac{1}{2}\cdot(1+r)y_{YP,t}+\frac{1}{2}\cdot y_{OP,t} \tag{A56}$$

Using that

$$\frac{\partial X_{G,t}}{\partial\tau_t}=\sqrt{\frac{\left[\phi q+\left(1-\phi\right)w\right]}{\tau_t\bar{L}_t}} \tag{A57}$$

The adaptation rate preferred by a coalition of young pessimists and old pessimists is given by

$$\tau_t^{YP,OP*}=\frac{1}{\bar{L}_t}\cdot\left[\phi q+\left(1-\phi\right)w\right]\cdot\left(\frac{\underline{\theta}\mu\gamma_{t+1}\left[\frac{1}{2}p_{t+1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right]}{\left(1+\frac{1}{2}r\right)\left[\phi q+\left(1-\phi\right)w\right]}\right)^2 \tag{A58}$$

$$=\frac{\left(\underline{\theta}\mu\gamma_{t+1}\right)^2}{\bar{L}_t}\cdot\frac{1}{\left[\phi q+\left(1-\phi\right)w\right]}\cdot\left(\frac{\left[\frac{1}{2}p_{t+1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right]}{\left(1+\frac{1}{2}r\right)}\right)^2 \tag{A59}$$

Finally, consider the coalition of old optimists and old pessimists. This coalition maximizes

$$\max_{\tau_t}\mathbb{E}\left(U\left(c_{OO,t},c_{OP,t},\bar{L}_{t+1}\right)\right)=(1-\omega)\cdot\left(\mathbb{E}_t\left(c_{OO,t}\right)\right)+\omega\cdot\left(\mathbb{E}_t\left(c_{OP,t}\right)\right)+f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right) \tag{A60}$$

$$\begin{aligned} s.t.\quad & c_{OO,t}\le(1-\tau_t)\,y_{OO,t}+\max\left\{p_t\left(1-\xi_{OO}\right)L_{OO,t-1}+(1+\hat{r})\,S_{OO,t-1},0\right\}\\ & c_{OP,t}\le(1-\tau_t)\,y_{OP,t}+\max\left\{p_t\left(1-\xi_{OP,t}\right)L_{OP,t-1}+(1+\hat{r})\,S_{OP,t-1},0\right\}\\ & \tau_t\ge 0\end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a old optimists' consumption in period t, $c_{OO,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{OO,t}\right)=(1-\tau_t)\,y_{OO,t}+(1+r)S_{OO}+p_t\left(1-\left(1-\tilde{\theta}_{OO}X_{G,t-1}\right)\mu\gamma_t\right)L_{OO,t-1} \tag{A61}$$

and the expectation of an old pessimists' consumption in period t, $c_{OP,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{OP,t}\right) = (1-\tau_t)\,y_{OP,t} + (1+r)S_{OP,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OP}X_{G,t-1}\right)\mu\gamma_t\right)L_{OP,t-1} \tag{A62}$$

Then, the maximization problem can be rewritten to

$$\begin{aligned}\max_{\tau_t}\mathbb{E}\left(U\left(c_{OO,t},c_{OP,t},\bar{L}_{t+1}\right)\right) = &(1-\omega)\cdot\left((1-\tau_t)\,y_{OO,t}+(1+r)S_{OO,t-1}+p_t\left(1-\left(1-\tilde{\theta}_{OO}X_{G,t-1}\right)\mu\gamma_t\right)L_{OO,t-1}\right)\\ &+\omega\cdot\left((1-\tau_t)\,y_{OP,t}+(1+r)S_{OP,t-1}+p_t\left(1-\left(1-\tilde{\theta}_{OP}X_{G,t-1}\right)\mu\gamma_t\right)L_{OP,t-1}\right)+f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)\\ s.t.\quad \tau_t\geq 0&\end{aligned} \tag{A63}$$

The FOC for τ_t is given by

$$(1-\omega)\left(-y_{OO}\right)+\omega\left(-y_{OP,t}\right)+\frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}\cdot\frac{\partial\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t}=0 \tag{A64}$$

where

$$\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)=\left(1-\left(1-\int_0^1\tilde{\theta}_jX_{G,t}di\right)\mu\gamma_{t+1}\right)\bar{L}_t \tag{A65}$$

and

$$\frac{\partial\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t}=\left((1-\omega)\bar{\theta}+\omega\underline{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial X_{G,t}}{\partial\tau_t} \tag{A66}$$

Then, this becomes

$$\frac{\partial X_{G,t}}{\partial\tau_t}\left[\left((1-\omega)\bar{\theta}+\omega\underline{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}\right]=(1-\omega)\cdot y_{OO}+\omega\cdot y_{OP,t} \tag{A67}$$

Using that

$$\frac{\partial X_{G,t}}{\partial\tau_t}=\sqrt{\frac{\left[\phi q+\left(1-\phi\right)w\right]}{\tau_t\bar{L}_t}} \tag{A68}$$

The adaptation rate preferred by a coalition of old optimists and old pessimists is given by

$$\tau_t^{OO,OP*}=\frac{1}{\bar{L}_t}\cdot\left[\phi q+\left(1-\phi\right)w\right]\cdot\left(\frac{\mu\gamma_{t+1}\left[\left((1-\omega)\bar{\theta}+\omega\underline{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}\right]}{\left[\phi q+\left(1-\phi\right)w\right]}\right)^2 \tag{A69}$$

$$=\frac{\left(\mu\gamma_{t+1}\right)^2}{\bar{L}_t}\cdot\frac{1}{\left[\phi q+\left(1-\phi\right)w\right]}\cdot\left[\left((1-\omega)\bar{\theta}+\omega\underline{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}\right]^2 \tag{A70}$$

A1.5 Proof of Proposition 5

To ensure that the adaptation rate preferred by young optimists is strictly larger than the adaptation rate preferred by old optimists (i.e. $\tau^{YO*} > \tau^{OO*}$), it must hold that

$$\left(\frac{p_{t+1} + \frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}}}{(1+r)}\right) > \left(\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{O,t}}\right) \tag{A71}$$

or equivalently

$$p_{t+1}\left[\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)}\right]^{-1} > r \tag{A72}$$

which is always satisfied as the concavity of the utility function of housing, $v(\bar{L}_t)$, ensures that the price of housing capital rises faster than the housing stock falls.

To ensure that the adaptation rate preferred by young pessimists is strictly larger than the adaptation rate preferred by old optimists (i.e. $\tau^{YP*} > \tau^{OP*}$), it must hold that

$$\left(\frac{p_{t+1} + \frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}}}{(1+r)}\right) > \left(\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{P,t}}\right) \tag{A73}$$

or equivalently

$$p_{t+1}\left[\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right]^{-1} > r \tag{A74}$$

which, again, is always satisfied.

Now, to ensure that the adaptation rate preferred by old optimists is larger than the adaptation rate preferred by young pessimists (i.e. $\tau^{OO*} > \tau^{YP*}$), it must hold that

$$\bar{\theta}\cdot\left(\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{O,t}}\right) > \underline{\theta}\cdot\left(\frac{p_{t+1} + \frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}}}{(1+r)}\right) \tag{A75}$$

or equivalently

$$\frac{\bar{\theta}}{\underline{\theta}} > \left(\frac{p_{t+1}\cdot\left[\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}}\right]^{-1} + \frac{\partial f(\mathbb{E}_{P,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{P,t}}\cdot\left[\frac{\partial f(\mathbb{E}_{O,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{O,t}}\right]^{-1}}{(1+r)}\right) \tag{A76}$$

which is the condition given in Assumption 3. Hence, under Assumption 3, we have that

$$\tau^{YO*} > \tau^{OO*} > \tau^{YP*} > \tau^{OP*} \tag{A77}$$

Then, it follows directly that

$$\tau^{OO,YP*} > \tau^{OO,OP*} > \tau^{YP,OP*} \tag{A78}$$

and

$$\tau^{YO*} > \tau^{OO*} > \tau^{OO,YP*} > \tau^{YP*} > \tau^{YP,OP*} > \tau^{OP*} \tag{A79}$$

It remains to be determined whether $\tau^{OO,OP*} > \tau^{YP*}$. This is the case if

$$\left((1-\omega)\bar{\theta} + \omega\underline{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)} > \underline{\theta} \cdot \left(\frac{p_{t+1} + \frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{P,t}}}{(1+r)}\right) \tag{A80}$$

or equivalently, if

$$\frac{\left((1-\omega)\bar{\theta} + \omega\underline{\theta}\right)}{\underline{\theta}} > \left(\frac{p_{t+1} \cdot \left[\frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}\right]^{-1} + \frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{P,t}} \cdot \left[\frac{\partial f\left(\mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{OO,OP,t}\left(\bar{L}_{t+1}\right)}\right]^{-1}}{(1+r)}\right) \tag{A81}$$

Then

$$\tau^{YO*} > \tau^{OO*} > \tau^{OO,YP*} > \tau^{OO,OP*} > \tau^{YP*} > \tau^{YP,OP*} > \tau^{OP*} \tag{A82}$$

and otherwise

$$\tau^{YO*} > \tau^{OO*} > \tau^{OO,YP*} > \tau^{YP*} > \tau^{OO,OP*} > \tau^{YP,OP*} > \tau^{OP*} \tag{A83}$$

A1.6 Proof of Proposition 6

Young pessimists prefer to form a coalition with old optimists rather than old pessimists if

$$\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OO*}\right)\right) > \mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OP*}\right)\right) \tag{A84}$$

That is, if

$$v\left(L_{YP,t}\left(\tau^{YP,OO*}\right)\right) - (1+r)\left(\left(\tau^{YP,OO*}\right)y_{YP,t} + p_t L_{YP,t}\left(\tau^{YP,OO*}\right)\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\left(\tau^{YP,OO*}\right)\right)\mu\gamma_{t+1}\right)L_{YP,t}\left(\tau^{YP,OO*}\right)$$
$$+ f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OO*}\right)\right)\right) > v\left(L_{YP,t}\left(\tau^{YP,OP*}\right)\right) - (1+r)\left(\left(\tau^{YP,OP*}\right)y_{YP,t} + p_t L_{YP,t}\left(\tau^{YP,OP*}\right)\right)$$
$$+ p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\left(\tau^{YP,OP*}\right)\right)\mu\gamma_{t+1}\right)L_{YP,t}\left(\tau^{YP,OP*}\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OP*}\right)\right)\right) \tag{A85}$$

Using that

$$v'\left(L_{YP,t}\right) = (1+r)p_t - \left(1-\left(1-\tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}\right)p_{t+1}$$

and rearranging terms gives

$$v\left(L_{YP,t}\left(\tau^{YP,OO*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OP*}\right)\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OO*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OP*}\right)\right)\right) >$$
$$(1+r)\left(\tau^{YP,OO*} - \tau^{YP,OP*}\right)y_{YP,t} + v'\left(L_{YP,t}\left(\tau^{YP,OO*}\right)\right)\cdot L_{YP,t}\left(\tau^{YP,OO*}\right) - v'\left(L_{YP,t}\left(\tau^{YP,OP*}\right)\right)\cdot L_{YP,t}\left(\tau^{YP,OP*}\right) \tag{A86}$$

Let $v\left(L_{i,t}\right) = ln\left(L_{it}\right)$. Then, this becomes

$$\underbrace{v\left(L_{YP,t}\left(\tau^{YP,OO*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OP*}\right)\right)}_{(i)>0} + \underbrace{f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OO*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OP*}\right)\right)\right)}_{(ii)>0} > (1+r)\underbrace{\left(\tau^{YP,OO*} - \tau^{YP,OP*}\right)}_{(iii)>0}y_{YP,t} \tag{A87}$$

where

(i) $\tau^{YP,OO*} > \tau^{YP,OP*}$(see Proposition 5) $\implies L_{YP,t}\left(\tau^{YP,OO*}\right) > L_{YP,t}\left(\tau^{YP,OP*}\right)$ (see Proposition 2).

(ii) $\tau^{YP,OO*} > \tau^{YP,OP*}$(see Proposition 5) $\implies X_{G,t}^{YP,OO*} > X_{G,t}^{YP,OP*}$.

(iii) $\tau^{YP,OO*} > \tau^{YP,OP*}$ (see Proposition 5).

Substituting the expressions for $\tau^{YP,OO*}, \tau^{YP,OP*}$ gives

$$\left(\frac{\left[\omega\underline{\theta}p_{t+1} + (\omega\underline{\theta} + (1-\omega)\bar{\theta})\cdot\frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)}\right)^2 - \left(\frac{\underline{\theta}\cdot\left[\frac{1}{2}p_{t+1} + \frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right]}{\left(1+\frac{1}{2}r\right)}\right)^2$$
$$< \frac{1}{A}\cdot\frac{v\left(L_{YP,t}\left(\tau^{YP,OO*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OP*}\right)\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OO*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OP*}\right)\right)\right)}{(1+r)\left[\phi q + (1-\phi)w\right]} \tag{A88}$$

Define

$$\Delta v\left(L_{YP,t}\right) = v\left(L_{YP,t}\left(\tau^{YP,OO*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OP*}\right)\right)$$

and

$$\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right)=f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OO*}\right)\right)\right)-f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OP*}\right)\right)\right)$$

Then, denote by $B\equiv B\left(\Delta v\left(L_{YP,t}\right),\bar{L}_t,\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right),\gamma_{t+1}\right)=\frac{\Delta v\left(L_{YP,t}\right)+\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right)}{(1+r)}\cdot\frac{\bar{L}_t}{(\mu\gamma_{t+1})^2}$. This allows us to rewrite the condition as

$$\frac{\omega^2}{(1+\omega r)^2}\cdot\left(p_{t+1}+\left(1+\frac{(1-\omega)}{\omega}\cdot\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}\right)^2<\frac{B}{\underline{\theta}^2}+\frac{1}{\left(1+\frac{1}{2}r\right)^2}\cdot\left(\frac{1}{2}p_{t+1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right)^2$$

which can be simplified to obtain

$$p_{t+1}+\left(1+\frac{(1-\omega)}{\omega}\cdot\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}<\frac{(1+\omega r)}{\omega}\cdot\sqrt{\left(\frac{B}{\underline{\theta}^2}+\frac{1}{\left(1+\frac{1}{2}r\right)^2}\cdot\left(\frac{1}{2}p_{t+1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right)^2\right)}$$

Then, young pessimists prefer to form a coalition with old optimists if

$$\frac{\bar{\theta}}{\underline{\theta}}\cdot<\frac{\omega}{(1-\omega)}\cdot\left(\left[\frac{\partial f\left(\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OO,t}\left(\bar{L}_{t+1}\right)}\right]^{-1}\cdot\left(\frac{(1+\omega r)}{\omega}\cdot\sqrt{\left(\frac{B}{\underline{\theta}^2}+\frac{1}{\left(1+\frac{1}{2}r\right)^2}\cdot\left(\frac{1}{2}p_{t+1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}\right)^2\right)}-p_{t+1}\right)-1\right)$$

Otherwise, we have that

$$\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OO*}\right)\right)<\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OP*}\right)\right)\tag{A89}$$

and a coalition of young pessimists and old optimists prevails.

A1.7 Proof of Proposition 7

In the social optimum, the benefits of public adaptation are fully internalized, i.e. $\theta_j = 1, \forall j$. Then, the optimal choice of public adaptation is determined by maximizing a utilitarian social welfare function, i.e.

$$\max_{X_{G,t}} \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t \left((1+r)\left((1-\tau_t)\left[\phi q + (1-\phi) w\right]\right) + v(\bar{L}_t) + f(\bar{L}_{t+1})\right) \tag{A90}$$

$$s.t. \quad \frac{1}{2} X_{G,t}^{2*} \bar{L}_t = \tau_t \cdot [\phi q + (1-\phi) w] \tag{A91}$$

$$\bar{L}_j = \bar{L}_t \prod_{\iota=t}^{j-1} \left(1 - (1 - X_{G,\iota}) \mu \gamma_{\iota+1}\right). \tag{A92}$$

The first order condition for $X_{G,t}$ is

$$(1+r) X_{G,t}^* \bar{L}_t = \mu \gamma_{t+1} \bar{L}_t \cdot f'\left(\bar{L}_{t+1}\right) + \sum_{j=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{j-t} \left(\left[-\frac{1}{2}(1+r) X_{G,j}^2 + v'(\bar{L}_j)\right] \frac{\partial \bar{L}_j}{\partial X_{G,t}} + f'(\bar{L}_{j+1}) \cdot \frac{\partial \bar{L}_{j+1}}{\partial X_{G,t}}\right) \tag{A93}$$

Using that

$$\frac{\partial \bar{L}_j}{\partial X_{G_t}} = \mu_L \gamma_{t+1} \bar{L}_t \prod_{\iota=t+1}^{j-1} \left(1 - (1 - X_{G,\iota}) \mu_L \gamma_{\iota+1}\right) \tag{A94}$$

The public choice of adaptation becomes

$$X_{G,t}^* = \frac{\mu_L \gamma_{t+1}}{(1+r)} \cdot \underbrace{\sum_{j=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{j-t} \left[-\frac{1}{2}(1+r) X_{G,j}^2 + v'(\bar{L}_j)\right] \prod_{\iota=t+1}^{j-1} \left(1 - (1 - X_{G,\iota}) \mu_L \gamma_{\iota+1}\right)}_{p_{t+1} | \theta_j = 1 \forall j}$$
$$+ \frac{\mu_L \gamma_{t+1}}{(1+r)} \cdot \left(f'\left(\bar{L}_{t+1}\right) + \sum_{j=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{j-t} \left(f'(\bar{L}_{j+1})\right) \prod_{\iota=t+1}^{j} \left(1 - (1 - X_{G,\iota}) \mu_L \gamma_{\iota+1}\right)\right) \tag{A95}$$

and the government budget balance condition is used to find the optimal adaptation rate, which is given by

$$\tau_t^S = \frac{\left(X_{G,t}^*\right)^2 \cdot \bar{L}_t}{2 \cdot \left[\phi q + (1-\phi) w\right]} \tag{A96}$$

Second Best Under second-best, the social planner maximizes the social welfare function while taking into consideration the dispersion in the beliefs on the efficacy of public adaptation, i.e. $\theta_j < 1 \forall j$:

$$\begin{aligned} &\max_{X_{G,t}} \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t \left((1+r)\left((1-\tau_t)\left[\phi q + (1-\phi) w\right]\right) + v(\bar{L}_t) + f(\mathbb{E}\left(\bar{L}_{t+1}\right))\right) \\ &s.t. \quad \frac{1}{2} X_{G,t}^{2*} \bar{L}_t = \tau_t \cdot [\phi q + (1-\phi) w] \\ &\qquad \mathbb{E}\left(\bar{L}_j\right) = \bar{L}_t \prod_{\iota=t}^{j-1} \left(1 - \left(1 - \int_0^1 \theta_i di X_{G,\iota}\right) \mu \gamma_{\iota+1}\right). \end{aligned} \tag{A97}$$

and the second-best level of public adaptation is given by

$$\begin{aligned} X_{G,t}^{SB*} = &\frac{\mu_L \gamma_{t+1} \cdot \int_0^1 \theta_i di}{(1+r)} \cdot \sum_{j=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{j-t} \left[-\frac{1}{2}(1+r) X_{G,j}^2 + v'(\bar{L}_j)\right] \prod_{\iota=t+1}^{j-1} \left(1 - \left(1 - \int_0^1 \theta_i di X_{G,\iota}\right) \mu_L \gamma_{\iota+1}\right) \\ &+ \frac{\mu_L \gamma_{t+1} \cdot \int_0^1 \theta_i di}{(1+r)} \cdot \left(f'\left(\mathbb{E}\left(\bar{L}_{t+1}\right)\right) + \sum_{j=t+1}^{\infty} \left(\frac{1}{1+r}\right)^{j-t} \left(f'(\mathbb{E}\bar{L}_{j+1})\right) \prod_{\iota=t+1}^{j} \left(1 - \left(1 - \int_0^1 \theta_i di X_{G,\iota}\right) \mu_L \gamma_{\iota+1}\right)\right) \end{aligned} \tag{A98}$$

A1.8 Proof of Proposition 8

High-income, old households maximize their expected utility, as given by

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{h,t},, \bar{L}_{t+1}\right)\right) = \mathbb{E}_t\left(c_{h,t}\right) + f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right) \tag{A99}$$

$$s.t. \quad c_{h,t} \leq (1-\tau_t)\, q + \max\left\{p_t\left(1-\xi_{h,t}\right) L_{h,t-1} + (1+\hat{r})\, S_{h,t-1}, 0\right\}$$

$$\tau_t \geq 0$$

where $c_{h,t}$ is the consumption of a high-income, old household in period t and $\mathbb{E}_t$ denotes expectations formed at (the start of) date t.

Using the no-arbitrage condition as in Proof of Proposition 1, the maximization problem can be rewritten as

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{h,t+1}, \bar{L}_{t+1}\right)\right) = (1-\tau_t)\, q + (1+r) S_{h,t-1} + p_{t+1}\left(1-\left(1-\tilde{\theta}_j X_{G,t-1}\right)\mu\gamma_t\right) L_{h,t-1} + f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right) \tag{A100}$$

$$s.t. \quad \tau_t \geq 0$$

The FOC for τ_t is given by

$$-q + \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)} \cdot \frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = 0 \tag{A101}$$

where

$$\frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \theta_j \mu \gamma_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \tag{A102}$$

and

$$\frac{\partial X_{G,t}}{\partial \tau_t} = \sqrt{\frac{\left[\phi q + \left(1-\phi\right) w\right]}{\tau_t \bar{L}_t}} \geq 0 \tag{A103}$$

Then, the optimal choice of adaptation rate of a high-income, old household with beliefs θ_j is given by

$$\tau_t^{Ojh*} = \frac{1}{\bar{L}_t} \cdot \left[\phi q + \left(1-\phi\right) w\right] \cdot \left(\frac{\theta_j \mu \gamma_{t+1} \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}}{q}\right)^2 \tag{A104}$$

Low-income, old households maximize their expected utility, as given by

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{l,t},, \bar{L}_{t+1}\right)\right) = \mathbb{E}_t\left(c_{l,t}\right) + f\left(\mathbb{E}_{j,t}\left(\bar{L}_{t+1}\right)\right) \tag{A105}$$

$$s.t. \quad c_{l,t} \leq (1-\tau_t)\, w + \max\left\{p_t\left(1-\xi_{l,t}\right) L_{h,t-1} + (1+\hat{r})\, S_{l,t-1}, 0\right\}$$

$$\tau_t \geq 0$$

where $c_{l,t}$ is the consumption of a high-income, old household in period t and $\mathbb{E}_t$ denotes expectations formed at (the start of) date t.

Using the no-arbitrage condition as in Proof of Proposition 1, the maximization problem can be rewritten as

$$\max_{\tau_t} \mathbb{E}\left(U\left(c_{l,t+1}, \bar{L}_{t+1}\right)\right) = (1-\tau_t)\, w + (1+r) S_{l,t-1} + p_{t+1}\left(1 - \left(1 - \tilde{\theta}_j X_{G,t-1}\right)\mu\gamma_t\right) L_{h,t-1} + f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right) \tag{A106}$$

$$s.t. \quad \tau_t \geq 0$$

The FOC for τ_t is given by

$$-w + \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)} \cdot \frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = 0 \tag{A107}$$

where

$$\frac{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \theta_j \mu \gamma_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \tag{A108}$$

and

$$\frac{\partial X_{G,t}}{\partial \tau_t} = \sqrt{\frac{\left[\phi q + \left(1-\phi\right) w\right]}{\tau_t \bar{L}_t}} \geq 0 \tag{A109}$$

Then, the optimal choice of adaptation rate of a low-income, old household with beliefs θ_j is given by

$$\tau_t^{Ojl*} = \frac{1}{\bar{L}_t} \cdot \left[\phi q + \left(1-\phi\right) w\right] \cdot \left(\frac{\theta_j \mu \gamma_{t+1} \frac{\partial f\left(\mathbb{E}_t\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_t\left(\bar{L}_{t+1}\right)}}{w}\right)^2 \tag{A110}$$

We determine the relative ordering of the adaptation rates preferred by the different types of old households. Specifically, as $q > w$, we have that $\tau^{OOl*} > \tau^{OOh*}$ and $\tau^{OPl} > \tau^{OPh*}$. Moreover, as $\bar{\theta} > \underline{\theta}$, we have that $\tau^{OOh*} > \tau^{OPh*}$ and $\tau^{OOl} > \tau^{OPl*}$. If it additionally holds that

$$\frac{q}{w} < \frac{\bar{\theta}}{\underline{\theta}} \cdot \frac{\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)}}{\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)}} \tag{A111}$$

then, the relative ordering of the adaptation rates preferred by old households is given by

$$\tau^{OOl*} > \tau^{OOh*} > \tau^{OPl*} > \tau^{OPh*} \tag{A112}$$

Otherwise, this becomes

$$\tau^{OOl*} > \tau^{OPl*} > \tau^{OOh*} > \tau^{OPh*} \tag{A113}$$

A1.9 Proof of Proposition 9

From Proposition 8, we know the relative ordering of the adaptation rates of the old households, both if economic inequality is low, and if it is high. In accordance with the baseline model, we focus on the case in which the young pessimists are pivotal.

Low Economic Inequality If economic inequality is low, the adaptation rate preferred by the high-income, old optimists must be higher than the adaptation rate preferred by the young pessimists to ensure that the young pessimists are pivotal. This requires

$$\left(\phi\cdot q+(1-\phi)\cdot w\right)\cdot\bar{\theta}\cdot\left(\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)/\partial\mathbb{E}_{O,t}}{q}\right)>\underline{\theta}\cdot\left(\frac{p_{t+1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}}}{(1+r)}\right) \tag{A114}$$

or equivalently

$$\frac{\bar{\theta}}{\underline{\theta}}>\left(\frac{p_{t+1}\cdot\left[\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{O,t}}\right]^{-1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}}\cdot\left[\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{O,t}}\right]^{-1}}{(1+r)}\right)\cdot\frac{q}{\left(\phi\cdot q+(1-\phi)\cdot w\right)} \tag{A115}$$

which is the condition given in Assumption 4 (i). Hence, under Assumption 4(i), we have that

$$\tau^{YO*}>\tau^{OOl*}>\tau^{OOh*}>\tau^{YP*}>\tau^{OPl*}>\tau^{OPH*} \tag{A116}$$

and the set of feasible coalitions is given by (i) a coalition of the old optimists and young pessimists, (ii) a coalition of the high-income, old optimists, young pessimists and the low-income, old pessimists, and (iii) a coalition of the young pessimists and the old pessimists. Alternatively, if the condition in Assumption 4(i) is not satisfied, we have that

$$\tau^{YO*}>\tau^{OOl*}>\tau^{YP*}>\tau^{OOh*}>\tau^{OPl*}>\tau^{OPH*} \tag{A117}$$

As a coalition of the high-income, old and low-income, old pessimists never forms a majority, the set of feasible coalitions is given by (i) a coalition of the young pessimists and old optimists, and (ii) a coalition of the young pessimists, high-income, old optimists and low-income, old pessimists. However, in this case the high-income, old optimists emerge as pivotal group and, as their preferred adaptation rate is not influenced due to asset price changes (see Proof of Proposition 8), the political equilibrium is always characterized by a coalition of the young pessimists, high-income, old optimists and low-income, old pessimists that prevails.

High Economic Inequality If economic inequality is high, the adaptation rate preferred by the high-income, old optimists must be higher than the adaptation rate preferred by the young pessimists to ensure that the young pessimists are pivotal. This requires

$$\left(\phi\cdot q+(1-\phi)\cdot w\right)\cdot\bar{\theta}\cdot\left(\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)/\partial\mathbb{E}_{O,t}}{q}\right)<\underline{\theta}\cdot\left(\frac{p_{t+1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}}}{(1+r)}\right) \tag{A118}$$

or equivalently

$$\frac{\bar{\theta}}{\underline{\theta}}<\left(\frac{p_{t+1}\cdot\left[\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{O,t}}\right]^{-1}+\frac{\partial f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{P,t}}\cdot\left[\frac{\partial f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{O,t}}\right]^{-1}}{(1+r)}\right)\cdot\frac{q}{\left(\phi\cdot q+(1-\phi)\cdot w\right)} \tag{A119}$$

which is the condition given in Assumption 4 (ii). Hence, under Assumption 4(ii), we have that

$$\tau^{YO*}>\tau^{OOl*}>\tau^{OPl*}>\tau^{YP*}>\tau^{OOh*}>\tau^{OPH*} \tag{A120}$$

and the set of feasible coalitions is given by (i) a coalition of the low-income, old and young pessimists, (ii) a coalition of the low-income, old pessimists, young pessimists and the high-income, old optimists, and (iii) a coalition of the young pessimists and the high-income, old. Alternatively, if the condition in Assumption 4(i)i is not satisfied, we have that

$$\tau^{YO*}>\tau^{OOl*}>\tau^{OPl*}>\tau^{OOh*}>\tau^{YP*}>\tau^{OPH*} \tag{A121}$$

As a coalition of the low-income, old and high-income, old pessimists never forms a majority, the set of feasible coalitions is given by (i) a coalition of the low-income, old pessimists, high-income, old optimists and young pessimists, and (ii) a coalition of the high-income, old and the young pessimists. Again, the high-income, old optimists emerge as pivotal group and, as their preferred adaptation rate is not influenced due to asset price changes (see Proof of Proposition 8), the political equilibrium is always characterized by a coalition of the low-income, old pessimists, high-income, old optimists and young pessimists that prevails.

A1.10 Proof of Proposition 10

Proposition 10. *If the number of young households is an infinitesimal amount smaller than that of old households, pessimists represent a fraction* $\omega > 0.5$ *of all voters, high-income households represent a fraction* $\phi < 0.5$ *of all voters, economic inequality is sufficiently low, and Assumption 4 (i) holds, the adaptation rates that maximize joint utility of each coalition are*

1.
$$\tau_t^{YP,OOh,OOl*} = A \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + \left(\omega\underline{\theta} + (1-\omega)\bar{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)} \right]}{(1+\omega r)} \right)^2, \tag{A122}$$

2.
$$\tau_t^{YP,OOh,OPl*} = A \cdot [\phi q + (1-\phi) w]^2 \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)} \right]}{\omega \cdot (1+r) \cdot [\phi q + (1-\phi) w] + (1-\omega)\phi \cdot q + \omega(1-\phi) \cdot w} \right)^2, \tag{A123}$$

3.
$$\tau_t^{YP,OPh,OPl*} = A \cdot \left(\frac{\underline{\theta} \left[\frac{1}{2} p_{t+1} + \frac{\partial f\left(\mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)} \right]}{\left(1 + \frac{1}{2} r\right)} \right)^2. \tag{A124}$$

If economic inequality is sufficiently high and Assumption 4 (ii) holds, the adaptation rates that maximize joint utility of each coalition are

1.
$$\tau_t^{YP,OOl,OPl*} = A \cdot [\phi q + (1-\phi) w]^2 \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)(1-\phi)\bar{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)} \right]}{\omega (1+r) [\phi q + (1-\phi) w] + (1-\phi) w} \right)^2, \tag{A125}$$

2.
$$\tau_t^{YP,OOh,OPl*} = A \cdot [\phi q + (1-\phi) w]^2 \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)} \right]}{\omega \cdot (1+r) \cdot [\phi q + (1-\phi) w] + (1-\omega)\phi \cdot q + \omega(1-\phi) \cdot w} \right)^2, \tag{A126}$$

3.
$$\tau_t^{YP,OOh,OPh*} = A \cdot [\phi q + (1-\phi) w]^2 \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + \left(\omega(1+\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)} \right]}{\omega (1+r) [\phi q + (1-\phi) w] + \phi q} \right)^2. \tag{A127}$$

Alternatively, if the condition in Assumption 4 ((i) respectively (ii)) is not satisfied, the adaptation rate that maximizes the joint utility of the prevailing coalition is given by the expression for $\tau_t^{YP,OOh,OPl*}$.

Low Economic Inequality We assume that coalitions choose a adaptation rate that maximizes their joint utility function. Consider first the coalition of young pessimists and old (low- and high-income) optimists. This coalition maximizes

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{YP,t}, c_{OOh,t}, c_{OOl,t}, c_{YP,t+1}, \bar{L}_{t+1}\right)\right) = \omega \cdot \left(v\left(L_{YP,t}\right) + \mathbb{E}_t\left(c_{YP,t+1}\right)\right)$$
$$+ (1-\omega) \cdot \left(\phi \mathbb{E}_t\left(c_{OOh,t}\right) + (1-\phi)\mathbb{E}_t\left(c_{OOl,t}\right)\right) + f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right) \quad \text{(A128)}$$

$$\begin{aligned} s.t. \quad & (1-\tau_t)\, y_{YP,t} \leq p_t L_{YP,t} + S_{YP,t} \\ & c_{YP,t+1} \leq (1-\tau_{t+1})\, y_{YP,t+1} + \max\left\{p_{t+1}\left(1-\xi_{YP,t+1}\right) L_{YP,t} + (1+\hat{r})\, S_{YP,t}, 0\right\} \\ & c_{OOh,t} \leq (1-\tau_t)\, q + \max\left\{p_t\left(1-\xi_{OOh,t}\right) L_{OOh,t-1} + (1+\hat{r})\, S_{OOh,t-1}, 0\right\} \\ & c_{OOl,t} \leq (1-\tau_t)\, w + \max\left\{p_t\left(1-\xi_{OOl,t}\right) L_{OOl,t-1} + (1+\hat{r})\, S_{OOl,t-1}, 0\right\} \\ & \tau_t \geq 0 \end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a young pessimists' consumption in period $t+1$, $c_{YP,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{YP,t+1}\right) = (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t} + (1-\tau_{t+1})\, y_{YP,t+1} \quad \text{(A129)}$$

and the expectation of the consumption of an old optimist of type $s \in \{h, l\}$ in period t, $c_{OOs,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{OOs,t}\right) = (1-\tau_t)\, y_{OOs,t} + (1+r) S_{OOs,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OOs} X_{G,t-1}\right)\mu\gamma_t\right) L_{OOs,t-1} \quad \text{(A130)}$$

Then, the maximization problem can be rewritten to

$$\max_{\tau_t} \mathbb{E}\left(U_{YP,OOh,OOl}\right) = \omega \cdot \left(v\left(L_{YP,t}\right) + (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t}\right)$$
$$+ (1-\omega) \cdot \phi\left((1-\tau_t)\, q + (1+r) S_{OOh,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OOh} X_{G,t-1}\right)\mu\gamma_t\right) L_{OOh,t-1}\right)$$
$$+ (1-\omega) \cdot (1-\phi)\left((1-\tau_t)\, w + (1+r) S_{OOl,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OOl} X_{G,t-1}\right)\mu\gamma_t\right) L_{OOl,t-1}\right)$$
$$+ f\left(\mathbb{E}_{YP,OOh,OOlt}\left(\bar{L}_{t+1}\right)\right)$$
$$s.t. \quad \tau_t \geq 0 \quad \text{(A131)}$$

The FOC for τ_t is given by

$$\omega\left(-(1+r)\, y_{YP,t} + \tilde{\theta}_{YP}\mu\gamma_{t+1} p_{t+1} L_{YP,t} \cdot \frac{\partial X_{G,t}}{\partial \tau_t}\right) - (1-\omega)\left(\phi q + (1-\phi)\, w\right)$$
$$+ \frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)} \cdot \frac{\partial \mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = 0 \quad \text{(A132)}$$

where

$$\mathbb{E}_{YP,OOh,OOlt}\left(\bar{L}_{t+1}\right) = \left(1 - \left(1 - \int_0^1 \tilde{\theta}_j X_{G,t} di\right) \mu\gamma_{t+1}\right) \bar{L}_t \tag{A133}$$

and

$$\frac{\partial \mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \left(\omega\underline{\theta} + (1-\omega)\bar{\theta}\right) \mu\gamma_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \tag{A134}$$

Then, this becomes

$$\frac{\partial X_{G,t}}{\partial \tau_t} \left[\omega\underline{\theta}\mu\gamma_{t+1} p_{t+1} + \left(\omega\underline{\theta} + (1-\omega)\bar{\theta}\right) \mu\gamma_{t+1} \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)} \right] = \omega \cdot (1+r) y_{YP,t} + (1-\omega) \cdot \left(\phi q + (1-\phi) w\right) \tag{A135}$$

Using that

$$\frac{\partial X_{G,t}}{\partial \tau_t} = \sqrt{\frac{\left[\phi q + \left(1-\phi\right) w\right]}{\tau_t \bar{L}_t}} \tag{A136}$$

The adaptation rate preferred by a coalition of young pessimists and old optimists is given by

$$\tau_t^{YP,OO*} = \frac{1}{\bar{L}_t} \cdot \left[\phi q + \left(1-\phi\right) w\right] \cdot \left(\frac{\mu\gamma_{t+1} \left[\omega\underline{\theta} p_{t+1} + \left(\omega\underline{\theta} + (1-\omega)\bar{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)} \right]}{(1+\omega r) \left[\phi q + \left(1-\phi\right) w\right]} \right)^2 \tag{A137}$$

$$= \frac{\left(\mu\gamma_{t+1}\right)^2}{\bar{L}_t} \cdot \frac{1}{\left[\phi q + \left(1-\phi\right) w\right]} \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + \left(\omega\underline{\theta} + (1-\omega)\bar{\theta}\right) \cdot \frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)} \right]}{(1+\omega r)} \right)^2 \tag{A138}$$

Consider the coalition of young pessimists, high-income, old optimists and low-income, old pessimists. This coalition maximizes

$$\begin{aligned} \max_{\tau_t} \mathbb{E}\left(U\left(L_{YP,t}, c_{OOh,t}, c_{OPl,t}, c_{YP,t+1}, \bar{L}_{t+1}\right)\right) &= \omega \cdot \left(v\left(L_{YP,t}\right) + \mathbb{E}_t\left(c_{YP,t+1}\right)\right) \\ &+ (1-\omega)\phi\left(\mathbb{E}_t\left(c_{OOh,t}\right)\right) + \omega(1-\phi)\left(\mathbb{E}_t\left(c_{OPl,t}\right)\right) + f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right) \end{aligned} \tag{A139}$$

$$\begin{aligned} s.t. \quad & (1-\tau_t) y_{YP,t} \leq p_t L_{YP,t} + S_{YP,t} \\ & c_{YP,t+1} \leq (1-\tau_{t+1}) y_{YP,t+1} + \max\left\{p_{t+1}\left(1-\xi_{YP,t+1}\right) L_{YP,t} + (1+\hat{r}) S_{YP,t}, 0\right\} \\ & c_{OOh,t} \leq (1-\tau_t) q + \max\left\{p_t\left(1-\xi_{OOh,t}\right) L_{OOh,t-1} + (1+\hat{r}) S_{OOh,t-1}, 0\right\} \\ & c_{OPl,t} \leq (1-\tau_t) w + \max\left\{p_t\left(1-\xi_{OPl,t}\right) L_{OPl,t-1} + (1+\hat{r}) S_{OPl,t-1}, 0\right\} \\ & \tau_t \geq 0 \end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a young pessimists' consumption in period $t+1$, $c_{YP,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{YP,t+1}\right) = (1+r)\left((1-\tau_t) y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1 - \left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t} + (1-\tau_{t+1}) y_{YP,t+1} \tag{A140}$$

and the expectation of the consumption of an old optimist of type $s \in \{h, l\}$ in period t, $c_{OOs,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{OOs,t}\right) = (1-\tau_t)\, y_{OOs,t} + (1+r)S_{OOs,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OOs}X_{G,t-1}\right)\mu\gamma_t\right)L_{OOs,t-1} \tag{A141}$$

Then, the maximization problem can be rewritten to

$$\begin{aligned}
\max_{\tau_t}\mathbb{E}\left(U_{YP,OOh,OPl}\right) = {} & \omega\cdot\left(v\left(L_{YP,t}\right) + (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\right)\mu\gamma_{t+1}\right)L_{YP,t}\right) \\
& + (1-\omega)\cdot\phi\left((1-\tau_t)\, q + (1+r)S_{OOh,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OOh}X_{G,t-1}\right)\mu\gamma_t\right)L_{OOh,t-1}\right) \\
& + \omega\cdot(1-\phi)\left((1-\tau_t)\, w + (1+r)S_{OPl,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OPl}X_{G,t-1}\right)\mu\gamma_t\right)L_{OPl,t-1}\right) \\
& + f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right) \\
s.t.\quad & \tau_t \geq 0
\end{aligned} \tag{A142}$$

The FOC for τ_t is given by

$$\begin{aligned}
& \omega\left(-(1+r)\, y_{YP,t} + \tilde{\theta}_{YP}\mu\gamma_{t+1}p_{t+1}L_{YP,t}\cdot\frac{\partial X_{G,t}}{\partial\tau_t}\right) - (1-\omega)\phi q - \omega(1-\phi)\, w \\
& + \frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\cdot\frac{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t} = 0
\end{aligned} \tag{A143}$$

where

$$\mathbb{E}_{YP,OOh,OPlt}\left(\bar{L}_{t+1}\right) = \left(1-\left(1-\int_0^{2(\omega-\omega\phi)+\phi}\tilde{\theta}_j X_{G,t}\,di\right)\mu\gamma_{t+1}\right)\bar{L}_t \tag{A144}$$

and

$$\frac{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t} = \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial X_{G,t}}{\partial\tau_t} \tag{A145}$$

Then, this becomes

$$\begin{aligned}
& \frac{\partial X_{G,t}}{\partial\tau_t}\left[\omega\underline{\theta}\mu\gamma_{t+1}p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right] \\
& = \omega\cdot(1+r)\, y_{YP,t} + (1-\omega)\phi\cdot q + \omega(1-\phi)\cdot w
\end{aligned} \tag{A146}$$

Using that

$$\frac{\partial X_{G,t}}{\partial\tau_t} = \sqrt{\frac{\left[\phi q + \left(1-\phi\right)w\right]}{\tau_t\bar{L}_t}} \tag{A147}$$

The adaptation rate preferred by a coalition of young pessimists, high-income, old optimists and low-income, old pessimists is given by

$$\tau_t^{YP,OOh,OPl*} = \frac{1}{\bar{L}_t}\cdot\left[\phi q + \left(1-\phi\right)w\right]\cdot\left(\frac{\mu\gamma_{t+1}\left[\omega\underline{\theta}p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\cdot(1+r)\cdot\left[\phi q + \left(1-\phi\right)w\right] + (1-\omega)\phi\cdot q + \omega(1-\phi)\cdot w}\right)^2 \tag{A148}$$

$$= \frac{\left(\mu\gamma_{t+1}\right)^2}{\bar{L}_t}\cdot\left[\phi q + \left(1-\phi\right)w\right]\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\cdot(1+r)\cdot\left[\phi q + \left(1-\phi\right)w\right] + (1-\omega)\phi\cdot q + \omega(1-\phi)\cdot w}\right)^2 \tag{A149}$$

Finally, consider the coalition of young pessimists and old (low- and high-income) pessimists. This coalition maximizes

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{YP,t}, c_{OPh,t}, c_{OPl,t}, c_{YP,t+1}, \bar{L}_{t+1}\right)\right) = \frac{1}{2}\cdot\left(v\left(L_{YP,t}\right) + \mathbb{E}_t\left(c_{YP,t+1}\right)\right)$$
$$+\frac{1}{2}\cdot\left(\phi\mathbb{E}_t\left(c_{OPh,t}\right) + (1-\phi)\,\mathbb{E}_t\left(c_{OPl,t}\right)\right) + f\left(\mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)\right) \quad \text{(A150)}$$

$$\begin{aligned} s.t. \quad & (1-\tau_t)\, y_{YP,t} \leq p_t L_{YP,t} + S_{YP,t} \\ & c_{YP,t+1} \leq (1-\tau_{t+1})\, y_{YP,t+1} + \max\left\{p_{t+1}\left(1-\xi_{YP,t+1}\right) L_{YP,t} + (1+\hat{r})\, S_{YP,t}, 0\right\} \\ & c_{OPh,t} \leq (1-\tau_t)\, q + \max\left\{p_t\left(1-\xi_{OPh,t}\right) L_{OPh,t-1} + (1+\hat{r})\, S_{OPh,t-1}, 0\right\} \\ & c_{OPl,t} \leq (1-\tau_t)\, w + \max\left\{p_t\left(1-\xi_{OPl,t}\right) L_{OPl,t-1} + (1+\hat{r})\, S_{OPl,t-1}, 0\right\} \\ & \tau_t \geq 0 \end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a young pessimists' consumption in period $t+1$, $c_{YP,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{YP,t+1}\right) = (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t} + (1-\tau_{t+1})\, y_{YP,t+1} \quad \text{(A151)}$$

and the expectation of the consumption of an old optimist of type $s \in \{h,l\}$ in period t, $c_{OOs,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{OPs,t}\right) = (1-\tau_t)\, y_{OPs,t} + (1+r) S_{OPs,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OPs} X_{G,t-1}\right)\mu\gamma_t\right) L_{OPs,t-1} \quad \text{(A152)}$$

Then, the maximization problem can be rewritten to

$$\begin{aligned} \max_{\tau_t} \mathbb{E}\left(U_{YP,OPh,OPl}\right) = & \frac{1}{2}\cdot\left(v\left(L_{YP,t}\right) + (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t}\right) \\ & + \frac{1}{2}\cdot\phi\left((1-\tau_t)\, q + (1+r) S_{OPh,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OPh} X_{G,t-1}\right)\mu\gamma_t\right) L_{OPh,t-1}\right) \\ & + \frac{1}{2}\cdot(1-\phi)\left((1-\tau_t)\, w + (1+r) S_{OPl,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OPl} X_{G,t-1}\right)\mu\gamma_t\right) L_{OPl,t-1}\right) \\ & + f\left(\mathbb{E}_{YP,OPh,OPlt}\left(\bar{L}_{t+1}\right)\right) \\ s.t. \quad & \tau_t \geq 0 \end{aligned} \quad \text{(A153)}$$

The FOC for τ_t is given by

$$\frac{1}{2}\left(-(1+r)\, y_{YP,t} + \tilde{\theta}_{YP}\mu\gamma_{t+1} p_{t+1} L_{YP,t}\cdot\frac{\partial X_{G,t}}{\partial \tau_t} - \left(\phi q + (1-\phi)\, w\right)\right)$$
$$+\frac{\partial f\left(\mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)}\cdot\frac{\partial \mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = 0 \quad \text{(A154)}$$

where

$$\mathbb{E}_{YP,OPh,OPlt}\left(\bar{L}_{t+1}\right) = \left(1 - \left(1 - \int_0^1 \tilde{\theta}_j X_{G,t} di\right)\mu\gamma_{t+1}\right)\bar{L}_t \tag{A155}$$

and

$$\frac{\partial \mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \underline{\theta}\mu\gamma_{t+1} \cdot \frac{\partial X_{G,t}}{\partial \tau_t} \tag{A156}$$

Then, this becomes

$$\frac{\partial X_{G,t}}{\partial \tau_t}\left[\underline{\theta}\mu\gamma_{t+1} \cdot \left(\frac{1}{2}p_{t+1} + \frac{\partial f\left(\mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)}\right)\right] = \frac{1}{2}(1+r)y_{YP,t} + \frac{1}{2}\left(\phi q + (1-\phi)w\right) \tag{A157}$$

Using that

$$\frac{\partial X_{G,t}}{\partial \tau_t} = \sqrt{\frac{\left[\phi q + (1-\phi)\, w\right]}{\tau_t \bar{L}_t}} \tag{A158}$$

The adaptation rate preferred by a coalition of young pessimists and old pessimists is given by

$$\tau_t^{YP,OP*} = \frac{1}{\bar{L}_t} \cdot \left[\phi q + (1-\phi)\, w\right] \cdot \left(\frac{\underline{\theta}\mu\gamma_{t+1}\left[\frac{1}{2}p_{t+1} + \frac{\partial f\left(\mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\left(1+\frac{1}{2}r\right)\left[\phi q + (1-\phi)\, w\right]}\right)^2 \tag{A159}$$

$$= \frac{\left(\mu\gamma_{t+1}\right)^2}{\bar{L}_t} \cdot \frac{1}{\left[\phi q + (1-\phi)\, w\right]} \cdot \left(\frac{\underline{\theta}\left[\frac{1}{2}p_{t+1} + \frac{\partial f\left(\mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OPh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\left(1+\frac{1}{2}r\right)}\right)^2 \tag{A160}$$

High Economic Inequality We assume that coalitions choose a adaptation rate that maximizes their joint utility function. Consider the coalition of young pessimists and the low-income old. This coalition maximizes

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{YP,t}, c_{OOl,t}, c_{OPl,t}, c_{YP,t+1}, \bar{L}_{t+1}\right)\right) = \omega \cdot \left(v\left(L_{YP,t}\right) + \mathbb{E}_t\left(c_{YP,t+1}\right)\right)$$
$$+ (1-\phi) \cdot \left((1-\omega)\,\mathbb{E}_t\left(c_{OOl,t}\right) + \omega\,\mathbb{E}_t\left(c_{OPl,t}\right)\right) + f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right) \tag{A161}$$

$$\begin{aligned}
s.t.\quad & (1-\tau_t)\, y_{YP,t} \leq p_t L_{YP,t} + S_{YP,t} \\
& c_{YP,t+1} \leq (1-\tau_{t+1})\, y_{YP,t+1} + \max\left\{p_{t+1}\left(1-\xi_{YP,t+1}\right)L_{YP,t} + (1+\hat{r})\, S_{YP,t}, 0\right\} \\
& c_{OOl,t} \leq (1-\tau_t)\, w + \max\left\{p_t\left(1-\xi_{OOl,t}\right)L_{OOl,t-1} + (1+\hat{r})\, S_{OOl,t-1}, 0\right\} \\
& c_{OPl,t} \leq (1-\tau_t)\, w + \max\left\{p_t\left(1-\xi_{OPl,t}\right)L_{OPl,t-1} + (1+\hat{r})\, S_{OPl,t-1}, 0\right\} \\
& \tau_t \geq 0
\end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a young pessimists' consumption in period $t+1$, $c_{YP,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{YP,t+1}\right) = (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t} + (1-\tau_{t+1})\, y_{YP,t+1} \tag{A162}$$

and the expectation of the consumption of a low-income, old household with beliefs $j \in \{O,P\}$ in period t, $c_{Ojl,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{Ojl,t}\right) = (1-\tau_t)\, w + (1+r) S_{Ojl,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{Ojl} X_{G,t-1}\right)\mu\gamma_t\right) L_{Ojl,t-1} \tag{A163}$$

Then, the maximization problem can be rewritten to

$$\begin{aligned}
\max_{\tau_t} \mathbb{E}\left(U_{YP,OOl,OPl}\right) = {} & \omega \cdot \left(v\left(L_{YP,t}\right) + (1+r)\left((1-\tau_t)\, y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t}\right) \\
& + (1-\phi)\cdot(1-\omega)\left((1-\tau_t)\, w + (1+r) S_{OOl,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OOl} X_{G,t-1}\right)\mu\gamma_t\right) L_{OOl,t-1}\right) \\
& + \omega\cdot(1-\phi)\left((1-\tau_t)\, w + (1+r) S_{OPl,t-1} + p_t\left(1-\left(1-\tilde{\theta}_{OPl} X_{G,t-1}\right)\mu\gamma_t\right) L_{OPl,t-1}\right) \\
& + f\left(\mathbb{E}_{YP,OOl,OPlt}\left(\bar{L}_{t+1}\right)\right) \\
s.t. \quad & \tau_t \geq 0
\end{aligned} \tag{A164}$$

The FOC for τ_t is given by

$$\begin{aligned}
& \omega\left(-(1+r)\, y_{YP,t} + \tilde{\theta}_{YP}\mu\gamma_{t+1} p_{t+1} L_{YP,t} \cdot \frac{\partial X_{G,t}}{\partial \tau_t}\right) - (1-\phi)\cdot w \\
& + \frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)} \cdot \frac{\partial \mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = 0
\end{aligned} \tag{A165}$$

where

$$\mathbb{E}_{YP,OOl,OPlt}\left(\bar{L}_{t+1}\right) = \left(1-\left(1-\int_0^{1-\phi+\omega} \tilde{\theta}_j X_{G,t} di\right)\mu\gamma_{t+1}\right)\bar{L}_t \tag{A166}$$

and

$$\frac{\partial \mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)}{\partial \tau_t} = \left(\omega(2-\phi)\underline{\theta} + (1-\omega)(1-\phi)\bar{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial X_{G,t}}{\partial \tau_t} \tag{A167}$$

Then, this becomes

$$\frac{\partial X_{G,t}}{\partial \tau_t}\left[\omega\underline{\theta}\mu\gamma_{t+1} p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)(1-\phi)\bar{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial \mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)}\right] = \omega\cdot(1+r)\, y_{YP,t} + (1-\phi)\, w \tag{A168}$$

Using that

$$\frac{\partial X_{G,t}}{\partial \tau_t} = \sqrt{\frac{\left[\phi q + \left(1-\phi\right) w\right]}{\tau_t \bar{L}_t}} \tag{A169}$$

The adaptation rate preferred by a coalition of young pessimists and the low-income, old is given by

$$\tau_t^{YP,OL*} = \frac{1}{\bar{L}_t} \cdot [\phi q + (1-\phi) w] \cdot \left(\frac{\mu\gamma_{t+1} \left[\omega\underline{\theta} p_{t+1} + (\omega(2-\phi)\underline{\theta} + (1-\omega)(1-\phi)\bar{\theta}) \cdot \frac{\partial f(\mathbb{E}_{YP,OOl,OPl,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{YP,OOl,OPl,t}(\bar{L}_{t+1})} \right]}{\omega(1+r)[\phi q + (1-\phi) w] + (1-\phi) w} \right)^2 \tag{A170}$$

$$= \frac{(\mu\gamma_{t+1})^2}{\bar{L}_t} \cdot [\phi q + (1-\phi) w] \cdot \left(\frac{\left[\omega\underline{\theta} p_{t+1} + (\omega(2-\phi)\underline{\theta} + (1-\omega)(1-\phi)\bar{\theta}) \cdot \frac{\partial f(\mathbb{E}_{YP,OOl,OPl,t}(\bar{L}_{t+1}))}{\partial \mathbb{E}_{YP,OOl,OPl,t}(\bar{L}_{t+1})} \right]}{\omega(1+r)[\phi q + (1-\phi) w] + (1-\phi) w} \right)^2 \tag{A171}$$

Consider the coalition of young pessimists and the high-income, old. This coalition maximizes

$$\max_{\tau_t} \mathbb{E}\left(U\left(L_{YP,t}, c_{OOh,t}, c_{OPh,t}, c_{YP,t+1}, \bar{L}_{t+1}\right)\right) = \omega \cdot \left(v\left(L_{YP,t}\right) + \mathbb{E}_t\left(c_{YP,t+1}\right)\right)$$
$$+ \phi \cdot \left((1-\omega)\mathbb{E}_t\left(c_{OOh,t}\right) + \omega \mathbb{E}_t\left(c_{OPh,t}\right)\right) + f\left(\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)\right) \tag{A172}$$

$$\begin{aligned} s.t.\quad & (1-\tau_t) y_{YP,t} \leq p_t L_{YP,t} + S_{YP,t} \\ & c_{YP,t+1} \leq (1-\tau_{t+1}) y_{YP,t+1} + \max\left\{p_{t+1}\left(1-\xi_{YP,t+1}\right) L_{YP,t} + (1+\hat{r}) S_{YP,t}, 0\right\} \\ & c_{OOh,t} \leq (1-\tau_t) q + \max\left\{p_t\left(1-\xi_{OOh,t}\right) L_{OOh,t-1} + (1+\hat{r}) S_{OOh,t-1}, 0\right\} \\ & c_{OPh,t} \leq (1-\tau_t) q + \max\left\{p_t\left(1-\xi_{OPh,t}\right) L_{OPh,t-1} + (1+\hat{r}) S_{OPh,t-1}, 0\right\} \\ & \tau_t \geq 0 \end{aligned}$$

Using the no-arbitrage condition as in Proof of Proposition 1, the expectation of a young pessimists' consumption in period $t+1$, $c_{YP,t+1}$, as formed at date t, becomes

$$\mathbb{E}_t\left(c_{YP,t+1}\right) = (1+r)\left((1-\tau_t) y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1 - \left(1 - \tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t} + (1-\tau_{t+1}) y_{YP,t+1} \tag{A173}$$

and the expectation of the consumption of a high-income, old household with beliefs $j \in \{O, P\}$ in period t, $c_{Ojh,t}$, as formed at (the start of) date t, becomes

$$\mathbb{E}_t\left(c_{Ojh,t}\right) = (1-\tau_t) w + (1+r) S_{Ojh,t-1} + p_t\left(1 - \left(1 - \tilde{\theta}_{Ojh} X_{G,t-1}\right)\mu\gamma_t\right) L_{Ojh,t-1} \tag{A174}$$

Then, the maximization problem can be rewritten to

$$\max_{\tau_t} \mathbb{E}\left(U_{YP,OOh,OPh}\right) = \omega \cdot \left(v\left(L_{YP,t}\right) + (1+r)\left((1-\tau_t) y_{YP,t} - p_t L_{YP,t}\right) + p_{t+1}\left(1 - \left(1 - \tilde{\theta}_{YP} X_{G,t}\right)\mu\gamma_{t+1}\right) L_{YP,t}\right)$$
$$+ \phi \cdot (1-\omega)\left((1-\tau_t) q + (1+r) S_{OOh,t-1} + p_t\left(1 - \left(1 - \tilde{\theta}_{OOh} X_{G,t-1}\right)\mu\gamma_t\right) L_{OOh,t-1}\right)$$
$$+ \omega \cdot \phi\left((1-\tau_t) q + (1+r) S_{OPh,t-1} + p_t\left(1 - \left(1 - \tilde{\theta}_{OPh} X_{G,t-1}\right)\mu\gamma_t\right) L_{OPh,t-1}\right)$$
$$+ f\left(\mathbb{E}_{YP,OOh,OPht}\left(\bar{L}_{t+1}\right)\right)$$
$$s.t.\quad \tau_t \geq 0 \tag{A175}$$

The FOC for τ_t is given by

$$\omega\left(-(1+r)\,y_{YP,t}+\tilde{\theta}_{YP}\mu\gamma_{t+1}p_{t+1}L_{YP,t}\cdot\frac{\partial X_{G,t}}{\partial\tau_t}\right)-\phi\cdot q$$
$$+\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)}\cdot\frac{\partial\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t}=0 \tag{A176}$$

where

$$\mathbb{E}_{YP,OOh,OPht}\left(\bar{L}_{t+1}\right)=\left(1-\left(1-\int_0^{\phi+\omega}\tilde{\theta}_j X_{G,t}di\right)\mu\gamma_{t+1}\right)\bar{L}_t \tag{A177}$$

and

$$\frac{\partial\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)}{\partial\tau_t}=\left(\omega(1+\phi)\underline{\theta}+(1-\omega)\phi\bar{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial X_{G,t}}{\partial\tau_t} \tag{A178}$$

Then, this becomes

$$\frac{\partial X_{G,t}}{\partial\tau_t}\left[\omega\underline{\theta}\mu\gamma_{t+1}p_{t+1}+\left(\omega(1+\phi)\underline{\theta}+(1-\omega)\phi\bar{\theta}\right)\mu\gamma_{t+1}\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)}\right]=\omega\cdot(1+r)\,y_{YP,t}+\phi q \tag{A179}$$

Using that

$$\frac{\partial X_{G,t}}{\partial\tau_t}=\sqrt{\frac{\left[\phi q+\left(1-\phi\right)w\right]}{\tau_t\bar{L}_t}} \tag{A180}$$

The adaptation rate preferred by a coalition of young pessimists and the low-income, old is given by

$$\tau_t^{YP,OL*}=\frac{1}{\bar{L}_t}\cdot\left[\phi q+\left(1-\phi\right)w\right]\cdot\left(\frac{\mu\gamma_{t+1}\left[\omega\underline{\theta}p_{t+1}+\left(\omega(1+\phi)\underline{\theta}+(1-\omega)\phi\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\left(1+r\right)\left[\phi q+\left(1-\phi\right)w\right]+\phi q}\right)^2 \tag{A181}$$

$$=\frac{\left(\mu\gamma_{t+1}\right)^2}{\bar{L}_t}\cdot\left[\phi q+\left(1-\phi\right)w\right]\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1}+\left(\omega(1+\phi)\underline{\theta}+(1-\omega)\phi\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPh,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\left(1+r\right)\left[\phi q+\left(1-\phi\right)w\right]+\phi q}\right)^2 \tag{A182}$$

A1.11 Proof of Proposition 11

Proposition 11. *If the number of young households is an infinitesimal amount smaller than that of old households, pessimists represent a fraction $\omega > 0.5$ of all voters, high-income households represent a fraction $\phi < 0.5$ of all voters, economic inequality is low, Assumption 4 (i) holds,*

and

$$\frac{1}{(1+\omega r)^2}\cdot\left(p_{t+1}+\left(1+\frac{(1-\omega)}{\omega}\cdot\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)}\right)^2-\left(\frac{[\phi q+(1-\phi)\,w]}{(1+\omega r)\,\phi\cdot q+(2+r)\omega\left(1-\phi\right)\cdot w}\right)^2$$
$$\cdot\left(p_{t+1}+\left((2-\phi)+\phi\cdot\frac{(1-\omega)}{\omega}\cdot\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right)^2<\frac{\Delta v\left(L_{YP,t}\right)+\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right)}{(1+r)}\cdot\frac{\bar{L}_t}{(\omega\underline{\theta}\mu\gamma_{t+1})^2}\tag{A183}$$

the political economy equilibrium is characterized by a coalition of young pessimists and old optimists. The adaptation rate proposed by this coalition equals

$$\tau_t^{YP,OOh,OOl*}=A\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1}+\left(\omega\underline{\theta}+(1-\omega)\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)}\right)^2.\tag{A184}$$

If economic inequality is high, Assumption 4 (ii) holds and

$$\left(\frac{\left[p_{t+1}+\left((2-\phi)+\frac{(1-\omega)}{\omega}(1-\phi)\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\,(1+r)\,[\phi q+\left(1-\phi\right)w]+\left(1-\phi\right)w}\right)^2-\left(\frac{\left[p_{t+1}+\left((2-\phi)+\frac{(1-\omega)}{\omega}\phi\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)\,\phi\cdot q+(2+r)\omega\left(1-\phi\right)\cdot w}\right)^2$$
$$<\frac{\Delta v\left(L_{YP,t}\right)+\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right)}{(1+r)\cdot[\phi q+\left(1-\phi\right)w]}\cdot\frac{\bar{L}_t}{(\omega\underline{\theta}\mu\gamma_{t+1})^2}\tag{A185}$$

the political economy equilibrium is characterized by a coalition of young pessimists and the low-income old. The adaptation rate proposed by this coalition equals

$$\tau_t^{YP,OOl,OPl*}=A\cdot[\phi q+\left(1-\phi\right)w]^2\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1}+\left(\omega(2-\phi)\underline{\theta}+(1-\omega)(1-\phi)\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\,(1+r)\,[\phi q+\left(1-\phi\right)w]+\left(1-\phi\right)w}\right)^2.\tag{A186}$$

Alternatively, if the implicit condition on the dispersion of beliefs is not satisfied (in either case), the political economy equilibrium is characterized by a coalition of young pessimists, high-income, old optimists and low-income, old pessimists. Then, the adaptation rate proposed equals

$$\tau_t^{YP,OOh,OPl*}=A\cdot[\phi q+\left(1-\phi\right)w]^2\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1}+\left(\omega(2-\phi)\underline{\theta}+(1-\omega)\phi\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)\,\phi\cdot q+(2+r)\omega\left(1-\phi\right)\cdot w}\right)^2.\tag{A187}$$

Low Economic Inequality Young pessimists prefer to form a coalition with high-income, old optimists and low-income, old optimists rather than high-income, old optimists and low-income, old pessimists if

$$\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOh,OOl*}\right)\right) > \mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOh,OPl*}\right)\right) \tag{A188}$$

That is, if

$$v\left(L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right)\right) - (1+r)\left(\left(\tau^{YP,OOh,OOl*}\right)y_{YP,t} + p_t L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right)\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\left(\tau^{YP,OOh,OOl*}\right)\right)\mu\gamma_{t+1}\right)\cdot L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OOl*}\right)\right)\right) > v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right) - (1+r)\left(\left(\tau^{YP,OOh,OPl*}\right)y_{YP,t} + p_t L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right) + p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\left(\tau^{YP,OOh,OPl*}\right)\right)\mu\gamma_{t+1}\right)L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right) \tag{A189}$$

Using that

$$v'\left(L_{YP,t}\right) = (1+r)p_t - \left(1-\left(1-\tilde{\theta}_j X_{G,t}\right)\mu\gamma_{t+1}\right)p_{t+1}$$

and rearranging terms gives

$$v\left(L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OOl*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right) > (1+r)\left(\tau^{YP,OOh,OOl*} - \tau^{YP,OOh,OPl*}\right)y_{YP,t} + v'\left(L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right)\right)\cdot L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right) - v'\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)\cdot L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right) \tag{A190}$$

Let $v\left(L_{i,t}\right) = ln\left(L_{it}\right)$. Then, this becomes

$$\underbrace{v\left(L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)}_{(i)>0} + \underbrace{f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OOl*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right)}_{(ii)>0} > (1+r)\underbrace{\left(\tau^{YP,OOh,OOl*} - \tau^{YP,OOh,OPl*}\right)}_{(iii)>0}y_{YP,t} \tag{A191}$$

where

(i) $\tau^{YP,OOh,OOl*} > \tau^{YP,OOh,OPl*}$(see Proposition 9) $\Longrightarrow L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right) > L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)$ (see Proposition 2).

(ii) $\tau^{YP,OOh,OOl*} > \tau^{YP,OOh,OPl*}$(see Proposition 9) $\Longrightarrow X_{G,t}^{YP,OOh,OOl*} > X_{G,t}^{YP,OOh,OPl*}$.

(iii) $\tau^{YP,OOh,OOl*} > \tau^{YP,OOh,OPl*}$ (see Proposition 9).

Substituting the expressions for $\tau^{YP,OOh,OOl*}, \tau^{YP,OOh,OPl*}$ gives

$$\left(\frac{\left[\omega\underline{\theta}p_{t+1} + \left(\omega\underline{\theta} + (1-\omega)\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)}\right)^2 - \left[\phi q + \left(1-\phi\right)w\right]^2\cdot\left(\frac{\left[\omega\underline{\theta}p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{(1+\omega r)\phi\cdot q + (2+r)\omega\left(1-\phi\right)\cdot w}\right)^2$$
$$< \frac{1}{A}\cdot\frac{v\left(L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OOl*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right)}{(1+r)\cdot\left[\phi q + \left(1-\phi\right)w\right]} \tag{A192}$$

Define

$$\Delta v\left(L_{YP,t}\right)=v\left(L_{YP,t}\left(\tau^{YP,OOh,OOl*}\right)\right)-v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)$$

and

$$\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right)=f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OOl*}\right)\right)\right)-f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right)$$

Then, the condition can be rewritten to

$$\frac{1}{(1+\omega r)^2}\cdot\left(p_{t+1}+\left(1+\frac{(1-\omega)}{\omega}\cdot\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OOl,t}\left(\bar{L}_{t+1}\right)}\right)^2-\left(\frac{[\phi q+(1-\phi)\,w]}{(1+\omega r)\,\phi\cdot q+(2+r)\omega\,(1-\phi)\cdot w}\right)^2$$
$$\cdot\left(p_{t+1}+\left((2-\phi)+\phi\cdot\frac{(1-\omega)}{\omega}\cdot\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right)^2<\frac{\Delta v\left(L_{YP,t}\right)+\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right)}{(1+r)}\cdot\frac{\bar{L}_t}{(\omega\underline{\theta}\mu\gamma_{t+1})^2} \tag{A193}$$

which implicitly defines an upper bound on the degree of dispersion in beliefs for which young pessimists prefer to form a coalition with high-income, old optimists and low-income, old optimists. When this condition is not satisfied, we have that

$$\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOh,OOl*}\right)\right)<\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOh,OPl*}\right)\right) \tag{A194}$$

in which case a coalition of young pessimists, high-income, old optimists and low-income, old pessimists prevails.

High Economic Inequality Young pessimists prefer to prefer to form a coalition with low-income, old optimists and low-income, old pessimists rather than high-income, old optimists and low-income, old pessimists if

$$\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOl,OPl*}\right)\right)>\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOh,OPl*}\right)\right) \tag{A195}$$

That is, if

$$v\left(L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)\right)-(1+r)\left(\left(\tau^{YP,OOl,OPl*}\right)y_{YP,t}+p_tL_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)\right)+p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\left(\tau^{YP,OOl,OPl*}\right)\right)\mu\gamma_{t+1}\right)$$
$$L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)+f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOl,OPl*}\right)\right)\right)>v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)-(1+r)\left(\left(\tau^{YP,OOh,OPl*}\right)y_{YP,t}+p_tL_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)$$
$$+p_{t+1}\left(1-\left(1-\tilde{\theta}_{YP}X_{G,t}\left(\tau^{YP,OOh,OPl*}\right)\right)\mu\gamma_{t+1}\right)L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)+f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right) \tag{A196}$$

Using that

$$v'\left(L_{YP,t}\right)=(1+r)\,p_t-\left(1-\left(1-\tilde{\theta}_jX_{G,t}\right)\mu\gamma_{t+1}\right)p_{t+1}$$

and rearranging terms gives

$$v\left(L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)\right)-v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)+f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOl,OPl*}\right)\right)\right)-f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right)>(1+r)$$
$$\left(\tau^{YP,OOl,OPl*}-\tau^{YP,OOh,OPl*}\right)y_{YP,t}+v'\left(L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)\right)\cdot L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)-v'\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)\cdot L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right) \tag{A197}$$

Let $v\left(L_{i,t}\right) = ln\left(L_{it}\right)$. Then, this becomes

$$\underbrace{v\left(L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)}_{(i)>0} + \underbrace{f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOl,OPl*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right)}_{(ii)>0} >$$

$$(1+r)\underbrace{\left(\tau^{YP,OOl,OPl*} - \tau^{YP,OOh,OPl*}\right)}_{(iii)>0} y_{YP,t} \tag{A198}$$

where

(i) $\tau^{YP,OOl,OPl*} > \tau^{YP,OOh,OPl*}$(see Proposition 10) $\implies L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right) > L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)$ (see Proposition 2).

(ii) $\tau^{YP,OOl,OPl*} > \tau^{YP,OOh,OPl*}$(see Proposition 10) $\implies X_{G,t}^{YP,OOl,OPl*} > X_{G,t}^{YP,OOh,OPl*}$.

(iii) $\tau^{YP,OOl,OPl*} > \tau^{YP,OOh,OPl*}$ (see Proposition 10).

Substituting the expressions for $\tau^{YP,OOl,OPl*}, \tau^{YP,OOh,OPl*}$ gives

$$\left(\frac{\left[\omega\underline{\theta}p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)(1-\phi)\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega(1+r)\left[\phi q + \left(1-\phi\right)w\right] + \left(1-\phi\right)w}\right)^2 - \left(\frac{\left[\omega\underline{\theta}p_{t+1} + \left(\omega(2-\phi)\underline{\theta} + (1-\omega)\phi\bar{\theta}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\cdot(1+r)\cdot\left[\phi q + \left(1-\phi\right)w\right] + (1-\omega)\phi\cdot q + \omega(1-\phi)\cdot w}\right)^2$$
$$< \frac{v\left(L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right) + f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOl,OPl*}\right)\right)\right) - f\left(\mathbb{E}_{P,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right)}{(1+r)\cdot A\cdot\left[\phi q + \left(1-\phi\right)w\right]^3} \tag{A199}$$

Define

$$\Delta v\left(L_{YP,t}\right) = v\left(L_{YP,t}\left(\tau^{YP,OOl,OPl*}\right)\right) - v\left(L_{YP,t}\left(\tau^{YP,OOh,OPl*}\right)\right)$$

and

$$\Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right) = f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOl,OPl*}\right)\right)\right) - f\left(\mathbb{E}_{O,t}\left(\bar{L}_{t+1}\left(\tau^{YP,OOh,OPl*}\right)\right)\right)$$

The condition can be rewritten to

$$\left(\frac{\left[p_{t+1} + \left((2-\phi) + \frac{(1-\omega)}{\omega}(1-\phi)\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOl,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega(1+r)\left[\phi q + \left(1-\phi\right)w\right] + \left(1-\phi\right)w}\right)^2 - \left(\frac{\left[p_{t+1} + \left((2-\phi) + \frac{(1-\omega)}{\omega}\phi\frac{\bar{\theta}}{\underline{\theta}}\right)\cdot\frac{\partial f\left(\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)\right)}{\partial\mathbb{E}_{YP,OOh,OPl,t}\left(\bar{L}_{t+1}\right)}\right]}{\omega\cdot(1+r)\cdot\left[\phi q + \left(1-\phi\right)w\right] + (1-\omega)\phi\cdot q + \omega(1-\phi)\cdot w}\right)^2$$
$$< \frac{\Delta v\left(L_{YP,t}\right) + \Delta f\left(E_{P,t}\left(\bar{L}_{t+1}\right)\right)}{(1+r)\cdot\left[\phi q + \left(1-\phi\right)w\right]^2}\cdot\frac{\bar{L}_t}{\left(\omega\underline{\theta}\mu\gamma_{t+1}\right)^2} \tag{A200}$$

which implicitly defines an upper bound on the degree of dispersion in beliefs for which young pessimists prefer to form a coalition with low-income, old optimists and low-income, old pessimists. If this condition is not satisfied, we have that

$$\mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOl,OPl*}\right)\right) < \mathbb{E}_t\left(U_{YP}\left(\tau^{YP,OOh,OPl*}\right)\right) \tag{A201}$$

in which case a coalition of young pessimists, high-income, old optimists, and low-income, old pessimists prevails.

A2 Additional Simulations: Constant Climate Risk

The key variable in our analysis is the housing stock, $\bar{L}_t$, as its decline changes the utility of households either directly or indirectly by altering prices. This affects the adaptation rates proposed by different households - indicating that the decline in $\bar{L}_t$ crucially shapes our results. While a rise in climate risk increases the rate at which the housing stock falls, the housing stock also declines over time if climate risk were to be constant. Hence, to validate the robustness of our results, we conduct model simulations in which we keep the level of climate risk (i.e. γ) constant over time. In this exercise, we compute the mean level of γ under each RCP trajectory and maintain γ at this mean level for all time periods.

Year	RCP 2.6	RCP 4.5	RCP 6.0	RCP 8.5
∀ t	0.04	0.05	0.05	0.07

Table 4: ***The mean level of climate risk, γ, under the different RCP trajectories.***

A2.1 The Evolution of the Housing Stock and House Prices

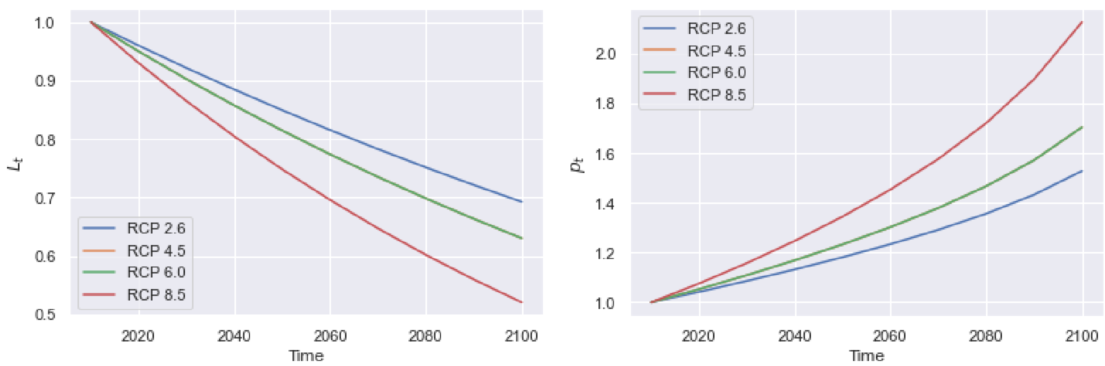

Figure 10: ***The evolution of the housing stock and - prices.***

Key: The steady-state of the supply of inhabitable houses (left panel) and of house prices (normalized, right panel) in the absence of climate change and deviations under the different RCP trajectories.

A2.2 Evolution of the Political Equilibrium

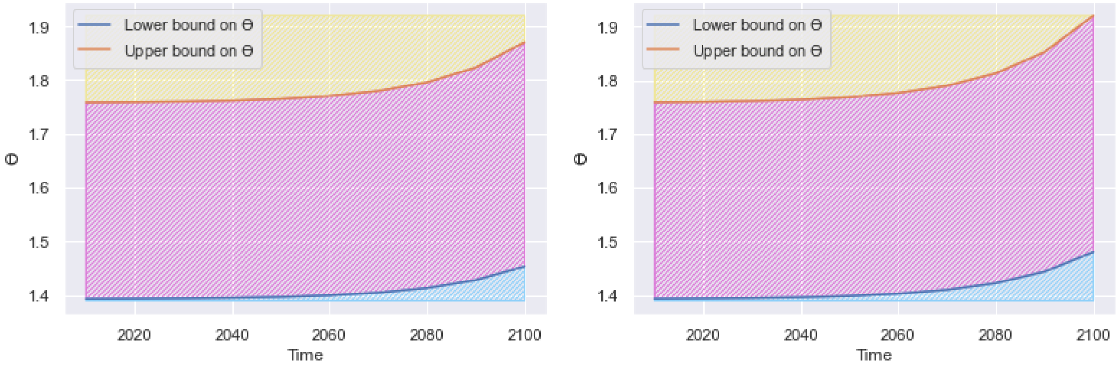

Figure 11: ***The evolution of the political equilibrium***.

Key: Joint evolution of the upper (Proposition 6) and lower (Assumption 3) bounds on the dispersion in beliefs for which a coalition of young pessimists and old optimists prevails (pink-shaded area). When the dispersion in beliefs is below the lower bound (blue-shaded area), a coalition of the old prevails, while a coalition of the pessimists prevails when the dispersion in beliefs is above the upper bound (yellow-shaded area). The panels show the evolution of the bounds over time and under the different RCP trajectories. The left panel shows the evolution of the bounds under RCP 4.5, while the right panel shows the evolution of the bounds under RCP 8.5.

A2.3 Adaptation Rates Proposed by Prevailing Coalitions and Political Tipping

Using the insights of Figure 3, we pick a value for Θ such that the political equilibrium tips from a coalition of pessimists to a coalition of young pessimists and old optimists. We choose $\Theta = 1.775$ and set the values for $\bar{\theta}, \underline{\theta}$ accordingly. In particular, we let $\bar{\theta} = 0.85$ and set $\underline{\theta} = 0.48$.

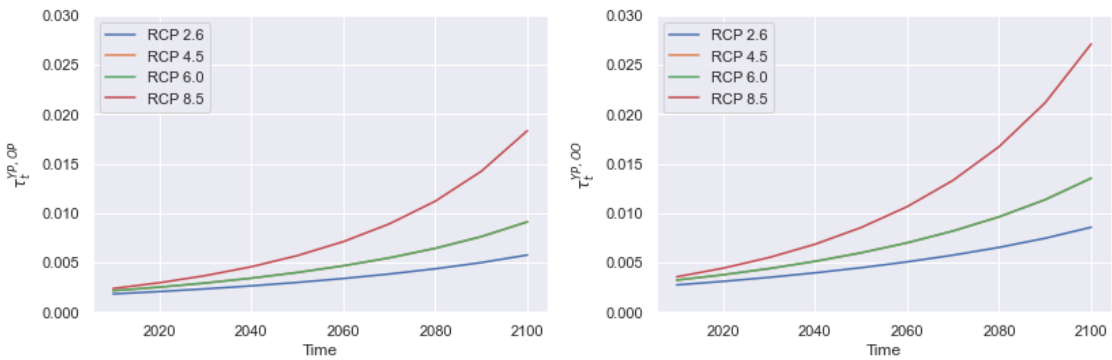

Figure 12: ***The adaptation rate proposed by different coalitions***.

Key: The adaptation rate proposed by a coalition of pessimists (left panel) and a coalition of young pessimists and old optimists (right panel), under the different RCP trajectories.

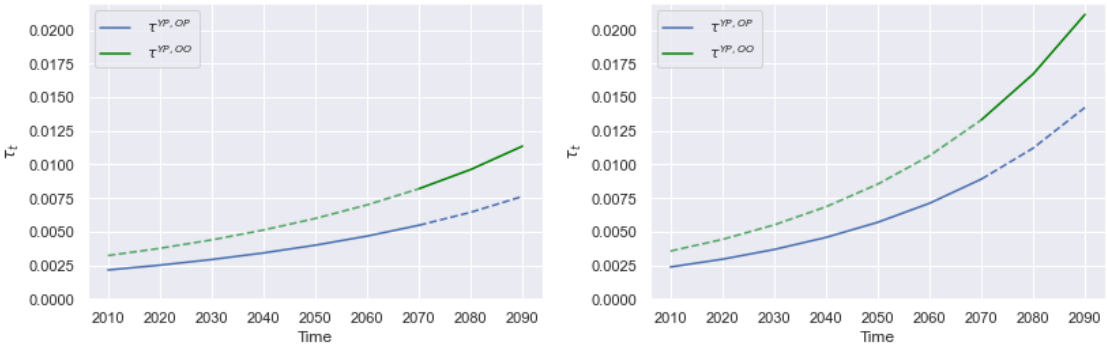

Figure 13: ***The tipping of the prevailing adaptation rate***.

Key: The prevailing adaptation rate in the economy over time over time when the political equilibrium tips around 2070, under RCP 4.5 (left panel) and RCP 8.5 (panel right).

A2.4 Adaptation Gap

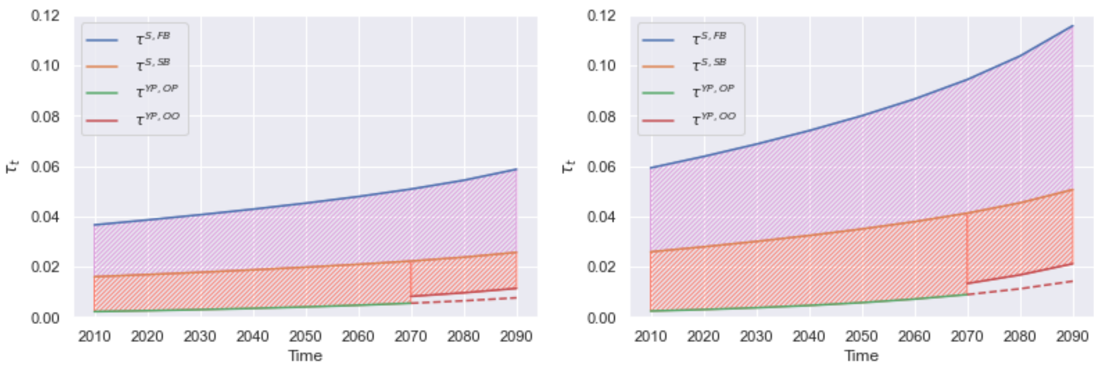

Figure 14: ***The decomposition of the adaptation gap***.

Key: Evolution of the adaptation gap under the second-best policy choice (red-shaded area) and first-best policy choice (red- and purple-shared area) over time when the dispersion in beliefs about the efficacy of public intervention is characterized by $\Theta = 1.775, \bar{\theta} = 0.85, \underline{\theta} = 0.48$, *under RCP 4.5 (left panel) and RCP 8.5 (right panel).*

A3 Additional Simulations: Comparative Statics

We run additional model simulations in which we change the value of several parameters. This comparative-statics exercise aims to test our simulation results against our analytical predictions. Specifically, we conduct simulations with i) a more concentrated income distribution and with ii) a higher fraction of pessimists.

A3.1 More concentrated Income Distribution

To examine the impact of a more concentrated income distribution, we reduce the fraction of high-income workers, ϕ, from 0.2 (baseline) to 0.1.

	Comparative Statics	Baseline
ϕ	0.1	0.1

Table 5: ***The fraction of high-income workers***.

Based on our analytical insights, a more concentrated income distribution increases adaptation rate preferred by both young and old households, as well as the adaptation rate proposed by each coalition. Since the fraction of high-income workers affects the adaptation rates of each coalition in a similar manner (specifically, in the expression of the optimal adaptation rate of each coalition, ϕ only appears in the common term, A), the decline in ϕ does not influence the threshold at which a particular coalition prevails, nor does it affect the time at which the political equilibrium tips. A more concentrated income distribution also increases the (FB and SB) optimal adaptation rate. Hence, - as both the socially optimal adaptation rate and the adaptation rate proposed by the prevailing coalition becomes larger - the adaptation gap is shifted upward. Finally, prices remain unaffected, as the evolution of the housing stock.

A3.1.1 Evolution of the Political Equilibrium

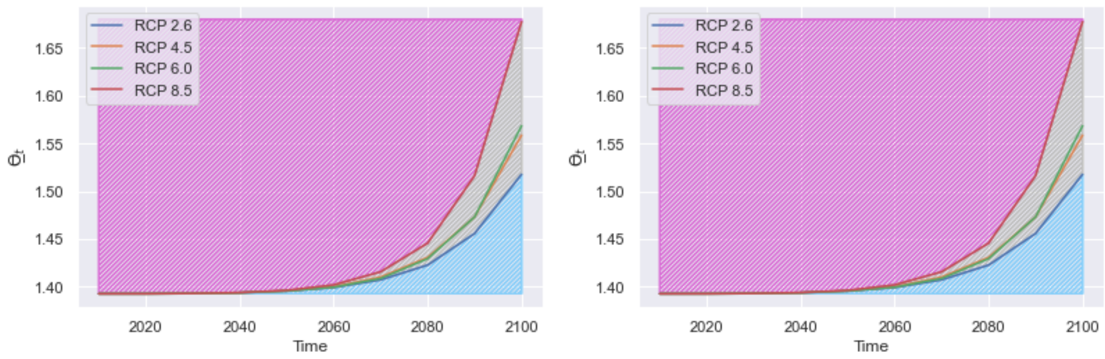

Figure 15: ***The evolution of the political equilibrium (i)***.

Key: Evolution of the threshold above which the old optimists prefer to form a coalition with young pessimists (Assumption 3) under the different RCP trajectories in the simulation with a more concentrated income distribution (left panel) and in the baseline model (right panel). The pink-shaded area highlights the values of Θ *for which the condition is satisfied. The blue-shaded area highlights the values of* Θ *for which the condition is not satisfied, in which case a coalition of the old prevails.*

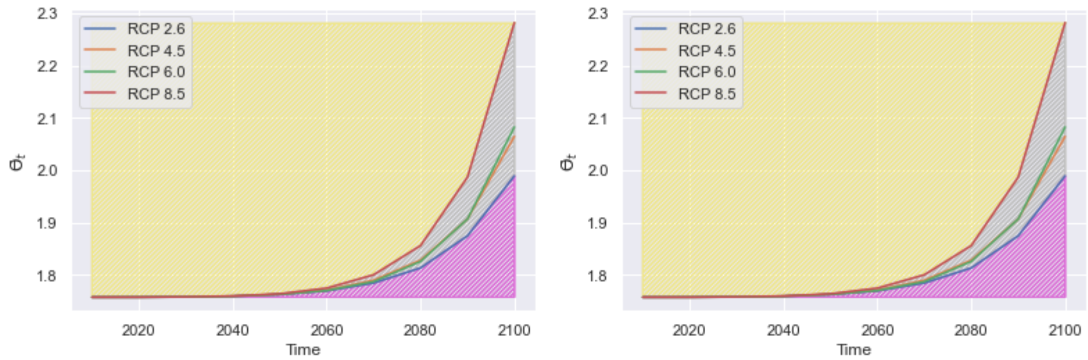

Figure 16: ***The evolution of the political equilibrium (ii)***.

Key: Evolution of the threshold below which the young pessimists prefer to form a coalition with old optimists(Proposition 6) under the different RCP trajectories in the simulation with a more concentrated income distribution (left panel) and in the baseline model (right panel). The pink-shaded area highlights the values of Θ *for which the condition is satisfied. The yellow-shaded area highlights the values of* Θ *for which the condition is not satisfied, in which case a coalition of between pessimists prevails.*

A3.1.2 Adaptation Rates Proposed by Different Coalitions

Since a more concentrated income distribution does not influence the threshold at which a particular coalition prevails, we follow our specification of Θ in our baseline model and set $\Theta = 1.775, \bar{\theta} = 0.85, \underline{\theta} = 0.48$. Consequently, the political equilibrium tips around 2070 again.

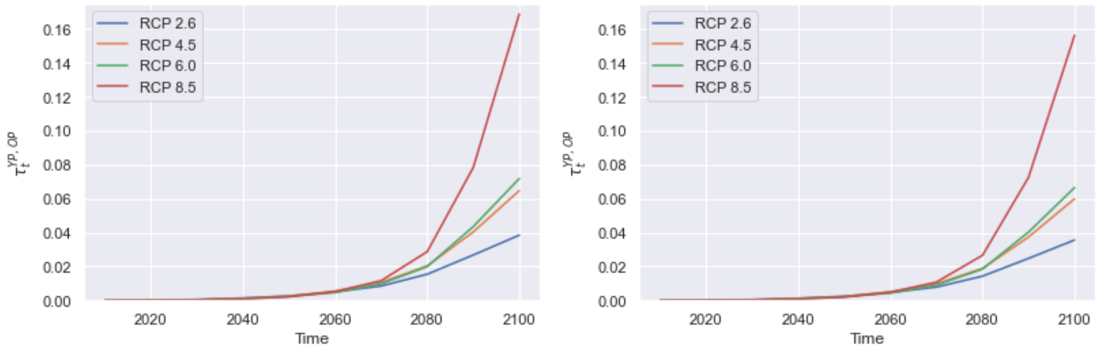

Figure 17: *Adaptation Rate Proposed by the Coalition of Pessimists.*

Key: The adaptation rate proposed by a coalition of pessimists under the different RCP trajectories in the simulation with a more concentrated income distribution (left panel) and in the baseline model (right panel).

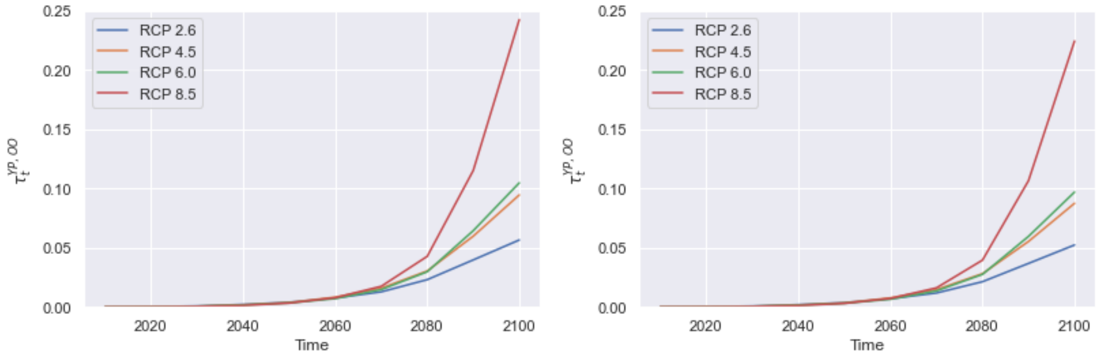

Figure 18: ***The adaptation rate proposed by the coalition of young pessimists and old optimists.***

Key: The adaptation rate proposed by a coalition of young pessimists and old optimists under the different RCP trajectories in the simulation with a more concentrated income distribution (left panel) and in the baseline model (right panel).

A3.1.3 Adaptation Gap

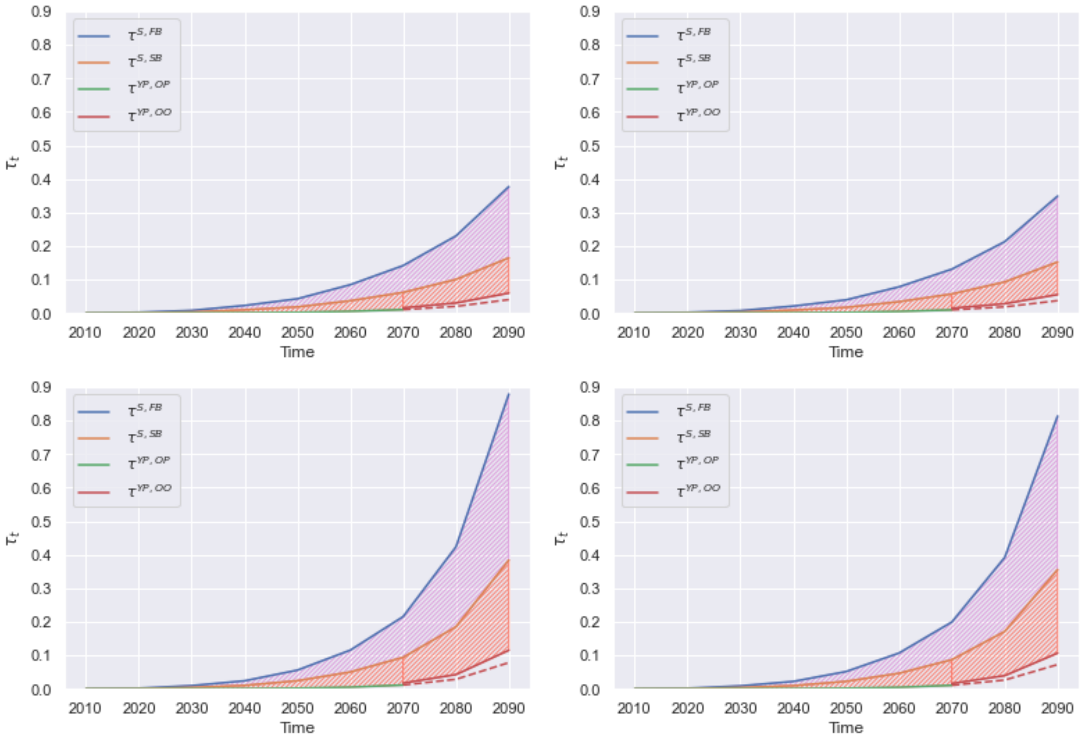

Figure 19: ***The decomposition of the adaptation gap***.

Key: Evolution of the adaptation gap under the second-best policy choice (red-shaded area) and first-best policy choice (purple-shaded area) over time in the simulation with a more concentrated income distribution (left panels) and in the baseline model (right panels). The upper panels plot the adaptation gap under RCP 4.5, and the lower panels plot the adaptation gap under RCP 8.5.

A3.2 Higher Fraction of Pessimists

To examine the impact of a higher fraction of pessimists, ω, we increase the fraction of pessimists from 0.51 (baseline) to 0.67.

	Comparative Statics	Baseline
ω	0.67	0.51

Table 6: ***The fraction of pessimists***.

The increase in the fraction of pessimists reduces the adaptation rate proposed by a coalition of old optimists and pessimists directly, but not the adaptation rate proposed by a coalition of young and old pessimists.[23] Consequently, forming a coalition with old optimists becomes more attractive for young pessimists, as they receive more weight in the determination of the coalition adaptation rate. As a result, this coalition becomes sustainable for larger values of Θ. While the first-best optimal adaptation rate remains unaffected by an increase in the fraction of pessimists, it *reduces* the second-best optimal adaptation rate. Consequently, a higher fraction of pessimists *reduces* the adaptation gap under the second-best policy choice. Furthermore, a higher fraction of pessimists does not affect prices [24], nor the evolution of the housing stock.

[23] An increase in the fraction of pessimists also reduces the adaptation rate preferred by a coalition of old optimists and pessimists.

[24] Recall: the simulations are conducted for an initial state where $X_{G,t} = 0$

A3.2.1 Evolution of the Political Equilibrium

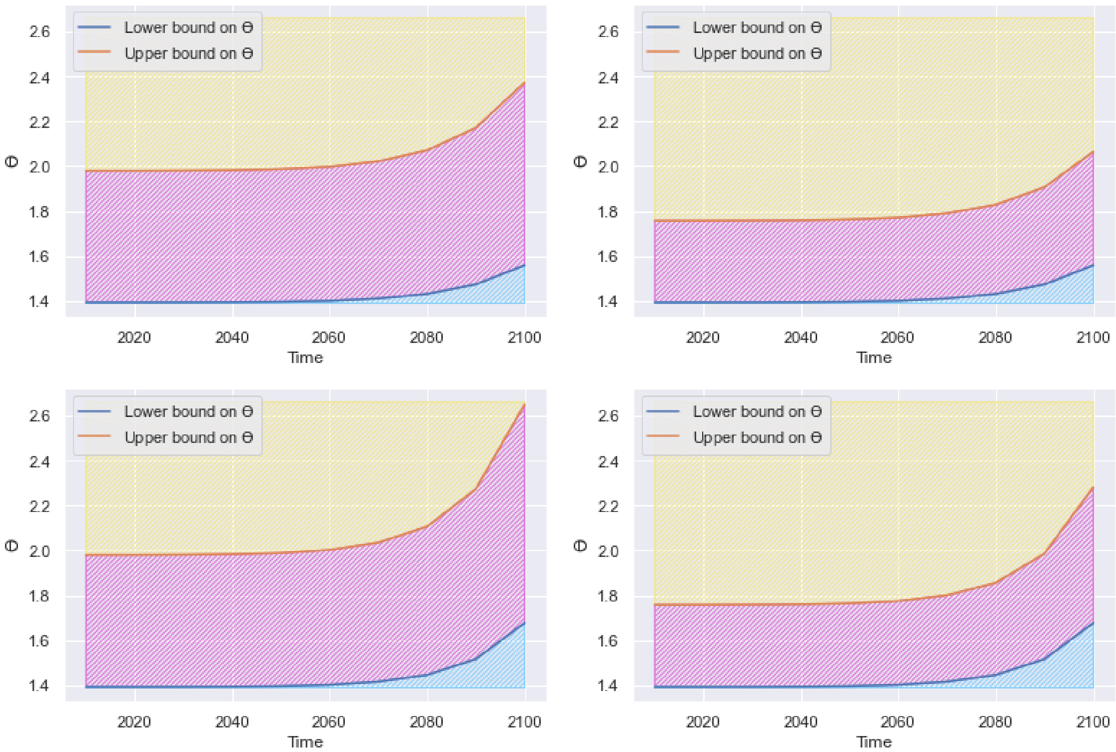

Figure 20: ***The evolution of the political equilibrium***.

Key: Joint evolution of the upper (Proposition 6) and lower (Assumption 3) bounds on the dispersion in beliefs for which a coalition of young pessimists and old optimists prevails (pink-shaded area). When the dispersion in beliefs is below the lower bound (blue-shaded area), a coalition of the old prevails, while a coalition of the pessimists prevails when the dispersion in beliefs is above the upper bound (yellow-shaded area). The panels show the evolution of the bounds over time, in the simulation with a higher fraction of pessimists (left panels) and in the baseline model (right panels). The upper panels plot the adaptation gap under RCP 4.5, and the lower panels plot the adaptation gap under RCP 8.5.

A3.2.2 Adaptation Rates Proposed by Different Coalitions

An increase in the fraction of pessimists influences the threshold for which a specific coalition prevails. We use the insights of Figure 20 to determine the value of the degree of dispersion in beliefs (Θ) for which there will be a tipping of the political equilibrium. In particular, we choose $\Theta = 2.05$ and $\bar{\theta} = 0.85$. Accordingly, we set $\underline{\theta} = 0.415$. In this case, the political equilibrium tips around 2080.

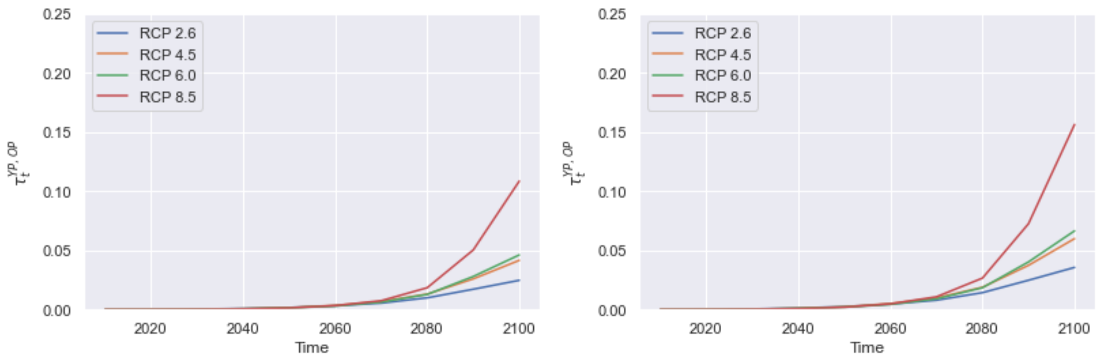

Figure 21: *Adaptation Rate Proposed by the Coalition of Pessimists.*

Key: The adaptation rate proposed by a coalition of pessimists under the different RCP trajectories in the simulation with a higher fraction of pessimists (left panel) and in the baseline model (right panel).

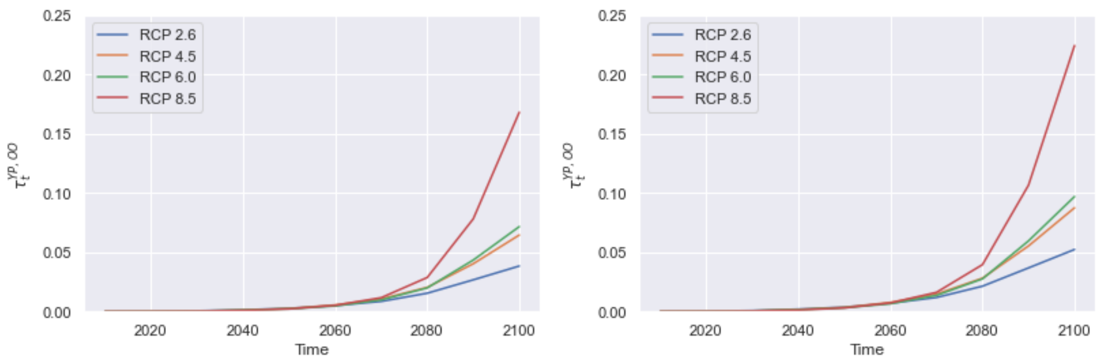

Figure 22: ***The adaptation rate proposed by the coalition of young pessimists and old optimists.***

Key: The adaptation rate proposed by a coalition of young pessimists and old optimists under the different RCP trajectories in the simulation with a higher fraction of pessimists (left panel) and in the baseline model (right panel).

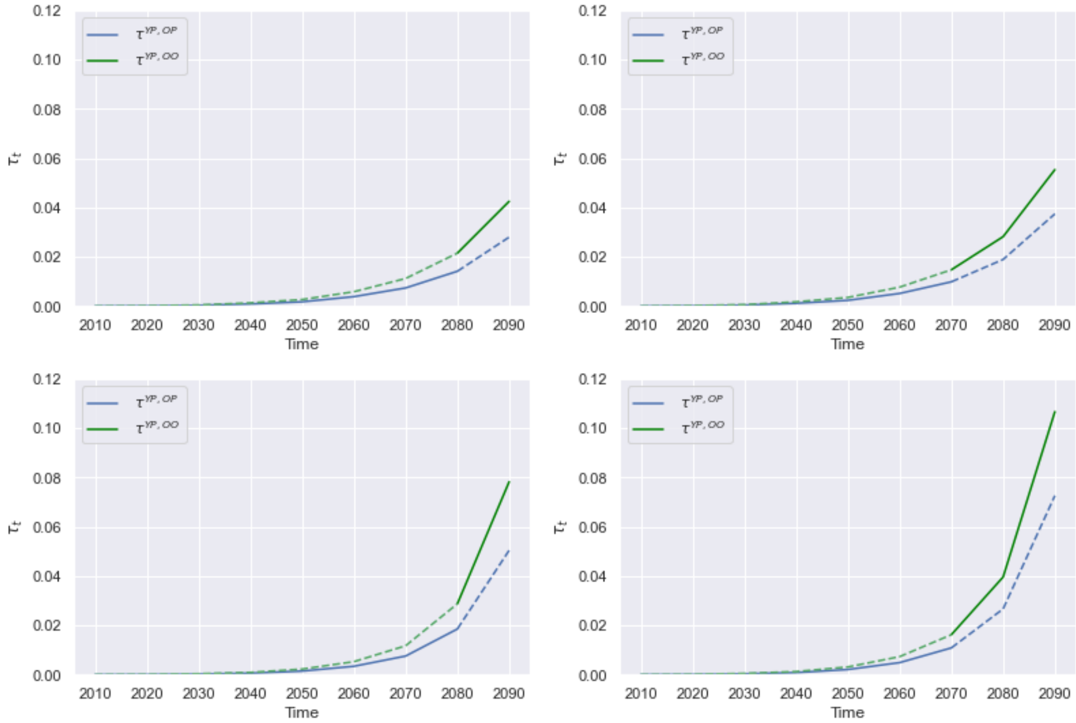

Figure 23: ***The tipping of the prevailing adaptation rate.***

Key: The prevailing adaptation rate in the economy over time when the political equilibrium tips around 2080 in the simulation with a higher fraction of pessimists (left panels) and in the baseline model (right panels). The upper panels plot the adaptation gap under RCP 4.5, and the lower panels plot the adaptation gap under RCP 8.5.

A3.2.3 Adaptation Gap

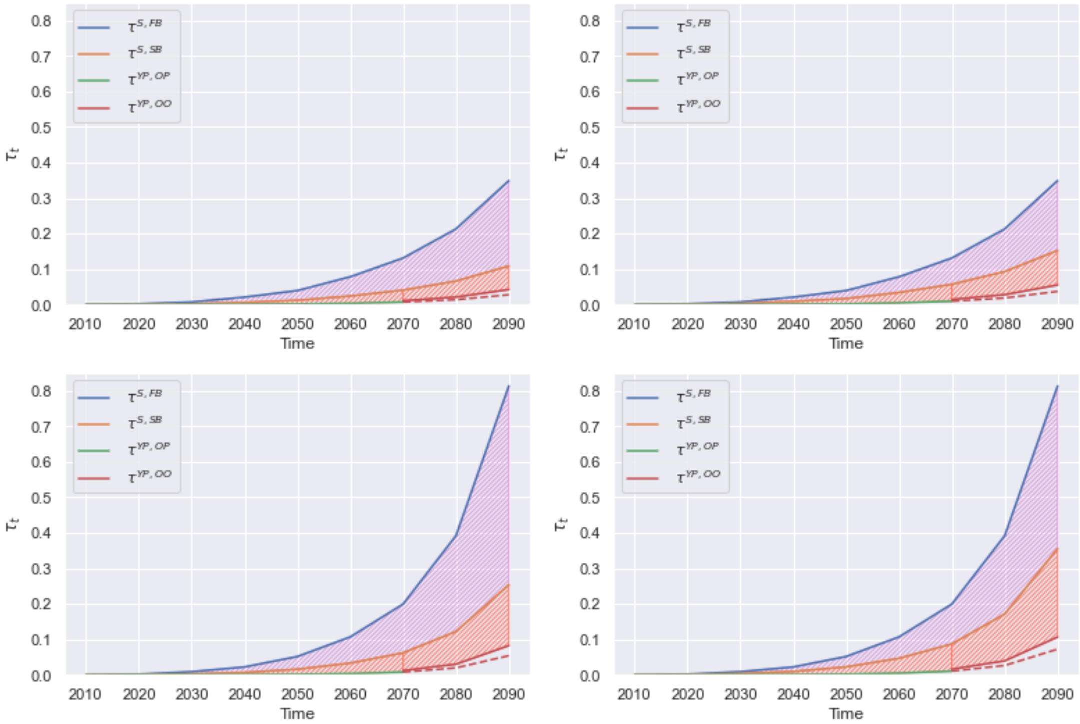

Figure 24: *The decomposition of the adaptation gap.*

Key: Evolution of the adaptation gap under the second-best policy choice (red-shaded area) and first-best policy choice (purple-shaded area) over time in the simulation with a higher fraction of pessimists (left panels) and in the baseline model (right panels). The upper panels plot the adaptation gap under RCP 4.5, and the lower panels plot the adaptation gap under RCP 8.5.

A4 Additional Simulations: Extended Model

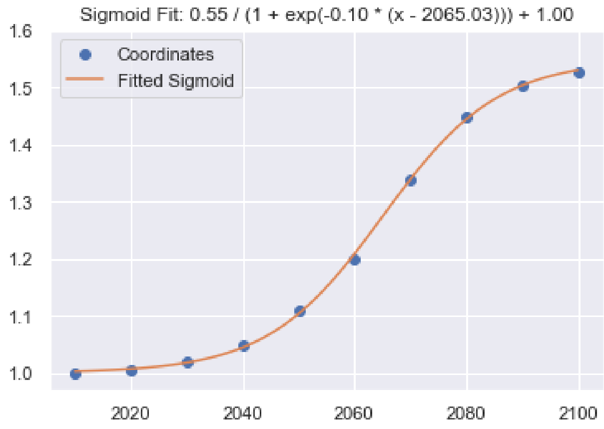

Figure 25: ***The evolution of the inequality multiplier in the extended model and the fitted S-curve.***

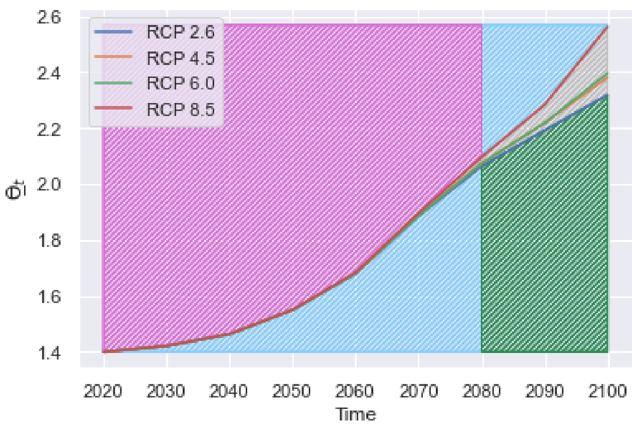

Figure 26: ***Evolution of Assumption 4 in the extended model under the different RCP trajectories.***