

ORP

Optimal Distributions from Tax- Advantaged Retirement Accounts

Optimal Retirement Planner

James S. Welch, Jr.

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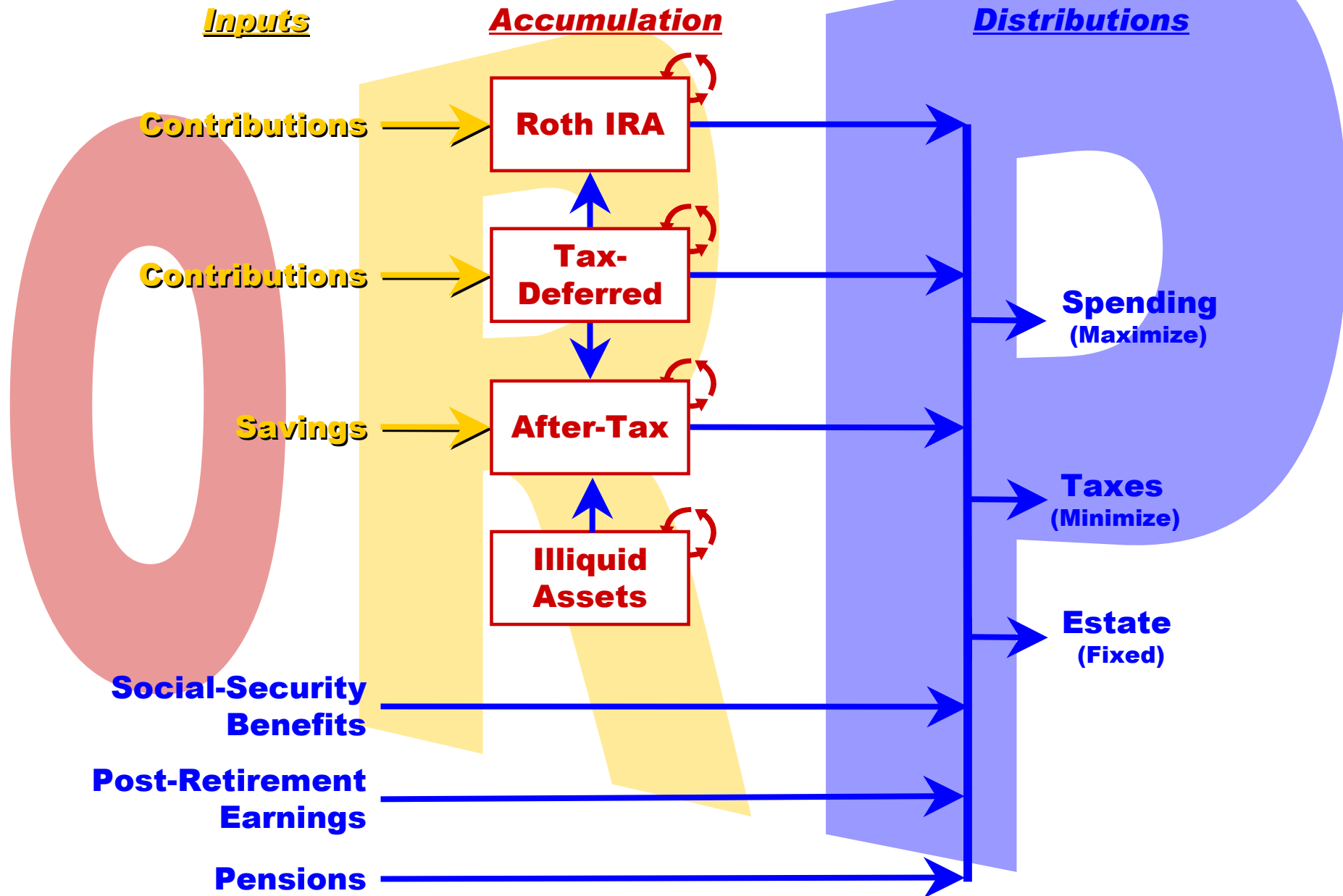
**NYU Stern School
of Business**

**Conference on
The Optimal Retirement Withdrawal Strategy**

May 1, 2008

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ORP Time Dynamic Process Flow Model



ORP Withdrawal Plan

Age	TaxDef	AfterTax	RothIRA	SocSec	RothTrns	Taxes	Spending
65	172	150		48	172	-34	163
66	95	134		50	95	-14	169
67	98	139		51	98	-15	175
68	104	9	31	53		-15	181
69	107		42	55		-16	187
70	111		43	57		-16	194
71	115		45	59		-17	200
72	119		46	61		-18	207
73	123		48	63		-18	215
74	127		49	65		-19	222
75	132		51	68		-20	230
76	136		53	70		-20	238
77	141		55	73		-21	246
78	146		57	75		-22	255
79	151		59	78		-23	264
80	41	200		80	41	-6	273
81	14	203		83	14	-2	283
82	14	210		86	14	-2	293
83	15	217		89	15	-2	303
84	15	225		92	15	-2	313
85	16	96	121	95		-3	324

All dollar amounts are in thousands

Conventional Calculators

- **Given:**

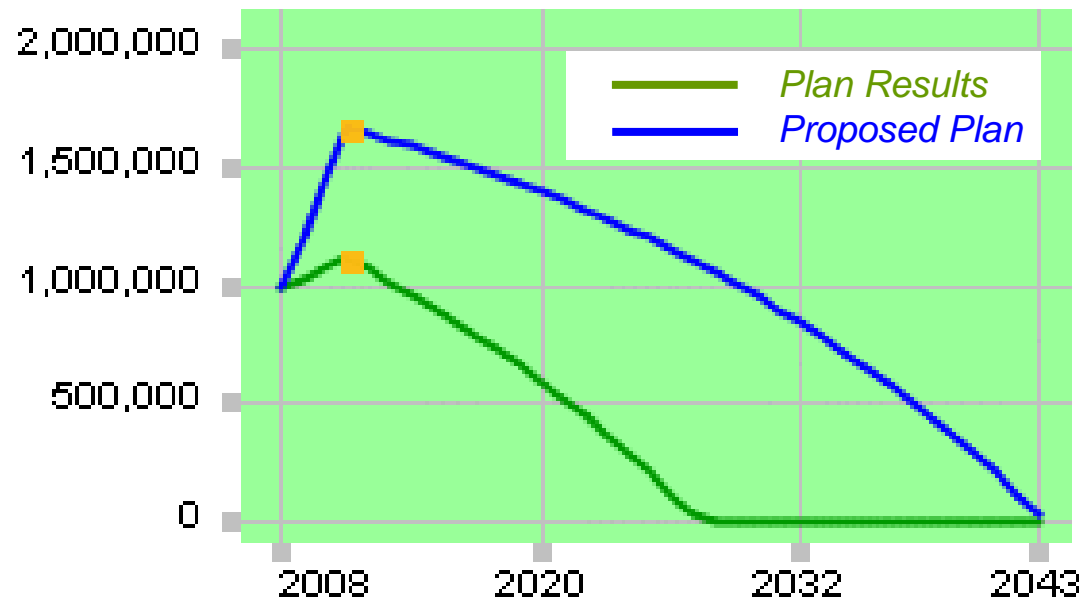
- Age
- Account Balances
- Retirement Age
- Desired Retirement Spending

- **Example:**

*AARP Retirement
Calculator Results*

- **Compute:**

- When the money runs out?



ORP Reverses the Process

- **Given:**

- Age
- Account balances
- Retirement Age
- Estate
- Life Expectancy

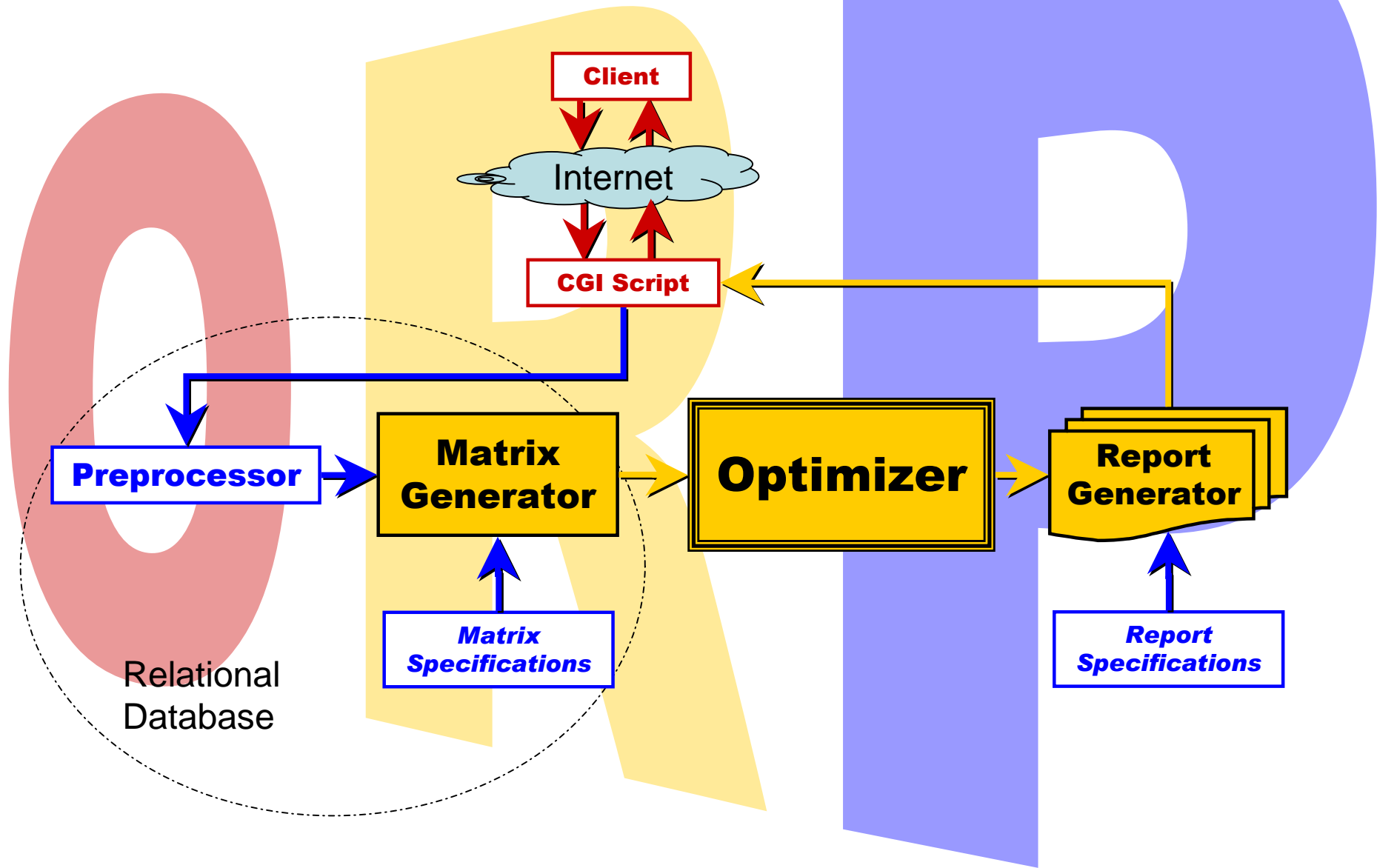
- **Example:**

- **Compute:**

- The maximum amount of money available for spending over the term of the plan.

Base Scenario	
Annual After-tax Spending (in today's dollars):	\$137,700
Assets at Retirement:	\$2,297,700
Total Plan Value:	\$4,936,600

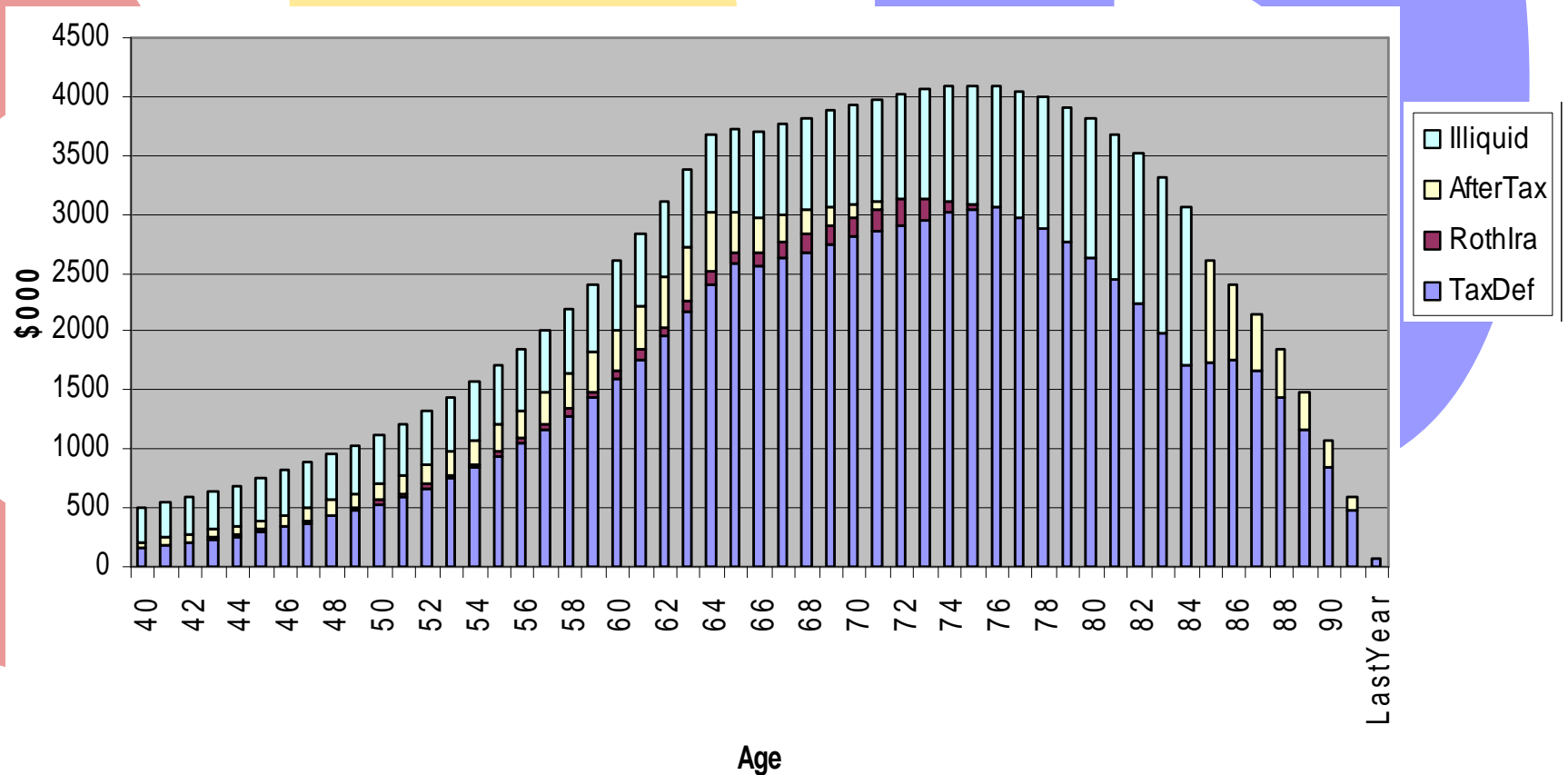
ORP Architecture



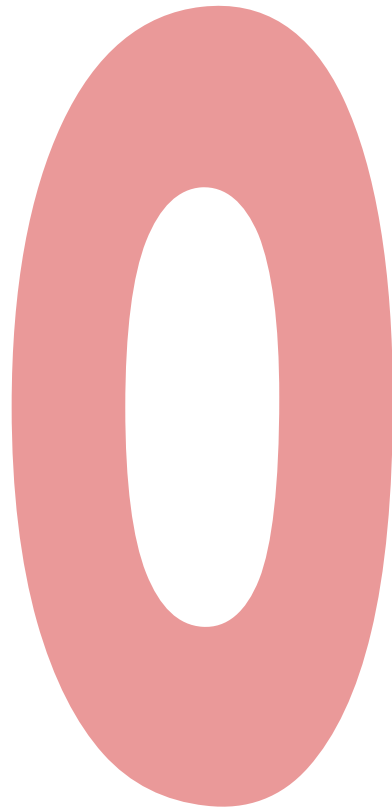
Example

- **Married Couple, ages 60 and 57.**
- **Tax-deferred Accounts: \$500K and \$400K.**
- **After Tax-tax Account: \$300K.**
- **Illiquid Asset (Home) \$600K, sell at age 80.**
- **Social Security: \$24K annually each.**
- **Asset Returns: 7%.**
- **Inflation: 3.5%.**
- **Retirement age: 65.**
- **Life Expectancy: 85.**
- **Estate: \$10K.**

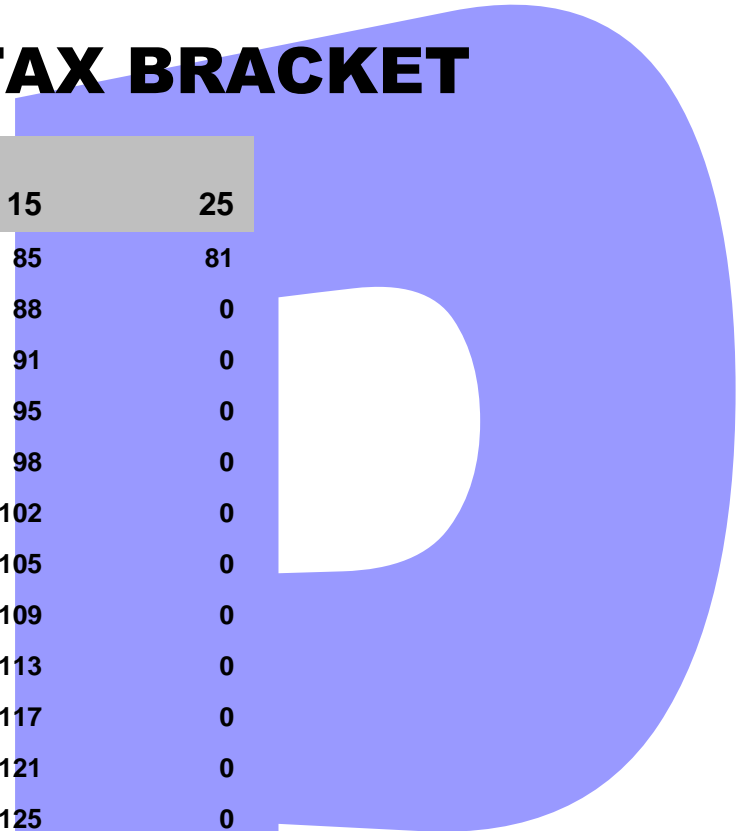
ORP Asset Balance (The Power of Compounding)



INCOME BY FEDERAL TAX BRACKET



Age	NoTax	10	15	25
65	30	18	85	81
66	31	19	88	0
67	32	19	91	0
68	34	20	95	0
69	35	21	98	0
70	36	21	102	0
71	38	22	105	0
72	39	23	109	0
73	40	24	113	0
74	42	24	117	0
75	43	25	121	0
76	45	26	125	0
77	46	27	129	0
78	48	28	134	0
79	50	29	139	0
80	51	30	27	0
81	53	31	0	0
82	55	32	0	0
83	57	33	0	0
84	59	34	0	0
85	61	36	0	0



Distributions in Perspective

Age	Total	TaxDef	AfterTax	RothIRA	SocSec	RothTrns	Taxes	Spending	Drawdown	Note
64	2,297									
65	2,292	172	150	0	48	172	-34	163	6.5%	163
66	2,275	95	134	0	50	95	-14	169	5.8%	169
67	2,252	98	139	0	51	98	-15	175	6.1%	175
68	2,224	104	9	31	53	0	-15	181	6.4%	181
69	2,189	107	0	42	55	0	-16	187	6.7%	187
70	2,146	111	0	43	57	0	-16	194	7.0%	194
71	2,094	115	0	45	59	0	-17	200	7.5%	200
72	2,033	119	0	46	61	0	-18	207	7.9%	207
73	1,962	123	0	48	63	0	-18	215	8.4%	215
74	1,879	127	0	49	65	0	-19	222	9.0%	222
75	1,785	132	0	51	68	0	-20	230	9.7%	230
76	1,677	136	0	53	70	0	-20	238	10.6%	238
77	1,556	141	0	55	73	0	-21	246	11.7%	246
78	1,419	146	0	57	75	0	-22	255	13.0%	255
79	1,267	151	0	59	78	0	-23	264	14.8%	264
80	955	41	200	0	80	41	-6	273	15.8%	273
81	800	14	203	0	83	14	-2	283	21.3%	283
82	630	14	210	0	86	14	-2	293	26.3%	293
83	445	15	217	0	89	15	-2	303	34.4%	303
84	243	15	225	0	92	15	-2	313	50.6%	313
85	24	16	96	121	95	0	-3	324	95.9%	324

-terms-	Values	-text-
CurrAge	60	Current Age of Retiree
Spouse	57	Current Age of Spouse
TaxDef	500	Beginning Tax-Deferred Account Balance
TaxDef2	400	Spouses Beginning Tax-Deferred Account Balance
ContDef	5	Contribution to Tax-Deferred Account
ContDef2	4	Spouses Contribution to Tax-Deferred Account
RothIRA		Roth IRA account Balance
RothIRA2		Spouses Roth IRA account Balance
ContRoth		Contribution to Roth IRA Account
CntRoth2		Spouses Contribution to Roth IRA Account
IRACont		Contribution to Regular IRA Account
IRACont2		Spouses Contribution to Regular IRA Account
AfterTax	300	After-Tax Investment Balance
ContSave	3	Contribution to Savings Account
Illiquid	600	Illiquid Asset Value.
TaxBasis	400	Cost of Illiquid Asset, for tax purposes
SellYear	80	Year to sell illiquid asset.
SocSec	24	Social security Income.
SocSec2	24	Spouses Social security Income.
SocsecA	65	Age to begin Social security.
SocsecA2	65	Spouses Age begin Social security.
PensionI		Pension - adjusted for inflation.
PensinI2		Spouses Pension - adjusted for inflation
Pension		Pension - NOT adjusted for inflation.
Pension2		Spouses Pension - NOT adjusted for inflation
PensionA		Age to start Pension.
PensinA2		Spouses Age to start Pension.
EarnInc		Earned income.
EarnInc2		Spouses Earned income.
EarnIage		Age to end Earned income.
EarnIag2		Spouses Age to end Earned income.
TaxRateI	20	After-Tax Account % Anticipated Tax Rate
StateMin		State Personal Income Tax Standard Deduction
StateRte		State Personal Income Tax Rate.
Inflatn	3.5	Inflation Rate
Return	7	Tax-Deferred Account % Avg. Pre Ret. Invest Ret.
ReturnR	6	Tax-Deferred Account % Avg. Post Ret. Invest Ret.
ReturnI	7	After-Tax Account % Avg. Pre Ret. Investment Return
ReturnIR	6	After-Tax Account % Avg. Post Ret. Investment Return
RetAge	65	Anticipated Retirement Age
Term	85	Age at which Plan is to End
Estate	33	Desired Estate Size
Spend		Desired Spending Level
RepealTx		1 to repeal tax cut back to 2001, 0 continue

ORP Input Parameters

Linear Program

- **Constraints**

- For $i \leq m; m < n$

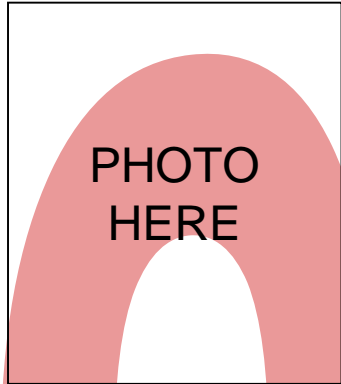
$$\sum_{j=1}^n a_{ij} x_j = b_i$$

- **Objective Function**

- Maximize f , subject to constraints

$$f = \sum_{j=1}^n c_j x_j$$

The Author



James S. Welch, Jr. has been a full time, professional computer programmer since he started on UNIVAC I in 1954. He concentrates on special purpose database management system development, large database accounting applications, and large scale mathematical programming systems. He developed the Optimal Retirement Planner (ORP), a linear programming (LP) based retirement calculator. ORP demonstrates a computationally intensive application composed mostly of commercial mathematical software can be available to the retail market over the Internet (i-orp.com). ORP has developed a cult following of users who find it useful for the strategic planning of optimal asset distribution during retirement.

Email: orplanner@gmail.com