

# CONTRIBUTION DYNAMICS IN DEFINED CONTRIBUTION PENSION PLANS DURING THE GREAT RECESSION OF 2007–2009

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*We investigate changes in workers' participation and contributions to defined contribution (DC) plans during the Great Recession of 2007–2009. Using longitudinal information from W-2 tax records matched to a nationally representative sample of respondents from the Survey of Income and Program Participation, we find that the recent economic downturn had a considerable impact on workers' participation and contributions to DC plans. Thirty-nine percent of 2007 participants decreased contributions to DC plans by more than 10 percent during the Great Recession. Our findings highlight the interrelationship between the dynamics in DC contributions and earnings changes. Participants experiencing a decrease in earnings of more than 10 percent were not only more likely to stop contributing by 2009 than those with stable earnings (30 percent versus 9 percent), but they also decreased their contributions substantially (-\$1,839 versus -\$129). The proportion of workers who decreased or stopped contributions during the crisis exceeded the proportion observed prior to it (2005–2007).*

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## Introduction

Over the past three decades, the pension landscape of the United States has changed dramatically, from one dominated by defined benefit (DB) plans to one where defined contribution (DC) plans are the most prevalent type of retirement plan (Turner and Beller 1989; Gustman and Steinmeier 1992; Employee Benefit Research Institute 1993; Kruse 1995; Rajnes 2002; Costo 2006; Buessing and Soto 2006; Gustman, Steinmeier, and Tabatabai 2009; Purcell 2005, 2009; Copeland 2005, 2009; Bureau of Labor Statistics 2010). This transition has led to a shift of risks and responsibilities from employers to employees who now have to make decisions regarding their own retirement savings. For a DC pension to provide adequate income at retirement, contributions generally need to occur regularly over the work life (Munnell and Sunden 2004). A common view regarding such plans is that once the employee enrolls in the plan and elects his or her contribution amount, inertia

will prevail and the employee will continue to contribute in future years.<sup>1</sup>

However, employees may elect to stop, decrease, or increase contributions in any given year in response, among others, to labor market or capital market shocks. Contribution changes that are due to unexpected economic shocks, such as those associated with a recessionary period (for example, housing, income, job and/or financial market shocks), may jeopardize the accumulation of funds in DC retirement accounts and can have an important impact on account balances at retirement, and hence, retirement preparedness. Thus, from a policy perspective it is important to

### Selected Abbreviations

DC	defined contribution
SIPP	Survey of Income and Program Participation

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understand whether and to what extent workers change their contributions over time, particularly in the context of a financial and economic crisis.

This article contributes to the existing literature on the impacts of the economic crisis by investigating the dynamics of employee participation and contributions to DC pension plans during the Great Recession of 2007–2009 and comparing those dynamics with the period prior to it (2005–2007). More specifically, we examine the extent to which changes in contributions are concomitant with earnings changes over the same period.

Using a longitudinal approach, we draw from a data set that links a nationally representative sample of workers from the Survey of Income and Program Participation (SIPP) to their administrative W-2 tax records. These records provide a unique opportunity to examine contribution patterns of the same participants over time. To our knowledge, this study is the first to use a nationally representative sample of individuals matched to administrative records containing longitudinal information about workers' earnings and tax-deferred contributions to examine changes in DC outcomes during the Great Recession.

By examining the impact of the recession on DC pension contributions of the same worker, we provide insights into individuals' responses to economic shocks. Our findings reveal great variability in contributions and indicate that inertia does not typify workers' behavior with respect to contributions to DC plans, especially during the Great Recession. A higher proportion of workers stopped or decreased their contributions substantially (by more than 10 percent) during the recession than did so prior to the recession. Both contribution amounts and contribution rates significantly decreased during the crisis, surpassing in magnitude the slight increase during the period prior to it. Our findings also highlight the role that earnings changes play in altering workers' DC contribution amounts. Thus, workers who experienced decreased earnings were significantly more likely to stop or decrease their contributions than those who did not.

In what follows, we briefly discuss several channels through which the economic downturn may have influenced DC plan contribution behavior and review prior research related to the impact of the Great Recession on DC account activities. Next, we describe our data and empirical strategy and then present our findings from comparing changes in contributions during

the crisis with those prior to it. The final section discusses these findings and their implications.

## **Background**

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During the 2008–2009 period, the US economy experienced the worst economic downturn since the Great Depression. According to the official definition, the economic downturn, often referred to as the Great Recession, began in December of 2007 and continued through June of 2009 (Business Cycle Dating Committee 2010). The period witnessed rising unemployment, along with falling housing prices, spending, stock prices, household wealth, and retirement assets.

A series of recent studies (Maurer, Mitchell, and Warshawsky 2012; Bricker and others 2011; Butrica, Johnson, and Smith 2012; Johnson and Smith, forthcoming) have revealed substantial impacts of the financial and economic crisis on several outcomes including, spending, retirement plans, and household assets. Hurd and Rohwedder (2010, 2012), for example, found that more than 30 percent of Health and Retirement Study respondents in their fifties decreased their spending during the Great Recession and that the 4–7 percentage point decline in spending was in excess of the decline in previous years. Over 60 percent of families in the Survey of Consumer Finances saw their wealth decline from 2007 to 2009 (Bricker and others 2011). Furthermore, households nearing retirement that were hurt hardest by the dual decline in equity values and home prices changed their retirement behavior in response by increasing saving and deferring retirement (Coronado and Dynan 2012). Given all of these changes, it is plausible that the Great Recession may have also affected participation and contributions to DC pension plans.

Economic and financial downturns may affect workers' retirement savings in employer provided pensions in various ways. Employment and earnings losses, as well as decreasing financial assets, may discourage workers from contributing to a DC pension plan.<sup>2</sup> Furthermore, workers may increasingly prefer to raise their liquid savings outside of retirement accounts during economic downturns, so that savings could be more readily available for consumption if the need arises. At the same time, some workers, particularly those who are not liquidity-constrained, may not change their behavior because of inertia or for other reasons. Others may even increase their contributions because of plan automatic increases or wage increases.

There are several channels through which the Great Recession may have influenced DC pension contribution behavior in the United States. First, a reduction in employment (Hurd and Rohwedder 2010; Coile and Levine 2010) may have put downward pressure on DC participants' contributions. The percentage of the employed population fell from over 63 percent in January 2006 to almost 58 percent by January 2010 (Hall 2010), and the unemployment rate increased from 5 percent in January 2008 to 10 percent by October 2009 (deWolf and Klemmer 2010). Furthermore, labor underutilization increased to 18 percent by the end of 2009, and the number of underemployed workers in part-time jobs rose, mainly reflecting slack demand (Sum and Khatiwada 2010). It is plausible that such employment changes, and the resulting changes in workers' earnings, may have influenced employees' participation and contribution decisions with regard to DC plans.

Second, the financial crisis led to a reduction in employers' matching contributions (Munnell, Aubry and Muldoon 2008a, 2008b). According to the Profit Sharing/401(k) Council of America (2009), during the 2008–2009 downturn, a fifth of private-sector employers either suspended or reduced their matching contributions. In response, employees may have altered their DC contribution amounts.<sup>3</sup> Third, sharp stock market declines and high market volatility may have led to changes in DC contribution behavior. By May of 2009, all retirement accounts had lost \$2.7 trillion in assets or 31 percent from their September 2007 peak (Soto 2009).<sup>4</sup> There are other channels, of course, such as changes in household wealth or access to credit during the Great Recession that may have led individuals or households to receive loans or early distributions from their retirement accounts and change their contribution behavior in order to meet debt obligations or consumption needs.<sup>5</sup>

Put together, the economic shocks observed during the Great Recession raise important questions about how employees' contributions to DC plans evolved over the period. To date, despite the critical role that consistency of DC pension contributions plays in retirement security, analyses of DC contribution behavior during periods of labor and financial market shocks are limited, particularly at the population level.<sup>6</sup> A strand of the existing literature uses the administrative records of particular investment firms to analyze cross-sectional aggregates of retirement account activities of account holders during the recession (VanDerhei, Holden, and Alonso 2009,

2010; Holden, Sabelhaus, and Reid 2010). While these studies look extensively at account activities among participants, such as account balances, investment decisions, and participation decisions, they do not link information for the same individual across years and thus do not measure changes in contribution amounts at the individual level. An exception is the recent study by Holden, Sabelhaus, and Reid (2010), which longitudinally tracked account activity of account holders from the beginning of 2008 through September 2009. The authors concluded that only 4.6 percent of plan participants stopped contributions during the first 6 months of 2009, slightly higher than the 3.7 percent of participants in 2008.

Another series of studies by Vanguard—a provider with over 1,100 retirement plans and over a million retirement accounts—also found limited changes in DC participation and contribution rates during the Great Recession (Pagliaro and Utkus 2009a, 2009b; Utkus and Young 2009, 2010; Vanguard 2010). Findings from this set of studies reveal that even though account balances were volatile over the period, the changes in participation and contribution rates among account holders appeared marginal,<sup>7</sup> leading the authors to characterize participants' behavior as driven by inertia (Pagliano and Utkus 2009b).

In sum, prior research using administrative records from retirement investment providers has shown that the majority of participants in DC plans during the Great Recession of 2007–2009 stayed the course and only marginal changes occurred in retirement account activity. However, longitudinal analysis for the same worker over a specified period is limited. It is also unclear from these studies how representative the sample statistics are of all account holders in the United States. Furthermore, the effects of earnings shocks over this period on participation and contributions, while controlling for important demographic covariates and job changes, have not been investigated.

### ***Data and Empirical Strategy***

Data for this study come from wave 1 of the 2008 Panel of the Survey of Income and Program Participation (SIPP), which provides us with a nationally representative sample of workers interviewed in the fall, with data collected for the reference period from May through August of 2008, just before the sharp decline in the financial market and job losses associated with the Great Recession toward the end of 2008. While SIPP data provide information about

demographic and socioeconomic characteristics of the sample, they do not contain longitudinal information on workers' tax-deferred contributions to retirement accounts. To obtain such data, we match SIPP respondents to their W-2 tax records.<sup>8</sup> These administrative records contain the employer identification number; respondents' annual taxable wage and salary income; and more importantly, tax-deferred contributions to DC accounts over the period of interest in this study (2005–2009). Such information allows us to track job changes, earnings, and tax-deferred contributions to DC plans of the same individuals during the period of Great Recession (2007–2009) and during the immediately preceding period (2005–2007). Another asset of the administrative data, other than their longitudinal feature, is that compared with survey data they provide a more accurate measure of annual earnings and DC pension contributions (Bricker and Engelhardt 2008; Dushi and Honig 2008; Dushi and Iams 2010; Kim and Tamborini 2012).

The analysis sample consists of respondents born from 1949 through 1980 (ages 29–60 in 2009) who according to W-2 records had positive earnings in all 3 years (2005, 2007, and 2009). We select respondents with earnings in those 3 years for two reasons. First, by definition, contributions are tied to employment and earnings; in other words, people with no earnings cannot contribute. Second, we are interested in comparing changes in tax-deferred contributions among wage earners who potentially could have contributed to a plan in both periods: precrisis and during the crisis. While this restriction excludes workers who lost their jobs over each period, our results are not biased because the excluded subsample is comprised of workers with very low earnings, and only a small proportion of them have positive tax-deferred contributions.<sup>9</sup> Another restriction is that respondents must have lived through 2009 to be included in the sample. These restrictions yield an unweighted sample size of 28,128 workers.

Our main goal is to assess whether changes in contributions observed *during the crisis* (2007–2009) exceed those observed during the nonrecessionary period *prior to the crisis* (2005–2007). To do so, we first highlight changes in contributions (both in real dollar amounts and rates) during the crisis and contrast them with similar statistics for the period prior to it.<sup>10</sup> Given our interest in determining the extent to which DC participants changed their contributions because of the recession in excess of what would have been observed in “normal times,” we determine the samples

for each period separately. Thus, for the period during the crisis, we follow only 2007 contributors through 2009; for the period prior to the crisis, we follow only 2005 contributors through 2007.

Appendix Table A-1 provides characteristics of the entire sample, workers with positive earnings in all 3 years, and separately for those with positive contributions in 2005 (analysis sample for the precrisis period) and in 2007 (analysis sample for the crisis period). Compared with the entire sample of workers, those with positive contributions in 2005 and 2007 are less likely to be female, non-Hispanic blacks, and non-Hispanic others. In addition, contributors are more likely to be married, non-Hispanic whites, and have a college degree or higher level of education.

We first present the distribution of substantial changes in contributions, and their magnitude, over each of the two periods. “Substantial” is considered to be at least a 10 percent change in contributions (in real terms) over the 2-year period, and we classify it into three mutually exclusive categories: decreased by more than 10 percent, increased by more than 10 percent, or stable (within plus/minus 10 percent; that is, contributions remained the same or either decreased by 10 percent or less or increased by 10 percent or less). We measure earnings changes using the same classification as that used for contributions.<sup>11</sup>

Next, we employ multivariate analysis to examine the relationship between the change in DC contributions and earnings changes. We first estimate a *probit* model of the probability of stopping contributions by 2009, where the dependent variable is equal to 1 if the respondent made tax-deferred contributions to an account in 2007 but stopped contributions by 2009, and 0 otherwise.

Then, we estimate Ordinary Least Squares (OLS) regression models of the 2009 tax-deferred contribution amounts and of the 2009 contribution rate. Predictors include a job change variable;<sup>12</sup> log of 2007 earnings; demographic characteristics such as sex, education, marital status, birth cohort, and race/ethnicity, as reported in the 2008 SIPP; and the main variable of interest—the percentage change in earnings from 2007 through 2009. We estimate similar models for the period prior to the crisis, 2005–2007 (available upon request from the authors). Estimates are weighted using SIPP's sampling weights and adjusted for its complex sample design.

Finally, we estimate fixed-effect models of the annual DC contribution amounts and of annual

contribution rates using person-year panel data from 2005 through 2009. The dependent variable in these models is the contribution amount and, separately, the contribution rate in each year from 2005 through 2009. In these models, we allow DC contributions to be a function of time-varying characteristics such as a job change, real annual earnings, and age at each year. We also allow for time-specific effects by including a dummy variable for each calendar year from 2005 through 2009 that will indicate whether, and to what extent, DC contributions changed in that time period, once we control for the time-varying characteristics. We estimate the OLS models separately for two subsamples: first, we restrict the sample to workers with positive contributions in at least 1 of the 5 years from 2005 through 2009; second, we restrict the sample to workers with positive DC contributions in all of the 5 years over that period.<sup>13</sup> Robust variance estimators are used to correct standard errors for repeated observations of the same individual.

A limitation of the current study, mainly the result of a lack of information in both administrative or survey data, is that it cannot identify the reasons why workers stopped or changed their contributions to DC plans. The observed changes in DC contributions over the period may have occurred for a variety of reasons. They could be involuntary, such as separation from a job or a job loss, a new job that does not offer a DC plan, changes in earnings or employment levels (full or part time), statutory contribution limits, or plan changes such as automatic increases in contributions or changes in the employer match. They could also result from voluntary job changes or be due to a worker's active decision to stop or change contributions. Consequently, although we can estimate the impact of earnings changes on contributions, while controlling for job changes, we cannot tell whether those changes in contributions are due to people making an active or passive decision regarding their savings in tax-deferred plans. Therefore, our findings reveal correlation rather than causality.

### ***DC Contribution Changes During the Great Recession and the Period Prior to It***

Table 1 presents the distribution of workers by whether their contributions stopped, remained stable, or substantially increased or decreased during the crisis and contrasts it with the period prior to the crisis. Panel A shows that overall, among 2007 participants, a considerable proportion of them (39 percent) decreased their contributions by more than 10 percent

by 2009, including the 16 percent of those who stopped contributing altogether. An additional 32 percent had relatively stable contributions (within plus/minus 10 percent), and the remaining 29 percent increased their contributions by more than 10 percent during the crisis.

As expected, given that contributions are tied to employment and earnings, disaggregating the sample by earnings changes, we observe that for a majority of the sample the change in earnings was accompanied by a similar change in contributions over the same period.<sup>14</sup> Strikingly, 74 percent of workers who saw their earnings decrease by more than 10 percent over the 2007–2009 period had decreased their contributions by more than 10 percent (Table 1, panel A). A significantly larger proportion of 2007 contributors who experienced decreased earnings stopped their contributions by 2009 (30 percent) compared with those with stable earnings (9 percent) or increased earnings (14 percent), suggesting that earnings loss was an important influence.

Panel B presents similar statistics for the period prior to the crisis (2005–2007) and shows considerable fluctuation in contributions even during normal times. Thus, overall, a nontrivial proportion of 2005 contributors (29 percent) decreased their contributions by more than 10 percent by 2007, whereas of the remaining sample about equal proportions had either stable contributions (35 percent) or increased contributions by more than 10 percent (36 percent). Similar to the behavior observed over the 2007–2009 period, 2005 contributors who experienced decreased earnings, compared with those with stable or increased earnings, were significantly more likely to stop or decrease their contributions.

Comparing the two time frames (panel A, the crisis period versus panel B, the precrisis period), reveals that during the crisis, 2007–2009, a statistically significantly higher proportion of workers decreased their contributions by more than 10 percent compared with the period prior to the crisis, 2005–2007 (39 percent versus 29 percent, respectively—a 10 percentage point difference). In addition, a significantly smaller proportion of respondents increased their contributions during the crisis compared with the period prior to it (29 percent versus 36 percent, respectively—a 7 percentage point difference). Furthermore, a significantly higher proportion of workers stopped their contributions during the crisis than in the period before it (16 percent versus 13 percent, respectively). Although the difference between the two periods

**Table 1.**  
**Proportion of respondents with positive contributions in the base year, by the magnitude of the change in contributions during and prior to the crisis and earnings changes (in percent)**

Earnings change	Decreased by more than 10%	Stable (within plus/minus 10%) <sup>a</sup>	Increased by more than 10%	Total	Stopped contributing by the end of the period	Total N (unweighted)
<b>Panel A: Crisis period (2007–2009): 2009 contributions relative to those in 2007</b>						
Total	39**	32**	29**	100	16**	12,746
Earnings over the period						
Decreased by more than 10%	74**	14**	12**	100	30	3,286
Stable (within plus/minus 10%) <sup>a</sup>	25**	49	26**	100	9*†	6,006
Increased by more than 10%	28**	20	52**	100	14*†	3,454
<b>Panel B: Precrisis period (2005–2007): 2007 contributions relative to those in 2005</b>						
Total	29	35	36	100	13	11,560
Earnings over the period						
Decreased by more than 10%	68	17	15	100	30	2,086
Stable (within plus/minus 10%) <sup>a</sup>	19	50	31	100	7†	5,771
Increased by more than 10%	23	21	56	100	12†	3,703

SOURCE: Authors' calculations using Social Security administrative records matched to the 2008 SIPP (wave 1) data.

NOTES: The sample consists of wage and salary workers with positive earnings in all of the 3 years (2005, 2007, and 2009) and with positive contributions in the base year 2007 (or 2005). Reported estimates are weighted.

\* denotes that the differences in each cell between the crisis and precrisis periods are statistically significant at the 5 percent level;

\*\* denotes that the differences in each cell between the crisis and precrisis periods are statistically significant at the 1 percent level;

† denotes that the difference within each period between workers who did experience decreased earnings and those with stable (or increased) earnings is statistically significant at the 1 percent level.

a. Contributions (earnings) remained the same or either decreased by 10 percent or less or increased by 10 percent or less.

seems relatively modest (3 percentage points), it represents an increase of 23 percent compared with the precrisis period.

Next, we examine the magnitude of the dollar and percentage change in contribution amounts, as well as in contribution rates during and before the crisis. Note that for each period, we first calculate the change in contributions for each individual and then present the estimated means in Table 2. Panel A shows that during the crisis DC contributions decreased on average by -\$399, or by 11 percent.<sup>15</sup> Contributors with decreased earnings of more than 10 percent over the period decreased their contributions substantially, both in real dollars and in percentage terms (on average by -\$1,839, or by -46 percent). In contrast, contributors whose earnings increased by more than 10 percent over the crisis period increased their contributions on average by \$544, or by 9 percent. With respect to contribution rates, overall they decreased from 6.3 percent of earnings in 2007 to 5.6 percent in 2009, or by 11 percent. The decline in contribution rate was considerable,

particularly among workers with decreased earnings (1.4 percentage points, or -26 percent).

In contrast to the crisis period, panel B of Table 2 reveals that overall contribution amounts during the precrisis period increased on average by \$121, whereas the contribution rate decreased on average by 3 percent. These changes are significantly different from those observed during the crisis in panel A. During the precrisis period, workers who experienced a substantial decrease in earnings had decreased their contributions on average by -\$1,535, or by -39 percent, but these are significantly smaller changes compared with those observed for the similar group during the crisis. In contrast, workers with stable earnings increased their contributions by \$263 during the precrisis period compared with a decrease of -\$129 during the crisis, leading to a difference-in-difference of -\$392. While workers with increased earnings raised their contributions in both periods, the increase was significantly higher during the precrisis period than during the crisis period (\$819 versus \$544). Charts 1 and 2 depict for

**Table 2.**  
**Mean dollar and percentage change of contribution amounts and mean contribution rates and their change during and prior to the crisis among respondents with positive contributions in the base year,<sup>a</sup> by earnings changes**

Earnings change	Contribution amount			Contribution rate			Total N (unweighted)
	In the base year (dollars)	Change over the period <sup>b</sup>		In the base year (percent)	Change over the period <sup>b</sup>		
		Dollar	Percent		Percentage point difference	Percent	
<b>Panel A: Crisis period (2007–2009)</b>							
Total	4,662	-399**	-11**	6.3	-0.7**	-11**	12,746
Earnings over the period							
Decreased by more than 10%	4,745	-1,839*	-46**	5.8	-1.4	-26**	3,286
Stable (within plus/minus 10%) <sup>c</sup>	4,809	-129**†	-2**†	6.7	-0.3**†	-3**†	6,006
Increased by more than 10%	4,321	544**†	9**†	6.1	-0.7**†	-9**†	3,454
<b>Panel B: Precrisis period (2005–2007)</b>							
Total	4,476	121	0.2	6.2	-0.2	-3	11,560
Earnings over the period							
Decreased by more than 10%	4,493	-1,535	-39	6.0	-1.4	-21	2,086
Stable (within plus/minus 10%) <sup>c</sup>	4,601	263†	4†	6.5	0.2†	3†	5,771
Increased by more than 10%	4,275	819†	16†	6.0	-0.4†	-4†	3,703

SOURCE: Authors' calculations using Social Security administrative records matched to the 2008 SIPP (wave 1) data.

NOTES: The sample consists of wage and salary workers with positive earnings in all of the 3 years (2005, 2007, and 2009) and with positive contributions in the base year 2007 (or 2005). Reported estimates are weighted. Monetary values are in 2009 dollars.

\* denotes that the differences in each cell between the crisis and precrisis periods are statistically significant at the 5 percent level;

\*\* denotes that the differences in each cell between the crisis and precrisis periods are statistically significant at the 1 percent level;

† denotes that the difference within each period between workers who did experience decreased earnings and those with stable (or increased) earnings is statistically significant at the 1 percent level.

a. The base year in the crisis period is 2007; in the precrisis period, the base year is 2005.

b. The change in contributions is calculated for each individual, and the reported estimates are the means of the individual changes.

c. Earnings remained the same or either decreased by 10 percent or less or increased by 10 percent or less.

each period (crisis, 2007–2009; precrisis, 2005–2007), respectively, the distribution of contribution amounts in the base year and their percentage change over the period (shown as frequency distributions overlaid by kernel density functions).

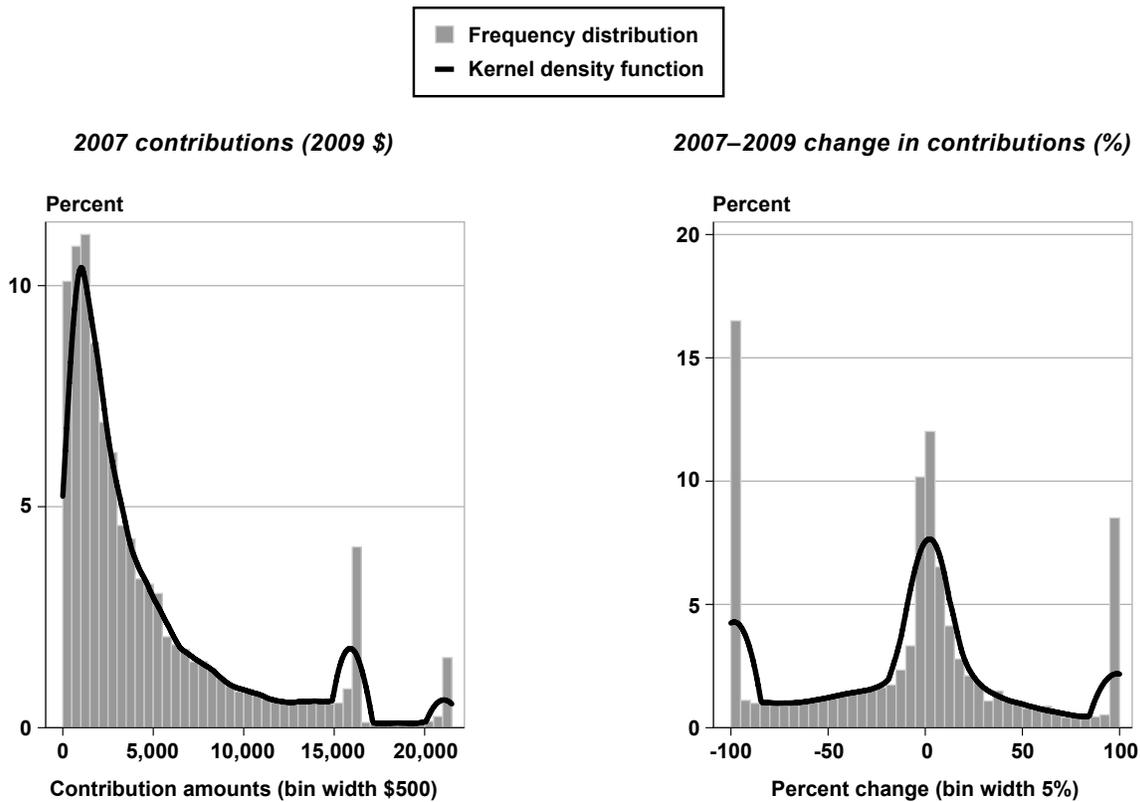
### **Multivariate Estimates of Contribution Changes**

We now turn to the multivariate analysis to examine changes in contributions while controlling for observable characteristics. Table 3 (column 1), reports estimated marginal effects of the probability of stopping contributions by 2009.<sup>16</sup> Once we control for observable demographic characteristics and job changes, we observed that workers whose earnings over the period decreased by more than 10 percent were about 71 percentage points more likely to stop their contributions

by 2009 than those whose earnings were relatively stable (the omitted category). Workers whose earnings over the period increased by more than 10 percent were about 10 percentage points more likely to stop contributions than those with stable earnings.

Workers with higher 2007 DC contributions had significantly higher contributions in 2009 (Table 3, column 2). Thus, all else equal, a 10 percent higher 2007 contribution leads to an 8 percent higher 2009 contribution. Consistent with the descriptive analysis, respondents who experienced earnings decreases had significantly lower contributions in 2009 (by -\$1,534, or 36 percent relative to the mean contribution amount of \$4,263), compared with respondents with stable earnings; those who experienced earnings increases had significantly higher contributions in 2009 (by \$762, or 18 percent relative

**Chart 1.**  
**Distribution of contribution amounts in 2007 and their percentage change during the crisis period (2007–2009)**



SOURCE: Authors' calculations using Social Security administrative records.

to the mean). Finally, model estimates of contribution rates (column 3), indicate that workers with decreased earnings had significantly lower contribution rates in 2009 (by -.948 percentage points, or 17 percent relative to the mean contribution rate of 5.62) than those with stable earnings; those with increased earnings also had lower contribution rates (by -.235 percentage points, or 4 percent at the mean). It is not surprising to see decreasing contribution rates among workers with earnings gains for two reasons. First, if earnings increased by more than the increase in their contribution amounts, and second, if the majority of those workers have reached the maximum statutory contribution limit, then any wage increases would lead to decreased contribution rates.

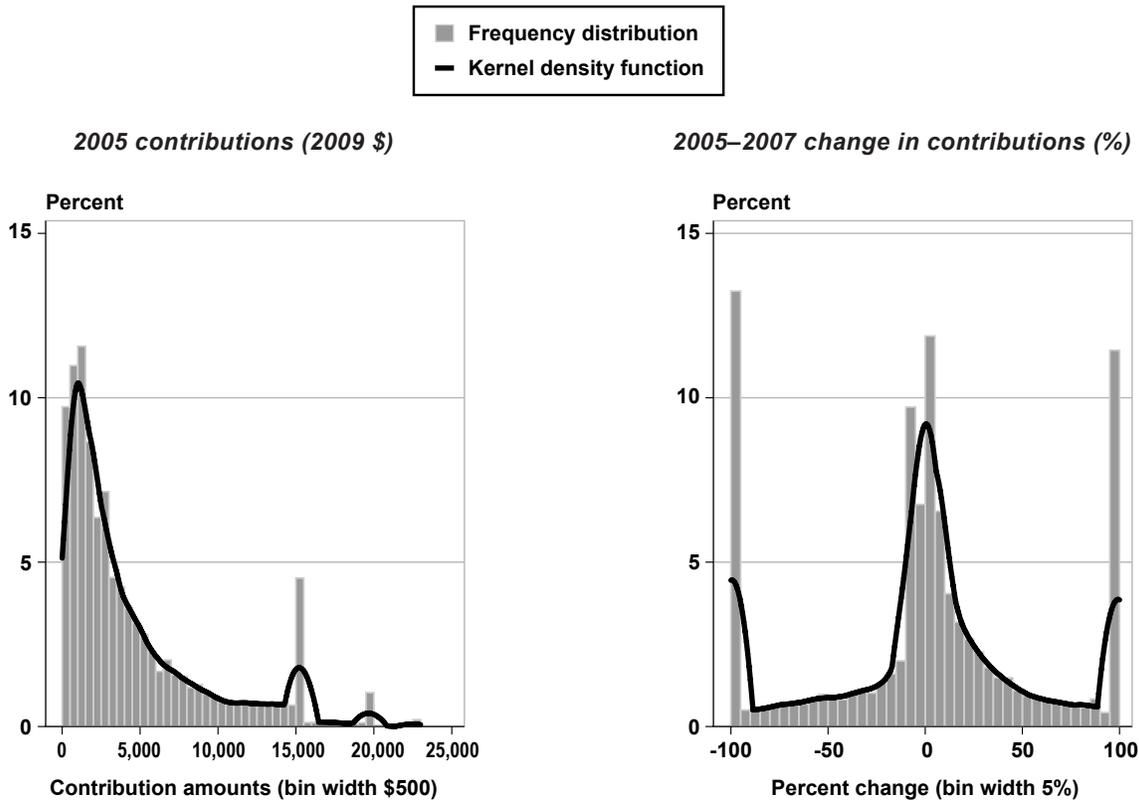
### **Fixed-Effect Models**

Overall, the estimated coefficients of the year effects from the fixed-effect models show that annual contributions in real terms increased between 2005 and 2008, but slightly decreased or plateaued in 2009 (see Chart 3 and the Appendix, Table A-2).<sup>17</sup> Thus in 2007,

contribution amounts among consistent contributors were significantly higher than in 2005 (by \$582, or 11 percent relative to the sample mean of \$5,478). In addition, while contributions in 2009 were also significantly higher than in 2005, they were almost the same as those in 2007 or 2008. It is noteworthy that the magnitude of the estimated coefficients is larger among consistent contributors than among those with at least 1 year of contributions, suggesting a greater taste for saving.

Similar patterns of increasing contribution rates between 2005 and 2008 are evident (see Chart 4 and the Appendix, Table A-2). Thus, at the mean, the contribution rate in 2007 among consistent contributors was significantly higher than that in 2005 (0.74 percentage points, or 10 percent relative to the mean contribution rate of 7.05). However, while the contribution rate in 2009 was still significantly higher than that in 2005 (by 0.62 percentage points, or 9 percent relative to the mean), it was significantly lower than that in 2007 (by 0.11 percentage points, or 2 percent). In sum, these findings confirm that contribution patterns

**Chart 2.**  
**Distribution of contribution amounts in 2005 and their percentage change during the precrisis period (2005–2007)**



SOURCE: Authors' calculations using Social Security administrative records.

during the Great Recession of 2007–2009 differ from the prerecessionary period of 2005–2007. On average, workers increased their contribution rate prior to the recession, but during the recession their contribution rate reversed back to 2007 levels. While at the mean those changes may not seem large, they were greater for a considerable part of the population, as shown in previous tables.

### Discussion

Retirement savings in DC pensions represent an increasingly important pillar of retirement security in the United States. This study contributes to the literature by providing insights into the dynamics of workers' contributions to DC plans during the Great Recession of 2007–2009 and comparing those with the period prior to the recession, using longitudinal tax records matched to a nationally representative sample of workers.

Our analysis reveals substantial variability in contributions over multiple years, suggesting that inertia may not typify many workers' DC contribution

behavior over time, particularly during the Great Recession. A sizable segment of workers (39 percent) decreased their contributions to DC plans substantially (by more than 10 percent) during the recession. In contrast, during more *normal times*, a significantly lower proportion of workers (29 percent) decreased their contributions substantially. In addition, the proportion of DC participants who stopped contributions during the crisis (16 percent) compared with the period prior to it (13 percent) increased by 23 percent (a 3 percentage point difference). Furthermore, at the mean, both contribution amounts and contribution rates decreased significantly during the crisis of 2007–2009, surpassing in magnitude the increase in contribution amounts and the decline in contribution rates observed during the precrisis period, 2005–2007.

Our findings also highlight the interrelationship between DC contributions and earnings changes. Thus, among workers with positive earnings over the period under study, experiencing a decrease in earnings (whether during or prior to the crisis) has a significant and substantial effect in the likelihood

**Table 3.**  
**Probit estimates of the probability of stopping contributions during the crisis period (2007–2009) and OLS estimates of DC plan contributions and contribution rates among respondents with positive contributions in 2007**

Independent variable	Probit marginal effects of the probability of stopping contributions by 2009 <sup>a</sup> (1)	OLS regression coefficients	
		2009 contribution amount (2)	2009 contribution rate <sup>b</sup> (3)
2007 DC plan contributions	-0.00004*	0.799*	---
2007 contribution rate	---	---	0.726*
Log of 2007 annual earnings	-0.228*	515*	0.534*
Earnings change during the crisis period (2007–2009)			
Decreased by more than 10%	0.705*	-1,534*	-0.948*
Stable (within plus/minus 10%) <sup>c</sup>	---	---	---
Increased by more than 10%	0.099*	762*	-0.235*
Constant	1.162*	-4,321*	-3.710*
Predicted mean of dependent variable in 2009	0.119	4,263	5.621
Pseudo R <sup>2</sup> or R <sup>2</sup>	0.199	0.707	0.548
N of observations		12,746	

SOURCE: Authors' calculations using Social Security administrative records matched to the 2008 SIPP (wave 1) data.

NOTES: Reported statistics are marginal effects from the probit model and regression coefficients from the OLS model. Control variables include demographic characteristics such as sex, education, birth cohort, race/ethnicity, marital status as reported in the survey year, as well as a dummy variable for at least a job change between 2007 and 2009 generated from the W-2 records. The sample consists of wage and salary workers with positive earnings in all of the 3 years (2005, 2007, and 2009) and with positive contributions in 2007. Standard errors are available from the authors upon request. Reported estimates are weighted and correct for SIPP's complex survey design.

OLS = Ordinary Least Squares;

\* denotes statistical significance at the 1 percent level;

--- denotes that the variable is omitted or not included in the regression model.

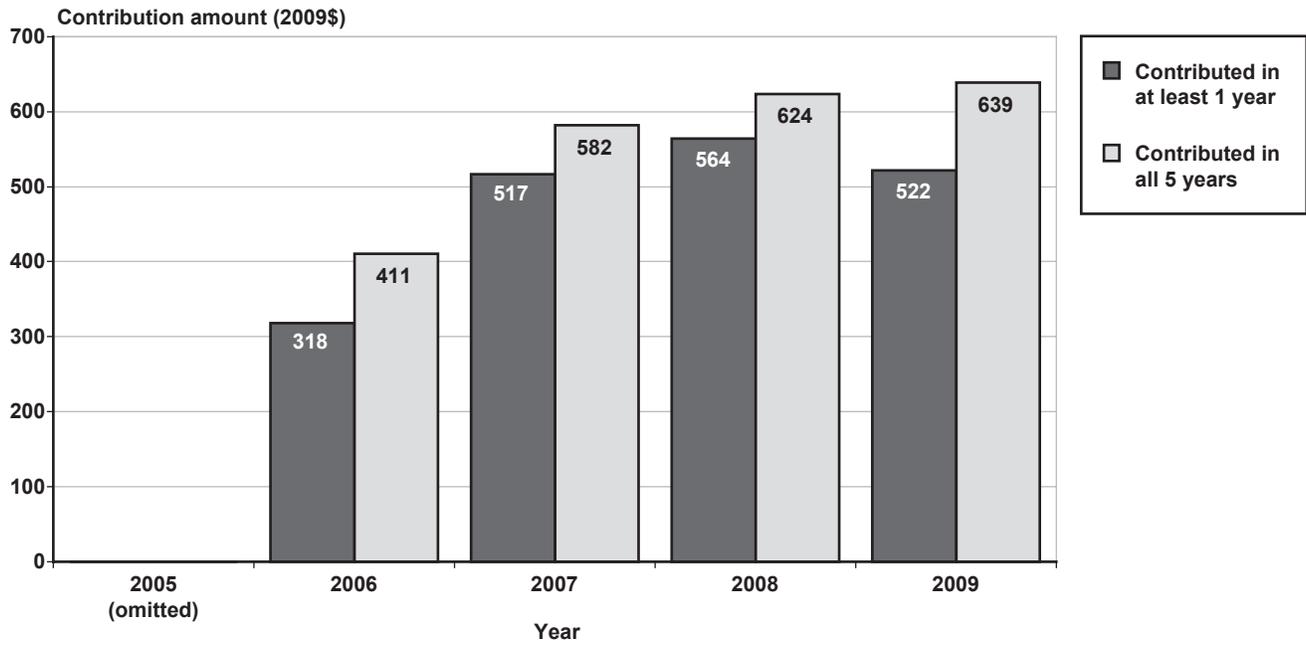
- The dependent variable is defined as equal to 1 if the respondent stopped contributing by 2009, and 0 otherwise; the marginal effects are calculated at the sample means and indicate the change in the probability of stopping contributions (in percentage points) for a discrete change in a dummy explanatory variable from 0 to 1, or the change in probability for an infinitesimal change in a continuous explanatory variable.
- The contribution rate is measured as the percentage of annual earnings that are tax-deferred contributions to retirement accounts.
- Earnings remained the same or either decreased by 10 percent or less or increased by 10 percent or less. This category is omitted.

of stopping contributions by the end of the period. A decrease in earnings also leads to a significant decrease in the contribution amount and contribution rate, suggesting that the loss in earnings is an important factor. Compared to workers with stable earnings, those who experienced an increase in earnings over the period were more likely to stop contributing to their plans. A plausible explanation for this behavior could include unobservable factors such as changes in the employer match, if the respondent is working for a new employer that does not offer a plan, or if the respondent is working for a new employer and is not yet eligible to participate in a plan. In addition, contribution rates declined among workers who

experienced earnings increases. A plausible explanation could be that some participants have reached the maximum statutory contribution limit and therefore any wage increases would lead to decreased contribution rates. In sum, these findings suggest that contribution patterns of DC plan participants are quite dynamic and these participants change their contributions (whether voluntary or involuntary) in response to earnings changes.

The findings of this study have important implications for retirement preparedness of employees whose retirement pension income will be drawn mainly from DC pensions. Evidence shows that earnings

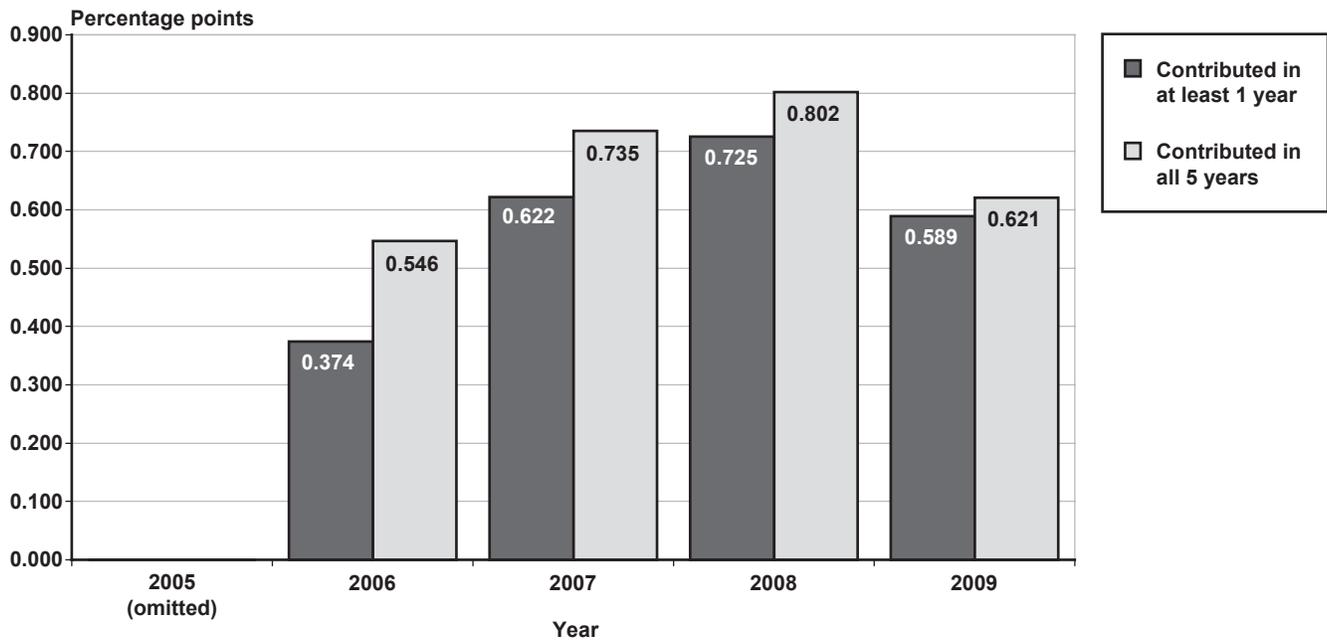
**Chart 3.**  
Coefficient estimates of annual contribution amounts compared with those in 2005, by year



SOURCE: Authors' calculations using Social Security administrative records.

NOTE: All values are statistically significant at the 1 percent level in the given year relative to 2005.

**Chart 4.**  
Coefficient estimates of annual contribution rates compared with those in 2005, by year



SOURCE: Authors' calculations using Social Security administrative records.

NOTE: All values are statistically significant at the 1 percent level in the given year relative to 2005.

shocks that occurred, particularly during the Great Recession, altered workers' participation and contribution amounts to DC plans. Accumulated wealth at retirement will depend not only on the decision to participate in a DC plan and the amount of contributions elected at that time, but will also depend on the employment and earnings shocks experienced throughout one's working life.

Depending on whether the observed changes in contributions are short term or long term, they will have an impact on workers' financial security at retirement. If changes observed over the Great Recession were temporary, then the impact in accumulated assets in DC plans at retirement could be small, whereas a long-term reduction in DC contributions may result in considerably lower retirement wealth. Based on our simulations, assuming that the changes in contributions are temporary, at the mean, account balances at age 62 would be 17 percent lower compared with a "no recession" scenario. However, if those changes were permanent, then their impact could be over 22 percent lower. While it is too early to tell whether the observed changes are temporary or permanent, evidence provided here suggests that researchers should at least be cautious and incorporate such possible changes into their models when making projections of DC pension wealth at retirement.

As noted above, we cannot identify the reasons why workers stopped or changed their contributions to DC plans. The observed changes in DC contributions could be involuntary—such as separation from a job or a job loss, a new job that does not offer a DC plan, changes in employment levels (full or part time), statutory contribution limits, or because of plan changes—such as automatic increases in contributions or changes in the employer match. They could also result

from voluntary job changes, or because of a worker's active decision to stop or change contributions. Consequently, although we can estimate the impact on contributions of earnings changes, while controlling for job changes, we cannot tell with certainty whether those changes in contributions are due to people making an active or passive decision regarding their savings in tax-deferred plans. It is plausible that some of those workers may have elected to contribute a percentage of their earnings to their DC plans (about 75 percent of participants according to self-reports in the SIPP data), thus generating automatic increases or decreases in contributions as their earnings changed. If this were the case, then it would suggest that these people did not make an active decision regarding their contributions (that is, a passive change in contributions). However, our results indicate that only about half of workers had a change in contributions of a similar magnitude as that observed in their earnings changes, whereas the remainder of the sample had changes in their contributions in excess of their earnings changes (Table 2). This suggests that they made an active decision.

To further our understanding of whether workers made an active or passive decision regarding their contributions to DC plans, a fruitful avenue of future research may be to examine the effect of a job change on contributions—by comparing workers who change jobs with those who do not change jobs—and its impact on retirement security of different cohorts. Furthermore, it would be valuable to investigate contribution decisions at the household level among married couples because a spouse's contribution decision may respond to the labor market prospect, job changes, pension access, and/or contributions of the other spouse in the household.

## Appendix

**Table A-1.**  
**Sample characteristics**

Characteristic	Sample of all wage earners <sup>a</sup>	Subsample with positive contributions <sup>b</sup>	
		2005	2007
Female	48.5	45.9	46.4
Married	65.7	70.9	70.1
Cohort			
Generation X (born 1965–1980)	48.5	42.7	45.4
Late baby boomers (born 1955–1964)	34.9	38.6	37.4
Early baby boomers (born 1949–1954)	16.6	18.7	17.2
Race/Ethnicity			
Non-Hispanic white	71.5	77.3	76.0
Non-Hispanic black	11.2	9.2	9.6
Hispanic	6.0	6.2	6.3
Non-Hispanic other	11.3	7.4	8.1
Education			
High school graduate or lower	40.4	30.6	31.3
Some college	24.6	24.7	25.0
College graduate or higher	35.0	44.6	43.7
N of observations (unweighted)	28,182	11,560	12,746

SOURCE: Authors' calculations using Social Security administrative records matched to the 2008 SIPP (wave 1) data.

NOTES: Reported estimates are weighted.

a. The sample consists of wage and salary workers with positive earnings in all three years (2005, 2007, and 2009).

b. The subsamples consist of wage earners who contributed to a plan in that year.

**Table A-2.**  
**Coefficient estimates from fixed-effect models of the amount of tax-deferred contributions and of contribution rates from 2005 through 2009**

Independent variable	OLS model of annual contributions (\$)		OLS model of annual contribution rates (%)	
	Sample of contributors <sup>a</sup>	Subsample of consistent contributors <sup>b</sup>	Sample of contributors <sup>a</sup>	Subsample of consistent contributors <sup>b</sup>
Year				
2005	---	---	---	---
2006	318*	411*	.374*	.546*
2007	517*	582*	.622*	.735*
2008	564*	624*	.725*	.802*
2009	522*	639*	.589*	.621*
Overall R <sup>2</sup>	0.255	0.457	0.079	0.003
Mean of dependent variable <sup>c</sup>	3,555	5,478	4.85	7.05
Number of person-year observations	79,730	42,200	79,730	42,200
Number of person observations	15,946	8,440	15,946	8,440

SOURCE: Authors' calculations using Social Security administrative records matched to the 2008 SIPP (wave 1) data.

NOTES: The earnings and contributions for each respondent vary by year and are expressed in real 2009 dollars. The estimation controls for other time-varying variables such as age categories, earnings, and job change; it accounts for the fact that there are repeated observations for the same respondent. Robust standard errors are available from the authors upon request. Reported estimates are weighted and account for SIPP's complex survey design.

OLS = Ordinary Least Squares;

--- denotes that the variable is omitted;

\* denotes statistical significance at the 1 percent level.

- a. The sample consists of wage and salary workers with positive DC contributions in at least 1 of the 5 years from 2005 through 2009.
- b. The subsample consists of wage and salary workers with positive DC contributions in all of the 5 years from 2005 through 2009.
- c. The mean dependent variable is calculated across all observations in all years.

## Notes

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<sup>1</sup> Findings by Choi and others (2002), for example, suggested that employees often follow the “path of least resistance.” Using data from administrative records of several large firms, they showed that the typical employee took over a year to enroll in a 401(k) plan, whereas in companies with automatic enrollment, the majority of employees accepted automatic enrollment defaults such as default saving rates and investment funds.

<sup>2</sup> Chai and others (2012) and Mitchell and Turner (2010) assessed how shocks to human capital shape retirement well-being. The authors showed that human capital risks that are due to fluctuations in labor earnings and unemployment can have profound influence on pension accumulations and thus produce very different pension outcomes.

<sup>3</sup> Munnell and Sunden (2004, 58–60), discussed the impact of employer matching on workers’ participation and contribution decisions.

<sup>4</sup> As the stock market recovered, by the first quarter of 2011 retirement account balances were mostly back to their 2007 levels (Butrica and Issa 2011), whereas the unemployment rate and the housing market had not yet recovered.

<sup>5</sup> Note that stock market changes may also lead to changes in contribution behavior. However, we lack information on respondents’ asset and portfolio allocation in retirement accounts and their changes over the period, as well as whether observed changes in contributions were in response to stock market shocks.

<sup>6</sup> In a recent paper, Muller and Turner (2011) used longitudinal data from the Panel Study of Income Dynamics to examine the density and persistence of workers’ participation in 401(k) plans from 1999 through 2005, but did not look at changes over time in contribution amounts or contribution rates. The authors found that 46 percent of workers who did not change jobs over the period contributed to a plan in all of those years. They concluded that individuals’ participation varied over time and that the concept of inertia did not seem to hold for 401(k) saving behavior.

<sup>7</sup> According to their findings, 3.1 percent and 2.9 percent of participants stopped contributions in 2008 and 2009, respectively, compared with approximately 2.5 percent of participants in 2006 and in 2007. In addition, the average contribution rate declined from the 7.3 percent peak in 2007 to 6.8 percent in 2009. In each year from 2006 through 2008, on average, 7 percent of participants decreased their contribution rates.

<sup>8</sup> Olsen and Hudson (2009) and Pattison and Waldron (2008) provide a detail discussion of W-2 tax-record data available in Social Security’s Detailed Earnings Records. It is important to note that about 90 percent of adult respondents in the 2008 Panel of SIPP had their survey reports matched to their W-2 records, thus we expect little selectivity bias because of the nonmatch.

<sup>9</sup> From the W-2 records, we can identify a job loss in cases when an individual had positive earnings in a given year but zero earnings in the subsequent year. The W-2 data show that 9.2 percent of all 2007 wage earners lost their jobs by 2009, compared with 6.9 percent of 2005 wage earners who did so by 2007. A very small proportion of contributors, 3 percent and 4 percent (or 330 and 514 observations), respectively, in each period, lost their jobs. Furthermore, in both periods, those who lost their jobs had lower average earnings than those who did not lose their jobs (\$12,000 versus \$39,000, respectively), suggesting that the excluded group may be comprised of part-time or part-year workers and thus less likely to participate in tax-deferred retirement plans. This analysis (available from the authors on request) indicates that these restrictions do not bias our results and do not considerably understate the decline in contributions; differences in results when including the excluded group in the sample are only trivial.

<sup>10</sup> As noted, the information on contribution amounts is drawn from W-2 records, and thus it is comprised of employee contributions only—the major part of funds invested in DC plans. It is plausible that the magnitude of the change in employee contributions may differ depending on whether or not employers suspended or reduced their matching contributions. However, we have no way of identifying employer contributions or their changes from the administrative or survey data (employer matching contribution is available from the survey at the time of interview, but is not available for the period prior to or after the interview). Broadly speaking, looking at only employee contributions may lead to an overestimate of the decline in contributions among workers whose employer contributions did not change, but to an underestimate among workers whose employer contributions were suspended or reduced.

<sup>11</sup> We selected the 10 percent cut-off point to reflect approximately the average increase in wages over a 2-year period (the annual increase of 5 percent is comprised of both normal wage growth and the inflation rate). In this way, we can distinguish to some extent those changes in contributions that are automatic because of increases in wages and thus may be involuntary (that is, a passive change) from those contribution changes that may be due to substantial wage shocks. Both earnings and contributions are price-indexed to 2009 dollars using the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) from the *2010 Trustees Report* (Board of Trustees 2010).

<sup>12</sup> Using the employer identification number, we define the job change variable as equal to 1 if in a given year the respondent is working for a new employer, that is, for whom he or she did not work in the previous year. Thus, for the crisis period, the job change dummy variable indicates at least one job change during the 2007–2009 period.

<sup>13</sup> Estimates are reported only for these two samples because we believe they provide the broadest range possible. The first sample allows for workers with earnings to join their plan for the first time or to leave their plan for different reasons (for example, if they changed jobs or became unemployed), and thus it is more representative of the general population. In contrast, the second sample of those with contributions in all 5 years is likely to include longer tenure employees with more stable jobs, and thus it represents a more select sample of workers with DC plans and greater taste for saving.

<sup>14</sup> It is worth noting that if participants elect to contribute to their plan a given percentage of their earnings and do not change it over time, then any increase (or decrease) in earnings will lead to a similar change in contributions without any active decision on their part. Thus, one would expect to see those participants in the diagonal in the table. In contrast, participants with a change in contributions exceeding the change in earnings, suggesting an active decision, would be off the diagonal.

<sup>15</sup> In Table 2, changes in contributions are calculated for each individual, and the reported estimates are the means of the individual changes.

<sup>16</sup> Estimates from the three models for the period prior to the crisis (2005–2007) are similar to those observed during the crisis period (available upon request from the authors).

<sup>17</sup> Please note that samples being analyzed in Appendix Table A-2 and Table 2 differ. In Table 2, we restrict the sample to those with positive contributions in the base year, whereas in Appendix Table A-2, we restrict the sample to consistent contributors (that is, those respondents with positive contributions in all 5 years, columns 2 and 4) and those with contributions in at least 1 year (columns 1 and 3).

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