



Fully Funded Pensions

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Lifetime Income

- Social Security typically replaces ~ 35% of preretirement income
 - January of 2019, SS paid retirement benefits to almost 43.9 million retired workers*
 - Average monthly benefit was \$1,417.03*
- Pensions could replace another 40%
 - Defined Benefit Plans
 - Defined Contribution Plans & IRAs

*Social Security Administration, *Monthly Statistical Snapshot, January 2019* 2 tbl.2 (Feb. 2019), https://www.ssa.gov/policy/docs/quickfacts/stat_snapshot/2019-01.pdf.



Life Expectancy

- 65-year-old man can expect to live to 84
- 65-year-old woman to 86.6
- 65-year-old couple
 - 50% chance that at least one 65-year-old spouse in a nonsmoking heterosexual couple in average health will live 27 years to age 92
 - 25% chance at least one will live 31 years to age 96
 - 10% chance at least one will live 35 years to age 101

*Social Security Administration, *Benefits Planner/Live Expectancy*, <https://www.ssa.gov/planners/lifeexpectancy.html> (last visited Dec. 17, 2019); Society of Actuaries, *Actuaries Longevity Illustrator* (2096), <http://www.longevityillustrator.org/> (last visited Dec. 17, 2019)

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Defined Benefit Plans

- Employer promises employees a specific benefit at retirement.
 - Benefits often tied to years of service (yos) & final average pay (fap)
 - e.g., a worker who retires after 30 years of service with final average pay of \$100,000 would receive a pension of \$60,000 a year for life ($\$60,000 = 2\% \times 30 \text{ yos} \times \$100,000 \text{ fap}$)

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The Model DB Plan

- Each worker
 - will earn a pension benefit (B) equal to **one percent times years of service (yos) times final pay (fp)** ($B = 1\% \times \text{yos} \times \text{fp}$)
 - Starts work at 25, **works from 25–64**
 - **Retires at 65** and collects a pension equal to 40 percent of final pay
 - e.g. final pay = \$100,000; pension = \$40,000 a year
 - **Dies at 85**



Key Assumptions for the Model DB Plan

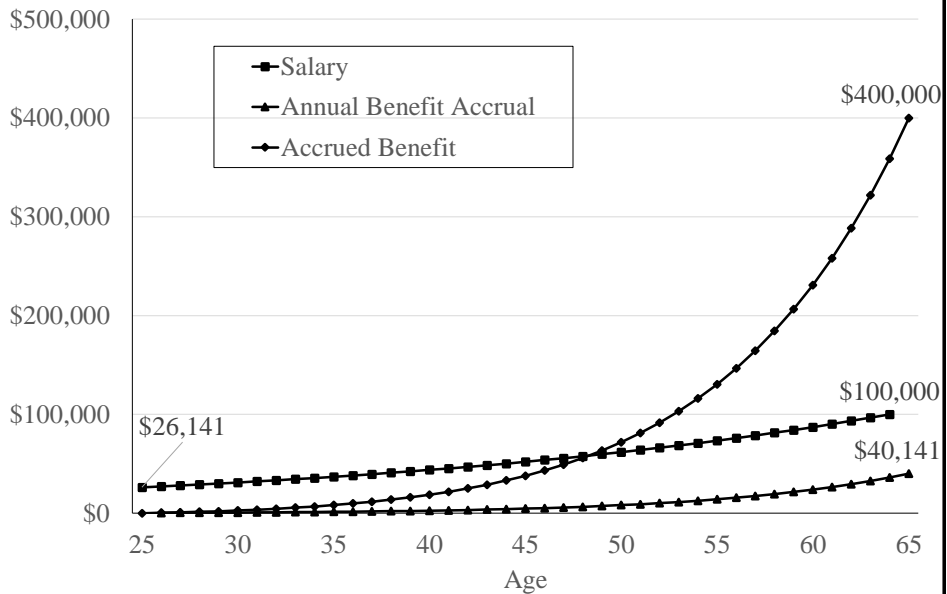
<i>Variable</i>	<i>Model Assumption</i>
<i>Economic Assumptions</i>	
Interest Rate	5.0%
Inflation Rate	2.5%
Salary Growth Rate	3.5%
<i>Worker Assumptions</i>	
Entry Age	25
Retirement Age	65
Career Length	40 years (i.e., 25–64)
Age at Death	85
Length of Retirement	20 years (i.e., 65–84)
Longevity at Entry Age	60 years (i.e., 25–85)
Final Salary at Age 64	\$100,000
<i>Plan Design Assumptions</i>	
Benefit Based On	Final Pay
Benefit Accrual Rate	1.0%
Vesting Period	Immediate
Benefit Form	Single-life Annuity
Annuity Factor	10

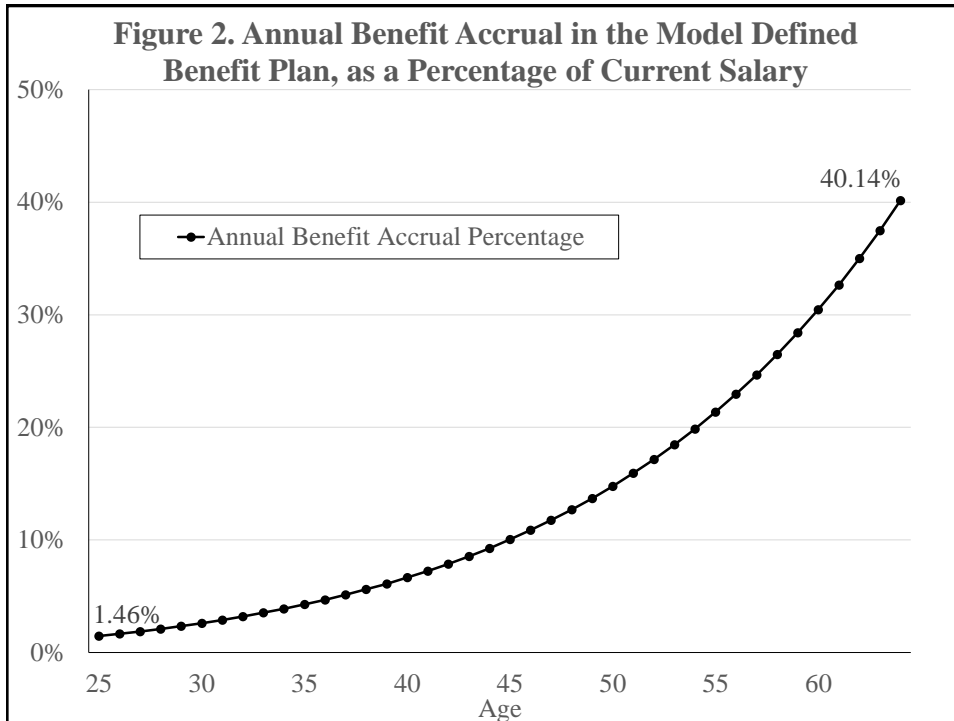



Benefit Accrual in the Model Defined Benefit Plan

Age	Salary	Years of Service	Benefit Factor	Future Annual Pension At Age 65	Accrued Benefit	Annual Benefit Accrual	Benefit Accrual as a Percentage of Salary
25	\$26,141	1	1%	\$0	\$0	\$380	1.46%
34	\$35,628	10	10%	\$3,098	\$6,827	\$1,382	3.88%
44	\$50,257	20	20%	\$9,226	\$33,115	\$4,652	9.26%
54	\$70,892	30	30%	\$19,863	\$116,137	\$15,699	19.86%
64	\$100,000	40	40%	\$37,681	\$358,868	\$40,141	40.14%
65				\$40,000	\$400,000		

Figure 1. Salary, Annual Benefit Accrual, and Accrued Benefit in the Model Defined Benefit Plan







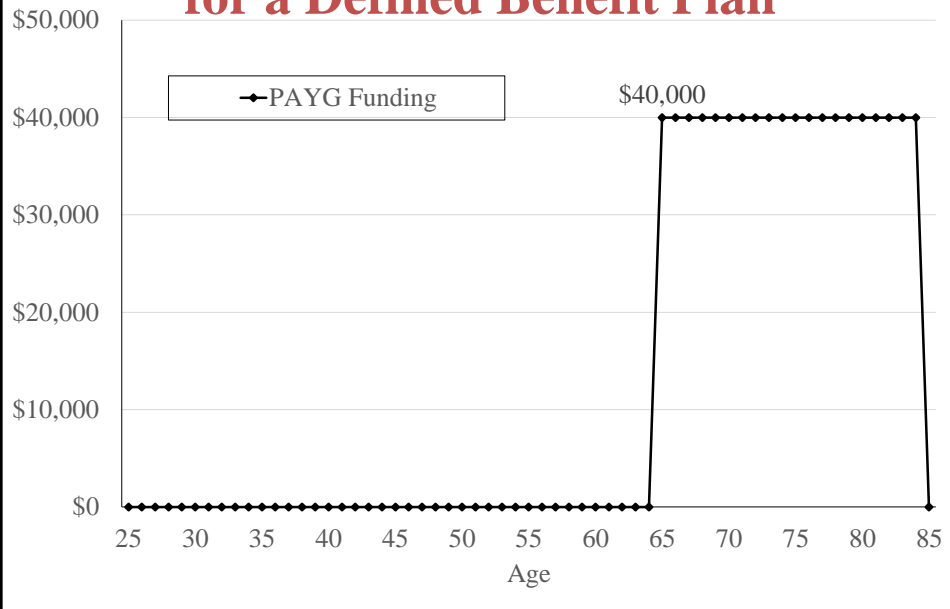
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Defined Benefit Plan Funding Methods

- Over a 40-year career, our hypothetical worker earned the right to a pension that would pay her \$40,000 a year from retirement at age 65 until her death at age 85.
 - Worth around \$400,000 at age 65
- My focus is on funding methods

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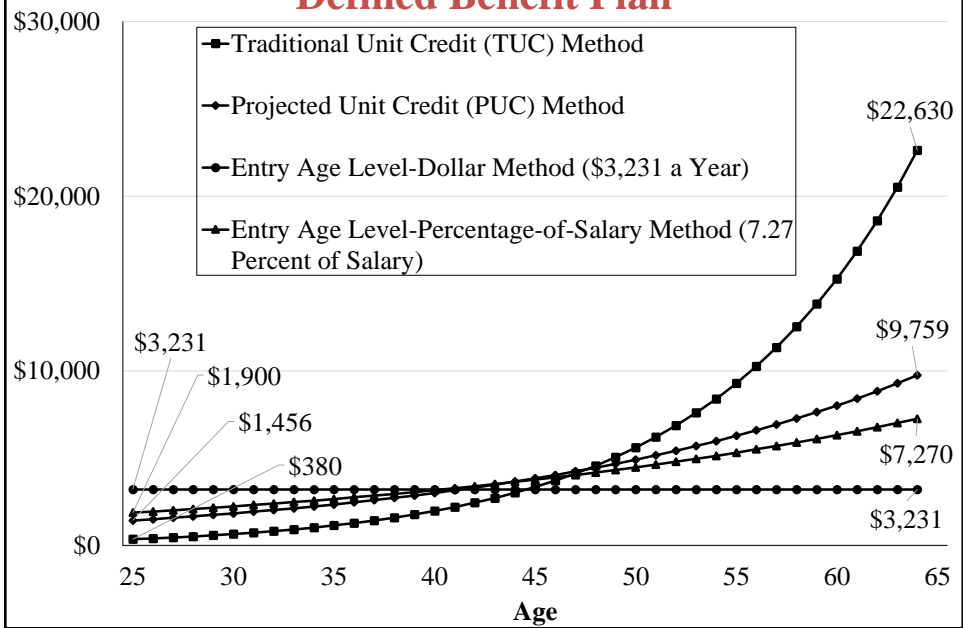
Pay-as-you-go (PAYG) Funding for a Defined Benefit Plan



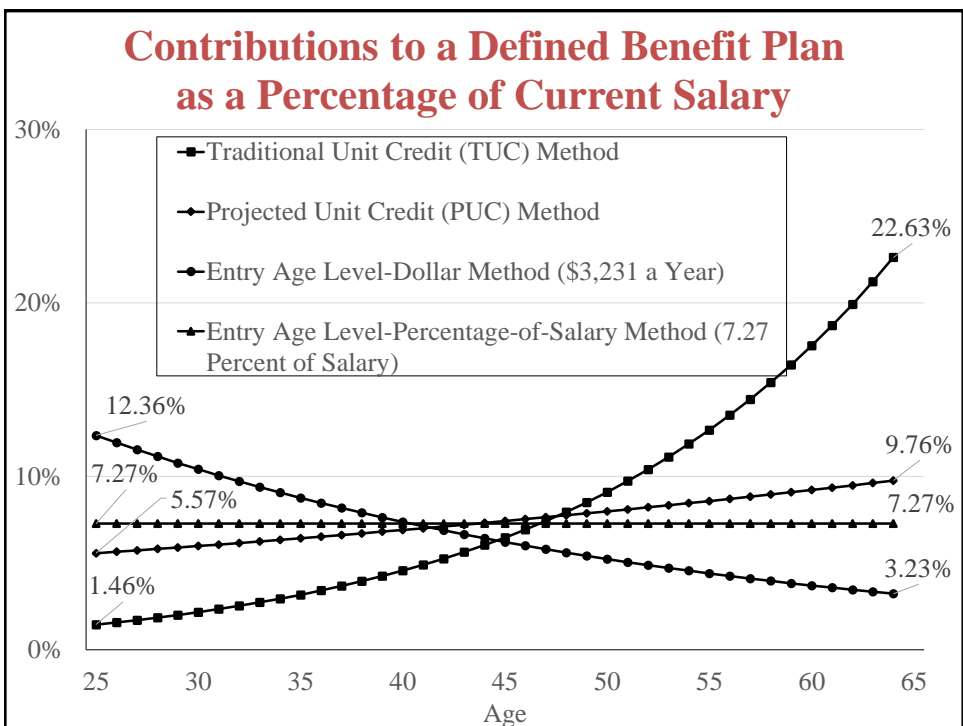
Defined Benefit Plan Prefunding

- Accumulate enough money during each worker's career to pay the promised pension
 - i.e., Σ contributions + interest = \$400,000 by 65
 - To pay for a \$40,000-a-year pension
- Fully prefund:
 - contribute \$56,818.27 at age 25
- Traditional Unit Credit (TUC) method
 - Make contributions to fund the worker's annual accrued benefit
 - e.g., \$380 at 25; \$22,630 at 64

Various Methods for Prefunding a Defined Benefit Plan



Contributions to a Defined Benefit Plan as a Percentage of Current Salary





Other Methods

- Projected Unit Credit (PUC) method
 - Make larger contributions to meet the projected benefit obligation (PBO)
 - e.g., \$1,146 at 25; \$9,759 at 64
- Entry Age Level-Dollar method
 - e.g., \$3,231 every year from 25 through 64
- Entry Age Level-Percentage method
 - e.g., \$1,900 at 25; \$7,270 at 64



Entry Age Normal Cost: Level-percentage-of-salary Method

<i>Age</i>	<i>Salary</i>	<i>Contributions</i>	<i>Value of the Accrued Benefit at the End of the Year</i>	<i>Contributions as a Percentage of Current Salary</i>
25	\$26,141	\$1,900	\$1,947	7.27%
34	\$35,628	\$2,590	\$28,341	7.27%
44	\$50,257	\$3,654	\$86,141	7.27%
54	\$70,892	\$5,154	\$196,707	7.27%
64	\$100,000	\$7,270	\$399,961	7.27%
65	(Annuity ~ \$40,000/year)			



Defined Contribution Plans

- Employer may contribute, say, 5% of pay to an account for the worker
 - E.g., a worker who earned \$100,000 in a given year would have \$5,000 contributed to an individual investment account for her ($\$5,000 = 5\% \times \$100,000$)
 - 401(k) plans are the most popular
 - Individuals can also contribute, up to \$19,500 in 2020

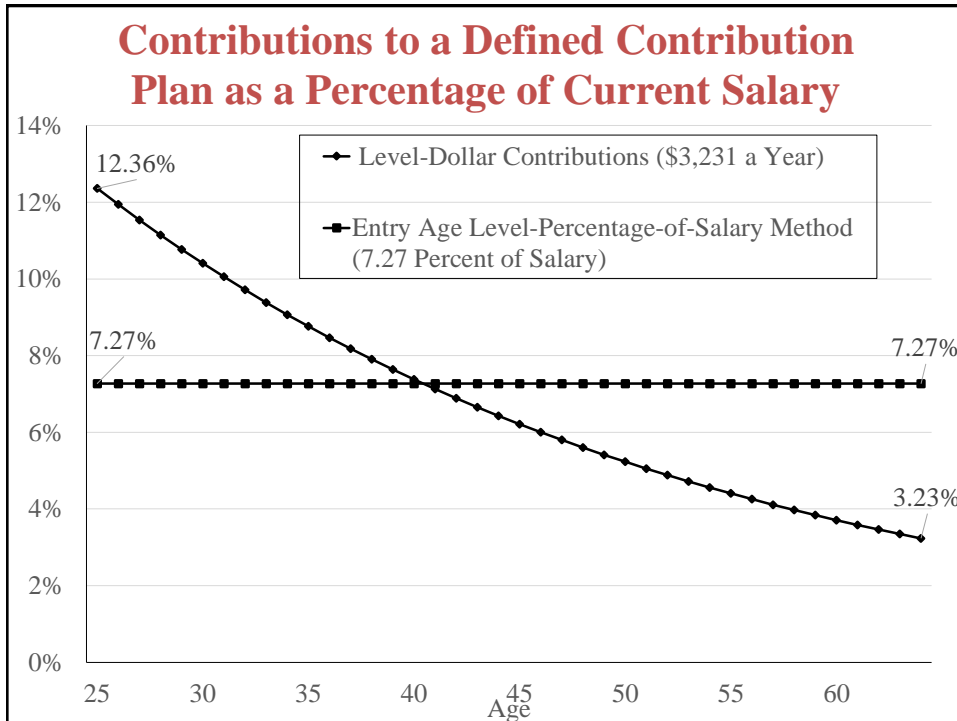
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Model Defined Contribution Plans

- Same worker assumptions
- Again accumulate ~ \$400,000 by age 65
 - Two heroic assumptions
 - interest rate is still 5%
 - annuity factor is still 10
- Level-Percentage-of-Salary model DC Plan
 - 7.27% of salary; \$1,900 at 25; \$7,270 at 64
- Level-Dollar model DC Plan
 - \$3,231 per year

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Real World Considerations

- Underfunding
- Inflation and COLAs
- Working Careers and Benefit Accumulation
- Social Security Replacement Rates Vary with Lifetime Income
- Spousal Issues
- Variability in Economic & Demographic Variables

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Underfunding

- DC plans—not many workers save 7.27% of their salaries over a 40-year career
- DB plans—even if these plan are designed to provide pensions that replace at least 40% of preretirement earnings, they often fall short of that target
 - Few workers stay with 1 employer for 40 years
 - Many companies & their plans fail
 - Many sponsors undercontribute to pensions

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Inflation in the Real World

- In the real world, retirees face inflation that will erode the real value of level-dollar benefits
- Greater savings are needed
 - Note that Social Security benefits are adjusted for post-retirement inflation

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Postretirement Inflation, from Age 65 to Age 110

Age	Nominal Pension	Inflation Rate	Real Value of a \$40,000 Pension	Nominal Pension with a Constant Real Value of \$40,000
65	\$40,000	2.5%	\$40,000	\$40,000
70	\$40,000	2.5%	\$35,354	\$45,256
80	\$40,000	2.5%	\$27,619	\$57,932
90	\$40,000	2.5%	\$21,576	\$74,158
100	\$40,000	2.5%	\$16,855	\$94,928
110	\$40,000	2.5%	\$13,167	\$121,515



Cost of Living Adjustment (COLA)?

- For 2.5% inflation (postretirement)
 - Need to accumulate ~ \$523,000 by age 65
 - 23% more
- Level-Percentage-of-Salary model DC Plan
 - ~9% of salary (not 7.27%)
 - $8.94\% = 1.23 \times 7.27\%$
- Level-Dollar model DC Plan
 - \$4,000 per year (not \$3,231)
 - $\$3,974.13 = 1.23 \times \$3,231$



Working Careers & Benefit Accumulation in the Real World

- Few people work 40 years
- Few workers accrue benefits every year
- Workers do not always vest in all of their accrued benefits
- Few workers annuitize retirement savings
- Workers may need to save more than 9%



Nonportability of Traditional Defined Benefit Pension Plans

<i>Worker No.</i>	<i>Employer No.</i>	<i>Years of Service</i>	<i>Final Pay</i>	<i>Total Pension</i>
1	1	40	\$100,000	\$40,000
2	1	10	\$35,628	\$3,563
	2	10	\$50,257	\$5,026
	3	10	\$70,892	\$7,089
	4	10	\$100,000	\$10,000
				\$25,678



Social Security Replacement Rates Vary with Lifetime Income

- Social Security replaces a larger percentage of the preretirement earnings of workers with low lifetime earnings
 - They can save a lower percentage of their salaries to replace 75% of their preretirement earnings
- High-income workers need to save a higher percentage of their salaries

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Spousal Issues

- The model pensions assume that pension benefits will be paid in the form of a single-life annuity, but the models could easily be enhanced to pay benefits in the form of a qualified joint and survivor annuity

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Variability in Economic & Demographic Variables

- The model pensions could easily accommodate simple alternative assumptions about economic and demographic variables

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Options for Reform

- Fully fund Social Security
- Fully fund pensions for all workers
 - Add-on Social Security accounts?
 - A universal pension system
 - Mandatory? like Australia, Singapore, Chile & Israel
 - Voluntary?
 - Individual pension accounts
 - Autoenrollment
 - Auto-portability

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About the Author

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- He teaches courses on tax and pension law and is the author of:
 - *Removing the Legal Impediments to Offering Lifetime Annuities in Pension Plans*, 23(1) CONNECTICUT INSURANCE LAW JOURNAL 31 (Fall 2016), <http://insurancejournal.org/wp-content/uploads/2017/03/2-Forman-1.pdf>;
 - *Survivor Funds*, 37(1) PACE LAW REVIEW 204 (Fall 2016) (with Michael J. Sabin), <http://digitalcommons.pace.edu/plr/vol37/iss1/7/>; &
 - *Tontine Pensions*, 163(3) UNIVERSITY OF PENNSYLVANIA LAW REVIEW 755 (2015) (with Michael J. Sabin), <http://www.pennlawreview.com/print/index.php?id=468>.