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**WILL AUTOMATIC ENROLLMENT REDUCE EMPLOYER  
CONTRIBUTIONS TO 401(K) PLANS?**

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### **Abstract**

Many employers match employee contributions to 401(k) plans. However, the employer cost of continuing this practice may increase rapidly as trends towards automatic enrollment boost employee participation. This paper examines the relationship between employer matching behavior and automatic enrollment. Using a sample of large 401(k) plans, we find that match rates are about 7 percentage points lower among firms with automatic enrollment than among those without automatic enrollment, even controlling for firm characteristics. So while autoenrollment increases the number of workers participating in private pensions, our findings suggest it might also reduce the level of pension contributions.



## **Introduction**

Employers have traditionally required workers to sign up for the company's 401(k) plan in order to participate. But many employers are now beginning to automatically enroll employees in the company's 401(k) plan at a default contribution rate and asset allocation. The 2006 Pension Protection Act (PPA) (and especially the release of related Internal Revenue Service rules in March 2009) will likely further boost the share of employers offering automatic enrollment in the years to come.

Researchers often focus on the ability of automatic enrollment to increase retirement security. For example, several studies have shown that automatic enrollment significantly increases pension participation rates (Beshears et al. 2009; Choi et al. 2002, 2004; Madrian and Shea 2001). Increased participation is likely to boost the retirement savings of many workers who would not participate without the automatic enrollment feature. And many employers view automatic enrollment favorably for the same reasons. Nearly one-half of employers offering automatic enrollment reported in a recent survey that their primary motivation was to encourage retirement savings, and about one-third cited a desire to increase plan participation (Deloitte Development LLC 2006).

It is unclear, however, how the trend toward automatic enrollment will affect employer contributions to 401(k) plans and, ultimately, employees' retirement account accumulations and retirement security. There is little research on how employers set their match level or how they would respond to the move towards automatic enrollment. Most of the pension-related research has focused on individuals' behavior—whether they participate in a 401(k), how much they contribute, and how they make investment choices. Employers are often assumed to be passive agents. Yet, all else equal, an increase in pension participation due to automatic enrollment will increase employers' cost of offering a match. In fact, companies often refer to the cost of matching contributions as the most important barrier to adding automatic enrollment (Bruno 2008). And for those employers with automatic enrollment, some experts are questioning whether they have an incentive to continue offering matches since research has shown employer matches to have only a modest impact on plan participation beyond the impact created by automatic enrollment (Beshears et al. 2009; Lucas 2007).

In this paper, we evaluate the extent to which firms adjust their 401(k) match rate to offset their higher costs. We model employer matching behavior as a function of automatic enrollment and other plan characteristics using a sample of large 401(k) plans. We find that firms with automatic enrollment average match rates that are about 7 percentage points lower than those without automatic enrollment, even after controlling for firm characteristics. Assuming the estimated difference in match rates is in response to the higher costs associated with automatic enrollment, our calculations suggest that a 7 percentage point reduction in match rates would offset at least 42 percent of the increase in costs for firms with participation rates of 60 percent or more before automatic enrollment. So while autoenrollment has been shown to increase the number of workers participating in the private pension plans, our findings suggest that it might also reduce the level of pension contributions.

The paper is organized as follows. The first section discusses employer pension trends and why firms might offer automatic enrollment and matching in their 401(k) plans. The second section describes the prevalence and level of 401(k) matches by industry and firm size over time. The third section estimates the impact of automatic enrollment on the likelihood and level of employer contributions to 401(k) plans, controlling for firm characteristics. The final section summarizes our results and discusses their policy implications.

### **401(k) Plans, Automatic Enrollment, and Matching**

Defined contribution (DC) plans are the most common type of pension plan among today's workforce. In 2007, about 90 percent of the private sector *employers* who offered a pension plan offered only defined contribution plans.<sup>1</sup> More than 90 percent of these plans are Internal Revenue Code §401(k) plans—defined contribution plans under which employees can elect to defer part of their compensation or receive these amounts in cash. In 2007, there were nearly

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<sup>1</sup> This paper analyzes employer responses to offering a match rate. Thus, we discuss pension coverage at the employer level (the number of *employers* who offered a defined contribution pension only divided by the number of *employers* who offer any type of pension plan.) Traditionally, pension coverage is presented at the worker-level—i.e., the percentage of workers covered by a defined-contribution pension plan only.

50,000 such plans with more than 45 million active participants holding more than \$2.3 trillion in assets.<sup>2</sup>

In 401(k) arrangements, workers generally make tax-deferred contributions, often specified as a particular share of salary or a given dollar amount, to a retirement account. Although there are many ways employers can structure their matching provisions, including establishing nonelective, nonmatching contributions, they generally match 50 cents on every dollar contributed by employees, up to 6 percent of salary. In contrast to defined benefit (DB) pensions, which are tied to employers who bear the responsibility for ensuring that employees receive pension benefits, DC plans are owned by employees who bear the responsibility for their own financial security. Specifically, employees with DC pensions must decide whether to participate, how much to contribute, how to allocate the account assets among different investment choices, and how much to withdraw when reaching retirement.

As long as market returns are relatively stable and participants and their employers contribute consistently over time, 401(k) plans can be a potent vehicle for retirement saving. Simple simulations show that individuals who participate in these plans during their careers can amass enough wealth to enjoy a comfortable retirement. For example, a worker who contributes continually from ages 30 to 62 and invests in a balanced portfolio can expect to accumulate enough wealth to replace 60 percent of his pre-retirement salary while in retirement (Munnell and Sundén 2004).

However, when offered a 401(k) plan, many workers do not take advantage of these arrangements because they fail to enroll (employers have traditionally required workers to sign up in order to participate). Researchers showed that for many individuals the lack of participation did not seem to be a matter of rational choice but inertia. Indeed, studies have shown that if employees are automatically enrolled in programs and have to opt out, they will not. Automatic enrollment (also known as “negative election”) is a 401(k) plan feature in which elective employee deferrals begin without requiring the employee to submit a request to join the plan. When automatic enrollment is present, employees have a pre-determined percentage of their pay deferred as soon as they become eligible for the plan. If employees do not want to participate, they must actively request to be excluded from the plan. Automatic enrollment in 401(k) plans

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<sup>2</sup> Based on authors’ calculations from Form 5500 filings among plans with 100 or more participants (active and retired).

turns out to significantly increase participation rates (Beshears et al. 2009; Choi et al. 2002, 2004; Madrian and Shea 2001). And the increase in participation rates can be very dramatic. Madrian and Shea (2001), for example, find that automatic enrollment increases participation rates of new hires from 49 percent to 86 percent. The demonstrated effectiveness of automatic enrollment has led many employers to adopt this feature in their 401(k) plans. In a survey of employers administered by Deloitte (2006), about one-third cited a desire to increase plan participation as the primary reason to offer automatic enrollment. Many firms have followed suit. The percentage of 401(k) plans with automatic enrollment has increased from 4.2 percent in 1999 to 23.6 percent in 2006 (see table 1). Despite the increase in automatic enrollment over time, many employers have been reluctant to implement it because of legal and administrative barriers (Perun 2008; Spangler 2007). However, the PPA has relieved employers who adopt automatic enrollment of any fiduciary liability thus making automatic enrollment a more attractive plan feature.

Most companies with automatic enrollment offer an employer match, a contribution made by the employer to match employee contributions (Beshears et al. 2009). But holding all other factors constant, the adoption of automatic enrollment is likely to increase employer costs. Increasing the number of 401(k) participants increases the amount disbursed in the form of employer matches. Consider the example shown in table 2 for a firm of 1,000 employees in which every worker earns \$50,000. Assume the firm offers a 401(k) plan with a 50 percent match up to the first 6 percent of contributions and participants contribute 6 percent. The firm offers no benefits other than wages and pensions. Before the firm adopts automatic enrollment, 49 percent of the employees participate in the plan. Thus, the cost of offering the match is \$735,000 per year ( $1,000 \text{ employees} \times 49 \text{ percent participation rate} \times 50 \text{ percent match rate} \times 6 \text{ percent contributions} \times \$50,000$ ) and the total labor cost is \$50,735,000 ( $\$50,000 \times 1,000 + \text{cost of the match}$ ). After the firm adopts automatic enrollment, participation increases from 49 to 86 percent (these are the effects of autoenrollment on participation for new hires documented by Madrian and Shea, 2001). The increase in participation increases the cost of the match by 76 percent to \$1,290,000 and total compensation by 1.1 percent to \$51,290,000. In this example, a 37 percentage point increase in participation rates increases compensation by 1.1 percent, which is equivalent to the intermediate long-range assumptions about the annual increase in real wages expected in the U.S. economy (Board of Trustees 2009). In other words, offering automatic



enrollment in this example is equivalent to giving workers the full typical annual raise. Firms can respond to the increase in costs due to automatic enrollment in three ways:

1) Firms can leave the pension and other compensation arrangements unchanged, which increases the total compensation (wages plus pensions plus other benefits) paid to workers. One reason for employers to increase compensation through automatic enrollment is that firms might see a correlation between retirement savings and productivity. For example, automatically enrolling workers in retirement plans might give otherwise nonparticipants a better understanding of the benefits of long term planning. Previous literature suggests that planners are better workers (Ippolito 1997). Indeed, nearly one-half of employers offering automatic enrollment reported in the Deloitte (2006) survey that their primary motivation was to encourage retirement savings. Another reason for increasing compensation through automatic enrollment is that employers can improve their performance on 401(k) nondiscrimination tests—rules forbidding employers from providing benefits exclusively to highly paid employees—by increasing participation among less well-paid workers. (See Brady (2007) for a brief exposition of the cross-subsidies incentives from nondiscrimination testing.) In other words, automatic enrollment allows high-paid, productive workers to be paid more in pensions by increasing 401(k) participation among low-paid, less-productive workers. Previous research suggests that low-income workers have lower participation rates and thus are the most likely to increase participation rates under automatic enrollment (Madrian and Shea 2001). In fact, one-fifth of plan sponsors said that improving nondiscrimination test results was their primary motivation for offering automatic enrollment (Deloitte Development LLC 2006).

2) Firms can reduce the match offered to workers to offset the increase in costs from automatic enrollment. In the example provided in table 2, the employer could set the match rate under automatic enrollment at a level that keeps total compensation at the pre-automatic enrollment level. Lowering the match rate by 21.5 percentage points (from 50 percent to 28.5 percent) would be enough to offset the increase in costs from autoenrollment. Furthermore, an important incentive for firms to offer a match has been

to avoid nondiscrimination tests through 401(k) matching safe harbors. However, the PPA introduced an automatic enrollment safe harbor with lower minimum required matching contribution rates, reducing employers' incentives to keep existing match rates.

3) Firms can reduce compensation other than pension benefits to keep total compensation at the same level it was before introducing the autoenrollment feature. For example, employers could reduce health benefits to offset the increase in costs from automatic enrollment.

The true response of the firm, however, is likely to be a combination of the three—not all the increase in costs will be fully offset and the reduction in compensation will not be taken entirely from the match rate. In this paper, we focus on the second option and measure the extent to which firms adjust their 401(k) match rate to offset the increase in costs due to automatic enrollment.

### **Prevalence and Level of 401(k) Matches by Industry and Firm Size**

This section describes how matching behavior has varied over time by firm size and industry using data from filings of the Form 5500. These returns, known as the Form 5500 series, contain detailed information about pension plans' finances, participants, and administrators used by government agencies to monitor compliance with the Employee Retirement Income Security Act (ERISA) and the Internal Revenue Code.<sup>3</sup> These data contain information on the full universe of employer-provided pension plans in the private sector, including the type of plan (defined benefit plan or 401(k) plan), the amount of employer and employee contributions, the number of active participants and total participants, and industry. The data in the Form 5500 are collected at the plan level. Plan sponsors are required to submit one form for each pension plan offered to their employees. For each plan, the data identifies plan sponsors by their Employer Identification Numbers (EIN). We restrict our analysis to 401(k) plans with 100 or more participants (active

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<sup>3</sup> See Buessing and Soto (2006) for more details on the Form 5500 data.

and retired) for the plan years 1993 through 2007.<sup>4</sup> We also exclude plans that do not include the industry of the sponsor or whose number of active participants is missing or zero.

The 5500 data does not include specific information on the match rate; however, it does include separate information on employer and employee contributions. Using these variables, we construct the match rate as the ratio of employee to employer contributions for each plan. This methodology follows Papke (1995) who argued two reasons why the average match rate would be preferable to the marginal match rate faced by participants at each point in time. First, the average match rate per plan helps summarize the step-wise match formulas often used by employers. For example, plans might offer to match 100 percent of eligible employee contributions up to 3 percent of contributions and 25 percent on the next 3 percent of contributions. And second, the average match rate per plan takes account of any adjustments the plan administrators had to make to pass nondiscrimination tests. These rules might make administrators fine-tune their contributions to ensure compliance. For example, employers can make nonelective, nonmatching contributions to nonhighly compensated employees. In these cases, the step-wise match formulas might not be fully informative.

From the analysis, we exclude plans with employee contributions equal to zero (for which a match can not be calculated). In addition, to minimize the effect from outliers we exclude plans with ratios of employer to employee contributions greater than 10. These exclusions do not eliminate many plans. Our final sample includes nearly 94 percent of all 401(k) plans for the period between 1993 and 2007 and nearly 97 percent for 2007.

*Prevalence of Employer Matches 1993-2007.* Table 3 shows the prevalence of the employer match by plan size (i.e., number of plan participants). The majority of plans in our sample offer an employer match (89 percent). Two trends emerge from this table. First, the share of firms offering a match has increased slightly over the last 15 years from 87 percent in 1993 to 91 percent in 2007.<sup>5</sup> Not only has the increase been small, but it also has not been steady. The

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<sup>4</sup> Plans with 100 or less participants file only a subset of the 5500 schedules. For example, these plans are not required to file schedule H (financial information), which contains information on employer and employee contributions. Additionally, before 1999 these plans were only required to file a Form 5500 every three years. Because of these limitations, we exclude these plans from the analyses.

<sup>5</sup> Note the wide variation by plan size and the disproportionate number of small plans. For this reason, we weight the statistics by active plan participants in the figures not presented by size plan.

percentage of plans with a match declined between 2000 and 2001 and again between 2001 and 2002. This dip is consistent with the reaction of firms to the 2001-2002 recession during which many employers suspended their 401(k) matches temporarily (Munnell and Sundén 2003). Second, match offers are correlated with the size of the plan. Large plans are more likely to offer a match than smaller plans. In 2007, for example, 94 percent of plans with 5,000 or more participants offered an employer match compared with only 85 percent of plans with less than 500 participants.

Match offers also vary by industry (see table 4). Over all years, 401(k) plans in the transportation and public utilities sector were the least likely to offer employer matches (80 percent). On the other hand, the vast majority of plans in the financial, insurance, and real estate sector (94 percent) offered a match between 1993 and 2007. Note also that plans in the agriculture, mining, and construction sector as well as the other services sector experienced a notable increase in employer match offers during the period.

*Level of Employer Matches 1993-2007.* In the overall sample, a quarter of the plans offered match rates below 18 percent and another quarter offered match rates above 55 percent (see table 5). The median match rate was 35 percent and the mean was 48 percent. While the prevalence of employer matching increased slightly between 1993 and 2007, the average match rate declined noticeably. In 1993, the average match rate was 54 percent. By 1999 it had declined to only 42 percent. In 2001, the average match rate began slowly increasing to reach 47 percent in 2007. The decline in the average match rate between 1993 and 2007 is due almost entirely to the decline in match rates at the top of the distribution. For example, the match rate in the 95<sup>th</sup> percentile of the distribution was 190 percent in 1993, but only 120 percent in 2007. Match rates in the rest of the distribution have been remarkably stable during the last 15 years.

This large decline in match rates in the top of the distribution could be partly due to the increase in employee contribution limits over the period, which rose from \$8,994 in 1993 to \$15,500 in 2007. With higher contribution limits, employers can lower their match rates under the assumption that employees, particularly those who are higher paid, can increase their contributions to offset the difference. A simpler explanation is that the tremendous growth in popularity of 401(k) plans (from 22,299 plans in 1993 to 48,507 in 2007) has impacted the match

distribution. A world in which the most generous 401(k) plans were already in place in 1993 with the less generous sponsors entering the 401(k) world gradually over time would be consistent with the observed decrease in the right tail of the match distribution.

As with match offers, match rates are correlated with plan size and industry. However, differences in match rates by plan size are much less pronounced than differences in match offers (see table 6). In the overall sample, average match rates were 49 percent among plans with 5,000 or more participants, 47 percent among plans with 2,500-4,999 participants, 46 percent among plans with 1,000-2,499 participants and those with 500-999 participants, and only 45 percent among plans with less than 500 participants. In contrast, there are large differences in match rates by industry (see table 7). Between 1993 and 2007, agriculture, mining, and construction industries offered the highest match rates (58 percent) followed by retail trade (57 percent) and financial, insurance, and real estate industries (54 percent). Manufacturing and wholesale trade industries averaged match rates between 48 and 49 percent. Transportation and public utilities, and other services offered the lowest level of match rates (37 and 41 percent, respectively).

### **Impact of Automatic Enrollment on the Likelihood and Level of Employer Matches**

In this section, we analyze the effect of automatic enrollment on the likelihood and level of an employer match. Unfortunately, the Form 5500 data does not include information on whether plans offer automatic enrollment. Therefore, we supplemented the Form 5500 data with information on automatic enrollment from the Pensions & Investment database of the top 1,000 pension funds (P&I 1,000). The P&I 1,000 database includes the largest 1,000 private and public pension funds in the United States based on total pension assets (defined benefit plus defined contribution assets). These data are only available at the employer level (one observation per plan sponsor). In 2007, these pension funds represented \$7,631 billion in combined assets (\$5,403 billion in defined benefit plans and \$1,957 billion in defined contribution plans). More importantly, the database includes a flag indicating whether plan administrators reported offering automatic enrollment in their defined contribution plans.

From the 1,000 plans in the P&I 1,000, we excluded public plan sponsors (state and local governments), private plan sponsors who offered only DB pensions, and sponsors of private multi- and multiple-employer plans (such as plans for carpenters or Teamsters). Thus, we started

with a subsample of 606 sponsors of private, single-employer plans from the P&I 1,000 (see table 8). We then merged this P&I 1,000 subsample with the full universe of private plans with 100 or more participants (active and retired) from the Form 5500 data in 2007 (48,507 plans covering more than 45 million participants and representing 46,859 unique firms).<sup>6</sup> The third column of table 8 reports the results from the data merge. The regression sample includes 532 (87 percent) of the 606 employers in the P&I 1,000 subsample. Combined, these employers have 829 pension plans (several employers have more than one plan). Although our regression sample of pension plans represents only 1.7 percent of all Form 5500 plans, it accounts for 50.8 percent of all plan assets and 29.6 percent of all plan participants. The regression sample contains generally large plans, since it is based on the P&I 1,000 database of plans with the largest assets. Large plans are also likely to be the plans with the largest number of participants. In fact, 87 percent of the plans in the regression sample have 1,000 or more participants compared with only about 12 percent of plans in the Form 5500 data (not shown).

*Distribution of Match Rates in 2007 by Automatic Enrollment.* Table 9 shows that plans in the regression sample are slightly less likely to offer a match (91 percent) than plans in the Form 5500 data (94 percent). The regression sample also has a lower match rate than the whole 5500 data at the mean (44 versus 47 percent). Table 9 also shows that autoenrollment appears correlated with whether the employer offers a match. Among plans without automatic enrollment, 93 percent offer a match. Among those with automatic enrollment, only 82 percent offer a match. Automatic enrollment is also correlated with match rates. The mean match rate is 47 percent for plans without automatic enrollment, but only 34 percent for those with automatic enrollment (medians are 43 and 33 percent respectively).

*Regression Analyses.* To further evaluate the relationship between automatic enrollment and matching behavior, we use regression analyses to control for other factors that might confound

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<sup>6</sup> The limited number of observations in the P&I 1,000 data allowed us to conduct visual matches based on the plan sponsor name. We started with the plan sponsor name from the P&I 1,000 and searched for the name of the company in the 5500 database. To ensure better matches, we first searched the full name, and then each of the pieces of the name. When we found a match, we recorded the EIN from the 5500 data and appended this information to the P&I 1,000 database. We repeated this process for each of the 606 plans in our P&I 1,000 subsample. Lastly, we merged the P&I 1,000 subsample with the Form 5500 data using the recorded EIN.

the effects of autoenrollment. We focus on two regression models. The first is a Probit model of the likelihood of offering a match. In this case the dependent variable is a binary variable that takes the value of 1 if the plan offers a match and 0 otherwise. The second model is a Tobit model with a lower bound of zero for the match rate. The dependent variable is the value of the average match rate offered by the plan.<sup>7</sup>

The key predictor in our models is an indicator for whether the plan includes automatic enrollment features. Our hypothesis is that autoenrollment is negatively correlated with employer match offers and match rates. The tables above suggest that the likelihood and level of the match also differs by industry. Therefore, we include indicators for each industry with the wholesale and retail trade sectors being in the omitted category. The evidence presented above also suggests that plan size is positively related with the likelihood and level of the match. Thus, we include an indicator for plans with 2,500 or more participants. Finally, we include an indicator for whether the firm also offers a defined benefit plan. The expected sign of this coefficient is uncertain—a positive sign would indicate that firms with DB plans are more generous than those without DB plans and therefore are more likely to have generous 401(k) plans; a negative sign would indicate that firms with DB plans already view themselves or their plans as generous and do not feel the need to also offer a 401(k) match or to have high 401(k) match rates.

Table 10 summarizes the descriptive statistics for the variables in our regression analyses. Plans with autoenrollment are less likely to be in the manufacturing sector and more likely to be in the other services sectors. The overall sample of plans includes 13 percent of plans with less than 1,000 participants. Although this may seem odd given that the P&I 1,000 data collects information on the sponsors of the largest plans, the regression sample can include multiple plans for each firm. Some of these plans were small 401(k) plans not necessarily represented in the P&I 1,000 database but captured in the Form 5500 data (P&I 1,000 includes one observation per sponsor, while Form 5500 data might include more than one plan per sponsor). To account for the presence of these smaller plans, we collapse the plans at the firm level including only the largest 401(k) plan for each unique employer. For the regression analyses, we discuss the results at both the plan- and firm-level.

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<sup>7</sup> Ordinary Least Square (OLS) regressions produce virtually the same results. We also ran regressions weighted by the number of active participants. These results are presented in the appendix.

Table 11 presents the regression results. The first panel shows results from the Probit model of employer match offers as a function of automatic enrollment and other variables. Our hypothesis is rejected since, at both the plan- and firm-level, the coefficient on automatic enrollment is insignificant. This finding suggests that after taking into account the effects of industry, plan size, and whether the firm offers a DB plan, autoenrollment is unrelated to whether plans or firms offer a match. The results in this panel also suggest that plans in the manufacturing sector, in the other services sector, or with 2,500 or more participants are more likely than their counterparts to offer a match.

More interestingly, the second panel of table 11 presents the results from the Tobit regression of employer match rates as a function of automatic enrollment and other variables. The coefficient on automatic enrollment suggests a negative relationship between automatic enrollment and match rates and is statistically significant at the firm-level. In particular, match rates are about 7 percentage points lower among firms with automatic enrollment than among those without automatic enrollment, after controlling for firm characteristics. The coefficients on the industry dummies indicate that firms in the agriculture, mining, and construction sector, manufacturing sector, and other services sector offer higher match rates than their counterparts. The size of the plan seems to matter as well. According to the results from the firm-level regression, plans with 2,500 or more participants offer match rates that are about 13 percentage points higher than those of smaller plans. Lastly, firms with both defined benefit and 401(k) plans seem to offer lower match rates; however, these coefficients are not statistically significant.

Although the regressions shown in table 11 suggest a relationship between automatic enrollment and match rates, they do not necessarily imply that autoenrollment causes lower match rates. For example, these results would also be consistent with a scenario in which firms with lower match rates are more likely to adopt automatic enrollment. An ideal dataset to examine this causal relationship would include the date that automatic enrollment was introduced. With this information, a clearer picture of causality would arise by comparing the match rate before and after autoenrollment. Unfortunately, this kind of analysis is currently not feasible since the P&I 1,000 data do not include the date at which automatic enrollment.

However, the panel nature of the 5500 data makes it possible to compare match rates for each plan in the years before automatic enrollment gained popularity with those in 2007.



Assuming automatic enrollment was adopted after this earlier period, we can estimate the magnitude of the change in match rates due to autoenrollment.

Table 12 shows the results from a regression whose dependent variable is the difference in match rates between 2007 and the average over the period 2000 to 2002. This variable takes a negative value if the match rate decreased between the period 2000 to 2002 and 2007. The results suggest that autoenrollment reduced match rates by about 9 percentage points in the plan-level regression and 5 percentage points in the firm-level regression. Only the coefficient in the plan-level regression, however, is significant at the 90 percent confidence level.

*Implications.* The regression coefficients suggest that, on average, match rates are about 7 percentage points lower for firms with automatic enrollment than for those without automatic enrollment. To better understand the potential impact of automatic enrollment on employer match rates, note that the cost of providing a match (CM) with and without autoenrollment can be expressed as

$$(1) CM_{\text{without}} = N * PR_{\text{without}} * MR_{\text{without}} * CR * EARNINGS, \text{ and}$$

$$(2) CM_{\text{with}} = N * PR_{\text{with}} * MR_{\text{with}} * CR * EARNINGS,$$

where N is the number of employees, PR the participation rate, MR the employer match rate, CR the average employee contribution rate as a percent of earnings, and EARNINGS the average firm earnings.

Rearranging some terms, the percent increase in the cost of offering the match due to automatic enrollment can be expressed as

$$(4) (CM_{\text{with}}/CM_{\text{without}}) = (PR_{\text{with}}/PR_{\text{without}}) * (MR_{\text{with}}/MR_{\text{without}})$$

In other words, leaving the match rate unchanged increases the cost of providing a match by the ratio of the percent change in participation due to automatic enrollment ( $PR_{\text{with}}/PR_{\text{without}}$ ). Thus, in order for the firm to fully offset the increase in costs, the match rate should be set to:

$$(5) MR_{\text{with}} = (PR_{\text{without}}/PR_{\text{with}}) * MR_{\text{without}}$$

Equation (5) indicates that the level of match rate that fully offsets the increase in costs depends on the percent increase in plan participation rates due to autoenrollment and the starting

match rate.<sup>8</sup> Table 13 summarizes the changes in match rates needed for a plan initially offering a 50 percent match rate. Each panel assumes a different level of increase in participation due to autoenrollment (from 10 percentage points to 30 percentage points) and shows the effects for different participation rates before autoenrollment.

Panel 1 of table 13 shows that a plan with a 60 percent participation rate before automatic enrollment would need to reduce the match rate from 50 to 42.9 percent to offset a 10 percentage point increase in participation. The last column shows that the regression coefficient would be enough offset 98 percent (6.9 percentage points from table 11/7.1 percentage points from table 13) of the increased cost due to automatic enrollment. Note that for firms starting at higher levels of participation, the reduction in match rates implied by the regression coefficient more than offsets the increase in costs from autoenrollment. For example, if plan participation increases from 80 to 90 percent after autoenrollment, match rates would only need to be reduced by 5.6 percentage points to completely offset the increased—slightly less than the reduction in match rates implied by the regression coefficients.

Panels 2 and 3 repeat the exercise allowing for larger effects of automatic enrollment on participation. We conclude from this table that the impact of automatic enrollment on the change in match rates is potentially substantial: a 7 percentage point reduction in match rates would offset at least 42 percent of the increase in costs for firms with participation rates of 60 percent or more before automatic enrollment.

## Conclusion

To date, the discussion surrounding automatic enrollment has focused on how it benefits employees by increasing their pension coverage and ultimately their retirement savings. In response to overwhelming evidence that automatic enrollment significantly increases pension participation rates, President Obama's 2010 budget included a proposal to require employers to automatically enroll employees in pension plans. Recognizing that automatic enrollment is not free for employers, this paper is the first to examine the relationship between automatic enrollment and employer matching behavior.

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<sup>8</sup> This assumes that autoenrollment does not change the number of employees, average employee contribution rates, or the average earnings of plan participants. Thus, in the example from table 2  $MR_{\text{with}} = (49\%/86\%) * 50\% = 28.5\%$ .

Likely due to data limitations, the literature has seldom focused on the decision-making of plan sponsors. In this paper, we examined one of the key decisions of plan sponsors—the level of match offered in 401(k) plans. We use data from the Form 5500 and the Pensions & Investment top 1,000 pension funds. The 5500 data include the full universe of private pension plans but does not include information on automatic enrollment; the P&I 1,000 data represent a limited number of plan sponsors but include an automatic enrollment indicator. Our analysis sample resulting from merging the Form 5500 data for 2007 with the P&I 1,000 is limited to 826 plans from 532 employers. Yet, these plans hold about half of the total 401(k) assets and accounts for about 30 percent of all participants in the system. Using these limited data, our results suggest that firms with automatic enrollment have employer match rates that are about 7 percentage points lower than those without automatic enrollment, even after controlling for firm characteristics. Assuming the estimated difference in match rates is in response to the higher costs associated with automatic enrollment, our calculations suggest that a 7 percentage point reduction in match rates would offset at least 42 percent of the increase in costs for firms with participation rates of 60 percent or more before automatic enrollment.

The findings of this paper indicate that while automatic enrollment is likely to achieve the goal of increasing pension coverage, it might also work against the principal goal of increasing retirement savings. The prospect of lower match rates may not only reduce employer contributions to workers' retirement accounts, but some research suggests that lower match rates might also lower workers' own retirement contributions.<sup>9</sup>

Future research will benefit from having more detail on the timing of the adoption of automatic enrollment. Additionally, more research is needed to understand how small- and mid-size plan sponsors will respond to the increase in costs from automatic enrollment (our results are limited to large 401(k) plans). A plausible solution to both of these issues is to add fields to the Form 5500 asking plan sponsors whether they have automatic enrollment and, if so, when it was introduced.

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<sup>9</sup> A number of studies have found that having an employer match increases a worker's plan participation and contribution rates (Choi et al. 2004; Engelhardt and Kumar 2004; Even and Macpherson 2005; Papke 1995; Papke and Poterba 1995). Other studies have found that government matches on Individual Development Accounts (IDAs) and Individual Retirement Accounts (IRAs) increase savings and assets among lower-income households (Duflo et al. 2006; Mills et al. 2006).

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**Table 1. Percentage of 401(k) Plans with Automatic Enrollment by Number of Plan Participants, 1999-2006**

|             | All  | 1-49 | 50-199 | 200-999 | 1,000-4,999 | 5,000+ |
|-------------|------|------|--------|---------|-------------|--------|
| <b>1999</b> | 4.2  | 1.4  | 0.8    | 0.7     | 7.4         | 17.3   |
| <b>2000</b> | 8.1  | 2.0  | 2.4    | 6.5     | 13.9        | 19.8   |
| <b>2001</b> | 9.1  | 3.5  | 2.8    | 6.6     | 14.6        | 17.0   |
| <b>2002</b> | 7.4  | 1.5  | 3.2    | 6.3     | 12.4        | 21.1   |
| <b>2003</b> | 8.4  | 1.1  | N/A    | 9.3     | 16.1        | 24.2   |
| <b>2004</b> | 10.6 | 0.9  | 3.4    | 9.8     | 18.2        | 30.6   |
| <b>2005</b> | 16.9 | 3.5  | 8.1    | 19.1    | 23.9        | 34.3   |
| <b>2006</b> | 23.6 | 6.8  | N/A    | N/A     | N/A         | 41.3   |

Source: Profit Sharing/401(k) Council of America, *Annual Survey of Profit Sharing and 401(k) Plans*, Chicago: Profit Sharing/401(k) Council of America, 1999-2006.

**Table 2. Illustrative Example of the Potential Increase in Employer Compensation Due to Automatic Enrollment**

|  |              |
|--|--------------|
| <b>Plan characteristics</b>  |              |
| Active participants  | 1,000        |
| Match rate   | 50%          |
| Up to  | 6%           |
| Average earnings   | \$50,000     |
| <b>Without autoenrollment</b>  |              |
| Participation rate   | 49%          |
| Employer contributions   | \$735,000    |
| Employer compensation (earnings + contributions)                       | \$50,735,000 |
| <b>With autoenrollment</b>   |              |
| Participation rate   | 86%          |
| Employer contributions   | \$1,290,000  |
| Employer compensation (earnings + contributions)                       | \$51,290,000 |
| <b>Possible effects of autoenrollment</b>                              |              |
| 1. Employers increase compensation                                     |              |
| Increase in employer compensation                                      | \$555,000    |
| Percent change in employer compensation                                | 1.1%         |
| 2. Employers keep compensation constant                                |              |
| Percentage point change in match rate to offset increased compensation | 21.5%        |
| Change in employer contribution per active participant                 | -\$645       |

Source: Authors' computations.

**Table 3. Percentage of Private Sector 401(k) Plans with an Employer Match by Number of Active Plan Participants, 1993-2007**

|                        | <b>&lt; 500</b> | <b>500-999</b> | <b>1,000-2,499</b> | <b>2,500-4,999</b> | <b>5,000+</b> | <b>All</b> |
|------------------------|-----------------|----------------|--------------------|--------------------|---------------|------------|
| <b>1993</b>            | 82%             | 84%            | 87%                | 85%                | 89%           | 87%        |
| <b>1994</b>            | 82%             | 85%            | 88%                | 86%                | 90%           | 87%        |
| <b>1995</b>            | 82%             | 84%            | 88%                | 88%                | 89%           | 86%        |
| <b>1996</b>            | 82%             | 85%            | 87%                | 90%                | 90%           | 87%        |
| <b>1997</b>            | 82%             | 85%            | 87%                | 91%                | 89%           | 87%        |
| <b>1998</b>            | 82%             | 86%            | 88%                | 91%                | 92%           | 88%        |
| <b>1999</b>            | 82%             | 87%            | 89%                | 90%                | 93%           | 89%        |
| <b>2000</b>            | 83%             | 86%            | 89%                | 89%                | 93%           | 90%        |
| <b>2001</b>            | 82%             | 87%            | 89%                | 90%                | 93%           | 89%        |
| <b>2002</b>            | 81%             | 87%            | 89%                | 90%                | 91%           | 87%        |
| <b>2003</b>            | 81%             | 86%            | 89%                | 90%                | 92%           | 88%        |
| <b>2004</b>            | 82%             | 88%            | 90%                | 89%                | 92%           | 89%        |
| <b>2005</b>            | 83%             | 88%            | 90%                | 92%                | 93%           | 89%        |
| <b>2006</b>            | 84%             | 88%            | 90%                | 93%                | 94%           | 90%        |
| <b>2007</b>            | 85%             | 89%            | 91%                | 93%                | 94%           | 91%        |
| <b>All years</b>       | 82%             | 86%            | 89%                | 90%                | 92%           | 89%        |
| <b>Number of plans</b> | 457,743         | 59,197         | 39,098             | 14,948             | 14,938        | 585,924    |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Years 1993-2007.

Note: Sample includes plans with 100 or more participants (active and retired). The last column (mean for all plans) is weighted by the number of active plan participants.



**Table 4. Percentage of Private Sector 401(k) Plans with an Employer Match by Industry, 1993-2007**

|                            | Agriculture,<br>mining &<br>construction | Manufacturing | Transportation<br>& public Utilities | Wholesale<br>trade | Retail trade | Financial,<br>insurance<br>& real<br>estate | Other<br>services | All     |
|----------------------------|--|---------------|--------------------------------------|--------------------|--------------|---|-------------------|---------|
| <b>1993</b>                | 80%                                      | 88%           | 79%                                  | 87%                | 87%          | 94%   | 81%               | 87%     |
| <b>1994</b>                | 85%                                      | 88%           | 82%                                  | 88%                | 87%          | 95%   | 80%               | 87%     |
| <b>1995</b>                | 90%                                      | 89%           | 86%                                  | 91%                | 83%          | 95%   | 76%               | 86%     |
| <b>1996</b>                | 90%                                      | 90%           | 82%                                  | 91%                | 83%          | 96%   | 81%               | 87%     |
| <b>1997</b>                | 88%                                      | 90%           | 84%                                  | 90%                | 83%          | 96%   | 80%               | 87%     |
| <b>1998</b>                | 87%                                      | 91%           | 96%                                  | 75%                | 89%          | 84%   | 90%               | 88%     |
| <b>1999</b>                | 83%                                      | 90%           | 86%                                  | 94%                | 87%          | 94%   | 89%               | 89%     |
| <b>2000</b>                | 86%                                      | 91%           | 78%                                  | 91%                | 94%          | 93%   | 89%               | 90%     |
| <b>2001</b>                | 87%                                      | 90%           | 77%                                  | 93%                | 89%          | 94%   | 88%               | 89%     |
| <b>2002</b>                | 88%                                      | 88%           | 79%                                  | 92%                | 89%          | 92%   | 86%               | 87%     |
| <b>2003</b>                | 88%                                      | 90%           | 80%                                  | 91%                | 89%          | 92%   | 87%               | 88%     |
| <b>2004</b>                | 90%                                      | 92%           | 78%                                  | 91%                | 89%          | 93%   | 88%               | 89%     |
| <b>2005</b>                | 91%                                      | 92%           | 75%                                  | 93%                | 90%          | 93%   | 89%               | 89%     |
| <b>2006</b>                | 91%                                      | 92%           | 83%                                  | 95%                | 89%          | 95%   | 90%               | 90%     |
| <b>2007</b>                | 91%                                      | 94%           | 81%                                  | 95%                | 89%          | 95%   | 90%               | 91%     |
| <b>All years</b>           | 88%                                      | 90%           | 80%                                  | 91%                | 88%          | 94%   | 87%               | 89%     |
| <b>Number of<br/>plans</b> | 46,166                                   | 179,726       | 20,853                               | 37,979             | 69,449       | 52,855                                      | 178,896           | 585,924 |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Years 1993-2007.

Note: Sample includes plans with 100 or more participants (active and retired). Results are weighted by the number of active plan participants.

**Table 5. Distribution of Private Sector 401(k) Plan Match Rates, 1993-2007**

|                  | 5th | 10th | 25th | Median | 75th | 90th | 95th | Mean | Percent with an employer match | Number of plans |
|------------------|-----|------|------|--------|------|------|------|------|--------------------------------|-----------------|
| <b>1993</b>      | 0%  | 0%   | 17%  | 36%    | 58%  | 100% | 180% | 54%  | 83%                            | 22,247          |
| <b>1994</b>      | 0%  | 0%   | 16%  | 34%    | 57%  | 98%  | 160% | 49%  | 83%                            | 25,312          |
| <b>1995</b>      | 0%  | 0%   | 15%  | 34%    | 54%  | 94%  | 150% | 49%  | 83%                            | 28,925          |
| <b>1996</b>      | 0%  | 0%   | 14%  | 33%    | 51%  | 92%  | 130% | 46%  | 83%                            | 31,966          |
| <b>1997</b>      | 0%  | 0%   | 14%  | 32%    | 51%  | 100% | 160% | 48%  | 83%                            | 35,170          |
| <b>1998</b>      | 0%  | 0%   | 15%  | 32%    | 51%  | 93%  | 120% | 44%  | 83%                            | 38,182          |
| <b>1999</b>      | 0%  | 0%   | 16%  | 33%    | 50%  | 80%  | 110% | 41%  | 83%                            | 29,858          |
| <b>2000</b>      | 0%  | 0%   | 17%  | 33%    | 53%  | 90%  | 110% | 46%  | 84%                            | 34,895          |
| <b>2001</b>      | 0%  | 0%   | 18%  | 34%    | 53%  | 86%  | 110% | 44%  | 83%                            | 46,074          |
| <b>2002</b>      | 0%  | 0%   | 17%  | 35%    | 55%  | 94%  | 150% | 47%  | 82%                            | 47,487          |
| <b>2003</b>      | 0%  | 0%   | 18%  | 35%    | 57%  | 93%  | 150% | 52%  | 83%                            | 48,134          |
| <b>2004</b>      | 0%  | 0%   | 18%  | 35%    | 56%  | 94%  | 150% | 49%  | 84%                            | 48,491          |
| <b>2005</b>      | 0%  | 0%   | 18%  | 36%    | 56%  | 95%  | 150% | 50%  | 84%                            | 49,973          |
| <b>2006</b>      | 0%  | 0%   | 20%  | 36%    | 58%  | 94%  | 150% | 52%  | 85%                            | 50,831          |
| <b>2007</b>      | 0%  | 1%   | 21%  | 37%    | 56%  | 84%  | 120% | 46%  | 86%                            | 48,379          |
| <b>All years</b> | 0%  | 0%   | 17%  | 35%    | 55%  | 92%  | 140% | 48%  | 84%                            | 585,924         |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Years 1993-2007.

Note: Sample includes plans with 100 or more participants (active and retired). Results are weighted by the number of active plan participants.

**Table 6. Average Private Sector 401(k) Plan Match Rates by Number of Active Plan Participants, 1993-2007**

|                        | <b>&lt; 500</b> | <b>500-999</b> | <b>1,000-2,499</b> | <b>2,500-4,999</b> | <b>5,000+</b> | <b>All</b> |
|------------------------|-----------------|----------------|--------------------|--------------------|---------------|------------|
| <b>1993</b>            | 54%             | 53%            | 51%                | 54%                | 55%           | 54%        |
| <b>1994</b>            | 51%             | 50%            | 47%                | 46%                | 54%           | 49%        |
| <b>1995</b>            | 49%             | 47%            | 46%                | 45%                | 54%           | 49%        |
| <b>1996</b>            | 48%             | 45%            | 45%                | 45%                | 52%           | 46%        |
| <b>1997</b>            | 46%             | 44%            | 45%                | 42%                | 49%           | 48%        |
| <b>1998</b>            | 45%             | 44%            | 45%                | 44%                | 46%           | 44%        |
| <b>1999</b>            | 42%             | 43%            | 42%                | 46%                | 45%           | 41%        |
| <b>2000</b>            | 43%             | 43%            | 44%                | 43%                | 48%           | 46%        |
| <b>2001</b>            | 42%             | 43%            | 43%                | 45%                | 48%           | 44%        |
| <b>2002</b>            | 43%             | 44%            | 44%                | 48%                | 48%           | 47%        |
| <b>2003</b>            | 45%             | 45%            | 46%                | 47%                | 48%           | 52%        |
| <b>2004</b>            | 45%             | 46%            | 46%                | 49%                | 46%           | 49%        |
| <b>2005</b>            | 46%             | 47%            | 47%                | 48%                | 47%           | 50%        |
| <b>2006</b>            | 46%             | 47%            | 47%                | 49%                | 48%           | 52%        |
| <b>2007</b>            | 46%             | 46%            | 48%                | 51%                | 47%           | 46%        |
| <b>All years</b>       | 46%             | 46%            | 46%                | 47%                | 49%           | 48%        |
| <b>Number of plans</b> | 457,743         | 59,197         | 39,098             | 14,948             | 14,938        | 585,924    |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Years 1993-2007.

Note: Sample includes plans with 100 or more participants (active and retired). The last column (mean for all plans) is weighted by the number of active plan participants.

**Table 7. Average Private Sector 401(k) Plan Match Rates by Industry, 1993-2007**

|                            | Agriculture,<br>mining &<br>construction | Manufacturing | Transportation<br>& public<br>utilities | Wholesale<br>trade | Retail<br>trade | Financial,<br>insurance<br>& real<br>estate | Other<br>services | All     |
|----------------------------|--|---------------|---|--------------------|-----------------|---|-------------------|---------|
| <b>1993</b>                | 54%                                      | 57%           | 35%                                     | 52%                | 48%             | 65%   | 49%               | 54%     |
| <b>1994</b>                | 62%                                      | 52%           | 32%                                     | 52%                | 44%             | 61%   | 42%               | 49%     |
| <b>1995</b>                | 64%                                      | 51%           | 36%                                     | 52%                | 42%             | 68%   | 39%               | 49%     |
| <b>1996</b>                | 61%                                      | 50%           | 35%                                     | 48%                | 38%             | 58%   | 41%               | 46%     |
| <b>1997</b>                | 59%                                      | 52%           | 32%                                     | 50%                | 49%             | 56%   | 38%               | 48%     |
| <b>1998</b>                | 45%                                      | 46%           | 51%                                     | 39%                | 43%             | 41%   | 42%               | 44%     |
| <b>1999</b>                | 55%                                      | 43%           | 29%                                     | 49%                | 40%             | 49%   | 38%               | 41%     |
| <b>2000</b>                | 55%                                      | 45%           | 27%                                     | 53%                | 55%             | 54%   | 42%               | 46%     |
| <b>2001</b>                | 59%                                      | 45%           | 28%                                     | 52%                | 50%             | 49%   | 41%               | 44%     |
| <b>2002</b>                | 59%                                      | 45%           | 31%                                     | 52%                | 61%             | 52%   | 42%               | 47%     |
| <b>2003</b>                | 63%                                      | 46%           | 56%                                     | 55%                | 83%             | 53%   | 41%               | 52%     |
| <b>2004</b>                | 69%                                      | 48%           | 31%                                     | 47%                | 74%             | 51%   | 40%               | 49%     |
| <b>2005</b>                | 71%                                      | 47%           | 30%                                     | 47%                | 79%             | 53%   | 40%               | 50%     |
| <b>2006</b>                | 70%                                      | 47%           | 56%                                     | 47%                | 78%             | 52%   | 42%               | 52%     |
| <b>2007</b>                | 73%                                      | 49%           | 42%                                     | 46%                | 44%             | 52%   | 42%               | 46%     |
| <b>All years</b>           | 58%                                      | 48%           | 37%                                     | 49%                | 57%             | 54%   | 41%               | 48%     |
| <b>Number of<br/>plans</b> | 46,166                                   | 179,726       | 20,853                                  | 37,979             | 69,449          | 52,855                                      | 178,896           | 585,924 |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Years 1993-2007.

Note: Sample includes plans with 100 or more participants (active and retired). Results are weighted by the number of active plan participants.

**Table 8. Construction of Regression Sample**

|                                      | <b>Data from<br/>5500 forms</b> | <b>Data from<br/>P&amp;I 1,000</b> | <b>Merged data<br/>= regression<br/>sample</b> | <b>Percent of<br/>total</b> |
|--------------------------------------|---------------------------------|------------------------------------|--|-----------------------------|
|                                      | <b>(1)</b>                      | <b>(2)</b>                         | <b>(3)</b>                                     | <b>=(3)/(1)</b>             |
| <b>Number of plans</b>               | 48,507                          | 606                                | 829  | 1.7%                        |
| <b>Number of unique firms</b>        | 46,859                          | 606                                | 532  | 1.1%                        |
| <b>Assets</b>                        | \$2,278,211                     | \$1,370,575                        | \$1,157,226                                    | 50.8%                       |
| <b>Number of active participants</b> | 45,448                          | N/A                                | 13,470   | 29.6%                       |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Year 2007 and Pensions & Investments (P&I) Top 1,000 Funds.

Note: Unique firms are identified using Employer Identification Numbers (EINs).

**Table 9. Distribution of Private Sector 401(k) Plan Match Rates by Automatic Enrollment**

|                                     | 5th | 10th | 25th | Median | 75th | 90th | 95th | Mean | Percent<br>with an<br>employer<br>match | Number<br>of plans |
|-------------------------------------|-----|------|------|--------|------|------|------|------|---|--------------------|
| <b>Form 5500 data for 2007</b>      | 0%  | 1%   | 21%  | 37%    | 56%  | 84%  | 120% | 46%  | 86%                                     | 48,379             |
| <b>Regression Sample</b>            | 0%  | 0%   | 27%  | 41%    | 55%  | 73%  | 96%  | 44%  | 91%                                     | 826                |
| <b>Without automatic enrollment</b> | 0%  | 5%   | 29%  | 43%    | 57%  | 78%  | 100% | 47%  | 93%                                     | 665                |
| <b>With automatic enrollment</b>    | 0%  | 0%   | 10%  | 33%    | 48%  | 64%  | 72%  | 34%  | 82%                                     | 161                |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Year 2007 and Pensions & Investments (P&I) Top 1,000 Funds.

Note: The regression sample is constructed by merging data from the Form 5500 and the P&I top 1,000 funds. It includes plans with 100 or more participants (active and retired). Results are weighted by the number of active plan participants.

**Table 10. Descriptive Statistics of Regression Variables at the Plan and Firm Level, by Automatic Enrollment**

|  | Plans   |                     |                  | Firms   |                     |                  |
|--|---------|---------------------|------------------|---------|---------------------|------------------|
|  | All     | Without auto enroll | With auto enroll | All     | Without auto enroll | With auto enroll |
| <b>Employer contribution per participant</b> | \$1,685 | \$1,670             | \$1,740          | \$1,726 | \$1,690             | \$1,871          |
| <b>Total contribution per participant</b>    | \$5,538 | \$5,282             | \$6,499          | \$5,640 | \$5,326             | \$6,931          |
| <b>Firm offers a match</b>                   | 91%     | 93%                 | 82%              | 91%     | 93%                 | 83%              |
| <b>Match rate</b>                            | 44%     | 47%                 | 34%              | 44%     | 47%                 | 35%              |
| <b>Industry</b>                              |         |                     |                  |         |                     |                  |
| Agriculture, mining, & construction          | 2%      | 2%                  | 3%               | 2%      | 2%                  | 3%               |
| Manufacturing                                | 31%     | 29%                 | 38%              | 29%     | 27%                 | 37%              |
| Transportation & public utilities            | 10%     | 8%                  | 21%              | 10%     | 8%                  | 20%              |
| Wholesale Trade                              | 2%      | 2%                  | 0%               | 2%      | 2%                  | 1%               |
| Retail Trade                                 | 21%     | 24%                 | 15%              | 21%     | 24%                 | 9%               |
| Finance, insurance, and real estate          | 11%     | 10%                 | 13%              | 12%     | 11%                 | 16%              |
| Other services                               | 24%     | 26%                 | 16%              | 24%     | 26%                 | 15%              |
| <b>Size</b>                                  |         |                     |                  |         |                     |                  |
| < 500  | 9%      | 9%                  | 7%               | 1%      | 1%                  | 0%               |
| 500-999                                      | 4%      | 4%                  | 4%               | 0%      | 0%                  | 1%               |
| 1,000-2,499                                  | 11%     | 10%                 | 15%              | 4%      | 4%                  | 4%               |
| 2,500-4,999                                  | 17%     | 17%                 | 19%              | 17%     | 17%                 | 15%              |
| 5,000+                                       | 59%     | 59%                 | 55%              | 78%     | 78%                 | 79%              |
| <b>Firm offers a defined benefit plan</b>    | 71%     | 66%                 | 92%              | 68%     | 63%                 | 90%              |
| <b>Number of observations</b>                | 826     | 665                 | 161              | 532     | 440                 | 92               |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Year 2007 and Pensions & Investments (P&I) Top 1,000 Funds.

Note: The regression sample is constructed by merging data from the Form 5500 and the P&I top 1,000 funds. It includes plans with 100 or more participants (active and retired). With the exception of the statistics by size, the results are weighted by the number of active plan participants.

Table 11. Regression Results of Automatic Enrollment on Employer Matching

**Regression 1. Probit with Dependent Variable=Firm Offers Match (0=No, 1=Yes)**

|  | Plan Level  |                | Firm Level  |                |
|--|-------------|----------------|-------------|----------------|
|  | Coefficient | Standard Error | Coefficient | Standard Error |
| <b>Autoenrollment</b>                                | 0.1007      | 0.1868         | -0.0434     | 0.2538         |
| <b>Industry (Wholesale and retail trade omitted)</b> |             |                |             |                |
| Agriculture, mining, & construction                  | 0.6596      | 0.4057         | 0.2898      | 0.4633         |
| Manufacturing  | 0.6196 ***  | 0.2152         | 0.5725 **   | 0.2820         |
| Transportation & public utilities                    | 0.4201      | 0.2847         | 0.2963      | 0.3554         |
| Finance, insurance, and real estate                  |             |                |             |                |
| Other services                                       | 1.0075 ***  | 0.2759         | 0.8729 **   | 0.3454         |
| <b>Size of 2,500 or more participants</b>            | 0.5181 ***  | 0.1524         | 0.5029      | 0.3489         |
| <b>Firm offers a defined benefit plan</b>            | -0.0315     | 0.1880         | 0.0629      | 0.2223         |
| <b>Constant</b>                                      | 0.5321 **   | 0.2639         | 0.5874      | 0.4244         |
| <b>Number of observations</b>                        | 747         |                | 463         |                |

**Regression 2. Tobit with Dependent Variable=Match Rate (Continuous Variable, Lower Limit=0)**

|  | Plan Level  |                | Firm Level  |                |
|--|-------------|----------------|-------------|----------------|
|  | Coefficient | Standard Error | Coefficient | Standard Error |
| <b>Autoenrollment</b>                                | -0.0599     | 0.0400         | -0.0690 *   | 0.0409         |
| <b>Industry (Wholesale and retail trade omitted)</b> |             |                |             |                |
| Agriculture, mining, & construction                  | 0.2634 **   | 0.1334         | 0.3119 *    | 0.1695         |
| Manufacturing  | 0.1716 **   | 0.0733         | 0.1789 ***  | 0.0645         |
| Transportation & public utilities                    | 0.1481      | 0.1066         | 0.1462      | 0.0992         |
| Finance, insurance, and real estate                  | 0.1096      | 0.0684         | 0.0938      | 0.0610         |
| Other services                                       | 0.1571 **   | 0.0743         | 0.1294 **   | 0.0631         |
| <b>Size of 2,500 or more participants</b>            | -0.0097     | 0.0519         | 0.1324 *    | 0.0753         |
| <b>Firm offers a defined benefit plan</b>            | -0.0481     | 0.0487         | -0.0753     | 0.0508         |
| <b>Constant</b>                                      | 0.3911 ***  | 0.0869         | 0.2922 ***  | 0.0997         |
| <b>Number of observations</b>                        | 826         |                | 532         |                |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Year 2007 and Pensions & Investments (P&I) Top 1,000 Funds.

Note: The regression sample is constructed by merging data from the Form 5500 and the P&I top 1,000 funds. It includes plans with 100 or more participants (active and retired). Plans in the financial, insurance, and real estate industries (79 plans representing 69 firms) are dropped from the Probit regressions because they all offer an employer match. Significance is denoted by \*  $p < .10$ , \*\*  $p < .05$ , and \*\*\*  $p < .01$ .



**Table 12. Regression Results of Automatic Enrollment on the Change in Employer Matching**

**Regression 3. OLS with Dependent Variable= Match Rate (2007) - Average Match Rate (2000-2002)**

|  | Plan Level  |                | Firm Level  |                |
|--|-------------|----------------|-------------|----------------|
|  | Coefficient | Standard Error | Coefficient | Standard Error |
| <b>Autoenrollment</b>                                | -0.0878 *   | 0.0523         | -0.0531     | 0.0692         |
| <b>Industry (Wholesale and retail trade omitted)</b> |             |                |             |                |
| <b>Agriculture, mining, &amp; construction</b>       | 0.0717      | 0.0622         | 0.0964 *    | 0.0581         |
| <b>Manufacturing</b>                                 | 0.0303      | 0.0552         | 0.0570      | 0.0598         |
| <b>Transportation &amp; public utilities</b>         | 0.1579 *    | 0.0925         | 0.2120 **   | 0.1059         |
| <b>Finance, insurance, and real estate</b>           | 0.0226      | 0.0485         | 0.0637      | 0.0472         |
| <b>Other services</b>                                | 0.0177      | 0.0490         | 0.0343      | 0.0468         |
| <b>Size of 2,500 or more participants</b>            | -0.0192     | 0.0535         | -0.0642     | 0.0900         |
| <b>Firm offers a defined benefit plan</b>            | -0.0297     | 0.0475         | -0.0729     | 0.0499         |
| <b>Constant</b>                                      | 0.0288      | 0.0760         | 0.0674      | 0.1044         |
| <b>Number of observations</b>                        | 599         |                | 429         |                |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Year 2007 and Pensions & Investments (P&I) Top 1,000 Funds.

Note: The regression sample is constructed by merging data from the Form 5500 and the P&I top 1,000 funds. It includes plans with 100 or more participants (active and retired). Significance is denoted by \* p < .10, \*\* p < .05, and \*\*\* p < .01.

**Table 13. Percent of Cost Increase Offset by a 7 Percentage Point Reduction in Match Rates**

| <b>Panel 1: Automatic enrollment increases participation by 10 percentage points</b> |                   |                         |                             |   |  |  |                       |
|--|-------------------|-------------------------|-----------------------------|---|--|--|-----------------------|
| <b>Without auto enroll</b>   |                   | <b>With auto enroll</b> |                             | <b>Requirements to offset auto enrollment costs</b> |  |  |                       |
| <b>Part. rate</b>  | <b>Match rate</b> | <b>Part. rate</b>       | <b>Ratio of part. rates</b> | <b>Match rate</b>                                   | <b>Computed <math>\Delta</math> in match</b> | <b>Regression <math>\Delta</math> in match</b> | <b>% Costs Offset</b> |
| <b>(1)</b>   | <b>(2)</b>        | <b>(3)</b>              | <b>(4)=(1)/(3)</b>          | <b>(5)=(4)*(2)</b>                                  | <b>(6)=(5)-(2)</b>                           | <b>(7)</b>                                     | <b>(8)=(7)/(6)</b>    |
| 10   | 50.0              | 20                      | 50                          | 25.0  | -25.0  | -7.0   | 28%                   |
| 20   | 50.0              | 30                      | 67                          | 33.3  | -16.7  | -7.0   | 42%                   |
| 30   | 50.0              | 40                      | 75                          | 37.5  | -12.5  | -7.0   | 56%                   |
| 40   | 50.0              | 50                      | 80                          | 40.0  | -10.0  | -7.0   | 70%                   |
| 50   | 50.0              | 60                      | 83                          | 41.7  | -8.3   | -7.0   | 84%                   |
| 60   | 50.0              | 70                      | 86                          | 42.9  | -7.1   | -7.0   | 98%                   |
| 70   | 50.0              | 80                      | 88                          | 43.8  | -6.3   | -7.0   | 112%                  |
| 80   | 50.0              | 90                      | 89                          | 44.4  | -5.6   | -7.0   | 126%                  |
| 90   | 50.0              | 100                     | 90                          | 45.0  | -5.0   | -7.0   | 140%                  |

  

| <b>Panel 2: Automatic enrollment increases participation by 20 percentage points</b> |                   |                         |                             |   |  |  |                       |
|--|-------------------|-------------------------|-----------------------------|---|--|--|-----------------------|
| <b>Without auto enroll</b>   |                   | <b>With auto enroll</b> |                             | <b>Requirements to offset auto enrollment costs</b> |  |  |                       |
| <b>Part. rate</b>  | <b>Match rate</b> | <b>Part. rate</b>       | <b>Ratio of part. rates</b> | <b>Match rate</b>                                   | <b>Computed <math>\Delta</math> in match</b> | <b>Regression <math>\Delta</math> in match</b> | <b>% Costs Offset</b> |
| <b>(1)</b>   | <b>(2)</b>        | <b>(3)</b>              | <b>(4)=(1)/(3)</b>          | <b>(5)=(4)*(2)</b>                                  | <b>(6)=(5)-(2)</b>                           | <b>(7)</b>                                     | <b>(8)=(7)/(6)</b>    |
| 10   | 50.0              | 30                      | 33                          | 16.7  | -33.3  | -7.0   | 21%                   |
| 20   | 50.0              | 40                      | 50                          | 25.0  | -25.0  | -7.0   | 28%                   |
| 30   | 50.0              | 50                      | 60                          | 30.0  | -20.0  | -7.0   | 35%                   |
| 40   | 50.0              | 60                      | 67                          | 33.3  | -16.7  | -7.0   | 42%                   |
| 50   | 50.0              | 70                      | 71                          | 35.7  | -14.3  | -7.0   | 49%                   |
| 60   | 50.0              | 80                      | 75                          | 37.5  | -12.5  | -7.0   | 56%                   |
| 70   | 50.0              | 90                      | 78                          | 38.9  | -11.1  | -7.0   | 63%                   |
| 80   | 50.0              | 100                     | 80                          | 40.0  | -10.0  | -7.0   | 70%                   |

  

| <b>Panel 3: Automatic enrollment increases participation by 30 percentage points</b> |                   |                         |                             |   |  |  |                       |
|--|-------------------|-------------------------|-----------------------------|---|--|--|-----------------------|
| <b>Without auto enroll</b>   |                   | <b>With auto enroll</b> |                             | <b>Requirements to offset auto enrollment costs</b> |  |  |                       |
| <b>Part. rate</b>  | <b>Match rate</b> | <b>Part. rate</b>       | <b>Ratio of part. rates</b> | <b>Match rate</b>                                   | <b>Computed <math>\Delta</math> in match</b> | <b>Regression <math>\Delta</math> in match</b> | <b>% Costs Offset</b> |
| <b>(1)</b>   | <b>(2)</b>        | <b>(3)</b>              | <b>(4)=(1)/(3)</b>          | <b>(5)=(4)*(2)</b>                                  | <b>(6)=(5)-(2)</b>                           | <b>(7)</b>                                     | <b>(8)=(7)/(6)</b>    |
| 10   | 50.0              | 40                      | 25                          | 12.5  | -37.5  | -7.0   | 19%                   |
| 20   | 50.0              | 50                      | 40                          | 20.0  | -30.0  | -7.0   | 23%                   |
| 30   | 50.0              | 60                      | 50                          | 25.0  | -25.0  | -7.0   | 28%                   |
| 40   | 50.0              | 70                      | 57                          | 28.6  | -21.4  | -7.0   | 33%                   |
| 50   | 50.0              | 80                      | 63                          | 31.3  | -18.8  | -7.0   | 37%                   |
| 60   | 50.0              | 90                      | 67                          | 33.3  | -16.7  | -7.0   | 42%                   |
| 70   | 50.0              | 100                     | 70                          | 35.0  | -15.0  | -7.0   | 47%                   |

Source: Authors' computations.

Appendix Table 1. Unweighted Regression Results of Automatic Enrollment on Employer Matching

Regression 1. Dependent Variable=Firm Offers Match (0=No, 1=Yes)

|  | Plan Level  |                |             |                | Firm Level  |                |             |                |
|--|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|
|  | OLS         |                | PROBIT      |                | OLS         |                | PROBIT      |                |
|  | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| <b>Autoenrollment</b>                                | 0.0137      | 0.0233         | 0.1007      | 0.1868         | -0.0051     | 0.0252         | -0.0434     | 0.2538         |
| <b>Industry (Wholesale and retail trade omitted)</b> |             |                |             |                |             |                |             |                |
| Agriculture, mining, & construction                  | 0.1163 *    | 0.0693         | 0.6596      | 0.4057         | 0.0463      | 0.0796         | 0.2898      | 0.4633         |
| Manufacturing  | 0.1099 **   | 0.0542         | 0.6196 ***  | 0.2152         | 0.0875      | 0.0532         | 0.5725 **   | 0.2820         |
| Transportation & public utilities                    | 0.0886      | 0.0667         | 0.4201      | 0.2847         | 0.0546      | 0.0644         | 0.2963      | 0.3554         |
| Finance, insurance, and real estate                  | 0.1678 ***  | 0.0523         |             |                | 0.1349 ***  | 0.0515         |             |                |
| Other services                                       | 0.1469 ***  | 0.0539         | 1.0075 ***  | 0.2759         | 0.1105 **   | 0.0540         | 0.8729 **   | 0.3454         |
| <b>Size of 2,500 or more participants</b>            | 0.0714 **   | 0.0290         | 0.5181 ***  | 0.1524         | 0.0634      | 0.0608         | 0.5029      | 0.3489         |
| <b>Firm offers a defined benefit plan</b>            | -0.0018     | 0.0225         | -0.0315     | 0.1880         | 0.0095      | 0.0218         | 0.0629      | 0.2223         |
| <b>Constant</b>                                      | 0.7664 ***  | 0.0615         | 0.5321 **   | 0.2639         | 0.7980 ***  | 0.0804         | 0.5874      | 0.4244         |
| <b>Number of observations</b>                        | 826         |                | 747         |                | 532         |                | 463         |                |

Regression 2. Dependent Variable=Match Rate (Continuous Variable, Lower Limit=0)

|  | Plan Level  |                |             |                | Firm Level  |                |             |                |
|--|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|
|  | OLS         |                | TOBIT       |                | OLS         |                | TOBIT       |                |
|  | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| <b>Autoenrollment</b>                                | -0.0629 *   | 0.0378         | -0.0599     | 0.0400         | -0.0677 *   | 0.0386         | -0.0690 *   | 0.0409         |
| <b>Industry (Wholesale and retail trade omitted)</b> |             |                |             |                |             |                |             |                |
| Agriculture, mining, & construction                  | 0.2287 *    | 0.1254         | 0.2634 **   | 0.1334         | 0.2991 *    | 0.1625         | 0.3119 *    | 0.1695         |
| Manufacturing  | 0.1392 **   | 0.0630         | 0.1716 **   | 0.0733         | 0.1590 ***  | 0.0566         | 0.1789 ***  | 0.0645         |
| Transportation & public utilities                    | 0.1215      | 0.0967         | 0.1481      | 0.1066         | 0.1329      | 0.0921         | 0.1462      | 0.0992         |
| Finance, insurance, and real estate                  | 0.0632      | 0.0588         | 0.1096      | 0.0684         | 0.0648      | 0.0537         | 0.0938      | 0.0610         |
| Other services                                       | 0.1159 *    | 0.0647         | 0.1571 **   | 0.0743         | 0.1055 *    | 0.0556         | 0.1294 **   | 0.0631         |
| <b>Size of 2,500 or more participants</b>            | -0.0267     | 0.0497         | -0.0097     | 0.0519         | 0.1185 *    | 0.0671         | 0.1324 *    | 0.0753         |
| <b>Firm offers a defined benefit plan</b>            | -0.0473     | 0.0467         | -0.0481     | 0.0487         | -0.0770     | 0.0496         | -0.0753     | 0.0508         |
| <b>Constant</b>                                      | 0.4529 ***  | 0.0782         | 0.3911 ***  | 0.0869         | 0.3356 ***  | 0.0885         | 0.2922 ***  | 0.0997         |
| <b>Number of observations</b>                        | 826         |                | 826         |                | 532         |                | 532         |                |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Year 2007 and Pensions &amp; Investments (P&amp;I) Top 1,000 Funds.

Note: The regression sample is constructed by merging data from the Form 5500 and the P&I top 1,000 funds. It includes plans with 100 or more participants (active and retired). Plans in the financial, insurance, and real estate industries (79 plans representing 69 firms) are dropped from the Probit regressions because they all offer an employer match. Results are weighted by the number of active plan participants. Significance is denoted by \* p < .10, \*\* p < .05, and \*\*\* p < .01.

Appendix Table 2. Weighted Regression Results of Automatic Enrollment on Employer Matching

Regression 1. Dependent Variable= Firm Offers Match (0=No, 1=Yes)

|  | Plan Level  |                |             |                | Firm Level  |                |             |                |
|--|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|
|  | OLS         |                | PROBIT      |                | OLS         |                | PROBIT      |                |
|  | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| <b>Autoenrollment</b>                                | -0.0897     | 0.0762         | -0.5419 *   | 0.3242         | -0.0866     | 0.0761         | -0.5387     | 0.3902         |
| <b>Industry (Wholesale and retail trade omitted)</b> |             |                |             |                |             |                |             |                |
| Agriculture, mining, & construction                  | 0.1232      | 0.0906         | 0.8043      | 0.5373         | 0.1034      | 0.0938         | 0.6800      | 0.5692         |
| Manufacturing  | 0.1139      | 0.0784         | 0.6681 *    | 0.3435         | 0.0910      | 0.0783         | 0.5339      | 0.3862         |
| Transportation & public utilities                    | -0.1402     | 0.1827         | -0.3364     | 0.4220         | -0.1261     | 0.1730         | -0.3321     | 0.4950         |
| Finance, insurance, and real estate                  | 0.1764 **   | 0.0760         |             |                | 0.1608 **   | 0.0749         |             |                |
| Other services                                       | 0.1634 **   | 0.0756         | 1.9018 ***  | 0.3635         | 0.1470 **   | 0.0751         | 1.8019 ***  | 0.4032         |
| <b>Size of 2,500 or more participants</b>            | 0.0318      | 0.0372         | 0.2943      | 0.2231         | -0.0161     | 0.0455         | -0.0939     | 0.4350         |
| <b>Firm offers a defined benefit plan</b>            | -0.0066     | 0.0504         | -0.0353     | 0.3713         | 0.0048      | 0.0498         | 0.0518      | 0.3874         |
| <b>Constant</b>                                      | 0.8197 ***  | 0.0954         | 0.7685      | 0.4750         | 0.8740 ***  | 0.1001         | 1.1630 *    | 0.6082         |
| <b>Number of observations</b>                        | 826         |                | 747         |                | 532         |                | 463         |                |

Regression 2. Dependent Variable= Match Rate (Continuous Variable, Lower Limit=0)

|  | Plan Level  |                |             |                | Firm Level  |                |             |                |
|--|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|
|  | OLS         |                | TOBIT       |                | OLS         |                | TOBIT       |                |
|  | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error | Coefficient | Standard Error |
| <b>Autoenrollment</b>                                | -0.1206 **  | 0.0602         | -0.1435 *   | 0.0789         | -0.1077 **  | 0.0550         | -0.1288 *   | 0.0714         |
| <b>Industry (Wholesale and retail trade omitted)</b> |             |                |             |                |             |                |             |                |
| Agriculture, mining, & construction                  | 0.2502 ***  | 0.0885         | 0.2782 ***  | 0.1023         | 0.2519 ***  | 0.0953         | 0.2741 **   | 0.1081         |
| Manufacturing  | 0.0599      | 0.0560         | 0.0852      | 0.0699         | 0.0629      | 0.0615         | 0.0819      | 0.0745         |
| Transportation & public utilities                    | 0.0779      | 0.1812         | 0.0410      | 0.2200         | 0.0395      | 0.1773         | 0.0068      | 0.2061         |
| Finance, insurance, and real estate                  | 0.0180      | 0.0600         | 0.0562      | 0.0724         | 0.0124      | 0.0652         | 0.0449      | 0.0768         |
| Other services                                       | 0.0696      | 0.0599         | 0.1045      | 0.0722         | 0.0584      | 0.0653         | 0.0875      | 0.0767         |
| <b>Size of 2,500 or more participants</b>            | -0.0579     | 0.0423         | -0.0533     | 0.0471         | 0.0012      | 0.0742         | -0.0037     | 0.0786         |
| <b>Firm offers a defined benefit plan</b>            | -0.0595     | 0.0611         | -0.0623     | 0.0670         | -0.0684     | 0.0616         | -0.0687     | 0.0664         |
| <b>Constant</b>                                      | 0.5167 ***  | 0.0860         | 0.4818 ***  | 0.1014         | 0.4667 ***  | 0.1059         | 0.4447 ***  | 0.1190         |
| <b>Number of observations</b>                        | 826         |                | 826         |                | 532         |                | 532         |                |

Source: Authors' calculations using the Annual Return/Report Form 5500 Series for Plan Year 2007 and Pensions &amp; Investments (P&amp;I) Top 1,000 Funds.

Note: The regression sample is constructed by merging data from the Form 5500 and the P&I top 1,000 funds. It includes plans with 100 or more participants (active and retired). Plans in the financial, insurance, and real estate industries (79 plans representing 69 firms) are dropped from the Probit regressions because they all offer an employer match. Results are weighted by the number of active plan participants. Significance is denoted by \*  $p < .10$ , \*\*  $p < .05$ , and \*\*\*  $p < .01$ .

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