

# Welfare Gains of Automatic IRAs When Consumers Have Short Planning Horizons

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## Abstract

We show the welfare gain of automatic enrollment in individual retirement accounts (IRAs) can be large if consumers use short-planning horizons. Five U.S. states currently require employers who do not offer retirement benefits to automatically enroll employees in IRAs, and several other states are considering similar legislation. Using the short-planning horizon behavioral life-cycle model, we show the welfare gain of this policy to be equivalent to about 8% of lifetime consumption for an individual using a fixed, short planning horizon of five years who is automatically enrolled in an IRA with a 3% contribution rate. The welfare gain is larger for a 5% contribution rate and is also larger if the individual uses a shorter planning horizon. The welfare gain is still positive for a planning horizon of 15 years.

**Keywords:** Short planning horizons, Time-inconsistent preferences, Dynamic optimization, Life-cycle consumption, Dynamic welfare analysis

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# 1 Introduction

Automatic enrollment in Individual Retirement Accounts (IRAs) is gaining popularity in the United States. Several states require employers who do not offer retirement benefits to auto-enroll employees into IRAs. Many other states and local governments are considering similar legislation.<sup>1</sup>

Auto-enrollment in IRAs has the potential to increase consumer welfare by changing the default contribution rate and increasing lifetime savings. The default rates range from 3-5% in the states who have started programs. Preliminary data from the OregonSaves program shows a majority of employees provided access to the program are participating and the average contribution rate is about 5% (Chalmers et al. (2019)). Empirical evidence from other settings suggests that many households respond to defaults in making savings decisions (Beshears et al. (2016) and Chetty et al. (2014).) Automatic enrollment could raise the overall saving rate of households—so long as they do not offset increased saving in IRAs with decreased saving or increased borrowing in other assets.

We calculate the welfare effect of auto-enrollment into an IRA in a model with short-sighted, or myopic, consumers. We show the welfare gain of automatically contributing 3% to the IRA is equivalent to 8.7% of lifetime consumption for consumers who use a five-year planning horizon. The welfare gain is larger for a 5% contribution rate and larger when consumers use a shorter planning horizon. We calculate the welfare effect assuming that consumers stay in the program after they are automatically enrolled. We focus on the role of automatic saving on life-cycle consumption while abstracting away from the decision to opt-out of the program.<sup>2</sup>

We use the short planning horizons of Caliendo and Aadland (2007) to conduct our analysis.<sup>3</sup> The model is appealing because it generates a hump-shaped consumption profile with a drop in consumption at retirement that is consistent with observed behavior in the U.S. We choose a short-sighted model rather than a model of present-bias (such as hyperbolic or quasi-hyperbolic discounting) because Findley and Caliendo (2014) find that hyperbolic discounting does not affect consumption and savings allocations if the planning horizon is short and fixed. Additionally, survey evidence suggests that many households use a short-planning horizon when making financial decisions.<sup>4</sup>

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<sup>1</sup>Programs in Oregon, California, Illinois, Maryland, and Connecticut are either already in operation or slated to begin later this year. See <https://www.oregonsaves.com>, <https://www.calsavers.com>, <https://www.ilsecurechoice.com>.

<sup>2</sup>See Bernheim et al. (2015) for theoretical consideration of the opt-out decision of 401(k) participants.

<sup>3</sup>See also Findley and Caliendo (2009) and (2010), and Cottle Hunt and Findley (2019).

<sup>4</sup>Over half of the respondents in the Health and Retirement survey chose the “next few years” or less in response to the question “In planning your family’s saving and spending, which time period is

In many theoretical models, an automatic increase in IRA savings would be completely offset by decreases in other types of savings or increases in debt (in the absence of credit market imperfections).<sup>5</sup> Increased IRA savings are *not* offset by reduction in other savings in the short-planning horizon model because the consumer not aware of the assets that have accumulated in her IRA (and thus does not unwind them) until retirement enters her planning horizon. Thus, the welfare calculations in this paper might best be interpreted as an upper-bound for the ability of automatic enrollment in IRAs to change behavior. The true effect will depend on if consumers opt-out of the IRA and if they unwind IRA savings. The new state programs provide an excellent opportunity to test how defaults affect life-cycle saving. This short paper illustrates that the welfare effects could be large and positive if the defaults increase savings.

## 2 Model

The short-planning horizon model used in this exercise closely follows that of Caliendo and Aadland (2007), and will only be described briefly. Age in continuous and indexed by  $t$ . The consumer enters the labor force at age  $t = 0$ , retires at  $t = T$ , and dies at  $t = \bar{T}$ . She receives wage income  $w(t) = wq(t)$  for  $t \in [0, T]$  where  $w$  is the market wage and  $q(t)$  is the longitudinal age-efficiency profile, modeled as a fourth order polynomial. She pays social security taxes at rate  $\theta$  and receives pay-as-you-go benefits in retirement of  $b = \int_0^T \theta w(t) dt / (\bar{T} - T)$ .

The consumer has two types of saving assets: an individual retirement account,  $IRA(t)$ , that is annuitized at retirement by the retirement plan provider, and private savings or borrowings,  $k(t)$ . Both earn interest at the real rate  $r$ . The individual contributes to the IRA at rate  $\delta$ . The constant annuity that exhausts the IRA balance at the date of death is

$$A = \frac{\int_0^T \delta w(t) e^{r(T-t)} dt}{\int_T^{\bar{T}} e^{r(T-t)} dt} \quad \text{for } t \in [T, \bar{T}]. \quad (1)$$

The private savings or borrowing account has boundary conditions  $k(0) = 0$  and  $k(\bar{T}) = 0$ .

We assume the length of the agent's planning horizon,  $x$ , is less than or equal to the length of the retirement period to improve the tractability of the model. With this assumption, the life span of the short-horizon consumer can be partitioned into four distinct phases:

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most important to you?" The HRS is available at <http://hrsonline.isr.umich.edu/data/index.html>.  
<sup>5</sup>See Findley and Cottle Hunt (2019) for a quasi-hyperbolic discounting example.

- Phase I: the consumer is working and is not aware of retirement,  $t \in [0, T - x]$
- Phase II: the consumer is working and is aware of retirement,  $t \in [T - x, T]$
- Phase III: the consumer is retired and is not aware of death,  $t \in [T, \bar{T} - x]$
- Phase IV: the consumer is retired and aware of death,  $t \in [\bar{T} - x, \bar{T}]$

The agent's saving and consumption problem can be solved for each phase, using the appropriate boundary conditions and laws of motion for the private savings account  $k(t)$ . The solution techniques for this type of model are explained in detail in Caliendo and Aadland (2007) and will not be covered in this short paper. Analytical solutions are available upon request.

## 2.1 Phase I

At vantage point  $t_0 \in [0, T - x]$  the shortsighted consumer solves

$$\max \int_{t_0}^{t_0+x} e^{-\rho(t-t_0)} \frac{c(t)^{1-\phi} - 1}{1-\phi} dt \quad (2)$$

subject to

$$\frac{dk(t)}{dt} = rk(t) + (1-\theta)w(t) - \delta w(t) - c(t) \quad (3)$$

with  $k(t_0)$  given and  $k(t_0 + x) = 0$ .

## 2.2 Phase II

At any point  $t_0 \in [T - x, T]$  the individual solves

$$\max \int_{t_0}^{t_0+x} e^{-\rho(t-t_0)} \frac{c(t)^{1-\phi} - 1}{1-\phi} dt \quad (4)$$

subject to

$$\frac{dk(t)}{dt} = rk(t) + (1-\theta)w(t) - \delta w(t) - c(t) \quad \text{for } t \in [t_0, T] \quad (5)$$

and

$$\frac{dk(t)}{dt} = rk(t) + A + b - c(t) \quad \text{for } t \in [T, t_0 + x] \quad (6)$$

with  $k(t_0)$  given and  $k(t_0 + x) = 0$ .

## 2.3 Phase III

At any point  $t_0 \in [T, \bar{T} - x]$  the individual solves

$$\max \int_{t_0}^{t_0+x} e^{-\rho(t-t_0)} \frac{c(t)^{1-\phi} - 1}{1-\phi} dt \quad (7)$$

subject to

$$\frac{dk(t)}{dt} = rk(t) + A + b - c(t) \quad \text{for } t \in [T, t_0 + x] \quad (8)$$

with  $k(t_0)$  given and  $k(t_0 + x) = 0$ .

## 2.4 Phase IV

At any point  $t_0 \in [\bar{T} - x, \bar{T}]$  the individual solves

$$\max \int_{t_0}^{t_0+x} e^{-\rho(t-t_0)} \frac{c(t)^{1-\phi} - 1}{1-\phi} dt \quad (9)$$

subject to

$$\frac{dk(t)}{dt} = rk(t) + A + b - c(t) \quad \text{for } t \in [T, t_0 + x] \quad (10)$$

with  $k(t_0)$  given and  $k(t_0 + x) = 0$ .

## 3 Parameterization

Following Findley and Caliendo (2007), we set  $T = 40$  and  $\bar{T} = 55$  in order to model an individual who starts work at age twenty-five, retires at sixty-five, and dies at age eighty. We set the exogenous interest rate  $r$  and the discount rate  $\rho$  both equal to 3.5% and the inverse elasticity of inter-temporal substitution to  $\phi = 1$ .<sup>6</sup> The social security tax rate is set to match the old age portion of OASDI  $\theta = 0.106$ .

We model wage income as  $w(t) = wq(t)$ , where  $q(t)$  is the longitudinal age-efficiency profile based on the calibration of Feigenbaum and Caliendo (2010)

$$w(t) = w[1 + 0.018095t + 0.000817t^2 - 5.1 \times 10^{-5}t^3 + 5.36 \times 10^{-7}t^4] \quad (11)$$

with  $w$  normalized to unity.

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<sup>6</sup>See also Gourinchas and Parker (2002), Bullard and Feigenbaum (2007), and Feigenbaum (2008).

## 4 Welfare Results

We compute the consumption equivalent variation (CEV) that shows how much consumption would have to be added to an individual in the short-planning horizon model such that she would be indifferent between not having an IRA and having an IRA with contribution rate  $\delta$ . A positive CEV indicates that the short-sighted consumer would prefer an IRA with an automatic contribution rate of  $\delta$ . The CEV is positive for the contribution rates being implemented in Illinois (3%) and California (5%) for all short-planning horizons considered in this model (horizons up to 15 years in length).

The welfare gains of the automatic enrollment in the IRA are large when the planning horizon is short. For a planning horizon of one year, the CEV is over 50% for any IRA contribution rate less than 30%. This is because the short-sighted individual does not anticipate retirement until one year before the exogenous retirement date and thus has saved very little on her own. Her lifetime utility is dramatically improved when a fraction of her wages are automatically saved in an IRA. The welfare gains are smaller for longer planning horizons. When the planning horizon is 15 years, the CEV is positive for IRA contribution rates less than  $\delta = 0.25$ . The welfare gain of participating in an IRA with an automatic contribution of 5% is equal to 2.2% of lifetime consumption for a 15 year planning horizon. The welfare effects of automatic IRAs are depicted in Table 1 and graphically in Figure 1.

Planning horizon $x$	IRA contribution rate $\delta$							
	0.01	0.03	0.05	0.1	0.2	0.3	0.4	0.5
1	0.464	0.514	0.532	0.547	0.537	0.505	0.453	0.376
3	0.114	0.173	0.198	0.22	0.205	0.153	0.069	-0.057
5	0.045	0.088	0.109	0.129	0.113	0.059	-0.029	-0.161
10	0.012	0.03	0.042	0.055	0.04	-0.008	-0.088	-0.210
15	0.006	0.016	0.022	0.03	0.019	-0.02	-0.086	-0.189

Table 1: Consumption equivalent variation that equates the utility of consumption of not having an IRA to having an IRA with a default contribution rate  $\delta$  for short planning horizons  $x$ .

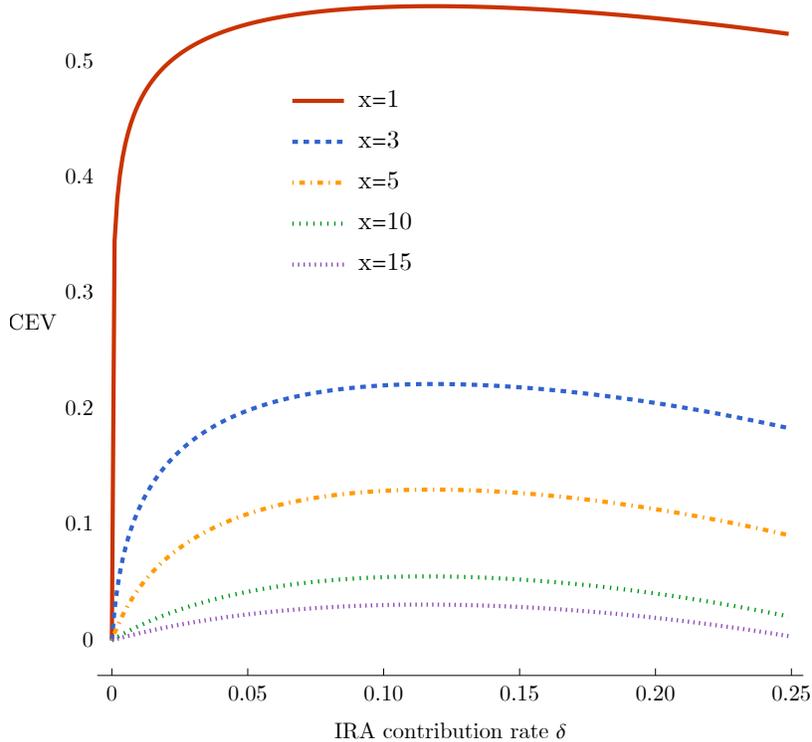


Figure 1: Consumption equivalent variation that equates the utility of consumption of not having an IRA to having an IRA with a default contribution rate  $\delta$  for short planning horizons  $x$ .

As a robustness check, we consider different parameterizations than our baseline. The welfare effects are larger when the inverse elasticity of substitution is increased to  $\phi = 2$ . Similarly, the welfare gains are larger when the interest rate  $r$  is less than the discount rate  $\rho$ . The reverse is true when the discount rate is less than the interest rate.

## 5 Conclusion

The welfare gains of automatic enrollment in IRAs are potentially large if consumers have short planning horizons. We calculate the consumption equivalent variation that makes a short-sighted indifferent between having an automatic IRA with contribution rate  $\delta$  and not having an IRA and find positive values for all planning horizons considered (up to 15 years) for automatic contribution rates up to  $\delta = 0.25$ . The new programs in several states provide an excellent opportunity to test the implications of this model. If employees stay enrolled in the IRA and if they *do not* offset IRA savings by reducing other saving or increasing debt, these programs could increase consumption smoothing and life-time utility for short-sighted households.

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