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**NAVAL
POSTGRADUATE
SCHOOL**

MONTEREY, CALIFORNIA

THESIS

**DECISION SUPPORT TOOL FOR RETIREMENT
PLANNING**

by

Brandon P. Connelly

September 2018

Thesis Advisor:
Second Reader:

Glenn R. Cook
Douglas J. MacKinnon

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DECISION SUPPORT TOOL FOR RETIREMENT PLANNING

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Submitted in partial fulfillment of the
requirements for the degree of

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from the

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ABSTRACT

In this research, a Microsoft Excel retirement planning decision support tool is developed to help Marine Corps Officers visualize their own time horizon to achieve retirement. Basic and advanced features allow individuals to adjust all of the variables within the tool to represent their unique financial retirement goals. The decision support tool will also help eligible Marine Corps Officers to choose between the Legacy Retirement System and Blended Retirement System, by understanding each retirement plan and calculating which plan would provide more financial benefit.

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LIST OF ACRONYMS AND ABBREVIATIONS

AGI	adjusted gross income
BAS	basic allowance for subsistence
BAH	basic allowance for housing
CAC	common access card
COLA	cost of living adjustment
CPI	consumer price index
CSB	career status bonus
DoD	Department of Defense
FY	fiscal year
GDR	government discount rate
HQMC	Headquarters Marine Corps
IRA	individual retirement account
IRS	Internal Revenue Service
MCCS	Marine Corps Community Services
MOAA	Military Officers Association of America
NDAA	national defense authorization act
NPC	Navy Personnel Command
PRS	personal readiness seminar
RMC	regular military compensation
SSA	Social Security Administration
TSP	Thrift Savings Plan
TRS	transition readiness seminar
USAA	United Services Automobile Association
VA	Veteran Affairs

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I. INTRODUCTION

A. BACKGROUND

Department of Defense's (DoD) retirement plan for military service members has increasingly been researched for understanding of the impact that the new retirement plan, the Blended Retirement System, may have on the United States Government both from a cost and a manpower perspective. Other research has focused on how the Blended Retirement System may impact eligible service members' retirement planning, as well as their decision making process on how long to stay in the military. In an effort to assist eligible service members in choosing between the two retirement systems, DoD and companies like United Services Automobile Association (USAA) have posted a variety of financial tools online. On each financial tool some or all of the variables could not be adjusted by the service member. however. The inflexibility of such financial tools in regard to important variables like rate of return or the career continuation pay multiplier may hamper eligible service members in making an informed decision on which retirement system is best for them.

Sean Pearson, a Certified Financial Planner, stated that the best time to plan for retirement was 20 years ago and the second best time to plan for retirement is today (Robaton, 2015). Restated in military terms, it is better to develop a retirement plan as a Second Lieutenant than waiting until retirement from the Marine Corps. Due to DoD's hands-off approach toward retirement planning, service members are on their own in creating a retirement plan. DoD service members would benefit from a retirement template that would give them the ability to adjust all of the variables to understand how each variable may impact their time horizon to achieve their unique financial retirement goals.

B. PROBLEM

The annual median savings rate for a United States working-age family is \$5,000 (Morrissey, 2016). One-third of Americans over the age of 18 do not have a retirement plan, and 58 percent of Americans over the age of 18 feel that their plan needs to be

improved (Robaton, 2015). The best time to plan for retirement was 20 years ago and the second best time to plan for retirement is today (Robaton, 2015).

The problem is that Marine Corps Officers are waiting too long to plan for retirement due to their lack of understanding on how different variables may impact their ability to reach their unique financial retirement goals. Marine Corps Officers need to research and understand how different variables may impact their time horizon to reach their unique financial retirement goals. Unfortunately, DoD's retirement calculator is not downloadable into a template that is easy for a Marine Corps Officer to understand and modify.

Through a quantitative experimentation study, this research develops a basic and an advanced decision support tool in Microsoft Excel that will serve as a template for Marine Corps Officers to use to build a retirement plan.

C. PURPOSE

The purpose of this research is to develop a decision support tool that will serve as a template for a Marine Corps Officer to use in building a tailored retirement plan. The objective of the research is to perform analysis on the time horizon required for a Marine Corps Officer to achieve their financial retirement goals. Additionally, this study analyzes how a decision support tool for retirement planning could benefit a Marine Corps Officer's understanding and ability to achieve their unique financial retirement goals. The intent is twofold: to build a decision support tool in Microsoft Excel because this software is familiar and accessible to Marine Corps Officers, and for the decision support tool to be updated at least annually.

A basic decision support tool for retirement planning will be valuable for a Marine Corps Officer without a financial background and the advanced version will be valuable for a Marine Corps Officer with a strong financial background. The decision support tool is intended to be a working document. Although the target population of this research is Marine Corps Officers, the tool may benefit all DoD active and reserve service members.

D. RESEARCH QUESTIONS

How could a decision support tool for retirement planning, benefit a Marine Corps Officer in understanding and achieving their financial retirement goals?

What are the critical variables that have the greatest impact on the time horizon for retirement planning?

What is the time horizon for a Marine Corps Officer to achieve their financial retirement goals?

E. SCOPE AND LIMITATIONS

This decision support tool for retirement planning was built for DoD Officers. With additional modifications, it could benefit all enlisted service members within DoD. The basic decision support tool will not be as accurate as the advanced decision support tool but will still be robust enough for building a retirement plan. To improve the accuracy of the basic and advanced decision support tool, it should be treated as a working document and be updated at least annually.

F. BENEFITS OF STUDY

The potential benefits from this research may be that Marine Corps Officers use the decision support tool to build their own retirement plan after understanding how different variables will impact their time horizon to reach their financial retirement goals. Once a Marine Corps Officer develops a retirement plan, they could provide this tool to enlisted Marines on their team.

G. METHODOLOGY

Data used to build the decision support tool will come from open sources like DoD military pay tables, DoD briefs on the Blended Retirement System, and financial studies that asked questions pertaining to retirement planning and current savings. A statistical approach will be used to analyze the time horizon for a Marine Corps Officer to achieve their retirement goals.

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II. LITERATURE REVIEW

A. NATIONAL DEFENSE AUTHORIZATION ACT

The National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2013 formed a Military Compensation and Retirement Modernization Commission to provide the President of the United States and Congress with recommendations on how to modernize benefits for Department of Defense's (DoD) military service members (Kamarck, 2017). The commission's recommendations led Congress to modernize the military retirement system in the NDAA for FY2016 (Thornberry, 2015). The new retirement system, the Blended Retirement System, will provide an estimated 85 percent of active and reserve service members with retirement benefits whereas the Legacy Retirement System provided only 19 percent of active-duty service members and 14 percent of reserve service members who served at least 20 years, with retirement benefits (Department of Defense [DoD], 2017e).

B. RETIREMENT TRAINING

1. Background

Recent changes to the military retirement system have caused Marines, regardless of their rank, to talk about retirement; a topic rarely discussed within the Marine Corps, with the exception of Marines who were getting close to retirement. The Marine Corps has not mandated annual training on any subject that would help prepare a Marine for retirement. Therefore, it is up to the individual Marine to take the initiative to develop a retirement plan while they are in the Marine Corps.

To help Marines make an informed decision, the Deputy Commandant for Manpower and Reserve Affairs has mandated that all Marines eligible to decide between the Legacy Retirement and the Blended Retirement System, complete the online Blended Retirement System training prior to a service member making a decision (Brilakis, 2016). Marine leaders also received mandatory training so they could help their Marines make an informed decision, but not make the decision for their Marines. Each service has its own unique plan on the medium that their respective eligible members will use when making a

retirement selection. The primary selection method for Marines eligible to choose between the two retirement systems will be through the Marine on Line website (Brilakis, 2016).

2. Local Training

In addition to a Marine's direct leadership, every Marine has access to Command Financial Specialists and Personal Financial Management Specialists. A Command Financial Specialist is a collateral-duty billet filled by a Marine and appointed by their respective commanding officer once they have completed formal training from a Personal Financial Management Specialist (Headquarters Marine Corps [HQMC], 2016). A Personal Financial Management Specialist is hired by the Marine Corps Community Services (MCCS) to provide financial advice to Marine's and their dependents (Marine Corps Community Services [MCCS], 2017a).

3. Classroom Training

Before their departure from the Marine Corps, HQMC requires that all Marines, regardless of their accumulated time-in-service, attend the Personal Readiness Seminar (PRS) and the Transition Readiness Seminar (TRS); both seminars are given by MCCS. PRS is a four-hour seminar that educates transitioning Marines on debt, living expenses, financial services, investments, and banking (MCCS, 2017b). TRS is a five-day seminar that gives transitioning Marines lectures on financial planning, Veterans Affairs (VA) benefits that they may be eligible for, and more (MCCS, 2017b). The goal is to help transitioning Marines develop a plan for higher education, employment, or entrepreneurial goals (MCCS, 2017b).

C. BLENDED RETIREMENT SYSTEM

1. Eligibility

Active-duty service members who joined prior to January 1, 2006, and reserve service members with more than 4,320 retirement points, will remain under the Legacy Retirement System (DoD, 2017e). Active-duty service members who joined after December 31, 2005, but before January 1, 2018, or reserve service members with less than 4,320 retirement points as of December 31, 2017, are eligible to remain with the Legacy

Retirement System or may choose to opt into the new retirement system, the Blended Retirement System (DoD, 2017e). Both the Legacy Retirement System and the Blended Retirement System are non-disability retirement plans (DoD, 2017a). Eligible service members have between January 1, 2018, and December 31, 2018, to make a decision; once a decision is made, it cannot be changed (DoD, 2017e). Service Secretaries are able to adjudicate extensions in case of hardship that prevented a service member from making a decision within the 2018 calendar year (Work, 2017). Any active-duty service member or reserve service member who joins the military after January 1, 2018, will be automatically enrolled into the Blended Retirement System (DoD, 2017e).

Marines in the reserves who retire under a non-disability retirement plan are not eligible to collect their pension until they reach 60 years old; active-duty Marines are eligible to start collecting their pension after 20 years of creditable service (DoD, 2017b). Marines serving in the reserves must accumulate at least 50 points per year. Marine reservists receive one point per day spent on active service, drilling, or performing funeral honors, and 15 points per year spent in the Marine Corps reserves (DoD, 2017b). To determine the number of years served by a reservist, take the total points accumulated by a reservist and divide by 360 (DoD, 2017b).

2. Compensation

The Blended Retirement System, like the Legacy Retirement System, provides a defined benefit, after 20 years of creditable service (DoD, 2017e). In addition to the annuity, only the Blended Retirement System offers automatic contributions and provides matching contributions to a service member's Thrift Savings Plan (TSP) (Work, 2017). The Blended Retirement System pays two percent times the number of creditable years served whereas the Legacy Retirement System pays two and a half percent (DoD, 2017e). In the Blended Retirement System, a service member can achieve a maximum of five percent matching contribution by DoD if they contribute five percent of their basic pay to TSP (DoD, 2017e). If a service member does not contribute any of their basic pay to their TSP, they will still receive a one percent automatic contribution from DoD after 60 days of service until the service member reaches 26 years of creditable service (DoD, 2017e).

The other four percent match DoD offers, starts after the third year of service and is available if the service member is contributing five percent of their basic pay to TSP (DoD, 2017e).

After 26 years of service, the government’s automatic and potential matching contribution will stop for all military service members. To encourage senior leaders to stay in their respective service, DoD requested to extend the automatic and matching contributions past 26 years of service. The first attempt was made during DoD’s 2016 budget request; this attempt was unsuccessful (Degrandpre, 2017). The second attempt was made during DoD’s 2017 budget request; this attempt was also unsuccessful (Degrandpre, 2017). DoD understood that subsequent attempts for the same request would likely be unsuccessful. In an effort to make some progress, DoD decided to modify their request within their 2018 budget request. DoD requested that only enlisted service member’s receive automatic and potentially matching contributions past 26 years of service (Degrandpre, 2017). Figure 1 shows a summary of the automatic and matching contribution DoD offers to a service member under the Blended Retirement System.

Individual Contribution	Agency Automatic Contribution	Agency Matching Contribution	Total TSP Monthly Contribution
0%	1%	0%	1%
1%	1%	1%	3%
2%	1%	2%	5%
3%	1%	3%	7%
4%	1%	3.5%	8.5%
5%	1%	4%	10%

NOTE: Currently serving members who opt-in will see matching contributions immediately

Figure 1. Automatic and Matching Contribution. Source: DoD (2017e).

a. Career Continuation Pay

In an effort to retain service members under the Blended Retirement System with eight to 12 years of service, a career continuation pay multiplier, between 2.5 to 13 times a service members basic monthly pay for active-duty service members and one half to six times a service members basic monthly pay for reservists will be paid out (DoD, 2017e).

Each Service Secretary is responsible for determining the eligibility, timing of payment, and procedures for the career continuation pay as well as the career continuation pay multiplier for their respective service (Work, 2017). Once the career continuation pay is accepted by a service member, the service member is obligated to serve no less than three additional years of active service (Work, 2017). In the event that a service member fails to complete all or a portion of the obligated service, they will be subject to paying back all or a pro-rated amount of the pay received back to the government (Work, 2017).

b. Lump Sum

Only the Blended Retirement System offers a lump sum option. Service members can elect to receive a 25 or 50 percent lump sum payment at retirement in return for a smaller monthly pension which will remain only until the day the service member reaches the full retirement age as determined by the Social Security Administration (SSA) (DoD, 2017e). As of 2017, anyone born after 1959, will reach full retirement age at 67 years old (Social Security Administration [SSA], 2017a). After reaching full retirement age, the reduced pension reverts back to the full pension amount (DoD, 2017e). Any service member who retired due to a physical disability, is unable to choose the lump sum option (Work, 2017). Service members under the Blended Retirement System must make the lump sum election no later than 90 days before the service member retires (Work, 2017). The lump sum payment can be taken all at once or can be broken up into four payments, over a time period not to exceed four years (Work, 2017).

The lump sum government discount rate (GDR) is calculated by taking Department of Treasury's seven-year average high-quality-market corporate bond spot rate with a 23-year maturity and adding a personal discount rate (Philpott, 2017). The personal discount rate is being influenced by retirees preference for selecting the lump sum; a technique not used by private pension plans (Philpott, 2017). From May 1, 2010, to April 1, 2017, the seven-year average of the high-quality-market corporate bond spot rate with a 23 year maturity was 4.99 percentage points (United States Department of Treasury, 2017). The lump sum GDR for calendar year 2018 was 6.99 percent (Hebert, 2017). Every year,

the new lump sum GDR will be published. Calendar year 2019's GDR will be published in June 2018 (Hebert, 2017).

If a Marine Corps Officer retires under the Blended Retirement System after 20 years of creditable of active-duty service at the rank of Maj, the Major would receive \$3,063 per month using the 2017 military pay chart (Defense Finance and Accounting Service, 2017). Assuming the Major retired at the age of 45, they would have the option to elect no lump sum, a 25, or a 50 percent lump sum of their pension payments starting from the date they retired until they turned 67 years old. If the GDR was 9.27 percent, the Major would receive \$227,454 if a 50 percent lump sum were elected or \$113,727 if a 25 percent lump sum were elected. If the GDR was 6.27 percent, the Major would receive \$300,569 if a 50 percent lump sum were elected or \$150,285 if a 25 percent lump sum were elected. Each lump sum payment is before federal, state, and local taxes.

D. LEGACY RETIREMENT SYSTEM

1. Final Pay

Active-duty and reserve Marines under the Legacy Retirement System who accumulated 20 years or more of creditable service are eligible to receive a military pension. Active-duty and reserved Marines who entered before September 8, 1980, are eligible to retire under the Final Pay, a non-disability retirement plan. The Final Pay retirement plan is calculated by taking 2.5 percent per year of creditable service multiplied by their final basic pay (DoD, 2017a).

The Final Pay retirement plan adjust retiree's pensions annually through Cost of Living Adjustments (COLA); COLA is computed from Department of Labor's Consumer Price Index (CPI) (DoD, 2017a). If CPI is negative, COLA will be zero percent (DoD, 2017d). Figure 2 shows a summary of the Final Pay retirement plan.

Retirement Plan	Basis	Multiplier	COLA	Readjustment	Bonus
Final Pay	Final basic pay	2.5% per year	CPI	None	None
High-36	Average of highest 36 months of basic pay	2.5% per year	CPI	None	None
CBS/REDUX	Average of highest 36 months of basic pay	Same as High-36 with reduction of one percentage point for each year short of 30 years of service	CPI - 1%	At age 62, 1) retired pay made equal to High-36 2) future multiplier made equal to High-36 3) future COLA continues at CPR - 1%	\$30,000 at 15th year of service with obligation to serve 20 year career
Disability	Either Final Pay or High-36 as appropriate	2.5% per year of % of disability member's choice	CPI	None	None

See below chart provides the basic criteria to determine which retirement plan applies to you.

Retirement Plan	Criteria to Receive
Final Pay	Entry before September 8, 1980
High-36	Entry on or after September 8, 1980, but before August 1, 1986 OR Entered on or after August 1, 1986, and did not choose the Career Status Bonus and REDUX retirement system
CSB/REDUX	Entered on or after August 1, 1986, AND elected to receive the Career Status Bonus (if you do not elect to receive the Career Status Bonus, you will be under the High-3 retirement system)
Disability	Determined medically unfit for continued service with a DoD disability rating of at least 30%

Figure 2. Legacy Retirement System Summary. Source: DoD (2017a).

2. High-36

Active-duty and reserve Marines who entered between September 8, 1980, and July 31, 1986, or entered after August 1, 1986, and who did not elect to receive the Career Status Bonus (CSB) and REDUX retirement, qualify for the High-36, a non-disability retirement plan (DoD, 2017a). The High-36 retirement plan takes the average of the highest 36 months of basic pay, multiplied by 2.5 percent per year of creditable service (DoD, 2017a). Similar to Final Pay retirement plan, the High-36 retirement plan is adjusted annually through COLA (DoD, 2017a). Figure 2 shows a summary of the High-36 retirement plan.

3. CSB/REDUX

The CSB/REDUX retirement plan pays 2.5 percent per year of creditable service multiplied by the average of the highest 36 months of basic pay a Marine received (DoD, 2017a). Effective January 1, 2018, service members will no longer be permitted to choose the CSB/REDUX option (Work, 2017).

Only active-duty Marines are eligible for the CSB/REDUX (DoD, 2017b). Those who signed up for the CSB/REDUX, a non-disability retirement plan, receive \$30,000 after 15 years of creditable service and then incur an obligation to serve five additional years

(DoD, 2017a). Under the CSB/REDUX retirement plan, COLA is one percent less than CPI. If COLA is .75 percent, then COLA for the CSB/REDUX retirement plan would be zero percent since the lowest COLA will be is zero percent. Figure 2 shows a summary of the CSB/REDUX retirement plan.

E. DISABILITY RETIREMENT

1. Eligibility

Marines qualify for a military pension regardless of their time served through the disability retirement plan if they receive a DoD disability rating at or above 30 percent (DoD, 2017a). Retired pay base for the disability retirement plan will be calculated under the Final Pay or High-36, depending on the date the Marine entered the Marine Corps (DoD, 2017a). The retired pay base is then multiplied by the percent; Marines must choose between the disability percent or 2.5 percent times the number of creditable years served (DoD, 2017c). The maximum percent multiplier is limited by law to 75 percent (DoD, 2017c). Figure 2 shows a summary of the disability retirement plan.

2. VA Rating

For a service member to be given a disability rating by the VA, the VA must be able to determine that a service member's current disability began either in the military or as a result of some incident or injury while serving in the military (Szymanski, 2016). Disability payments received from the VA are tax free. For service members with less than a 50 percent VA disability rating, can reduce their military retiree pay with the VA disability payments, thereby significantly reducing their potential tax liability (Szymanski, 2016). Any service member with a VA disability rating greater than or equal to 50 percent is authorized to receive their full military pension (disability retirement plan) on top of their full VA disability pay (Szymanski, 2016).

F. THRIFT SAVINGS PLAN

1. Background

The Federal Employees' Retirement System Act of 1986 gave federal employees a defined contribution pension plan, with the TSP 401(k) but excluded the military

(Thrift Savings Plan [TSP], 2017a). In 2001, the military was given permission to participate in the TSP after the passage of the National Defense Authorization Act for FY 2001 (DoD, 2017m).

A TSP can be set up to receive pre-tax (traditional) or after-tax (Roth) contributions (TSP, 2017b). Pre-taxed contributions are subtracted from a service member's basic pay, which may reduce a service member's tax liability (TSP, 2017b). Earnings grow tax deferred but any withdrawals from the traditional account are taxable. After-tax contributions are made from a service member's basic pay after paying taxes (TSP, 2017b). Earnings also grow tax deferred but any withdrawals from the Roth account are not taxable so long as the service member is older than 59.5 years old (TSP, 2017e).

So long as a service member has a TSP account balance greater than \$199, they will be permitted to keep their account with TSP after leaving the military (TSP, 2017c). Just like a traditional IRA, TSP will force a service member to take minimum distributions starting April 1 of the year after they turn 70.5 years old; a Roth IRA does not require a service member to take minimum distributions after reaching a certain age (Internal Revenue Service [IRS], 2016b).

2. Funds

TSP has a limited number of funds to invest in. TSP fund options include the G Fund, F Fund, C Fund, S Fund, I Fund, and five different Life cycle Funds that invest different percentages of the G Fund, F Fund, C Fund, S Fund, and I Fund (TSP, 2017e). Table 1 shows the summary of individual TSP funds.

Table 1. Summary of Individual TSP Funds. Source: TSP (2017e).

	G Fund	F Fund*	C Fund*	S Fund*	I Fund*	L Funds**
Description of Investments	Government securities (specially issued to the TSP)	Government, corporate, and mortgage-backed bonds	Stocks of large and medium-sized U.S. companies	Stocks of small to medium-sized U.S. companies (not included in the C Fund)	International stocks of more than 20 developed countries	Invested in the G, F, C, S, and I Funds
Objective of Fund	Interest income without risk of loss of principal	To match the performance of the Bloomberg Barclays U.S. Aggregate Bond Index	To match the performance of the Standard & Poor's 500 (S&P 500) Index	To match the performance of the Dow Jones U.S. Completion TSM Index	To match the performance of the MSCI EAFE (Europe, Australasia, Far East) Index	To provide professionally diversified portfolios based on various time horizons, using the G, F, C, S, and I Funds
Risk	Inflation risk	Market risk, Credit risk, Prepayment risk, Inflation risk	Market risk, Inflation risk	Market risk, Inflation risk	Market risk, Currency risk, Inflation risk	Exposed to all of the types of risk to which the individual TSP funds are exposed - but total risk is reduced through diversification among the five individual funds
Volatility	Low	Low to moderate	Moderate	Moderate to high — historically more volatile than C Fund	Moderate to high — historically more volatile than C Fund	Asset allocation shifts as time horizon approaches to reduce volatility

The G Fund invests in government securities, the F Fund invests in bonds, the C Fund invests in stocks of medium to large companies in the United States, the S Fund invests in stocks of small to medium companies in the United States, and the I Fund invests in stocks from over 20 international countries (TSP, 2017e).

Service members can choose to invest in one or more funds so long as the annual contribution does not exceed the IRS elective deferral limit, which as of 2017 was \$18,000 (TSP, 2017f). An additional \$6,000 catch-up contribution is authorized as of 2017 by the IRS (2016a) for those who are 50 years or older. Any contributions made to an IRA account do not count toward the TSP contribution limits (IRS, 2017a).

The average net expense rate for TSP funds in 2016 was 38 cents per \$1,000 invested (TSP, 2017d). Morningstar, an independent investment research company, conducted a fee study in 2015, and found that the average net expense rate was \$6.4 per

\$1,000 invested (Johnson & Rawson, 2015). Expenses reduce an investors overall rate of return and delay the time horizon for an investor to achieve their financial retirement goals.

3. Risks

In general, the higher the risk, the higher the rate of return. Although diversification can reduce risk, it cannot eliminate risk. Each TSP fund may be exposed to one or more of the following risks: inflation risk, market risk, currency risk, credit risk, and prepayment risk (TSP, 2017e). Volatility in general, increases proportionally as the rate of return increases. A historical rate of return is the rate an investor can expect to receive in the long-term. In the short-term, due to volatility, a rate of return could be substantially higher or lower than the historical rate of return.

G. INDIVIDUAL RETIREMENT ACCOUNT

1. Contribution Limits

The maximum traditional or Roth individual retirement account (IRA) contribution limit for 2017 is \$5,500 for Americans less than 50 years old and \$6,500 for Americans 50 years and older (IRS, 2017a). Any contribution over the authorized limit is subjected to a six percent tax each year until the money is withdrawn from the IRA (IRS, 2017a). Eligibility to make a Roth IRA contribution is based on the adjusted gross income (AGI) (IRS, 2017a). For example, a married couple filing jointly with an AGI less than \$186,000 is authorized to contribute the full contribution limit (IRS, 2017a).

If the couple's AGI is greater than \$186,000 but less than \$196,000, then the authorized contribution limit is reduced using an IRS formula, which is available on their website (IRS, 2017a). If the couple's AGI is in excess of \$196,000, then they are unable to make any contributions into a Roth IRA (IRS, 2017a). Unlike a Roth IRA, a traditional IRA does not have any AGI restrictions that would prohibit an American from making a contribution (IRS, 2017a).

2. Deduction Eligibility

An American's AGI may prevent them from being able to take a full or even partial deduction from their traditional IRA contribution (IRS, 2017a). For example, in 2017, the IRS (2017a), will permit a full deduction for married couples filing jointly whose AGI is \$98,000 or less, a partial deduction if their AGI is greater than \$98,000 but less than \$118,000, and will prevent any deduction to be taken if their AGI is greater than \$118,000.

3. Early Withdrawal Penalty

In an effort to deter investors from making a withdrawal for any purpose other than for retirement, any unauthorized withdrawals from TSP or an IRA will lead to an early withdrawal tax of 10 percent (IRS, 2017b). The IRS publishes a list of exceptions that are exempt from the 10 percent penalty. The IRS (2017b) allows a first-time homebuyer to withdraw up to \$10,000 penalty free to use toward the cost of buying, building, rebuilding a home, or other usual closing and financing costs. Additional IRS (2017b) exceptions include unreimbursed medical expenses, medical insurance, disabled, annuity distributions, higher education expenses, and qualified reservist distributions.

H. SOCIAL SECURITY

1. Compensation

The average retiree eligible to receive social security received \$1,341 as of January 2016 (SSA, 2017b). Americans born after 1959 can elect to start receiving a reduced Social Security retirement benefit at age 62, receiving 70 percent of the full retirement benefit (SSA, 2017a). Every month a retiree delays receiving payment will increase the percent of the retirement benefit, reaching 100 percent of their full retirement benefit at the full retirement age of 67 (SSA, 2017a). A retiree has the option to defer benefits past the age of 67 (SSA, 2017a). Every month past the age of 67 will yield a retiree an extra two-thirds of one-percent increase to their benefits until they reach the age of 70 (SSA, 2017g). The two-thirds of one-percent multiplied by 12 months equals an eight percent annual increase in benefits (SSA, 2017g). For example, if a retiree born after 1959 chooses to receive benefits at 67 years and six months, they would receive 104 percent of their full retirement

benefits (SSA, 2017g). If a retiree born after 1959 waits until age 70, they would receive 124 percent of their full retirement benefits.

2. Potential Insolvency

The SSA is paying out more than it is collecting. The SSA (2017c) estimates that it will run short of money by 2034. After year 2034, it is projected that only 79 percent of benefits will be able to be paid out and payouts will further decline to 74 percent by 2090 (SSA, 2017c). Of the 2,646 adults surveyed in the 2016 Planning and Progress Study, only 25 percent stated that they felt confident that Social Security will be there for them when they retire (Northwestern Mutual, 2016). To prevent insolvency, Congress continues to research ways to reform Social Security. Potential solutions being researched include: increasing the retirement age to 69 for Americans born after 1968, eliminate COLA for high-income retirees, reducing benefits, and by modifying the law to incentivize people to work longer than 35 years (Blggs, 2016).

I. TAXES

1. Gross Income Deductions

The IRS allows service members to exclude several types of pay from being reported as gross income in their federal tax return. Exceptions include basic allowance for housing (BAH), basic allowance for subsistence (BAS), overseas housing allowance, dislocation allowance, per diem, and more. The second table within IRS (2017c) publication three lists each pay excluded in greater detail. Combat pay is excluded from federal taxes for all enlisted, warrant officer, and chief warrant officer; commissioned officers may exclude combat pay from federal taxes up to the highest enlisted basic pay plus imminent danger pay (IRS, 2017c). For 2017, the highest enlisted basic pay of \$7,844.70 plus imminent danger pay of \$225 totaled \$8,069.70 (Defense Finance and Accounting Service, 2017). Combat pay should be counted when determining IRA contribution and deduction limits (IRS, 2017c).

2. States That Do Not Tax Active-Duty Military Pay

Some states exempt all active-duty military pay from state income tax. Other states tax a portion or all of their pay. New Jersey is the only state that taxes active-duty military basic pay and combat pay earned from a combat zone (Sahadi, 2015). Service members are unable to change their home of record to reduce their state tax liability without a break in service of more than 24 hours (Navy Personnel Command [NPC], 2015). This causes some service members to pay no state income tax throughout their entire career in the military. Other service members are not as fortunate; service members with California as their home of record, faced the highest state income tax rate in 2016 (TurboTax, 2016).

For a single or married Marine filing separately with a taxable income between 41,629 and \$52,612, the Marine would be taxed at \$1,437.79 plus eight percent of the amount over \$41,629 (State of California, 2017). For a single or married Marine filing separately with a taxable income between \$52,612 and \$268,750, the Marine would be taxed at \$2,316.43 plus 9.30 percent of the amount over \$52,612 (State of California, 2017). Married Marines filing a joint return with a taxable income between \$38,002 and \$59,978 are taxed at \$599.74 plus four percent of the amount over \$38,002 (State of California, 2017).

3. States That Do Not Tax Military Retirement Pay

Tax planning is a very important part of retirement planning (Sheedy, 2014). This is the reason why Florida is so popular among retirees; they have no inheritance, estate, and state income tax (Kiplinger, 2017). The following states exempt military retirement pay from state income tax: Alabama, Alaska, Connecticut, Florida, Hawaii, Illinois, Kansas, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Nevada, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, South Dakota, Tennessee, Texas, Washington, Wisconsin, and Wyoming

(Marine Officers Association of America [MOAA], 2017). Only California, North Dakota, and Vermont do not exempt military retirement pay from state taxation (MOAA, 2017). The remaining states partially exempt military retirement pay (MOAA, 2017). Figure 3 shows a summary of how states tax military retirement pay.

Physically demanding jobs only get harder to perform as a retiree ages. A service member who is used to lifting 50 or 100 lbs throughout the day at work will be unlikely to sustain this physical agility 10, 20, or even 30 years after retiring from the military. This may force a service member to change career fields or reduce their income stream by pursuing a different career. A military retiree may find themselves leaving their second career earlier than planned to care for a family member.

The Employee Benefit Research Institute reported that 46 percent of retirees actually spent more money during the first two years after retirement and 33 percent spent more during the first six years after retirement (Kochanek et al., 2016). Any service member who leaves the military without a disability or non-disability retirement plan will quickly learn how expensive health care can be in retirement. USATODAY columnist Maurie Beckman (2017) reported that a 65-year-old couple would spend on average, \$377,000 on health care expenses while in retirement.

In 2016, the average retiree collected \$16,092 annually in Social Security retirement benefits (SSA, 2017b). Even if a retiree does not have a mortgage or rent payment each month, this would still be difficult to live off of. From 2000 through 2016, inflation averaged 2.17 percent while COLA averaged 2.15 percent (SSA, 2017e; World Bank, 2017). Since Social Security COLA raises lagged inflation, a retiree's purchasing power has decreased.

K. RETIREMENT CALCULATORS

1. USAA Military Retirement Comparison Tool

On March 13, 2017, United Services Automobile Association (USAA) launched a military retirement comparison tool to help eligible service members choose between the two retirement systems since DoD's Blended Retirement System comparison calculator was not available at that time (United Services Automobile Association [USAA], 2017). USAA's tool required the service member to input data on three different web pages and then provided a service member a comparison between the two retirement systems on the fourth web page (USAA, 2017). The left side of the fourth web page with an assumed seven percent average rate of return, displayed the TSP value under three options: first, a one

percent DoD automatic contribution without a service member contributing, second, a five percent contribution by both DoD and the service member, and third, a five percent contribution by DoD and a 10 percent contribution by the service member (USAA, 2017). The right side of the forth web page displayed the Legacy Retirement System and the Blended Retirement System monthly pension after assuming retirement at the grade of 0–5 with 20 years of creditable service (USAA, 2017).

USAA’s tool did not allow a service member to adjust the average rate of return, their contribution to TSP, their projected grade of retirement, and the number of creditable years served past 20 years. USAA’s tool does not mention or provide financial numbers for a service member who elected to take a 25 or 50 percent lump sum under the Blended Retirement System.

2. Service Calculators

a. Navy

Even though DoD’s retirement calculator has a link to a Navy benefits calculator, the link is broken. The Navy benefits calculator can be easily found with an online search engine. The Navy benefits website links active-duty service members to DoD’s retirement calculator page (NPS, 2017). The Navy benefits website links reservists to an Army website that no longer exists (NPC, 2017).

b. Air Force

The Air Force calculator website requires a service member to answer 10 different questions. The output provided is a monthly estimate for the High-36 and the CSB/REDUX retirement plan as well as an estimate for the cost and an annuity estimate for the Survivor Benefit Plan (Air Force Personnel Center, 2017).

3. DoD Calculators

a. Typical Scenarios

Before selecting a calculator, DoD provided a link for a service member to view typical retirement scenarios. For Officers, four scenarios were displayed: 0–5 retiring at

20 years, 0–5 retiring at 24 years, 0–6 retiring at 30 years, and a CWO-3 retiring at 22 years (DoD, 2017g). For enlisted service members, three scenarios were displayed: E-7 retiring at 20 years, E-8 retiring at 24 years, and an E-9 retiring at 30 years (DoD, 2017g). Each scenario displayed two charts; the first chart was the gross monthly retired pay and the second chart was the accumulated savings. Each scenario made an unchangeable assumption about the age of the service member at retirement, their life expectancy, and an eight percent rate of return (DoD, 2017g).

b. Retirement Choice Calculator

This DoD retirement choice calculator was designed to show a service member a comparison between the High-36 and CSB/REDUX retirement plan (DoD, 2017f). DoD’s retirement choice calculator directs Army service members to the My Army Benefits website and Air Force and Navy personnel to the Air Force retirement separations website. The Air Force website does not require a common access card (CAC) to access the website. The Army website requires a CAC.

c. Regular Military Compensation Calculator

The Regular Military Compensation (RMC) calculator was designed to provide a service member with basic level of indirect and direct compensation received. The output shows a service member’s total compensation, their taxable income after deductions, and that BAH and BAS are not taxable (DoD, 2017h). The RMC is used to determine the civilian salary equivalent (DoD, 2017h).

d. Final Pay Calculator

DoD’s Final Pay calculator allows a service member to adjust three career factors: projected year the service member will retire, number of years and months of creditable service, and the projected grade at retirement (DoD, 2017i). The Final Pay calculator requires a service member to select an average tax rate once retired and assumes an annual basic pay raise of 2.1 percent each year until retirement (DoD, 2017i). The output is broken into three parts: first, a summary results table showing monthly, annual, and cumulative

pay every 10 years, second, a projection of monthly pay each year for the next 40 years, and third, the cumulative pay at the end of each year for the next 40 years (DoD, 2017i).

e. High-36 Calculator

The High-36 calculator link directly from DoD's retirement calculator website is broken. A quick search through an online search engine allows a service member to find the High-36 calculator. The High-36 calculator allows a service member to adjust the same factors and tax rate as the Final Pay calculator (DoD, 2017j). The High-36 calculator displays the data in the same output format as the Final Pay calculator (DoD, 2017j).

f. CSB/REDUX Calculator

The CSB/REDUX calculator link directly from DoD's retirement calculator website is broken. The CSB/REDUX calculator can easily be found through an online search engine. The CSB/REDUX calculator requires a service member to following questions: what year they will reach 15 years of creditable service, the service member's age at 15 years of creditable service, the number of years and months of creditable service they are projected to have at retirement, their grade at retirement, and how much of the bonus will be invested in a retirement account after paying 25 percent tax (DoD, 2017k). The output model assumes an annual CSB/REDUX COLA increase of three-tenths of a percent and an annual return rate of five percent for the amount invested in a retirement account (DoD, 2017k). The CSB/REDUX output is formatted the same way as the High-36, providing service members monthly and accumulated savings each year after retirement for the next 40 years (DoD, 2017k).

g. Blended Retirement System Comparison Calculator

On May 9, 2018, DoD released a beta version of their Blended Retirement System Comparison Calculator (Jowers, 2017). DoD recommended that service members eligible to decide between the two retirement systems, complete their mandatory training prior to using the comparison calculator (DoD, 2017l). The calculator requires a service member to input information on the first six screens and then provides a summary between the

Legacy Retirement System and the Blended Retirement System on the seventh screen (DoD, 2017).

The first screen requires a service member to select if they are in the active component or reserve component and if they plan to retire in the active or reserve component (DoD, 2017). The second screen requires a service member to select when they were born, pay entry base date, current grade, estimated service length at retirement, and what month they would opt into the Blended Retirement System (DoD, 2017). The drop down menu for the current grade does not include any of the prior-enlisted Officer grades. The third screen requires a service member to estimate their life expectancy, TSP withdrawal age, TSP contribution rate, and TSP average rate of return (DoD, 2017). The fourth screen projects a service member's promotion until retirement; an override box allows a service member to increase the promotion timeline but not decrease it (DoD, 2017). The fifth screen requires a service member to select the number of installments the career continuation pay bonus will be paid out over and the percent of the bonus invested into TSP (DoD, 2017). The career continuation pay multiplier is fixed at 2.5 times a service member's basic monthly pay even though the multiplier can be between 2.5 to 13 times for active-duty service members. The highest percent the calculator will accept to be invested into TSP is 92 percent. Anything percent higher will default to 92 percent. The sixth screen requires a service member to choose what percent of a lump sum they elect to receive under the Blended Retirement System and the number of installments (DoD, 2017). The GDR used in the lump sum calculation is not displayed.

The seventh screen, the summary page, has the following five tabs: overview, present value, TSP summary, lump sum, and all payments (DoD, 2017). The overview tab displays the value between the two retirement systems in current and future dollars with a line chart and provides the value of each option below the graph (DoD, 2017). The present value tab calculates what the value of each option is worth today but does not disclose the GDR (DoD, 2017). The TSP summary tab shows the total amount a service member will have contributed to their TSP and the total government match (DoD, 2017). The lump sum tab shows the payout based on the lump sum selected on the sixth screen (DoD, 2017).

L. COST OF LIVING ADJUSTMENT

Prior to the 1950 amendments, Social Security payments remained unchanged year after year (SSA, 2017f). The first increase came in September 1950 and the second increase in September 1952; retiree's payments increased 89.5 percent as a result (SSA, 2017f). Any subsequent increases required Congress to enact special legislation to increase Social Security payment to retirees (SSA, 2017f). In an effort to automate and streamline future Social Security increases, Congress legislated and President Nixon signed P.L. 92-336 in 1972 (SSA, 2017f). This law authorized a one-time, 20 percent increase in Social Security payments and automated annual COLA increases based on the CPI (SSA, 2017f). COLA increases were designed to thwart the negative impact of inflation upon retirees receiving Social Security. Even if the CPI was negative, COLA would not be negative; it would remain zero percent (DoD, 2017d).

The average COLA rate between 1975 and 2016 was 3.80 percent; the average COLA rate in the last 10 years was 1.72 percent (SSA, 2017f). Figure 4 graphs the volatility in COLA rate from 1975 to 2016 on a line chart.

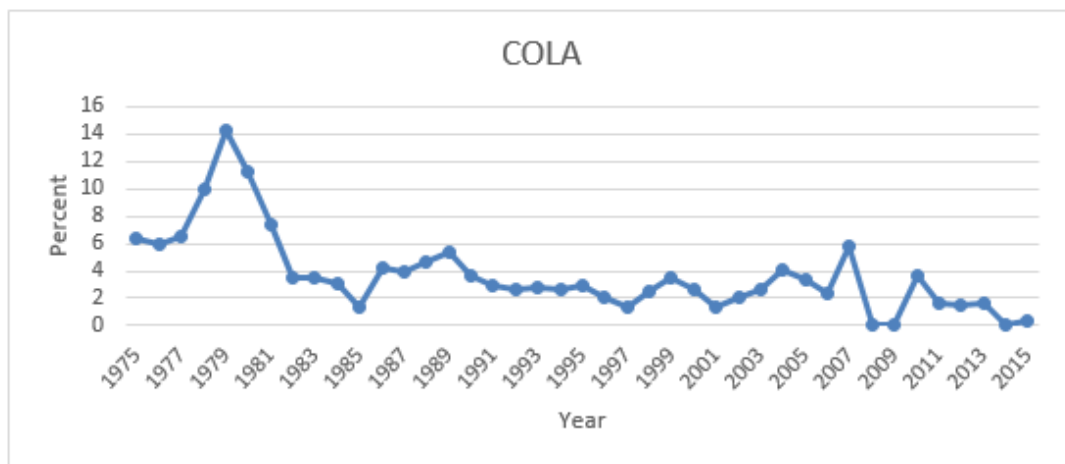


Figure 4. COLA Rates from 1975 to 2016. Adapted from SSA (2017f).

M. INFLATION

Inflation is a rise in the price of services and goods within a larger economy (Harvey, 2011). In other words, assuming a service member's compensation remains the same, their purchasing power will decrease as the cost of services and goods increase. In the short-term, between 2011 and 2016, inflation averaged 1.31 percent (World Bank, 2017). In the long-term, between 1975 and 2016, inflation averaged 3.87 percent (World Bank, 2017). Since recent inflation rates have been substantially lower than the long-term historical inflation average, using a long-term historical inflation average would be more appropriate for long-term retirement planning. Figure 5 graphs the inflation rate volatility between 1975 and 2016.

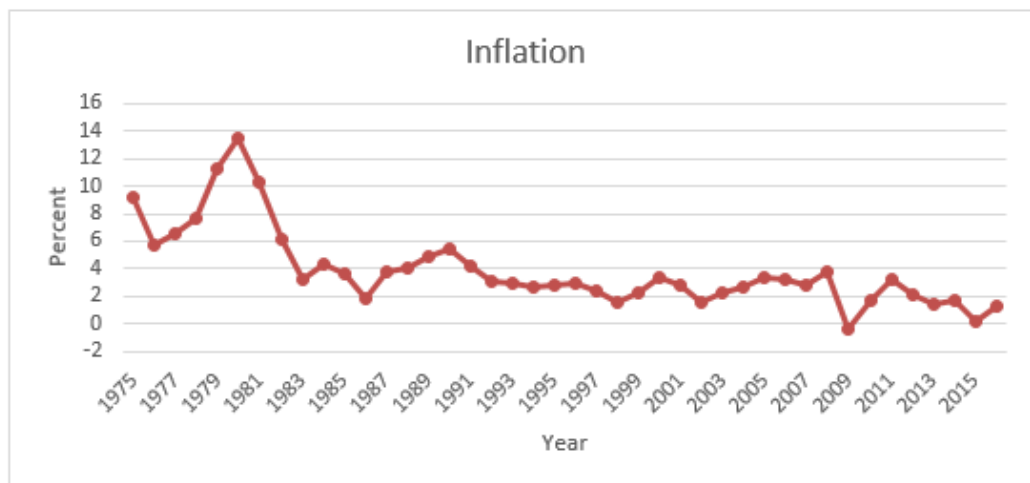


Figure 5. Inflation Rates from 1975 to 2016.
Adapted from World Bank (2017).

The Federal Reserve's (2017) annual inflation target rate is two percent. This rate reduces the risk of deflation in the economy weakens and promotes maximum employment and price stability (Federal Reserve, 2017). From 2013 through 2016, the U.S. inflation rate has been below the Federal Reserve's annual inflation target rate of two percent (World Bank, 2017).

Online Blended Retirement System training is mandated to help eligible Marines choose between the Legacy Retirement System and the Blended Retirement System. Command Financial Specialists and Personal Financial Management Specialists are available to help answer any questions a Marine may have but not make the decision for them. Only the Marine can choose between the two retirement systems. The decision must be made within calendar year 2018. Once made, it cannot be changed. It is up to the individual Marine to develop a retirement plan. Scenarios presented in Chapter III will assist a Marine Corps Officer in understanding and achieving their financial retirement goals.

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III. PROBLEM

A. SCENARIO OVERVIEW

Nine different scenarios were created to assist a Marine Corps Officer in understanding and achieving their financial retirement goals. Each scenario ran multiple times, holding all of the variables constant, except for the one being changed, to understand the impact of the changed variable.

- Scenario One shows how a Marine Corps Officer's estimated net worth can be affected should retirement occur at the time intervals within the scenario.
- Scenario Two shows how quickly an Officer's total savings can grow under different return rates.
- Scenario Three shows the impact the percent saved each year can have on the total savings accumulated after 20 years.
- Scenario Four shows the impact delayed savings can have on the total savings accumulated after 20 years.
- Scenarios Five through Nine show how many years it can take to accumulate a \$1,000,000 net worth.

The following promotion assumptions were made: the active-duty Marine Corps Officer was not prior enlisted and was promoted to the rank of First Lieutenant after three years' time-in-service, promoted to rank of Captain after six years' time-in-service, promoted to the rank of Major after 11 years' time-in-service, was promoted to the rank of Lieutenant Colonel after 17 years' time-in-service, promoted to the rank of Colonel after 22 years' time-in-service (not applicable for Scenarios Two, Three, and Four), and then received no further promotions until retirement.

Inflation and basic pay raises were removed to simplify the scenario. The amounts listed in each scenario are in future dollars. The final assumption was that savings were made in a tax deferred account.

B. SCENARIOS

1. Scenario One

In Scenario One, three experiments were conducted, each with a different number of years served. The first experiment was with 20 years of service, the second with 25 years of service, and the third experiment with 30 years of service before retiring. In this scenario, the assumption is that the active-duty Marine Corps Officer saved 10 percent of their basic pay each year and achieved a six percent average annual rate of return. Appendix A shows the data and formulas used to calculate the output, the estimated net worth. Table 2 shows a tabular summary for Scenario One.

Table 2. Scenario One Summary

Scenario	Return Rate	Retire after	Estimated Net Worth	% saved
1	6.00%	20 years	See 4.A.1	10%
		25 years	See 4.A.1	
		30 years	See 4.A.1	

2. Scenario Two

Four different experiments were conducted by adjusting the annual return rate in each experiment. The first experiment in Scenario Two used a two percent rate of return, the second experiment used a four percent rate of return, the third experiment used a six percent rate of return, and the fourth experiment used an eight percent rate of return. In Scenario Two, the Officer consistently saved 10 percent of their basic pay starting the year they joined the Marine Corps. Appendix B shows the data and formulas used to calculate the output, the savings accumulated after serving 20 years in the Marine Corps. Table 3 shows a tabular summary for Scenario Two.

Table 3. Scenario Two Summary

Scenario	Return Rate	% Saved	Savings Started	Savings after 20 years in Marine Corps
2	2%	10%	Year 1	See 4.A.2
	4%			See 4.A.2
	6%			See 4.A.2
	8%			See 4.A.2

3. Scenario Three

In Scenario Three, four different experiments were conducted by changing the percent the Officer consistently saved each year, starting the year they joined the Marine Corps. The first experiment in Scenario Three was with an Officer who saved five percent of their basic pay, the second experiment used a 10 percent savings rate, the third experiment used a 15 percent savings rate, and the fourth and final experiment used a 20 percent savings rate. Appendix C shows the data and formulas used to calculate the output, the savings accumulated after serving 20 years in the Marine Corps. Table 4 shows a tabular summary for Scenario Three.

Table 4. Scenario Three Summary

Scenario	Return Rate	% Saved	Savings Started	Savings after 20 years in Marine Corps
3	6%	5%	Year 1	See 4.A.3
		10%		See 4.A.3
		15%		See 4.A.3
		20%		See 4.A.3

4. Scenario Four

In Scenario Four, four different experiments were conducted by adjusting the year that a Marine Corps Officer started saving after joining the Marine Corps. The first experiment was with an Officer who started to save the year they joined the Marine Corps,

the second experiment used an Officer who started to save after being in the Marine Corps for five years, the third experiment used an Officer who started to save after being in the Marine Corps for 10 years, and the final experiment in Scenario Four used an Officer who started to save after being in the Marine Corps for 15 years. Appendix D shows the data and formulas used to calculate the output, the savings accumulated. Table 5 shows a tabular summary for Scenario Four.

Table 5. Scenario Four Summary

Scenario	Return Rate	% Saved	Savings Started	Savings after 20 years in Marine Corps
4	6%	10%	Year 1	See 4.A.4
			Year 5	See 4.A.4
			Year 10	See 4.A.4
			Year 15	See 4.A.4

5. Scenarios Five through Nine

An experiment consisting of five different scenarios was conducted to determine the time horizon for a Marine Corps Officer to achieve a hypothetical financial retirement goal, a net worth of \$1,000,000. Scenarios Five through Nine assumed that an active-duty Marine Corps Officer saved 100 percent of their savings into one specific Thrift Savings Plan (TSP) fund. Table 1 in Chapter II describes each TSP fund in greater detail.

In Scenarios Five through Nine, each scenario conducted three experiments by changing the percent of basic pay saved by the Officer throughout their career in the Marine Corps. The following percentages of basic pay saved are common amongst Scenarios Five through Nine: five percent, 10 percent, and 15 percent of an Officer's basic pay. It is assumed that all savings started as soon as the Officer joined the Marine Corps. After 30 years time-in-service, the Marine Corps Officer retired and started working at a new job two months later. The retired Officer stayed at this job for the next 12 years. The new job's salary was equal to the Marine Corps Officer's monthly basic pay prior to retirement. In addition, the Officer received 75 percent of their basic pay under the legacy retirement

system each month. It is also assumed that when the Officer joined the Marine Corps, they had no debt or savings.

Scenario Five used a return rate of 2.63 percent, Scenario Six used a return rate of 4.59 percent, Scenario Seven used a return rate of 7.00 percent, Scenario Eight used a return rate of 8.13 percent, and Scenario Nine used a return rate of 1.02 percent. Appendix E, F, G, H, and I, respectively, show the data and formulas used to calculate the output, the time (in years) it would take to accumulate a \$1,000,000 net worth. All of the return rates reflect TSP's actual 10 year compound return rate ending in 2016 for each TSP fund (TSP, 2017g). Table 6 shows a tabular summary of Scenarios Five through Nine.

Table 6. Scenarios Five through Nine Summary

Scenario	TSP Fund	Return Rate	% Saved	Time to accumulate \$1,000,000 net worth
5	G Fund	2.63%	5%	See 4.A.5
			10%	See 4.A.5
			15%	See 4.A.5
6	F Fund	4.59%	5%	See 4.A.5
			10%	See 4.A.5
			15%	See 4.A.5
7	C Fund	7.00%	5%	See 4.A.5
			10%	See 4.A.5
			15%	See 4.A.5
8	S Fund	8.13%	5%	See 4.A.5
			10%	See 4.A.5
			15%	See 4.A.5
9	I Fund	1.02%	5%	See 4.A.5
			10%	See 4.A.5
			15%	See 4.A.5

C. DECISION SUPPORT TOOL FOR RETIREMENT PLANNING

1. Overview

The decision support tool for retirement planning was created using the 2013 version of Microsoft Excel with a Microsoft Windows operating system. Opening the tool in a medium with a different operating system, like an iPad for example, may prevent a service member from viewing comments that were added to specific cells to prevent the tool from becoming too busy.

The decision support tool for retirement planning has six different tabs. The first and second tabs were tailored specifically for service members with a basic understanding of retirement; these tabs are titled Basic Cash Flow and Basic Net Worth. These tabs are not as detailed as the advanced tabs for net worth and cash flow but are close enough for a service member to use to make informed decisions from.

The third and fourth tabs are the advanced versions of net worth and cash flow titled Advanced Cash Flow and Advanced Net Worth. These advanced tabs were tailored specifically for service members with an advanced understanding of retirement finance. Each advanced tab includes all of the input variables used in the basic version and includes additional input variables to provide a service member with a more accurate output.

The fifth tab, titled BRS vs LRS, stands for Blended Retirement System versus the Legacy Retirement System. Only one version was created because the integrity of the output was compromised in a basic version that removed one or more input variables. To mitigate the complexity of this tab, additional comments were added to explain concepts and terms in the tab.

The sixth tab, titled Data & Calculations, is a repository for data used by one or more of the other tabs. This tab includes the military basic pay chart for Officers with two or less years time-in-service all the way through 40 years of time-in-service. This pay chart is only applicable to active-duty Officers.

Some of the cells within each tab have a red triangle in the upper right hand corner of a cell. This is an indicator that the cell has a comment. Comments were added to provide

additional information for a service member to understand a concept or term used within the respective tab.

Each tab has a legend in the lower right hand corner of the screen. Gray colored cells are formulated and it is highly recommend that service members do not modify any of the gray colored cells. Modifying one or more gray colored cells will likely affect other cells that reference the cell modified. This could compromise the integrity of the entire tool. Yellow colored cells are input cells, which should be changed based on a service member's unique situation.

2. Description of Terms

a. Appreciating Assets

Appreciating assets are expected in the long-term to achieve a positive rate of return but in the short term, due to volatility, may yield a negative rate of return. Appreciating assets are further broken down into three different categories: tax exempt, tax deferred, and taxable. If an asset is tax exempt, investment earnings grow tax free and are not taxed upon withdrawal if the Internal Revenue Service (IRS) individual retirement account (IRA) rules are followed. Tax deferred assets allow investment earnings to grow tax free until withdrawn. Assets withdrawn from a tax exempt and tax deferred account may trigger an IRS early withdrawal penalty of 10 percent if the funds are withdrawn before the age of 59.5 years old and are not exempted under the IRS publication 590-B (IRS, 2017b). Realized investment earnings for taxable assets will require a service member to report the earnings when filing their next tax return.

b. Depreciating Assets

Depreciating assets can lose value each year, even if they are not used. According to Forbes Magazine, a new car can lose 20 percent of its value as soon as it is driven off the dealer's lot (Elliott, 2010). The value of the vehicle continues to fall as the odometer on the vehicle rises.

c. Debt

Any money you owe is considered debt. For example, if you own a home but have a first mortgage, then list the home as an appreciating asset and the first mortgage as a debt. If the entire credit card balance is not paid off each month, then the balance should be listed as a debt. If the credit card balance is paid off each month, then write down that there is a credit card under debt but list the balance owed as \$0.00. The interest rate charged on debt can either be a fixed rate or a variable rate. Variable rates tend to be initially lower than fixed rates but can be changed based on how the rate is indexed.

d. Average Return Rate

The average return rate used within the tool represents the weighted average annual return rate for appreciating assets. This rate is defined after any management or administration fees incurred from the funds invested in are subtracted. The rate should not be reduced by taxes.

e. Estimated Net Worth

The estimated net worth value listed within the decision support tool for retirement planning reflects pre-taxed values. An estimated net worth value can be further reduced if assets in a tax deferred or from a tax exempt account are withdrawn under conditions not approved by the IRS.

f. Risk Appetite

Statistically speaking, investing in lottery tickets with the hope of winning millions of dollars is a high risk investment because of the low probability of winning. A low risk investment can include a certificate of deposit, which provides a small but consistent interest payment on a consistent basis. Some service members may be comfortable with extreme volatility in exchange for a chance at obtaining a higher rate of return. Other service members may have a medium risk appetite and decide to invest in a diversified mutual fund.

D. BASIC CASH FLOW

1. Basic Cash Flow Inputs

Starting from left to right, a service member should list their incoming monthly pay, monthly expenses, any outstanding debt, balanced owed on the debt, the interest rate on the debt, the monthly payment made on the debt, federal taxes, state taxes, and any local taxes. The basic cash flow inputs only impacts a service member's current cash flow. The input cells are colored yellow.

2. Basic Cash Flow Outputs

The formulated cells for the Basic Cash Flow tab are: incoming subtotal, expenses subtotal, debt subtotal, taxes subtotal, and the net cash flow. All of these figures reflect monthly values. The formulated cells are colored gray. Data from the output cells was graphed using a pie chart. Figure 6 is a screenshot of the Basic Cash Flow tab.

E. BASIC NET WORTH

1. Basic Net Worth Inputs

Starting from left to right the following should be inputted (if applicable): the pre-taxed value of each type of appreciating asset, their respective annual return rate, each depreciating asset, their value, each type of debt, the balance owed for each debt, the annual interest rate, the monthly payment, and the current year. The input cells are colored yellow.

2. Basic Net Worth Outputs

The formulated cells for the Basic Net Worth are: appreciating assets subtotal, depreciating assets subtotal, debt subtotal, monthly savings, and average return rate. Formulated cells are colored gray. The monthly savings comes from the net cash flow value calculated in the Basic Cash Flow tab.

A line chart graphed the future value of the estimated net worth output data for the current and following 39 years. The estimated net worth calculation assumed that depreciating assets did not lose their value over time and that the interest rates on each debt were fixed. Figure 7 is a screenshot of the Basic Net Worth tab.

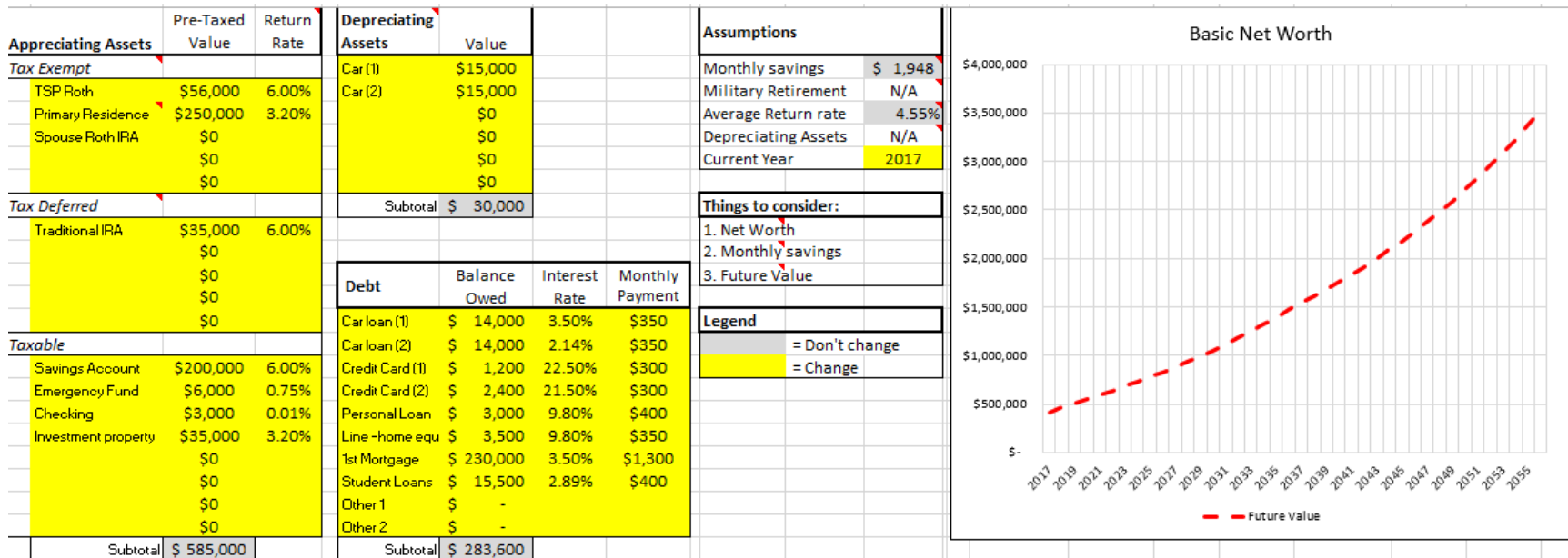


Figure 7. Basic Net Worth Tab

F. ADVANCED CASH FLOW

1. Advanced Cash Flow Inputs

From the left to right the following should be inputted (if applicable): age, current year, any incoming income (listed as a monthly figure), outgoing debt and expenses (listed as a monthly figure), pension cost of living adjustment (COLA), Social Security COLA, and the year the Officer plans to retire from the military. Input cells are colored yellow.

2. Advanced Cash Flow Outputs

The output for the advanced cash flow is the monthly net cash flow for the current year as well as for the next 39 years. A line chart graphed the output data. Future net cash flows can significantly change based on the retirement system pension a service member retires under, if they plan on working after retiring from the military, and at what age they elect to start receiving Social Security retirement benefits. In the event of a cash flow shortfall, the assumption was that the shortfall would be subtracted from their net worth instead of reducing expenditures to return to a positive or break-even cash flow. In the event of a cash flow surplus, the assumption was that the surplus would be invested, instead of being spent. The formulated cells are colored gray. Figure 8 is a screenshot of the Advanced Cash Flow tab.

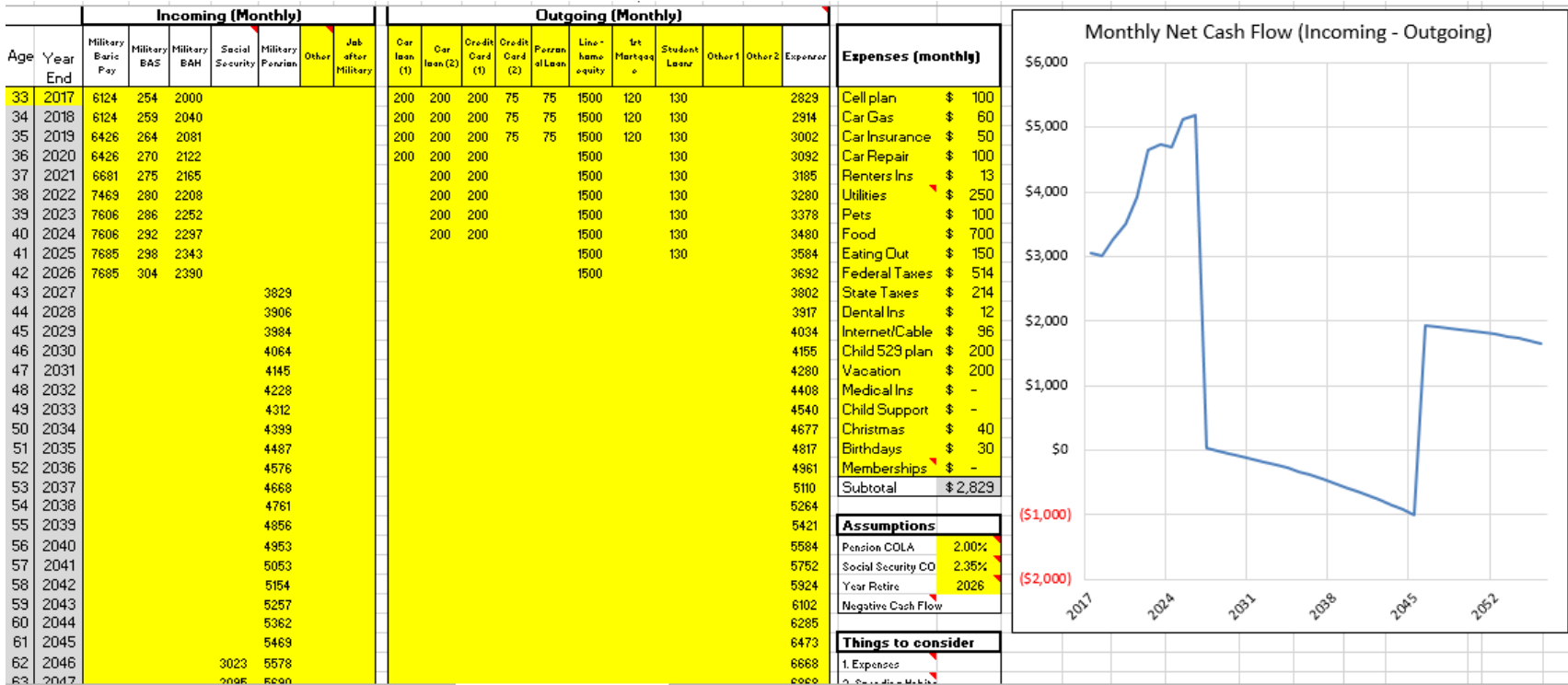


Figure 8. Advanced Cash Flow Tab

G. ADVANCED NET WORTH

1. Advanced Net Worth Inputs

Starting from left to right the following should be inputted (if applicable): the pre-taxed value of each type of appreciating asset, their respective annual return rate, depreciating assets, their value, the percent it is expected to depreciate each year, each type of debt, the balance owed for each debt, the annual interest rate on each debt owed, monthly payment paid on each debt, monthly basic pay, percent of basic pay saved to TSP, percent of basic pay raise saved, the government match (applies only to service members under the Blended Retirement System), the year the Officer expects to retire from the military, the current year, estimated return rate, and inflation rate. The input cells are colored yellow.

2. Advanced Net Worth Outputs

The output for the advanced net worth is the present and future value of the estimated net worth for the current year as well as for the next 39 years. A line chart graphed the output data. The present value was calculated by discounting the future value with the number inputted in cell M17. Formulated cells include appreciating assets subtotal, total assets, weighted average return rate for appreciating assets, depreciating assets subtotal, total debt, and weighted average interest rate for debt. The formulated cells are colored gray. Figure 9 is a screenshot of the Advanced Net Worth tab.

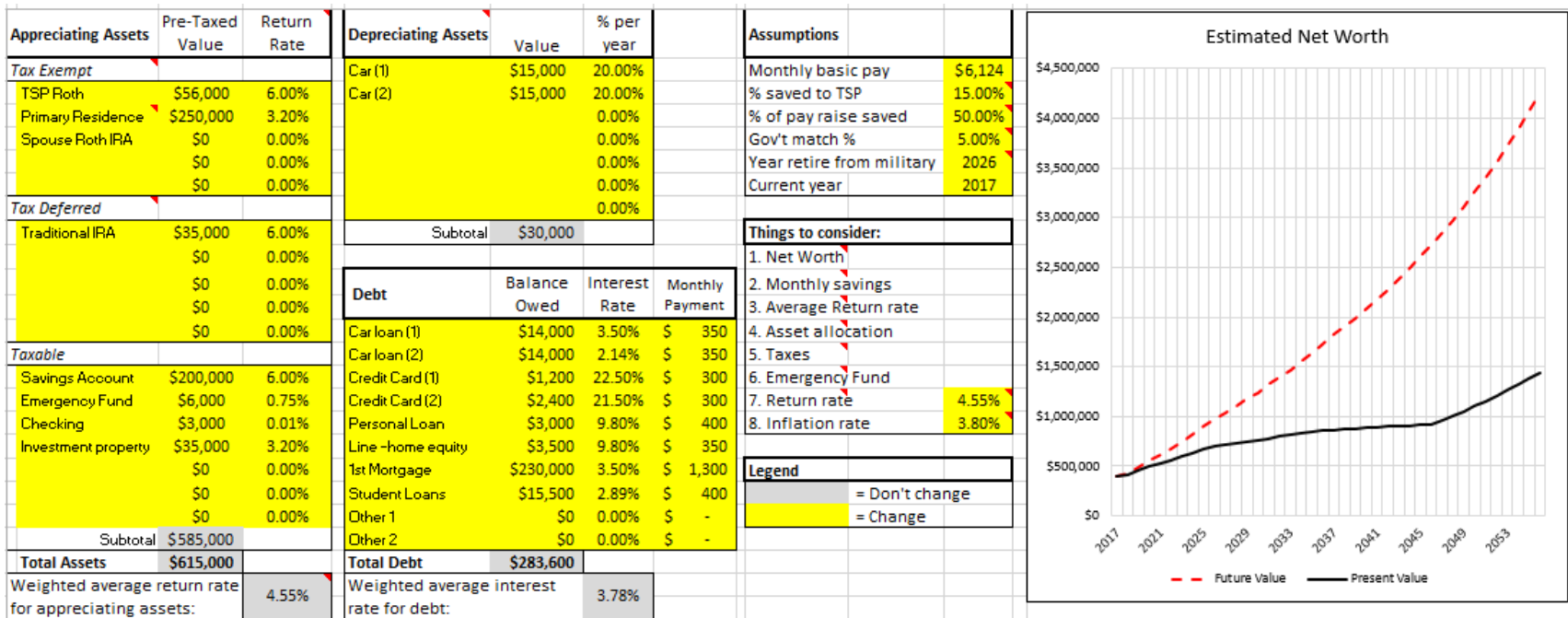


Figure 9. Advanced Net Worth Tab

H. BLENDED RETIREMENT SYSTEM VERSUS LEGACY RETIREMENT SYSTEM

1. Blended Retirement System versus Legacy Retirement System Inputs

A list of inputs for the Blended Retirement System and the Legacy Retirement System were consolidated in Table 7. These values should be changed based on an Officer's unique situation. Yellow colored cells are input cells.

Table 7. Blended Retirement System versus Legacy Retirement System Inputs

Inputs: Blended Retirement System vs. Legacy Retirement System	
	Example
Monthly Budget (invest the rest)	\$3,829
Annual return rate	4.50%
Retire at ___ years	20
High -36 average	\$7,658
Current year	2017
Year retired from military	2026
Year Marine turns 67	2051
Average annual COLA raise	2.65%
Average annual inflation	2.80%
% invested in TSP	16.00%
Career continuation pay (CCP)	
Multiplier	2.5
Monthly pay	\$6,124
% of CCP invested in TSP	100%
CCP tax rate	15%
Lump Sum	
Government discount rate	6.27%
% of lump sum invested	100%
Lump sum tax rate (fed+state+local)	20%
% Gov't auto contribute + match	5.00%

2. Blended Retirement System versus Legacy Retirement System Outputs

The Blended Retirement System versus Legacy Retirement System output is the monthly pension and the total retirement value, starting the year the Officer retires from the military and for the next 39 years. A line chart graphed the output from the total retirement value and a separate line chart graphed the monthly pension. Each graph has four lines depicting the four different retirement options.

- Option 1: The Legacy Retirement System.
- Option 2a: The Blended Retirement System with 0 percent lump sum
- Option 2b: The Blended Retirement System with a 50 percent lump sum
- Option 2c: The Blended Retirement System with a 25 percent lump sum

Formulated cells are colored gray. The formulated cells from the left to the right are: Career Continuation Pay (after tax), net present value of the Blended Retirement System's 50 percent lump sum (after tax), and the net present value of the Blended Retirement System's 25 percent lump sum (after tax), current year, the next 39 years, and years until retirement. Figure 10 is a screenshot of the two output graphs in the Blended Retirement System versus Legacy Retirement System tab.

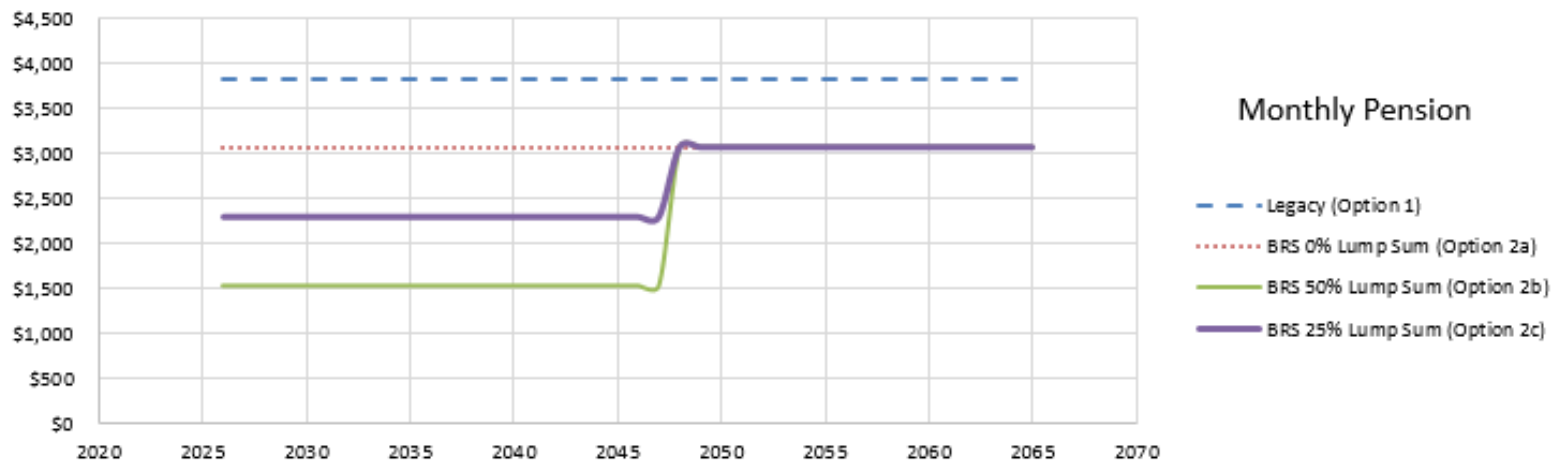
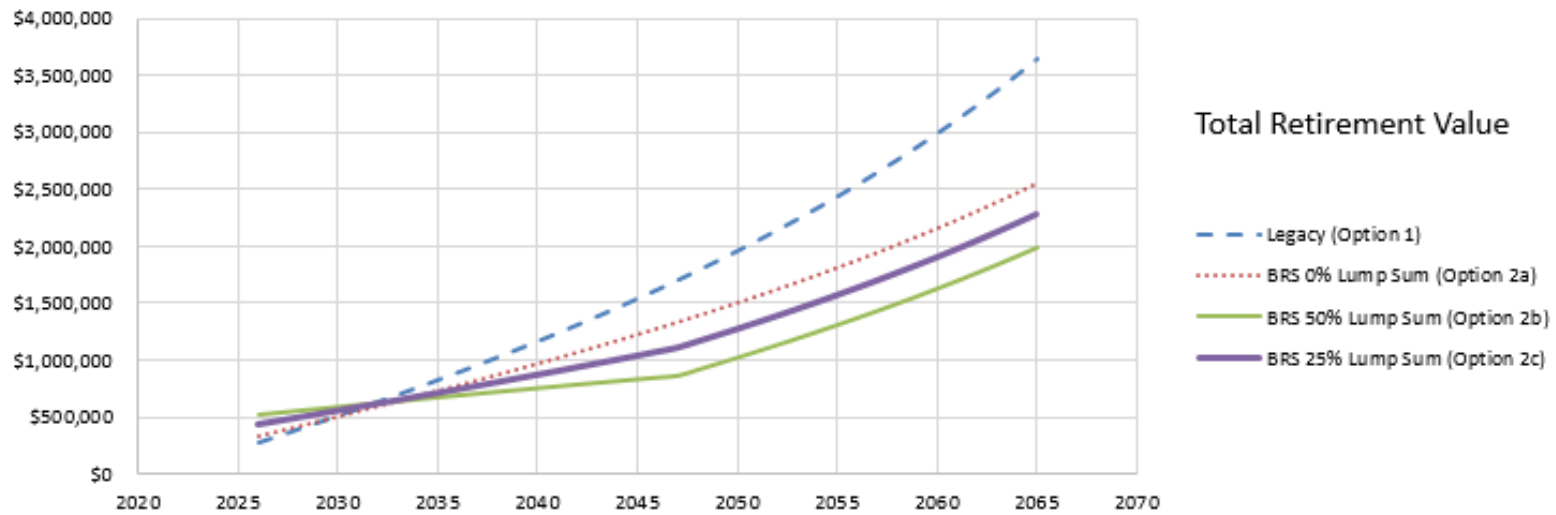


Figure 10. Blended Retirement System versus Legacy Retirement System Output Graphs

I. RETIREMENT TOOL COMPARISON

1. Overview

The Blended Retirement System versus Legacy Retirement System tab within the decision support tool for retirement planning was compared to a commercial and a government tool that was specifically designed to help eligible service members choose between the Blended Retirement System and the Legacy Retirement System. A comparison was conducted through two case studies. The first case study conducted a comparison between the inputs variables and the outputs available within each tool. The second case study fed the same input variables through each tool to compare the output data in future dollars for three different Marine Corps Officers.

2. Case Study One

The left column in Table 8 shows the inputs being compared amongst the following tools in the right hand columns: commercial, government, and thesis. A “✓” in a green colored cell was placed in the respective commercial, government, or thesis column that answered yes to the input listed. An “X” in a red colored cell was placed in the respective commercial, government, or thesis column that answered no to the input listed. Table 9 did the same thing for outputs.

Table 8. Case Study One Input Summary

INPUTS	Commercial	Government	Thesis
Supports active-duty service members	See 4.B.1.a	See 4.B.1.a	See 4.B.1.a
Supports reserve service members			
Able to select between all ranks			
Able to select or input years served			
Able to fully adjust average return rate			
Able to select or input retire at ____ years			
Able to select or input age turn 67			
Able to fully adjust average COLA raises			
Able to fully adjust annual inflation			
Able to fully adjust service member percent invested in TSP			
Able to select or input a retirement budget			
Able to fully adjust the Career Continuation Pay (CCP) multiplier			
Able to fully adjust the percent of the CCP invested into TSP			
Able to fully adjust when the CCP will be received			
Able to adjust the tax rate on the CCP			
Able to adjust CCP over 1 - 4 installments			
Able to fully adjust the Blended Retirement System (25 or 50 % lump sum discount rate (referred to as Government Discount Rate)			
Able to fully adjust the % of the lump sum invested			
Able to fully adjust the tax rate on the lump sum			
Able to fully adjust the government auto contribution and match			
Able to adjust lump sum being received over 1 - 4 installments			
Able to adjust life expectancy			
Able to adjust TSP withdrawal age			

Table 9. Case Study One Output Summary

OUTPUTS	Commercial	Government	Thesis
Calculates monthly pension for legacy retirement system	See 4.B.1.b	See 4.B.1.b	See 4.B.1.b
Calculates monthly pension for Blended Retirement System with 0% lump sum			
Calculates monthly pension for Blended Retirement System with 25% lump sum			
Calculates monthly pension for Blended Retirement System with 50% lump sum			
Calculates present value of both retirement systems			
Calculates future value of both retirement systems			
Calculates Career Continuation Pay			
Calculates TSP savings (based on service member's contribution and government auto contribution and match)			

3. Case Study Two

The second case study was conducted with an active-duty Second Lieutenant Officer with one year time-in-service, an active-duty Captain with six years' time-in-service and an active-duty Major with 11 years' time-in-service as of December 31, 2017. The Second Lieutenant started saving after one year time-in-service, the Captain started to save after six years' time-in-service, and the Major started to save after 11 years' time-in-service. The commercial, government, and thesis' tool will compare the value of the four different retirement options in future dollars.

- Option 1: The Legacy Retirement System.
- Option 2a: The Blended Retirement System with 0 percent lump sum
- Option 2b: The Blended Retirement System with a 50 percent lump sum
- Option 2c: The Blended Retirement System with a 25 percent lump sum

Table 10 lists the assumptions for an active-duty Marine Corps Officer without prior enlisted time.

Table 11 is a summary of the comparison being conducted within case study two.

Table 10. Case Study Two Assumptions

	First Lieutenant	Captain	Major	Lieutenant Colonel
Promotion (time-in-service)	3 years	5 years	10 years	17 years
Retire	After 20 years time-in-service at age 42			
Life expectancy	87 years			
Career Continuation Pay	2.5 x basic monthly pay at 12 years time-in-service			
Average tax rate	25%			
Contribute to TSP	10%			
Lump Sum Discount Rate	6.99%			
Average return rate	7%			
Cost of Living Adjustment	1.90%			
Inflation	1.90%			

Table 11. Case Study Two Summary

Lifetime Retirement Benefit (Future Dollars)		Commercial	Government	Thesis
Second Lieutenant (1 year time-in-service)	Legacy Retirement System			
	Blended Retirement System 0% Lump Sum			
	Blended Retirement System 25% Lump Sum			
	Blended Retirement System 50% Lump Sum			
Captain (6 years time-in-service)	Legacy Retirement System			
	Blended Retirement System 0% Lump Sum			
	Blended Retirement System 25% Lump Sum			
	Blended Retirement System 50% Lump Sum			
Major (11 years time-in-service)	Legacy Retirement System			
	Blended Retirement System 0% Lump Sum			
	Blended Retirement System 25% Lump Sum			
	Blended Retirement System 50% Lump Sum			

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IV. DATA ANALYSIS

A. SCENARIO RESULTS

1. Scenario One

In Scenario One, assuming a six percent average annual rate of return and an active-duty Marine Corps Officer saving 10 percent of their basic pay each year, an Officer could expect to accumulate an estimated net worth of \$270,021 after 20 years of time-in-service, \$433,600 after 25 years of time-in-service, and \$659,889 after 30 years of time-in-service in the Marine Corps. Table 12 shows Scenario One's results in tabular form.

Table 12. Results for Scenario One

Scenario	Return Rate	Retire after	Estimated Net Worth	% saved
1	6.00%	20 years	\$270,021	10%
		25 years	\$433,600	
		30 years	\$659,889	

2. Scenario Two

The largest savings, \$331,766, accumulated after 20 years' time-in-service in the Marine Corps, occurred with an eight percent annual return rate when savings were started the same year the Officer joined the Marine Corps. The second largest savings, \$270,021, were achieved with an annual return rate of six percent. The third largest savings, \$221,335, were achieved with an annual return rate of four percent. The smallest savings, \$182,817, were achieved with a two percent annual return rate. Table 13 shows Scenario Two's results in tabular form.

Table 13. Results for Scenario Two

Scenario	Return Rate	% Saved	Savings Started	Savings after 20 years in Marine Corps
2	2%	10%	Year 1	\$182,817
	4%			\$221,335
	6%			\$270,021
	8%			\$331,766

3. Scenario Three

In Scenario Three, assuming a six percent average annual rate of return and an active-duty Marine Corps Officer who started saving the year they joined the Marine Corps, could expect to accumulate \$135,010 if they saved five percent of their basic pay, \$270,021 if they saved 10 percent of their basic pay, \$405,031 if they saved 15 percent of their basic pay, and \$540,042 if they saved 20 percent of their basic pay. Table 14 shows Scenario Three’s results in tabular form.

Table 14. Results for Scenario Three

Scenario	Return Rate	% Saved	Savings Started	Savings after 20 years in Marine Corps
3	6%	5%	Year 1	\$135,010
		10%		\$270,021
		15%		\$405,031
		20%		\$540,042

4. Scenario Four

Scenario Four assumed a six percent annual rate of return and that the Officer saved 10 percent of their basic pay. If savings were started the year the Officer joined the Marine Corps, then they could expect to accumulate \$270,021. If savings were started after being in the Marine Corps for five years, the Officer could expect to accumulate \$218,864. If

savings were started 10 years after joining the Marine Corps, an Officer could expect to accumulate \$143,242 after serving 20 years. If savings were started 15 years after joining the Marine Corps, an Officer could expect to accumulate \$72,529 after serving 20 years in the Marine Corps. Table 15 shows the results from Scenario Four in tabular form.

Table 15. Results for Scenario Four

Scenario	Return Rate	% Saved	Savings Started	Savings after 20 years in Marine Corps
4	6%	10%	Year 1	\$270,021
			Year 5	\$218,864
			Year 10	\$143,242
			Year 15	\$72,529

5. Scenarios Five through Nine

Scenario Nine, with an assumed five percent savings rate generated the longest time period to accumulate a net worth of \$1,000,000 requiring 98 years. Scenario Five, with an assumed five percent savings rate, generated the second longest time period by taking 67 years. Scenario Nine, with an assumed savings rate of 10 percent, generated the third longest time period by requiring 61 years. Scenario Six with an assumed savings rate of five percent, generated the fourth longest time period by taking 51 years. Scenario Eight had the shortest time period to accumulate a net worth of \$1,000,000 with an assumed savings rate of 15 percent by taking 27 years. Table 16 shows a summary of the number of years required to accumulate a net worth of \$1,000,000.

Table 16. Results for Scenario's Five through Nine

Scenario	TSP Fund	Return Rate	% Saved	Time to accumulate \$1,000,000 net worth
5	G Fund	2.63%	5%	67 years
			10%	46 years
			15%	37 years
6	F Fund	4.59%	5%	51 years
			10%	38 years
			15%	33 years
7	C Fund	7.00%	5%	41 years
			10%	33 years
			15%	29 years
8	S Fund	8.13%	5%	38 years
			10%	31 years
			15%	27 years
9	I Fund	1.02%	5%	98 years
			10%	61 years
			15%	43 years

B. DECISION SUPPORT TOOL FOR RETIREMENT PLANNING RESULTS

Each Officer's output for the Basic Cash Flow, Basic Net Worth, Advanced Cash Flow, and Advanced Net Worth will be different based on input variables reflecting their unique situation. Line and pie charts were added to help Officers absorb the large amount of output data.

1. Case Study One

a. Input Results

Table 17 shows whether the commercial, government, and thesis tool answered yes or no to the 23 inputs listed. The commercial tool had four yes's and 19 no's, the government tool had 15 yes's and eight no's, and the thesis tool had 18 yes's and five no's.

Table 17. Case Study One Input Results.

INPUTS	Commercial	Government	Thesis
Supports active-duty service members	✓	✓	✓
Supports reserve service members	✓	✓	X
Able to select between all ranks	X	X	✓
Able to select or input years served	✓	✓	✓
Able to fully adjust average return rate	X	✓	✓
Able to select or input retire at ___ years	✓	✓	✓
Able to select or input age turn 67	X	✓	✓
Able to fully adjust average COLA raises	X	X	✓
Able to fully adjust annual inflation	X	X	✓
Able to fully adjust service member percent invested in TSP	X	✓	✓
Able to select or input a retirement budget	X	X	✓
Able to fully adjust the Career Continuation Pay (CCP) multiplier	X	✓	✓
Able to fully adjust the percent of the CCP invested into TSP	X	✓	✓
Able to fully adjust when the CCP will be received	X	✓	✓
Able to adjust the tax rate on the CCP	X	X	✓
Able to adjust CCP over 1 - 4 installments	X	✓	X
Able to fully adjust the Blended Retirement System (25 or 50% lump sum discount rate (referred to as Government Discount Rate)	X	X	✓
Able to fully adjust the % of the lump sum invested	X	X	✓
Able to fully adjust the tax rate on the lump sum	X	X	✓
Able to fully adjust the government auto contribution and match	X	✓	✓
Able to adjust lump sum being received over 1 - 4 installments	X	✓	X
Able to adjust life expectancy	X	✓	X
Able to adjust TSP withdrawal age	X	✓	X

Adapted from DoD (2017I); USAA (2017).

b. Output Results

The commercial tool had two yes's and six no's. The government and thesis tool both had eight yes's. Table 18 shows whether the commercial, government, and thesis tool answered yes or no to the eight different outputs listed.

Table 18. Case Study One Output Results.

OUTPUTS	Commercial	Government	Thesis
Calculates monthly pension for legacy retirement system	✓	✓	✓
Calculates monthly pension for Blended Retirement System with 0% lump sum	✓	✓	✓
Calculates monthly pension for Blended Retirement System with 25% lump sum	X	✓	✓
Calculates monthly pension for Blended Retirement System with 50% lump sum	X	✓	✓
Calculates present value of both retirement systems	X	✓	✓
Calculates future value of both retirement systems	X	✓	✓
Calculates Career Continuation Pay	X	✓	✓
Calculates TSP savings (based on service member's contribution and government auto contribution and match)	X	✓	✓

Adapted from DoD (2017); USAA (2017).

2. Case Study Two

The commercial tool only calculated the Legacy Retirement System and the Blended Retirement System with a zero percent lump sum. For the Second Lieutenant with one year time-in-service, the thesis tool calculated the highest lifetime retirement benefit under the Blended Retirement System with a zero percent lump sum. For the Captain with six years' time-in-service, the thesis tool calculated the highest lifetime retirement benefit under the Legacy Retirement System. For the Major with 11 years' time-in-service, the government tool calculated the highest lifetime retirement benefit under the Legacy Retirement System. Table 19 shows the lifetime retirement benefits in future dollars as calculated by the commercial, government, and thesis tool.

Table 19. Results for Case Study Two.

Lifetime Retirement Benefit (Future Dollars)		Commercial	Government	Thesis
Second Lieutenant (1 year time-in-service)	Legacy Retirement System	\$ 5,365,595	\$ 7,524,393	\$ 8,434,030
	Blended Retirement System 0% Lump Sum	\$ 7,829,604	\$ 8,035,112	\$ 8,827,132
	Blended Retirement System 25% Lump Sum	Does not calculate	\$ 7,632,366	\$ 8,747,510
	Blended Retirement System 50% Lump Sum	Does not calculate	\$ 7,229,620	\$ 8,787,321
Captain (6 years time-in-service)	Legacy Retirement System	\$ 4,883,822	\$ 6,412,408	\$ 6,997,852
	Blended Retirement System 0% Lump Sum	\$ 6,505,676	\$ 6,441,463	\$ 6,019,180
	Blended Retirement System 25% Lump Sum	Does not calculate	\$ 6,098,236	\$ 5,129,919
	Blended Retirement System 50% Lump Sum	Does not calculate	\$ 5,755,010	\$ 5,574,549
Major (11 years time-in-service)	Legacy Retirement System	\$ 4,445,530	\$ 5,292,744	\$ 5,173,441
	Blended Retirement System 0% Lump Sum	\$ 5,138,311	\$ 4,851,494	\$ 3,344,124
	Blended Retirement System 25% Lump Sum	Does not calculate	\$ 4,568,198	\$ 2,459,164
	Blended Retirement System 50% Lump Sum	Does not calculate	\$ 4,284,902	\$ 2,901,644

Adapted from DoD (2017); USAA (2017).

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V. RESULTS

A. SUMMARY

Marines who are saving 5, 10, or even 15 percent of their basic pay, should not expect to achieve a net worth of over \$500,000 unless their average rate of return is well above the 10 year compounded average return rate achieved within any of the Thrift Savings Plan (TSP) funds. Scenario One showed that an estimated net worth can increase exponentially over time, assuming that the return rate and percent save remain constant. A resulting conclusion is that an Officer may need to delay retirement to achieve their retirement goals by either staying in the Marine Corps longer or by starting a second career after retiring from the Marine Corps.

Scenario Two showed how the return rate impacted the accumulated savings after 20 years. An Officer who invests only in low risk, low return funds should expect in the long-term, to have a smaller net worth than an Officer who takes a more aggressive investing approach and achieves a higher average rate of return. Usually, the higher the rate of return, the greater the volatility and risk associated with that investment. An Officer may decide to scale back their retirement goals to align with the level of risk they are comfortable with taking, increase their risk appetite to achieve their retirement goals, or pursue a hybrid approach and adjust both their risk appetite and their retirement goals.

Scenario Three was similar to Scenario One but used different percents of basic pay saved. For every additional five percent of basic pay saved, an Officer's savings after 20 years would increase by \$135,010. The resulting conclusion is that the greater the percent of their basic pay that an Officer saves, the greater their accumulated savings can likely be when they retire from the Marine Corps.

Scenario Four showed the impact of an Officer's accumulated savings at 20 years for each five year increment that savings were delayed. Making catch-up contributions later in an Officers career may not be enough to close the difference required to achieve an Officer's retirement goals. The resulting conclusion is to save as much as an Officer can, as early as they can.

Scenario Five through Nine showed the time (in years) it would take to accumulate a net worth of \$1,000,000 if a Marine Corps Officer invested all of their savings in one specific TSP fund. A higher average return rate reduced the time it took to accumulate a \$1,000,000 net worth. As the percent of basic pay saved increases, it further reduced the time it took to accumulate a \$1,000,000 net worth. The resulting conclusion is for an Officer to manage their expectations with how many years it will take them to accumulate a net worth of \$1,000,000.

Case Study One showed the input and output differences between the commercial, government, and thesis tool. The commercial tool had the lowest overall flexibility, followed by the government tool, and then the thesis tool. The resulting conclusion is that for an Officer to select the best tool for them, they will need to understand each tools' input and output limitations.

Case Study Two showed the lifetime retirement benefits in future dollars as calculated by the commercial, government, and thesis tool. If the same inputs were put into each tool, an Officer at first may believe that one or more of the tools' calculations are wrong. An Officer who looks back at Case Study One may discover the link between the different results and whether the tool included each input variable into their calculation.

B. RECOMMENDATIONS

Use the decision support tool for retirement planning instead of using Department of Defense's (DoD) Blended Retirement System Comparison Calculator or the United Services Automobile Association's (USAA) Retirement Comparison Tool because these tools prevent a service member from adjusting one or more of the variables. For example, DoD's Blended Retirement System Comparison Calculator does not allow a service member to adjust the Government Discount Rate (GDR) used in calculating the lump sum, decrease the projected promotion rate, and pick from any of the prior enlisted, Officer grades.

Use the Decision Support Tool for retirement planning, electronically attached to this thesis, as a template to determine where an Officer is, financially, right now. The next step would be to review what the net worth is projected to be if the same financial habits

are maintained. If the results are satisfying, no further action is required. For everyone else, adjust the variables within the tool to understand what it would take to reach for unique financial retirement goals to be reached.

Treat the decision support tool for retirement planning as a working document. Review the working document at least once a year but not more than once a quarter to ensure that the working document aligns with the financial retirement goals and risk appetite. Reviewing the working document more often may increase irrational and impulsive decisions caused by short-term volatility in the financial market. It is better to maintain a long-term strategy.

Saving for retirement is a balancing act. It will require a lot of reflection to determine the appropriate amount to save for the future. One extreme is to save every penny possible to have a bountiful and lavish retirement. The other extreme is to take on debt to fuel a life style of living beyond a Marine's means. Almost all service members will be somewhere in between. If applicable, include a spouse when creating and reviewing the retirement plan to agree on the best way forward.

For Officers eligible to choose between the two military retirement systems, choose one and "do not look back." Due to the infancy of the Blended Retirement System, further changes may occur. One such change could be extending automatic and potential matching contributions past 26 years of service. Another change could be the formula used for calculating the lump sum GDR under the Blended Retirement System. Even a small change to the GDR could affect a lump sum payout by thousands of dollars. Make a decision based on the facts known at the present day.

For Officers eligible to decide between the two retirement systems, it is recommended that Officers focus at present on whether the Legacy Retirement System or the Blended Retirement System with a zero percent lump sum provides the highest total value over their expected life span. Since future lump sum GDRs are unknown and are subject to change every calendar year, Officers should not focus present day on which lump sum option to select within the Blended Retirement System. One year before retirement, Officers should review the GDR to determine if taking a lump sum makes sense for their

unique situation. A retirement choice that looks valuable in the short run (at or near retirement) may not necessarily be the most valuable choice in the long run.

Retirement finance is like a foreign language. It will take time to learn. For those who do not have the time or desire to manage their retirement assets, they should seek the professional advice of a financial expert. For Officers who want to take an active role in managing their retirement assets, working with a financial expert may help prevent an Officer from making one or more expensive mistakes. Stay engaged, and ask as many questions as necessary to ensure that the retirement plan aligns with the risk appetite and retirement goals of each officer and their situation.

C. FURTHER STUDY

If minor modifications to the tool are made, this tool could be beneficial to DoD enlisted service members. This tool could also be beneficial to DoD civilians with further modifications.

Turning the tool into an application may increase the tool's popularity among millennials and "Generation Z" Americans. Making videos might assist users who learn better by seeing or listening than by reading.

APPENDIX A. SCENARIO ONE DATA

Time In Service (Yrs)	Rank	Monthly Basic Pay	Estimated Net Worth	
1	O-1	\$ 3,035	\$ 3,860	Variables
2	O-1	\$ 3,035	\$ 7,952	10.0% % Saved
3	O-2	\$ 3,982	\$ 13,495	6.0% Return Rate
4	O-2	\$ 4,586	\$ 20,138	
5	O-2	\$ 4,741	\$ 27,377	
6	O-3	\$ 5,657	\$ 36,215	
7	O-3	\$ 5,657	\$ 45,584	
8	O-3	\$ 5,941	\$ 55,876	
9	O-3	\$ 5,941	\$ 66,786	
10	O-3	\$ 6,124	\$ 78,582	
11	O-4	\$ 6,887	\$ 92,058	
12	O-4	\$ 7,230	\$ 106,778	
13	O-4	\$ 7,230	\$ 122,381	
14	O-4	\$ 7,469	\$ 139,224	
15	O-4	\$ 7,469	\$ 157,078	
16	O-4	\$ 7,606	\$ 176,178	
17	O-5	\$ 8,330	\$ 197,344	
18	O-5	\$ 8,565	\$ 220,080	
19	O-5	\$ 8,565	\$ 244,179	
20	O-5	\$ 8,798	\$ 270,021	
21	O-5	\$ 8,798	\$ 297,413	
22	O-6	\$ 10,319	\$ 328,384	
23	O-6	\$ 10,319	\$ 361,213	
24	O-6	\$ 10,587	\$ 396,352	
25	O-6	\$ 10,587	\$ 433,600	
26	O-6	\$ 11,106	\$ 473,743	
27	O-6	\$ 11,106	\$ 516,294	
28	O-6	\$ 11,106	\$ 561,399	
29	O-6	\$ 11,106	\$ 609,209	
30	Retire	\$ 11,106	\$ 659,889	

Estimated net worth calculation:

$$= ((\text{Monthly Basic Pay} \times 12 \times \% \text{ Saved}) + \text{Prior year's cumulated savings}) \times (1 + \text{Return Rate})$$

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APPENDIX B. SCENARIO TWO DATA

Time In Service	Rank	Monthly Basic Pay	Cumulated savings with each return rate				Variables
			2%	4%	6%	8%	
1	O-1	\$ 3,035	\$ 3,715	\$ 3,787	\$ 3,860	\$ 3,933	
2	O-1	\$ 3,035	\$ 7,503	\$ 7,726	\$ 7,952	\$ 8,181	10.0% % Saved
3	O-2	\$ 3,982	\$ 12,528	\$ 13,005	\$ 13,495	\$ 13,996	
4	O-2	\$ 4,586	\$ 18,392	\$ 19,249	\$ 20,138	\$ 21,060	
5	O-2	\$ 4,741	\$ 24,563	\$ 25,936	\$ 27,377	\$ 28,889	
6	O-3	\$ 5,657	\$ 31,978	\$ 34,033	\$ 36,215	\$ 38,532	
7	O-3	\$ 5,657	\$ 39,542	\$ 42,455	\$ 45,584	\$ 48,946	
8	O-3	\$ 5,941	\$ 47,605	\$ 51,567	\$ 55,876	\$ 60,561	
9	O-3	\$ 5,941	\$ 55,829	\$ 61,044	\$ 66,786	\$ 73,105	
10	O-3	\$ 6,124	\$ 64,441	\$ 71,129	\$ 78,582	\$ 86,890	
11	O-4	\$ 6,887	\$ 74,160	\$ 82,569	\$ 92,058	\$102,767	
12	O-4	\$ 7,230	\$ 84,492	\$ 94,895	\$106,778	\$120,359	
13	O-4	\$ 7,230	\$ 95,032	\$107,714	\$122,381	\$139,358	
14	O-4	\$ 7,469	\$106,074	\$121,343	\$139,224	\$160,186	
15	O-4	\$ 7,469	\$117,338	\$135,519	\$157,078	\$182,681	
16	O-4	\$ 7,606	\$128,994	\$150,432	\$176,178	\$207,152	
17	O-5	\$ 8,330	\$141,770	\$166,845	\$197,344	\$234,520	
18	O-5	\$ 8,565	\$155,089	\$184,208	\$220,080	\$264,382	
19	O-5	\$ 8,565	\$168,674	\$202,265	\$244,179	\$296,633	
20	O-5	\$ 8,798	\$182,817	\$221,335	\$270,021	\$331,766	

Cumulated savings calculation:
 =((Monthly Basic Pay x 12 x % Saved) + Prior year's cumulated savings) x (1 + Return Rate)

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APPENDIX C. SCENARIO THREE DATA

Time In Service (Yrs)	Rank	Monthly Basic Pay	Cumulated savings with each percent saved				Variables
			5%	10%	15%	20%	
1	O-1	\$ 3,035	\$ 1,930	\$ 3,860	\$ 5,790	\$ 7,721	Variables
2	O-1	\$ 3,035	\$ 3,976	\$ 7,952	\$ 11,928	\$ 15,904	6.0% Return Rate
3	O-2	\$ 3,982	\$ 6,747	\$ 13,495	\$ 20,242	\$ 26,989	
4	O-2	\$ 4,586	\$ 10,069	\$ 20,138	\$ 30,207	\$ 40,276	
5	O-2	\$ 4,741	\$ 13,688	\$ 27,377	\$ 41,065	\$ 54,754	
6	O-3	\$ 5,657	\$ 18,108	\$ 36,215	\$ 54,323	\$ 72,431	
7	O-3	\$ 5,657	\$ 22,792	\$ 45,584	\$ 68,376	\$ 91,168	
8	O-3	\$ 5,941	\$ 27,938	\$ 55,876	\$ 83,814	\$ 111,752	
9	O-3	\$ 5,941	\$ 33,393	\$ 66,786	\$ 100,178	\$ 133,571	
10	O-3	\$ 6,124	\$ 39,291	\$ 78,582	\$ 117,874	\$ 157,165	
11	O-4	\$ 6,887	\$ 46,029	\$ 92,058	\$ 138,087	\$ 184,115	
12	O-4	\$ 7,230	\$ 53,389	\$ 106,778	\$ 160,167	\$ 213,555	
13	O-4	\$ 7,230	\$ 61,190	\$ 122,381	\$ 183,571	\$ 244,762	
14	O-4	\$ 7,469	\$ 69,612	\$ 139,224	\$ 208,837	\$ 278,449	
15	O-4	\$ 7,469	\$ 78,539	\$ 157,078	\$ 235,618	\$ 314,157	
16	O-4	\$ 7,606	\$ 88,089	\$ 176,178	\$ 264,267	\$ 352,356	
17	O-5	\$ 8,330	\$ 98,672	\$ 197,344	\$ 296,017	\$ 394,689	
18	O-5	\$ 8,565	\$ 110,040	\$ 220,080	\$ 330,120	\$ 440,159	
19	O-5	\$ 8,565	\$ 122,090	\$ 244,179	\$ 366,269	\$ 488,358	
20	O-5	\$ 8,798	\$ 135,010	\$ 270,021	\$ 405,031	\$ 540,042	

Cumulated savings calculation:

$$= ((\text{Monthly Basic Pay} \times 12 \times \% \text{ Saved}) + \text{Prior year's cumulated savings}) \times (1 + \text{Return Rate})$$

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APPENDIX D. SCENARIO FOUR DATA

Time In Service	Rank	Monthly Basic Pay	Cumulated savings started in year					
			1	5	10	15		
1	O-1	\$ 3,035	\$ 3,860					Variables
2	O-1	\$ 3,035	\$ 7,952					6.0% Return Rate
3	O-2	\$ 3,982	\$ 13,495					10.0% % Saved
4	O-2	\$ 4,586	\$ 20,138					
5	O-2	\$ 4,741	\$ 27,377	\$ 6,031				
6	O-3	\$ 5,657	\$ 36,215	\$ 13,588				
7	O-3	\$ 5,657	\$ 45,584	\$ 21,600				
8	O-3	\$ 5,941	\$ 55,876	\$ 30,453				
9	O-3	\$ 5,941	\$ 66,786	\$ 39,837				
10	O-3	\$ 6,124	\$ 78,582	\$ 50,017	\$ 7,790			
11	O-4	\$ 6,887	\$ 92,058	\$ 61,778	\$ 17,017			
12	O-4	\$ 7,230	\$ 106,778	\$ 74,681	\$ 27,235			
13	O-4	\$ 7,230	\$ 122,381	\$ 88,359	\$ 38,066			
14	O-4	\$ 7,469	\$ 139,224	\$ 103,161	\$ 49,850			
15	O-4	\$ 7,469	\$ 157,078	\$ 118,851	\$ 62,342	\$ 9,501		
16	O-4	\$ 7,606	\$ 176,178	\$ 135,657	\$ 75,757	\$ 19,745		
17	O-5	\$ 8,330	\$ 197,344	\$ 154,392	\$ 90,898	\$ 31,526		
18	O-5	\$ 8,565	\$ 220,080	\$ 174,550	\$ 107,247	\$ 44,312		
19	O-5	\$ 8,565	\$ 244,179	\$ 195,918	\$ 124,576	\$ 57,866		
20	O-5	\$ 8,798	\$ 270,021	\$ 218,864	\$ 143,242	\$ 72,529		

Cumulated savings calculation:
 =((Monthly Basic Pay x 12 x % Saved) + Prior year's cumulated savings) x (1 + Return Rate)

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APPENDIX E. SCENARIO FIVE DATA

Time In Service	Rank	Monthly Basic Pay	Cumulated savings with each percent saved			Variables
			5%	10%	15%	
1	O-1	\$ 3,035	\$ 1,869	\$ 3,738	\$ 5,606	
2	O-1	\$ 3,035	\$ 3,787	\$ 7,573	\$ 11,360	2.63% Return Rate
3	O-2	\$ 3,982	\$ 6,338	\$ 12,677	\$ 19,015	
4	O-2	\$ 4,586	\$ 9,329	\$ 18,658	\$ 27,987	
5	O-2	\$ 4,741	\$ 12,494	\$ 24,988	\$ 37,482	
6	O-3	\$ 5,657	\$ 16,306	\$ 32,612	\$ 48,319	
7	O-3	\$ 5,657	\$ 20,219	\$ 40,437	\$ 60,656	
8	O-3	\$ 5,941	\$ 24,409	\$ 48,817	\$ 73,226	
9	O-3	\$ 5,941	\$ 28,709	\$ 57,418	\$ 86,127	
10	O-3	\$ 6,124	\$ 33,235	\$ 66,470	\$ 99,705	
11	O-4	\$ 6,887	\$ 38,350	\$ 76,700	\$ 115,050	
12	O-4	\$ 7,230	\$ 43,811	\$ 87,621	\$ 131,432	
13	O-4	\$ 7,230	\$ 49,415	\$ 98,830	\$ 148,245	
14	O-4	\$ 7,469	\$ 55,314	\$ 110,628	\$ 165,942	
15	O-4	\$ 7,469	\$ 61,368	\$ 122,736	\$ 184,104	
16	O-4	\$ 7,606	\$ 67,665	\$ 135,331	\$ 202,996	
17	O-5	\$ 8,330	\$ 74,575	\$ 149,149	\$ 223,724	
18	O-5	\$ 8,565	\$ 81,810	\$ 163,620	\$ 245,430	
19	O-5	\$ 8,565	\$ 89,236	\$ 178,472	\$ 267,707	
20	O-5	\$ 8,798	\$ 97,000	\$ 194,001	\$ 291,001	
21	O-5	\$ 8,798	\$ 104,969	\$ 209,938	\$ 314,907	
22	O-6	\$ 10,319	\$ 114,084	\$ 228,168	\$ 342,252	
23	O-6	\$ 10,319	\$ 123,439	\$ 246,877	\$ 370,316	
24	O-6	\$ 10,587	\$ 133,204	\$ 266,409	\$ 399,613	
25	O-6	\$ 10,587	\$ 143,227	\$ 286,454	\$ 429,681	
26	O-6	\$ 11,106	\$ 153,833	\$ 307,665	\$ 461,498	
27	O-6	\$ 11,106	\$ 164,717	\$ 329,434	\$ 494,152	
28	O-6	\$ 11,106	\$ 175,888	\$ 351,776	\$ 527,664	
29	O-6	\$ 11,106	\$ 187,353	\$ 374,706	\$ 562,058	
30	New Job	\$ 17,585	\$ 203,108	\$ 406,217	\$ 609,325	
31	New Job	\$ 19,436	\$ 220,418	\$ 440,836	\$ 661,254	
32	New Job	\$ 19,436	\$ 238,183	\$ 476,366	\$ 714,549	
33	New Job	\$ 19,436	\$ 256,415	\$ 512,831	\$ 769,246	
34	New Job	\$ 19,436	\$ 275,127	\$ 550,254	\$ 825,381	
35	New Job	\$ 19,436	\$ 294,331	\$ 588,662	\$ 882,993	
36	New Job	\$ 19,436	\$ 314,040	\$ 628,080	\$ 942,119	
37	New Job	\$ 19,436	\$ 334,267	\$ 668,534	\$ 1,002,801	
38	New Job	\$ 19,436	\$ 355,026	\$ 710,052	\$ 1,065,079	
39	New Job	\$ 19,436	\$ 376,331	\$ 752,663	\$ 1,128,994	
40	New Job	\$ 19,436	\$ 398,197	\$ 796,394	\$ 1,194,591	
41	New Job	\$ 19,436	\$ 420,637	\$ 841,275	\$ 1,261,912	
42	Retire	\$ 8,330	\$ 436,829	\$ 873,659	\$ 1,310,488	
43		\$ 8,330	\$ 453,447	\$ 906,894	\$ 1,360,341	
44		\$ 8,330	\$ 470,502	\$ 941,004	\$ 1,411,506	
45		\$ 8,330	\$ 488,005	\$ 976,011	\$ 1,464,016	
46		\$ 8,330	\$ 505,969	\$ 1,011,938	\$ 1,517,907	
47		\$ 8,330	\$ 524,405	\$ 1,048,810	\$ 1,573,215	
48		\$ 8,330	\$ 543,326	\$ 1,086,652	\$ 1,629,978	
49		\$ 8,330	\$ 562,745	\$ 1,125,489	\$ 1,688,234	
50		\$ 8,330	\$ 582,674	\$ 1,165,348	\$ 1,748,022	

Cumulated savings calculation:

$$= ((\text{Monthly Basic Pay} \times 12 \times \% \text{ Saved}) + \text{Prior year's cumulated savings}) \times (1 + \text{Return Rate})$$

51		\$ 8,330	\$	603,127	\$	1,206,255	\$	1,809,382
52		\$ 8,330	\$	624,119	\$	1,248,238	\$	1,872,357
53		\$ 8,330	\$	645,662	\$	1,291,325	\$	1,936,987
54		\$ 8,330	\$	667,772	\$	1,335,545	\$	2,003,317
55		\$ 8,330	\$	690,464	\$	1,380,928	\$	2,071,392
56		\$ 8,330	\$	713,752	\$	1,427,505	\$	2,141,257
57		\$ 8,330	\$	737,653	\$	1,475,306	\$	2,212,959
58		\$ 8,330	\$	762,183	\$	1,524,365	\$	2,286,548
59		\$ 8,330	\$	787,357	\$	1,574,714	\$	2,362,071
60		\$ 8,330	\$	813,194	\$	1,626,387	\$	2,439,581
61		\$ 8,330	\$	839,710	\$	1,679,420	\$	2,519,130
62		\$ 8,330	\$	866,923	\$	1,733,847	\$	2,600,770
63		\$ 8,330	\$	894,853	\$	1,789,705	\$	2,684,558
64		\$ 8,330	\$	923,516	\$	1,847,033	\$	2,770,549
65		\$ 8,330	\$	952,934	\$	1,905,868	\$	2,858,802
66		\$ 8,330	\$	983,125	\$	1,966,251	\$	2,949,376
67		\$ 8,330	\$	1,014,111	\$	2,028,221	\$	3,042,332
68		\$ 8,330	\$	1,045,911	\$	2,091,822	\$	3,137,733
69		\$ 8,330	\$	1,078,547	\$	2,157,095	\$	3,235,642

APPENDIX F. SCENARIO SIX DATA

Time In Service	Rank	Monthly Basic	Cumulated savings with each percent saved			Variables
			5%	10%	15%	
1	O-1	\$ 3,035	\$ 1,904	\$ 3,809	\$ 5,713	Variables
2	O-1	\$ 3,035	\$ 3,896	\$ 7,793	\$ 11,689	4.59% Return Rate
3	O-2	\$ 3,982	\$ 6,574	\$ 13,148	\$ 19,722	
4	O-2	\$ 4,586	\$ 9,754	\$ 19,508	\$ 29,262	
5	O-2	\$ 4,741	\$ 13,177	\$ 26,354	\$ 39,531	
6	O-3	\$ 5,657	\$ 17,332	\$ 34,663	\$ 51,995	
7	O-3	\$ 5,657	\$ 21,677	\$ 43,355	\$ 65,032	
8	O-3	\$ 5,941	\$ 26,401	\$ 52,801	\$ 79,202	
9	O-3	\$ 5,941	\$ 31,341	\$ 62,681	\$ 94,022	
10	O-3	\$ 6,124	\$ 36,622	\$ 73,244	\$ 109,866	
11	O-4	\$ 6,887	\$ 42,625	\$ 85,250	\$ 127,875	
12	O-4	\$ 7,230	\$ 49,119	\$ 98,237	\$ 147,356	
13	O-4	\$ 7,230	\$ 55,910	\$ 111,820	\$ 167,731	
14	O-4	\$ 7,469	\$ 63,164	\$ 126,327	\$ 189,491	
15	O-4	\$ 7,469	\$ 70,750	\$ 141,500	\$ 212,250	
16	O-4	\$ 7,606	\$ 78,770	\$ 157,541	\$ 236,311	
17	O-5	\$ 8,330	\$ 87,613	\$ 175,227	\$ 262,840	
18	O-5	\$ 8,565	\$ 97,010	\$ 194,019	\$ 291,029	
19	O-5	\$ 8,565	\$ 106,837	\$ 213,675	\$ 320,512	
20	O-5	\$ 8,798	\$ 117,262	\$ 234,524	\$ 351,787	
21	O-5	\$ 8,798	\$ 128,166	\$ 256,331	\$ 384,497	
22	O-6	\$ 10,319	\$ 140,524	\$ 281,048	\$ 421,572	
23	O-6	\$ 10,319	\$ 153,450	\$ 306,899	\$ 460,349	
24	O-6	\$ 10,587	\$ 167,137	\$ 334,274	\$ 501,410	
25	O-6	\$ 10,587	\$ 181,452	\$ 362,904	\$ 544,356	
26	O-6	\$ 11,106	\$ 196,750	\$ 393,500	\$ 590,251	
27	O-6	\$ 11,106	\$ 212,751	\$ 425,501	\$ 638,252	
28	O-6	\$ 11,106	\$ 229,485	\$ 458,970	\$ 688,456	
29	O-6	\$ 11,106	\$ 246,968	\$ 493,976	\$ 740,964	
30	New Job	\$ 17,595	\$ 269,360	\$ 538,720	\$ 808,079	
31	New Job	\$ 19,436	\$ 293,920	\$ 587,840	\$ 881,760	
32	New Job	\$ 19,436	\$ 319,607	\$ 639,215	\$ 958,822	
33	New Job	\$ 19,436	\$ 346,474	\$ 692,948	\$ 1,039,422	
34	New Job	\$ 19,436	\$ 374,574	\$ 749,147	\$ 1,123,721	
35	New Job	\$ 19,436	\$ 403,963	\$ 807,926	\$ 1,211,890	
36	New Job	\$ 19,436	\$ 434,702	\$ 869,403	\$ 1,304,305	
37	New Job	\$ 19,436	\$ 466,951	\$ 933,702	\$ 1,400,553	
38	New Job	\$ 19,436	\$ 500,476	\$ 1,000,952	\$ 1,501,428	
39	New Job	\$ 19,436	\$ 535,644	\$ 1,071,289	\$ 1,606,933	
40	New Job	\$ 19,436	\$ 572,427	\$ 1,144,854	\$ 1,717,281	
41	New Job	\$ 19,436	\$ 610,898	\$ 1,221,796	\$ 1,832,694	
42	Retire	\$ 8,330	\$ 644,165	\$ 1,288,331	\$ 1,932,496	
43		\$ 8,330	\$ 678,960	\$ 1,357,919	\$ 2,036,879	
44		\$ 8,330	\$ 715,351	\$ 1,430,702	\$ 2,146,053	
45		\$ 8,330	\$ 753,413	\$ 1,506,825	\$ 2,260,238	
46		\$ 8,330	\$ 793,221	\$ 1,586,443	\$ 2,379,664	
47		\$ 8,330	\$ 834,857	\$ 1,669,715	\$ 2,504,572	
48		\$ 8,330	\$ 878,404	\$ 1,756,809	\$ 2,635,213	
49		\$ 8,330	\$ 923,950	\$ 1,847,901	\$ 2,771,851	
50		\$ 8,330	\$ 971,587	\$ 1,943,173	\$ 2,914,760	
51		\$ 8,330	\$ 1,021,410	\$ 2,042,819	\$ 3,064,229	

Cumulated savings calculation:

$$= ((\text{Monthly Basic Pay} \times 12 \times \% \text{ Saved}) + \text{Prior year's cumulated savings}) \times (1 + \text{Return Rate})$$

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APPENDIX G. SCENARIO SEVEN DATA

Time In Service	Rank	Monthly Basic Pay	Cumulated savings with each percent saved			Variables
			5%	10%	15%	
1	O-1	\$ 3,035	\$ 1,948	\$ 3,897	\$ 5,845	
2	O-1	\$ 3,035	\$ 4,033	\$ 8,066	\$ 12,099	7.00% Return Rate
3	O-2	\$ 3,982	\$ 6,872	\$ 13,744	\$ 20,616	
4	O-2	\$ 4,586	\$ 10,297	\$ 20,595	\$ 30,892	
5	O-2	\$ 4,741	\$ 14,062	\$ 28,124	\$ 42,186	
6	O-3	\$ 5,657	\$ 18,678	\$ 37,356	\$ 56,034	
7	O-3	\$ 5,657	\$ 23,617	\$ 47,235	\$ 70,852	
8	O-3	\$ 5,941	\$ 29,085	\$ 58,170	\$ 87,254	
9	O-3	\$ 5,941	\$ 34,935	\$ 69,870	\$ 104,805	
10	O-3	\$ 6,124	\$ 41,312	\$ 82,624	\$ 123,936	
11	O-4	\$ 6,987	\$ 48,625	\$ 97,250	\$ 145,876	
12	O-4	\$ 7,230	\$ 56,671	\$ 113,341	\$ 170,812	
13	O-4	\$ 7,230	\$ 65,279	\$ 130,558	\$ 195,838	
14	O-4	\$ 7,469	\$ 74,644	\$ 149,288	\$ 223,932	
15	O-4	\$ 7,469	\$ 84,664	\$ 169,328	\$ 253,992	
16	O-4	\$ 7,606	\$ 95,474	\$ 190,947	\$ 286,421	
17	O-5	\$ 8,330	\$ 107,505	\$ 215,009	\$ 322,514	
18	O-5	\$ 8,565	\$ 120,529	\$ 241,057	\$ 361,586	
19	O-5	\$ 8,565	\$ 134,484	\$ 268,929	\$ 403,393	
20	O-5	\$ 8,798	\$ 149,525	\$ 299,050	\$ 448,575	
21	O-5	\$ 8,798	\$ 165,640	\$ 331,280	\$ 496,921	
22	O-6	\$ 10,319	\$ 183,660	\$ 367,720	\$ 551,580	
23	O-6	\$ 10,319	\$ 203,355	\$ 406,710	\$ 603,065	
24	O-6	\$ 10,587	\$ 224,387	\$ 448,773	\$ 673,160	
25	O-6	\$ 10,587	\$ 246,890	\$ 493,781	\$ 740,671	
26	O-6	\$ 11,106	\$ 271,303	\$ 542,606	\$ 813,908	
27	O-6	\$ 11,106	\$ 297,424	\$ 594,848	\$ 892,272	
28	O-6	\$ 11,106	\$ 325,374	\$ 650,748	\$ 976,121	
29	O-6	\$ 11,106	\$ 355,280	\$ 710,560	\$ 1,065,840	
30	New Job	\$ 17,585	\$ 391,439	\$ 782,878	\$ 1,174,317	
31	New Job	\$ 19,436	\$ 431,317	\$ 862,634	\$ 1,293,952	
32	New Job	\$ 19,436	\$ 473,987	\$ 947,974	\$ 1,421,961	
33	New Job	\$ 19,436	\$ 519,644	\$ 1,039,287	\$ 1,558,931	
34	New Job	\$ 19,436	\$ 568,496	\$ 1,136,993	\$ 1,705,489	
35	New Job	\$ 19,436	\$ 620,769	\$ 1,241,537	\$ 1,862,306	
36	New Job	\$ 19,436	\$ 676,700	\$ 1,353,400	\$ 2,030,300	
37	New Job	\$ 19,436	\$ 736,547	\$ 1,473,093	\$ 2,209,640	
38	New Job	\$ 19,436	\$ 800,582	\$ 1,601,965	\$ 2,401,747	
39	New Job	\$ 19,436	\$ 869,901	\$ 1,738,202	\$ 2,607,303	
40	New Job	\$ 19,436	\$ 942,416	\$ 1,884,831	\$ 2,827,247	
41	New Job	\$ 19,436	\$ 1,029,862	\$ 2,041,724	\$ 3,062,587	

Cumulated savings calculation:
 =((Monthly Basic Pay x 12 x % Saved) + Prior year's cumulated savings) x (1 + Return Rate)

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APPENDIX H. SCENARIO EIGHT DATA

Time In Service	Rank	Monthly Basic	Cumulated savings with each percent saved			Variables
			5%	10%	15%	
1	O-1	\$ 3,035	\$ 1,569	\$ 3,338	\$ 5,907	
2	O-1	\$ 3,035	\$ 4,098	\$ 8,196	\$ 12,294	8.13% Return Rate
3	O-2	\$ 3,982	\$ 7,015	\$ 14,029	\$ 21,044	
4	O-2	\$ 4,586	\$ 10,560	\$ 21,121	\$ 31,681	
5	O-2	\$ 4,741	\$ 14,495	\$ 28,990	\$ 43,485	
6	O-3	\$ 5,657	\$ 19,343	\$ 38,687	\$ 58,030	
7	O-3	\$ 5,657	\$ 24,586	\$ 49,173	\$ 73,759	
8	O-3	\$ 5,941	\$ 30,440	\$ 60,879	\$ 91,319	
9	O-3	\$ 5,941	\$ 36,769	\$ 73,537	\$ 110,306	
10	O-3	\$ 6,124	\$ 43,731	\$ 87,462	\$ 131,194	
11	O-4	\$ 6,887	\$ 51,755	\$ 103,509	\$ 155,284	
12	O-4	\$ 7,230	\$ 60,653	\$ 121,306	\$ 181,959	
13	O-4	\$ 7,230	\$ 70,275	\$ 140,550	\$ 210,824	
14	O-4	\$ 7,469	\$ 80,834	\$ 161,668	\$ 242,502	
15	O-4	\$ 7,469	\$ 92,251	\$ 184,503	\$ 276,754	
16	O-4	\$ 7,606	\$ 104,686	\$ 209,372	\$ 314,058	
17	O-5	\$ 8,330	\$ 118,601	\$ 237,203	\$ 355,804	
18	O-5	\$ 8,565	\$ 133,800	\$ 267,601	\$ 401,401	
19	O-5	\$ 8,565	\$ 150,235	\$ 300,470	\$ 450,706	
20	O-5	\$ 8,798	\$ 168,157	\$ 336,315	\$ 504,472	
21	O-5	\$ 8,798	\$ 187,536	\$ 375,073	\$ 562,609	
22	O-6	\$ 10,319	\$ 209,478	\$ 418,956	\$ 628,434	
23	O-6	\$ 10,319	\$ 233,203	\$ 466,406	\$ 699,610	
24	O-6	\$ 10,587	\$ 259,031	\$ 518,063	\$ 777,094	
25	O-6	\$ 10,587	\$ 286,959	\$ 573,918	\$ 860,878	
26	O-6	\$ 11,106	\$ 317,494	\$ 634,989	\$ 952,483	
27	O-6	\$ 11,106	\$ 350,512	\$ 701,024	\$ 1,051,536	
28	O-6	\$ 11,106	\$ 386,214	\$ 772,428	\$ 1,158,642	
29	O-6	\$ 11,106	\$ 424,818	\$ 849,637	\$ 1,274,455	
30	New Job	\$ 17,585	\$ 470,765	\$ 941,529	\$ 1,412,294	
31	New Job	\$ 19,436	\$ 521,647	\$ 1,043,294	\$ 1,564,942	
32	New Job	\$ 19,436	\$ 576,666	\$ 1,153,333	\$ 1,729,999	
33	New Job	\$ 19,436	\$ 636,159	\$ 1,272,318	\$ 1,908,476	
34	New Job	\$ 19,436	\$ 700,488	\$ 1,400,976	\$ 2,101,464	
35	New Job	\$ 19,436	\$ 770,047	\$ 1,540,094	\$ 2,310,141	
36	New Job	\$ 19,436	\$ 845,261	\$ 1,690,522	\$ 2,535,783	
37	New Job	\$ 19,436	\$ 926,590	\$ 1,853,180	\$ 2,779,771	
38	New Job	\$ 19,436	\$ 1,014,531	\$ 2,029,063	\$ 3,043,594	

Cumulated savings calculation:

$$= (\text{Monthly Basic Pay} \times 12 \times \% \text{ Saved}) + \text{Prior year's cumulated savings} \times (1 + \text{Return Rate})$$

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APPENDIX I. SCENARIO NINE DATA

Time In Service	Rank	Monthly Basic	Cumulated savings with each percent saved			Variables
			5%	10%	15%	
1	O-1	\$ 3,035	\$ 1,839	\$ 3,679	\$ 5,518	
2	O-1	\$ 3,035	\$ 3,698	\$ 7,395	\$ 11,093	102% Return Rate
3	O-2	\$ 3,982	\$ 6,149	\$ 12,298	\$ 18,447	
4	O-2	\$ 4,586	\$ 8,992	\$ 17,983	\$ 26,975	
5	O-2	\$ 4,741	\$ 11,957	\$ 23,914	\$ 35,871	
6	O-3	\$ 5,657	\$ 15,508	\$ 31,016	\$ 46,523	
7	O-3	\$ 5,657	\$ 19,095	\$ 38,190	\$ 57,285	
8	O-3	\$ 5,941	\$ 22,891	\$ 45,781	\$ 68,672	
9	O-3	\$ 5,941	\$ 26,725	\$ 53,450	\$ 80,175	
10	O-3	\$ 6,124	\$ 30,710	\$ 61,419	\$ 92,129	
11	O-4	\$ 6,887	\$ 35,197	\$ 70,394	\$ 105,591	
12	O-4	\$ 7,230	\$ 39,938	\$ 79,877	\$ 119,815	
13	O-4	\$ 7,230	\$ 44,728	\$ 89,456	\$ 134,184	
14	O-4	\$ 7,469	\$ 49,711	\$ 99,423	\$ 149,134	
15	O-4	\$ 7,469	\$ 54,745	\$ 109,491	\$ 164,236	
16	O-4	\$ 7,606	\$ 59,914	\$ 119,828	\$ 179,742	
17	O-5	\$ 8,330	\$ 65,574	\$ 131,148	\$ 196,722	
18	O-5	\$ 8,565	\$ 71,434	\$ 142,869	\$ 214,303	
19	O-5	\$ 8,565	\$ 77,354	\$ 154,709	\$ 232,063	
20	O-5	\$ 8,798	\$ 83,476	\$ 166,952	\$ 250,428	
21	O-5	\$ 8,798	\$ 89,660	\$ 179,320	\$ 268,981	
22	O-6	\$ 10,319	\$ 96,829	\$ 193,659	\$ 290,488	
23	O-6	\$ 10,319	\$ 104,072	\$ 208,143	\$ 312,215	
24	O-6	\$ 10,587	\$ 111,550	\$ 223,100	\$ 334,650	
25	O-6	\$ 10,587	\$ 119,105	\$ 238,210	\$ 357,315	
26	O-6	\$ 11,106	\$ 127,051	\$ 254,103	\$ 381,154	
27	O-6	\$ 11,106	\$ 135,079	\$ 270,158	\$ 405,236	
28	O-6	\$ 11,106	\$ 143,188	\$ 286,376	\$ 429,564	
29	O-6	\$ 11,106	\$ 151,380	\$ 302,760	\$ 454,141	
30	New Job	\$ 17,585	\$ 163,583	\$ 327,165	\$ 490,748	
31	New Job	\$ 19,436	\$ 177,031	\$ 354,063	\$ 531,094	
32	New Job	\$ 19,436	\$ 190,617	\$ 381,235	\$ 571,852	
33	New Job	\$ 19,436	\$ 204,342	\$ 408,684	\$ 613,026	
34	New Job	\$ 19,436	\$ 218,206	\$ 436,410	\$ 654,619	
35	New Job	\$ 19,436	\$ 232,212	\$ 464,425	\$ 696,637	
36	New Job	\$ 19,436	\$ 246,361	\$ 492,722	\$ 739,084	
37	New Job	\$ 19,436	\$ 260,654	\$ 521,309	\$ 781,963	
38	New Job	\$ 19,436	\$ 275,093	\$ 550,187	\$ 825,280	
39	New Job	\$ 19,436	\$ 289,679	\$ 579,359	\$ 869,038	
40	New Job	\$ 19,436	\$ 304,414	\$ 608,829	\$ 913,243	
41	New Job	\$ 19,436	\$ 319,300	\$ 638,599	\$ 957,899	
42	Retire	\$ 8,330	\$ 327,605	\$ 655,211	\$ 982,816	
43		\$ 8,330	\$ 335,996	\$ 671,991	\$ 1,007,987	
44		\$ 8,330	\$ 344,471	\$ 688,943	\$ 1,033,414	
45		\$ 8,330	\$ 353,034	\$ 706,067	\$ 1,059,101	
46		\$ 8,330	\$ 361,683	\$ 723,366	\$ 1,085,050	
47		\$ 8,330	\$ 370,421	\$ 740,842	\$ 1,111,263	
48		\$ 8,330	\$ 379,248	\$ 758,496	\$ 1,137,744	
49		\$ 8,330	\$ 388,165	\$ 776,330	\$ 1,164,495	
50		\$ 8,330	\$ 397,173	\$ 794,346	\$ 1,191,519	
51		\$ 8,330	\$ 406,273	\$ 812,546	\$ 1,218,819	

Cumulated savings calculation:

$$= ((\text{Monthly Basic Pay} \times 12 \times \% \text{ Saved}) + \text{Prior year's cumulated savings}) \times (1 + \text{Return Rate})$$

52	\$ 8,330	\$ 415,466	\$ 830,931	\$ 1,246,397
53	\$ 8,330	\$ 424,752	\$ 849,504	\$ 1,274,256
54	\$ 8,330	\$ 434,133	\$ 868,266	\$ 1,302,399
55	\$ 8,330	\$ 443,610	\$ 887,220	\$ 1,330,830
56	\$ 8,330	\$ 453,183	\$ 906,367	\$ 1,359,550
57	\$ 8,330	\$ 462,855	\$ 925,709	\$ 1,388,564
58	\$ 8,330	\$ 472,624	\$ 945,249	\$ 1,417,873
59	\$ 8,330	\$ 482,494	\$ 964,988	\$ 1,447,481
60	\$ 8,330	\$ 492,464	\$ 984,928	\$ 1,477,392
61	\$ 8,330	\$ 502,536	\$ 1,005,071	\$ 1,507,607
62	\$ 8,330	\$ 512,710	\$ 1,025,421	\$ 1,538,131
63	\$ 8,330	\$ 522,989	\$ 1,045,977	\$ 1,568,966
64	\$ 8,330	\$ 533,372	\$ 1,066,744	\$ 1,600,115
65	\$ 8,330	\$ 543,861	\$ 1,087,722	\$ 1,631,582
66	\$ 8,330	\$ 554,457	\$ 1,108,914	\$ 1,663,371
67	\$ 8,330	\$ 565,161	\$ 1,130,322	\$ 1,695,483
68	\$ 8,330	\$ 575,974	\$ 1,151,949	\$ 1,727,923
69	\$ 8,330	\$ 586,898	\$ 1,173,796	\$ 1,760,694
70	\$ 11,106	\$ 598,636	\$ 1,195,232	\$ 1,793,848
71	\$ 11,106	\$ 612,464	\$ 1,224,927	\$ 1,837,391
72	\$ 11,106	\$ 625,442	\$ 1,250,884	\$ 1,876,327
73	\$ 11,106	\$ 638,553	\$ 1,277,107	\$ 1,915,660
74	\$ 11,106	\$ 651,798	\$ 1,303,596	\$ 1,955,394
75	\$ 11,106	\$ 665,178	\$ 1,330,356	\$ 1,995,534
76	\$ 11,106	\$ 678,694	\$ 1,357,389	\$ 2,036,083
77	\$ 11,106	\$ 692,349	\$ 1,384,697	\$ 2,077,046
78	\$ 11,106	\$ 706,142	\$ 1,412,284	\$ 2,118,427
79	\$ 11,106	\$ 720,076	\$ 1,440,153	\$ 2,160,229
80	\$ 11,106	\$ 734,153	\$ 1,468,306	\$ 2,202,458
81	\$ 11,106	\$ 748,373	\$ 1,496,745	\$ 2,245,118
82	\$ 11,106	\$ 762,738	\$ 1,525,475	\$ 2,288,213
83	\$ 11,106	\$ 777,249	\$ 1,554,498	\$ 2,331,747
84	\$ 11,106	\$ 791,909	\$ 1,583,817	\$ 2,375,726
85	\$ 11,106	\$ 806,718	\$ 1,613,435	\$ 2,420,153
86	\$ 11,106	\$ 821,678	\$ 1,643,356	\$ 2,465,033
87	\$ 11,106	\$ 836,790	\$ 1,673,581	\$ 2,510,371
88	\$ 11,106	\$ 852,057	\$ 1,704,115	\$ 2,556,172
89	\$ 11,106	\$ 867,480	\$ 1,734,960	\$ 2,602,440
90	\$ 11,106	\$ 883,060	\$ 1,766,119	\$ 2,649,179
91	\$ 11,106	\$ 898,798	\$ 1,797,597	\$ 2,696,395
92	\$ 11,106	\$ 914,698	\$ 1,829,396	\$ 2,744,093
93	\$ 11,106	\$ 930,759	\$ 1,861,519	\$ 2,792,278
94	\$ 11,107	\$ 946,985	\$ 1,893,970	\$ 2,840,956
95	\$ 11,108	\$ 963,377	\$ 1,926,754	\$ 2,890,132
96	\$ 11,109	\$ 979,937	\$ 1,959,874	\$ 2,939,811
97	\$ 11,110	\$ 996,666	\$ 1,993,333	\$ 2,989,999
98	\$ 11,111	\$ 1,013,567	\$ 2,027,134	\$ 3,040,701

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