

# **An Investigation of the Impact on Retirement Benefits from Changing the Defined Benefit US Social Security System to the Defined Contribution Australian Superannuation System: Data from 1980 through 2010**

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## **ABSTRACT**

*The goal of this paper is to compare the value of the assets retiring employees would have if they retired in January 2011 under the current Defined Benefit US Social Security System with the wealth generated under the Defined Contribution Australian Superannuation System. We compare the 80<sup>th</sup>, 50<sup>th</sup> and 20<sup>th</sup> percentiles of income as both systems are a function of an employee's earnings. This paper adds to the literature by incorporating a complete business cycle. Similar work done at either the peak or near the recent bottom of the stock market may provide distorted outcomes.*

## **LITERATURE REVIEW**

The Social Security System is a Defined Benefit plan. Retirees earn some dollar value of retirement benefit based on their final salary and the number of quarters of credit that they have earned. The Australian Superannuation system is essentially a Defined Contribution plan. In the Australian system, only the employer makes deposits into an account but the employee can direct these payments to be invested into six different assets.

“Superannuation” has historically been defined as a lump-sum retirement payout (Scheiwe 1999). Defined Benefit Plans (DB) differ from Defined Contribution (DC) plans in that the employee's benefit is known upfront and payable for life. Total benefits from a DC are dependent on the aggregate account balance at retirement and the timing of withdrawals (Todd 1997).

Concerns over future funding shortfalls have led some countries to shift emphasis away from their traditional DB plans (Salisbury 2001). Australia, for example, has made significant efforts to move towards a DC plan that represents their citizen's primary savings vehicle (Cameron 2001). In the United States, social security represents the main method of saving for retirement and is equivalent to a DB plan, except that it is managed by the Federal government, not by an employer. No major revisions to the Social Security retirement system have been made in recent years even though a funding shortfall is all but given (Feldstein and Samwick 2002; Palley 2002). Periodically, especially after increases in stock prices, there are calls to privatize Social Security. President Bush advocated such changes to the system, although the details of his administration's proposal were not released.

Historically, valuing the benefits to retirees under these two systems has been hampered by the time period used to value the assets. Valuations at the height of stock market's "irrational exuberance" may unfairly benefit the defined contribution plan. Valuations made at the bottom of the stock market cycle, and when interest rates are at historic lows, may unfairly benefit the defined contribution plan. We have valued these assets over a thirty year period that ends in December of 2010, a time that incorporates more than one full stock market cycle. However, interest rates are still near this period's low range.

## **WHAT IS SUPERANNUATION?**

The beginning of the Australian Social Security System can be traced back to the Pensions Act of 1909. However, this system, along with many others throughout the world has grown in size and complexity. Many new avenues have been created by which people can fund their future. One such system of funding, superannuation, has become a major element in Australia's social welfare system. The genesis of Australia's retirement system took on a "twin-pillar" income policy approach. A "flexible and sustainable" retirement system was to be achieved by utilizing a means-tested Age Pension that was to be funded out of general revenue. The second part was to be based on individual private savings; it was from this leg that superannuation was to emerge (Kelly et al, 1-2).

Superannuation is a government-regulated system that entices individual workers to save through specially regulated funds for their own retirement. "Superannuation is like a long-term savings account" (Smith 1). The funds created by superannuation are solely for the employee's retirement, but by law, employers are required to contribute while the employer employs the individual. For the employee, investing extra income into the funds is strictly optional. Superannuation is one of the most important and largest assets in any working Australian's portfolio and is "one of the best ways to save tax effectively during your working life for your retirement" (Smith 8).

The system of compulsory superannuation was created in 1985 and 1986 when the Australian Council of Trade Unions (ACTU) received a "3 percent employer-provided superannuation benefit to be incorporated in employment awards in lieu of a general wage increase" (Feldstein 66). In 1991, the government became involved in expanding compulsory superannuation with the establishment of the Superannuation Guarantee Charge (SGC), which showed an increase of the employer contribution rate from 3% to 9% by 2001. Participation in this system is "mandatory in that employers are required to make contributions for all their employees, subject to some exemptions for part-time and casual workers who do not generate sufficient balances" (Feldstein 85). However, employee contributions are voluntary. The benefits from the fund/plan cannot be paid out until the individual is fifty-five, unless there are cases of severe hardship, and sometimes voluntary contributions may be withdrawn when changing employers.

A major advantage of superannuation over many other investment choices is the tax savings offered. The contributions made by the employee to the fund are made after tax income. However, when the retirement benefits are paid out to the individual at retirement the amount is not taxed again. Employer payments are taxed 15% upon contribution to the fund. The contributions are tax deductible for the employer. The earnings from the fund made on contributions are taxed an additional 15% each year. The payments made from the fund to the

retiree upon retirement are taxed as normal personal income with a 15% rebate if they are taken as annuities. Lump sum payments are taxed at 15%.

## **METHODOLOGY**

We gathered data on income levels for the 20<sup>th</sup>, 50<sup>th</sup> and 80<sup>th</sup> percentiles of the population, life expectancies, interest rates on Treasury Inflation Protected Securities, and the returns to the 6 asset classes over the last 30 years. Because stock prices and interest rates rise and fall, the values of assets change from one time to another. Assets valued at the peak of the market in 1998 for instance, would likely result in a different conclusion from those valued these at the bottom of the market in 2002. We used 30 years of monthly data ending in December 2010 and incorporated both the bottom and top of the markets, which we contend will produce a more thorough test of the two systems.

This study explores the values of both types of plans. However, calculating the value of the two systems requires separate techniques. The value of social security benefits is figured from future payments, while the value of the superannuation benefits is based on past earnings and contributions.

The first step in the process is to compute a common timeline of cash flows or benefits to value. For the advantage of simplicity, both systems will be based on average retirement age and life expectancy. The universal retirement age of 65 years and four months will be used for both valuations. Our example retiree will reach this age in January 2011. The retiree's life expectancy was assumed to be 17 years after the retirement age of 65.3 years. Again, this is for the sake of simplicity and ease of comparison in the model. The National Center for Health Statistics calculated the life expectancy of a 65 year old to be 17.4 years (National Center for Health Statistics, 1994).

The major comparison between the two systems will be expressed across a spectrum of percentile rankings. The three spectrums will be the 20<sup>th</sup> percentile of aggregate income received by each household, the fiftieth (median) and the 80<sup>th</sup> percentile.

### ***Valuation of the Current Social Security System***

We value the present value (as of January 2010) of the projected social security benefits. Several assumptions must be made in the process. The worker is assumed to have stayed at the same income percentile for the thirty year period of study. So each worker is assumed to have started and stayed at their respective income levels for the period of this study. Table 1 provides the nominal incomes for each of these levels from 1980 through 2010. Since we use a real discount rate, the effects of inflation and cost of living adjustments (COLA) can be ignored for calculating the present value of the Social Security retirement benefit. Again, the full retirement age of 65.3 years will be achieved in January 2011. We assume that they will continue for 17 years. Finally, the discount rate for all payments will be the Treasury Inflation Protection Securities yield-to-maturity in January 2011. (Technically, the growth in the value of the social security benefit is tied to the growth in wages rather than the growth in the general price level, and this assumption boils down to assuming that wage growth equals inflation over the 17 year retirement period. If we allowed for the value of the benefit to increase, it would increase the present value of the social security benefit).

## *Valuation of Superannuation Benefits*

Several assumptions will be made for the reasons of simplicity. First, the worker is assumed to have stayed at the same income percentile for the twenty-five year period of study. The average retirement age of 65.3 years will be reached in January 2010. The first payment to the fund was made in 1980. Over the life of the contributions, the compulsory employer contribution rate is 7% of gross income of the employee, with an increase to 9% from January 2001 as mandated by law. No voluntary contributions are made over the life. The contributions are taxed at a fixed rate of 15%. We did not tax the earnings of the account for this calculation, however. (It would reduce the value of the account. We will adjust this assumption in the next edition of the paper).

**Table 1**  
*Historical Incomes Percentile*

<b>Year</b>	<b>20<sup>th</sup></b>	<b>median</b>	<b>80<sup>th</sup></b>
1980	7556	17710	31700
1981	8160	19074	34600
1982	8520	20171	36670
1983	9000	20885	38898
1984	9600	22415	41600
1985	10000	23618	43809
1986	10358	24897	43120
1987	10800	26061	48363
1988	11382	27225	50593
1989	12096	28906	53710
1990	12500	29943	55205
1991	12588	30126	56760
1992	12600	30636	58007
1993	12967	31241	60300
1994	13426	32264	62841
1995	14400	34076	65124
1996	14768	35492	68015
1997	15400	37005	71500
1998	16116	38885	75000
1999	17136	40696	79232
2000	17920	41990	81766
2001	17970	42228	83500
2002	17916	42409	54016
2003	17984	43318	86867
2004*	17984	43318	86867

\* 2004 numbers have not been released, continuing to use 2003 values  
20<sup>th</sup> and 80<sup>th</sup> percentile numbers are from Table H-1 at  
<http://www.census.gov/hhes/income/histinc/h01ar.html>  
Median incomes are from table H-6, regions,--all races  
<http://www.census.gov/hhes/income/histinc/h06ar.html>



**Table 5**  
**Returns of the Superannuation Portfolios by Income Percentiles**

<b>C&amp;D</b>	<b>L&amp;P</b>	<b>IBS</b>	<b>E in U&amp;T</b>	<b>Dir Property</b>	<b>Overseas</b>	<b>Average</b>	<b>Equal</b>
\$41,749.4	\$41,236.1	\$38,241.1	\$100,852.	\$76,097.6	\$51,973.1	\$70,577.3	\$58,358.3
8	3	7	79	7	0	1	9
\$90,587.6	\$89,397.2	\$82,712.1	\$225,605.	\$168,384.	\$115,043.	\$156,658.	\$128,621.
4	1	5	39	92	30	40	77
\$171,244.	\$169,078.	\$156,655.	\$420,495.	\$315,087.	\$216,465.	\$293,233.	\$241,504.
21	38	01	04	42	20	50	21

## **RESULTS, IMPLICATIONS, AND FUTURE RESEARCH**

The present values of the social security benefits for the 20<sup>th</sup>, 50<sup>th</sup> and 80<sup>th</sup> percentile workers are \$120,715, \$204,112, and \$285,232 respectively. These retirees would have been worse off in nearly every situation had they switched to the Australian Superannuation system in 1980 (at the age of 40). Only four of the twenty-four total portfolios had higher values than social security.

The retiree consistently in the 80<sup>th</sup> percentile of earnings in his or her last 30 years of employment would have been better off in three of the eight portfolios than in the US Social Security System. A retiree invested entirely in the S&P 500 (equities in units and trusts), Direct Property, or the average portfolio would have been better off than being in the US Social Security System with portfolios valued at \$420,495, \$315,087, and \$293,234 respectively. This compares to social security's present value of \$285,232. Median earning retirees were better off in only one of the eight portfolios provided. Retirees invested entirely in the S&P 500 (equities in units and trusts) would have a portfolio valued at \$225,605, compared to the present value of the annuity promised by social security of \$204,112.

All other portfolios in all income classes were worse off. In eight of the twenty-four total portfolios the investor had less than half of the value of their social security annuity. If the retiree lived longer than the 17 year life expectancy assumed in this paper, the present value of the social security annuity would be even greater.

Other factors to consider, however, include the ownership of the portfolio. The value of the social security annuity is not transferable to another person upon death. If the retiree dies before retirement age or before the end of their 17 year life expectancy, the value of the annuity is retained by the social security system. In the superannuation system, the value of the assets is transferable to the survivors/beneficiaries of the retiree.

The recent advocates for changing the current US Social Security System have assured workers over 55 years old that their benefits would be unaffected. Those under 55 may find that they will face a different system than is currently in place. This research shows that a 50 year old worker, with 30 years of employment ahead when our hypothetical system changed, was better off in the Social Security system than the Superannuation System. The less time the workers have to adjust to any changes in the system the greater the potential disparity of the retiree's wealth positions at retirement.

We intend to submit a version of this paper to a journal after this conference. We will also extend the research to take into account the changes that are proposed to the current system

and will modify our assumptions to project the benefits workers in their 20s and 30s would receive under the proposed systems.

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## APPENDIX

### RETURNS CALCULATIONS

#### *C&D- Cash and Deposits*

<b>Month</b>	<b>Pd.</b>	<b>Gross Annual Income</b>	<b>Monthly Cont. after tax</b>	<b>Ret. on C&amp;D</b>	<b>Cash and Deposits only</b>
January	300	7,556	37.47	13.48%	\$40.06
February	299	7,556	37.47	14.58%	\$40.28
March	298	7,556	37.47	17.74%	\$40.91
April	297	7,556	37.47	15.80%	\$40.52
May	296	7,556	37.47	9.78%	\$39.33
June	295	7,556	37.47	8.33%	\$39.05
July	294	7,556	37.47	8.73%	\$80.97
August	293	7,556	37.47	10.29%	\$81.83
September	292	7,556	37.47	11.73%	\$83.09
October	291	7,556	37.47	12.99%	\$83.19
November	290	7,556	37.47	15.36%	\$82.89
December	289	7,556	37.47	17.10%	\$83.30

Six month certificate of Deposit rates were downloaded from the Federal Reserve of St. Louis data base (FRED). Each deposit was invested at that rate for six months. When it matured, the new deposit was added and invested at the new six month rate. The final value of this portfolio was the sum of the current values of the last six months of investments.

#### *Dir. Property – Direct Property*

<b>Month</b>	<b>Pd.</b>	<b>Gross Annual Income</b>	<b>Monthly Cont. after tax</b>	<b>Ret. on DP</b>	<b>Direct Property Only</b>
January	300	7,556	37.47	12.88%	\$125.81
February	299	7,556	37.47	13.04%	\$127.63
March	298	7,556	37.47	15.28%	\$155.33
April	297	7,556	37.47	16.33%	\$169.96
May	296	7,556	37.47	14.26%	\$142.12
June	295	7,556	37.47	12.71%	\$123.95
July	294	7,556	37.47	12.19%	\$118.38
August	293	7,556	37.47	12.56%	\$122.31
September	292	7,556	37.47	13.20%	\$129.42
October	291	7,556	37.47	13.79%	\$136.38
November	290	7,556	37.47	14.21%	\$141.41
December	289	7,556	37.47	14.79%	\$148.82

Thirty Year mortgage rates were downloaded from the Federal Reserve of St. Louis data base (FRED). Each deposit was invested at that rate for 10 years.

When it matured, the new deposit was added and invested at the new 10 year rate. The final value of this portfolio was the sum of the current values of the last 10 years of investments. We assumed that the mortgages in the early period were refinanced. This rate peaked in October 1981 at 18.45%. We felt that it was unlikely that these loans would not have been refinanced, and that the investor would not actually be able to earn these rates for the entire initial life of the mortgage.

*L&P – Loan and Placements*

<b>Month</b>	<b>Pd.</b>	<b>Gross Annual Income</b>	<b>Monthly Cont. tax</b>	<b>after Ret. on L&amp;P</b>	<b>Loan and Placements only</b>
January	300	7,556	37.47	12.06%	\$41.98
February	299	7,556	37.47	13.92%	\$42.68
March	298	7,556	37.47	15.82%	\$43.39
April	297	7,556	37.47	13.30%	\$42.45
May	296	7,556	37.47	9.39%	\$40.98
June	295	7,556	37.47	8.16%	\$40.52
July	294	7,556	37.47	8.65%	\$40.71
August	293	7,556	37.47	10.24%	\$41.30
September	292	7,556	37.47	11.52%	\$41.78
October	291	7,556	37.47	12.49%	\$42.14
November	290	7,556	37.47	14.15%	\$42.77
December	289	7,556	37.47	14.88%	\$43.04
January	288	8,160	40.46	14.08%	\$94.05
February	287	8,160	40.46	14.57%	\$95.25
March	286	8,160	40.46	13.71%	\$95.35
April	285	8,160	40.46	14.32%	\$94.78
May	284	8,160	40.46	16.20%	\$94.64
June	283	8,160	40.46	14.86%	\$93.02
July	282	8,160	40.46	15.72%	\$93.93
August	281	8,160	40.46	16.72%	\$95.43
September	280	8,160	40.46	16.52%	\$95.83
October	279	8,160	40.46	15.38%	\$95.31
November	278	8,160	40.46	12.41%	\$93.55
December	277	8,160	40.46	12.85%	\$94.23

One Year US T-Bill rates were downloaded from the Federal Reserve of St. Louis data base (FRED). Each deposit was invested at that rate for 12 months. When it matured, the new deposit was added and invested at the new 12 month rate. The final value of this portfolio was the sum of the current values of the last 12 months of investments.

**IBS- Interest Bearing Securities**

<b>Month</b>	<b>Pd.</b>	<b>Gross Annual Income</b>	<b>Monthly Cont. after tax</b>	<b>Ret. on IBS</b>	<b>Interest Bearing Securities Only</b>
January	300	7,556	37.47	12.00%	\$38.59
February	299	7,556	37.47	12.86%	\$38.67
March	298	7,556	37.47	15.20%	\$38.89
April	297	7,556	37.47	13.20%	\$78.56
May	296	7,556	37.47	8.58%	\$77.77
June	295	7,556	37.47	7.07%	\$77.70
July	294	7,556	37.47	8.06%	\$118.37
August	293	7,556	37.47	9.13%	\$117.86
September	292	7,556	37.47	10.27%	\$118.13
October	291	7,556	37.47	11.62%	\$160.36
November	290	7,556	37.47	13.73%	\$160.66
December	289	7,556	37.47	15.49%	\$161.62
January	288	8,160	40.46	15.02%	\$208.36
February	287	8,160	40.46	14.79%	\$208.56
March	286	8,160	40.46	13.36%	\$208.83
April	285	8,160	40.46	13.69%	\$257.34
May	284	8,160	40.46	16.30%	\$259.16
June	283	8,160	40.46	14.73%	\$258.47
July	282	8,160	40.46	14.95%	\$308.93
August	281	8,160	40.46	15.51%	\$311.24
September	280	8,160	40.46	16.52%	\$311.27
October	279	8,160	40.46	15.38%	\$362.82
November	278	8,160	40.46	12.41%	\$362.61
December	277	8,160	40.46	12.85%	\$363.03
January	276	8,520	42.25	14.32%	\$419.57
February	275	8,520	42.25	14.73%	\$419.77
March	274	8,520	42.25	13.95%	\$419.41
April	273	8,520	42.25	13.98%	\$477.95
May	272	8,520	42.25	13.34%	\$477.42
June	271	8,520	42.25	14.07%	\$477.89
July	270	8,520	42.25	13.24%	\$537.42
August	269	8,520	42.25	11.43%	\$534.51
September	268	8,520	42.25	10.85%	\$534.25
October	267	8,520	42.25	9.32%	\$593.17
November	266	8,520	42.25	9.16%	\$589.97
December	265	8,520	42.25	8.91%	\$589.33

Three month T-bill rates were downloaded from the Federal Reserve of St. Louis data base (FRED). Each deposit was invested at that rate for 3 months. When it matured, the new deposit was added and invested at the new 3 month

rate. The final value of this portfolio was the sum of the current values of the last 3 months of investments.

*E in U&T – Return on the S&P 500*

<b>Month</b>	<b>Pd.</b>	<b>Gross Annual Income</b>	<b>Monthly Cont. after tax</b>	<b>Ret. on U&amp;T</b>	<b>Equities and only</b>	<b>Units Trusts</b>
January	300	7,556	37.47	6.22%	\$39.80	
February	299	7,556	37.47	-0.01%	\$77.25	
March	298	7,556	37.47	-9.72%	\$103.57	
April	297	7,556	37.47	4.62%	\$147.55	
May	296	7,556	37.47	5.15%	\$194.54	
June	295	7,556	37.47	3.16%	\$239.34	
July	294	7,556	37.47	6.96%	\$296.07	
August	293	7,556	37.47	1.01%	\$336.90	
September	292	7,556	37.47	2.94%	\$385.37	
October	291	7,556	37.47	2.03%	\$431.42	
November	290	7,556	37.47	10.65%	\$518.83	
December	289	7,556	37.47	-3.02%	\$539.49	

Monthly Returns were downloaded from [http://www.hedgefund.net/bench\\_numbers.php3?cgiid=10000](http://www.hedgefund.net/bench_numbers.php3?cgiid=10000). Each deposit was invested at that rate for 1 month. Each new deposit was added and invested for the next month. The final value of this portfolio was the last value.

*All Overseas – Return on the Morgan Stanley EAFE Index*

<b>Month</b>	<b>Pd.</b>	<b>Gross Annual Income</b>	<b>Monthly Cont. after tax</b>	<b>Ret. on O/S</b>	<b>Overseas Only</b>
January	300	7,556	37.47	4.47%	\$39.14
February	299	7,556	37.47	-0.77%	\$76.02
March	298	7,556	37.47	-10.98%	\$101.02
April	297	7,556	37.47	9.03%	\$150.99
May	296	7,556	37.47	4.26%	\$196.48
June	295	7,556	37.47	5.99%	\$247.96
July	294	7,556	37.47	-0.87%	\$282.95
August	293	7,556	37.47	3.09%	\$330.30
September	292	7,556	37.47	3.12%	\$379.23
October	291	7,556	37.47	3.86%	\$432.76
November	290	7,556	37.47	-2.35%	\$459.17
December	289	7,556	37.47	0.16%	\$497.43

Monthly Returns were downloaded from Morgan Stanley. Each deposit was invested at that rate for 1 month. Each new deposit was added and invested for the next month. The final value of this portfolio was the last value.