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IMPACT OF DEFAULTS IN RETIREMENT SAVING PLANS: PUBLIC EMPLOYEE PLANS

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ABSTRACT

This study examines the impact of the adoption automatic enrollment provisions by the state of South Dakota for its supplemental retirement saving plan (SRP). In South Dakota, state and local government employees, including teachers, are also covered by a defined benefit pension plan and by Social Security. Thus, career public employees in South Dakota can expect a life time annuity from these two programs of around 75 percent of their final salary. Prior to the introduction of automatic enrollment, the proportion of newly hired employees who were contributing to the SRP was less than three percent in their first year of employment. After the introduction of automatic enrollment, over 90 percent of newly hired workers who were auto enrolled were participating in the plan. Significant differences compared to earlier studies of auto enrollment include: we are examining public employees who are also covered by a defined benefit retirement plan, prior to the introduction of auto enroll participation were extremely low, and these is no employer match to employee contributions to the SRP. Thus, the key question is whether auto enrollment has the same powerful impact on contributions to a retirement saving plan under these conditions.

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Impact of Defaults in Retirement Savings Plans: Public Employee Plans

Over the past two decades, a series of papers have shown the power of defaults to alter saving decisions in employer-provided retirement saving plans. Studies have shown that automatic enrollment policies have two primary effects. First, the adoption of automatic enrollment results in a substantial increase in the proportion of employees participating in retirement saving plans. While the magnitude of the increase in the participation ranges from study to study, research generally indicates participation rises from about 60 percent of the workforce in traditional plans without automatic enrollment to over 90 percent once automatic enrollment is adopted. Second, firms adopting automatic enrollment policies must also select a default contribution rate, often three percent of salary, and this default contribution rate usually becomes the modal contribution to the plan.

In general, these studies have been conducted using administrative data for a single firm or a small set of private sector firms in which the retirement saving plan is the only employer-provided pension plan. The analysis typically focuses on the introduction of automatic enrollment to an existing 401(k) and compares participation and contributions rate shortly before and a few months after the adoption of the policy.

The present study adds to this literature by examining the impact of the adoption automatic enrollment provisions by a state government, specifically the adoption of automatic enrollment by the state of South Dakota for its supplemental retirement saving plan (SRP). In South Dakota, state and local government employees, including teachers, are also covered by a defined benefit pension plan and by Social Security. Thus, career public employees in South Dakota can expect a life time annuity from these two programs of around 75 percent of their final salary. Prior to the introduction of automatic enrollment, the proportion of newly hired employees who were contributing to the SRP was less than three percent in their first year of

employment. After the introduction of automatic enrollment, over 90 percent of newly hired workers who were auto enrolled were participating in the plan.

We begin with a review of the literature examining the impact of defaults in retirement saving plans and show how the present study represents an important addition and extension to our understanding of the role of defaults in a different setting. Section II describes both the mandatory defined benefit plan offered by South Dakota and the process by which automatic enrollment was adopted by some but not all of the government agencies in South Dakota. We then discuss the administrative data available to us and how this project differs from the earlier studies on defaults. Section III presents an overview of the change in participation and contribution rates after the introduction of automatic enrollment for the SRP. Finally, in Section IV, we use regression analysis to determine the characteristics of individuals most likely to remain in the SRP who were employed by agencies that adopted automatic enrollment along with the probability of individuals, who are employed by agencies that did not adopt automatic enrollment, deciding to opt into the SRP.

I. Review of the Default Literature

In large measure, the focus on defaults in retirement saving plans stems from the emergence of behavior economics and the framing of choices (Benartzi and Thaler, 2004, 2013). Traditional economic theory would suggest that with freedom of choice among various options, defaults should not affect ultimate outcomes. However, limited information about the value of different distribution options and procrastination or inertia may result in defaults leading to permanent decisions.

The recent literature examining the importance of defaults in supplemental retirement savings plans begins with Madrian and Shea (2001). They analyze the 401(k) savings behavior of employees in one large corporation before and after the introduction of automatic enrollment. The company in this analysis is a publicly traded Fortune 500 company in the health care and insurance industry, it was national in scope with locations in 38 states. The employer match in the plan was 50 percent on the first 6 percent of an employee's salary before and after the change in enrollment. The 401(k) plan was the only retirement plan offered by the firm. Prior to the adoption of automatic enrollment, the participation rate in the 401(k) plan was 57 percent.

Auto enrollment was adopted by the firm in 1998 with a default contribution of 3 percent of salary. The result of automatic enrollment was that participation increased to over 80 percent and default contribution rate was a strong determinant of actual contributions.[1] Among those hired after the introduction of automatic enrollment, 86 percent remained in the plan after one year. Madrian and Shea (2001, p. 1161) also found that automatic enrollment "equalizes participation rates across various demographic groups," i.e. the participation rates among those employees least likely to participate in retirement saving plans increased before automatic enrollment (younger and lower-paid employees along with black and Hispanic workers) increased in magnitude relative to those groups who were already participating at high rates.

Choi, et al (2004) examined the impact of automatic enrollment using data from three large corporations in different industries (office equipment, health services, and food products). Once

[1] In a related paper, Carroll, et al (2009) examine a strong positive effect on participation when a firm used what the authors called an "active decision" requirement. This study examined data for a single large financial services firms. See Beshears, et al (2009) and Choi et al (2005) for additional analysis of the effect of auto enrolment.

again, the retirement saving plan is the only pension plan offered by each of the companies. This paper utilizes data over a three year period. They report that adoption of automatic enrollment has a "dramatic impact" of increasing participation rates to over 85 percent in all three companies. After being automatically enrolled, between 65 and 87 percent of individuals in all three companies contributed exactly at the default contribution rate.[2]

Choi, Laibson, and Madrian (2004) examine employee responses to the introduction of automatic enrollment in nine companies. In each case, they find that in the absence of automatic enrollment participation rates are rather low but increase with tenure. Following the introduction of automatic enrollment, participation rates jump to between 86 and 96 percent.

Several earlier studies should be mentioned as they relate to the current study even though they did not examine automatic enrollment policies. Key areas of interest are the presence of an additional pension plan and the level of employer communications about plans offered by the employer and the importance of additional saving for retirement. As we will see later, public employees in South Dakota are covered by a defined benefit plan and the retirement system sent regular communications concerning the adoption of automatic enrollment into the SRP. Andrews (1992) examined Form 5500 data which report pension information provided by plan sponsors. She finds that the probability of participation in a retirement saving plan rises with age, earnings, and tenure and importantly, participation rates decline in the presence of a defined benefit pension plan. Papke (1995) also finds that workers covered by another retirement plan are less likely to contribute to a 401(k) plan. Clark and Schieber (1998) and Bernheim and

[2] Bernheim, Fradkin, and Popov (2015) develop various method of evaluating the welfare gains and costs of imposing defaults in 401(k) plans.

Garret (2003) report that employer communications concerning retirement plans can increase participation in retirement savings plan.

Most of the studies to date have examined data from private sector firms that do not provide a defined benefit plan in addition to the retirement saving plan. An exception to the focus on private sector firms is Goda, et al (2018) which examines federal employees and participation in the Thrift Saving Plan (TSP). In additional to being able to contribute to the optional TSP, federal employees are also covered by a defined benefit plan. This study reports a participation rate over 90 percent before the adoption of automatic enrollment and a subsequent small increase in participation after its adoption.

Clark and Mitchell (2019) studied the saving decisions of employees in a quasi-governmental agency. The employees were covered by Social Security and a defined benefit pension plan. In addition, workers were given the opportunity to contribute to a 401(a) retirement saving plan with relatively generous employer contributions. Clark and Mitchell found that a change in the default investment from a moderate asset allocation fund (AAF) to age related target date funds (TDF) with more investment risk did not alter participation rates in the plan nor did it alter the contribution rates of participants. At the time of the change in the default, all assets previously held in the AAF were mapped into the new TDF. While participants could change investment to offset the higher risk associated with the TDF relatively few did so. Thus, the power of defaults seems to extend to the default investment in retirement savings plans.

Most of the papers examine the response to automatic enrollment in 401(k) plans offered by private sector firms where the plan sponsor has an employer match and does not offer any other retirement plan. In general, the research findings indicate that the adoption of automatic enrollment for 401(k) plans in these situations results in substantial increases in participation in

saving plans[3] and that employee contributions are centered on the default contribution rates. These findings imply that workers do not subsequently opt out of the plans and that once in the plan, they seldom change their contribution rate. The present study examines whether automatic enrollment will have similar powerful effects for public employees who are also covered by a defined benefit plan and when the employer does not provide an employer matching contribution.

II. Adoption of Automatic Enrollment in South Dakota

Virtually all state and local government employees teachers in South Dakota are covered by the South Dakota Retirement System (SDRS) and they are also covered by Social Security. SDRS is a defined benefit pension plan with a benefit formula:

Benefit = 1.55% times (final average salary) times (years for service after 2008)

Plus

Benefit = 1.7% times (final average salary) times (years for service before 2008)

Individuals can retire with unreduced benefits at age 65 or if they meet the Rule of 85 requirements, if the sum of the retiree's age plus years of service equal 85.[4]

Prior to the introduction of automatic enrollment, very few newly hired employees enrolled in the SRP in their first years of employment. For example, between 2005 and 2009, fewer than three percent of newly hired workers enrolled in the SRP during their first year of employment. This level of participation is much lower than found in earlier studies of private

[3] An exception to this conclusion is the paper by Butrica and Karamcheva (2015) which reports that automatic enrollment increases participation by only seven percentage points.

[4] Details of the SDRS pension are described in the member handbook of the system which can be accessed at http://www.sdrs.sd.gov/docs/ClassAFoundationMemberHandbook.pdf

sector firms who do not offer a defined benefit.[5] Another potential reason for limited participation in the plan is that the South Dakota SRP does not have an employer matching contribution. In 2009, the state legislature enacted legislation that allowed, but did not require, each government agency that participated in the South Dakota Retirement System and the SRP to institute automatic enrollment for all newly hired employees. [6]

While virtually all primary defined benefit and defined contribution public sector plans automatically cover all full-time employees, the SDRS was one of the first major public sector retirement systems, along with the Employees Retirement System of Texas, to implement automatic enrollment for their supplemental savings plan. The adoption of the automatic enrollment policy by an agency requires that this policy be applied to all of the agency's newly hired employees. Once the automatic enrollment policy is adopted, all permanent full-time employees hired on or after a determined date are automatically enrolled in the SRP at a default contribution of $25 per month (about one percent of the mean salary of South Dakota public employees). This default contribution rate is much lower than is typically associated with automatic enrollment policies in the private sector.

The initial contributions to the SRP are placed in a money market account, for first 90 days after which time funds are transferred to an age appropriate target date fund. The participant can allocate these contributions to other investment options anytime during this 90-day window as well. Once automatically enrolled in the SRP, the participant has the option to increase contributions up to IRS maximum limits, move current and future contributions to other investment options, and within the first 90 days of being automatically enrolled, opt out of the SRP and receive a refund of all contributions. Once this 90-day window has past, future contributions can be stopped, i.e. the employee can opt out of the SRP; however, the participant

[5] The proportion of South Dakota public employees who participate in the retirement saving plan is also considerably lower than participation rates for North Carolina teachers who are also covered by a state managed defined benefit plan (Clark, et al 2016 and Clark, Pathak, and Pelletier, 2018)

[6] Clark, Franzel, and Pelletier (2018) provide a detailed description of the automatic enrollment provisions and the process by which this policy was adopted and introduced.

cannot receive a refund of initial contributions unless they are eligible for a one-time, in-service distribution under IRS rules, are separated from service, or retire.

The introduction of automatic enrollment by South Dakota provides the opportunity to estimate the impact of automatic enrollment provisions in an environment that is much different from previous studies. There are three major differences between the South Dakota case and that of earlier studies. First, public employees in South Dakota are also covered by a defined benefit plan that provides employees with 20 to 30 years of service with a life annuity of 30 to 50 percent of final earnings. Since the workers are also covered by Social Security, most career public employees in South Dakota will have retirement income of about 75 percent of their final salary in the form of life annuities from SDRS and Social Security without contributing to the SRP. Second, the SRP does not provide any employer matching contributions so there is a more limited enticement to contribute to this tax deferred saving plan compare to private sector 401(k) plans that have been the focus of previous studies. Third, the default contribution is considerably lower than that used by most employers in other studies so that the monetary need to opt out is much less for the South Dakota employees. The main research question we examine is whether automatic enrollment will have the same powerful impact on participation rates for public sector workers covered by a defined benefit pension plan and a retirement saving plan that provides no employer matching contributions.

III. Changes in Participation and Contribution Rates in Response to the Adoption of Automatic Enrollment

To determine how public employees who are also covered by a defined benefit plan respond to automatic enrollment in a supplemental retirement plan, we obtained administrative records from SDRS on all public employees in South Dakota who were hired between 2005 and 2016. Using these data, we are able to determine enrollment and contribution rates for all new hires in the first year of employment and the subsequent participation rates between the hire date and 2016. A unique aspect of this analysis is that we are able to observe contributions for a number of years after employment for both those hired before and after the introduction of automatic enrollment. Since not all public agencies adopted automatic enrollment, we also observe participation and contributions for individuals hired in the same year for those automatically enrolled and those employed in agencies that did not adopt auto enrollment. The data on annual

contributions, account balances, and annual salary is reported over fiscal years (July 1 to June 30). Our analysis covers new hires in SDRS and who have access to the SRP. Between 2005 and 2016, 50,333 such new employees were hired by government agencies in South Dakota.

Participation Rate Soars with Adoption of Automatic Enrollment

From the administrative data, we observe the year each employee was hired and whether they contributed to the SRP in that first year as measured by total contributions at the end of the fiscal year, these trends are shown in Table 1. The number of new hires range between 3,000 and 6,000 every year. Columns 2 and 3, Table 1 sort new hires in each year into individuals whose employer had adopted auto enrollment and those employed by agencies where auto enrollment was not adopted. Of course, prior to 2010, no agency auto enrolled any new employees. Column 4 reports the percent of all new employees enrolled in the SRP by year of employment. The participation rate in the SRP for individuals hired between 2005 and 2009 was less than three percent in each year. It is important to note that this low participation rate is much lower that was found in other studies prior to the adoption of automatic enrollment, Thus, it would appear that given the expectation of lifetime annuities from both the SDRS and Social Security, most public employees decided that it was not in their self-interest to make contributions to a retirement saving plan.

[Table 1]

The introduction of automatic enrollment into the SRP produced a dramatic change in savings outcomes. After the new law went into effect, participation rates in the SRP for all new hires jumped from less than three percent to over 40 percent. This dramatic increase actually understates the impact of the adoption of automatic enrollment. Column 5, Table 1 indicates the percent of individuals hired after 2009 who were automatically enrolled in the SRP and who remained in the plan during their first year of employment rose to over 90 percent (except for individuals hired in 2012) following the introduction of the new policy. In comparison, Column 6 shows the percent of individuals who enrolled in the SRP and were not subject to automatic enroll remained less than eight percent in every year. The ability to compare same year contribution rates for South Dakota employees with and without automatic enrollment allows us

to control for time variant market conditions in a manner that has not been available to other studies.

Chart 1 further illustrates the impact of adopting an automatic enrollment policy. The solid line indicates the participation rate for all newly hired public employees in each year. The hashed line shows the participation rate of individuals hired after 2009 by agencies that did not adopt automatic enrollment and the dotted line indicates the proportion of new employees contributing to the SRP in agencies who were automatically enrolled. Thus, the adoption of automatic enrollment appears to have increased participation by approximately 40 percent for all South Dakota employees with the option of contributing to the SRP; however, the initial participation rate for those at agencies that adopted auto enrollment exceeds the rate for agencies that do not have auto enrollment by 85 percentage points.

[Chart 1]

It is interesting to note that the participation rate of 90 percent with automatic enrollment observed in South Dakota is very similar to the participation rate found in studies of private sector firms that do not provide their employees with a defined benefit plan and whose 401(k) plans offer employer matches. The low rate of opting out of the SRP supports the finding of earlier studies that inertia plays a substantial role in the effect of automatic enrollment. In addition, the low opt out rate in South Dakota may also be influenced by the relatively low default contribution rate of only $25 per month or about 1 percent; did the new employees even notice the modest reduction in their take home pay due to the default contribution. The change in participation rates in South Dakota indicate that even when employees have relatively high replacement rates from a defined benefit pension plan and Social Security automatic enrollment in a retirement saving plan produces participation rates of 90 percent.

Contribution Rate Settles around Default Contribution

Table 2 shows the median contribution rates for workers who enrolled in the SRP in their first year of employment ranged between 2 and 3.5 percent of annual salary prior to the

introduction of automatic enrollment.[7] As noted earlier, the default contribution rate for those automatically enrolled is only $25 per month. The average annual salary for all new hires during this period is $31,907, implying a default contribution rate for workers earning the mean salary for public employees equal to about one percent of annual earnings. The effect of this rather low default contribution rate is shown in the post 2009 years when median contribution rates fell substantially to approximately one percent of annual salary. One should note that these participants include individuals who would have contributed to the SRP without automatic enrollment plus those who would have not participated without automatic enrollment.

[Table 2]

These data support earlier findings that contribution rates after the introduction of automatic enrollment tend to cluster around the default contribution rate. An interesting observation is that the contribution rate to the SRP plan fell even for those who were not subject to automatic enrollment. This latter decline may be due to peer effects or the idea that the state has endorsed the low default contribution rate as the optimal saving level.

Are There Lasting Effects of Automatic Enrollment?

In order to determine the long-range impact of automatic enrollment on participation in retirement saving plans, one needs several years of employment data to see whether participation rates with automatic enrollment decline over time. Similarly, one needs to determine if participation rates rise over time without automatic enrollment. If rates decline relative to year of hire rates for those automatically enrolled and rise for those without automatic enrollment, then limiting the analysis of year of hire rates would overstate the positive impact of adopting automatic enrollment. To examine these issues, we once again sort the observations by year of employment and whether the employer adopted automatic enrollment, and then calculate the proportion of individuals by hire year who are contributing to the SRP for each year between

[7] Rollovers from other tax qualified saving plans into the SRP were not distinguished from annual contributions to the SRP. To avoid having large rollovers influencing our analysis, we capped total contributions to the SRP at the legal limit for each year.

year of hire and 2016. Participation rates between hire date and 2016 for those with and without automatic enrollment are shown in Table 3 by year of hire.

[Table 3]

The proportion of workers contributing to the SRP among those automatically enrolled steadily declines with additional years of employment. For those hired in 2010 who were auto enrolled, the participation rate fell from 92.3 percent in year of hire to 80.5 percent in 2016. Similarly for those hired in 2011, the year of employment rate was 94.4 percent and this rate declined to 84.8 percent in 2016. Thus, the proportion of individuals contributing to the SRP who were auto enrolled fell by about 10 percent points after five years. In contrast, the participation rates for those not automatically enrolled rise with years of service so that the positive effect of automatic enrollment on participation in the SRP declines over time with increased tenure. For example, for those not automatically enrolled and hired in 2010, the participation rate increased from 7.2 percent in 2010 to 11.5 percent in 2016. In each year of hire, the proportion of those not auto enrolled who were contributing to the SRP rose by about four percentage points after five years.

Once again, these findings are consistent with earlier studies that find that participation rates in traditional opt in savings plans rise with increases in tenure while participation in plans with opt out provisions tend to decline gradually over time. Despite these trends indicating a narrowing of the differences in participation the difference in participation rates for those subject to automatic enrollment and those who are not is still very significant several years after employment. This analysis shows that the adoption of automatic enrollment substantially increased participation in the SRP by South Dakotan public employees.

Comparing Agencies with and without Automatic Enrollment

An important question in this analysis is whether employees in agencies that adopted automatic enrollment differ significantly from those agencies that chose not to institute automatic enrollment. To examine the potential that differences across agencies are affecting changes in participation rates, we examine the participation rates between 2005 and 2009 in agencies that

ultimately did and did not adopt automatic enrollment along with the mean characteristics in the two groups of government agencies.

The results presented in Tables 4 and 5 suggest that employees in agencies that adopted auto-enrollment differ from those hired by agencies that did not adopt auto-enrollment. In Table 4, we report the fraction of new hires per year who participate in the SRP, before the introduction of auto-enrollment, splitting the sample according to whether or not the hiring agencies will eventually adopt auto-enrollment once it becomes available. We see that new hires in agencies who will later on adopt auto-enrollment are, for four out of the five years, more than twice as likely to participate in the SRP. At a 5 percent significance level we can reject the hypothesis that these rates are equal for any given year using a basic equality of means test. Overall the participation rates are low and the largest gap, 4.5 percent versus 1.67 percent, is just before the introduction of auto-enrollment. The difference in pre-reform participation rates across agencies may suggest that employee preferences influenced whether agencies adopted the automatic enrollment policy.

[Table 4]

To further assess how employees differ depending on whether the hiring agencies eventually adopt auto-enrollment we report in Table 5 the sample means for the different characteristics we have information about. More specifically, we look at age at hire, gender, and salary. Furthermore, we compute sample averages for new hires through the whole sample, before 2010 or 2010 and after. These sample averages are computed for all new hires in Column 1, new hires by agencies who eventually adopt auto-enrollment in Column 2, new hires by agencies who never adopted auto-enrollment in Column 3. A simple equality of means test strongly reject the

hypothesis that the means for agencies adopting or not auto-enrollment are equal. Economically, some of these differences are small. For example, the differences in age at hire are at most one year. The biggest differences can be seen for gender and salary. For pre and post auto-enrollment, new hires by agencies who eventually adopt auto-enrollment are about 10 percent more likely to be male and the salary is about $6,000 higher.

[Table 5]

These results suggest that there are differences in the employees of agencies who adopt auto-enrollment compared to those by agencies who don't. They tend to be slightly more likely to be male and have a higher salary. Before the introduction of auto-enrollment, they were also more likely to participate in the SRP. This suggest that in the more formal regression analysis below for the decision to participate in the SRP we want to control for these factors: age at hire, gender, salary, whether the agency eventually adopt auto-enrollment, whether the employee was auto-enrolled. While the participation rates and worker characteristics are statistically significantly different between the two groups of agencies, the magnitudes are relative small and are unlikely to affect the large post-reform differences in the proportion of new hires who contribute to the SRP in the first year of retirement.

IV. Regression Analysis

The richness of the administrative data from South Dakota allows us to examine several conclusions reported in earlier studies in more detail. In the following analysis, we estimate participation rates using probit models. Specifically, we estimate the probability of new hires making contributions to the SRP in their first year of employment whether they were automatically enrolled in the SRP or whether the new employee was not automatically enrolled.

A unique aspect of this analysis is that in the automatic enrollment years, some government agencies adopted automatic enrollment and others did not. Thus, we are able to examine participation decisions for individuals hired by agencies that ultimately adopted auto enrollment before and after this policy was established – this is the type of comparison in previous studies. However, we are also able to compare participation decisions for the same year when some agencies adopted automatic enrollment and others did not, thus controlling for year effects which is not done in other studies.

As with other studies that use administrative data, we have limited information about the personal characteristics of new hires. The data provided by the SDRS include the age of employees when first employed (measured in years), whether the employee is a female or male, the annual salary (measured in thousands of dollars), the specific state agencies that employed the individual, whether the employee was auto-enrolled in the SRP, and when the employer adopted auto-enrollment if it ever did. Using these data, we estimate participation decisions in various contexts.

Participation in SRP in First Year of Employment: 2005 to 2016

Using the complete sample of all 50,333 employees hired over the years 2005-2016, we estimate the probability that an employee participates in the SRP in the year of hire. The model includes explanatory variables: age at hire, a dichotomous variable equal to one if the employee is a male and zero if not, annual salary in first year of employment, a dichotomous variable equal to one if the employee was auto-enrolled and zero if not, a dichotomous variable equal to one if the employer adopted auto-enrollment and zero if not, and year of employment fixed effects. The participation model is estimated with and without interaction terms between automatic

enrollment and the individual characteristics of the new hires. The marginal effects derived from the two probit equations are shown in Table 6.

[Table 6]

Column 1, Table 6 reports the partial effects evaluated at the mean of the sample for the model without interaction terms. In this base case participation regression, age has no significant impact on the probability of newly employed workers participating in the SRP. Other variables in the model have small but statistically significant effects on the probability of contributing to the SRP. The probability that a male participates in the retirement saving plan is 0.83 percentage points higher than a newly hired female while a $10,000 higher initial salary increases the probability of participation by 2.0 percentage points. One should remember that during first half of the sample period, participation rates were very low so these small percentage point increases represent substantial percentage increases in the pre-auto enroll period.

Whether the employee was auto-enrolled into the SRP dramatically increases the probability of making a contribution to the SRP in the first year of employment. In this base case model, the probability of participation is 75.7 percentage points higher for those who were auto enrolled compared to those who were not. Whether the employer eventually adopts auto-enrollment also has an important impact, increasing the probability of participation by 13.7 percentage points. Holding constant whether the individual was automatically enrolled in the SRP, the year fixed effects indicate that the overall participation rate is between 10 and 20 percentage points higher in the post-automatic years compared to the years prior to agencies being allowed to adopt auto-enrollment. This finding suggests that there was a spill-over effect to the investment decisions of individuals hired by agencies who did not adopt auto enrollment.

To the base case model, we now add interaction terms consisting of age at hire, male, salary and employer auto-enroll dummy times an indicator variable I_{2010} equal to one for years 2010 and later, zero otherwise. The addition of interaction terms allow the slope parameters to change for these variables after the introduction of auto-enrollment. Results for the extended model are presented in Column 3, Table 6. We see that the impact of adding the interaction terms increases the magnitude of the direct effect of the personal characteristics in the pre auto-enrollment period. For example, if age at hire increases by 10 years then the probability of participation increases by about 3.2 percentage points. This compares to the finding of no effect of age in the base case. The estimated effect of being male increases from 0.08 percentage point to 2.05 percentage points, and a $10,000 higher initial salary increases the probability of contributing to the SRP by 3.9 percentage points compared to 2.0 percentage points in the base case.

While the direct effects increase in size in the auto-enrollment period, all the personal interaction terms have a negative sign which indicates that the adoption of automatic enrollment significantly reduces the differences in the probability of participation across age, gender, and salary groups. The magnitude of the interaction terms is such that auto enrollment almost cancels the economic significance of these factors (statistically with a Wald test we can reject the hypothesis that they are canceled). With a LR test, we can strongly reject the hypothesis that the interaction terms are all zero. The impact of employers auto-enrolling their employees declines from 75.7 percentage points in the base case to 64.4 percentage points. The impact of the employer being one who eventually adopt auto-enrollment goes form increasing the probability of participation by 6.6 percentage points before 2010 to 26.7 percentage points in 2010 and later.

The year fixed effects across the years 2010-2016 indicate that the probability of participating in SRP goes up by about 30 percentage points compared to the years 2005-2009.

An alternative way to interpret the estimates from the probit model is to compute the predicted probabilities of participating in the SRP for different scenarios. For example, let us consider the estimates for the model with interaction terms in Table 6 and the following stylized new hire: a 37 year old female earning $30,000. If this individual was hired in 2006 from an employer who never adopted auto-enrollment, the predicted probability of participating in the SRP is 1.5 percent, increasing to 4.55 percent if hired in 2011 instead. In 2006, if the employer is one who will eventually adopt auto-enrollment once it becomes available, then the probability is 2.84 percent. Finally, if this individual was hired in 2011 and auto-enrolled then the probability is 92.3 percent.

Participation in SRP during the Auto Enrollment Era

A unique aspect of this study is that we are able to examine how participation rates in different agencies vary in the same year based on whether the agency adopted auto enrollment. Recall that in 2010 the South Dakota legislature gave each governmental agency the authority to adopt an auto enrollment policy but agencies were not required to institute auto enrollment. If the agency adopted auto enrollment, all new employees were subject to this policy. Thus, in each year after 2010, some new hires were auto enrolled while others were not. It is important to remember that all of the agencies included in this study provided the same defined benefit plan, offered the same retirement saving plan, and most had the same health insurance.

Using data for all new employees in the auto enrollment period, we are able to estimate contemporaneous decisions on whether to contribute to the SRP based on the auto enroll status of each employee. Table 7 presents estimates of the probability that an employee participates in

SRP during the auto-enrollment era, 2010 to 2016. The participation model remains the same as we include the same explanatory variables used in Table 6 with one exception, the interaction terms are based on whether the individual employee was auto-enrolled or not.

[Table 7]

Column 1, Table 7 reports the estimates from our base case model. The marginal effects indicate that age at hire reduces the probability of participating in the SRP by about 1.3 percentage points for each additional 10 years of age. This effect is somewhat surprising since most studies find that older employees are more likely to contribute to retirement saving plans. In the auto enrollment era, being a male is estimated to increase the probability of participation by about 0.24 percentage points (although this effect is not statistically significant) while a $10,000 salary increase raises the probability by 1.7 percentage points. These latter two effects are similar in size to those presented for the entire sample period in Table 6.

The impact of the employee auto-enroll dummy is very large and indicates that employees that were auto enrolled when hired were 71.4 percentage points more likely to contribute to the SRP. Interestingly, the magnitude of this individual indicator variable is essentially the same as we observed in Table 6 for the auto enroll era variable. New hires by agency that will eventually adopt auto-enrollment are 35.1 percentage points more likely to contribute. Similar to the results in Table 6, there is not much variation among the year fixed effects (except for 2012).

When auto enroll interaction terms are added to the specification (see Column 3), the marginal effects have negative signs similar to what was seen for the entire sample period. Once again the direct effects of the personal characteristics indicate a positive effect while the interactive terms have a negative influence on the participation probability. These estimates

indicate that the adoption of auto enrollment tends to eliminate differences in saving tendencies by age, gender, and salary. For employees that are not auto-enrolled, being a male increases the probability by about 2.4 percentage point but it decreases the probability by 2.9 percentage points for employees that are auto-enrolled. For a $10,000 salary increase, the marginal effects indicate a 6.4 percentage point increase in the probability of participating for the employees that are not auto-enrolled but a 2.3 percentage point decrease for auto-enrolled employees. The year fixed effects remain about the same and now, holding everything else the same, the probability of participating increases by about 90 percent if the employee is auto-enrolled and 32.5 percent if the employer adopts auto-enrollment.

Impact of Auto Enrollment for Agencies that Adopted this Policy

Most previous studies of auto enrollment have examined the change in participation rates in a firm using participation in a retirement saving plan before and after the adoption of an automatic enrollment policy. Following this methodology, we now estimate participation probabilities using newly hired employees only for those agencies that adopted auto enrollment. Thus, we have five years of hiring data before the adoption of the auto enroll policy and six years after the policy was implemented. By contrasting these results with those in Table 6, we can see if employees hired by agencies that eventually take part in auto-enrollment behave differently from all new hires.

In this sample, almost all the new employees are auto-enrolled in the years 2010-2016. 189 of the 196 agencies who adopted auto-enrollment did so at the beginning of 2010. They account for 95% of new hires during this period. Thus, we remove the employee auto-enroll dummy from the model. But notice that for new employees hired before the employer adopted auto-enrollment, they will of course not be auto-enrolled; however, we can use a dichotomous

variable indicating whether the person was hired after the adoption of the auto enroll policy as an interactive term with the personal variables. The marginal effects from the base case estimates (no interactive terms) are shown in Column 1, Table 8. In this model, only the age at hire variable is significant and it indicates that 10 years older at hire is associated with a 1.1 percentage point decrease in the probability participating in the SRP. As expected, the year fixed effects show a large increase (about 90 percentage points) in the probability of participating in the SRP in the years 2010-2016 compared to the years before the introduction of auto enrollment.

The impact of adding interaction terms to the base specification is similar to found for the full sample and shown in Table 6. Before 2010, holding everything else constant, increasing age at hire by 10 years increases the probability by about 5.9 percentage points, being a male increases it by 2.2 percentage points, and a $10,000 salary increases it by 6.1 percentage points. In 2010 and after, the probabilities become -3.5 percentage points, -3.5 percentage points, and -2.3 percentage points, respectively. The impact of year fixed effects is even stronger, about 97 percent increase once auto-enrollment is introduced in 2010.

[Table 8]

V. Conclusions

There is a considerable literature indicating the effectiveness of automatic enrollment policies in increasing participation in retirement saving plans. Virtually all of these studies examine private sector firms where a 401(k) plan is the only retirement plan offered by the employer. In contrast, there are no studies of the introduction of automatic enrollment by state and local governments.

In general, all public full-time employees are covered by a mandatory pension, usually a defined benefit plan. As a result, career public employees that are also covered by Social Security are likely to have a life annuity equal to 70-80 percent of their final salary. While government employers offer their employees the opportunity to contribute to a retirement saving plan, employees may believe that they have less of a need for additional retirement saving. In addition, the plans offered by government employers rarely have matching employer contributions so there is less of an incentive for employees to contribute to these plans.

As a result, participation rates in retirement saving plans in the public sector tend to be much lower than they are for private sector firms. In our example, only about 3 percent of newly hired workers in South Dakota enrolled in the 457 plan offered to state and local employees prior to 2010. The objective of this study is to determine whether employees in South Dakota responded to the introduction of an automatic enrollment policy at the same level as private sector employees.

The key finding of this analysis is that participant rates in the retirement saving plan go from less than 3 percent to 90 percent after the introduction of automatic enrollment. The richness of the data provided by the SDRS allows us to explore several interesting issues. A unique component of the data is that South Dakota allowed each government agency to adopt automatic enrollment in 2010 but the agencies were not required to adopt this policy. As a result, we can compare the change in participation over time for the same agencies before and after the introduction of auto enroll and also to compare employees hired in agencies with and without auto enrollment in the same year. All of the comparisons indicate that the introduction of automatic enrollment yield increases in participation rates of newly hired employees of over 80 percent. Similar to earlier studies, our regression analysis illustrates that the adoption of

automatic enrollment tends to equalize participation rates across age, gender, and level of income.

Another difference in the automatic enrollment policy in South Dakota is that relatively low default contribution rate of $25 per month, or approximately one percent of the average salary of a new employee. This low default contribution may partially explain the large response to the auto enroll policy. The typical South Dakota employee follows the usual pattern of remaining at the default contribution.

This study shows that public employees who are covered by a defined benefit plan and Social Security tend not to contribute to a traditional opt-in retirement saving plan; however, the adoption of automatic enrollment for new employees results in a dramatic increase in the proportion of employees who participate in the plan. Across country, state and local governments are reducing the generosity of their retirement plans. As a result, the findings from this study have important policy implications and indicate that state and local governments should consider the adoption of defaults to encourage participation in the supplement saving plans to enhance the retirement security of public employees.

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Table 1. Proportion of Employees Contributing to SRP in First Year of Employment.

Fiscal year of hire	Number of new hires by year (1)	Number of hires who were automatically enrolled (2)	Number of hires who were not automatically enrolled (3)	Percent of hires enrolled in SRP (4)	Percent of hires who were automatically enrolled who are in the SRP (5)	Percent of hires not automatically enrolled who are in the SRP (6)
2005	3150	N/A	3150	1.33	N/A	1.33
2006	3483	N/A	3483	2.24	N/A	2.24
2007	3770	N/A	3770	1.99	N/A	1.99
2008	4020	N/A	4020	2.51	N/A	2.51
2009	3950	N/A	3950	2.86	N/A	2.86
2010	3335	1206	2129	37.96	92.29	7.19
2011	3349	1500	1849	43.95	94.40	3.03
2012	4183	2128	2055	44.47	82.75	4.82
2013	4692	2177	2515	45.23	92.93	3.94
2014	4959	2181	2778	42.83	91.79	4.39
2015	5493	2332	3161	42.93	93.35	5.73
2016	5949	2547	3402	43.99	93.95	6.58

This table reports the participation rate in the SRP in the first year of employment for different year of hire cohorts. The participation rate is computed as the number of individuals hired in a given fiscal year, with positive earnings in the designated year, and who made a positive contributions divided by the number of individuals who were hired in this fiscal year and who had positive annual earnings in their first year.

Table 2. Median Contribution Rate to SRP as Percent of Annual Salary in Each Year Conditional on participation.

Fiscal year of hire	Contribution rate	Contribution rate for individuals who were automatically enroll in the SRP	Contribution rate for those not automatically enrolled in the SRP
2005	3.51	N/A	3.51
2006	3.35	N/A	3.35
2007	3.78	N/A	3.78
2008	3.23	N/A	3.23
2009	2.01	N/A	2.01
2010	0.99	1.01	0.57
2011	0.96	0.95	1.47
2012	1.00	1.00	0.98
2013	0.97	0.97	1.06
2014	0.94	0.94	0.95
2015	0.88	0.88	0.66
2016	0.86	0.86	0.80

This table reports the median contribution rate to the SRP in the first year of hire for different cohorts. The median contribution rate is computed as the median of the employee's annual contribution divided by her annual compensation, using only employees who participate in the SRP.

Table 3. Participation Rate by Year of Hire with and without Automatic Enrollment

Year of hire		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
2005		1.33	2.16	3.11	4.42	6.18	7.60	7.90	8.01	8.29	9.70	10.88	11.71
2006			2.24	3.72	4.44	6.17	7.44	7.86	8.00	8.15	9.34	9.98	10.82
2007				1.99	3.59	5.06	6.86	7.51	8.52	8.87	10.08	11.56	12.83
2008					2.51	3.74	5.78	6.47	6.95	7.70	8.75	9.59	11.02
2009						2.86	4.55	5.55	6.29	7.05	8.11	9.42	10.86
2010							37.96	35.99	35.24	34.28	35.09	35.47	35.51
	with auto						92.29	86.57	84.04	82.28	81.87	80.90	80.50
	w/o auto						7.19	6.25	7.12	8.01	9.50	10.57	11.46
2011								43.95	40.83	39.18	40.14	39.58	39.19
	with auto							94.40	87.89	86.07	86.01	85.41	84.81
	w/o auto							3.03	2.99	3.47	5.63	6.27	7.06
2012									44.47	42.19	41.39	41.84	42.06
	with auto								82.75	77.33	73.93	73.26	71.90
	w/o auto								4.82	4.10	6.06	7.65	8.73
2013										45.23	43.97	43.40	42.74
	with auto									92.93	89.01	87.54	86.46
	w/o auto									3.94	4.49	5.75	6.82
2014											42.83	42.53	41.58
	with auto										91.79	89.40	87.38
	w/o auto										4.39	4.28	5.22
2015												42.93	41.85
	with auto											93.35	91.14
	w/o auto											5.73	4.54
2016													43.99
	with auto												93.95
	w/o auto												6.58

Table 4. Participation Rate in SRP in the Year of Hire: Agency Eventually Adopts Auto Enrollment

Fiscal year of hire	Number of hires who were not auto enrolled and employer never adopted (1)	Number of hires who were not auto enrolled and employer eventually adopted (2)	Percent of hires not auto enrolled and employer never adopted who are in the SRP (3)	Percent of hires not auto enrolled and employer eventually adopted who are in the SRP (4)
2005	1642	1508	0.85	1.86**
2006	1671	1812	1.43	2.99***
2007	2036	1734	1.47	2.60**
2008	2188	1832	1.65	3.55***
2009	2281	1667	1.67	4.50***

This table reports the participation rate in the SRP in the first year of employment for different year of hire cohorts before the introduction of auto-enrollment. The results are separated between employers who eventually do auto-enrollment (number of hires in column 1, participation rate in SRP in column 2) and employers who never do auto-enrollment (number of hires in column 2, participation rate in SRP in column 4). The participation rate is computed as the number of individuals hired in a given fiscal year, with positive earnings in the designated year, and who made a positive contributions divided by the number of individuals who were hired in this fiscal year and who had positive annual earnings in their first year. The symbols *, ** and *** means that the difference between the value in column 3 is statistically different than the corresponding value in column 4 at the 10%, 5% and 1% significance level respectively.

Table 5. Sample Means of Employee Characteristics: Agency Eventually Adopts Auto Enrollment

	All employees **(1)**	**Only employees from employers who eventually joined auto-enrollment** **(2)**	**Only employees from employers who never joined auto-enrollment** **(3)**
Age at hire			
Full sample	36.80	36.42	37.12***
Before 2010	37.88	37.30	38.37***
2010 and after	36.17	35.92	36.39***
Male			
Full sample	38.47%	44.14%	33.58%***
Before 2010	39.04%	45.20%	33.72%***
2010 and after	38.14%	43.54%	33.49%***
Salary			
Full sample	$28,972	$32,291	$26,112***
Before 2010	$26,489	$29,478	$23,904***
2010 and after	$30,399	$33,913	$27,377***

This table reports the sample average of the different regressors employed in the regression analysis. Column 1 reports values computed for the complete sample. Columns 2 and 3 respectively split the sample into new hires by employers who eventually do auto-enrollment or never do auto-enrollment. The variable I_{2010} represents a dummy variable equal to one if the observation is in year 2010 or later, otherwise it's equal to zero. The symbols *, ** and *** means that the difference between the value in column 3 is statistically different than the corresponding value in column 4 at the 10%, 5% and 1% significance level respectively.

Table 6. Probit Model for Individual Participation in the SRP in Year of Hire

	No Interaction Terms		Interaction Terms	
	Partial Effects	PE Std. Errors	Partial Effects	PE Std. Errors
	(1)	(2)	(3)	(4)
age at hire	0.01	0.02	0.32***	0.05
age at hire*I_{2010}			-0.40***	0.05
Male	0.83*	0.49	2.05*	1.10
Male*I_{2010}			-1.86	1.23
Salary	0.20***	0.01	0.39***	0.02
Salary*I_{2010}			-0.28***	0.03
Employee auto-enroll	75.70***	1.22	64.43***	1.60
Employer auto-enroll	13.65***	0.85	6.62***	1.08
Employer auto-enroll*I_{2010}			20.12***	1.84
Year dummy 2006	2.41	1.93	1.04	1.98
Year dummy 2007	2.26	1.93	0.82	1.99
Year dummy 2008	3.74**	1.85	1.39	1.91
Year dummy 2009	4.84***	1.84	1.70	1.89
Year dummy 2010	19.29***	1.75	30.24***	2.90
Year dummy 2011	17.96***	1.88	30.11***	2.90
Year dummy 2012	8.73***	1.70	19.41***	2.82
Year dummy 2013	17.70***	1.75	29.91***	2.82
Year dummy 2014	16.89***	1.72	29.22***	2.80
Year dummy 2015	20.75***	1.70	34.30***	2.78
Year dummy 2016	22.79***	1.68	36.76***	2.76

Marginal effects are calculated at the mean values based on probit estimates of participation. Statistical significance: 10% (*), 5% (**) and 1% (***). The LR test (p-value) for the hypothesis that all interaction terms are zero is 298.58 (0.000). The Wald test (p-value) for the hypothesis that the interaction terms cancel out the regressors in the auto-enroll era is 322.10 (0.000). The number of observations is 50333. The fraction of individuals who participate in the SRP is 28.27%. The standard errors of the partial effects are calculated with the Delta method. The variable I_{2010} represents a dummy variable equal to one if the observation is in year 2010 or later, otherwise it's equal to zero.

Table 7. Probit Model for Individual Participation in the SRP in Year of Hire: Auto-Enrollment Years (2010-2016)

	No Interaction Terms		Interaction Terms	
	Partial Effects (1)	PE Std Errors (2)	Partial Effects (3)	PE Std Errors (4)
age at hire	-0.13***	0.04	0.13***	0.05
age at hire*I_{auto}			-0.46***	0.07
Male	0.24	0.85	2.46*	1.28
Male*I_{auto}			-5.38***	1.74
Salary	0.17***	0.02	0.64***	0.02
Salary*I_{auto}			-0.87***	0.03
Employee auto-enroll	71.39***	2.37	90.11***	3.76
Employer auto-enroll	35.12***	2.34	32.55***	2.40
Year dummy 2011	-0.41	2.15	1.36	2.16
Year dummy 2012	-2.07***	1.78	-9.88***	1.82
Year dummy 2013	-0.65	1.90	1.17	1.92
Year dummy 2014	-1.38	1.84	0.35	1.86
Year dummy 2015	3.93**	1.82	5.30***	1.84
Year dummy 2016	6.47***	1.79	7.95***	1.81

Marginal effects are calculated at the mean values based on probit estimates of participation. Statistical significance: 10% (*), 5% (**) and 1% (***). The LR test (p-value) for the hypothesis that all interaction terms are zero is 533.13 (0.000). The Wald test (p-value) for the hypothesis that the interaction terms cancel out the regressors for the employees auto-enrolled in the SRP is 158.11 (0.000). The number of observations is 31960. The fraction of individuals who participate in the SRP is 43.24%. The standard errors of the partial effects are calculated with the Delta method. The variable I_{auto} represents a dummy variable equal to one if the observation is for an employee who was auto-enrolled in the SRP, otherwise it's equal to zero.

Table 8.Probit Model for Individual Participation in the SRP in Year of Hire: Only Employees in Agencies that Adopted Auto Enrollment

	No Interaction Terms		Interaction Terms	
	Partial Effects	PE Std. Errors	Partial Effects	PE Std. Errors
	(1)	(2)	(3)	(4)
age at hire	-0.11**	0.05	0.59***	0.10
age at hire*I_{2010}			-0.94***	0.12
Male	-1.25	1.06	2.27	2.36
Male*I_{2010}			-5.73**	2.66
Salary	0.01	0.02	0.61***	0.05
Salary*I_{2010}			-0.84***	0.06
Year dummy 2006	1.12	3.79	0.10	4.16
Year dummy 2007	0.75	3.88	0.07	4.26
Year dummy 2008	1.69	3.69	0.14	4.08
Year dummy 2009	2.67	3.66	0.22	4.02
Year dummy 2010	90.44***	3.77	97.37***	6.42
Year dummy 2011	92.52***	3.76	98.24***	6.42
Year dummy 2012	80.90***	3.36	93.30***	6.24
Year dummy 2013	91.02***	3.52	97.67***	6.28
Year dummy 2014	89.90***	3.49	97.25***	6.26
Year dummy 2015	91.45***	3.52	97.87***	6.25
Year dummy 2016	92.05***	3.49	98.11***	6.27

Marginal effects are calculated at the mean values based on probit estimates of participation. Statistical significance: 10% (*), 5% (**) and 1% (***). The LR test (p-value) for the hypothesis that all interaction terms are zero is 378.65 (0.000). The Wald test (p-value) for the hypothesis that the interactions cancel out the regressors in the auto-enroll era is 150.4024 (0.000). The number of observations is 22626. The fraction of individuals who participate in the SRP is 58.13%. The standard errors of the partial effects are calculated with the Delta method. The variable I_{2010} represents a dummy variable equal to one if the observation is in year 2010 or later, otherwise it's equal to zero.

Chart 1. Participation Rate in Supplement Retirement Saving Plan in Their First Year