Determining Optimal Default Savings Rates For 401(K) Plans

DETERMINING OPTIMAL DEFAULT SAVINGS RATES FOR 401(K) PLANS

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Automatic enrolment in 401(k) plans has succeeded in increasing employee participation rates, but the impact on overall savings rates has been less than might have been expected, as some participants who would have previously opted into the plan at a higher savings rate choose to remain at the lower default savings rate under the automatic enrolment regime. Current policy encourages sponsors to offer relatively low default savings rates under these plans, which is likely decreasing average participant welfare. This paper establishes a framework for analyzing the impact of varying plan default and mandatory minimum savings rates on participant welfare and suggests that welfare would be increased with higher default savings rates and perhaps mandatory minimum savings rates.

· Harvard Law School, J.D. Candidate 2015 and Fellow of the Society of Actuaries. I am grateful to Oren Bar-Gill, Ryan Bubb, Daniel Halperin, Howell Jackson, Louis Kaplow, David Laibson, Brigitte Madrian, Steven Shavell, and the student participants in the Law and Economics seminar for their helpful comments and suggestions.

INTRODUCTION

For most employees in the American workforce, the decision of what percentage of salary to save for retirement is critical to their financial security in old age. These seemingly individualized decisions are significantly influenced by decisions made by plan sponsors and government policymakers. The design of the retirement savings plan provided by the employer, itself shaped by the regulations for fiduciary duties under the Employee Retirement Income and Security Act (ERISA), and the non-discrimination tests and tax incentives under the Internal Revenue Code (IRC), has a significant impact on the amount that individuals save towards retirement.[1] For example, whether the plan automatically enrolls new employees or requires them to opt-in to the plan to start saving dramatically impacts the percentage of employees who participate in the plan.[2] Many employers also make contributions to participants in the plan, either matching some portion of employee contributions or making non-elective contributions of a fixed percentage of salary to all participants in the plan. Employers' decisions about how to design their retirement plans, such as whether to include automatic enrolment or matching provisions, are shaped by tax incentives and safe harbor rules which provide exemptions from non-discrimination testing and some fiduciary duty rules if plan designs meet certain criteria.[3]

One critical element of plan design is the default savings rate set for employees who make no active choice about how much they should save. If the plan does not offer automatic enrolment, then this default is implicitly set at 0%, and as a result many employees never contribute to their retirement savings plans.[4] If a plan does offer automatic enrolment, then it must also provide a rate for employees to save at under the default option. Studies have shown that many employees remain at the default rate specified in the plan[5], including some who might otherwise have opted in to the plan and chosen a higher savings rate if the default had been non-

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[1] *See* 26 U.S.C.A. § 401(k) for regulation under the IRC and Dana M. Muir, *Choice Architecture and the Locus of Fiduciary Obligation in Defined Contribution Plans*, 99 IOWA L. REV. 1 (2013) for description or regulation of 401(k) plans under ERISA.

[2] *See e.g.,* James J. Choi et al., *Saving for Retirement on the Path of Least Resistance* (Nat'l Bureau of Econ. Research, Working Paper NB04-08, 2004).

[3] *See* 26 U.S.C.A. § 401(k)(12) and 26 U.S.C.A. § 401(k)(13) for safe harbors from non-discrimination testing and Fiduciary Relief for Investments in Qualified Default Investment Alternatives, 29 C.F.R. § 2550.404c-5 (2007) for safe harbor from fiduciary duty rules

[4] *See e.g.,* Choi et al., *supra* note 2

[5] *Id.*

participation in the plan.[6] For this reason, determining where default savings rates in plans should be set in order to encourage optimal savings behavior can be a complicated task. This paper develops a model for analyzing the impact of the chosen default savings rate on employee welfare and discusses some implications of the model and its results for plan sponsors setting those default rates, and policymakers creating plan sponsors' incentives.

The remainder of this paper is divided into five parts. Section I provides an overview of the retirement savings landscape in the United States, as well as the relevant regulations for 401(k) plans and the impact of behavioral economics on 401(k) policy so far. Section II, the heart of the paper, develops a welfare model for analyzing default and mandatory savings rate policies. It shows the results generated by the basic model as well as results generated under a variety of sensitivity tests and discusses the implications of these results. Section III provides an extension to the basic model which analyzes the implications of having multiple populations of employees each having different savings needs and preferences, allowing for some analysis of the potential impact of individualized defaults. Section IV provides recommendations to plan sponsors and policymakers based on the results of the analysis in this paper.

I. OVERVIEW OF 401(K) PLANS AND THEIR FEATURES

A. Retirement Savings in the United States

In the United States, defined contribution retirement plans, including 401(k) plans, comprise a very significant and increasing share of retirement savings. Together with social security and defined benefit plans, they form the "three-legged stool" of retirement savings.[7] Social security provides monthly income for life during retirement. This income depends on earnings throughout an individual's career, and provides an average of only $1,294 per month and a maximum of $2,642 per month in 2014.[8] Because these amounts are typically much lower than what these individuals were making while working, most retirees need to supplement their social security benefits in order to maintain consumption in retirement close to

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[6] Ryan Bubb & Richard H. Pildes, *How Behavioral Economics Trims Its Sails and Why* (NYU L. & Econ. Res. Paper No. 13-29 2013)

[7] *See, e.g.*, Danny M. Ervin et al., *The Impact of Asset Allocation, Savings and Retirement Horizons, Savings Rates, and Social Security Income in Retirement Planning: A Monte Carlo Analysis*, FIN. SERVS. REV., Winter 2009, at 313.

[8] 2014 Social Security Fact Sheet, SOC. SEC. ADMIN., http://www.ssa.gov/pressoffice/factsheets/colafacts2014.pdf (last visited Apr. 5, 2014).

pre-retirement levels. Of the other two legs of the stool, over the past 30 years defined contribution plans have become increasingly popular at the expense of defined benefit plans. Several factors have contributed to the shift, including increased regulatory costs for defined benefit plans, greater investment and mortality risk held by employers sponsoring defined benefit plans, and employee interest in more flexible and portable retirement systems.[9] The creation of 401(k) plans themselves as a result of a 1978 revision to the IRC likely also contributed to this shift.[10] 401(k) plans have since become the most common form of defined contribution retirement plan in the United States.[11]

B. Regulation of 401(k) Plans

401(k) plans are established by employers, also known as plan sponsors, for the benefit of their employees, and are regulated as defined contribution plans under ERISA, which imposes some fiduciary obligations on the plan sponsors.[12] These plans allow employees to save a percentage of their pay in a tax-advantaged fund for use in retirement and as a result are also subject to regulation under the Internal Revenue Code. Typically employees will have a choice of investment options in which they can invest their retirement savings. Some employers also contribute to employees' accounts, either through an automatic contribution of a certain percentage of each employee's pay, or through a matching program where the employer contributes to each employee's account based on a formula linked to the amount the employee contributed.

Under the Internal Revenue Code, 401(k) plans must meet certain requirements in order to qualify for their preferential tax treatment.[13] Plan

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[9] Choi et al., *Reinforcement Learning and Savings Behavior* (Yale ICF Working Paper No. 09-01, 2009), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1014655; Gopi Shah Goda & Colleen Flaherty Manchester, *Incorporating Employee Heterogeneity Into Default Rules for Retirement Plan Selection* (Ctr. for Ret. Res. Working Paper 2010-6, 2010); Alicia H. Munnell, *401(k) Plans in 2010: An Update from the SCF* (Ctr. for Ret. Res. IB 12-13, 2012), *available at* http://crr.bc.edu/wp-content/uploads/2012/07/IB_12-13-508.pdf (showing % of workers with DB plans declined from 88% in 1983 to 31% in 2010 and the % of workers with DC plans increased from 38% in 1983 to 81% in 2010)

[10] *See* §135(a) of the Revenue Act of 1978, Pub. L. No. 95-600, 92 Stat. 2763, 2785 (Nov. 6, 1978)

[11] *See e.g.,* Alicia H. Munnell, *401(k) Plans in 2010: An Update from the SCF* (Ctr. for Ret. Res. IB 12-13, 2012), *available at* http://crr.bc.edu/wp-content/uploads/2012/07/IB_12-13-508.pdf

[12] Dana M. Muir, *Choice Architecture and the Locus of Fiduciary Obligation in Defined Contribution Plans*, 99 IOWA L. REV. 1 (2013).

[13] Application of participation and discrimination standards, 26 U.S.C.A. § 401(k)(3)

sponsors must demonstrate that their plans either pass non-discrimination tests intended to ensure that plans are used to provide retirement savings to a broad base of employees rather than used only by highly compensated employees (HCEs), or that they qualify for certain safe harbors provided for in the regulations.[14] The non-discrimination test requires that HCEs not save at a rate more than 2% greater than, or more than 125% of, the average non-highly compensated employee (NHCE) rate.[15] If they fail this test, employers either have to repay the excess saved by HCEs or make contributions for NHCEs to lift their savings up to the necessary rate.[16]

Two safe harbors allow employers to avoid this non-discrimination plan testing: the Qualified Automatic Contribution Arrangement (QACA), added by the Pension Protection Act of 2006 (PPA of 2006), and the traditional 401(k) Safe Harbor Plan.[17] To qualify for the QACA, plan sponsors must provide for automatic enrolment of employees into the plan with an initial default contribution rate of at least 3%, rising at least 1% each year of service until a minimum of 6% default contribution rate from four years of service onward.[18] The default contribution rate cannot exceed 10% in order to qualify for this safe harbor.[19] In addition to the default contribution rate constraints, plans must either provide a minimum matching contribution of 3.5% on the first 6% of employee contributions, or make a non-elective 3% contribution to all eligible NHCEs in order to qualify for the safe harbor.[20] The QACA also requires that employer contributions be fully vested after two years of service.[21]

Under the traditional Safe Harbor Plan, employers can avoid non-discrimination testing by having a minimum matching contribution of 4% on the first 5% of employee contributions or making a non-elective 3% contribution to all eligible NHCEs.[22] Under the traditional safe harbor, all employer contributions must vest immediately.[23] Therefore the law currently provides two key advantages to plan sponsors who choose to use the QACA over the traditional Safe Harbor: decreased minimum matching requirements from 4% to 3.5%, and delayed minimum vesting requirements

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[14] *Id.*; Traditional safe harbor plans laid out in 26 U.S.C.A. § 401(k)(12), Qualified Automatic Contribution Arrangement safe harbor laid out in 26 U.S.C.A. § 401(k)(13)

[15] 26 U.S.C.A. § 401(k)(3)

[16] 26 U.S.C.A. § 401(k)(8)

[17] Traditional safe harbor: U.S.C.A. § 401(k)(12); Qualified Automatic Contribution Arrangement: 26 U.S.C.A. § 401(k)(13)

[18] 26 U.S.C.A. § 401(k)(13)

[19] *Id.*

[20] *Id.*

[21] *Id.*

[22] 26 U.S.C.A. § 401(k)(12)

[23] *Id.*

from immediate vesting to vesting after two years of service.

On the individual side, participants face limits on withdrawals before retirement, maximum dollar amounts for annual contributions, as well as mandatory minimum withdrawals during retirement in order to preserve the funds for their intended purpose of funding retirement.[24] If 401(k) funds are withdrawn for reasons other than retirement there may be a 10% penalty applied in addition to taxing it as income in the year in which it is withdrawn.[25] Some plans do allow for individuals to access some of their 401(k) funds by taking out loans against their account values, so long as these loans satisfy rules laid out by the Internal Revenue Code and ERISA.[26] In exchange for these restrictions, participants receive significant tax advantages for savings in their 401(k) plans: contributions to these plans are tax-deferred, such that they are deducted from taxable income in the year that contributions are made, and the accumulation is not taxed until the individual withdraws their money at retirement.[27]

The other major source of regulation of 401(k) plans is ERISA, which specifies some fiduciary obligations plan sponsors must meet in administering the plans. Plan sponsors can be held liable if inappropriate investment of their employees' retirement funds results in losses, which had previously encouraged plan sponsors to require employees to make their own investment allocation decisions.[28] Because of such concerns about fiduciary liability, some plan sponsors were initially wary of adopting automatic enrolment, which requires employers to make some decision about where contributions from employees who make no active choice and are automatically enrolled in the plan at the default savings rates should be invested. Prior to the PPA of 2006, plan sponsors were concerned that they might be liable for losses resulting from the selection of the default investments employees' funds would be placed into.[29] To address these concerns, the PPA of 2006 provided a safe harbor for automatic enrolment plans which use Qualified Default Investment Alternatives (QDIAs).[30] Plan sponsors are now immune from liability for investment selection if the default investment qualifies as a QDIA.

C. Behavioral Economics and the Pension Protection Act of 2006

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[24] Treas. Reg. §1.401(k)-1(d).

[25] *Id.*

[26] *See* I.R.C. § 72(p) and ERISA § 408(b)(1), 29 U.S.C.S. §1108(b).

[27] Treas. Reg. §1.401(k)-1(d).

[28] *See Muir*, supra note 12

[29] Pension Protection Act of 2006, Pub. L. No. 109-280, 120 Stat. 780.

[30] Fiduciary Relief for Investments in Qualified Default Investment Alternatives, 29 C.F.R. § 2550.404c-5 (2007)

Studies demonstrating that when individuals decide how much to save for retirement, they are prone to behavioral biases including stickiness of defaults and likely under-saving have gained popular attention and policy traction, resulting in a shift in plan design towards automatic enrolment, and consequently increased participation rates over time.[31] They have also influenced legislators and resulted in incentives for automatic enrolment being included in the PPA of 2006.[32] The PPA of 2006 created the QACA Safe Harbor, which became effective on January 1, 2008, and exempts plans from nondiscrimination testing if they provide for automatic enrolment with a minimum default of 3% in the first year of each employee's service at the company and increasing at least 1% each year until 6% in the fourth year of service. As can be seen in the table showing data from Vanguard plans from 2005-2013, offering this safe harbor option likely influenced plan design decisions, increasing use of automatic enrollment in general, as well as use of a 3% initial default savings rate and 1% automatic increase in default rate per year of service.[33]

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Percentage of participants hired under automatic enrolment	6%	14%	25%	30%	39%	44%	48%	52%	62%
Percentage of those plans using automatic enrolment having 3% initial default savings rate	46%	52%	56%	60%	56%	57%	55%	53%	51%
Percentage of those plans using automatic enrolment increasing default savings rate by 1% each year	31%	57%	66%	73%	68%	68%	67%	67%	67%

While the encouragement of automatic enrolment via the PPA of 2006 has generally been heralded as a policy success for behavioral economics, it has not been without criticism.[34] Participation rates have indeed increased, but overall savings rates have not increased as much as might have been expected, since many people who would have otherwise opted in to the plan and chosen a relatively high savings rate if the default had been non-participation now stick with the relatively low default rate chosen by the plan.[35] In the Vanguard data for the 2013 plan year, plans with automatic

[31] VANGUARD, HOW AMERICA SAVES 2013 (2013)
[32] PPA of 2006, *supra* note 29
[33] VANGUARD, HOW AMERICA SAVES 2014 (2014), 20-21, figures 16 and 17
[34] *See e.g.*, Bubb & Pildes, *supra* note 6
[35] *Id.*

enrolment had higher participation rates, but lower average savings rates, with the combined effect of actually lowering the average level of savings across plan participants and non-participants.[36]

In addition to the concern with the stickiness of the default actually reducing savings rates for many people, some observers continue to object to the very idea of policymaker involvement and "soft paternalism". Others argue that tinkering with defaults is too "soft" an approach, and that the same behavioral justifications for tinkering with the default rate might justify use of mandates or other approaches as well.[37] At the very least, it seems clear that if policymakers are going to encourage automatic enrolment and plan sponsors are going to offer it, more thought should be given to what the default savings rate should be.

D. Analysis of Behavioral Factors Relevant to 401(k) Policy and Plan Design

Many observers believe that most Americans do not contribute enough to their 401(k) plans.[38] There are many behavioral economic theories which could explain this result. Among those cited by academics studying the field are poor financial literacy, overweighting the near future (myopia/hyperbolic discounting), inertia, procrastination, reinforcement learning, overconfidence with respect to asset returns, and perceived expert guidance of the default.[39] These sources of behavioral bias generally fall into two categories: those that relate to whether to make an active decision about what amount they should save in the first place, and those that relate

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[36] VANGUARD, HOW AMERICA SAVES 2014 (2014), 25, 31, figures 24 and 32, showing a 65% participation rate and 7.5% average savings rate for participants under voluntary enrolment and a 82% average savings rate and 4.9% average savings rate for participants under automatic enrolment. Multiplying these together gives a 4.9% average savings rate across all plan participants and non-participants in voluntary enrolment plans and a 4.0% average savings rate across all plan participants and non-participants in automatic enrolment plans.

[37] Bubb & Pildes, *supra* note 6

[38] *See e.g.*, DOUGLAS B. BERNHEIM, MERRILL LYNCH, IS THE BABY BOOM GENERATION PREPARING ADEQUATELY FOR RETIREMENT? (1992); (1992), Christine Dugas, *Retirement Crisis Looms as Many Come Up Short*, USA TODAY, July 19, 2002, http://usatoday30.usatoday.com/money/perfi/retirement/bw/2002-07-19-usat-cover.htm; Alicia H. Munnell et al., *A New National Retirement Index* (Ctr. for Ret. Res. IB 48, 2006), *available at http://crr.bc.edu/wp-content/uploads/2006/06/ib_48.pdf*.

[39] *See* Wei-Yin Hu, Olivia S. Mitchell, Cynthia Pagliaro, and Stephen P. Utkus (2013). "Evaluating Web-based Savings Interventions: A Preliminary Assessment." Ann Arbor MI: University of Michigan Retirement Research Center (MRRC) Working Paper, WP 2013-299, http://www.mrrc.isr.umich.edu/publications/papers/pdf/wp299.pdf for background on behavioral reasons why people might under-save.

to the rate chosen once an active decision is made.

Strong compelling evidence exists that people are reluctant to make a decision in the first place, with far more people choosing to stick with whatever default rate the plan sets than could easily be explained without a behavioral economic theory.[40] Many observers also believe that even once savers make a decision they choose a rate that is too low and consequently under-save for their retirement.[41] This contention however is harder to prove as convincingly, because there are many factors which might explain what seems like too low a savings rate in any particular case.[42] Even among those who believe it is appropriate to assume employees are making rational savings decisions, most do not go so far as to say that all individuals behave rationally for all of their decisions, but rather that people on average behave rationally and the various deviations from rationality do not have a systemic bias one way or the other. This assumption would still imply a difference between the chosen and optimal savings rate for any individual, but that these differences would average out to zero.

Those who believe in the under-saving theory suggest that Americans should be saving about 12% of their income for retirement, as compared to the median 9% (6% employee plus 3% employer contribution) they actually do save, representing an under-saving of approximately 3%.[43] While people may under-save by 3% on average, there is in fact a distribution of under-saving, with some people in fact over-saving.

Even if it is assumed that Americans under-save at the aggregate level, at the individual level there are many factors which provide rational heterogeneity in optimal savings rates, making no single savings rate the appropriate one for all individuals. These factors include age, gender, income level, future life expectancy and current liquidity needs, among others.[44] Policymakers might be able to identify the impact of some of the most common factors and include those in their policy choices. If they could do so successfully, plans could use this to create individualized

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[40] Choi et al., *For Better or For Worse: Default Effects and 401(k) Savings Behavior* (Nat'l Bureau of Econ. Research, Working Paper 8651, 2001),

[41] *Supra* note 31

[42] *See e.g.*, Eric M. Engen et al., *The Adequacy of Retirement Saving* (Brookings Papers on Economic Activity No. 2, 1999); John Karl Scholz et al., *Are Americans Saving 'Optimally' for Retirement?,* 114 J. POL. ECON. 607 (2006); Glenn R. Hubbard et al., *Precautionary Saving and Social Insurance*, 103 J. POL. ECON. 360 (1995) (arguing retirees might have lower expenses than pre-retirees once children leave the home or because they can cut back on expenses by doing more themselves, such as cooking and eating at home rather than dining out).

[43] Roger Ibbotson et al., *National Savings Rate Guidelines for Individuals*, J. FIN. PLANNING 50, April 2007 (2007)

[44] *See* Carroll et al., *Optimal Defaults and Active Decisions*, *supra* note 41 at 1642.

default savings rates which might be more appropriate than a single default rate applicable to all employees, or one that varies only with years of service, as is encouraged by the current QACA safe harbor favoring automatic escalation.

The evidence so far on the range of savings rates chosen given default rates set in plans is limited, but there does appear to be a pattern that the closer the plan gets to what participants would have chosen anyway the more people choose to accept the default. So when the default was to require opt-in to the plan (that is, a 0% default rate), 41% of participants remained with the default, while that proportion increased to 61% when the default savings rate was 2% and to 66% when it was 3%.[45] When defaults are much higher than the typical rates chosen however, the trend reverses, with only 25% of participants remaining with the default rate of 12% in one example.[46] Another study showed similar results, with the observed frequency of chosen savings rates close to the default rate reduced compared to the pre-automatic enrolment frequency of those savings rates.[47] Some observers have also noted that small upward deviations from typical current default rates do not increase opt-out rates, which is consistent with the hypothesis that opt-out rates decrease the closer they get to the rates participants would choose if they had to make an active choice.[48]

It is also intuitively appealing that the further away the default gets from what people would actually choose the more motivated they will be to make a change. If the primary reason for people's stickiness is procrastination or aversion to making complex decisions, then people will be more motivated to overcome these biases the larger the gap between the default and where they would save if they made a decision. If, however, people's stickiness is related to a genuine belief that the plan sponsor has a better idea of what they should be saving than they do, then their likelihood to opt-out might be relatively insensitive to where the default is placed. In addition, there is evidence that higher-income individuals choose higher savings rates and opt out of the defaults more frequently than lower income individuals.[49] This

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[45] John Beshears et al., *The Limitation of Defaults* (Nat'l Bureau of Econ. Research, Working Paper NB-10-02, 2010), *available at* http://www.nber.org/aging/rrc/papers/onb10-02.pdf

[46] *Id.*

[47] Choi et. al, *supra* note 2

[48] VANGUARD, *supra* note 38 at 30

[49] VANGUARD, *supra* note 38 at 24, 30 (participation rates increase with income, with a low of 46% participation for those with income less than $30,000 a year, and a high of 87% participation for those earning over $100,000 a year. Higher income participants also choose a higher rate than lower income participants when they do participate: Those participants earning less than $30,000 save an average of 4.7% of their income compared to 8.3% of income for those earning over $100,000 a year)

observation could be consistent with the assumption that the further the default rate is from what individuals would otherwise choose the more likely they are to opt out of the default, as these high-income individuals' chosen rates are indeed further away from the defaults than the rates lower income individuals choose. It might also, however, reflect greater financial education on average and hence less behavioral biases, including stickiness, among the higher income group.

E. 401(k) Plan Design Decisions for Sponsors

Plan sponsors must make a number of plan design decisions which impact the participation and savings rates of plan members. First, as previously discussed, they must decide whether or not to offer automatic enrolment. If they do offer it, they must then decide where to set the default rate. Addressing the question of where this should be set is the main focus of this paper. Another plan design decision is whether to offer a matching contribution or make non-elective contributions to all employees regardless of what amount they contribute themselves to the plan.

The model developed in this paper does not address matching contributions. In fact, in analyzing the optimal default and minimum savings rates, in order to focus on the impact of the other factors at play, it assumes that there are no matching programs in place, even though many plan sponsors do use such plan features. This is because, for any significant matching program, not saving at least the amount required for the maximum match is almost always irrational and the impact of the match would dominate the welfare analysis.[50]

Because the match should be such a powerful incentive to save at least up to the match, the difference between a match and a non-elective contribution functions mostly to penalize those who fail to appreciate how good of a deal it is. It is therefore recommended that the matching component of the safe harbor test should be eliminated or replaced with a mandatory minimum employer contribution. Since part of the reason people accept defaults is a belief that they reflect some form of expert guidance, policy makers should at least avoid setting the default rate at a clearly irrational level below that required to achieve a full match.

The remainder of this paper addresses the question of where the default savings rates in 401(k) plans should be set. To do so, it proposes a framework for analyzing how stickiness and under-saving interact with each other and what the welfare effects of various combinations of default and mandatory minimum savings rates in plans would be. Based on this

[50] James C. Choi et al., *$100 Bills on the Sidewalk: Suboptimal Investment in 401(k) Plans*, 93 REV. ECON. STAT. 748 (2011)

framework it simulates the average welfare losses of various default and minimum savings rates policies on plan populations relative to all members of the population choosing the optimal savings rate.

It is important to note that this simulation model captures only the welfare effects of the default and mandatory minimum savings rates and is therefore incapable of capturing other important non-welfare effects, such as the value of individual choice and the value of the information created by individuals exercising that choice, which may weigh on the decision of whether to employ defaults or mandates as well as the level at which they should be set. Policymakers who place independent value on individual choice may prefer not to use mandates even if they improve average welfare. Because the choices of those who opt out provide valuable information to policymakers, mandates might also reduce future understanding of this retirement savings issue.

II. A Behavioral Model for Analyzing 401(k) Default Savings Rate Policy

The model developed in this paper is built assumes that individuals engage in a two-step process when determining the rate at which they will save. First, they decide whether or not to opt out of the default rate set in the plan. One set of factors influencing the decision at this step is the individual's proneness to behavioral biases related to the stickiness of the initial default, such as tendency towards procrastination and their perception of the default as a form of expert guidance. The other factor is how reasonable the default rate chosen seems to the individual. The further the default rate is from what seems like a reasonable choice for the individual, the more likely they are to overcome their biases towards sticking with the initial default. If the individual does choose to move away from the default at this stage then they must make an active choice of savings rate at step two.

At step two, individuals choose a savings rate they believe is most appropriate for them. This decision will be influenced by many rational and irrational factors that vary by individual. For example, individuals might consider how much of their income is likely to be replaced by social security, how long they expect to live in retirement, what other sources of savings they have, or any unusual current or future expenses they expect to have. All of these factors would provide rational reasons for heterogeneity in savings rate chosen depending on individual circumstances. Another set of factors, which will also vary by individual, might cause individuals to irrationally choose a savings rate that is not optimal for them. These behavioral biases applicable at this step might include poor financial

literacy, underestimation of the importance of compounding, overconfidence in asset returns, or overweighting the near future at the expense of the far future. The savings rate actually chosen at step two then will be the result of an aggregation of all these factors. The default rate chosen by any individual at this step is therefore modeled as the sum of the optimal rate for them (which would be based only on the rational factors) plus the behavioral bias in their decision which represents the impact of all the irrational factors on their chosen rate.

The model for assessing the welfare impact of a plan's default savings rate starts with a population of *n* individual plan participants who each have their own stickiness factors, preferred savings rates, and other biases which are modeled as independent random variables. The stickiness factor represents that individual's reluctance to make an active choice to depart from the default, essentially the cost which must be overcome for that individual to be motivated to depart from the default. The preferred savings rate represents the rate the individual will choose if they do opt out of the default. The bias variable represents the difference between each individual's preferred savings rate and the optimal savings rate for them. It is intended to capture the aggregate effect of all behavioral biases for that individual other than those which apply to the stickiness factor.

The model assumes that for each individual, if the squared difference between the default rate and their preferred savings rate exceeds their stickiness factor, they will opt-out from the default to the maximum of their preferred rate and the mandatory minimum rate. This assumption was calibrated based on the percentage of people who remained at the default savings rate across a number of plans with default savings rates of 0%, 2%, 3% and 12%.[51] If this squared difference between the preferred savings rate and the default rate in the plan does not exceed the individual's stickiness factor then they will remain at the default rate. Algebraically, each individual's chosen saving rate r_i is represented by equation (1) below:

$$r_i = \begin{cases} \max(m, p_i), & if\ (d - p_i)^2 > s_i \\ d, & if\ (d - p_i)^2 \leq s_i \end{cases} \quad (1)$$

Where *m* is the minimum savings rate allowed by the plan, *d* is the default savings rate set by the plan, pi is the preferred savings rate for individual *i* and s_i is the stickiness factor for individual *i*.

The average welfare loss across the population is calculated as the

[51] Beshears et al., *The Limitations of Defaults* (Nat'l Bureau of Econ. Research, Working Paper NB10-02, 2010).

squared difference between the resulting saving rate and the optimal rate.[52] This squared distance from optimal approach is a standard welfare economics framework and is used by other models of this issue. As discussed in section I.E) above, this framework does not include the impact of matching provisions in plans, because they would dominate the welfare analysis if included. Algebraically, the average welfare loss *AWL*, is represented by equation (2) below:

$$AWL = \sum_{i=1}^{n} (r_i - o_i)^2 / n \qquad 2)$$

Where r_i is the chosen savings rate for each individual i from equation 1), o_i is the optimal savings rate for each individual i, and n is the number of individuals in the simulated plan. The optimal savings rate for each individual is equal to their preferred savings rate less their bias variable. That is,

$$o_i = p_i - b_i \qquad 3)$$

Where p_i is the preferred rate for each individual and bi is his or her bias when selecting a preferred savings rate. The objective in selecting a combination of minimum and default savings rates under this approach is to minimize the average welfare loss in equation 2 above.

This paper analyzes the welfare effects of various default and mandate options under this framework, and then proceeds to look at the sensitivity of this welfare analysis to changes in assumptions made in the model, such as the distribution of stickiness factors and under-saving biases. This sensitivity analysis is useful in determining both the robustness of the model's results to changes in assumptions and the effectiveness of potential policy interventions which would tend to change some of the assumptions. For example, some policies might alter the stickiness of defaults, by either encouraging or discouraging people from opting out of the default. Other policy responses could attempt to increase financial education, potentially reducing both stickiness and other biases. The sensitivity analysis can also be used to determine the welfare loss associated with policymaker error in setting the default and/or mandatory minimum rate. The paper then extends the framework to a two-population model in order to capture the effects of correlation between individuals' preferred savings rates and stickiness factors. This extension is also used to analyze an individualized defaults

[52] *See* Gabriel D. Carroll et al., *Optimal Defaults and Active Decisions*, 124 Q. J. ECON. 1639, 1658 (2009)

proposal.

A. Calibrating the Basic Model

Preferred savings rates are assumed to follow a lognormal distribution, with an average savings rate chosen of 6% and median of 7.2%, consistent with data from Vanguard in 2003, before significant adoption of automatic enrolment plans.[53] This distribution was selected because it provides a close fit to the data on the percentage of plan participants selecting certain savings rates provided by Vanguard, as seen in the table below.

Savings Rate	Lognormal Distribution	Vanguard Data
0.1%-3.9%	25%	24%
4.0%-6.0%	25%	25%
6.1%-9.9%	30%	27%
10.0%-14.9%	13%	17%
15.0%+	6%	7%

It is assumed that each individual's stickiness factor, reflecting their willingness to stick with the default option is uniformly distributed from zero to some maximum value. This distribution was selected for simplicity. Other distributions were considered but did not provide significantly different results. This maximum was chosen to fit the best available data comparing opt-out percentages at 0%, 2%, 3% and 12% default savings rates, assuming that preferred savings rates follow the lognormal distribution described above and that individuals opt-out if the squared distance between their preferred savings rate and the default savings rate set by the plan exceeds their own stickiness factor.[54] Based on this analysis a maximum stickiness factor of 0.004 was chosen.

In accordance with studies which show under-saving for retirement, the initial assumption for the average bias once a non-default savings rate is chosen is that of an average 3% under-saving bias.[55] This bias is modeled as a normal distribution with a 3% average under-saving and an assumed

[53] VANGUARD, *supra* note 38 at 26.
[54] Beshears et al., *Limitations of Defaults*, *supra* note 49
[55] Ibbotson et al., *supra* note 36

3% standard deviation. As shown in section II.B) below on sensitivity testing the under-saving assumption, this assumption regarding the standard deviation of the under-saving bias has a negligible impact on the analysis.

Under these assumptions for the basic model, Figure 1 below shows the average welfare loss for default and mandatory savings rates ranging from 0% to 15%. It also shows the average welfare loss by default rate chosen when a 6% minimum savings rate is included in the plan. Multiple minimums savings rates were tested, and 6% was found to be the minimum savings rate which produces the lowest average welfare loss.

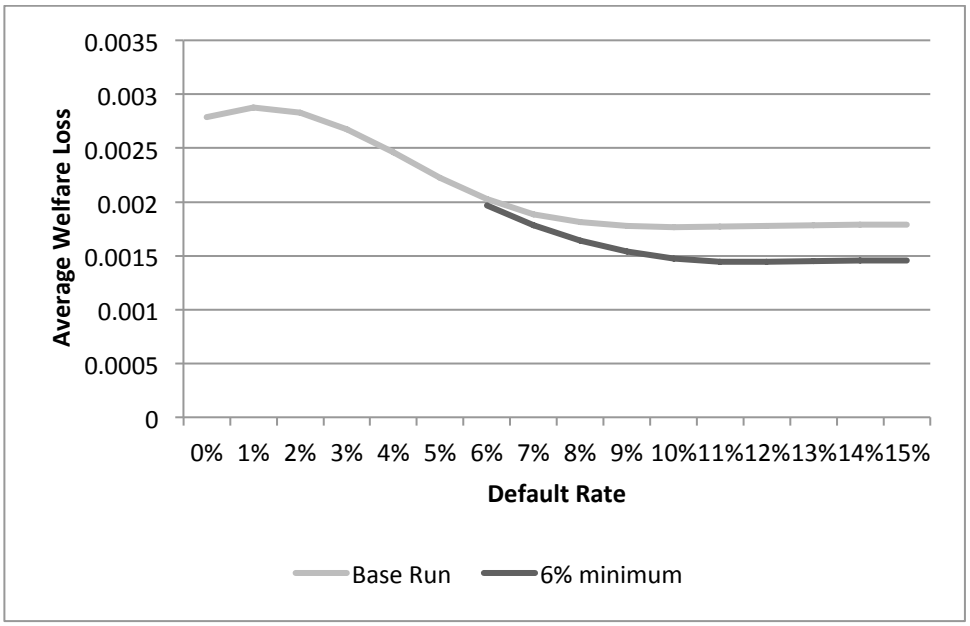

Figure 1. Average Welfare Loss by Default Rate under Basic Model

Based on these initial assumptions the optimal default rate is 10% when there is no minimum savings rate, and 12% when a 6% minimum savings rate is applied. These optimal default rates correspond to the minimum points on the curves shown in Figure 1. The curve including the 6% minimum savings rate only displays default savings rates equal to or greater than the 6% minimum, because it would be impossible to default employees to a savings rate less than the minimum rate allowed by the plan. The curve including the 6% minimum savings rate is lower than the curve without the minimum savings rate, indicating that inclusion of the minimum rate improves average welfare for all default rates under the basic model. The slope of the curve is also higher at the lower default rates, meaning that changes to default rates have a more significant impact when starting from lower levels than they do when starting from higher levels of initial default

rates. This occurs because when default rates increase, more people choose to opt-out of the default, limiting the impact of the default rate chosen. At the highest extremes of default rates, most people choose to opt-out, so the result is close to that which would occur if all participants were forced to make an active choice. This means that plan sponsors and policymakers should be more concerned about setting default rates too low than too high, since the impact of higher default rates is muted by the fact that they also cause more people to opt-out of them. This is true even though the base model assumes that people under-save by an average of 3% in the event that they do opt out. As discussed below, the welfare impact of setting high defaults which cause more employees to opt out of the default depends critically on this assumption.

B. Sensitivity Test: Impact of Under-Saving Assumption

As noted earlier, the assumption that people are under-saving even when they make an active choice of rate is controversial. If it is assumed instead that everyone is rational and makes the optimal choice of savings rate then it would be best to simply force people to choose, as welfare loss can only come from people accepting the default under this assumption. It might be more realistic to consider what happens if individuals are biased for a variety of reasons, but that these biases average out and produce no systematic under-saving. Figure 2 below illustrates the average welfare losses by default rate under either of these assumptions both with and without minimum savings rates.

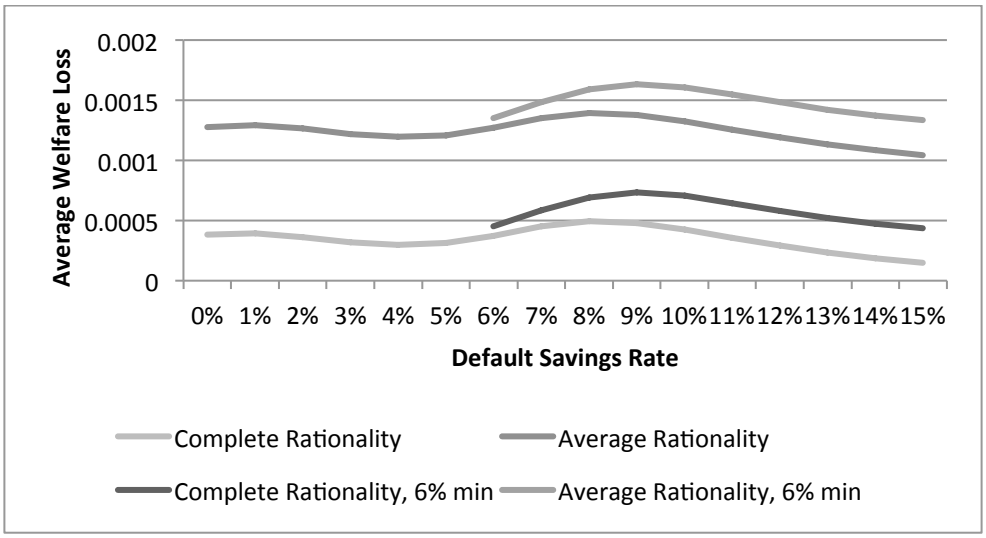

Figure 2. Average Welfare Loss by Default Rate Assuming Rationality

With these rationality assumptions, the curves including minimum savings rates are now higher than those without minimum savings rate, indicating that these minimums decrease welfare under assumptions of rationality and therefore, that whether policymakers wish to use such mandates will depend in part on how much they believe in the rationality of plan participants. The curves not including a minimum savings rate have a local minimum average welfare loss around 4% and produce the lowest overall average welfare losses at the highest default savings rates, which confirms that when assuming employees make rational decisions once they make an active choice of savings rate the optimal policy is to make as unreasonably high a default rate as possible in order to encourage people to opt out of it and make their own decision.

Interestingly, the difference between assuming complete rationality and average rationality merely shifts the average welfare loss curve upwards, but does not change its shape, which means that the implications for plan sponsors and policymakers are the same under either assumption. This is so because the combination of default and mandatory minimum savings rates which produce the lowest average welfare loss does not change when the entire curve shifts in parallel. It is also notable that there is a local minimum for both functions around 4%, suggesting that if policymakers assume people are at least on average rational, but do not want to commit to an intentionally unreasonable default savings rate, they should still set a non-zero default rate. At any rate, such a default rate of zero is not optimal even under an assumption of complete rationality of savings rates chosen by plan participants.

Returning to an assumption of under-saving on average by participants, it might be helpful to consider how important the assumption about the variability of this savings bias is relative to the average level of under-saving. Figure 3 below shows the results of the model with and without a 6% minimum savings rate for assumptions of no variability in bias, and 6% standard deviation of this bias, which is double the assumption used in the basic model.

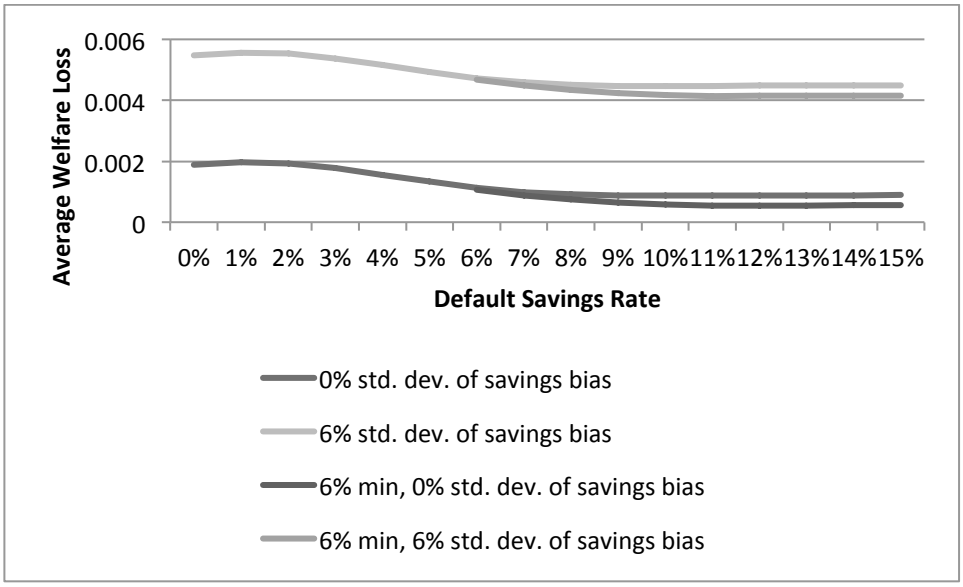

Figure 3. Average Welfare Loss for Different Variances of Savings Biases

As in the case of comparing complete to average rationality above, changing the variability of the savings bias up or down shifts the entire curves up or down, but does not change the shape of the curves. This means that changes in default rates cause the same change in average welfare losses regardless of the assumption made about the variability of the savings rate bias distribution. Therefore the implications of the model for plan sponsors and policymakers also remain unchanged by changes in the assumption of the variability of savings rate biases.

Given the uncertainty about the degree of under-saving bias, it is also useful to assess how this assumption impacts the analysis of overall welfare loss. Figure 4 below shows the average welfare loss by default rate set for a variety of under-saving assumptions.

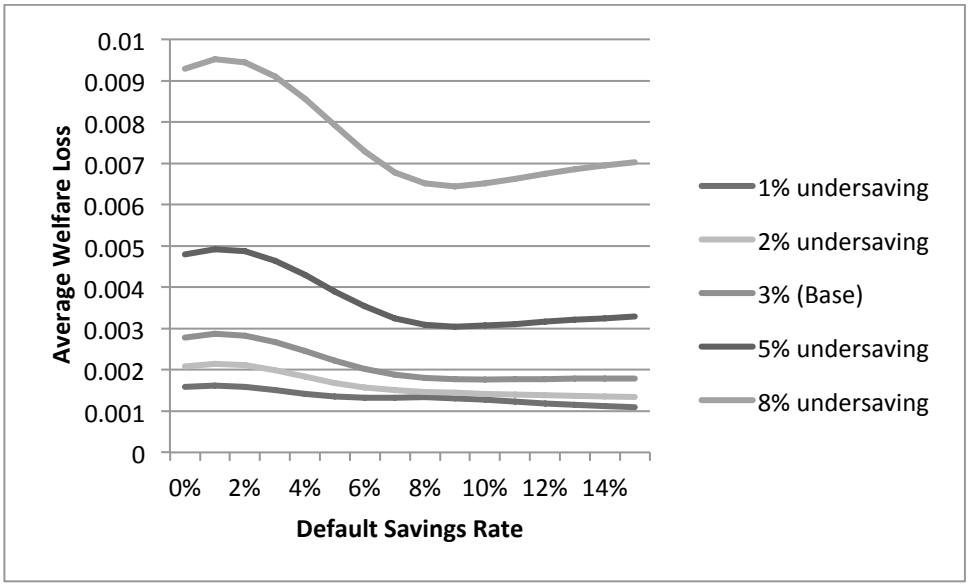

Figure 4. Average Welfare Loss Under Various Average Under-Saving Assumptions

The higher the degree of under-saving assumed, the higher the curve on the graph, indicating greater overall welfare losses. This indicates that any policy interventions such as increased financial education which could successfully reduce the amount of under-saving would have a very significant impact on welfare.[56] Also, the higher the under-saving assumed the more a default rate around 9% becomes clearly superior to higher default rates. The curves for lower under-savings rates are flatter at the higher end of the default rate range, indicating that default rates around 9% or above will all produce similar average welfare losses under these assumptions. This means that for low under-saving rates the optimal policy is to set extreme default rates which essentially force plan members into making an active choice. In contrast, the more under-saving is assumed, the worse this policy of setting an extreme rate becomes relative to the non-extreme optimal default rate. Figure 4 shows that the breakeven degree of under-saving which justifies use of a non-extreme default rate is about 3%: for under-saving of 3% or more, there is an optimal non-extreme default rate, while below 3% simply pushing people to make an active choice with an extreme default is preferable.

The assumption of under-saving also impacts whether including a minimum as well as default rate improves welfare. Figure 5 below illustrates that that the breakeven degree of under-saving for a 6% minimum

[56] William G. Gale et al., *Raising Household Saving: Does Financial Education Work?*, 72 SOC. SEC. BULL. 39 (2012); Choi et al., *supra* note 2 at 6, note 6

savings rate to improve welfare relative to a default-only approach is somewhere between 1% and 2%. For 1% under-saving the inclusion of the minimum default rate pushes the entire curve above the curve with no minimum included indicating that the inclusion of the minimum reduced welfare for all default rates under this assumption. The reverse occurs with a 2% or higher under-saving assumption, where the curve including the minimum savings rate lies entirely below the curve not including it, indicating that its inclusion increased welfare for all default rates under this assumption. Given the controversy and uncertainty about how much people under-save, policymakers should be wary of mandating such a minimum savings rate if they are not confident that people do in fact under-save by an average of at least 2% once they make an active choice about how much to save.

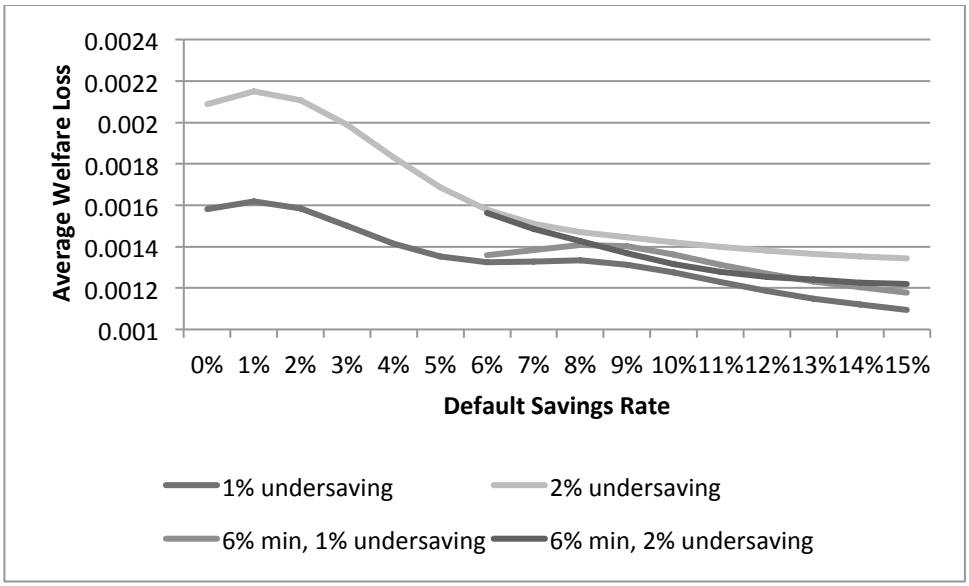

Figure 5. Average Welfare Loss for 1% and 2% Under-Saving Assumptions

C. Sensitivity Test: Impact of Stickiness Assumption

Stickiness can sometimes be beneficial when it keeps people who would otherwise under-save at a higher savings rate than they would choose if they made an active choice, but it can also sometimes be detrimental when it causes people to remain at a default below their optimal savings rate when they would choose a higher rate than the default if they made an active choice. So, important questions for policymakers include: Under what conditions can this stickiness increase welfare and what is the "optimal stickiness"? Would average welfare benefit from less sticky or stickier

defaults under the basic model?

The charts below show the average welfare loss by level of the maximum stickiness variable for a 9% default savings rate under the basic model assumptions as well as under alternative assumptions of 5% and 1% average under-saving. As seen in Figure 6 below, under the basic model assumptions, the stickiness factor which produces the lowest average welfare losses is around 0.0025, which is lower than the 0.0040 assumed in the model, suggesting that average welfare would be increased by reducing stickiness from its initial level. Therefore it may be beneficial for plan sponsors to remind and encourage those who have so far remained at the default savings rate to make an active choice about what rate to save at. However, the optimal stickiness is clearly above zero, suggesting an approach that forces all participants into making an active decision may not be optimal. Also, some policy approaches which are too aggressive in forcing people to make active choices might not only reduce stickiness but also encourage poorer quality decisions about what rate to choose as a result of the excessive pressure.

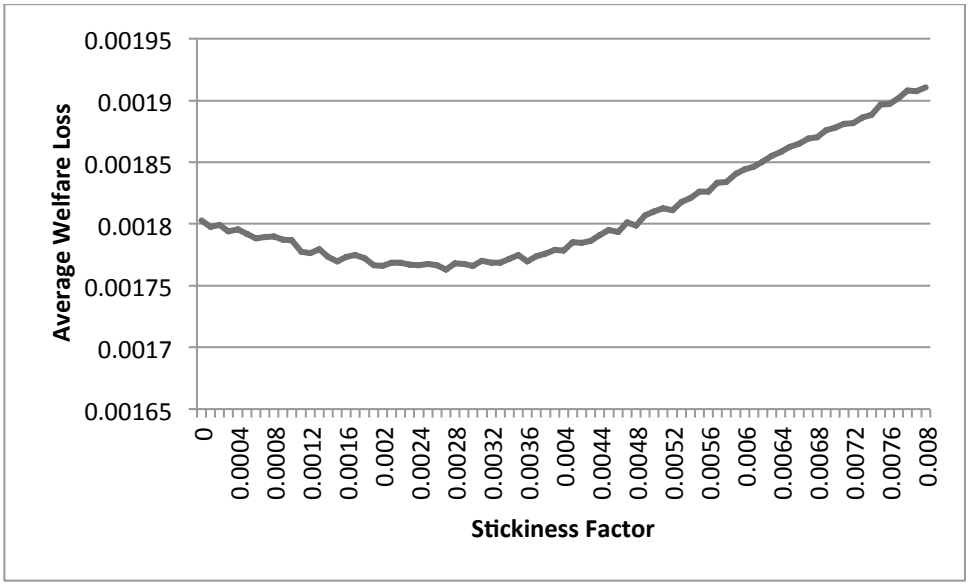

Figure 6. Average Welfare Loss by Stickiness Factor Under Basic Model Assumptions

Figures 7 and 8 show that the "optimal" level of stickiness depends on how much it is assumed that people under-save. The level of stickiness which corresponds to the lowest average welfare losses is higher when assuming 5% under-saving than it is under the basic model assumption of 3% under-saving, which is in turn higher than when assuming 1% under-saving. This result makes sense, because the more it is assumed that people

make good decisions if they opt out the more their proneness to remain at the default level hurts them. Conversely the more it is assumed that people would make poor decisions if they opted out of the default, the more their inclination to remain with the default may actually help them.

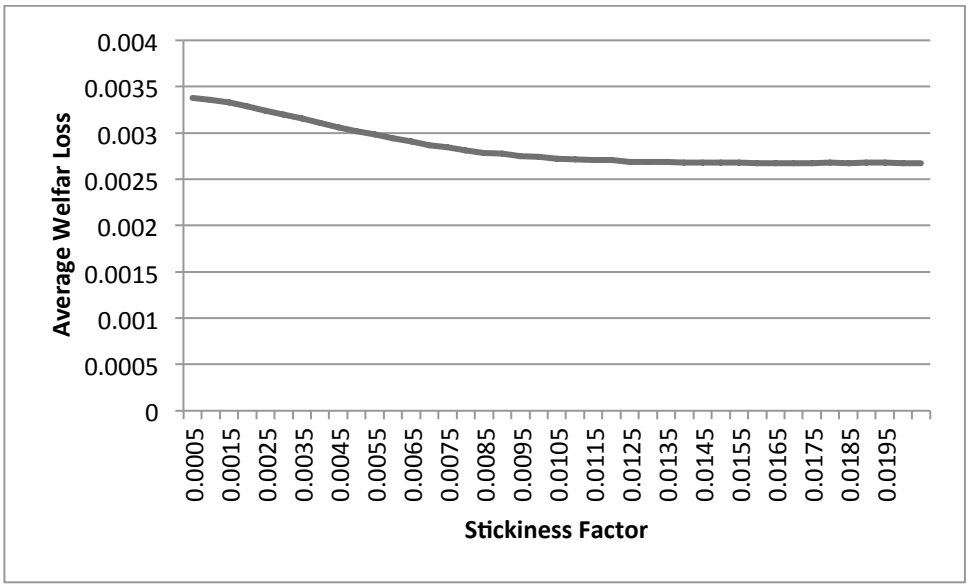

Figure 7. Average Welfare Loss by Stickiness Factor Assuming 5% Under-Saving

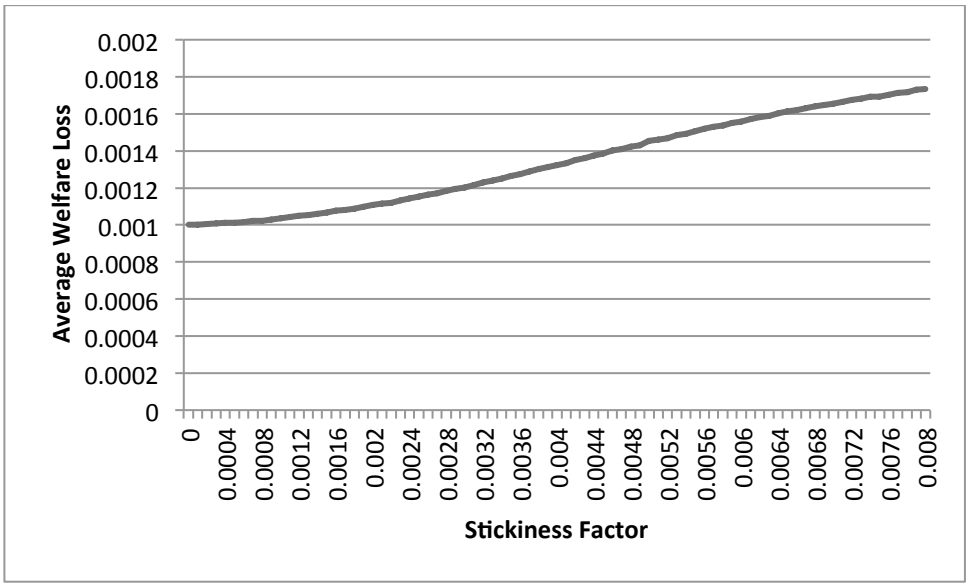

Figure 8. Average Welfare Loss by Stickiness Factor Assuming 1% Under-Saving

D. Sensitivity Test: Function of Distance between Preferred and Default Rates

The basic model assumes that individuals decide to opt out from the default rate if the squared difference between their preferred savings rate and the default savings rate under the plan exceeds their stickiness factor. This assumption about the shape of this function was calibrated based on relatively little data however, so it might be concerning if it is playing too significant a role in the results of the analysis. If individuals were less sensitive to how close the default savings rate is to their preferred savings rate than the basic model assumes, then an absolute value function might be more appropriate. For the graph in Figure 9 below, the formula for determining the rate chosen by each individual, r_i is changed from its definition in equation (1) to the definition in equation (4) below:

$$r_i = \begin{cases} \max(m, p_i), & if\ abs(d - p_i) > s_i \\ d, & if\ abs(d - p_i) \leq s_i \end{cases} \quad (4)$$

This change reduces the sensitivity of the opt-out decision to how close the preferred and default savings rates are to each other, making it more likely that individuals will remain with the default savings rate even if their preferred rate is far from it. The maximum stickiness factor was re-estimated under this assumption, with the maximum value providing the best fit to the available data under this assumption determined to be 0.1. The shapes of the curves are similar under either assumption, with the curve for the linear function higher than the one for the quadratic function. At lower default rates, the difference between the two curves is greater, with the linear function producing greater welfare losses at these rates.

Because the shapes of the two curves are similar, the assumption of the function of the distance between the default rate set by the plan and an individual's chosen rate to use in determining whether that individual will opt out does not significantly impact the results of the model. Likely an assumption which was a combination of linear and quadratic functions would result in a curve somewhere between the two and also have similar implications for plan sponsors and policymakers. Therefore the model is relatively robust to the function chosen, at least within the range between linear and quadratic cost functions.

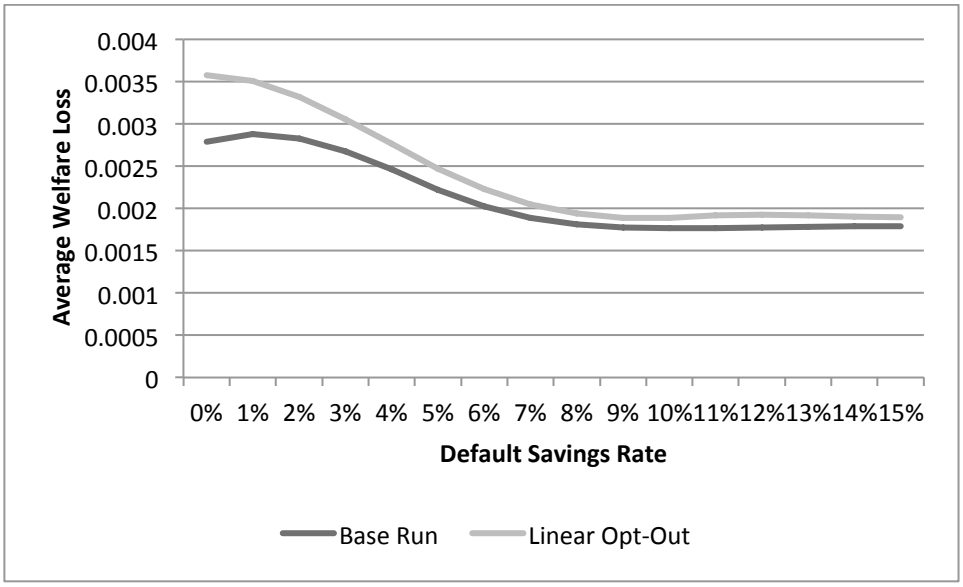

Figure 9. Average Welfare Loss for Linear Cost Function Compared to Basic Model

E. Asymmetric Welfare Functions and Other Metrics

Policymakers may not consider the relative costs of under-saving and over-saving to be symmetrical. They may, for example, consider under-saving to be more problematic, because retirees with inadequate retirement savings are unable to compensate as effectively as a working over-saver might be able to. They may also be more concerned about the social costs imposed by poverty in retirement relative to those associated with excessive saving and consequently depressed spending during working years. On the other hand, policymakers might consider over-saving in 401(k) plans to be more problematic, as these plans are tax-advantaged, so savings in excess of those necessary for achieving the policy goal of providing for security in retirement represent a drain on the treasury. The graphs below illustrate the impact of changing the welfare function to be asymmetrical. In Figure 10, the average welfare loss function is changed to *AWL'*, which doubles the penalty associated with under-saving, and is represented by equation (5) below.

$$AWL' = \begin{cases} \sum_{i=1}^{n} 2 * (r_i - o_i)^2 \,, if\ r_i < o_i \\ \sum_{i=1}^{n} (r_i - o_i)^2 \,, \qquad if\ r_i \geq o_i \end{cases} \tag{5}$$

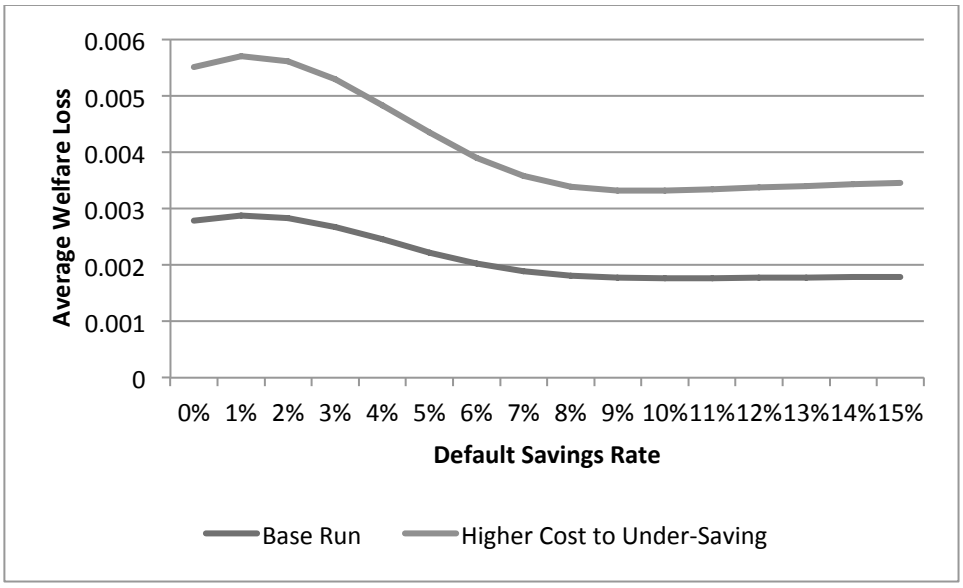

Figure 10. Effect of Welfare Loss Function Which Disproportionately Penalizes Under-Saving

In Figure 11, the average welfare loss function is changed to *AWL''* which doubles the penalty associated with over-saving, and is represented by equation (6) below.

$$AWL'' = \begin{cases} \sum_{i=1}^{n} (r_i - o_i)^2, & if\ r_i < o_i \\ \sum_{i=1}^{n} 2 * (r_i - o_i)^2, & if\ r_i \geq o_i \end{cases} \quad (6)$$

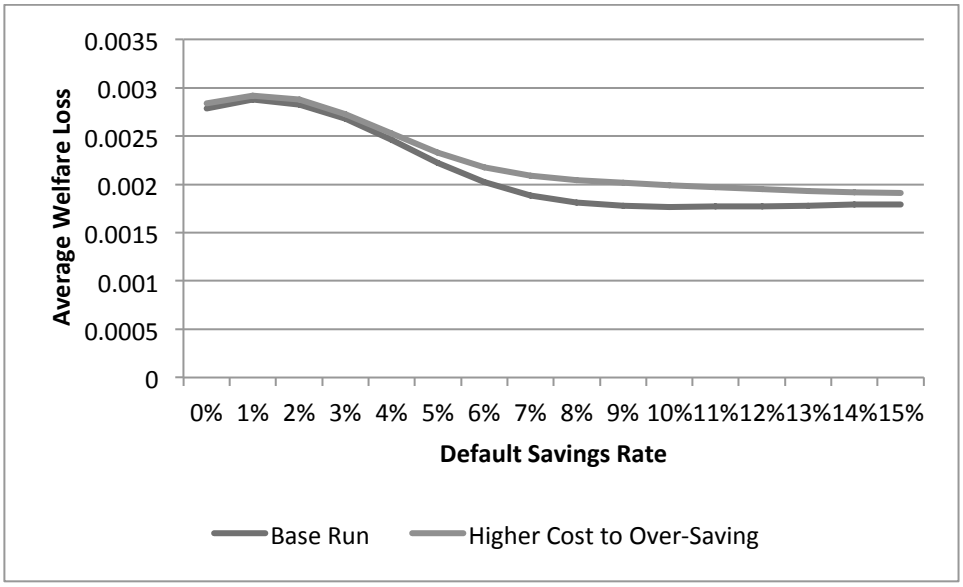

Figure 11. Effect of Welfare Loss Function Which Disproportionately Penalizes Over-Saving

Figures 10 and 11 show that doubling the welfare losses associated with under-saving relative to over-saving, or vice versa does not significantly change the shape of the welfare loss function. It does shift the welfare loss function, especially in the case of added penalty for under-saving, which makes sense given that the basic model assumption is that under-saving occurs substantially more than over-saving. Because the shape of the curves does not change significantly, the implications of the model for plan sponsors and policymakers who weight over-saving differently from under-saving is not very significant, at least up to weighting one twice as strongly as the other.

Policymakers and plan sponsors might also be interested in metrics other than average welfare loss. One approach could be to simply maximize average savings. Another approach for approaching default policy suggested by some behavioral scholars is setting defaults in a way that minimizes opt-outs.[57] Both of these alternative measures have the advantage that they do not require calculation of an optimal savings rate, which is unknown, and difficult and controversial to estimate. They may also be easier to grasp by policymakers, plan sponsors and plan members alike than an average welfare loss metric.

Figure 12 below shows both the average savings rate and the opt-out percentage for the basic model. Savings are maximized with a 9% default savings rate, which is a very similar recommended default rate to that given

[57] http://ethics.harvard.edu/event/liberty-paternalism-and-welfare

by the welfare loss analysis. This makes sense given that we are assuming that people generally under-save, so increasing actual savings generally increases welfare as well. This metric does not prove especially helpful if one wants to assess the value of a minimum savings rate, however, since an increasing minimum will always increase overall savings, and therefore an approach of trying to maximize savings by changing the minimum savings rate would suggest an infinite minimum savings rate, which is not a particularly helpful suggestion.

Minimizing opt-outs on the other hand results in a very different recommended default rate, and one which is more in line with the currently observed range of default rates from about 3% to 6%. This is far from the rate recommended by the average welfare analysis. The approach itself implicitly assumes that stickiness is beneficial and that opt-outs are detrimental and should be avoided, which is not the case under the base model.

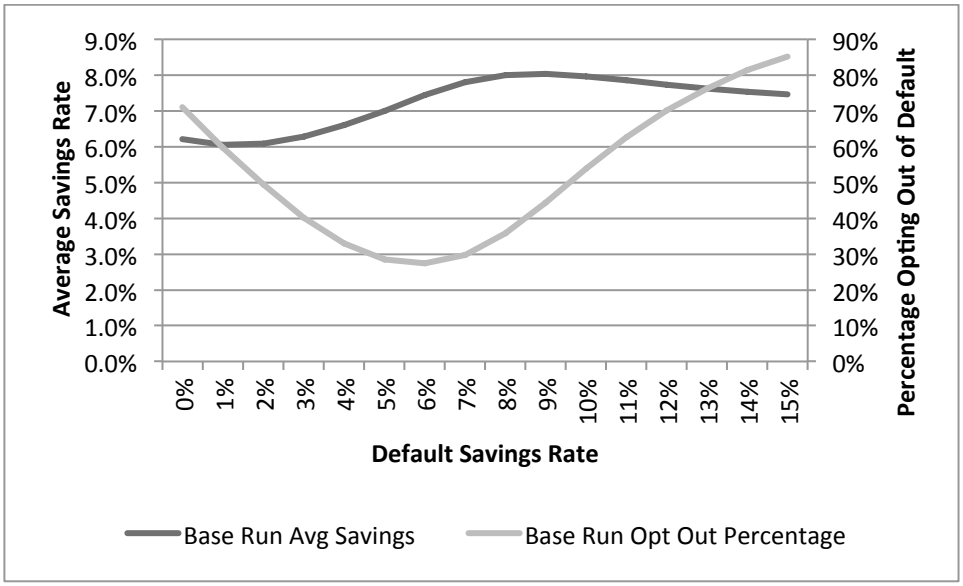

Figure 12. Average Savings Rate and Opt-Out Percentage Metrics

III. An Extension to the Basic Model: A Two-Population Model

A. Reasons for Using a Two-Population Model

In the base model it is assumed that all variables – preferred savings rate, under-saving bias, and stickiness - are independent of each other, so that individuals who prefer high savings rate are prone to stickiness and under-saving to exactly the same extent as those who prefer low savings rates. Evidence from Vanguard's plans suggest that in fact there are certain groups more likely to both save more and opt-out of the initial default, with

higher wage-earners, older workers, and longer-tenured workers all saving more and being less prone to stickiness than average.[58] This correlation could have important implications for default savings rate policy.

First of all plan populations are heterogeneous, with some much more heavily skewed towards lower-saving individuals and some skewed much more heavily towards higher-saving individuals. If the optimal defaults for these populations differ then it would be useful for plan sponsors to understand how they differ so as to be able to choose the plan design that is most appropriate for their population. This also has implications for policymakers, who might not want to create a one-size fits all approach to encouraging or mandating certain default and minimum savings rates if the optimal rates depend significantly on each plan population.

A second implication arises even if plans have an equal mix of high-savers and low-savers. Given that those with high preferred savings rates are likely to be less sticky, the actual default rate chosen has less of an influence on them. Therefore we might expect that the recommended default rate for even a plan with an equal mix of low-savings and high-savings populations would be closer to that recommended for the low-savings population than that recommended for the high-savings population.

Finally, dividing into high-savings and low-savings populations based on observable characteristics such as age, salary, and job-tenure allows the possibility of targeting each sub-population within a plan with a different default rate. Some have argued in favor of such individualized default rates.[59] A two-population model can help assess the likely benefits that could be achieved by allowing such targeting of the default rates. Such defaults would also likely make people more likely to interpret the default rate as a form of expert guidance, increasing stickiness via a stronger endorsement effect.

To illustrate these issues, the initial base model population is separated into a low-savings and a high-savings population. The low-savings population has a median preferred rate of 4% while the high-savings population has a median preferred rate of 8%, compared to the base model assumption of 6% median preferred savings rate for all individuals. Further, the low-savings population is assumed to have twice the stickiness of the average population in the base model, while the high-savings population is assumed to have only half of it. These assumptions are meant

[58] VANGUARD, HOW AMERICA SAVES 2014 (2014), 25, 31, figures 24 and 32 show that higher income, older, and longer tenured workers both save more in general and had a smaller difference in participation rates between voluntary and automatic enrolment, indicating lesser stickiness

[59] *See* Cass R. Sunstein, *Impersonal Default Rules vs. Active Choices vs. Personalized Default Rules: A Triptych* (May 19, 2013), available at http://ssrn.com/abstract=2171343.

to help illustrate some of the potential impacts of the existence of different populations with different stickiness and savings preferences. An alternative approach, which would likely more accurately reflect real plan populations would be to include more populations in between the lowest and highest savings populations. The two population approach was chosen for ease of modeling and explanation of results.

B. A Low-Savings Population

Figure 13 below shows that the optimal default rate for a low-savings plan population is 7%, which is lower than the optimal default rate of around 9% observed from the base model. It also shows the average welfare loss by default rate chosen when a 5% minimum savings rate is included in the plan. Multiple minimums savings rates were tested, and 5% was found to be the minimum savings rate which produces the lowest average welfare loss. These optimal default and minimum savings rates indicate that plans having a lower-saving population than average would maximize their plan members welfare with lower default and minimum savings rates than the average plan. Figure 13 also shows that inclusion of the minimum savings rate mitigates some of the welfare costs of using an extreme default, since those who opt-out are limited in the degree to which they can under-save as a result.

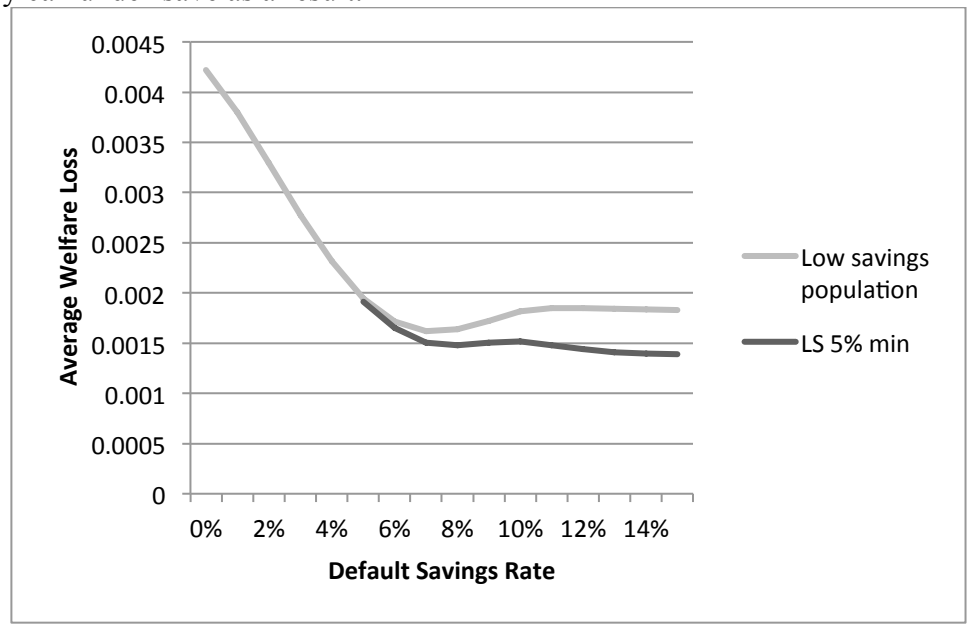

Figure 13. Average Welfare Loss by Default Rate for Low-Savings Population

C. A High-Savings Population

Figure 14 below shows that the optimal default rate for a high-savings plan population is 13%, which is higher than the optimal default rate of around 9% observed from the base model. It also shows the average welfare loss by default rate chosen when an 8% minimum savings rate is included in the plan. Multiple minimums savings rates were tested, and 8% was found to be the minimum savings rate which produces the lowest average welfare loss. These optimal default and minimum savings rates indicate that plans having a higher-saving population than average would maximize their plan members' welfare with higher default and minimum savings rates than the average plan.

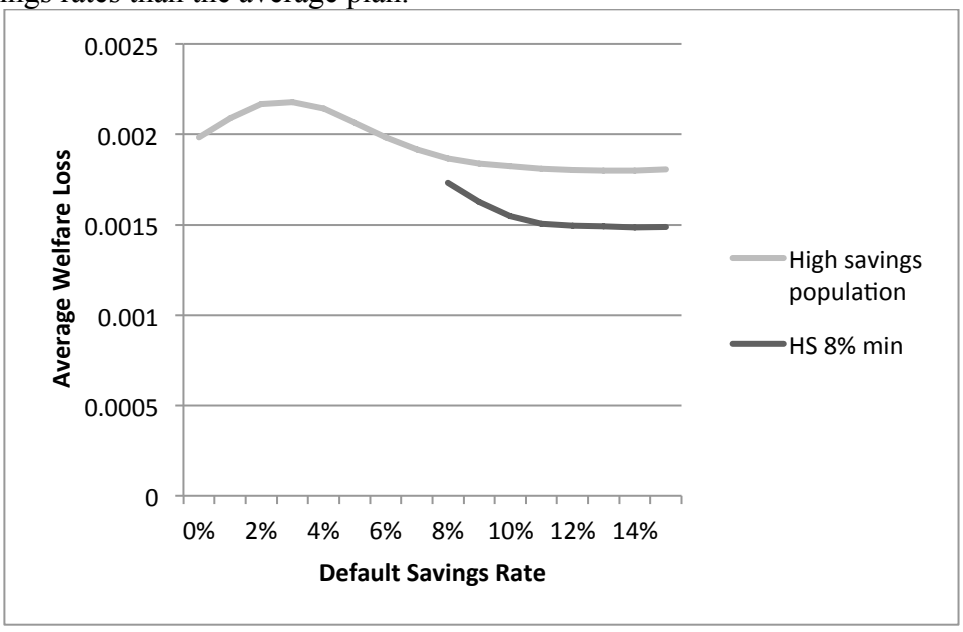

Figure 14. Average Welfare Loss by Default Rate for High-Savings Population

D. A Mixed Population

Figure 15 below illustrates the different welfare losses by default savings rates for a plan consisting of a single average population, and one which is made up of 50% low-savers and 50% high-savers. While the average preferred savings rates are the same under either set of assumptions, and the overall average welfare losses are similar, the mixed model has different policy implications that the base model. Because the higher-savings population is less sticky than the low-savings population, they tend to opt-out regardless of the default rate set in the plan, which makes the

shape of the curve more similar to that of simply the low-savings population. The result is that the optimal default rate for this mixed population is 7%, the same as it was for the low-savings population, but lower than it was when under the assumption of a homogeneous population used in the base model. This illustrates that the correlation between savings preferences and stickiness can have a significant impact on the welfare analysis.

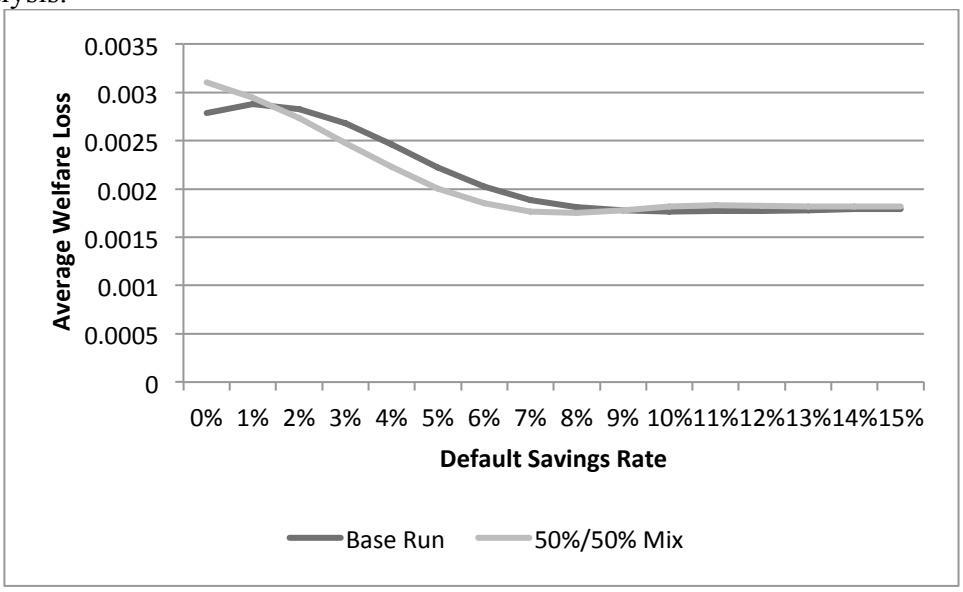

Figure 15. Average Welfare Loss by Default Rate for Mixture of High – and Low-Savings Populations Compared to the Base Model

E. Individualized Defaults

A lot of participant variation can be described by a few variables known to the plan sponsor, so the sponsor could conceivably create individualized defaults based on these variables. Plan sponsors might either use information they already have about their employees, such as their salary, age, years of service at the company, and gender, or they might ask that employees fill out a survey in order to gather the necessary information on which to base individualized defaults. Opt-out rates would be reduced by this policy by making default rates closer to preferred rates as well as potentially increasing stickiness factors, as individuals might perceive the tailored default as an even stronger form of expert guidance and be less likely to deviate from it.

If we assume first that there is no such increase in the stickiness factor associated with using individualized defaults, and that a plan sponsor is able to identify which population each individual belongs to, setting the optimal default rate for each population (7% for the low-savings population and

13% for the high-savings population) then the plan could lower overall average welfare losses to 0.001709. This is an improvement from the average welfare losses of 0.001752 if the same default rate of 7% must be applied to all plan members. However, if the use of individualized defaults creates a stronger endorsement effect, increasing stickiness, then the impact of this policy could be reduced. If the use of individualized defaults doubles the stickiness of each plan population, then the average welfare loss associated with individualized defaults increases to 0.001749, only slightly lower than the average welfare losses from not using individualized defaults at all.

Figures 16 and 17 show the average welfare losses of the low- and high-savings populations with and without this increased stickiness. They illustrate how increased stickiness can be detrimental – in each case the curve reflecting increased stickiness lies entirely above the curve without the increase, meaning the increase in stickiness increases average welfare losses. The curves do get much closer to each other around the optimal default rate for each population however, illustrating that increased stickiness is not as costly if plan sponsors accurately select the optimal default savings rate. In this way, increased stickiness puts more pressure on plan sponsors to get this default rate correct because it makes it less likely participants will opt out of the default even if it is inappropriate for them.

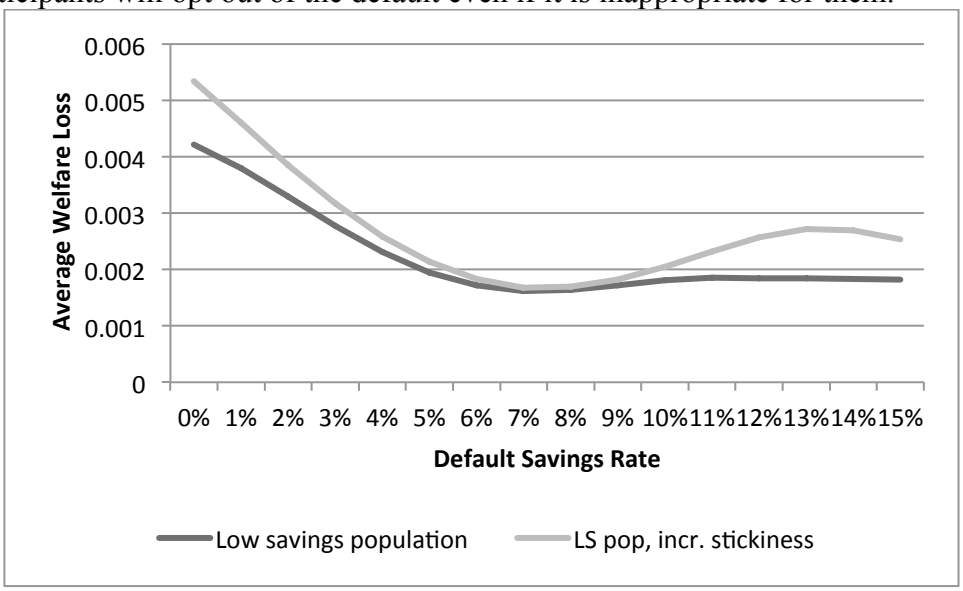

Figure 16. Average Welfare Loss by Default Rate for Low-Savings Population with and without increased stickiness associated with individualized defaults

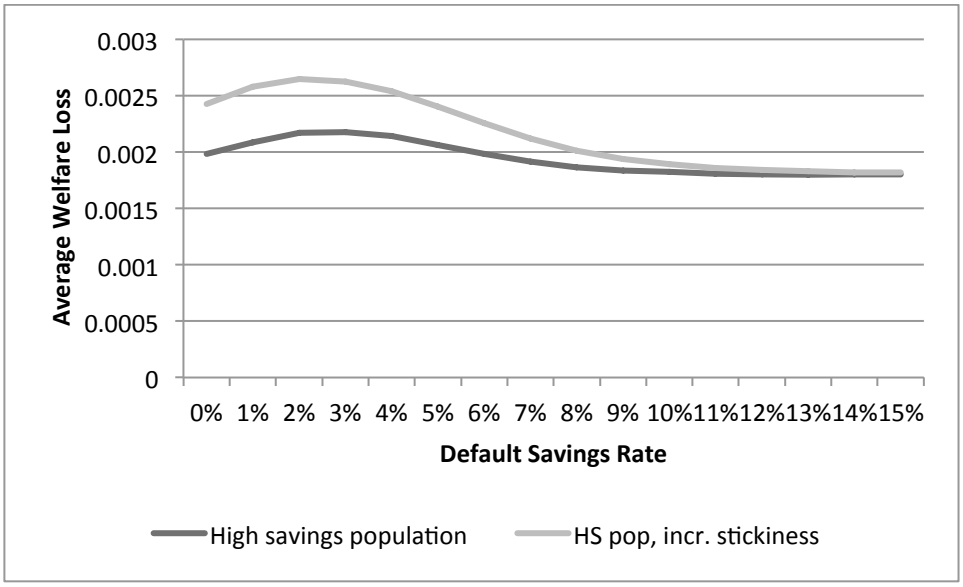

Figure 17. Average Welfare Loss by Default Rate for Low-Savings Population with and without increased stickiness associated with individualized defaults

If policymakers did decide that individualized defaults might be beneficial for plan participants, they would probably have to create a safe harbor from fiduciary liability when doing so. Under current law, plan sponsors might be wary of adopting individualized defaults for fear of incurring any liability as a fiduciary if the resulting default rates were inappropriate for some individuals. By tailoring them to each individual, they would be more likely to be seen as offering investment or retirement planning advice.

In making such a safe harbor policymakers would have to consider what attributes employers should be allowed to use to individualize their default savings rates. The choice of these attributes may be politically controversial. For example, such a policy would likely provide a higher default savings rate for higher income earners, because social security provides a lesser percentage of their retirement income needs. Encouraging higher income earners to save more (and take greater advantage of the tax breaks provided by 401(k)s) than lower income earners might provoke a backlash and would be contrary to the intent of the nondiscrimination testing required by current IRS regulations.

IV. Recommendations for Plan Sponsors and Policymakers

The framework outlined in this paper shows how stickiness of defaults and average levels of under-saving interact in assessing the welfare effects

of different levels of default savings rates and mandatory minimums. While the model would benefit from further research to refine the assumptions it makes, some policy implications become clear even under a variety of assumptions about employee behavior. The results demonstrate that default savings rates should be significantly higher than the 3% rate typical today. These relatively low defaults are encouraged by current policy, which provides a safe harbor from nondiscrimination testing even at these low rates. Taking into account the results under the basic model as well as the sensitivities, the author would recommend a default savings rate around 9% because default rates around this level are optimal or close to it under a wide variety of assumptions.

While an extreme default rate produces even better results under many assumptions, setting an intentionally extreme default would likely produce employee backlash and might significantly harm those who stay at the default despite how extreme it is. Instead the author would recommend approaches that attempt to reduce the stickiness of defaults, by frequently reminding plan participants who have not yet made an active choice that they have yet to do so and that the default rate likely is not the optimal choice for them. Plan sponsors should also encourage participants to use a reputable financial planning service to help them make this decision. This might decrease both the stickiness bias and the under-saving bias, which could significantly increase average welfare. Of course, the more employers prod and push their employees towards using expert financial planners, the more they might worry about exposing themselves to fiduciary liability when any of the advice goes wrong. Therefore a safe harbor from such liability under ERISA should be set up for employers who encourage their employees to use reputable third-party financial planners whose compensation is in no way tied to the decisions the employees make.

These results also show that even under assumptions of complete rationality, a zero default rate is sub-optimal. Therefore it is recommended that the traditional Safe Harbor Plan be removed, in favor of requiring automatic enrolment for all plans seeking to avoid nondiscrimination testing. In fact, under any of the assumptions studied here, a default rate of 4% outperforms a 0% default, so policymakers should encourage plan sponsors to use automatic enrolment by stronger means than merely a safe harbor. Automatic enrolment should therefore be a mandatory requirement, rather than an alternative to nondiscrimination testing. A safe harbor from the nondiscrimination testing could still be provided for those plan sponsors who choose to offer default rates and non-elective contributions even higher than the new mandatory minimum levels of these. Additionally, the current maximum default of 10% should be removed, given that high rates encourage participants to make active choices and as a result tend to either

improve average welfare or not decrease it significantly, depending on the assumptions used. The IRS might be concerned that removing this maximum could result in over-saving in some plans, excessively depriving the federal government of tax revenues. However, this impact is muted since most people opt out of defaults which are set at an extremely high level. As seen in the section of the paper on asymmetric welfare loss functions, even when using a welfare function that penalizes over-saving twice as much as under-saving, high default savings rates do not create significantly greater welfare losses than lower default savings rates.

The matching component of the safe harbor test should also be eliminated in favor of a mandatory minimum employer contribution. Because the match should be such a powerful incentive to save at least up to the match, the difference between a match and a non-elective contribution functions mostly to penalize those who fail to appreciate how good of a deal it is, which does not seem like an appropriate objective of retirement savings policy. If the matching is preserved, then employers should be required to set the default rate to at least the level necessary to qualify for the full match in order to qualify for the safe harbor.

Mandatory minimums in excess of the current 3% encouraged by the safe harbors would be justified by this model, which shows 6% to the optimal minimum rate. However, the mandate underperforms when the average under-savings rate drops to 1% or less, so a decision with respect to whether to apply a minimum rate depends on how much one assumes participants under-save on average. Minimum savings rates also raise concerns about the value of individual choice and the deprivation of information to future policymakers about how many people would prefer to save less than the minimum and why.[60] Based on these concerns, the author would not actively encourage mandates at a level higher than the 3% rate encouraged by current law until more research could be done on average levels of under-saving, and the reasons why those who currently save low amounts do so.

* * *

[60] *See e.g.* Sunstein *supra* note 56

Appendix 1: R Code for Basic Model

```
for (i in 1:16) {
pmu<-log(6)             # mu-value for distribution of preferred savings rates
psd<-sqrt(2*log(1.2)) # sigma-value for distribution of preferred rates
bmu<--0.03              # average behavioral bias once savings rate chosen
bsd<-0.03               # sd of behavioral bias once savings rate chosen
n<-1000000              # number of participants in plan
smult<-0.004            # maximum value of stickiness factor
d<-(i-1)/100            # default savings rate in plan
m<-0.00                 # minimum savings rate in plan
p<-rlnorm(n,pmu,psd)/100     # preferred savings rate random variable
b<-rnorm(n,bmu,bsd) # behavioral bias random variable
o<-p-b                  # optimal savings rate random variable
s<-runif(n,0,smult)     # stickiness factor random variable
k<-(d-p)^2              # squared difference from preferred rate to default
oo<-ifelse(k>s,1,0)     # optout binary variable
r<-ifelse(k>s,ifelse(m>p,m,p),d) # actual savings rate chosen
l<-(r-o)^2              # welfare loss for each individual
avgr[i]<-mean(r)        # average actual savings rate
optout[i]<-mean(oo)   # percentage optout
awl[i]<-mean(l)}        # average welfare loss
```