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Inattentive voters and welfare-state persistence

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Inattentive Voters and Welfare-State Persistence

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Abstract

Welfare-state measures often tend to persist even when they seem to have become suboptimal due to changes in the economic environment. This paper proposes an information-based explanation for this welfare-state persistence. I present a structural model where rationally inattentive voters decide upon implementations and removals of social insurance. In this model, welfare-state persistence arises from disincentive effects of social insurance on attentiveness. The welfare state crowds out private financial precautions and with it agents' attentiveness to changes in economic fundamentals. When welfare-state arrangements are pronounced, agents realize changes in economic fundamentals later and reforms have considerable delays.

Keywords: welfare state, voting, imperfect information
JEL classification: D72, H55, D83

1 Introduction

It is a frequently expressed view that the political process features an asymmetry between the speed of implementations of welfare-state arrangements and the speed of their removals. Reforms enhancing the size of the welfare state seem easily and quickly implemented while opposite reforms face stronger opposition. Welfare-state measures thus tend

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to persist. This paper offers an information-based explanation for this welfare-state persistence.

Many authors agree that the welfare state is persistent. For example, Lindbeck (2003) observes "certain asymmetries between the politics of expansion and retreat" in welfare-state dynamics. Hassler et al. (2003) emphasize that, in the US, the UK, France, and Italy, the great depression led to increased public intervention which did not diminish after the economies had recovered. Brooks and Manza (2006) find similar patterns in welfare-state dynamics of several OECD countries at the end of the twentieth century and summarize that "welfare states within most developed democracies appear quite resilient in the face of profound shifts in their national settings." Welfare-state persistence is further observed by e.g. Gavin and Perotti (1997), Blanchard and Wolfers (2000), Agell (2002), Hercowitz and Strawczynski (2004), Beetsma et al. (2009), Balassone et al. (2010), and Brügemann (2012).

This paper offers an explanation for welfare-state persistence which is based on the effects of the welfare state on attentiveness. Since the welfare state crowds out private financial precautions, it also reduces incentives to inform oneself about economic fundamentals such as life expectancy or invalidity risk. These fundamentals do not only influence private decisions on savings or insurance but also determine the optimal social choice regarding welfare-state arrangements.

The frequency with which people inform themselves about fundamentals depends on their level of private financial precaution and the incentives for private precaution depend on welfare-state arrangements. If the degree of social insurance is high, people engage little in private financial activity such as savings. Therefore, they also inform themselves rarely about fundamentals. Consequently, if initial welfare-state arrangements are pronounced, it takes relatively long until a change in fundamentals is noticed by a majority of society and translated into appropriate policies. By contrast, the political delay is short when initial welfare-state arrangements are weak.

This reasoning relies on the presence of information costs. The importance of such costs in democratic decision making has been stressed by Downs (1957). Downs pointed out that even small information costs can lead voters to be rationally ignorant and cause pronounced uncertainty about relevant political issues since the importance of any individual vote is negligible. This point is taken up by e.g. Roemer (1994), Cukierman and Tommasi (1998), Myerson (1998), Schultz (2002), and Taylor and Yildirim (2010) who work with the assumption that voters are imperfectly informed about the state of the world or the working of the economy. Empirical support for this form of imperfect information of voters is provided by e.g. Haller and Norpoth (1994), Bartels (1996), Nannestad and Paldam (1997), Duch et al. (2000), De Boef and Kellstedt (2004), and Duch and Stevenson (2011).

In the model presented in this paper, agents are rationally inattentive (Reis 2006a; Reis 2006b) and decide on the timing of their infrequent and costly acquirement of perfect information. Empirical support for the inattentiveness hypothesis is provided by Lusardi (1999), Ameriks et al. (2003), Carroll (2003) and Mankiw et al. (2003). Agents have no incentive to inform themselves for political purposes because their individual impact on social choices is negligible. However, agents seek information about fundamentals in order to improve their private decisions which are, in turn, affected by social choices.

Agents in the model have an uncertain income stream and decide on savings. Due to the absence of a private insurance market, there is a precautionary motive for savings. Agents face a risk of receiving no market income in future periods and this risk is a stochastic fundamental which determines optimal savings. In the political process, agents decide whether to vote in favor of a social insurance. Agents are ex ante identical such that there is no distributional motive of social insurance. However, there is potential demand for social insurance since agents have no access to a private insurance market. The stochastic income risk is hence also a determinant of the optimal social choice.

Informing oneself about income risk thus improves both the savings and the voting decision but agents only value the private benefit of improved savings and do not internalize the social benefit of their attentiveness. Thus, the information choice is only affected by the incentives for private savings which are weakened by social insurance.

The model economy shifts between two aggregate states of the world with different levels of income risk. I analyze situations where social insurance is socially beneficial in only one of the two states. When agents believe this one to be the current state of the world, they vote in favor of social insurance and implement it. When social insurance is implemented, private savings are lower and, consequently, agents remain inattentive for longer periods of time. As a result, the removal of social insurance when a change in the state of the world has made it suboptimal takes, in expectation, longer than the implementation of social insurance after an opposite change in fundamentals.

The key mechanism of this paper relies on the negative effect of social insurance on agents' private financial precaution, their attentiveness and thus their knowledge about economic fundamentals. The crowding-out effects of social insurance with respect to private financial precaution have been modeled by e.g. Rust and Phelan (1997) and documented empirically by Bird (2001). The negative effect of social insurance on economic knowledge is documented empirically by Jappelli (2010).

Under perfect information, previous explanations have attributed welfare-state persistence to changes in preferences or in the distributional conflict. In the former argument, pro-work attitudes erode when more agents live out of benefits (Lindbeck 1995; Lindbeck and Weibull 1999; Brooks and Manza 2006). The latter argument stresses that the welfare-state produces its own support by enforcing distributional conflicts (Bénabou 2000; Agell 2002; Hassler et al. 2003; Beetsma et al. 2009) or by generating a group of beneficiaries who would else not exist (Saint-Paul 2002; Brügemann 2012). In my model, preferences are stable and there is no distributional conflict since agents are ex-ante identical. The disincentive effects of social insurance on attentiveness are a thus a complementary explanation for welfare-state persistence enforcing the effects of changes in preferences or distributional conflicts.

Previous papers on voting over welfare-state measures under uncertainty have worked with a given information structure. For example, Dhami (2003) analyzes voting on redistribution in a representative democracy with asymmetric information. Laslier et al. (2003) and Hansen (2005) study majority-voting models of redistribution with imperfect information. In Dhami (2003) and Hansen (2005), the information structure is exogenously given, while, in Laslier et al. (2003), it is endogenous but taken as given by agents. By contrast, in the model presented in this paper, agents face an active information choice.

The remainder of the paper is organized as follows. Section 2 presents the set-up of the model. In Section 3, the model is solved for individual decisions of agents. Section 4 describes the aggregate dynamics of the model. Section 5 concludes.

2 Model Set-up

I consider an endowment economy with uncertain income that is subject to two frictions. First, information is only available at a cost such that agents will rationalize on information. Second, there is a lack of a private insurance market such that there is a precautionary motive for savings and, in principle, demand for distortionary social insurance. In the political process, agents balance expected costs and benefits of social insurance based on their potentially imperfect information.

The economy which is populated by a mass-1 continuum of dynasties. A dynasty consists of an infinite stream of agents who live for two periods each. Each dynasty has one member in each generation. Generations are linked through the transmission of information. Specifically, each agent receives all her dynasty's information at the beginning of her life.[1]

Thus, each generation t consists of a mass-1 continuum of agents who live for two periods, t and $t+1$. Agents maximize

$$E_{i,t}\left[U_{i,t}\right] = E_{i,t}\left[u\left(c_{i,t,t}\right) + u\left(c_{i,t,t+1}\right) - \kappa \cdot d_{i,t}\right], \tag{1}$$

where $U_{i,t}$ is the lifetime utility of agent i in generation t, in short agent i,t. $c_{i,t,t}$ denotes this agent's consumption in period t, and $c_{i,t,t+1}$ is consumption of this agent in period $t+1$. $E_{i,t}$ denotes the statistical expectation operator conditional on information available to agent i,t. $d_{i,t}$ is an indicator variable describing the choice of the agent whether to be attentive to new information.

κ is a fixed utility cost of acquiring new information. This can be understood as the cost of obtaining, processing, and interpreting information. It may arise because agents find the process annoying or frustrating. Reis (2006a) argues that, while some information may be observed at little cost, the costs of understanding it and determining the optimal response can be substantial. Likewise, this cost could be modelled as a resource cost capturing e.g. payments to a financial advisor or as opportunity costs of time (Sims 2003; Mankiw and Reis 2010).

To ensure analytical tractability, I use linear-quadratic preferences

$$u\left(c_{i,t,t+h}\right) = \mu \cdot c_{i,t,t+h} - \left(c_{i,t,t+h}\right)^2, \tag{2}$$

[1] In the model, this has the reasonable implication that a generation inherits its predecessor's institutions if not engaging in costly reassessing them.

where $h = 0, 1$ and $\mu \geq 4$.[2]

Individual uncertainty. In the first period of their life, agents receive a deterministic gross income $y_{i,t,t}$ normalized to one,

$$y_{i,t,t} = 1. \tag{3}$$

Income in the second period of life is stochastic. With probability $1-\pi_t$, a generation-t agent will receive a gross income of 1 also in period $t+1$ (and be called "lucky"). With probability π_t, agent i of generation t will receive an income of 0 (and be called "unlucky") in period $t+1$,

$$y_{i,t,t+1} = \begin{cases} 1, & \text{prob. } 1-\pi_t \\ 0, & \text{prob. } \pi_t. \end{cases} \tag{4}$$

Aggregate uncertainty. The risk of receiving no income in the second period of life, π_t, follows an exogenous stochastic process. In particular, π_t can take two values, π^h and π^l, $\pi^h > \pi^l$. Thus there are two states of the world, a "good" one with low income risk and a "bad" one where income risk is high. State changes occur with an exogenous probability $\lambda < \frac{1}{2}$ in any period. Thus, the stochastic process for π is a two-state Markov process with transition matrix

$$\Lambda = \begin{bmatrix} 1-\lambda & \lambda \\ \lambda & 1-\lambda \end{bmatrix}. \tag{5}$$

Income risk in period t is the same as k periods ago when the number of state changes between these two periods is even. π_t is a generation-wide variable determining the risk for each member of generation t to receive no income in period $t+1$. This risk is the same for all members of the generation.

For agents, there are two ways to cope with income risk, private (precautionary) savings and social insurance. There is no private insurance market. Agents have the possibility to save at a gross interest rate of 1,

[2] It is common to assume linear, quasi-linear, or linear-quadratic preferences in dynamic political-choice models in order to ensure tractability (Tabellini 2000; Hassler et al. 2003; Borck 2007; Hassler et al. 2007). In this model, the maximal amount of consumption in a period is 2. Therefore, (2) exhibits positive and decreasing marginal utility for all relevant levels of consumption.

i.e. agent i,t can store any amount $s_{i,t}$ of her income from period t to period $t+1$. Furthermore, each generation t can decide to implement social insurance. If so, the government evens out income differences perfectly. Specifically, it collects incomes from all lucky agents and redistributes incomes equally among the members of the generation. Thus, the contribution of the lucky agents is $\tau_t = 1$ when there is social insurance. If a generation decides against social insurance, I will capture this formally as a contribution of zero, $\tau_t = 0$.

It is assumed that the amount of total resources is lower in the presence of social insurance. This may capture disincentive effects or government inefficiency, which is modeled in a short-cut way for simplicity. From every unit of contributions collected, the government can only redistribute $e < 1$ units.

The implementation of social insurance by a generation applies to both periods of the generation's life. In the first period, social insurance is a waste of resources since agents are still identical and thus pay the same contributions and receive the same transfer.[3] However, in the second period, social insurance reduces income risk at the price of lower expected income. Formally, net income $x_{i,t,t}$ of an agent i,t in the first period of her life is given by

$$x_{i,t,t} = 1 - (1-e)\,\tau_t \tag{6}$$

and net income $x_{i,t,t+1}$ in the second period of her life is given by

$$x_{i,t,t+1} = \begin{cases} 1 - \tau_t + (1-\pi_t)\,e\tau_t, & \text{prob. } 1-\pi_t \\ (1-\pi_t)\,e\tau_t, & \text{prob. } \pi_t \end{cases}, \tag{7}$$

where τ_t is the contribution implemented by generation t and can be either one or zero.

Agent i,t faces the following budget constraint in her first period of life:

$$c_{i,t,t} + s_{i,t} \leq x_{i,t,t}. \tag{8}$$

Thus, consumption and savings may not succeed her net income. In the second period consumption may not exceed net income plus savings,

$$c_{i,t,t+1} \leq x_{i,t,t+1} + s_{i,t}. \tag{9}$$

[3] This simplifies the analytical solution but does not affect the qualitative results.

Political choices are decided by direct democracy. Each generation t decides whether to implement social insurance, i.e. $\tau_t = 1$, or not, i.e. $\tau_t = 0$, by a direct vote over these two opportunities. The vote takes place in a general, free, and secret ballot. All agents in generation t participate in this vote. Furthermore, agents vote truthfully and support their individual expected-utility maximizing τ_t.[4] The vote of agent i of generation t is denoted by $\tau_{i,t} \in \{0, 1\}$.

The timing of events is illustrated in Figure 1. Prior to period t, income risk π_t for generation t is determined according to the transition matrix (5). In this period t, an agent of generation t first receives information from the member of her dynasty in generation $t-1$. Second, she takes part in the referendum on the implementation of social insurance of her generation.[5] Third, the agent decides whether or not to obtain complete information on income risk π_t. Fourth, the agent receives net income $x_{i,t,t}$, decides how much to save, and consumes the remaining part of her income. In the second period of her life, the agent first bequeaths information to a member of generation $t+1$. After this, she observes and receives her net income $x_{i,t,t+1}$, and consumes.

Agents' decisions are determined by (potentially perfect) beliefs about the state of the world. Since agents have the possibility to update their beliefs, one has to distinguish between prior and posterior beliefs. Posterior and prior beliefs are labeled by different time indices. The time index $t+$ refers to beliefs after the updating decision in period t, whereas the time index t refers to the time in period t before the updating decision. An agent's prior belief can be represented by the probabilities the agent assigns to the two possible states of the world, $p^h_{i,t} = prob_{i,t}\left[\pi_t = \pi^h\right]$ and $1 - p^h_{i,t} = prob_{i,t}\left[\pi_t = \pi^l\right]$, where $prob_{i,t}\left[\cdot\right]$ denotes the probability of the event in the brackets conditional on information available to agent i of generation t before the updating decision. Analogously, $p^h_{i,t+} = prob_{i,t+}\left[\pi_t = \pi^h\right]$ denotes the agent's posterior belief. When the agent decides to be attentive, she will know the state of the world for sure after updating, i.e. $p^h_{i,t+} = 1$ or $p^h_{i,t+} = 0$ then. By contrast, when the agent decides to be inattentive, then $p^h_{i,t+} = p^h_{i,t}$ and the posterior belief can take any value between zero and one. The

[4] Since any single voter has zero mass in this model, I abstain from analyzing strategic voting behavior and assume "sincere" (Bearse et al. 2009) voting.

[5] Voting taking place before updating simplifies the solution but affects results in both political regimes symmetrically by increasing political delays by one period.

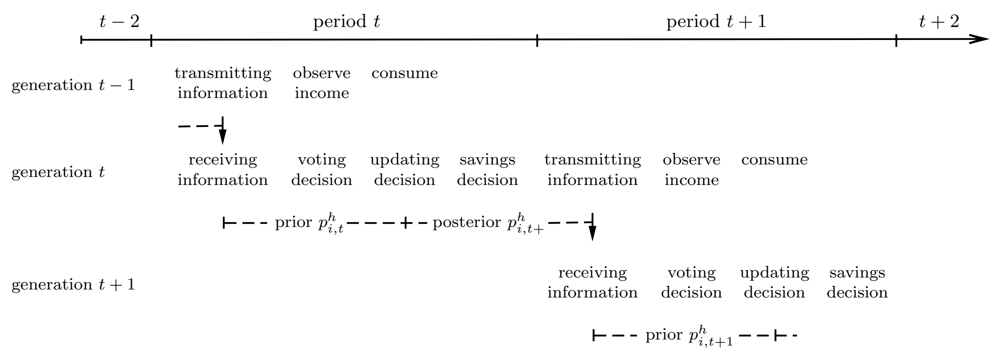

Figure 1: The timing of events and beliefs.

timing of the beliefs can be seen from the dashed lines in Figure 1.

3 Individual Decisions

Decisions of an agent depend only on her beliefs $p^h_{i,t}$ and $p^h_{i,t+}$. Thus agents with identical beliefs make identical decisions. This is the case because income in the second period of life, which is a source of heterogeneity, realizes after all decisions are taken.

Agent i of generation t chooses $\tau_{i,t} \in \{0,1\}$, $d_{i,t} \in \{0,1\}$, $s_{i,t} \in [0, x_{i,t}]$ sequentially such as to maximize (1) subject to (8), (9), and $\tau_t = \tau_{i,t}$ capturing the sincerity of the voting decision. At the first and second stage, the agent takes into accout optimal subsequent behavior.

From stage to stage, the information set of the agent can change. At the final stage, the agent chooses savings based on the (potentially perfect) posterior belief $p^h_{i,t+}$ and knowing whether there is social insurance. At the second stage, the agent chooses whether to update information based on the prior belief $p^h_{i,t}$ knowing whether there is social insurance. At the first stage, the agent decides whether to vote in favor of social insurance based on the prior belief $p^h_{i,t}$. Prior to all decisions, the agent calculates subjective probabilities of the two states of the world, $p^h_{i,t}$ and $1 - p^h_{i,t}$, based on the received information. I solve the problem by backward induction.[6]

[6]A detailed derivation of all results can be found in the web appendix to this paper on the author's research page.

3.1 Savings decision

When deciding on individual savings, $s_{i,t}$, an agent i of generation t knows whether her generation has implemented social insurance. Since the updating decision has already taken place at this stage, the relevant belief is the posterior belief $p^h_{i,t+}$. At this stage, updating costs are already sunk. The agent seeks to maximize

$$E_{i,t+}\widetilde{U}_{i,t} = E_{i,t+}\left[u\left(c_{i,t,t}\right) + u\left(c_{i,t,t+1}\right)\right], \tag{10}$$

which defines $\widetilde{U}_{i,t}$, based on the posterior belief $p^h_{i,t+}$ by choosing individual savings, $s_{i,t}$, subject to the two period budget constraints (8) and (9). The first-order condition for this problem is

$$u'\left(x_{i,t,t} - s_{i,t}\right) = E_{i,t+}u'\left(x_{i,t,t+1} + s_{i,t}\right) \tag{11}$$

which is a consumption Euler equation for the product of the rate of time preference and the gross interest rate being one. Marginal utility in the first period equals expected marginal utility in the next period.

In condition (11), $x_{i,t,t+1}$ is stochastic and can take four values depending on the aggregate state π_t and the agent's individual draw of the income process, see equation (7) in which τ_t is known to the agent at this stage. The agent's expected utility depends on the probabilities the agent assigns to these four scenarios. These subjective probabilities are combinations of the income probabilities conditional on the state of the world, π^h and $1-\pi^h$ or π^l and $1-\pi^l$, respectively, and the probabilities the agent assigns to the two states of the world, $p^h_{i,t+}$ and $1-p^h_{i,t+}$. Using this subjective probability distribution of $x_{i,t,t+1}$ and period utility (2) in condition (11) gives optimal savings.

In generations without social insurance, i.e. for $\tau_t = 0$, savings,

$$s_{i,t}|_{\tau_t=0} = \frac{\pi^e_{i,t+}}{2}, \tag{12}$$

depend positively on expected income risk $\pi^e_{i,t+} = \left(1 - p^h_{i,t+}\right) \cdot \pi^l + p^h_{i,t+} \cdot \pi^h$. When generation t has decided in favor of social insurance, i.e. for $\tau_t = 1$, optimal savings are given by

$$s_{i,t}|_{\tau_t=1} = \frac{e \cdot \pi^e_{i,t+}}{2} \tag{13}$$

and, next to income risk, depend on the level of government efficiency e. It is important that, since $e < 1$, savings are lower when there is social insurance. This implies that having better information when choosing savings has a smaller impact on utility in the presence of social insurance.

Expected indirect utility. At the updating decision, the agent takes into account the optimal subsequent savings behavior. Therefore it is useful to determine expected indirect lifetime utility net of updating costs which is determined by the solution to the optimization problem for savings. This expected indirect utility is a function of individual beliefs and the political regime. I denote expected indirect lifetime utility net of updating costs in the two political regimes by $\widetilde{V}\left(p_{i,t+}^{h}\right) := E_{i,t+}[\widetilde{U}_{i,t} \mid \tau_t = 0]$ and $\widetilde{W}\left(p_{i,t+}^{h}\right) := E_{i,t+}[\widetilde{U}_{i,t} \mid \tau_t = 1]$, respectively.

When there is no social insurance, i.e. $\tau_t = 0$, expected indirect lifetime utility is given by

$$\widetilde{V}\left(p_{i,t+}^{h}\right) = 2\mu - 2 - (\mu - 1)\,\pi_{i,t+}^{e} + \frac{\left(\pi_{i,t+}^{e}\right)^2}{2} \tag{14}$$

and decreases in expected income risk. In the other political state, i.e. with social insurance, $\tau_t = 1$, expected indirect lifetime utility is

$$\widetilde{W}\left(p_{i,t+}^{h}\right) = 2\mu e - 2e^2 - (\mu - 2e)\,e\pi_{i,t+}^{e} + \frac{\left(\pi_{i,t+}^{e}\right)^2 e^2}{2} - e^2\left[E_{i,t+}\left(\pi_t\right)^2\right], \tag{15}$$

where $E_{i,t+}\left(\pi_t\right)^2 = \left(\pi^l\right)^2 + p_{i,t+}^{h}\left(\left(\pi^h\right)^2 - \left(\pi^l\right)^2\right)$. Here, expected indirect utility includes an expectation of the squared income risk because also conditional net incomes in period $t+1$ depend on π_t, see equation (7).

Three properties of the expected indirect utility functions are important for the subsequent analysis. First, both expected indirect utility functions (14) and (15) are convex in $p_{i,t+}^{h}$,

$$\widetilde{V}''\left(p_{i,t+}^{h}\right) = \left(\pi^h - \pi^l\right)^2 > 0, \tag{16}$$

$$\widetilde{W}''\left(p_{i,t+}^{h}\right) = e^2\left(\pi^h - \pi^l\right)^2 > 0. \tag{17}$$

The convexity implies that there are potential gains from updating because, when knowing π_t for sure, i.e. $p_{i,t+}^{h} = 0$ or $p_{i,t+}^{h} = 1$, agents can choose the appropriate savings level and thus improve relative to uncertain income risk.

Second, $\widetilde{W}$ is less convex than $\widetilde{V}$, in the sense that $\widetilde{W}''\left(p_{i,t+}^{h}\right) < \widetilde{V}''\left(p_{i,t+}^{h}\right)$. In the presence of social insurance, agents save less and, consequently, the impact of an optimal savings decision on utility is lower. This implies that gains from updating are smaller when there is social insurance.

Third, there are constellations where agents would prefer social insurance only in one state of the world and not in the other, i.e.

$$\widetilde{V}(0) > \widetilde{W}(0), \quad \widetilde{V}(1) < \widetilde{W}(1) \tag{18}$$

or

$$\widetilde{V}(0) < \widetilde{W}(0), \quad \widetilde{V}(1) > \widetilde{W}(1). \tag{19}$$

Since the focus of this paper is on changes between political regimes, I will restrict the analysis to cases where either condition (18) or condition (19) is satisfied. It depends on the parameterization whether the agent is better off with social insurance when income risk is high or when it is low.[7] For the results of the paper, it is irrelevant whether agents prefer social insurance for high or low levels of income risk as long as they prefer it in only one of the two states. When condition (18) or (19) is fulfilled, there is a unique posterior belief p_{+}^{*} such that the preferred political system changes when the posterior belief passes p_{+}^{*}.[8]

3.2 Updating decision

The agent will update her information whenever her expected indirect utility is higher when doing so. The agent enters this stage of the decision problem with knowledge about the political regime and a prior belief $p_{i,t}^{h}$ about income risk. In both political regimes, the decision whether to update will depend on the prior belief about income risk. When taking the updating decision, the agent takes into account optimal subsequent behavior as reflected in $\widetilde{V}$ or $\widetilde{W}$, respectively.

[7] Increases in income risk have two counteracting effects on the attractiveness of social insurance. First, rising income risk increases the probability that the agent will be a beneficiary of the social-insurance system and thus makes this system more attractive. Second, rising income risk also affects the dependency ratio decreasing the benefits the agent receives if unlucky, thus making social insurance less attractive.

[8] Since $\widetilde{V}$ and $\widetilde{W}$ are strictly convex, there are at most two intersections between the two functions. When condition (18) or condition (19) is satisfied, the number of intersections between $\widetilde{V}$ and $\widetilde{W}$ on $(0,1)$ is odd. Together, this implies that the two functions intersect exactly once on $(0,1)$.

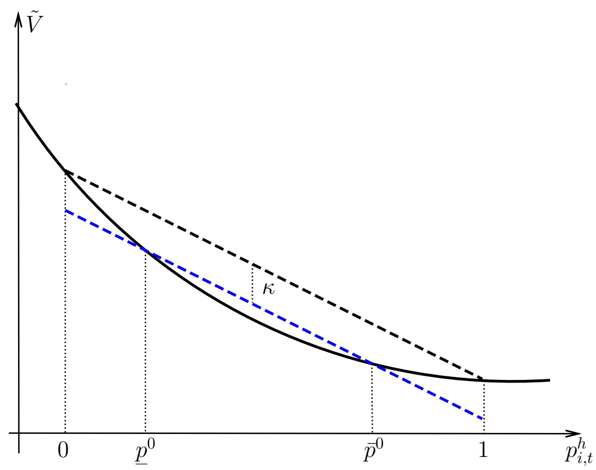

Figure 2: Updating decision in the absence of social insurance ($\tau_t = 0$).

Figure 2 illustrates the solution of the updating decision for the case of $\tau_t = 0$. The agent decides whether to update based on her prior beliefs about income risk, $p^h_{i,t}$. When the agent decides not to update, she will choose a savings level according to her prior belief. Consequently, the agent will then expect to receive a lifetime utility of $\widetilde{V}\left(p^h_{i,t}\right)$ since $p^h_{i,t+} = p^h_{i,t}$ and $d_{i,t} = 0$.

When the agent decides to be attentive, she will know π_t for sure after updating, i.e. $p^h_{i,t+} = 0$ or $p^h_{i,t+} = 1$. The agent will then choose savings according to the true income risk. However, in case the agent updates, her lifetime utility is reduced by the updating cost κ. She will then receive either $\widetilde{V}(0) - \kappa$ or $\widetilde{V}(1) - \kappa$. Prior to updating, the agent expects to observe $\pi_t = \pi^h$ with probability $p^h_{i,t}$ and $\pi_t = \pi^l$ with probability $1 - p^h_{i,t}$. Before updating, the agents thus expects a lifetime utility level of $\left(1 - p^h_{i,t}\right) \cdot \widetilde{V}(0) + p^h_{i,t} \cdot \widetilde{V}(1) - \kappa$ in case she updates.

Since $\widetilde{V}$ is convex in $p^h_{i,t+}$, there are potential gains from updating. The agent will decide to update whenever

$$\left(1 - p^h_{i,t}\right) \cdot \widetilde{V}(0) + p^h_{i,t} \cdot \widetilde{V}(1) - \widetilde{V}\left(p^h_{i,t}\right) > \kappa. \tag{20}$$

Updating costs could be that large that condition (20) is never fulfilled. However, if there is some $p^h_{i,t} \in (0, 1)$ for which condition (20) is fulfilled, then there is a unique updating range between $\underline{p}^0$ and $\bar{p}^0$, due to the strict convexity of $\widetilde{V}$. Whenever $\tau_t = 0$ and $p^h_{i,t} \in \left(\underline{p}^0, \bar{p}^0\right)$, the agent decides to obtain perfect information about income risk.

In the other political regime, $\tau_t = 1$, the updating decision works equivalently. Here, the agent updates whenever

$$\left(1 - p^h_{i,t}\right) \cdot \widetilde{W}(0) + p^h_{i,t} \cdot \widetilde{W}(1) - \widetilde{W}\left(p^h_{i,t}\right) > \kappa. \tag{21}$$

If there is some $p^h_{i,t} \in (0,1)$ for which condition (21) is fulfilled, then there is a unique range $\left(\underline{p}^1, \bar{p}^1\right)$ for which (21) is fulfilled.

Due to the constant second derivatives of both $\widetilde{V}$ and $\widetilde{W}$, both updating ranges, if they exist, are symmetric around 1/2. This implies that $\bar{p}^0 = 1 - \underline{p}^0$ and $\bar{p}^1 = 1 - \underline{p}^1$. This symmetry is the reason why it is not important whether agents prefer social insurance for high or low levels of income risk. The length of the range of beliefs for which the agent remains inattentive depends on the political regime but not on the specific end of the belief support. For instance, in the presence of social insurance, the agent chooses not to update for beliefs in $\left(0, \underline{p}^1\right)$ and for beliefs in $\left(1 - \underline{p}^1, 1\right)$. Both ranges have length $\underline{p}^1$.

However, it is important that the updating range is smaller in the presence of social insurance which is crucial for the different information choices in the two political regimes. This result reflects that, when $\tau_t = 1$, savings are lower and thus choosing savings based on better information has a lower influence on lifetime utility.[9] Furthermore, there a values of the information cost κ such that the agent would never update when social insurance is implemented but sometimes do so when there is no social insurance.

Expected indirect utility. At the voting stage of the decision problem, the agent takes into account optimal subsequent behavior including optimal updating. Therefore, it is useful to determine the expected indirect utility function which arises from optimal savings and optimal updating. I denote this function as $V\left(p^h_{i,t}\right) := E_{i,t}\left[U_{i,t} \mid \tau_t = 0\right]$ for the case of $\tau_t = 0$ and $W\left(p^h_{i,t}\right) := E_{i,t}\left[U_{i,t} \mid \tau_t = 1\right]$ for the case of $\tau_t = 1$.

[9] To show this result formally, note that also the difference function $\widetilde{V} - \widetilde{W}$ is convex in $p^h_{i,t}$ since $\widetilde{V}''\left(p^h_{i,t}\right) > \widetilde{W}''\left(p^h_{i,t}\right)$. Thus, the left hand side of (20) is always larger than the left hand side of (21). Therefore, whenever $p^h_{i,t}$ fulfills condition (21), condition (20) is also fulfilled but the reverse does not hold.

In the absence of social insurance, this function is

$$V\left(p_{i,t}^h\right)=\begin{cases}\widetilde{V}\left(p_{i,t}^h\right), & p_{i,t}^h\notin\left(\underline{p}^0,\bar{p}^0\right)\\ \left(1-p_{i,t}^h\right)\cdot\widetilde{V}\left(0\right)+p_{i,t}^h\cdot\widetilde{V}\left(1\right)-\kappa, & p_{i,t}^h\in\left(\underline{p}^0,\bar{p}^0\right)\end{cases}. \tag{22}$$

Analogously, in the presence of social insurance, expected lifetime utility as a function of the agent's belief is

$$W\left(p_{i,t}^h\right)=\begin{cases}\widetilde{W}\left(p_{i,t}^h\right), & p_{i,t}^h\notin\left(\underline{p}^1,\bar{p}^1\right)\\ \left(1-p_{i,t}^h\right)\cdot\widetilde{W}\left(0\right)+p_{i,t}^h\cdot\widetilde{W}\left(1\right)-\kappa, & p_{i,t}^h\in\left(\underline{p}^1,\bar{p}^1\right)\end{cases}. \tag{23}$$

Two expected indirect utility functions V and W fulfilling condition (19) are illustrated graphically in Figure 3. V and W have a unique intersection p^* on $(0,1)$. The notion of a political delay implies that a reform is actually caused by a change in fundamentals. This is ensured when the expected indirect utility functions V and W intersect in the updating ranges as depicted in Figure 3.[10] Then, a policy reform only takes place when agents actually observe that the true current state of the world is different from the state revealed by their last update.

3.3 Voting decision

At the voting stage stage, the agent decides whether to vote in favor of social insurance or against it. She takes this choice such as to maximize expected indirect utility taking into account optimal subsequent updating and savings as reflected in V or W, respectively. At this stage, the agent has some prior beliefs $p_{i,t}^h$ about the state of the world.

Since voting for one or the other alternative is costless, the voting decision is rather simple to determine. The agent votes for the political system under which expected indirect utility is higher, depending on the agent's prior belief about the state of the world, $p_{i,t}^h$. Agent (i,t) votes in favor of social insurance whenever

$$W\left(p_{i,t}^h\right)>V\left(p_{i,t}^h\right)$$

and votes against it when $W\left(p_{i,t}^h\right)<V\left(p_{i,t}^h\right)$.

Revisiting the expected indirect utility functions V and W, it follows that there is a unique p^* for which the agent is indifferent between the

[10] This is not necessary but possible as illustrated in the web appendix.

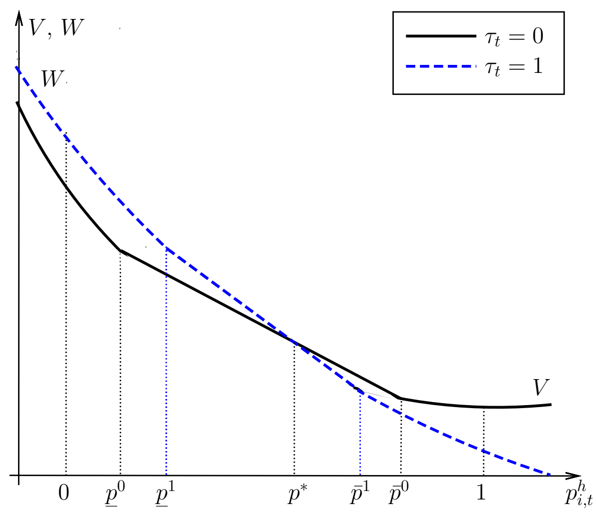

Figure 3: Indirect utility from optimal savings and optimal updating as a function of the prior belief in the two political regimes, $\tau_t = 0$ (solid line) and $\tau_t = 1$ (dashed line).

two political regimes, see Figure 3. The voting decision is determined by whether the agent's prior belief $p^h_{i,t}$ is below or above p^*. Whether she votes in favor of social insurance when $p^h_{i,t} > p^*$ or when $p^h_{i,t} < p^*$ depends on the parametrization. However, the voting decision changes when the prior belief passes p^*.

3.4 Belief formation

The prior belief $p^h_{i,t}$ is a main determinant of the agent's subsequent decisions. Agent i, t receives all information her ancestor $i, t-1$ had at the beginning of period t. Agent $(i, t-1)$ in turn received all information from agent $i, t-2$ and so on. Consequently, agent i, t knows the time of her dynasty's last update on income risk and what the respective member observed at that time.

Consider an agent (i, t) whose dynasty's last update was in period $t - j$. In period t, the probability that income risk is still the same as at the time of the last update equals the probability that the number of state changes between $t-j$ and t is even, given by

$$prob\left[\pi_t=\pi_{t-j}\right]=\begin{cases} j!\left(1-\lambda\right)^j\sum_{n=0}^{j/2}\frac{\left(\lambda^2\right)^n\left((1-\lambda)^{-2}\right)^n}{(j-2n)!(2n)!}, & j \text{ even} \\ j!\left(1-\lambda\right)^j\sum_{n=0}^{(j-1)/2}\frac{\left(\lambda^2\right)^n\left((1-\lambda)^{-2}\right)^n}{(j-2n)!(2n)!}, & j \text{ odd.}\end{cases} \tag{24}$$

This probability converges towards 1/2 and, since $\lambda<\frac{1}{2}$, it decreases monotonically in j. This implies that, the longer the time since the last update, the lower the probability that income risk is still the same.

When, in the period of the dynasty's last update, $t-j$, the state of the world was bad, the dynasty's beliefs evolve according to

$$p_{i,t}^h=prob\left[\pi_t=\pi_{t-j}\right] \tag{25}$$

until the next update, with $prob\left[\pi_t=\pi_{t-j}\right]$ given by equation (24). In case the state of the world was good in $t-j$, beliefs evolve as

$$p_{i,t}^h=1-prob\left[\pi_t=\pi_{t-j}\right] \tag{26}$$

until the next update. Beliefs thus converge (from above or below) towards 1/2. The speed of convergence is the same for both, equations (25) and (26). Since $p_{i,t}^h=1/2$ is always in the updating range if such range exists, beliefs reach the updating range in both political regimes.

Note that explicit updating is not the only source of complete information about income risk. Since agents vote truthfully, the outcome of the referendum in period t is a perfect signal about what agents who updated in period $t-1$ observed. When the agent observes an unexpected change in the result of the election, this can only be due to the fact that some agents have observed a change in the state of the world. This signal is observable for all agents and agents' beliefs will thus be identical afterwards. This way, the updating decision will be perfectly synchronized across the population. As a consequence, all agents within one generation have identical prior beliefs, $p_{i,t}^h=p_t^h\ \forall i$. Since the prior belief determines all decisions of an agent (income difference realize afterwards), also all decisions are taken in an identical way by all agents within one generation, $\tau_{i,t}=\tau_t$, $d_{i,t}=d_t$, $p_{i,t+}^h=p_{t+}^h$, $s_{i,t}=s_t\ \forall i$.[11]

[11] This implies that neither freeriding on the information reflected in other agents' behavior nor rational abstentions are relevant as all agents have the same information.

4 Aggregate Dynamics

4.1 Duration of inattentiveness and political delay

The duration of inattentiveness $I(\tau)$ is the time between two updates and depends on the current political regime described by τ. This time is only finite when, for some prior belief p_t^h, agents decide to update information or, technically, when an updating range exists for the current political regime. If an updating range exists, the duration of inattentiveness can be determined as follows. After an updating period $t-j$, agents' beliefs move into the direction of the updating range according to equations (25) or (26). The speed of this movement is independent of the state of the world in the previous updating period. In addition, the distance to the updating range is independent of the state of the world in the previous updating period since this range is symmetric around 1/2, i.e. $\bar{p}^0 = 1 - \underline{p}^0$ and $\bar{p}^1 = 1 - \underline{p}^1$. However, the distance to the updating range does depend on the current political regime since $\underline{p}^0 < \underline{p}^1$.

In the absence of social insurance, the duration of inattentiveness $I(0)$ is the time between the last update and the first period in which prior beliefs are within $\left(\underline{p}^0, 1-\underline{p}^0\right)$,

$$I(0) = \min\left\{t \in \mathbb{N} \mid prob\left[\pi_t = \pi_{t-j}\right] < 1 - \underline{p}^0\right\}. \tag{27}$$

Analogously, in the presence of social insurance, the duration of inattentiveness is

$$I(1) = \min\left\{t \in \mathbb{N} \mid prob\left[\pi_t = \pi_{t-j}\right] < 1 - \underline{p}^1\right\}. \tag{28}$$

If $\underline{p}^0$ and $\underline{p}^1$ exist, it holds that $\underline{p}^0 < \underline{p}^1$. Further, if $\underline{p}^1$ exists, also $\underline{p}^0$ does but not vice versa. Thus, the duration of inattentiveness is never longer without social insurance than with social insurance,

$$I(0) \leq I(1). \tag{29}$$

The political delay is the time between a change in the fundamental income risk and the implementation of the appropriate policy reform. This delay then depends on the duration of inattentiveness and the timing of the change in the fundamental. The maximum delay is the duration of inattentiveness I and occurs when the change in the fundamental happens right after agents have updated. Due to the timing of events, the minimum delay is one period and occurs when income risk changes right before agents' next update. Since state changes occur with equal probability each period, all delays between the minimum and maximum delay are equally likely. The expected political delay is thus $D(\tau) = \frac{1}{2} \cdot (I(\tau) + 1)$, where τ indicates the initial political regime. Since $I(0) \leq I(1)$, the expected political delay is never longer in the absence of social insurance than in the presence of it,

$$D(0) \leq D(1) . \tag{30}$$

This result relies on the disincentive effects of social insurance. In the presence of this welfare-state measure, agents save less and can thus gain less from information. As a consequence, agents remain inattentive for longer periods of time. Changes in income risk are then, in expectations, realized later and reforms have longer delays.

4.2 A numerical illustration

In this section, I illustrate the asymmetric effects of rational inattentiveness in the two political regimes numerically. In order to highlight the role of the information cost κ, I present results for different values of κ holding constant the other parameters of the model. Specifically, I consider the constellation $\pi^l = 0.3$, $\pi^h = 0.7$, $\mu = 4$, and $e = 0.94$. These parameter values imply that the indirect utility functions V and W intersect at $p^* = 0.5$. Thus political reforms are only implemented after agents have updated beliefs. Furthermore, I set $\lambda = 0.1$ implying that the expected duration of a state of the world is ten periods. Table 1 presents the duration of inattentiveness and the expected political delay for different values of the information cost κ.

To put the absolute level of the information cost κ into perspective, the table also reports κ relative to full-information lifetime utility in the good state without social insurance, $\kappa/\widetilde{V}(0)$, and its consumption equivalent. Columns 4 to 7 report the durations of inattentiveness and the expected political delays in the two political regimes. Note that the regime in the parantheses $(0, 1)$ refers to the initial political regime. Hence, $D(0)$ is the expected delay of an implementation of social insurance and $D(1)$ is the expected delay of a removal of social insurance.

In the first row of Table 1, information costs are rather small and amount to only 0.1% of consumption. In this setting, agents find it optimal to update their beliefs in every period in both political regimes.

information costs			duration of inattentiveness		expected political delay	
κ	$\kappa/\widetilde{V}(0)$	cons. equ.	$I(0)$	$I(1)$	$D(0)$	$D(1)$
0.0036	0.07%	0.10%	1	1	1.0	1.0
0.0067	0.13%	0.19%	1	2	1.0	1.5
0.0134	0.26%	0.38%	3	4	2.0	2.5
0.0178	0.35%	0.51%	5	15	3.0	8.0
0.0198	0.39%	0.57%	11	∞	6.0	∞
0.0232	0.45%	0.66%	∞	∞	∞	∞

Table 1: Duration of inattentiveness and expected political delay for different information costs ($\pi^l = 0.3$, $\pi^h = 0.7$, $e = 0.94$, $\mu = 4$, $\lambda = 0.1$)

Thus the time between two updates is 1. Consequently, we also observe the minimum political delay of one period between a change in fundamentals and the implementation of the appropriate policy reform.

With higher information costs of about 0.2% of consumption, agents still find it rational to update every period when there is no social insurance. However, with social insurance, gains from updating are lower and agents only update every second period. Consequently, a change in income risk justifying the implementation of social insurance is translated into a policy reform right in the next period. By contrast, removals of social insurance can have a delay of two periods.

Further increases in the information cost leads to longer durations of inattentiveness and, in consequence, to longer political delays. Since gains from updating are always lower in the presence of social insurance, the duration of inattentiveness and expected political delays are longer in this political regime. The fourth row of the table summarizes a situation where the asymmetry in inattentivess and political delays in the two political regimes in quite pronounced. This situation features relatively quick implementations of welfare-state measures which are then quite persistent.

The next to last row of Table 1 presents a scenario where information costs are such that, without social insurance, agents find it optimal to update their beliefs every eleven periods but never update in the presence of social insurance. In this case, condition (21) is not fulfilled for any $p^h_{i,t} \in [0, 1]$. In this scenario, the society implements social insurance with an expected delay of three periods. Once this political regime is implemented, agents decide to be inattentive forever and thus the social insurance will never be removed independent of the underlying state of the world. Thus welfare-state persistence is eternal in this scenario.

The same holds in the last row of Table 1. Here, agents are also completely inattentive in the absence of social insurance. Political reforms thus never take place. The economy remains in its initial political regime forever.

Note that relatively low information costs are sufficient to generate these extreme forms of political persistence. In the scenarios displayed in the last two rows of Table 1, information costs amount to 0.39% and 0.45% of lifetime utility under full information in the good state of the world, respectively, which is equivalent to a loss of less than 1% of consumption. Reis (2006a) discusses different parametrizations of his inattentiveness modell with updating costs ranging from 0.2% to 0.8% of income. Zbaracki et al. (2004) measure updating and planning costs of a firm and find that these costs are roughly 1% of total revenue.

5 Conclusion

This paper has offered an information-based explanation for welfare-state persistence. The explanation is based on the incentive effects of the welfare state on attentiveness. The welfare state crowds out private financial precautions and this way reduces incentives to be attentive to developments in economic fundamentals. When the degree of social insurance is high, people engage little in private financial activity. Consequently, they remain inattentive to news for longer periods of time. As a result, it takes long until a change in fundamentals is noticed by a majority of society and translated into appropriate policies if initial welfare-state arrangements are pronounced.

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