Asynchronous Risk:
Unemployment, Equity Markets, and Retirement Savings

Jason S. Seligman
Carl Vinson Institute
University of Georgia

Jeffrey B. Wenger
School of Public and International Affairs
University of Georgia

WORKING PAPER

September 12, 2004

ABSTRACT

The stock market and labor market are often thought to lead and lag general economic conditions, respectively. This may negatively affect returns from Defined Contribution type pension plans since contributions to these plans are a direct function of employment. We look for evidence of systematic retirement savings losses due to timing of unemployment spells. We create a simulation model which matches stochastically generated unemployment spells to stock market returns for two cohorts of men and women in different quartiles of the earnings distribution. In general, we find that lower income workers suffer more significant percentage losses in retirement savings as a result of more frequent spells of unemployment. In addition, we find that these losses are amplified by the timing of unemployment relative to the equities market. A decomposition finds that both the market timing effect and the loss of accruals contribute to savings losses as a result of unemployment. Market timing effects are larger for higher earning workers. Finally, we find that younger women have more savings opportunities relative to a contemporaneous cohort of older women workers.

KEYWORDS

Unemployment, retirement, savings, defined contribution, pensions, earnings distribution

1.0 Introduction

How do people cope with risk? One might avoid high risk situations all together. Barring that, people can diversify their risks; shifting opportunities (and likely rewards) from high risk to low. People may also insure against risk – institutionalized diversification. However, in the context of employment, none of these coping strategies is entirely sufficient. Avoiding work is not practicable; either is diversifying. Typically, workers have firm-specific and general skills that are costly to acquire, making diversification expensive. Insuring against income loss due to unemployment is only partially accomplished through the unemployment insurance system. Of course no system compensates for lost contributions to employer based pension plans, and thus opportunities to self-insure are limited.

While it is difficult to ameliorate against some employment risks it is not impossible. Effort and determination matter in labor market outcomes. College graduates are less likely to be unemployed than high school graduates. However, some risks based on race, sex or ethnicity can not be diversified away from. Black, college graduates are still more likely to be unemployed relative to white college graduates. (4.5 percent versus 2.8 percent)[1]. Additionally, some risks are unknowable, making them more akin to brute luck than at knowable risk. What is the likelihood that today's computer programmer will be yesterday's shoe maker?

Most previous research on employment risk and retirement savings addresses the issue by examining the effects of employment risk on portfolio allocation. For workers in industries or occupations with high unemployment earnings risks, researchers argue that portfolio allocation should be overweighted with low-risk investments (Cocco et al. 1997; Campbell at al. 1999). While portfolio allocation must ultimately be a component of any risk reduction strategy, we are interested in a more fundamental aspect of employment risk: labor market risk.

Few people realize the extent of labor market risks. Conservatively, for long-tenured workers (3 or more years of experience) 3.1 percent permanently lost their jobs as a result of plant closure, position elimination or insufficient during the three-year period 1999-2001. Using a more expansive definition of displacement[2], the percentage of workers who experienced a spell of unemployment during the three years leading up to 2002 was 12.4 percent. Of the full-time workers who lost their jobs from 1999-2001, 14.2 percent left the labor force, 22.5 percent were still unemployed, and 7.2 percent were working part-time. For the 56.1 percent who had found full-time work, nearly one-third of them had experienced a 20 percent reduction in weekly earnings (Schmitt, 2004).

Faced with risks to employment income some groups of workers may have difficulty achieving adequate retirement savings. Since nearly more than half of all displaced

[1] Annual average from 2003 Current Population Survey (series codes LNU04027674 (black), LNU04027670 (white))

[2] Workers with no tenure requirement who may have lost their job for any reason other than for cause.

workers are between 35-54 the effects of displacement can be significant on retirement savings.

In this paper we examine the relationship between unemployment, equity returns and retirement savings. We are particularly interested in the unemployment and savings opportunities for workers in different quartiles of the income distribution. Throughout the paper we assume that workers in all quartiles of earnings make identical investment (portfolio allocation) decisions, save similar amounts (either as a percentage of income or a fixed dollar amount) and do not use their accumulated retirement savings to smooth consumption over periods of unemployment. In general, we find that workers at the bottom quartiles of earnings experience large retirement savings percentage losses relative to the other quartiles as a result of unemployment. Additionally, the timing of unemployment spells relative to equity market performance, amplifies retirement income losses for all worker types.

2.0 Literature and Theory

Individual investors face three important sources of retirement savings risk. Each person (or family) faces idiosyncratic financial market risk. Workers in defined contribution plans often make their own investment decisions and these decisions result in different rates of return based workers' investment choices and market timing. The second risk faced by investors, is the possibility that financial market rates of return remain low for extended periods of time, or experience negative corrections just ahead of retirement. For example, Burtless (1998) finds that after 40 years of contributing to a hypothetical account invested solely in stocks, a worker retiring in 1966 would have sufficient savings to replace 100 percent of her career-high earnings, while a similar worker retiring in the late 1970s could have replaced only a little more than 40 percent. Finally, there is the risk associated with outliving your retirement savings, so-called longevity risk. (Brown, 1999; Hurd, 1989)

A number of researchers have highlighted another risk inherent in defined contribution plans: unanticipated shocks to labor income due to business cycle fluctuations. This risk arises when labor income is considered a non-tradable implicit asset that is balanced with other explicit assets to achieve a household's optimal portfolio allocation (Campbell et al., 1999; Storesletten et al., 1998; Viceira, 1999). For instance, if labor income is riskless, then riskless asset holdings are expected to be avoided and a household's portfolio will contain mainly risky assets (Bodie et al., 1991). If labor income is risky but unrelated to financial market risks, the portfolio allocation in risky assets is projected to be reduced (Viceira, 1999). If labor income risky and correlated with financial market returns, households should be more likely to invest in less risky assets (Campbell et al., 1999).

However, the relationship between equity and labor market volatility is not well described in the business cycle literature. One class of models links the equity and labor markets to inventory shocks and/or measures of corporate profits. In these models, when

the rate of GDP growth contracts, inventories accumulate (Keynes 1935). This accumulation signals to employers their need to reduce production, and with it demand for inputs. This begins the process by which firms lay off or let go of workers, or simply go bust. When the rate of GDP growth accelerates, inventories decline, this sends the opposite signal to the firm. With increased demand firms begin purchasing more inputs, including labor. Elsewhere in the business cycle literature, authors have considered why labor markets may adjust less rapidly than the markets for other inputs. Unionization, firm-specific human capital, efficiency wages (Alexopoulos 2002), and high or uncertain search costs (Andolfatto, 1996) for replacement workers (Yang 1998) have all been cited as reducing flexibility in the labor market. All of these describe why firms may hesitate to either let go of workers when times are bad, or to begin hiring when times are good.

Empirical consideration of the timing of equity and the labor market is not very prevalent in research to date. There are a few noteworthy exceptions however. Research by Domain and Louton (1995), estimates models of the relationship between US equity indices and the US unemployment rate. They find negative stock returns are followed by sharp increases in unemployment. Recoveries are followed by slower reductions in the unemployment rate; this leads to asymmetry in the onset and recovery of the labor market. Silvapulle and Silvapulle (1997) find additional evidence of these labor market and equities asymmetries. They find that negative stock returns have a more pronounced effect on the labor market than do positive returns.

The empirical relationship between stock market returns and labor market has been accepted by those who track and forecast economic conditions. In general, an index of stock prices is a leading indicator. For example, both the Conference Board and the Bureau of Economic Analysis consider equities a leading indicator. Labor market indicators however are considered to be leading, coincident, or lagging indicators. For example, the Conference Board considers initial unemployment claims among its leading indicators, while the employment of non-agricultural workers is considered to be coincident, and the duration of unemployment to be a lagging indicator of economic conditions over the business cycle (Conference Board, 2004).

Previous research and theory make clear that financial and labor markets contain interrelated risks. However, the full effect of unemployment on savings remains unclear. From the paragraphs just above, it is clear that equity markets are typically considered a leading indicator of economic performance while labor markets may represent a lagging indicator. Thus ambiguity on the labor side makes the combined effect unclear prior to empirical investigation. The timing of unemployment may exacerbate or ameliorate shortfalls in retirement savings. To illustrate the case where timing effects increase savings losses, consider a worker who invests her defined contribution pension exclusively in a broad based index fund comprising the S&P500 and loses her job shortly after equities decline in value. She has purchased expensive equities (relative to the drop) during her employment and during her unemployment spell cannot (does not have the resources to) purchase equities on the decline; opportunities for dollar-cost-averaging are somewhat muted for a worker in this situation. Alternative scenarios may be equally likely. For example, the effect of unemployment on such pension funds may be in part

mitigated if spells of unemployment coincide with periods of below average investment performance. Thus workers' expected retirement income losses could be amplified via a loss of purchasing opportunities or mitigated with a serendipitous spell of unemployment.

3.0 Data & Method

We examine the relationship between the probability of job loss and retirement savings and develop estimates of retirement savings based on simulations of the US economy. Our simulations use monthly data from the Center for Research in Security Prices (CRSP) for the S&P 500 as a measure of investment returns, and data from the Current Population Survey for unemployment, earnings and demographics. The simulations hold constant both the rates of return on investments and the underlying probability of unemployment, but allow exogenous shocks of varying sizes to impact the economy overall. Only when random shocks exceed underlying probabilities are specific worker-types laid off. We then calculate summary statistics for each simulated economy and record how each of up-to sixteen worker-types do in terms of retirement accumulation losses and effect of market timing. This exercise is iterated fifty-thousand times, and we report the general trends which emerge.

In each period the worker's account grows or shrinks at a rate based on the total return of the S&P 500 (including dividends – which are assumed to be reinvested). Patterns of unemployment matter inasmuch as early spells lead to long periods of lost accumulation, and because stock returns are volatile.

Data

Throughout this paper we use two primary data sets: the Center for Research in Security Prices (CRSP) monthly data for the S&P500 returns including dividend reinvestment and the Current Population Survey – Outgoing Rotation Group (CPS-ORG) files. Both data sets cover the period from 1979 to 2002. We simulate worker savings in a defined contribution plan invested solely in a broad-based equity account (represented by the S&P 500). Estimates of unemployment rates by wage quartiles and gender are calculated using the CPS-ORG files. All wages and returns are inflation adjusted using the Bureau of Economic Analysis' GDP Implicit Price Deflator to constant 2000 dollars.

CRSP data are monthly; we use end of month prices, as the basis for our calculations and include dividend returns. These data are accessible to researchers by agreement with the University of Pennsylvania.

The structure of the CPS data allows us to match individuals across years, effectively creating a one-year panel data sets (see Madrian and Lefgren 2000 for details on the matching of persons in CPS data). We measure unemployment as the one year hazard rate of the experienced unemployed. Only those who were initially employed and then became unemployed one year later, are counted as unemployed in our sample. Thus, we estimate unemployment hazards conditional on being employed one year earlier. This

allows us to examine not only the unemployment experience of these workers but also their earnings prior to a spell of unemployment. The CPS is the optimal data source for unemployment estimates since it forms the basis of the official unemployment rate estimates.

Workers are classified into quartiles based on their hourly wage rate prior to unemployment. Separate earnings quartiles are calculated for men and women. All quartiles have balanced age profiles, that is, one-fourth of each age group is classified in each quartile. (This prevents the lowest earnings quartile from being overweighted with young workers.) We then match each worker to their employment outcome in the following year and calculate the probability of being unemployed in each quartile for men and women. In this way, eight sets of monthly hazards are generated by the procedure for the period of January 1980 through December of 2002, yielding twenty-three years of data. Within this period there are two merges which are not possible 1984-85 and 1994-95 due to decennial changes in CPS panel. For these periods (24 months) we impute a hazard rates using a series of labor market indicators such as the unemployment rate and employment-to-population ratios[3]. We also construct two age-earnings profiles for worker types ages 26-30 and 42-46 in 1980. We calculate these two age-earnings profiles for all eight worker-types in our simulation model (four earnings quartiles, two genders).

The other major component of income loss related to spells of unemployment is the duration of the spell. Clearly, short spells of unemployment are less costly for worker's retirement savings. We model unemployment duration based on period-specific duration distributions using published Bureau of Labor Statistics (BLS) data. The BLS classifies unemployment duration into four categories: 1) four weeks or less, 2) five to 15 weeks, 3) 16 to 26 weeks, and 4) 27 or more. We re-classify unemployment duration in terms of discrete weekly segments by using a piecewise linear spline of the durations and percentages in each category.

Finally BEA's Implicit GDP data are quarterly. These data are made monthly with a linear deconstruction of changes between observations. In spite of the original data being quarterly, we chose the GDP deflator since we are interested in controlling for economy-wide changes in prices (both stock and labor markets are adjusted). The Consumer Price Index (CPI) or the Producer Price Index (PPI) are too narrowly constructed for our purposes.

In summary the CRSP, CPS-ORG, BLS and BEA data provide six important measures for our analysis. CRSP data provide monthly prices for the S&P500 which form the basis of our retirement investments. The CPS-ORG files allow us to estimate gender and earnings-specific unemployment hazard rates. The BLS provides information about the distribution of unemployment durations and the BEA provides the implicit price deflator.

Method

[3] Imputation results are available from authors upon request.

Our method is to use the underlying unemployment rates and durations and simulate different economy-wide shocks over the 1980-2002 period. We do this by generating a series of stochastic shocks to the economy that are the same for all workers regardless of earnings quartile or gender. Under these conditions all workers face the same macro-economy. These randomly generated shocks are compared with the underlying unemployment hazards and durations to generate employment outcomes in the economy.

We take random draws from a uniform distribution to generate labor market conditions. Each month, a new draw is taken and compared to the representative worker's baseline unemployment hazard. If the random draw is observed to be below the hazard the worker becomes unemployed. Results are calibrated by adjusting the range of the uniform distribution so that the average unemployment rate generated by our simulation approximates the average rate of unemployment for men and women over 20 from 1980-2002. Once a period of unemployed begins, a second draw is made to determine the duration of unemployment. Again, the assignment is based on the published distribution of unemployment durations so that while in general drawing smaller numbers leads to faster exits, the same draw generates longer durations in periods when documented durations are longer. The worker is re-employed when the second draw is at or below month-specific duration hazard profile. These durations are rounded to monthly segments to be consistent with our wage and stock data. Because of the necessity of monthly data, and the ambiguity contained in BLS's fourth category, durations in our simulation are both top coded to be less than or equal to 6 months (26 weeks), and bottom coded to be greater than or equal to 1 month (4 weeks)[4]. Due to the nature of hazards, workers in some earnings quartiles may find themselves unemployed when others receiving the same lottery number remain employed. Having all worker-specific hazards compared to the same economy-wide number allows us to model an economy where each simulation results in general economic conditions that are the same for all groups of workers. In our model unemployment incidence is allowed to be a measured function of wage quartile and gender, however, because BLS duration data are not broken down by wage quartile, or gender we assume that the underlying duration distribution in each month is constant for all groups.

Stylistically, we provide each worker with a slip of paper along with her paycheck each month. This slip of paper contains two numbers. The first number is a ticket in the lottery for unemployment, the second determines the unemployment duration. The first number is compared with the month-specific unemployment hazard for the worker's earnings-quartile and gender category. If the lottery number is in the range of the hazard the worker becomes unemployed. She receives a pink slip. The second number announces the required duration of unemployment, again compared to a month-specific duration schedule. At the end of the assigned unemployment period the unemployed return to work.

We structure DC accounts as follows: we assume that there are no retirement savings account-related transaction costs of unemployment. Second, the employer pays the

[4] On average, our duration estimates are likely to under-report retirement savings losses. From 1979-2002, 15 percent of the unemployed had durations in excess of 26 weeks.

administrative costs of retirement savings program. Third, we assume that the unemployed do not withdraw from these accounts prematurely[5]. Forth and finally we assume that all workers invest in the S&P500 with reinvestment of dividends. With respect to the patterns of wages and contributions we assume that there is no inter-quartile mobility and additionally, that a worker may not be unemployed for less than one month or more than six months. We assume that once re-employed she earns the real median wage of her persistent earnings quartile. Worker mobility across earnings quartiles is an important dimension of savings; however the direction of earnings mobility for the unemployed is less clear. Indeed, there is a large body of empirical work suggesting that our assumption of returning each worker to the firm at what amounts to relatively equal real pay overstates worker's retirement savings. Many researchers including Baumol, Blinder and Wolff (2002), Farber (2003), and Schmitt (2004) find that displaced workers typically experience real wage declines. A considerable minority of worker, however, experience real wage gains. By selecting wide bands of the earnings distribution (quartiles), and granting workers median, within quartile wages, we damp some volatility, and overstate the likely earnings once reemployed.

At the end of each simulation we compare the balances of workers' retirement savings with the retirement balance of a consistently employed worker with similar characteristics (earnings quartile, cohort specific age-earnings profile, and gender). The difference of savings and resulting accumulations is attributed to periods of unemployment. After simulating the twenty-three year economy 50,000 times we average the mean losses by group and calculate standard deviations and tests of significance.

With this structure we are able to assess real market returns for periods in which workers are out of the labor force and to compare these to average returns across the entire observed period, thus we observe any "market timing effects" which might aggravate or reduce DC pension losses. We finally check the outcome of average unemployment rate across quartiles, and compare that to historic unemployment rates to make sure that our results do not stem from implausibly large, or small unemployment as observed after the simulation.

Finally, as we have only twenty-three years of data we amplify the resulting measure of dollar and time losses to reflect plausible impacts over a forty year work-history. This step may be considered to over-sample the included years, however it does not affect percentage losses, and where magnitudes are reported, this set up allows the reader to put results in the context of results elsewhere in the broader literature on pension savings.

4.0 Results

In our first set of simulations we allow only the unemployment rate in each earnings quartile to vary. We assume that each worker, regardless of earnings quartile, saves $333

[5] We thus assume either that workers finance consumption entirely from their unemployment benefit, or the existence of other precautionary savings, keeping balances in the DC accounts higher than they might be in actual job loss situations.

each month. While this assumption is not realistic, it allows us to isolate the effects of unemployment on retirement savings. Overall, saving $333 per month over 40 years and investing that sum in the S&P500 with reinvestment of dividends, yields a total retirement savings greater than that attained by lower income workers who save ten percent of their wages. Table 1 presents our estimates of the income and percentage losses associated with spells of unemployment.

[Table 1 – about here]

For male workers in the lowest quartile of earnings, retirement losses resulting from spells of unemployment totaled $50,784. For men in the highest earnings quartile, these losses averaged $28,995. This implies, holding contributions constant, the lowest quartile of earners would experience retirement savings losses that are 75 percent larger then their top quartile male counterparts. For women a similar picture emerges. Women's retirement income losses for the bottom earnings quartile averaged $45,715 while income losses in the top quartile averaged $19,085 – the smallest for any group. Perhaps even more interesting is the relationship between percentage losses of retirement savings and time spent unemployed. In every case, the percentage of retirement income lost exceeds the time spent unemployed. This is likely in part an artifact of the time period we analyze. Since unemployment was the highest in the early 1980s (early in these workers' careers) workers' lower initial savings were compounded over time. This result may be considerably different for workers who began employment and saving for retirement in the mid-1990s. This may illustrate that early patterns of unemployment create cohort savings effects in much the same way as long periods of below average equities returns creates replacement rate effects for retirees (Burtless, 1998).

Our second set of simulations allows for differential savings contributions based on earnings. We separate workers into two groups based on age: a young cohort aged 26 in 1980 and an older cohort aged 42 in 1980. As expected, allowing for differential contribution rates changes the totals lost by each earnings group considerably. Tables 2 and 3 show results for the young and old cohort simulations. For the young cohort retirement savings ranged from $260,000 to $793,000 for the highest and lowest quartile men. Women in this cohort saved considerably less, owing to their lower wages and contributions; savings ranged from $196,000 to $600,000 for the lowest and highest earning female quartiles. The largest loss for all female cohorts was $17,878 (representing fourth quartile, young women), and for all male cohorts was $42,523 for (representing fourth quartile, older men). Despite the changes in dollar losses the percentage losses *by group* remain relatively constant; no measurement variation is greater than 0.1%. Low earning men (young and old) still lose approximately 8 percent of income relative to a baseline of no unemployment. This stated, percentage losses vary considerably *across groups* with any of the approaches and cohorts used.

[Tables 2 and 3 – about here]

Our simulation results are largely determined by the unemployment rate of each group. This makes calibration of our data an important consideration. We calibrated the

stochastic component of the simulation so that it would produce aggregate unemployment rates similar to the United States over the period of 1980 to 2002. In general, the men's and women's average unemployment rate in our simulation, (5.5 and 4.6 percent, respectively) are near the US averages of 5.5 for men and women over age 20. In general men in the lowest earnings quartile of our simulation spend 35.4 months unemployed, while men in the top quartile spend 19.6 months unemployed (Table 4). Overall, women spend less time unemployed; in our simulations women in the lowest earning quartile spend an average of 31.8 months unemployed while women in the highest earning quartile average 13.4 months of unemployment.

Table 4 also shows the differential rate of investment return during spells of unemployment relative to the market average for each quartile. We use this differential rate to calculate the "in-spell marginal loss." Intuitively, if the market is performing better than average during a spell of unemployment, then unemployed workers are doubly hurt. They forgo contributions and also the better rates of return these contributions would make during their spell of unemployment. This market timing effect can exacerbate total losses since losses are compounded over time. In Table 4 the in-spell loss for first quartile workers is a function of the market return, the duration of unemployment, and the contribution amount. First quartile workers forego $194 worth of returns from the market due solely to the timing of their unemployment spell. We compound this amount for 20 years at the market rate to approximate mid-career losses due to market timing.

Ex ante, it is unclear whether the market timing effect should be positive or negative. The timing effect could be negative if retirement losses were ameliorated with fortuitous spell timing, or conversely, exacerbated by unfortunate spell timing. In general, we find that income losses due to unemployment are systematically higher for all workers as a result of spell timing. In general, spell timing accounts for 10-13 percent of the total losses related to unemployment.

[Table 4 – about here]

We find that on average, the timing effect contributes meaningfully to savings losses, comprising approximately 12 percent for men and 11 percent for women. The highest earning men, however, lose more as a result of ill-timed unemployment than any other group. More than 13 percent of all their retirement savings losses are the result of the timing of their unemployment spells. The effects for women are varied across quartiles, however, the highest quartile women lose the most as a result of the timing of unemployment. This is the case despite the brevity of their unemployment durations. In general we find that for the highest earning men and women, the timing of unemployment has the largest effect on their overall losses compared to workers in the other income quartiles.

During the period covered by our data, 1980-2002, important changes in the demographics of the labor force occurred, especially changes in the labor force participation of women. From January 1980 to December 2002 the female labor force

participation rate for women over 20 years old, increased from 51.3 percent to 60.6 percent. Table 5 illustrates the cohort effect experienced by women in our sample. These new economic opportunities also created new retirement savings opportunities. In general, the younger women cohort earned more than the older women cohort and had more retirement savings as a result.

[Table 5 – about here]

In every case women who were 26-30 years old in 1980 (young cohort) outperformed the older cohort, those 42-46 in 1980. Their unemployment experiences are identical (by construct) so we can attribute all of the differences to earnings. By contrast men in these cohorts, saw a small reduction in labor force participation during this time, declining from 79.7 to 75.9 percent participation from January 1980 to December 2002. We also see that the older cohort has more retirement income than the younger cohort. In general, women have less retirement income than men. The estimated gender ratio in retirement income by quartile is much higher for the younger cohort relative to the older cohort. However, despite this narrowing gap, younger women in our model accrue, 73 cents for every dollar of that men accrue in retirement savings.

Finally, Table 6 decomposes our retirement savings effects into three components accrued timing losses, unemployment losses, and total losses. Timing losses as discussed previously represent only that component of retirement losses attributed to the differential return related to market timing. That we find such large effects for the timing effect is somewhat surprising. However, the largest impact on retirement savings is due to diminished accrual from spells of unemployment. In all cases, nearly 90 percent of the total loss in retirement savings were related to unemployment. These effects are large; for low income men and women losses were $20,746 and $14,126 respectively. While higher earnings workers had larger dollar losses they were much lower in percentage terms.

[Table 6 – about here]

5.0 Conclusions

Our simulations of retirement savings find that lower income workers' unemployment experiences and timing of unemployment spells result in considerable savings losses relative to a baseline case of no unemployment. Lower income workers experience the largest percentage declines of retirement savings ranging from 8.0 and 7.2 percent for men and women in the lowest quartile of earnings, while workers in the highest quartile of earnings experienced losses of 4.5 percent (men) and 3.0 percent (women). Equally important we find that the timing of unemployment spells amplified income losses by forcing workers out of the labor market during periods of high expected equity returns. In the absence of these timing effects, retirement savings losses would have been 10-13 percent smaller.

We believe our estimates understate the true retirement savings losses associated with unemployment. In our simulations we assume that workers in all quartiles of earnings

have equal facility in managing their retirement portfolio, that workers experiencing unemployment do not "raid" their retirement savings, that spells of unemployment cannot exceed 26 weeks, and finally, once an unemployment spell ends a worker is re-employed at their previous wage. All of these assumptions are likely to result in an understatement of retirement income losses; this is especially true for the lowest earning workers who experience more unemployment.

Our model has a number of shortcomings, the effects of which are unclear, *ex ante*. First, we do not allow for inter-quartile mobility during the life cycle. Allowing mobility would, by definition, eliminate some of the inter-quartile disparities in losses. While this would spread the losses more evenly across the quartiles, it would not change their magnitude taken as an average across worker-types. We also assume that while unemployment probabilities are a function of earnings quartiles, unemployment durations are not. If higher income workers experience longer but less frequent spells of unemployment some of the disparities in our results would be diminished. If however, higher income workers experience shorter durations, the savings disparities would increase. Finally, we do not allow workers to alter their portfolios in order to diversify away some of their employment income risk. However, it is unclear that allowing workers with risky income streams to balance their portfolio with less risky assets would raise overall retirement savings.

This research has a number of important policy implications. The increasing prominence of defined contribution plans and continued debate about privatizing Social Security impose new risks on workers. It is true that unemployment-risk exists in both defined benefit plans and with Social Security but both have mechanisms that protect vested workers' retirement savings. For DB plans, once a person is fully vested, benefits are more or less guaranteed. In the case of Social Security, only a subset of quarters of earnings are used in calculating benefits, and the benefit formula is strongly progressive. This has the effect of compensating for lower earnings and not counting many periods of zero income (like unemployment). Of particular note, the Social Security Administration allows workers to drop the lowest five years of earnings from their lifetime earnings before calculating benefits. Our results show that all worker types are unemployed for periods which are much less than this provided allowance. No such assurances are available in DC plans; our research implies that workers in the lowest earnings quartiles are likely to need these types of consideration the most.

References:

Baumol, W.J., A.S. Blinder, E.N. Wolff. (2003). Downsizing in America: reality, Causes, and Consequences. New York: Russell Sage Foundation.

Burtless, G., 1998, Financial Market Risks of Individual Accounts: The Twentieth Century Record, unpublished manuscript, Washington, D.C.: Brookings Institution.

Madrian, B.C. and L.J. Lefgren. (2000). An Approach to Longitudinally Matching the Current Population Survey. Journal of Economic and Social Measurement 26: 31-62.

Schmitt, J. (2004). Job Displacement Over the Business Cycle, 1991-2001. Washington DC: CEPR Working Paper.

Farber, H.S. (2003) Job Loss in the United States, 1981-2001. Industrial Relations Section, Princeton University: Working Paper No. 471

Gomes, F. and A. Michaelides. (2003). Portfolio Choice with Internal Habit Formation: A Life-Cycle Model with Uninsurable Labor Income Risk. London Business School, London, UK: unpublished manuscript

Campbell, J.Y., J.F. Cocco, F.J. Gomes, and P.J. Maenhout. (1999). Investing Retirement Wealth? A Life-Cycle Model. Harvard Institute of Economic Research Discussion Paper No. 1896, Cambridge, MA: Harvard University.

Brown, J.R. (1999). Are the Elderly Really Over-Annuitized? New Evidence on Life Insurance and Bequests. NBER Working Papers 7193, National Bureau of Economic Research.

Hurd, M.D. (1989). Mortality Risk and Bequests. Econometrica 57(4): 779-813

Silvapulle, P. and M. J. Silvapulle. (1997). Business cycle asymmetry and the stock market. School of Business discussion paper A97.22. Bundoora, La Trobe University School of Business.

Conference Board (2004). Methodology (Leads and Lags)

http://www.tcb-indicators.org/US/Data/component_description.cfm

Table 1: Average Loss in Retirement Accumulation by Earnings Quartile & Gender
Contributions Fixed at $333 per month (nominal)

		Avg Monthly Contribution	Dollar Loss	Percentage Loss	Unemployment Over Career
Male	Quartile 1	*constant*	$50,784	8.0%	7.3%
	Quartile 2	*"*	$40,160	6.4%	5.6%
	Quartile 3		$34,585	5.5%	4.8%
	Quartile 4		$28,995	4.6%	4.1%
Female	Quartile 1	*constant*	$45,715	7.2%	6.6%
	Quartile 2	*"*	$33,955	5.4%	4.8%
	Quartile 3		$27,342	4.3%	3.8%
	Quartile 4		$19,085	3.0%	2.8%

Dollar losses amplified to show 40 year career equivalents

Table 2: Average Loss in Retirement Accumulation by Earnings Quartile & Gender
Proportional Contributions at 10% of Observed Earnings

		Avg Monthly Contribution	Avg Dollar Loss	Percentage Loss	Unemployment Over Career
Male	Quartile 1	$140.23	$20,746	8.0%	7.4%
	Quartile 2	$222.64	$25,377	6.3%	5.6%
	Quartile 3	$309.00	$29,776	5.4%	4.8%
	Quartile 4	$462.18	$35,752	4.5%	4.1%
Female	Quartile 1	$106.26	$14,126	7.2%	6.6%
	Quartile 2	$159.32	$15,336	5.3%	4.8%
	Quartile 3	$226.27	$17,078	4.3%	3.8%
	Quartile 4	$350.99	$17,878	3.0%	2.8%

Dollar losses amplified to show 40 year career equivalents
Earnings from Young-Worker Cohort age: 26 - 48
Year 2000 Dollars

Table 3: Average Loss in Retirement Accumulation by Earnings Quartile & Gender
Proportional Contributions at 10% of Observed Earnings

		Avg Monthly Contribution	Avg Dollar Loss	Percentage Loss	Unemployment Over Career†
Male	Quartile 1	$134.48	$21,685	8.0%	7.4%
	Quartile 2	$221.73	$28,274	6.3%	5.6%
	Quartile 3	$316.02	$33,199	5.5%	4.8%
	Quartile 4	$505.59	$42,523	4.6%	4.1%
Female	Quartile 1	$99.81	$13,664	7.2%	6.6%
	Quartile 2	$143.55	$14,357	5.4%	4.8%
	Quartile 3	$199.03	$15,836	4.3%	3.8%
	Quartile 4	$319.43	$17,145	3.0%	2.8%

Dollar losses amplified to show 40 year career equivalents
Earnings from Older-Worker Cohort age: 42 - 64
† Unemployment periods for young and old workers are equivalent by construction
Year 2000 Dollars

Table 4: Unemployment Spells, Marginal Investment Losses During Unemployment Spells

		Number of Months	In-Spell Marginal Loss	Marginal Timing Effect†	Timing effect as % of Total Loss
Male	Quartile 1	35.4	$193.70	$2,282.15	11.0%
	Quartile 2	27.0	$243.45	$2,868.30	11.3%
	Quartile 3	23.1	$296.86	$3,497.57	11.7%
	Quartile 4	19.6	$403.92	$4,758.94	13.3%
Female	Quartile 1	31.8	$129.16	$1,521.75	10.8%
	Quartile 2	23.0	$134.42	$1,583.72	10.3%
	Quartile 3	18.2	$147.40	$1,736.65	10.2%
	Quartile 4	13.4	$173.94	$2,049.34	11.5%

Results based on 40 year working career, all worker age-cohorts
† Assumes mid-career in-spell loss would receive average return (20 years at 1.03% per month)
Timing effect calculates average impact of timing of spells of unemployment on total returns
Year 2000 dollars

Table 5: Total Savings and Dollar Losses from Unemployment by Gender, Earnings Quartile & Cohort

		Younger		Older	
		Total Savings	Losses	Total Savings	Losses
Male	Quartile 1	$260,036	$20,746	$271,542	$21,685
	Quartile 2	$404,434	$25,377	$445,310	$28,274
	Quartile 3	$551,085	$29,776	$608,595	$33,199
	Quartile 4	$793,163	$35,752	$931,870	$42,523
Female	Quartile 1	$196,200	$14,126	$189,637	$13,664
	Quartile 2	$287,249	$15,336	$268,290	$14,357
	Quartile 3	$398,432	$17,078	$368,165	$15,836
	Quartile 4	$599,709	$17,878	$571,997	$17,145

	Female/Male Savings Ratio	
	Younger	Older
Quartile 1	75.5%	69.8%
Quartile 2	71.0%	60.2%
Quartile 3	72.3%	60.5%
Quartile 4	75.6%	61.4%

Dollar losses amplified to show 40 year career equivalents
Younger workers were aged 26-30 in 1980
Older workers were aged 42-46 in 1980
Hazards constant across cohorts, contributions proportional to income
Year 2000 Dollars

Table 6: Decomposition of Total Loss Effects, Younger Workers

		Accruals & Returns		Total	Unemployment as a Percent
		Timing	Unemployment	Losses	of Total Loss
Male	Quartile 1	$2,282	$18,464	$20,746	89.0%
	Quartile 2	$2,868	$22,509	$25,377	88.7%
	Quartile 3	$3,498	$26,278	$29,776	88.3%
	Quartile 4	$4,759	$30,993	$35,752	86.7%
Female	Quartile 1	$1,522	$12,604	$14,126	89.2%
	Quartile 2	$1,584	$13,752	$15,336	89.7%
	Quartile 3	$1,737	$15,341	$17,078	89.8%
	Quartile 4	$2,049	$15,828	$17,878	88.5%

Younger workers were aged 26-30 in 1980
Hazards constant across cohorts, contributions proportional to income