

# A Cohort Analysis Of The Amount In Defined Contribution And Individual Retirement Accounts

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*Individual Retirement Accounts and 401(k) plans were introduced in the 1980s to encourage retirement saving. The amount saved in these accounts is likely to be affected by an individual's age, their cohort, and the economic conditions of the period. However, there is little research on the effect of age, period, and cohort on these accounts. To address this gap, six cohorts were developed from the 1986, 1992, and 1998 Survey of Consumer Finances. The amount in defined contribution accounts and IRA and Keogh savings increased with age, but period and cohort effects varied, especially for defined contribution account savings.*

**Key words:** *Age effect, Period effect, Cohort effect, Defined contribution accounts, Individual Retirement Accounts, Keogh plans*

## Introduction

For the last 11 years, the Retirement Confidence Survey (RCS) has tracked trends in retirement confidence and retirement planning behavior. For the past few years, the overall picture portrayed by these trends has been optimistic with slight upswings in retirement confidence backed by significant changes in retirement planning and saving activities. However, the 2001 RCS found that retirement confidence has declined and that fewer nonretired individuals were engaged in retirement planning and savings activities than in recent years (Salisbury, Turyan & Helman, 2001). Perhaps, the changes in individual attitudes and behavior may be attributed to the individual's cohort.

A cohort is a group of people who have shared experiences and events in their formative years that could lead to similar attitudes and behaviors for the remainder of their life. Financial preparation for retirement could be an example of the cohort effect. For example, a recent study revealed that 51% of Baby Boomers (ages 37-55), feel that they are late in preparing for retirement, compared with 43% of the Generation X cohort (ages 25-36), 42% of the Swing cohort (ages 56-68), 28% of the World War II cohort (ages 69 and older), and 26% of Generation Y cohort (ages 18-24). Overall, 43% of the sample considered themselves to be behind in saving for retirement (Scudder Investments, 2001).

To gain more insight into participant investment knowledge and behavior, John Hancock Financial

Services has conducted seven surveys in the last 10 years of defined contribution plan participants. The most recent survey in 2001 showed that less than 25% believed themselves to be knowledgeable investors, and 40% of respondents had no opinion as to the average annual returns for stocks, bonds, money market, and stable value investments. Many who had an opinion had extremely optimistic expectations. Despite this low level of self-assessed investment knowledge, less than 50% of participants used financial planning or investment advisory services when offered by their employer (Greenwald, 2001).

According to the 1999 Current Population Survey, only 55% of wage and salary workers between the ages of 25 and 64 actually participated in an employer-sponsored retirement plan in 1999. Among workers who owned either an IRA/Keogh or a 401(k) type plan in 1998, the average account was \$34,722. However, the average value of all retirement accounts in the household was \$52,893 in 1998 (Purcell, 2001). Whether the amount saved in these accounts will become sufficiently large enough to enable Americans to retire is unknown. However, an economist with the Employee Benefit Research Institute observed, "In general, workers are better off because IRA and 401(k) programs exist. Surely, many of the dollars in these programs would have been saved even without the programs; but they would not necessarily have been *earmarked for retirement* and been available to fund retirement expenses" (Yakoboski, 2000, p. 1).

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The decline in confidence in preparing financially for retirement (Salisbury, et al., 2001) and lack of worker's expertise in investing (Greenwald, 2001; Scudder Investments, 2001) are factors that prompt this examination of the effects of age, events and experiences in the formative years, and the economic conditions of the period, itself, on saving for retirement. The development of cohorts will enable the investigators to examine questions that have not been previously considered, i.e., the effect of age, period, and cohort. Cohort analysis of data may be based on a panel or a series of cross-sectional surveys (Glenn, 1977).

The amount held in defined contribution plans and IRAs/Keogh plans is the focus of the study because these savings have unique characteristics. They are similar in that they are participant-directed and tax-deferred, and they differ because the former are employer-sponsored while the latter are initiated by the individual. The literature review which follows includes sections on pension plans, age effects, period effects, cohort effects, and control variables. The section on the method consists of data, measures, and statistical analysis. The results section consists of findings associated with each type of retirement fund accumulation. The implications section focuses on the age, period, and cohort effects, and future research.

## **Background**

### *Overview of Pension Plans*

Although pensions have existed for over one hundred years, their widespread use is primarily a post-World War II practice (Ippolito, 1997). The basic tax rules toward pensions were established in 1926, but they became important when marginal income tax rates increased sharply during the 1940s. Pensions became more common during the 1950s, but they did not represent significant accumulated assets and liabilities until the 1960s. Historically, defined benefit plans dominated primary pension coverage. In 1979, among workers covered by a pension plan, more than 80% were covered by a defined benefit plan. By 1996 this share was 50% showing that a shift had occurred away from defined benefit plans to defined contribution plans (Ippolito, 1997).

There are several explanations for the shift from defined benefit to defined contribution plans (Ippolito, 1997). One hypothesis is that during the 1980s, the cost of administering defined benefit plans increased relative to the cost for defined contribution plans. These changes favor defined contribution plans,

particularly for small firms. Another is the introduction of a new kind of defined contribution plan, the 401(k) plan which was enacted in 1979 and became effective in 1981. The 401(k) plan is similar to a traditional defined contribution plan because it permits an unconditional employer contribution to all employees. However, the unique features of the 401(k) are that it permits workers to make voluntary pretax contributions, and the firm can match workers' contributions. The introduction of 401(k) plans reduced the demand for defined benefit plans, and made the demand more sensitive to price. A third explanation could be changes in tax laws in 1986 which imposed both one-time costs to rewrite the pension plan and higher ongoing operating costs for pension plans. Although costs increased for all sizes of firms with defined benefit plans, the cost was largest for smaller plans. The benefit provided by the employer in a defined benefit plan is dependent on the employee's earnings, length of service or both earnings and service and there are usually no employee contributions (Employee Benefit Research Institute, 1997).

Keogh plans were established in 1962 as a tax-deferred retirement savings option for self-employed people. The Keogh plan allows sole proprietors or members of a partnership to set aside savings for themselves and their employees. Contributions and earnings accumulate tax free until distribution when they are subject to normal income taxes. Self-employed individuals are also eligible to contribute to an IRA, but may make deductible contributions to both an IRA and a Keogh plan only when their taxable income is below the levels established by the Internal Revenue Service (Employee Benefit Research Institute, 1997).

Individual Retirement Accounts (IRAs) were developed in 1978 to provide a tax-deferred savings plan for earners who did not have access to an employer-sponsored pension plan. In the early to mid 1980s, growth in IRAs was associated with deductible contributions to IRAs (Sabelhaus, 1999). Recent legislation has allowed workers with employer plans to establish and contribute to IRAs, but the contributions are not deductible for those above certain income levels. More recently, stock market gains, not contributions, have been the primary source of growth (Fronstin, 1998).

### *Age Effects*

The life cycle hypothesis (LCH) is widely used to explain household expenditure and saving patterns over time (Ando & Modigliani, 1963). The LCH proposes

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that consumers consider current and past experiences and future expectations to achieve a relatively consistent level of consumption over the lifetime. Younger households are likely to spend more than they earn when they are establishing households, but justify borrowing to finance their level of living based on an expected increase in earnings. During the peak earning years, households are likely to save a relatively large proportion of income to prepare for retirement. The LCH suggests that households will spend down their savings in retirement. Hence, younger households may be less likely than older households to be concerned with saving for retirement. Younger workers are likely to be eligible to participate in defined contribution accounts at work. Thus, they may be able to develop retirement fund accumulations that could increase based on the additional contributions to their accounts and on the return on assets in their accounts.

Based on the life cycle savings hypothesis and previous research on retirement that included age as a determinant of retirement fund accumulation (DeVaney & Chien, 2001; Li, Montalto & Geistfeld, 1996; Yuh, Montalto & Hanna, 1998), the effect of age on the types of participant-directed retirement fund accumulation should be positive. As workers age, they should be more likely to have established their households, and to save for long-term purposes such as retirement. Hence, the first hypothesis (H1) proposes that: The amount of total retirement savings/defined contribution accounts/IRAs and Keogh plans of the youngest age group will be less than that of any older age group.

### *Period Effects*

In addition to the period effects in the development of pension plans which were previously described, the economic climate of the U.S. might have affected saving for retirement. The expansion of the 1990s is a stark contrast to the first half of the 20<sup>th</sup> century in which the U.S. economy endured a series of recessions, which culminated in the Great Depression. The quarter century after World War II was a period of rapid increase in productivity growth, with a resulting rise in living standards. From the cyclical peak of 1948 to 1973, business sector output per hour rose by more than 3 percent per year. Living standards in 1973 were 82% higher than in 1948 (Economic Report of the President, 2000, p. 25).

In the two decades after 1973, there was much greater economic instability than in the early postwar period. Between 1973 and 1983, the U.S. economy recorded

average yearly inflation and unemployment rates of 8.4 and 7.2%, respectively. The economy grew strongly in the mid-1980s, but Federal deficits and the crisis in the savings and loan industry contributed to rising inflation and recession in 1990. An expansion began hesitantly in 1991 and was sustained. By February 2000, participation in the labor force had increased to a record of 67% of the working-age population and annual unemployment had declined to 4.2%, a 30 year low (Economic Report of the President, 2000, pp. 25-28).

Employees and self-employed workers who contributed to retirement funds in the 1970s probably did not obtain good returns in that decade, as the mean nominal annual rate of return for large company stocks for 1970-1979 was only 5.9% and the mean return for corporate bonds was only 6.2% (Ibbotson Associates, 2001, p. 18). The 1980s had much better returns, with a mean return of 17.5% for large company stocks and 13.0% for corporate bonds. The 1990s had a mean return of 18.2% for large company stocks and 8.4% for corporate bonds (Ibbotson Associates, 2001, p. 18). For the 1990s, those who put most of their contributions in stock funds should have had much larger accumulation than those who chose bond funds or even more stable investments.

The amount of retirement fund accumulation since the mid 1980s should reflect overall growth. Hence, the second hypothesis (H2) proposes that: The amount of total retirement savings/defined contribution accounts/IRAs and Keogh plans in 1986 will be less than in 1992 and 1998.

### *Cohort Effects*

A cohort is a group of people who have shared experiences and events. As a result, the members of the cohort are likely to share "certain attitudes and consumer behavior" (Meredith & Schewe, 1994, p. 22). Several important events and experiences have occurred in the U.S. and they are frequently used to describe a number of well-known cohorts. They are the Depression, World War II, the Baby Boom, and Generation X.

The Depression cohort was born between 1912 and 1921 (Meredith & Schewe, 1994). They are known to be compulsive savers and extremely wary of risk. The World War II cohort, born between 1922 and 1927, was unified by a common enemy and shared experiences. The Post-World War II cohort was born between 1928 and 1945. They experienced a long

period of economic growth, but global unrest, the threat of nuclear power, and the Cold War added uncertainty to everyday life. The Early Boomer Cohort was born between 1946 and 1954. They experienced the Vietnam Conflict, and the assassinations of President John F. Kennedy, Martin Luther King, and Robert Kennedy. The cohort experienced good economic times. The Late Boomer Cohort was born between 1955 and 1965. They were influenced by Watergate and economic changes during this period. Debt as a means of maintaining a lifestyle made sense to this cohort. The Generation X Cohort was born between 1966 and 1976. Many members of the cohort were children of divorce and were "latchkey" children growing up.

Meredith and Schewe (1994, p. 24) summarized the attitude and consumer behavior related to the personal financial attitude and behavior of the cohorts as follows:

Depression cohort, "Save for a rainy day,"

World War II cohort, "Save a lot, spend a little,"

Post-World War II cohort, "Save some, spend some"

Early and Late Boomer cohorts, "Spend, spend, borrow, and spend," and

Generation X cohort, "Spend? Save? Now what?"

Based on the experiences of the cohorts, the third hypothesis (H3) proposes that: The accumulation of total retirement savings/defined contribution accounts/IRAs and Keogh plans of the youngest cohort will be less than any other cohort.

#### *Control Variables*

Control variables are widely used in cohort analysis. The control variables represent basic characteristics appropriate to the topic being studied such as education, marital status, race, household size, income, work status, self-employment, and homeownership. These characteristics have been studied by many researchers including DeVaney, Sharpe, Kratzer and Su (1998), Investment Company Institute (2000), Li, et al. (1996), Springstead and Wilson (2000), Yuh and DeVaney (1996), and Yuh, et al. (1998).

A study on the participation in three voluntary individual account-type plans---IRAs, 401(k)s, and federal Thrift Savings Plan (TSP)---clarified expectations about who participated. The findings showed that participants in all three plans were disproportionately male, higher earners, older, full-time workers, and either white or non-black minorities compared with the population at large. Similarly, a

survey in 1998 by the Investment Company Institute (2000) provided a profile of a typical 401(k) plan participant. The median age for 401(k) participants in the ICI survey was 41 years; 66% were married, 45% had a college or postgraduate degree, 51% were white-collar professionals, and 32% were in blue-collar occupations. The median household income of plan participants in the ICI survey was \$50,000.

Because IRAs were developed primarily for workers who were not covered by a pension plan at work and because Keogh plans were developed for the self-employed, a measure of self-employment should be included in the control variables. Self-employed households are likely to have smaller amounts in defined contribution accounts and larger amounts in IRAs and Keogh plans (DeVaney, et al., 1998). If those who rent would like to buy a home, they might be saving for a home rather than accumulating retirement funds. Hence, home-owners may have larger amounts of retirement fund accumulation compared to those who do not own homes (DeVaney & Chien, 2001; Yuh, et al., 1998).

#### **Method**

##### *Data*

The cohorts were defined as a six-year age interval which was the amount of time between the three independently replicated cross-sectional surveys. The cohort data were constructed using standard cohort tables developed by Glenn (1977). The data are typically displayed in the form of a rectangular age by period table. The age brackets and time periods are of the same length which is six years and shown in columns and rows, so that the cohort profiles can be traced on diagonals. This type of design allows for the possibility of calculating age effects adjusted for period and cohort differences, and cohort effects adjusted for period and age variations (Fienberg & Mason, 1987). If the age effects are significant, figures drawn from the cohort table will show large variations from one row to another. If the period effects are significant, figures drawn from the cohort table will show large variations from one column to another. If the cohort effects are significant, figures drawn from the cohort table (Table 1) will show large variations from one diagonal to another (Masson, 1986).

The cohort data used in this study were constructed from the 1986, 1992, and 1998 Surveys of Consumer Finance (SCF). The surveys are sponsored by the Federal Reserve Board in cooperation with other government agencies (Kennickell, Starr-McCluer &

**Cohort Analysis of the Amount in Retirement Accounts** Surette, 2000). The surveys contain detailed and comprehensive financial and demographic information about households in the United States. Because the current study focuses on retirement planning, households headed by someone who as of 1997 was younger than 23 or older than 70 or retired were excluded. Age 23 was selected because it is typically the age when many young people graduate from college, begin full time work, and have a consistent source of income. Even though not all young people finish college, 23 years old is used here as a proxy for assuming that sufficient income is earned on which the individual would make household saving and consumption decisions as suggested by the life-cycle hypothesis. At age 70 ½, individuals are required to start withdrawing from tax qualified retirement accounts such as defined contribution accounts, IRAs, and Keogh plans.

**Table 1.**  
Standard Cohort Table

Age	Period		
	1986	1992	1998
Age 1: 23-28	A	A-1	A-2
Age 2: 29-34	B	A	A-1
Age 3: 35-40	C	B	A
Age 4: 41-46	D	C	B
Age 5: 47-52	E	D	C
Age 6: 53-58	F	E	D
Age 7: 59-64	G	F	E
Age 8: 65-70	H	G	F

Based on Glenn (1977).

In the 1992 and 1998 SCF, multiple imputation was employed to replace missing or deficient values with a vector of values representing a distribution of possibilities (Rubin, 1987). Hence, each variable was represented by five values, i.e. five data sets were created. However, only the first implicate of the five implicates was used from each of the 1992 and 1998 surveys. Not using a repeated-imputation inference (RII) can result in significance tests not being valid in some cases (Montalto & Sung, 1996), but when combining different survey years, the RII technique is not feasible. For this study, the samples of the 1986, 1992, and 1998 SCF consisted of 2,025 households, 2,955 households, and 3,198 households, respectively.

*Measures*

There were three dependent variables: the amount in defined contribution savings accounts, the amount in Individual Retirement Accounts and Keogh plans, and the total of these two types of accounts. Defined benefit savings were not included in the study because the amount of the benefit received at retirement is not known until the person retires. Defined contribution account savings and IRA/Keogh plan savings were measured as a continuous variable. It was not possible to separate the amount in IRAs and Keogh plans because the SCF records this information in one variable. As these variables have a skewed distribution, log transformation (base ten) was performed and the log of each value was used in the following analysis. The variables used to develop the measures of retirement fund accumulation are shown in Appendix A for each of the 1986, 1992, and 1998 data sets.

The control variables were education, marital status, race, household size, income, full-time or part-time work status, self-employment, and owning a home. The

**Financial Counseling and Planning**, Volume 12 (1), 2001 variable refers to the head of household for age, education, marital status, race, work status, home ownership, and self-employment. Income and household size refer to the entire household. The highest level of education attained was categorized as: less than or equal to a high school diploma, some college or a baccalaureate degree, or an advanced degree. Marital status was coded as married or otherwise. Race was coded as white or otherwise. Household size and income were continuous variables. Work status was coded according to the response given to the question, "Thinking about all of your current work for pay, do you consider yourself to be working full-time or part-time?" Self employed was coded as 1 if the worker was self-employed and 0 if otherwise. Homeownership was coded as homeowner or otherwise. The coding of control variables is shown in Table 2.

**Table 2.**  
Coding of Control Variables

Variables	Coding
Years of Education	
High School or Less (reference)	<=12 years
Some College or BS	13-16 years
Advanced Degree	>16 years
Household Income	Continuous (Log with base 10)
Marital Status	1 if married, 0 otherwise
Race	1 if white, 0 otherwise
Work Full-time	1 if yes, 0 otherwise
Homeownership	1 if homeowner, 0 otherwise
Household Size	Continuous
Self-employed	1 if yes, 0 otherwise

A few households recorded a negative amount for total household income. Because a log transformation (base ten) was performed for income to make the skewed data more normally distributed, the 29 cases with

## Results

### *Age and Period Effects*

*Sample Characteristics* The total sample extracted from the three surveys was 8,178 households based on the selection process of deleting households with a head who was younger than 23 or older than 70 or retired. Table 3 shows the sample size for the eight age groups by each period.

### **Figure 1.**

Mean Retirement/Thrift/IRA-Keogh Account Balance by Age Groups in 1985 (1997 dollars).

negative income were deleted. Examination of occupational status of the 29 who were deleted revealed that they were: working now but on vacation or on strike (18 cases), temporarily laid off (2 cases), unemployed and looking for work (3 cases), a homemaker (3 cases), or disabled (3 cases). The values for each type of retirement fund accumulation were positive; consequently, no cases were deleted. All dollar amounts were converted to 1997 dollars. See Appendix B for an explanation.

### *Statistical Analysis*

Cohort analysis is typically carried out with analysis of variance (ANOVA) to investigate whether there are row differences, column differences, or interactions, in the measured central tendency of the dependent variable (Fienberg & Mason, 1987; Olweus & Alasker, 1991). However, the diagonal effects need a more sophisticated technique to disentangle the row, column, and interaction effects in a test of general analysis of variance because of linear dependency among rows, columns, and diagonals. Therefore, in addition to a two-way ANOVA for row and column effects, a one-way ANOVA to test the variations for each cohort separately is used to extract the diagonal effects.

ANOVA is used when the data have an equivalent number of observations in each group, i.e. balanced data. In this study, the data are unbalanced. That is, the number of observations in each cell of the ANOVA design are different across rows and down the columns. General linear models (GLMs) allow for unequal cell sizes because the GLM has a weighting feature to equate groups. GLM also has the advantage of being formally generalizable to multiple-group cases or any ANOVA design (Tatsuoka & Lohnes, 1988).

Therefore, general linear models with the nature of analysis of variance are performed for each hypothesis test.

Figures 1-3 show the cross-sectional household age-retirement accumulation profiles for 1986, 1992, and 1998, respectively. Overall, the largest amount of retirement fund accumulation is held by households in the 7<sup>th</sup> age group. The figures provide support for the life-cycle savings hypothesis.

**Cohort Analysis of the Amount in Retirement Accounts**

**Figure 2.**

Mean Retirement/Thrift/IRA-Keogh Account Balance by Age Groups in 1991 (1997 dollars).

**Figure 3.**

Mean Retirement/Thrift/IRA-Keogh Account Balance by Age Groups in 1997.



**Cohort Analysis of the Amount in Retirement Accounts**

**Table 3.**  
Sample Size for the Eight Age Groups by Period.

Age	Period		
	1986	1992	1998
Age 1: 23-28	188	290	324
Age 2: 29-34	347	422	375
Age 3: 35-40	350	496	516
Age 4: 41-46	337	495	581
Age 5: 47-52	278	453	591
Age 6: 53-58	254	348	435
Age 7: 59-64	185	280	272
Age 8: 65-70	86	171	104
<b>Total</b>	2025	2955	3198

Ages are as of year prior to each sample year, i.e., 1985, 1991, 1997

*Analysis of Variance with General Linear Models*

The hypotheses on age and period effects on the types of retirement fund accumulation were tested using GLM. Age and period were statistically significant after controlling for all other variables. The hypotheses of main effects were fully supported. The results are shown in Table 4.

*Total Retirement Fund Accumulation* Age and period effects for each type of retirement fund accumulation were examined using two-way ANOVA. The results are shown in Table 5. The hypotheses for age were supported, that is, the total retirement fund accumulation for each of the 2<sup>nd</sup> to 8<sup>th</sup> age groups was significantly larger than the youngest age group. Thus, there was an age effect. However, total retirement fund accumulation varied by period. In 1992, households had significantly smaller levels of total retirement fund accumulation compared to 1986. But, households in 1998 had significantly larger levels of total retirement fund accumulation than households in 1986.

Standardized coefficients were used to check the relative importance of independent variables to the dependent variables. Based on the absolute value of the coefficients, the relative importance of each variable on total retirement fund accumulation from *most to least* was: an advanced degree, the 6<sup>th</sup> age group, some college or a BS, income, the 7<sup>th</sup> age group, home ownership, the 5<sup>th</sup> age group, the 4<sup>th</sup> age group, being married, the 3<sup>rd</sup> age group, being white, working full time, period 3, the 2<sup>nd</sup> age group, household size, and period 2. There was no difference between self-employment and wage work in regard to the amount of total retirement fund accumulation (Table 5).

**Table 4.**  
Results of Two-Way ANOVA: Age and Period Effects.  
(N=8,178)

Variables	DF	F-Values		
		Retirement	Thrift Account	IRA/Keogh
Period	2	44.74‡	96.42‡	14.87‡
Age	7	34.42‡	4.11†	54.28‡
Some College or BS	1	270.73‡	67.86‡	226.95‡
Advanced Degree	1	488.88‡	112.65‡	582.01‡
Household Income	1	170.11‡	60.78‡	159.53‡
Married	1	118.26‡	57.57‡	71.8‡
White	1	120.58‡	39.15‡	81.31‡
Full-time Worker	1	42.47‡	70.98‡	1.52
Homeowner	1	212.53‡	95.55‡	118.69‡
Household Size	1	16.43‡	1.13	17.62‡
Self-employed	1	2.30	353.57‡	119.39‡
Model Fit		225.27‡	85.27‡	223.58‡
R <sup>2</sup>		0.33	0.16	0.33

Type III sum of squares were used to obtain the F-values because of unbalanced cell sizes. \*p<0.05 †p<0.01 ‡p<0.001

**Defined Contribution Accounts.** In the defined contribution account model, the hypothesis for age was supported. The 2<sup>nd</sup> through 7<sup>th</sup> age groups had significantly larger amounts in defined contribution accounts than the youngest age group. Interestingly, the amount of defined contribution savings of the 8<sup>th</sup> age group (age 65-70) was not significantly different from the youngest age group. The lack of an effect for the oldest group could mean that these older workers were: covered by defined benefit pensions, or not covered by any employer pensions, or there may be some other reason related to age (Table 5).

Compared to 1986, the amount in defined contribution account savings was larger in 1992 and in 1998. Hence, the hypothesis for a period effect was supported. It is likely that workers were better off because they worked for an employer that had a defined contribution plan, or that workers were financially able to contribute to a defined contribution plan in the 2<sup>nd</sup> and 3<sup>rd</sup> periods or some other reason related to the period. When standardized coefficients for the independent variables were examined, it was shown that self-employment was the most important indicator because of the absolute size of the coefficient. However, the sign was negative indicating that compared to those who worked for someone else, the self-employed had less saved in defined contribution accounts. This was consistent with the expectations that the self-employed would be less

likely to be participants in defined contribution accounts. Listing the other variables from *most* to *least* important indicators of the amount of defined contribution account savings showed the following: period 3, advanced degree, home ownership, income, full time work, being married, some college or a BS, the 6<sup>th</sup> age group, the 3<sup>rd</sup> age group, the 5<sup>th</sup> age group, white, the 4<sup>th</sup> age group, the 2<sup>nd</sup> age group, period 2, and the 7<sup>th</sup> age group. The amount accumulated in defined contribution accounts did not vary according to the size of the household (Table 5).

**Table 5.**  
Standardized Coefficients from the Two-Way ANOVA: Age and Period Effects. (N=8178)

Variables	Retirement Account	DC Account	IRA/Keogh Plan
Period 2: 1992	-0.03*	0.04 †	-0.07‡
Period 3: 1998	0.06‡	0.17‡	-0.05‡
Age 2: 29-34	0.05‡	0.05‡	0.01
Age 3: 35-40	0.10‡	0.07‡	0.06‡
Age 4: 41-46	0.13‡	0.06‡	0.11‡
Age 5: 47-52	0.14‡	0.07‡	0.13‡
Age 6: 53-58	0.17‡	0.07‡	0.17‡
Age 7: 59-64	0.16‡	0.04†	0.18‡
Age 8: 65-70	0.09‡	0.00	0.10‡
Some College or BS	0.17‡	0.10‡	0.15‡
Advanced Degree	0.24‡	0.13‡	0.26‡
Household Income	0.16‡	0.11‡	0.16‡
Married	0.12‡	0.10‡	0.10‡
White	0.10‡	0.07‡	0.08‡
Full-time Worker	0.07‡	0.10‡	-0.14
Homeowner	0.16‡	0.12‡	0.12‡
Household Size	-0.04‡	-0.01	0.04‡
Self-employed	-0.01	-0.21‡	0.11‡

\*p<0.05 †p<0.01 ‡p<0.001

**Individual Retirement Accounts and Keogh Plans.** The effects for age and period in the statistical analysis of IRAs and Keogh plans shown in Table 5 suggest that these plans were less utilized by younger workers. Compared to the youngest group, the 3<sup>rd</sup> through 8<sup>th</sup> age groups had a larger amount in IRAs and Keogh plans, but the 2<sup>nd</sup> age group was not significantly different from the youngest group.

The parameter estimates for periods 2 and 3 reveal that IRAs and Keogh plan savings in 1992 and 1998 were significantly less than in 1986 holding all other factors constant (Table 5). This might reflect that workers held jobs that provided eligibility for defined contribution account participation and they did not participate in

IRAs or Keogh plans. Another possibility is that the smaller amount of savings in IRAs and Keogh plans was a result of changes in the tax law enacted in 1986 which eliminated the tax deductibility of IRAs for households with income above certain levels. Workers may have been less likely to contribute to IRAs if the income tax deduction was not available to them. Another possibility could be that workers felt it was too complicated to determine whether they were eligible for a tax deduction through an IRA and did not contribute to IRAs.

The standardized coefficients for IRAs and Keogh plans reveal that having an advanced education was the most important indicator followed by (in order from *most* to *least* important): the 7<sup>th</sup> age group, the 6<sup>th</sup> age group, income, some college or a BS, the 5<sup>th</sup> age group, home ownership, self-employment, the 4<sup>th</sup> age group, the 8<sup>th</sup> age group, being married, white, period 2, the 3<sup>rd</sup> age group, period 3, and household size. There was no difference between full and part-time workers in the amount saved in IRAs and Keogh plans suggesting that both part-time and full-time workers utilized IRAs and, perhaps, Keogh plans as retirement fund accumulation options (Table 5).

*Cohort Analysis*

*Sample Characteristics* To conduct the cohort

analysis, the three cross-sectional data sets were pooled into six cohorts. Because the cohorts represent the diagonals of the age by period table which was shown in Table 1, there were only 6 cohorts in the cohort analysis. As shown in Figure 4, the average retirement fund accumulation, defined contribution accounts, and IRA/Keogh plans peaked at the level of the 5<sup>th</sup> cohort. Workers in the 6<sup>th</sup> cohort may have been covered under defined benefit pensions or not covered by one of these types of savings. Perhaps, workers in the younger cohorts were more likely to be eligible for defined contribution accounts than older workers. Workers in the 5<sup>th</sup> cohort may have participated in IRAs for several years.

The descriptive statistics for the control variables of the cohorts are shown in Table 6. A summary of key points revealed the following highlights. The portion of full time workers was highest for Cohort 1, the youngest cohort. Household size was largest for Cohort 2. The portion with a white household head was highest for cohort 6. Attaining a level of education that included some college or a degree was greatest for Cohort 3. Income was highest for Cohort 4. The portion who were married was highest for cohort 5. The portion who were homeowners was highest for cohort 5. The proportion who were self-employed ranged between 11% and 16%.

**Figure 4.**  
Mean Retirement/Thrift/IRA-Keogh Account Balance by Cohorts (1997 dollars)

**Table 6.**

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**Sample Characteristics for Each Cohort (weighted).**

<b>Variable</b>	<b>Cohort 1</b>	<b>Cohort 2</b>	<b>Cohort 3</b>	<b>Cohort 4</b>	<b>Cohort 5</b>	<b>Cohort 6</b>
<b>Dependent Variables</b>						
Retirement Account	12,847 (37,536)	18,256 (66,243)	25,527 (82,845)	36,623 (147,872)	54,423 (194,767)	39,870 (193,522)
Thrift Account	840 (2,725)	1,648 (6,802)	3,631 (14,071)	7,639 (37,775)	18,368 (118,186)	9,283 (57,625)
IRA/Keogh Plan	2,018 (9,018)	3,144 (13,354)	7,786 (29,525)	12,173 (60,649)	18,288 (104,852)	17,649 (55,242)
<b>Control Variables</b>						
<b>Years of Education</b>						
High School or Less	50%	44%	38%	46%	55%	56%
Some College or BS	41%	45%	45%	37%	32%	29%
Advanced Degree	9%	11%	17%	17%	13%	15%
Household Income	42,420 (61,346)	47,640 (87,987)	54,204 (109,396)	58,305 (366,546)	51,953 (167,305)	50,187 (137,920)
Married	55%	60%	60%	62%	64%	62%
White	77%	77%	77%	79%	76%	84%
Full-time Worker	82%	81%	80%	80%	71%	66%
Homeowner	45%	56%	65%	69%	72%	72%
Household Size	3.09 (1.51)	3.16 (1.56)	3.09 (1.57)	2.88 (1.53)	2.62 (1.49)	2.32 (1.21)
Self-employed	11%	12%	16%	14%	12%	14%
Sample Size	1126	1424	1436	1225	898	638

## Cohort Analysis of the Amount in Retirement Accounts

### Results of One-Way ANOVA

Cohort effects can only be examined by a separate one-way ANOVA model, but not in the models previously presented because of the problem of linear dependence among age, period, and cohort, and the data structure for statistical analysis. As shown in Table 7, strong cohort effects were detected in retirement fund accumulation using separate one-way ANOVA models after controlling for the socioeconomic variables. The findings suggest that cohort effects significantly contributed to the differences in retirement saving in addition to age and period effects.

Table 7.  
Results of One-Way ANOVA: Cohort Effect.  
(N=6,747)

Variables	DF	Retirement Account	Thrift Account	IRA/Keogh Plan
Cohort	5	11.44‡	4.33*	42.21‡
Some College or BS	1	219.24‡	56.48‡	186.58‡
Advanced Degree	1	431.38‡	99.04‡	516.42‡
Household Income	1	248.54‡	119.16‡	182.31‡
Married	1	92.07‡	40.07‡	62.39‡
White	1	87.58‡	18.25‡	75.13‡
Full-time Worker	1	19.64‡	39.66‡	2.83
Homeowner	1	181.64‡	78.92‡	101.03‡
Household Size	1	24.05‡	3.94*	20.12‡
Self-employed	1	0.07	265.23‡	116.71‡
Model Fit		207.72‡	72.71‡	217.13‡
R <sup>2</sup>		0.30	0.13	0.31

\*p<0.05 †p<0.01 ‡p<0.001

Table 8.  
Estimated Coefficients from the One-Way ANOVA:  
Cohort Effect. (N=6,747)

Variables	Retirement Account	Thrift Account	IRA/Keogh Plan
Cohort 2	0.14	-0.14	0.39*
Cohort 3	0.39*	-0.47*	0.99‡
Cohort 4	0.71‡	-0.26	1.40‡
Cohort 5	1.19‡	-0.42*	2.30‡
Cohort 6	1.25‡	-0.99	2.43‡
Some College or BS	1.92‡	0.99‡	1.72‡
Advanced Degree	3.32‡	1.62‡	3.53‡
Household Income	0.42‡	0.30‡	0.35‡
Married	1.41‡	0.95‡	1.13‡
White	1.42‡	0.66‡	1.27‡

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Full-time Worker	0.75‡	1.08‡	-0.28
Homeowner	1.82‡	1.22‡	1.32‡
Household Size	0.22‡	-0.09	-0.19‡
Self-employed	0.04	-2.18‡	1.38‡
Intercept	-3.76	-2.35	-4.12

*Total Retirement Fund Accumulation* As shown in Table 8, the parameter estimates of cohort effects indicate the direction of movements in the accumulation of the types of retirement fund accumulation. Cohorts 3, 4, 5, and 6 had significantly higher levels of total retirement fund accumulation than the youngest cohort. Education, income, marital status, race, homeownership, and household size significantly and positively affected the amount in total retirement fund accumulation. There was no difference in regard to total retirement fund accumulation between self-employed workers and other workers.

*Defined Contribution Accounts.* Cohort effects on defined contribution accounts varied significantly for each cohort. Cohorts 3 and 5 had significantly smaller amounts of defined contribution accounts than the youngest cohort. There may have been different explanations for each cohort. Members of the 3<sup>rd</sup> cohort may have chosen not to enroll in defined contribution accounts preferring to receive their full wages or salary. Members of the 5<sup>th</sup> cohort may have been covered by other plans. Perhaps, they were covered by a defined benefit plan instead of being eligible for a defined contribution account. The coefficients for the control variables show that household heads with more education, higher income, who were married, white, a full time worker, and a homeowner had larger amounts in defined contribution accounts. Self-employment had a negative effect on the amount of the defined contribution account savings. Household size was not significantly related to the amount in defined contribution accounts (Table 8).

*Individual Retirement Accounts and Keogh Plans* As shown in Table 8, the 2<sup>nd</sup> through 6<sup>th</sup> cohorts had significantly larger savings in IRAs and Keogh plans than the youngest cohort. The results of one-way ANOVA showed positive effects for education, income, marital status, race, homeownership, and self-employment. However, having a larger household meant a smaller amount of savings in IRAs and Keogh plans. There was no difference between full time and part-time workers in the amount saved for IRAs and Keogh plans suggesting that IRAs and Keogh plans

were a useful retirement fund accumulation option for part-time workers.

### Discussion and Implications

#### *Age Effects*

The older age groups had larger amounts of total retirement fund accumulation, defined contribution accounts, and IRA and Keogh plan savings. This effect was consistent with the life-cycle savings hypothesis. An implication related to the age effect is the importance of educating younger workers to participate in retirement plans as soon as possible (Ward, 2000). If workers are financially constrained or they fail to participate in a retirement plan, they may fall behind other workers in preparing for a financially secure retirement. Some of the younger workers may need educational programs to enable them to manage their finances and begin to save.

#### *Period Effects*

The period effects varied by type of savings. Total retirement fund accumulations were smaller in 1992 than they were in 1986; but they were larger in 1998 than they were in 1986. This probably reflects the recession in 1990. If people were unemployed or felt insecure in regard to their job, they may have reduced their saving in IRAs and Keogh plans. The amount in defined contribution savings increased in both 1992 and 1998 compared to 1986. This may have reflected the shift from defined benefit pensions to defined contribution plans, especially 401(k) plans (Ippolito, 1997). If workers were participating, their savings were accumulating. The amount in IRAs and Keogh plans was smaller in both 1992 and 1998 than it was in 1986. This might be a reflection of changes in tax laws which reduced the tax deductibility of IRAs for workers with higher incomes.

An implication arising from the period effect would be for prospective employees to consider what employee benefits are available when making a decision between one job or another. Workers who are knowledgeable about employee benefits, especially retirement fund options, should evaluate the benefits of potential jobs based on type of retirement plan, health care insurance, and other benefits, as well as salary. Another implication would be that workers with appropriate education and skills will be less affected by economic downturns than workers with less education and fewer skills. Hence, workers should obtain as much education and training as possible and continue to educate themselves while working to avoid layoffs and downsizing.

#### *Cohort Effects*

The 3<sup>rd</sup> through 6<sup>th</sup> cohorts had a significantly larger amount of total retirement fund accumulation than the youngest cohort. The 2<sup>nd</sup> cohort did not differ significantly from the youngest cohort. When the amount of defined contribution savings of the cohorts were analyzed, the 3<sup>rd</sup> and 5<sup>th</sup> cohort had significantly smaller amounts than the youngest cohort. The explanations are likely to differ for the cohorts because of attitudes toward money which were assimilated during their formative years (Meredith & Schewe, 1994). The 3<sup>rd</sup> cohort may have preferred more take-home income and the 5<sup>th</sup> cohort may have been covered by a defined benefit pension. Another possibility is that workers, especially the 3<sup>rd</sup> cohort, had changed jobs and rolled over a defined contribution account into an IRA or taken the distribution as a lump sum.

There was a strong cohort effect for the amount in IRAs and Keogh plan savings. All cohorts had a significantly larger amount than the youngest cohort. This suggests that the older cohorts had accumulated larger savings in their IRAs although it is not possible to determine whether it is the result of contributions, rollovers, and earnings on the balance in the IRA or through contributions and earnings in the Keogh plans or a combination of these factors. From a public policy perspective, it appears that IRAs and Keogh plans help workers save for retirement.

Some of the control variables had consistent and positive effects in the two-way ANOVA and the one-way ANOVA. Retirement fund accumulations were higher for households with higher income, for those headed by an individual with more education, for married couples, for whites, and for homeowners. These results are generally consistent with previous studies on retirement fund accumulation (Li, et al.; Yuh & DeVaney, 1996). The effect of the other control variables such as full-time work, household size, and self-employment varied for each type of savings.

An implication arising from the cohort effects would be that some groups may need more information in regard to retirement fund accumulation (Greenwald, 2001). This concern arises from the lower amounts of defined contribution account savings for the 3<sup>rd</sup> and 5<sup>th</sup> cohorts. Younger cohorts may need assistance with managing their money before they can establish a withdrawal from their paycheck that is directed toward retirement. It may be necessary to learn more about these cohorts to determine their perspective on saving

**Cohort Analysis of the Amount in Retirement Accounts** for retirement. They may be saving using other savings options such as certificates of deposit, mutual funds, stocks, and investments in a home, business or real estate.

*Future Research*

The results of this study provide a benchmark for future studies that surely will include the 2001 Survey of Consumer Finances. The most recent data collection will enable researchers to examine the period effects for 2000 as well age and cohort effects. Another aspect of future studies that will be of special interest will be the aging of the baby boomer cohorts.

It would be useful to conduct focus groups on factors that motivate workers to enroll in a defined contribution plan, to contribute the maximum amount, and to refrain from borrowing from their plans. Also, it would benefit individuals and employers to learn more about the effectiveness of educational programs and materials. Conducting focus groups to gain a better understanding of the use of IRAs could be helpful to policy-makers. Finally, it would be meaningful to conduct interviews or focus groups with the self-employed to learn more about ways of encouraging them to plan for retirement. The Small Employer Retirement Surveys have revealed that many small employers without retirement plans do not know about plan sponsorship (Salisbury, Helman, Ostuw & Yakoboski, 2000; Salisbury, et al., 2001).

**Appendix A**

List of Variables Across Three Waves of the Surveys of Consumer Finances

	1986	1992	1998

**Appendix B**

To enable the comparison of retirement fund accumulation and income between the three periods, dollar amounts from the 1986, 1992, and 1998 SCF which were collected in 1985, 1991, and 1997, respectively, were converted to correspond to 1997 dollars based on the Consumer Price Index released by the Bureau of Labor Statistics, U.S. Department of Labor. The annual average CPI was 107.6 in 1985, 136.2 in 1991, and 160.5 in 1997. The calculations are: (1) 1985 dollars/107.6 X 160.5 = 1997 dollars, and (2) 1991 dollars/136.2 X 160.5 = 1997 dollars.

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<i>Dependent Variables</i>			
Retirement fund accumulation	Defined contri-bution + IRA/Keogh	Defined contri-bution + IRA/Keogh	Defined contri-bution + IRA/Keogh
Defined contribution plans	C147	X4226+X4326+X4426+X4826+X4926+X5206	X4226 +X4326 +X4426 +X4826 +X4926 +X5206
IRA/Keogh	C1411	X3610 +X3620 +X3630	X3610 +X3620 +X3630
<i>Control Variables</i>			
Age	C1113	X8022	X8022
Education	C1630	X5901	X5901
Household Income	C1818	X5729	X5729
Marital Status	C1125	X8023	X8023
Race	B3111	X5909	X5909
Full-time Worker	C1638	X4511	X4511
Homeownership	C1501	X701	X701
Household Size	C1101	X101	X101
Self-employed	C1810	X4106	X4106
Weight	C1014	X42001	x42001

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