Additional material (intended for online dissemination)

A Policy reforms

We denote by κ the contribution rate and savings above this cap are not subject to exemptions. We set the threshold κ such that the pension system budget constraint from equation (13) is satisfied in the final steady state with $subsidy^{ISS} = subsidy^{FSS} = 0$. Given the longevity projections for Germany, the increase in the contribution rates necessary to maintain pension system neutrality to the fiscal balance, under our preferred calibration where $\alpha = 0.33$, amounts to $\kappa = 5.07\%$.[18] We thus set $\overline{w_{j,t}l_{j,m,t}} = 5.07\% w_{j,t}l_{j,m,t}$ as the maximum exempt from labor taxation and social security contributions in the scenarios with incentivized OAS instrument.

We introduce incentives to two types of schemes: E-E-T and T-T-E. In both cases, the participation decision is binary. Still, the timing of participation (the age at which agents choose to start contributing to the incentivized OAS instrument) makes this decision effectively quasi-continuous.[19] Recall that

$$\forall j < \bar{J} : \mathcal{I}_{j,m,t} = (1-\tau^l-\tau)w_{j,t}l_{j,m,t} \quad \text{and} \quad \forall j \geq \bar{J} : \mathcal{I}_{j,m,t} = (1-\tau^l)b_{j,m,t}.$$

The exempt in E-E-T scheme is complete, i.e., the eligible contribution is entirely exempt from taxation, hence for participants:

$$\mathcal{I}^r_{j,m,t} = \begin{cases} (1-\tau^l-\tau)(1-\kappa)w_{j,t}l_{j,m,t} & \text{for} \quad j < \bar{J} \\ (1-\tau^l)b_{j,m,t} + \tilde{b}_{j,m,t} & \text{for} \quad j > \bar{J}, \end{cases}$$

where $\tilde{b}_{j,m,t}$ denotes the pension benefit from the OAS scheme. While the universal pension system with $b_{j,m,t}$ pensions is of defined benefit nature, as portrayed in equation (12), the OAS scheme is of a defined contribution nature. Consequently, E-E-T pension funds accrue following $\tilde{b}_{j+1,m,t+1} = (1+\bar{r}_t)\tilde{b}_{j,m,t} + \kappa w_{j,t}l_{j,m,t}$. These accumulated funds are transformed into pension benefit payments using life expectancy at retirement. Also, E-E-T is funded, thus $\forall j > \bar{J}: \quad \tilde{b}_{j,m,t} = (1+\bar{r}_t)\tilde{b}_{j-1,m,t-1}$.

For the T-T-E instrument, the subsidy at disbursement stage ($j > \bar{J}$) implies

$$\mathcal{I}^r_{j,m,t} = (1-\tau^l)b_{j,m,t} + (1-\xi\tau^l)\tilde{b}_{j,m,t},$$

where $\tilde{b}_{j,m,t}$ denotes the benefit from OAS scheme for participating agents. Note that for $\xi = 1$, there is no subsidy, i.e., a situation equivalent to no OAS instrument, for $\xi \in (0,1)$, the subsidy implies partial tax refund, whereas $\xi < 0$ implies a subsidy. Since this is a T-T-E scheme, pension funds accrue following $\tilde{b}_{j+1,m,t} = (1+(1-\tau^k)\bar{r}_t)\tilde{b}_{j,m,t} + \kappa w_{j,t}l_{j,m,t}$. The pension funds are converted to pension benefits by dividing the accrued funds by life expectancy at retirement. Subsequently, the benefits are indexed with the interest rather than payroll growth as in universal pension system, $\forall j > \bar{J}: \quad \tilde{b}_{j,m,t} = (1+(1-\tau^k)\bar{r}_t)\tilde{b}_{j-1,m,t}$.

To make the size of the government subsidy comparable between the E-E-T and T-T-E scheme, we calibrate the ξ parameter such that the government expenditure for the instrument is identical as a share of GDP in the final steady state. In addition, we also consider the T-T-E instrument disbursed as a flat subsidy, that is, at the disbursement stage ($j > \bar{J}$)

$$\mathcal{I}^r_{j,m,t} = (1-\tau^l)b_{j,m,t} + \tilde{b}_{j,m,t} + \tilde{\xi}\tilde{\eta}_m/45,$$

where the definition of $\tilde{b}_{j,m,t}$ is the same as in the case of proportional T-T-E and $\tilde{\xi}$ denotes the lump sum

[18] In an alternative calibration, where $\alpha = 0.45$, the required increase in the contribution rates necessary to maintain pension system neutrality to the fiscal balance amounts to $\kappa = 6.23\%$.

[19] Typically, government incentives at the accumulation stage are combined with incentives at contribution stage, i.e., a threshold imposed on contributions κ can be expressed as a mutually unambiguous threshold on assets, which makes conceptually E-T-T similar to T-E-T, and overall E-E-T instruments the most frequent type of incentives schemes (OECD, 2018). Note that if individuals are permitted to choose the age at which they join the instrument, the fixed contribution rate becomes effectively a cap on lifetime earnings with quasi-continuous choices between 0 contributions and $\kappa \sum_j w_{j,t}l_{j,m,t}$ threshold.

transfer disbursed after retirement to all OAS participants, in proportion to their chosen number of years in participation $\tilde{\eta}_m/45$. Note that $\tilde{\xi}$ is a lump sum subsidy. Meanwhile, ξ is a proportional subsidy. For example, an agent who chose to participate for one year will receive $\tilde{\xi}*1/45$, and an agent who chose to participate during the entire career will receive $\tilde{\xi}*1$. This lump sum is calibrated such that $\sum_m \sum_{j=\bar{J}}^{J} \tilde{\xi}\tilde{\eta}_m/45$ was equivalent to E-E-T in terms of share in GDP.

Comparing proportional T-T-E to a lump sum T-T-E is interesting because, in our setup, agents optimize lifetime paths conditional on implicit taxation in the pension system. The universal PAYG defined benefit pension system brings negative net present value because it accrues at a rate lower than the interest rate. This implies distortionary taxation on labor (implicit tax). T-T-E instruments have positive net present value (implicit subsidy), but the lump sum is less distortionary than the proportional subsidy. Meanwhile, the PAYG DB pension system is proportional. Thus, a scenario with T-T-E flat informs about the scale of this distortion, which is why replacing a proportional pension system with a lump sum transfer (reducing distortion) allows us to quantify these effects in our model.

Agents choose to participate in the instrument endogenously, depending on whether the instrument increases their lifetime utility. Agents can freely choose the age $j \in [1, \bar{J}-1]$ at which they join the instrument, yet after joining, they have to stick to it until retirement $\bar{J}$. General equilibrium effects depend on how many agents join the instrument. By employing a fixed point method, we find the equilibrium until, in subsequent iterations, agents do not wish to re-adjust their participation decisions, having observed the general equilibrium outcomes (in particular, the fiscal costs and size of the subsidy).

B Measuring policy effects

This section presents the three welfare measures reported in the paper. For agents with rational preferences (i.e., with $\beta = 1$), experienced and planned utility are equivalent. In the case of agents with time-inconsistent preferences, experienced utility differs from planned utility. All three measures of welfare rely on experienced utility. The difference between them lies in how subsequent ages are weighed. Given that experienced and planned utility are equivalent for agents with $\beta = 1$, all three measures yield precisely the same result if agents have no time inconsistency, regardless of financial literacy.

B.1 Forward-looking welfare measure

In this approach, welfare is measured by taking the perspective of age $j = 1$. On the one hand, this is appealing because it is the welfare of at least one of the many selves, which time-inconsistent agents appear to be, and it is the one making plans for the future. On the other hand, this approach discounts "strongly" the future due to the additional $\beta < 1$ discounting. This approach is used by, among others, Krusell et al. (2002). Equation (B.1) states formally the forward-looking welfare measure

$$CE_m^{forward} = \exp\left(\frac{U_{1,m}^r - U_{1,m}}{\phi(1 + \beta \sum_{j=2}^{J} \delta^{j-1}\pi_j)}\right) - 1, \tag{B.1}$$

where $U_{1,m}$ is the optimized lifetime utility in a status quo scenario as perceived from a perspective of an agent at age $j = 1$, and $U_{1,m}^r$ is the analog in a given reform scenario. Parameters ϕ and δ are leisure preference and time preference parameters calibrated as per Table 2. The functional form for $U_{1,m}$ is given in equations (2) and (5) for fully rational and time inconsistent agents, respectively. For brevity, we drop the time subscript t.

B.2 Backward-looking welfare measure

In this approach, welfare is measured without factoring in the time inconsistency. One interpretation of this criterion is that it represents the preferences of the consumer if she were to set a choice program before the beginning of the first life period (as if period zero existed, see for example Gruber and Koszegi, 2001). To obtain the backward-looking welfare measure, utility equation (5) for agents with time inconsistency is replaced with utility equation (2) for fully rational agents. Formally, welfare measure is obtained from:

$$CE_m^{backward} = \exp\left(\frac{\sum_{j=1}^{J} \delta^{j-1}\pi_j \left[u(c_{j,m}^r, l_{j,m}^r) - u(c_{j,m}, l_{j,m})\right]}{\phi \sum_{j=1}^{J} \delta^{j-1}\pi_j}\right) - 1, \tag{B.2}$$

where superscript r denotes reform scenarios and utility without superscripts denotes baseline scenario.

B.3 Imrohoroğlu et al. (2003) welfare measure

Following Imrohoroğlu et al. (2003), the lifetime utility of a time-inconsistent agent evaluated at age j (i.e., this is the period at which future is discounted additionally by β) is formulated as:

$$\tilde{U}_j = \sum_{s=1}^{j-1} \delta^{s-j}\pi_s u(c_s, l_s) + \pi_j u(c_j, l_j) + \beta \sum_{s=j+1}^{J} \delta^{s-j}\pi_s u(c_s, l_s). \tag{B.3}$$

The welfare measure based on this approach is formally obtained by:

$$CE^{Imrohoroglu}_{m,t} = \exp\left(\frac{\sum_{j=1}^{J}\delta^{j-1}\pi_{j,t}(\tilde{U}^r_j - \tilde{U}_j)}{\phi\sum_{j=1}^{J}\pi_j(\sum_{s=1}^{j}\delta^{s-1}\pi_s + \beta\sum_{s=j+1}^{J}\delta^{s-1}\pi_s)}\right) - 1, \tag{B.4}$$

where superscript r denotes the reform scenario, and utility without superscripts denotes the baseline scenario.

B.4 Saving regret measure

In the final steady state, for baseline, and each reform scenario, repeat the following steps:

1. obtain assets for fully rational agents at $j = \bar{J}$: $a^{FR}_{\bar{J}}$;
2. instead of actually held assets $a_{j,\bar{J}} \quad \forall m \notin FR$ assign counterfactually $a^{FR}_{\bar{J}}$ to agent $m \notin FR$ at $j = \bar{J}$ [20] and reevaluate consumption choices for $j > \bar{J}$;
3. obtain welfare measure implied by step 2 in variants described in sections E, D and B.3.

This procedure yields our proxy for saving regret, i.e., a measure of how much permanent consumption an incompletely rational agent would have given up to obtain the assets of a fully rational agent at retirement. The final step compares the measures obtained through this procedure between the baseline scenario (pensions decline to maintain pension system balance, there is no incentivized OAS instrument) and one of the government-subsidized OAS schemes.

[20] Fully rational agents have highest assets stock $\forall_{j\in(1,..,J)}$ (see figure 1 and F.1), hence action described in step 2 is equivalent to crediting asset stock of each agent m with the additional amount equal to $a^{FR}_{\bar{J}} - a_{m,\bar{J}}$.

C The main results

Admittedly, the behavioral population structure in our model is arbitrary. Hence implications at the aggregate are conditional on this structure. Indeed, a society without incompletely rational individuals will have very different macroeconomic adjustments than a society with mostly incompletely rational individuals. This section aims to illustrate the macroeconomic indicators behind the results for subcohorts rather than an evaluation of macroeconomic effects.

An economy that raises contributions in the wake of longevity between the initial steady-state (ISS) and the final steady-state (FSS) experiences lower capital growth and higher distortions than an economy that reduces pension benefits – we refer to this latter scenario as *laissez-faire*. Table C.1 reports the macroeconomic aggregates. An economy that reduces pensions experiences a rise in voluntary savings (by roughly 14 percent, column 3) even though agents with bounded rationality populate it. While the reaction of incompletely rational agents is lower than for fully rational agents, it occurs for both types of agents. The capital increase is twice as large as in the case of keeping up the pension provisions from the initial steady state and raising the contribution rate (column 2). The explanation lies in the overall strength of two opposing effects.

On the one hand, rising longevity raises voluntary savings; a decline in pensions reinforces this effect. On the other hand, rising consumption taxes increases the value of leisure relative to consumption and thus reduces incentives to work. Lower capital accumulation reduces labor productivity growth, which further reduces earned income.

Table C.1: Macroeconomic summary

		ISS	FSS				
			raise τ	reduce ρ	E-E-T	T-T-E	T-T-E flat
		(1)	(2)	(3)	(4)	(5)	(6)
pensions (replacement)	ρ/ρ_{ISS}	1.00	1.00	0.74	0.74	0.74	0.74
contributions rate (%)	τ	14.32	19.39	14.32	14.32	14.32	14.32
OAS contribution rate (%)	κ	-	-	-	5.07	5.07	5.07
consumption tax (%)	τ^c	15.00	14.94	13.42	16.81	17.31	17.75
OAS transfers per worker		-	-	-	0.0296	0.0293	0.0292
labor	$L = \sum_{j,m} \omega_j l_{j,m}$	100%	107.1%	108.1%	109.7%	109.6%	108.3%
aggregate product	Y	100%	109.6%	112.9%	118.7%	116.8%	115.4%
wages	w	100%	102.3%	104.4%	108.1%	106.6%	106.6%
income tax revenues	$\tau^l \cdot wL$	100%	109.6%	112.9%	102.9%	116.8%	115.4%
pension tax revenue	$\tau^l \cdot B$	100%	148.3%	112.8%	118.6%	116.7%	115.3%
aggregate capital	A	100%	114.6%	123.3%	139.2%	133%	131.5%
of which							
voluntary		100%	114.6%	123.3%	51.3%	56.9%	56.3%
in OAS scheme		-	-	-	87.9%	76.2%	75.2%
interest rate (%)	r	5.18	4.66	4.18	3.44	3.74	3.74
capital tax revenues	$\tau^k \cdot \sum_{j,m} \mathcal{K}_{j,m}$	100%	103.1%	99.5%	34.1%	96.1%	94.9%
aggregate gross consumption	C	100%	107.0%	107.5%	116.0%	115.8%	114.6%
consumption tax revenues	$\tau^c \cdot C$	100%	106.6%	96.1%	130.0%	133.5%	135.5%

Notes: ISS = initial steady state. FSS = final steady state. We denote subcohort by m. To infer about changes in *per worker* terms, numbers reported in rows should be divided by the respective change in aggregate labor ($L = \sum_{j,m} \omega_j l_{j,m}$). The tax and contribution rates are reported in nominal terms, except for the ratio of pension benefits, which is reported in relation to the initial steady state. Macroeconomic aggregates reported relative to the initial steady state, capital split between OAS and voluntary assets relative to the total stock of assets in the initial steady state (when all assets were voluntary assets). Consumption tax is used as fiscal closure.

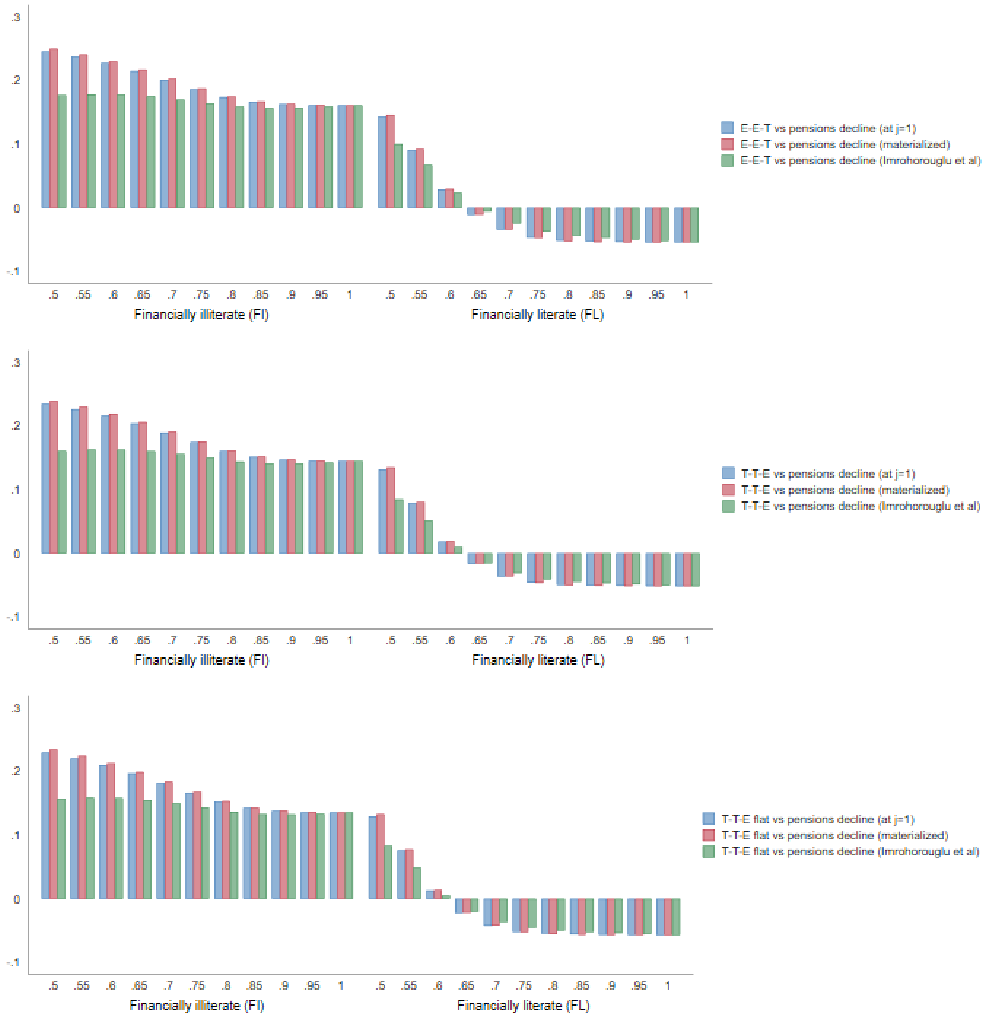
The adjustments due to inter-temporal and intra-temporal choices generate effects on wages (which rise by 4 percent in the scenario of pension decline but only 2.3 percent in the scenario of raising contributions) and the interest rate (which declines by one percentage point in the scenario of pension decline, but only about half so in the scenario of raising contributions). Indeed, when pensions are reduced, a large rise in labor supply and an increase in wages raises overall labor tax revenue. Analogously, capital income tax revenues rise. This allows the consumption tax to decline and consumption to rise, despite lower pensions in this economy.

Introducing incentivized OAS schemes in an economy with reduced pensions raises the overall capital stock by a further 7-12 percent (columns 4, 5, and 6) but with substantial crowd-out. The scope of adverse effects is the largest, and total capital accumulation is the smallest with the E-E-T scheme. The rise in the capital stock is predominantly generated by financially illiterate agents, who hold almost no voluntary savings when their experienced rate of return was zero but record positive savings throughout their lifetime in the OAS schemes. Accordingly, they smooth consumption (and labor supply) better throughout their lifetime.

A rise in overall capital accumulation in the economy permits faster wage growth, raising further incentives to work (particularly relative to the distortive scenario of raising the contributions). These two mechanisms increase tax revenues from earned income taxation. Meanwhile, the shift of assets from voluntary (taxed) assets to OAS, combined with a further decline in the interest rate, substantially reduces tax revenues from the capital income base by more than 60 percent in the case of E-E-T (column 4).[21] This decline in capital income tax revenues is the key driver of adjustments in consumption tax. Indeed, despite the rise in the labor income tax base, the incentivized OAS schemes result in a significant increase in consumption taxation in our model (from 15 percent to between 16.8 and 18 percent, that is, by 1.8 to 3 percentage points), predominantly to finance the tax incentives. Note also that labor tax revenues rise less than total payroll in the case of E-E-T.

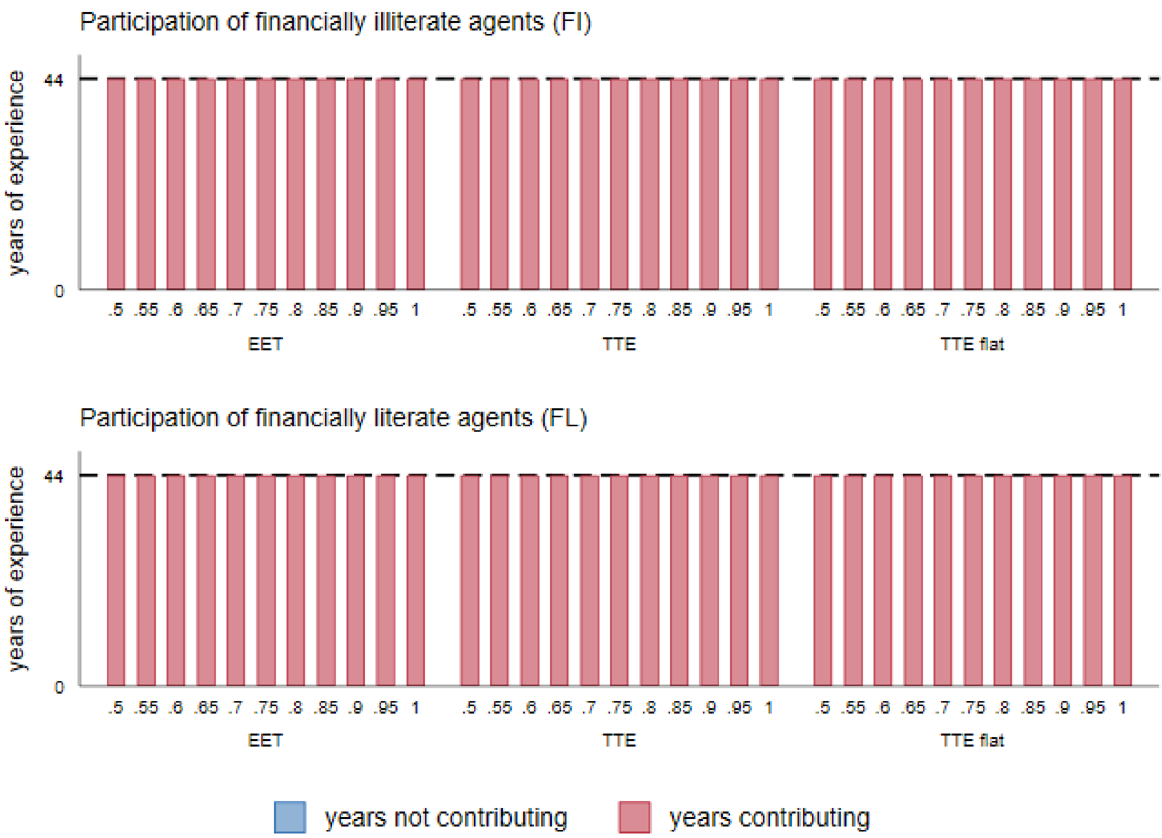
[21] Decline in capital income tax revenues in the case of both T-T-E schemes is related to the decline in the interest rates.

Figure C.1: Welfare effects of the reform – comparison of welfare measures



Note: In this figure, we portray welfare expressed as consumption equivalent in percent of lifetime consumption across behaviorally heterogeneous groups. The comparison scenario for each reported result is a reduction in pension benefits such that the pension system is balanced despite the increase in longevity. The orange bars denote the scenario of raising the pension benefit contributions to keep pension levels constant while maintaining the pension system in balance. The E-E-T and two T-T-E instruments have contribution rates of the same magnitude as necessitated by the scenario of raised pension contributions. The size of fiscal incentives to the three incentivized OAS instruments is such that the total fiscal expenditure on tax incentives are equivalent across scenarios in terms of share in GDP.

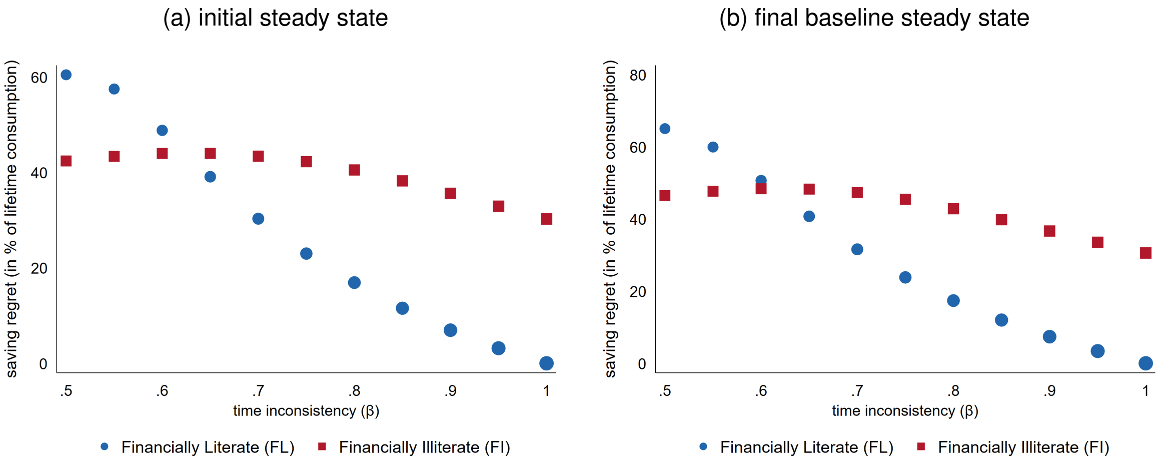
Figure C.2: Participation in incentivized OAS schemes, $\alpha = 33\%$



Note: The blue part of a bar denotes the working period ages in which the agent is not participating in an OAS scheme. Switch from a blue bar to a red bar signifies the age at which agents decide to enroll. When the bar is only blue, a given type of agent never participates in a given OAS scheme. When the bar is only red, a given type of agent contributes to a given OAS scheme throughout the working period. Participation decision is endogenous in the model. At each age j, agents compare subsequent lifetime utility, depending on their individual decision to participate. These decisions are aggregated, fiscal costs are imposed, and in the next iteration, agents reevaluate if they prefer their decision from the previous iteration or if they want to change. If the agent participates at age j, then the agent also participates for all ages above j until $\bar{J}$, i.e., agents are allowed to postpone participation but are not allowed to exit the instrument (participation decision is irrevocable within an iteration). The algorithm stops when the agents' decision from the subsequent iteration no longer differs from the previous iteration.

D Welfare effects: backward-looking metric

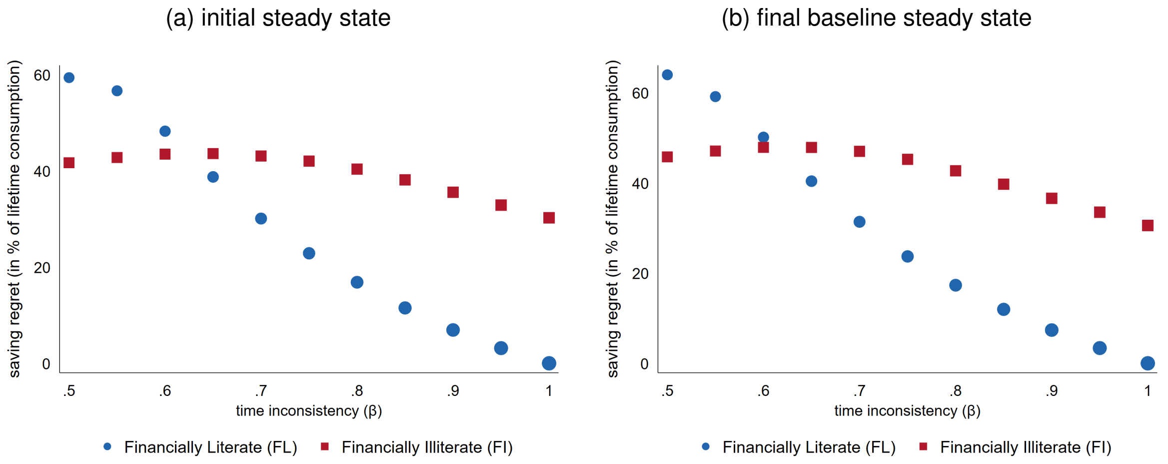
Figure D.1: Saving regret, backward-looking measure, $\alpha = 33\%$



Note: saving regret computed following the procedure described in Appendix B.4. Saving regret expressed in consumption equivalent terms (% of lifetime consumption). The baseline scenario assumes pension decline to maintain pension system balance.

E Welfare effects: forward-looking metric

Figure E.1: Saving regret, forward-looking measure



Note: saving regret computed following the procedure described in Appendix B.4. Saving regret expressed in consumption equivalent terms (% of lifetime consumption). The baseline scenario assumes pension decline to maintain pension system balance.

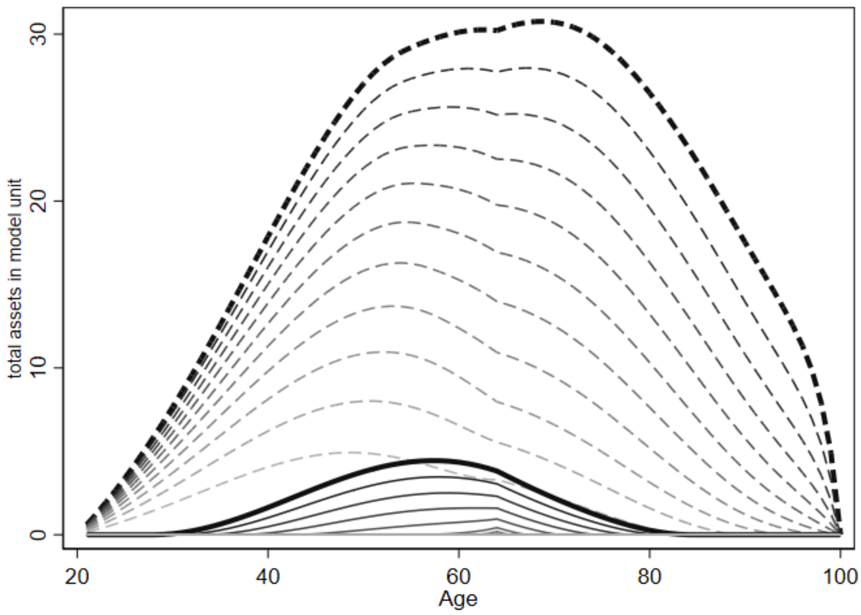
F Sensitivity: lower labor share ($\alpha = 45\%$)

Table F.1: Calibration of the macroeconomic parameters for $\alpha = 45\%$

Parameter		Value	Data source		Data target	Model (annuitization) none	full
			Macroeconomy				
Depreciation	d	0.0296	National accounts	investment rate	20.00%	20.00%	21.67%
Leisure preference	ϕ	0.3175	OECD	hours worked	35.00%	35.00%	36.46%
Time preference	δ	1.0165	-	interest rate	6.00%	6.00%	5.30%
Taxes & government							
Consumption	τ^c	0.1500	OECD	$\tau^c \cdot \mathcal{C}/Y$	9.18%	9.18%	8.93%
Labor income	τ^l	0.1045	OECD	$\tau^l \cdot wL/Y$	6.75%	6.75%	6.75%
Capital income	τ^k	0.1303	OECD	$\tau^k \cdot r\mathcal{K}/Y$	4.47%	4.47%	4.24%
Contribution rate	τ	0.1745	-	$subsidy/Y$	0%	0%	0.01%
Replacement rate	ρ	0.0097	AWG 2018	B/Y	9.60%	9.60%	9.60%
Gov't expenditure		0.1882	National accounts	G/Y	18.82%	18.82%	18.82%

Note: This table is analogous to Table 2 in the main text. The only difference is the calibration of the capital share in the economy. In an economy calibrated with $\alpha = 45\%$, the average replacement rate defined as a ratio of lifetime average gross labor income and pension benefit amounts to 56.5%. This figure differs significantly from the replacement rate reported by (OECD, 2018), i.e. 38%, as well as from the replacement rate obtained in a calibration where $\alpha = 33\%$, i.e., 34.8% The interest rate reported in Table 2 is r as per equation (16). In the model with full annuitization on top of the interest rate, r_t, financially literate agents get annuity premium, $\mu_{j,t}$. This renders the net interest rate faced by financially literate agents age-specific.

Figure F.1: Assets: private voluntary savings in initial steady state - calibration for $\alpha = 45\%$



Note: figure portrays baseline profiles of asset accumulation across various types of agents. Dashed lines are used for financially literate agents. Solid lines are used for financially illiterate agents. Darker shades of gray signify β parameter closer to 1 (i.e., lower extent of time inconsistency). Thick black lines denote agents with $\beta = 1$ for reference.

Figure F.2: Saving regret, welfare in the spirit of Imrohoroğlu et al. (2003), $\alpha = 45\%$

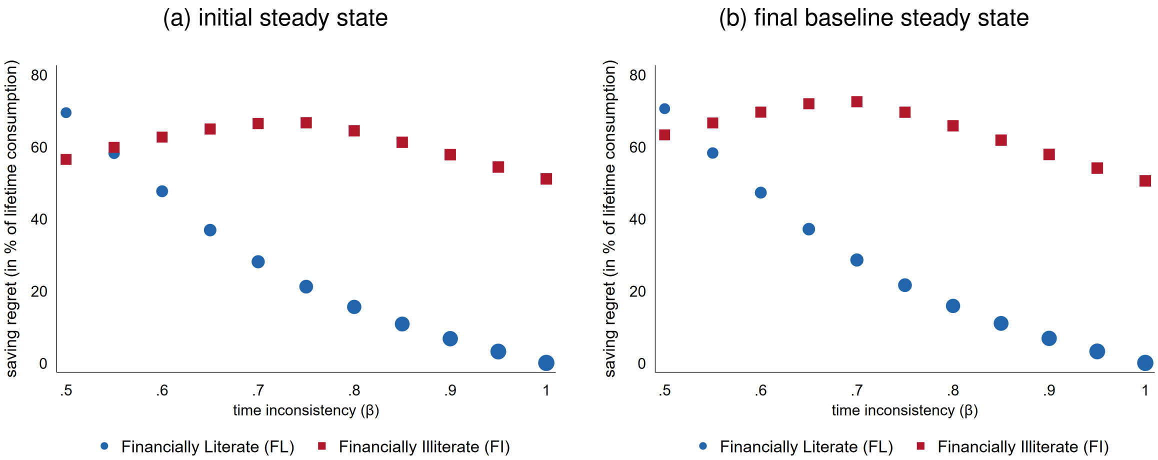


Figure F.3: Saving regret, backward-looking measure, $\alpha = 45\%$

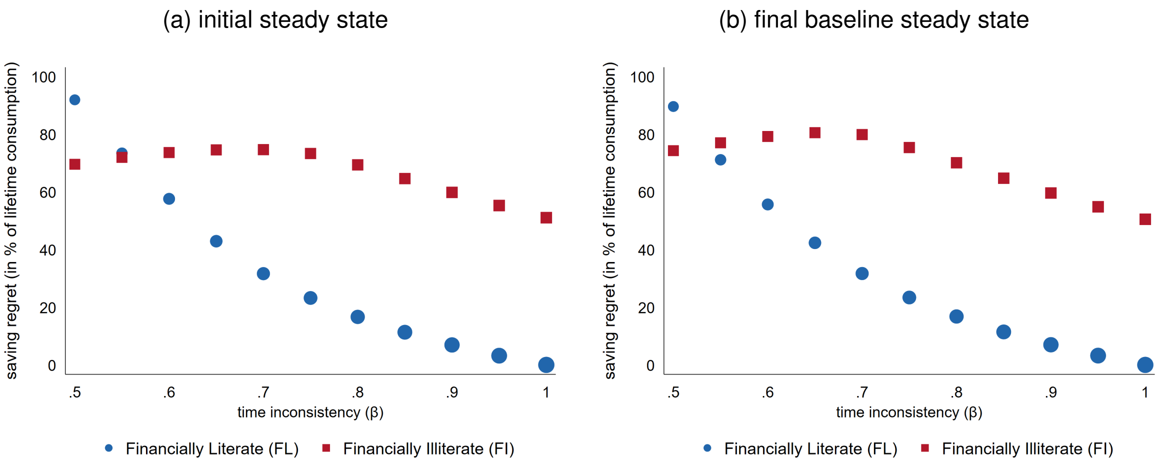
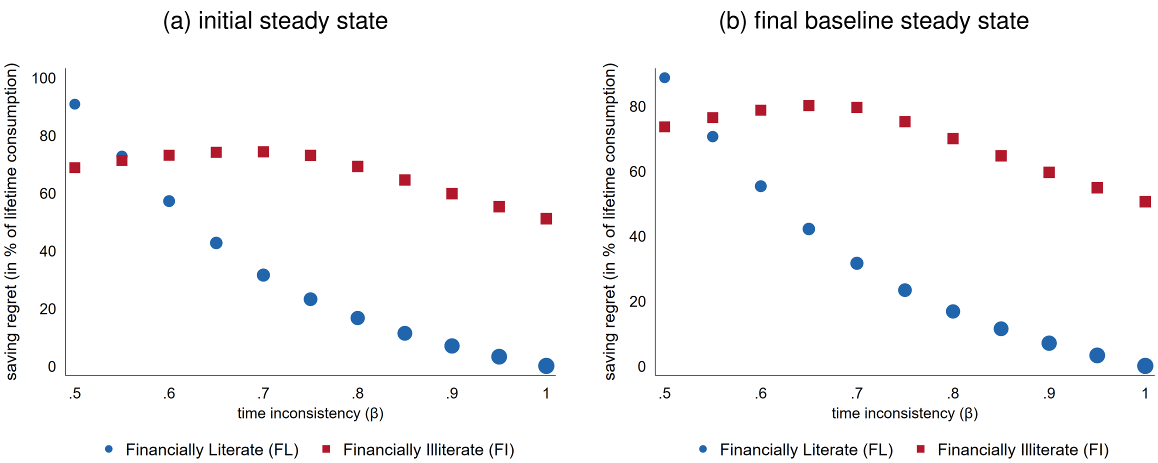


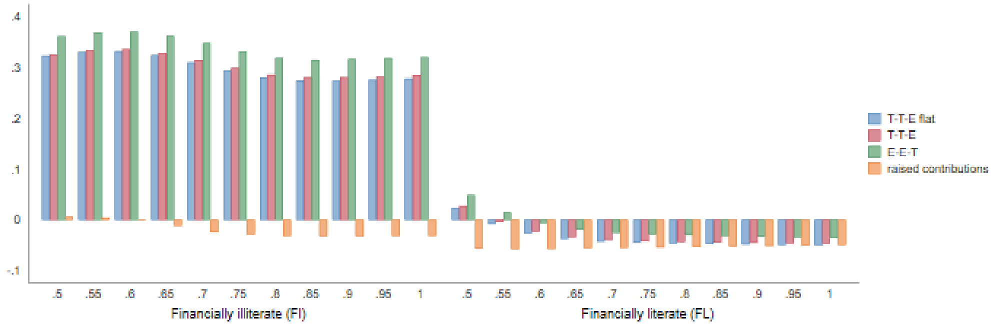
Figure F.4: Saving regret, forward-looking measure, $\alpha = 45\%$



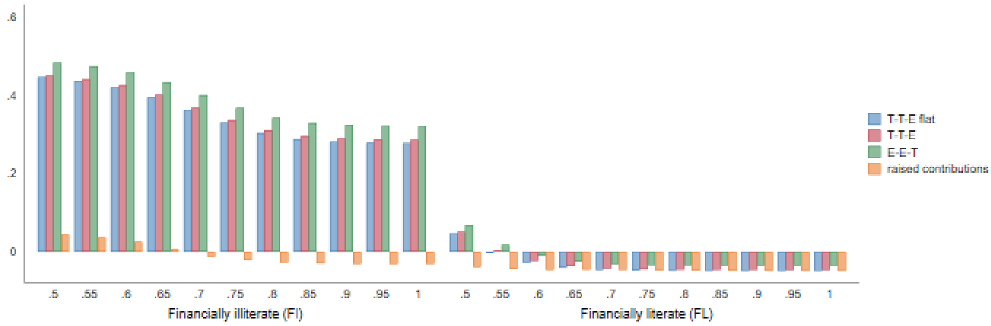
Note: saving regret computed following the procedure described in Appendix B.4. Saving regret expressed in consumption equivalent terms (% of lifetime consumption). The baseline scenario assumes pension decline to maintain pension system balance.

Figure F.6: Welfare effects of the reform – for $\alpha = 45\%$

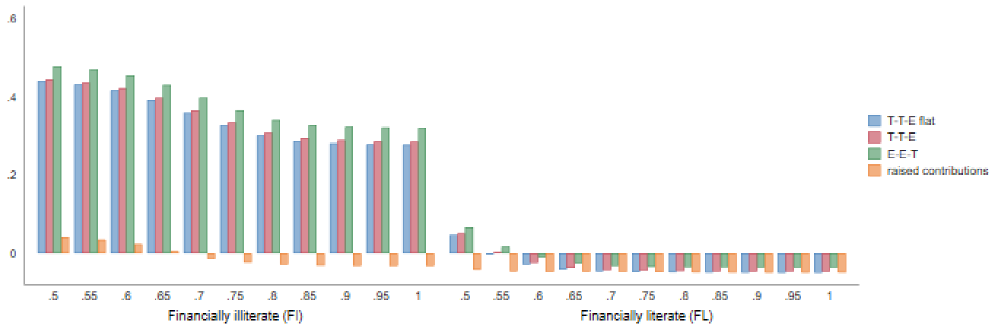
(a) Imrohoroğlu et al. (2003)



(b) backward-looking

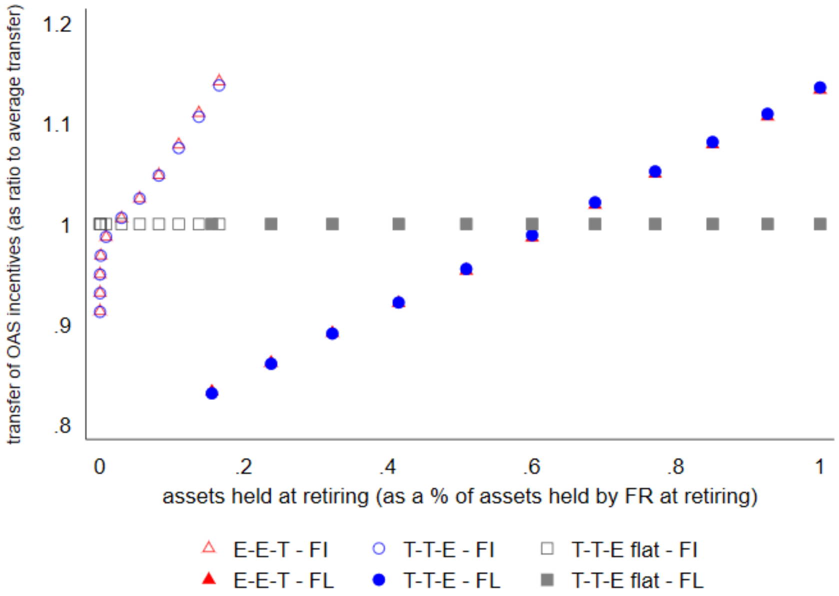


(c) forward-looking



Note: see Figure 7.

Figure F.7: Transfers for OAS incentives – re-calibration for $\alpha = 45\%$



Note: see Figure 5. The transfers are a similar ratio to the average transfer for E-E-T and T-T-E under the current calibration, but they are not identical.

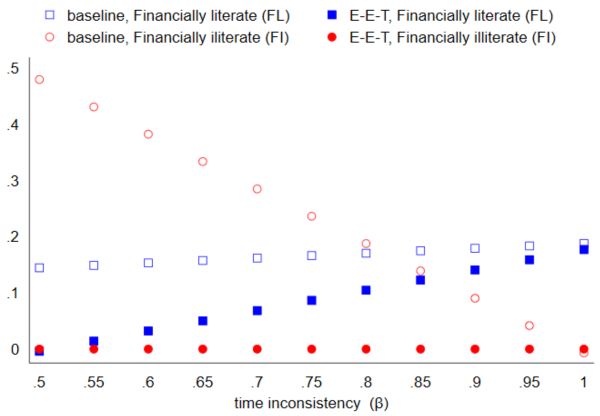
Table F.2: Macroeconomic summary – for $\alpha = 0.45$

		ISS	FSS				
			raise τ	reduce ρ	E-E-T	T-T-E	T-T-E flat
		(1)	(2)	(3)	(4)	(5)	(6)
pensions (replacement)	ρ/ρ_{ISS}	1.00	1.00	0.74	0.74	0.74	0.74
contributions rate (%)	τ	17.45	23.67	17.45	17.45	17.45	17.45
OAS contribution rate (%)	κ	-	-	-	6.22	6.22	6.22
consumption tax (%)	τ^c	15.00	12.86	9.68	12.56	13.4	13.67
OAS transfers per worker		-	-	-	0.045	0.0443	0.0443
labor	$L = \sum_{j,m} \omega_j l_{j,m}$	100%	109.7%	110.9%	114%	113.8%	112.9%
aggregate product	Y	100%	114.7%	121%	130.2%	127.4%	126.5%
wages	w	100%	104.5%	109.2%	114.2%	112%	112%
income tax revenues	$\tau^l \cdot wL$	100%	114.7%	121%	112.9%	127.4%	126.5%
pension tax revenue	$\tau^l \cdot B$	100%	155.6%	121.0%	130.1%	127.3%	126.4%
aggregate capital	A	100%	121.1%	134.7%	153.2%	146.3%	145.3%
of which							
voluntary		100%	121.1%	134.7%	88.7%	89.2%	88.7%
in OAS scheme		-	-	-	64.5%	57.1%	56.7%
interest rate (%)	r	5.31	4.87	4.47	4.07	4.24	4.24
capital tax revenues	$\tau^k \cdot \sum_{j,m} \mathcal{K}$	100%	111.1%	113.4%	68%	116.9%	116%
aggregate gross consumption	C	100%	110.5%	112%	124.2%	123.2%	122.4%
consumption tax revenues	$\tau^c \cdot C$	100%	94.7%	72.2%	104%	110%	111.5%

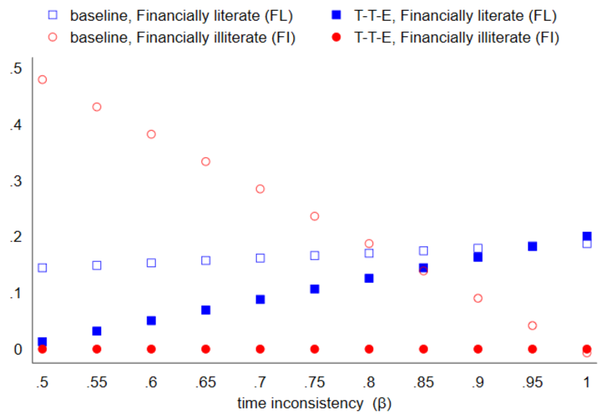
Note: ISS = Initial Steady State. FSS = Final Steady State. This table reports results analogous to Table C.1, with the main difference that $\alpha = 0.45$ rather than the basic calibration of $\alpha = 0.33$.

Figure F.8: Age-adjusted incidence of poverty – for $\alpha = 45\%$

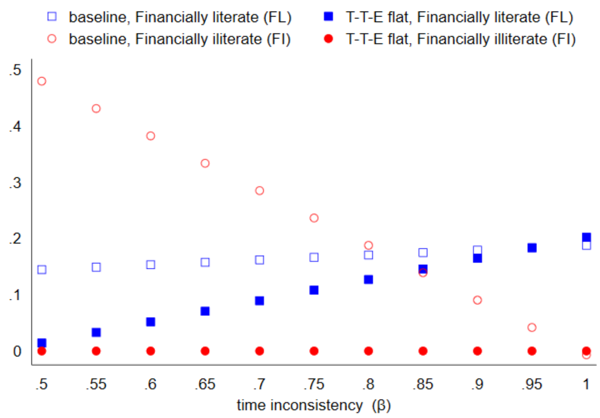
(a) E-E-T



(b) T-T-E



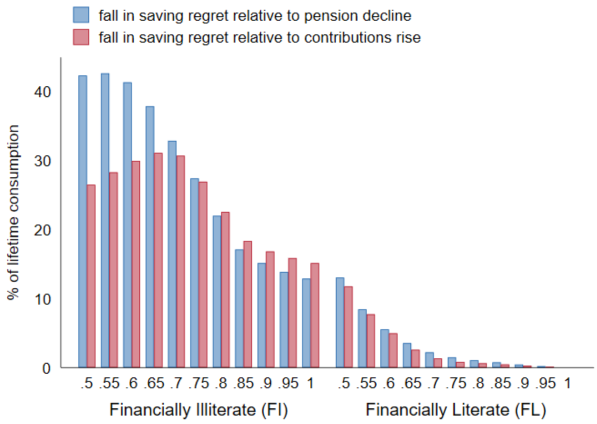
(c) T-T-E flat



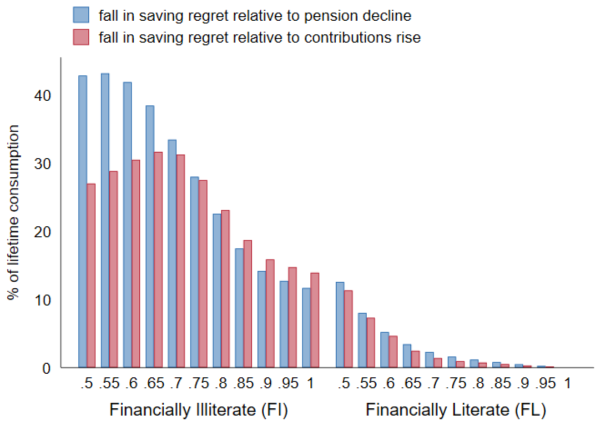
Note: see Figure 3.

Figure F.9: Decline in saving regret due to OASs – for $\alpha = 45\%$

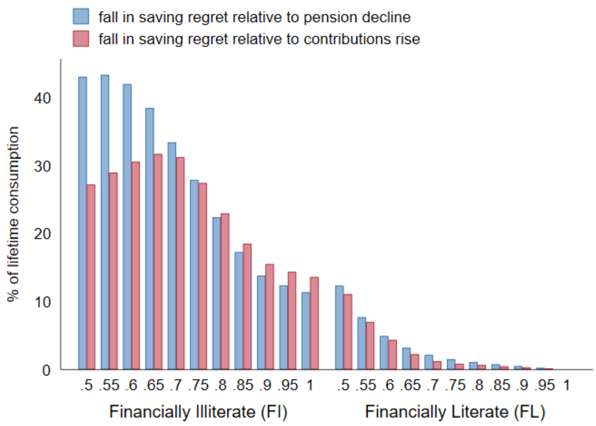
(a) E-E-T



(b) T-T-E

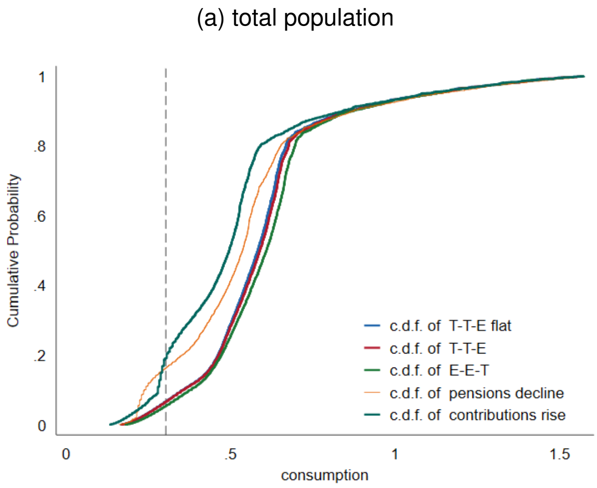


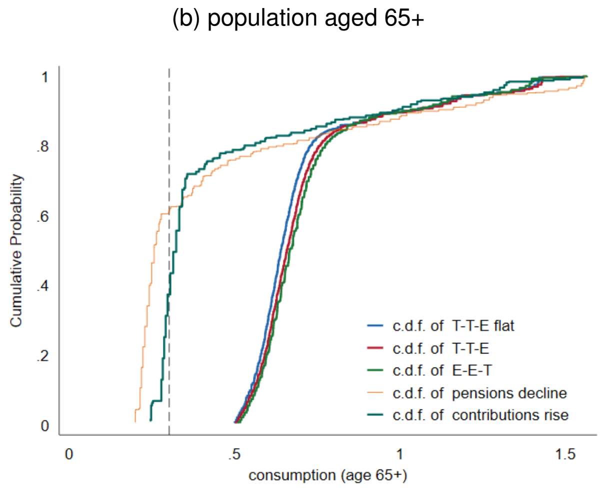
(c) T-T-E flat



Note: see Figure 6

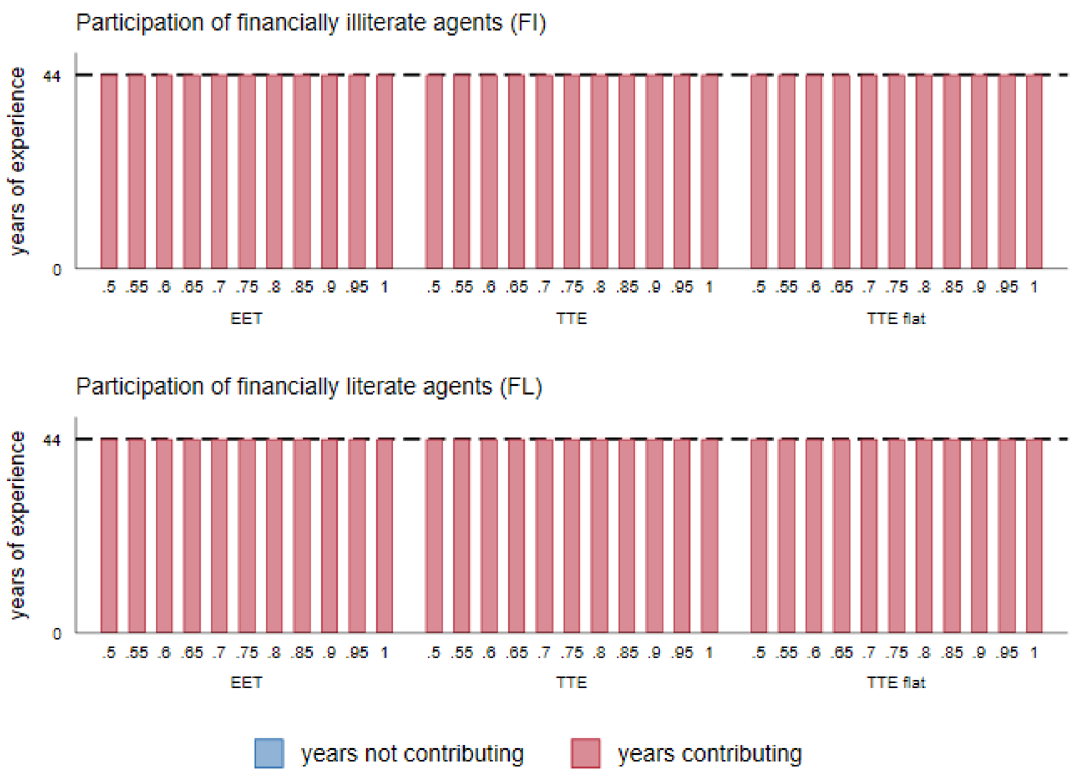
Figure F.10: Poverty – for $\alpha = 45\%$





Note: see Figure 4.

Figure F.11: Participation in incentivized OAS schemes – for $\alpha = 45\%$



Note: see Figure C.2.

G Sensitivity: higher productivity growth ($\gamma_{FSS} = 1.54\%$)

Table G.1: Macroeconomic summary – γ growing between ISS and FSS

		ISS	FSS				
			raise τ	reduce ρ	E-E-T	T-T-E	T-T-E flat
		(1)	(2)	(3)	(4)	(5)	(6)
pensions (replacement)	ρ/ρ_{ISS}	1.00	1.00	0.74	0.74	0.74	0.74
contributions rate (%)	τ	14.32	19.39	14.32	14.32	14.32	14.32
OAS contribution rate (%)	κ	-	-	-	5.07	5.07	5.07
consumption tax (%)	τ^c	15.00	16.13	14.64	17.95	18.51	19.06
OAS transfers per worker		-	-	-	0.0334	0.0329	0.0329
labor	$L = \sum_{j,m} \omega_j l_{j,m}$	100%	106.5%	107.5%	109.5%	109.4%	107.8%
aggregate product	Y	100%	106.1%	109.1%	115.3%	113.4%	111.8%
wages	w	100%	99.6%	101.5%	105.3%	103.7%	103.7%
income tax revenues	$\tau^l \cdot wL$	100%	106.1%	109.1%	100%	113.4%	111.8%
pension tax revenue	$\tau^l \cdot B$	100%	143.5%	109.0%	115.2%	113.3%	111.7%
aggregate capital	A	100%	105.1%	112.5%	128.2%	122.1%	120.4%
of which							
voluntary		100%	105.1%	112.5%	42.4%	49.4%	48.8%
in OAS scheme		-	-	-	85.7%	72.7%	71.6%
interest rate (%)	r	5.18	5.28	4.82	4	4.34	4.34
capital tax revenues	$\tau^k \cdot \sum_{j,m} \mathcal{K}$	100%	107.3%	104.7%	32.6%	102.3%	100.8%
aggregate gross consumption	C	100%	103.4%	103.9%	112.7%	112.5%	111.2%
consumption tax revenues	$\tau^c \cdot C$	100%	111.2%	101.3%	134.8%	138.8%	141.3%

Note: ISS = Initial Steady State. FSS = Final Steady State. This table reports results analogous to Table C.1, with the main difference that $\gamma_{ISS} = 1.01\% \neq \gamma_{FSS} = 1.54\%$.

Figure G.1: Saving regret, welfare in the spirit of Imrohoroğlu et al. (2003), $\gamma_{FSS} = 1.54\%$

(a) initial steady state (b) final baseline steady state

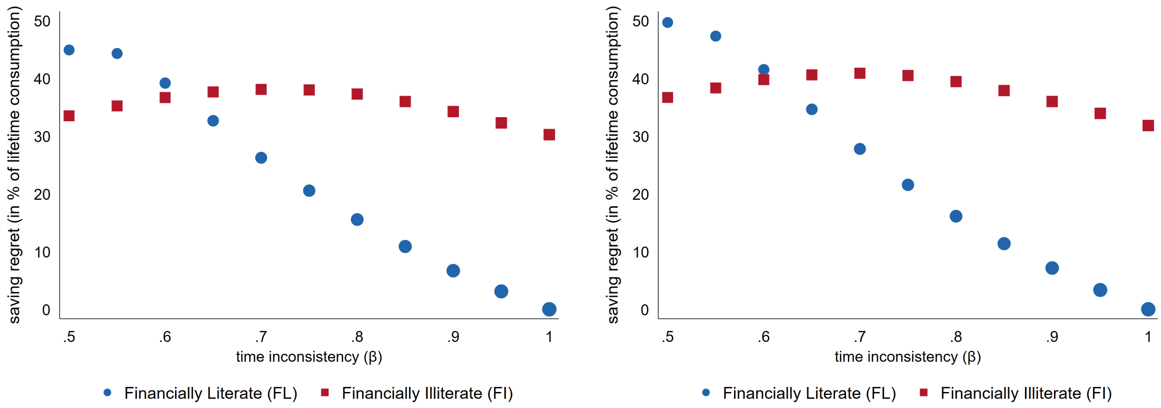


Figure G.2: Saving regret, backward-looking measure, $\gamma_{FSS} = 1.54\%$

(a) initial steady state (b) final baseline steady state

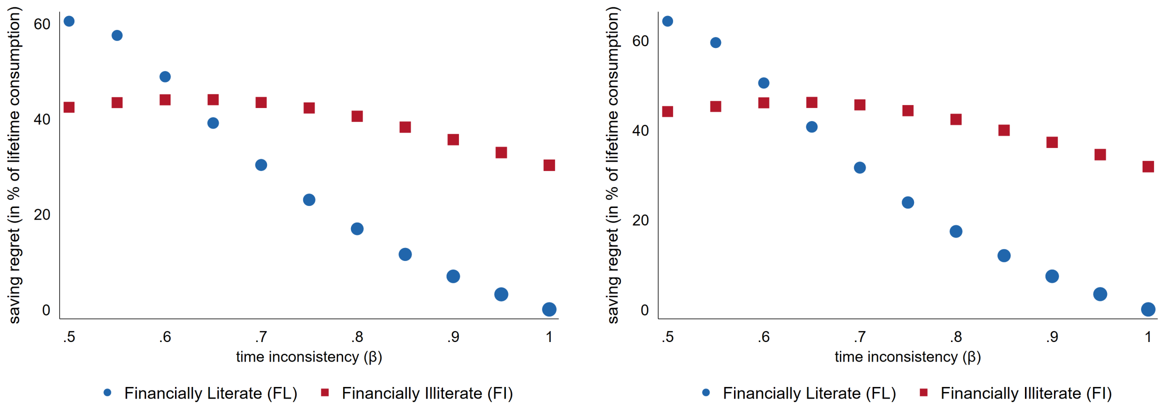
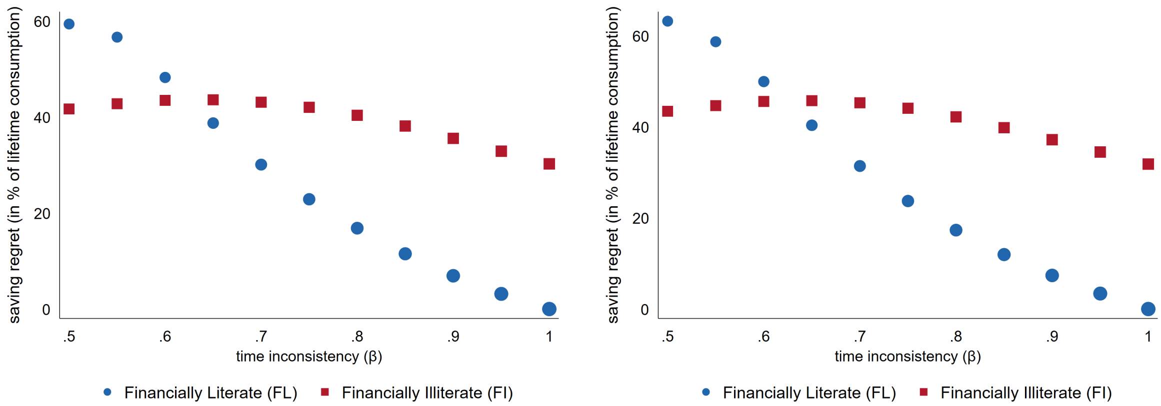


Figure G.3: Saving regret, forward-looking measure, $\gamma_{FSS} = 1.54\%$

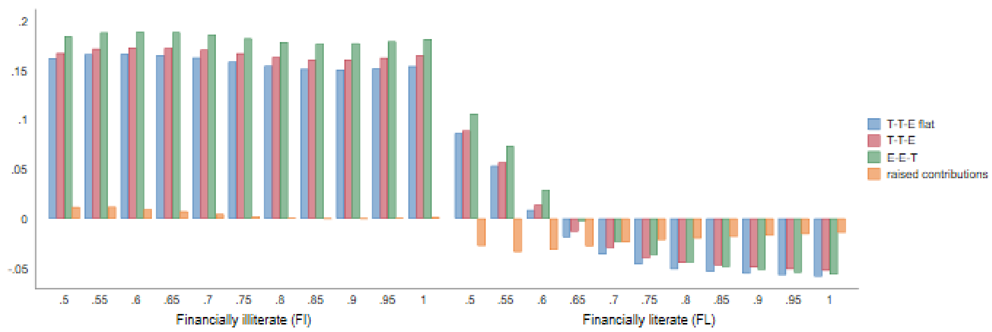
(a) initial steady state (b) final baseline steady state



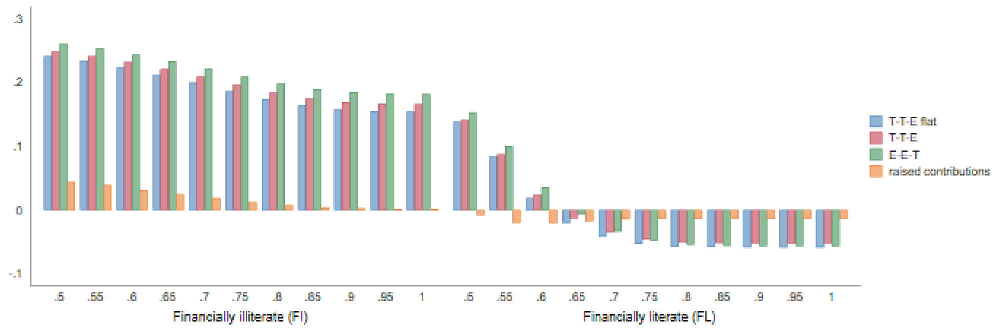
Note: saving regret computed following the procedure described in Appendix B.4. Saving regret expressed in consumption equivalent terms (% of lifetime consumption). The baseline scenario assumes pension decline to maintain pension system balance in the final steady state.

Figure G.5: Welfare effects of the reform – TFP increase ($\gamma_{FSS} = 1.54\%$)

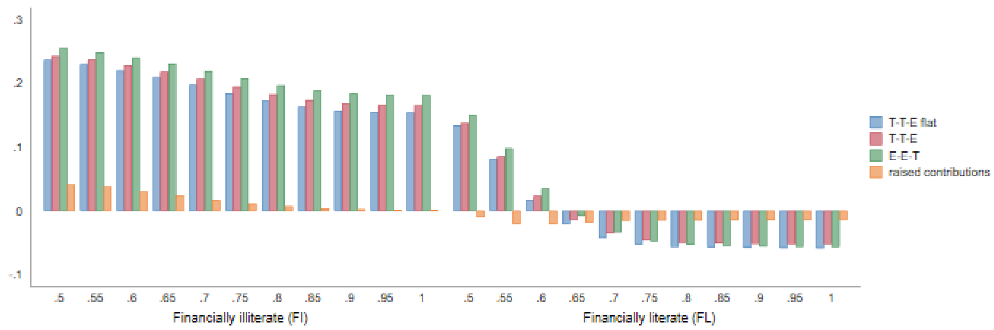
(a) Imrohoroğlu et al. (2003)



(b) backward-looking

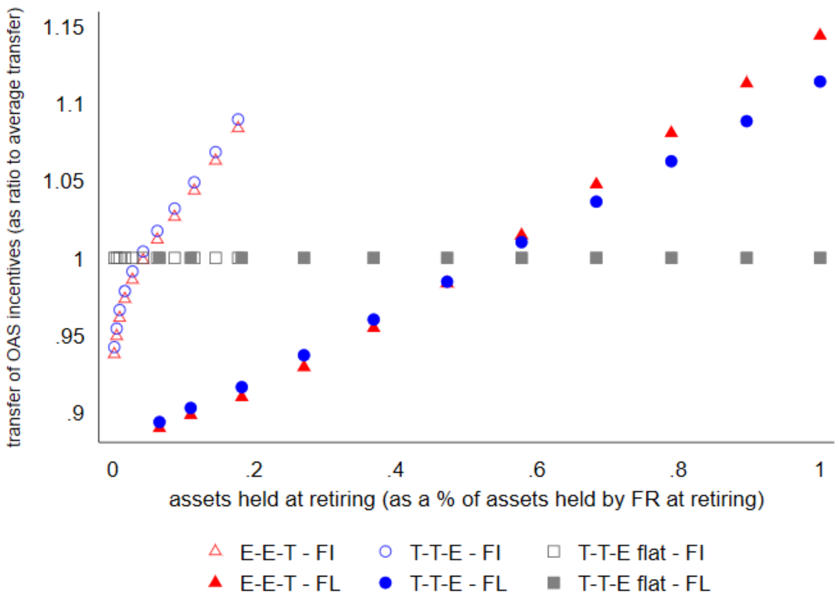


(c) forward-looking



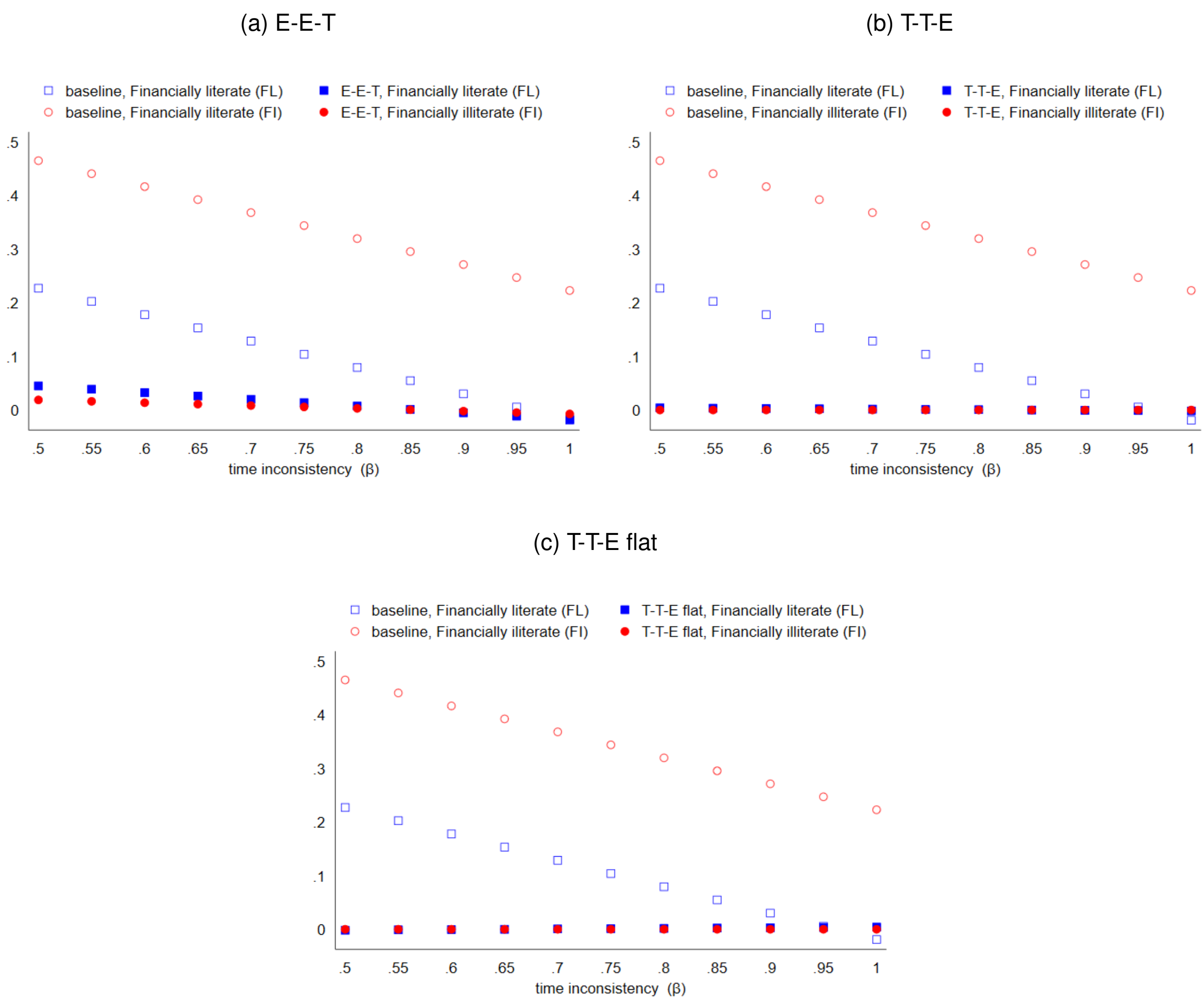
Note: see Figure 7.

Figure G.6: Transfers for OAS incentives – TFP increase ($\gamma_{FSS} = 1.54\%$)



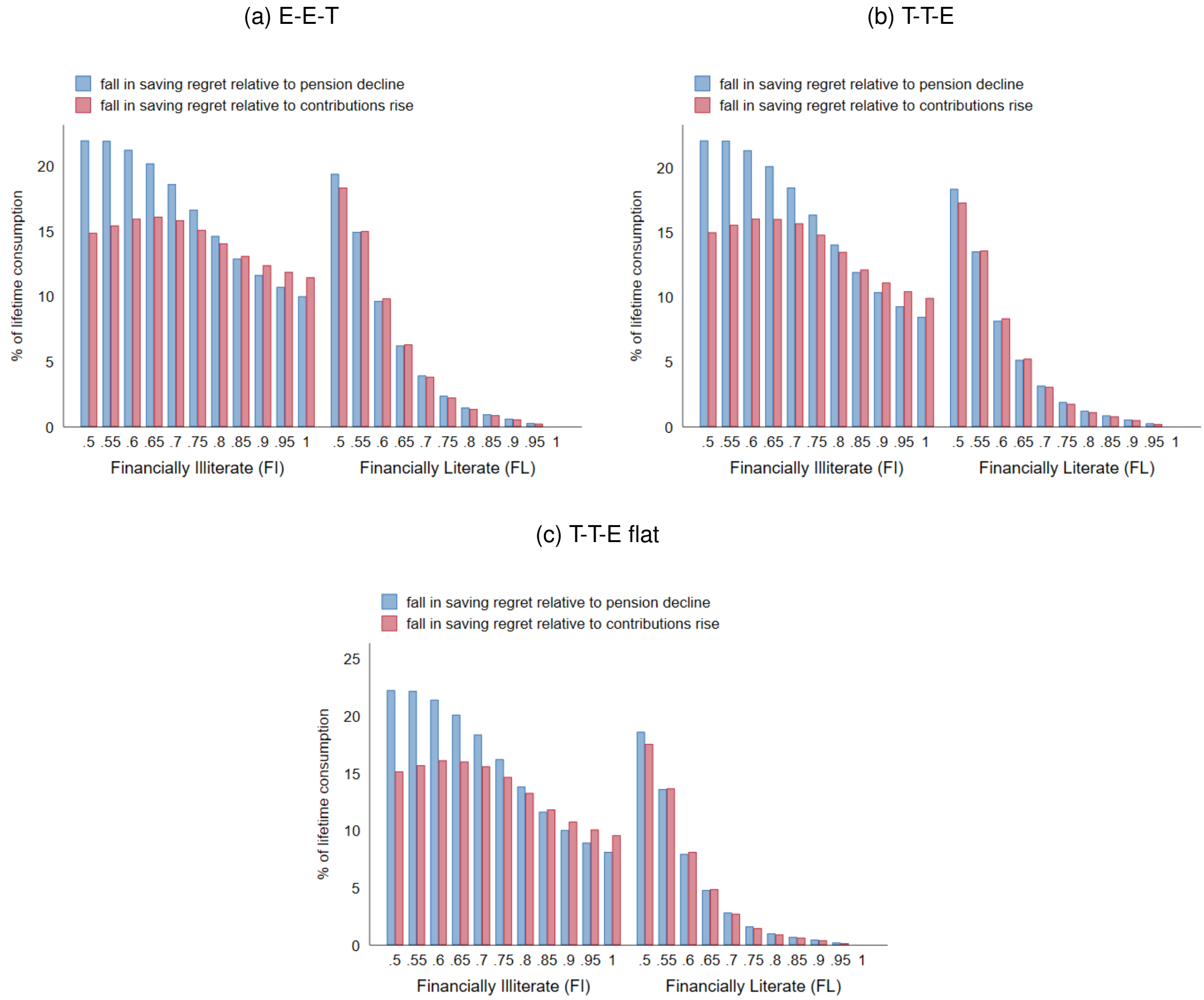
Note: see Figure 5.

Figure G.7: Age-adjusted incidence of poverty – TFP increase ($\gamma_{FSS} = 1.54\%$)



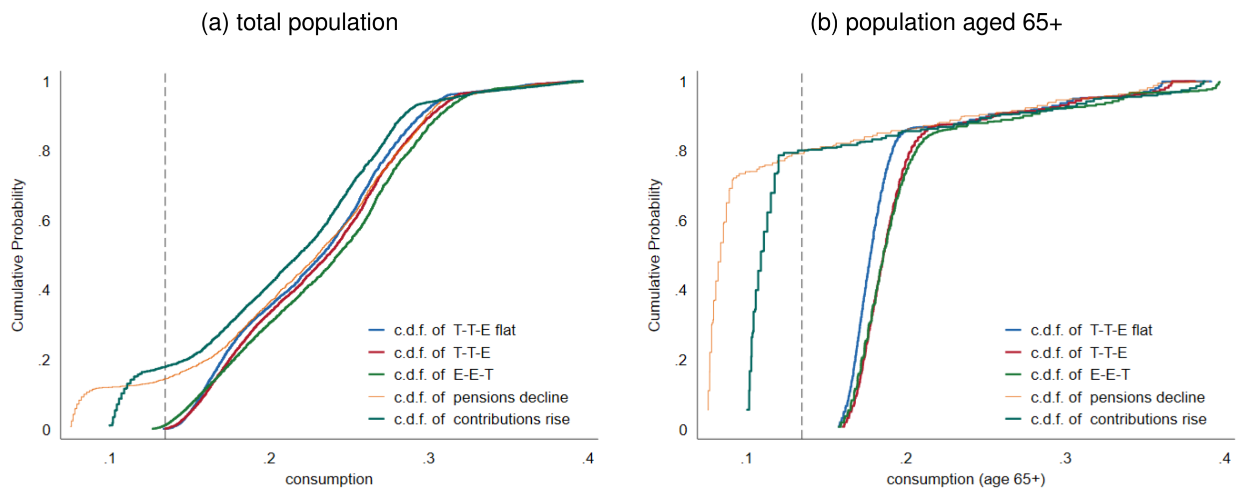
Note: see Figure 3.

Figure G.8: Saving regret – TFP increase ($\gamma_{FSS} = 1.54\%$)



Note: see Figure 6

Figure G.9: Poverty – TFP increase ($\gamma_{FSS} = 1.54\%$)



Note: see Figure 4.

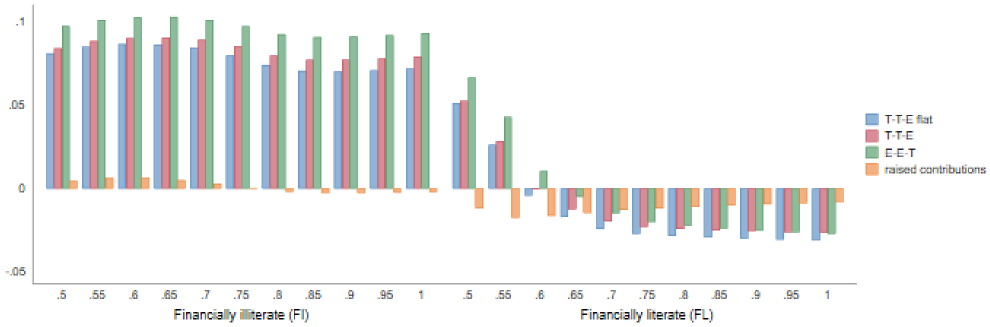
Figure G.10: Participation in incentivized OAS schemes – TFP increase ($\gamma_{FSS} = 1.54\%$)

Note: see Figure C.2.

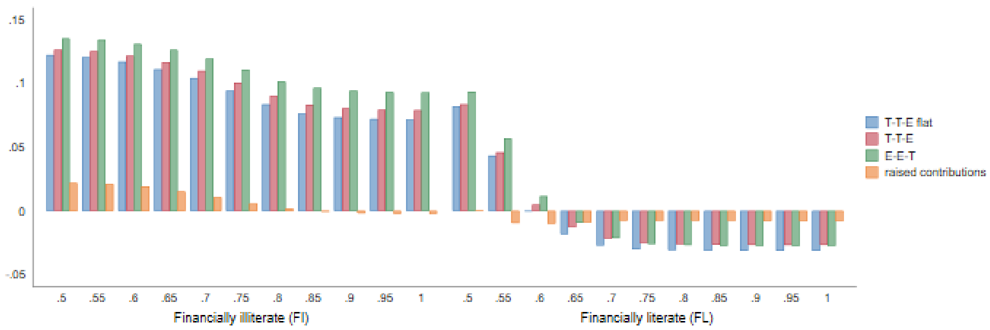
H Sensitivity: higher pension eligibility age ($\bar{J}_{FSS} = \bar{J}_{ISS} + 3$)

Figure H.1: Welfare effects of the reform – rise in retirement eligiblity age

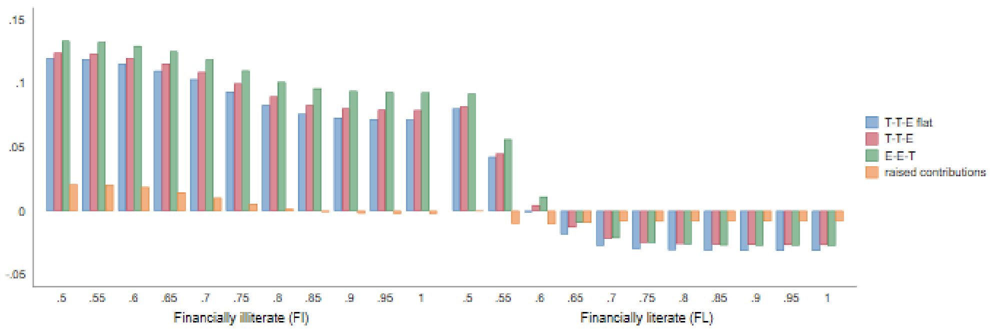
(a) Imrohoroğlu et al. (2003)



(b) backward-looking

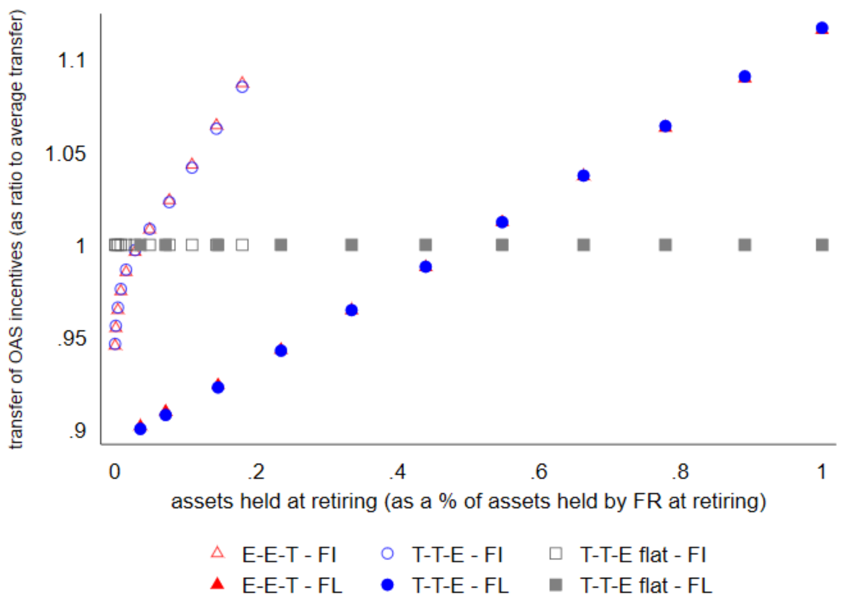


(c) forward-looking



Note: see Figure 7.

Figure H.2: Transfers for OAS incentives – rise in retirement eligiblity age



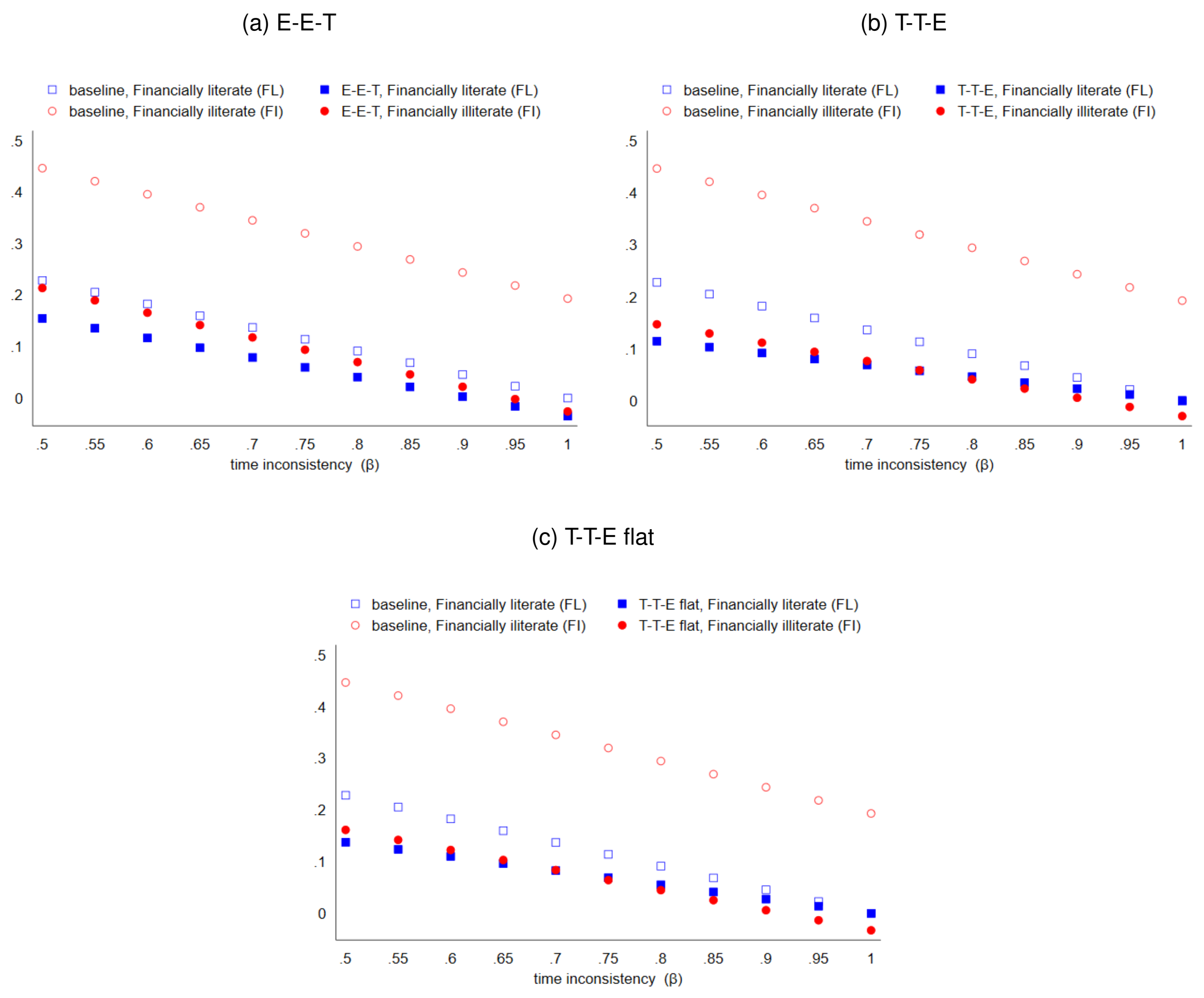
Note: see Figure 5. The transfers are a similar ratio to the average transfer for E-E-T and T-T-E under the current calibration, but they are not identical.

Table H.1: Macroeconomic summary – rise in retirement eligiblity age

		ISS	FSS				
			raise τ	reduce ρ	E-E-T	T-T-E	T-T-E flat
		(1)	(2)	(3)	(4)	(5)	(6)
pensions (replacement)	ρ/ρ_{ISS}	1.00	1.00	0.84	0.84	0.84	0.84
contributions rate (%)	τ	14.32	17.13	14.32	14.32	14.32	14.32
OAS contribution rate (%)	κ	-	-	-	2.13	2.13	2.13
consumption tax (%)	τ^c	15.00	14.81	14.08	16.45	16.9	17.28
OAS transfers per worker		-	-	-	0.0234	0.0231	0.0231
labor	$L = \sum_{j,m} \omega_j l_{j,m}$	100%	108.9%	109.4%	110.7%	110.5%	109.4%
aggregate product	Y	100%	111.5%	113.2%	116.5%	115.1%	113.9%
wages	w	100%	102.4%	103.5%	105.2%	104.2%	104.2%
income tax revenues	$\tau^l \cdot wL$	100%	111.5%	113.2%	101%	115.1%	113.9%
pension tax revenue	$\tau^l \cdot B$	100%	133.3%	113.1%	116.4%	115%	113.8%
aggregate capital	A	100%	116.9%	121.3%	129%	125%	123.8%
of which							
voluntary		100%	116.9%	121.3%	85%	89.1%	88.3%
in OAS scheme		-	-	-	44%	36%	35.6%
interest rate (%)	r	5.18	4.63	4.39	4.03	4.24	4.23
capital tax revenues	$\tau^k \cdot \sum_{j,m} \mathcal{K}$	100%	104.6%	102.8%	66.2%	102.3%	101.2%
aggregate gross consumption	C	100%	109.3%	109.6%	115.4%	115.1%	114.2%
consumption tax revenues	$\tau^c \cdot C$	100%	107.9%	102.8%	126.6%	129.7%	131.5%

Note: ISS = Initial Steady State. FSS = Final Steady State. This table reports results analogous to Table C.1, with the main difference that $\bar{J}_{FSS} = \bar{J}_{ISS} + 3$.

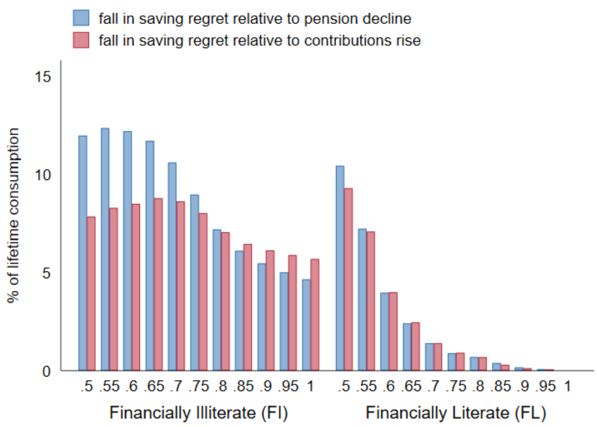
Figure H.3: Age-adjusted incidence of poverty – rise in retirement eligiblity age



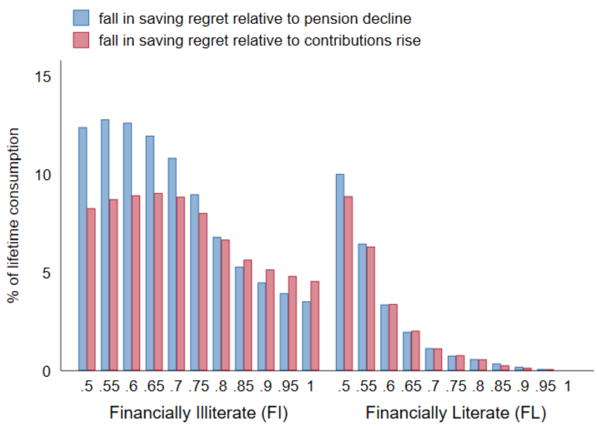
Note: see Figure 3.

Figure H.4: Saving regret – rise in retirement eligiblity age

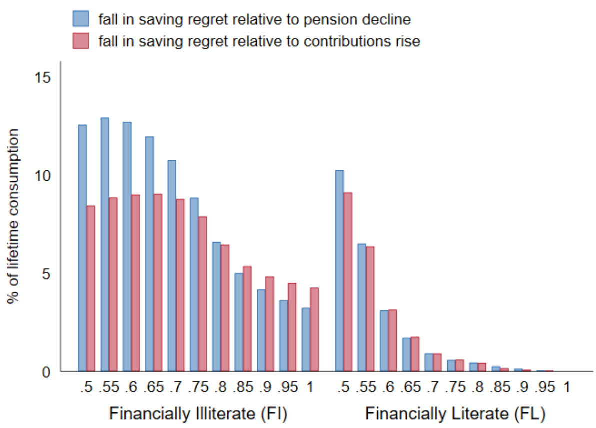
(a) E-E-T



(b) T-T-E



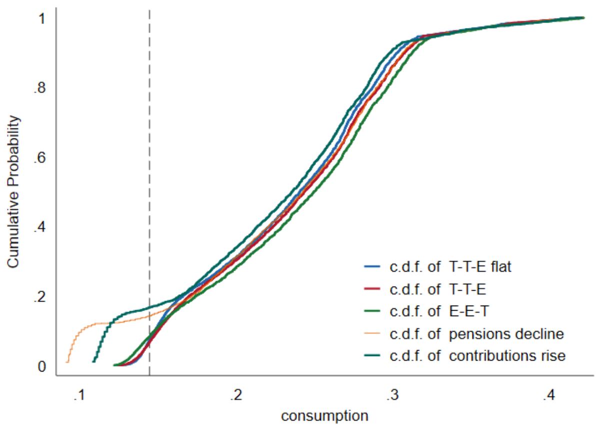
(c) T-T-E flat



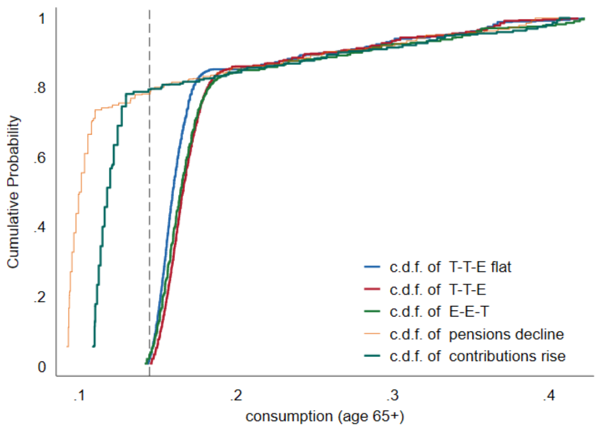
Note: see Figure 6

Figure H.5: Poverty – rise in retirement eligiblity age

(a) total population

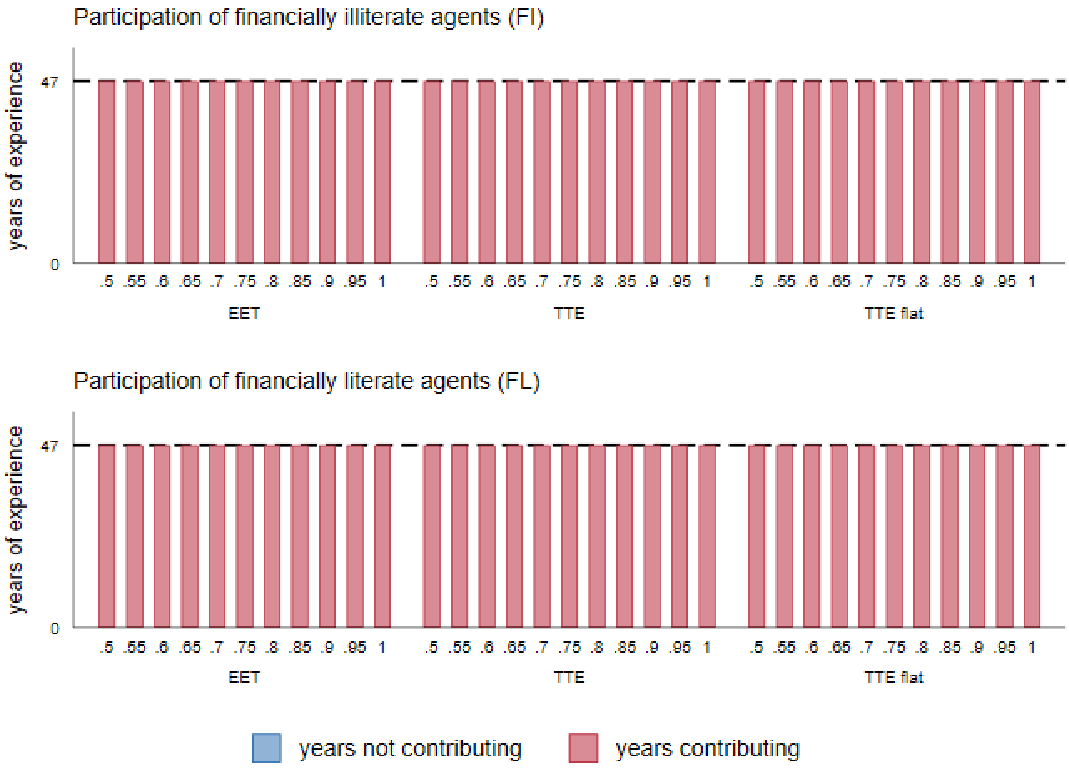


(b) population aged 65+



Note: see Figure 4.

Figure H.6: Participation in incentivized OAS schemes – rise in retirement eligiblity age



Note: see Figure C.2.