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Department of Defense's 2015 retirement plan cost analysis

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MBA PROFESSIONAL REPORT

DEPARTMENT OF DEFENSE'S 2015 RETIREMENT PLAN COST ANALYSIS

June 2016

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13. ABSTRACT (maximum 200 words)

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This MBA report presents a sensitivity analysis on three separate variables that have a significant impact on retirement costs. Realistic manipulation of these independent variables will show short-term versus long-term cost savings. Additionally, a high-cost and low-cost scenario is explored.

With cost scenarios differing up to $321 billion, DOD needs to be aware of the potential effects of future outlays. It is recommended that DOD conduct additional economic research and acquire further data on the preferences of current SMs in order to provide a more narrow range of cost savings.

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LIST OF ACRONYMS AND ABBREVIATIONS

COLA	Cost of Living Adjustment
CPI	Consumer Price Index
DB	Defined Benefit
DC	Defined Contribution
DOD	Department of Defense
FERS	Federal Employees Retirement System
FY	Fiscal Year
FY16$	Fiscal Year 2016 Constant Dollars
MCRMC	Military Compensation and Retirement Modernization Commission
OSD	Office of the Secretary of Defense
POTUS	President of the United States
PV	Present Value
REDUX	Military Reform Act of 1986
SM	Service Member
TSP	Thrifts Savings Plan
TY$	Then Year Dollars
YOS	Years of Service

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I. INTRODUCTION

A. BACKGROUND

The Military Compensation and Retirement Modernization Commission (MCRMC) was established by the National Defense Authorization Act in fiscal year (FY) 2013. It primary purpose was to generate recommendations for the President of the United States (POTUS) and Congress on how best to modernize and gain efficiencies for military pay and benefits. The commission was legislatively mandated to provide the following:

- Ensure the long-term viability of the All-Volunteer Force by sustaining the required human resources of that force during all levels of conflict and economic conditions.
- Enable the quality of life for members of the Armed Forces and the other uniformed services and their families in a manner that fosters successful recruitment, retention, and careers for members of the Armed Forces and the other uniformed services.
- Modernize and achieve fiscal sustainability for the compensation and retirement systems for the Armed Forces and the other uniformed services for the 21st century. (Military Compensation and Retirement Modernization Commission [MCRMC], 2015, p. 1)

In the MCRMC final report, there are a total of 15 recommendations made to POTUS and Congress on how best to pursue military pay and benefit reforms. This MBA project concentrates only on the first recommendation of the MCRMC report and the new retirement system defined therein. The MCRMC recommendation reads as follows:

> Help more Service members save for retirement earlier in their careers, leverage the retention power of traditional Uniformed Service retirement, and give the Services greater flexibility to retain quality people in demanding career fields. (2015, p. 3)

This newly recommended retirement system was signed into law in November 2015 and is scheduled to go into effect across the uniformed services on January 01, 2018.

While the current retirement system rewards service members (SMs) who pursue a long term military career, it ignores the majority of SMs who fall short of the 20 years of service (YOS) required for active duty military retirement. This new retirement system, which blends the current system with Thrift Savings Plan (TSP), is designed to reward military service that falls short of the current time requirements (MCRMC, 2015). Additionally, this new plan should help the uniformed services better shape their force profiles and retention targets across the SM pay grade spectrum (MCRMC, 2015). Finally, Department of Defense (DOD) costs savings can be obtained by switching to this new system (MCRMC, 2015).

The remainder of this MBA project will focus on the new retirement system's cost savings and the assumptions used to determine these savings.

B. PURPOSE

The purpose of this project is to determine how changing the value of the following planning assumptions in the MCRMC report will impact the estimated cost savings of this new plan through FY47:

- contribution percentage of each service member
- percentage of current service members opting to enroll in the blended plan
- government rate of borrowing

This project will conduct a sensitivity analysis on the above listed assumptions.

C. RESEARCH QUESTIONS

The primary research questions this project addresses are:

- How do the estimated cost savings change as SM contribution percentages change from 0% to the maximum matching percentage of 5%?
- How do the estimated cost savings change as the percentage of current service members opting to enroll in the new plan change?
- How do the estimated cost savings change as the government rate of borrowing changes?

Additional questions investigated include the following:

- Our analysis will result in a cost savings range for each assumption. Does the high cost value still results in overall savings when comparing to the current system?
- Does the high cost value of all combined assumptions still result in overall savings when compared to the current system?

D. SCOPE AND LIMITATIONS

The total cost of military retirement compensation includes both monetary and nonmonetary benefits. Monetary benefits are realized in the form of a monthly annuity adjusted by a cost-of-living adjustment (COLA). Nonmonetary benefits include access to all exchange and commissary facilities, medical care in the form of TRICARE for Life, and various Morale, Welfare and Recreation programs and facilities (Burrelli & Torreon, 2014). This MBA project will focus solely on the cost of the monetary benefits provided to SMs. Furthermore, monetary benefits are received by retired active and reserve component SMs, disabled SM, and in some instances the surviving spouse of a retiree. This MBA project will focus only on benefits received by retired active-duty SMs. This demographic makes up $43.2 billion of the total $54.09 billion total retirement program cost (Burrelli & Torreon, 2014). The new retirement system does not make changes to current retiree benefits; therefore, we will only be analyzing the cost of changes to future SM benefits. The total cost calculated in our research does not reflect the retiree total program cost.

Additional training and implementation costs will be incurred if any changes are made to the retirement system. The MCRMC report has calculated these anticipated costs, and will not change through our range of research.

This project does not analyze the effects to retention and force structure that the new retirement system will have on the DOD. Furthermore, it does not consider current trends in military downsizing in order to provide a reasonable estimation if the DOD maintained its current manning levels.

E. ORGANIZATION OF RESEARCH

Chapter II addresses the history of the military retirement system, its overall objectives, details of the current retirement system, and details of the new retirement plan.

Chapter III addresses both the methodology and assumptions used to test the new retirement system's cost savings projections. Special attention is made in the description of the processes used during sensitivity testing of the MRCRMC assumptions and Present Value (PV) calculations. Additionally, this chapter lists the data used to conduct the calculations.

Chapter IV lists the results from the sensitivity analysis defined in Chapter III. These results show the total cost variations within the new retirement system based on changes within the tested MCRMC assumptions. The results listed in this chapter answer the primary and secondary research questions posed in Chapter I.

Chapter V concludes the study and makes recommendations based on the analytical model's results as they relate to the overall cost of the new retirement system.

II. OVERVIEW OF MILITARY RETIREMENT SYSTEM

The purpose of this chapter is to outline the history and purpose of the DOD's retirement system. Additionally, this overview will define the current system and the new retirement system signed into law November 2015. It is important to understand the components of the current and new military retirement systems in order to assess the cost savings when tested through multiple assumptions.

A. HISTORICAL BACKGROUND

The military retirement system is an important benefit for U.S. military personnel that dates back to the Congressional Act of February 28, 1855, in which "the Secretary of the Navy was permitted to convene examining boards to determine the capability of officers for performing promptly and efficiently all their duty both ashore and afloat and to remove any officer determined not capable of performing such duty from the active list" (Under Secretary of Defense for Personnel and Readiness [Under Secretary of Defense], 2011).

The first formal retirement system for Army, Navy, and Marine Corps officers was approved by Congress in 1861 by establishing voluntary retirement for officers serving over 40 YOS, and then expanded that to include the involuntary retirement of officers with 45 YOS or after reaching age 62 (Under Secretary of Defense, 2011). These reforms and others like them during this period were to "conserve the energetic and young officer corps" (Under Secretary of Defense, 2011). Ensuing legislation reduced the YOS required for a service member to become eligible for voluntary retirement. In 1870, Marine Corps and Army officers became eligible for retirement after 30 YOS and later extended to Navy officers in 1908 (Under Secretary of Defense, 2011).

The current retirement system of vesting at 20 YOS began in 1946 for Navy and Marine Corps officers, and in 1948 for officers of the Army and the newly established Air Force (Christian, 2006). The system was a force management tool that was used by Congress to reduce the number of officers following World War II. Ultimately, the military came to terms that enlisted members should have the same retirement benefits as

officers; therefore, Congress associated the enlisted voluntary retirement pay formula with that of the officer ranks in 1948 (Under Secretary of Defense, 2011).

B. OBJECTIVES

Most supporters of the military retirement system would say that it is to lure and keep quality SMs. They emphasize that the system must contend with the private sector for quality personnel at a fair cost to the taxpayer. This force management tool must be flexible in order to manage the manpower requirements of the DOD. The DOD Office of the Actuary (2013) states the non-disabled military retirement system is designed to ensure:

- continued service in the armed forces is competitive with alternative employment
- promotion opportunities are kept open for young and able members
- some measure of economic security is made available to members after retirement from a military career
- a pool of experienced personnel are available for recall in times of war or national emergency. (Department of Defense [DOD], 2013, p. 50)

The Military Compensation Background Papers go even further to say that the retirement payments to members must also be "socially acceptable" during old age and "generally competitive with private-sector employers" (Under Secretary of Defense, 2011). Therefore, any suggested reform must take all of these factors into account, not just singular aspects such as DOD cost reduction.

C. CURRENT SYSTEM

There are four distinct military retirement plans: Final Pay, High-36, Military Reform Act of 1986 (REDUX), and Disability. The first three options apply to non-disabled service members, while the final plan focuses on disabled service members. This MBA project will concentrate on the active duty non-disability retirement plans; see Tables 1 and 2. These three plans require a minimum of 20 YOS and initial monthly pay

outs are calculated bytaking the retiring member's base pay and multiplying it by a multiplier percentage:

$$\text{Annuity} = \text{Base pay} * (\text{multiplier \%})$$

1. Final Pay Plan

This plan requires entry into military service prior to September 8, 1980 (DOD Military Compensation, n.d.). SMs will receive a retirement annuity beginning at their date of retirement. SMs' base pay at the time of retirement is utilized in the calculations of the annuity. For each YOS, 2.5 percentage points are added to the multiplier. This annuity is calculated with the following formula:

$$\text{Annuity} = \text{Base Pay} * (\text{YOS} * 2.5\%)$$

To protect against inflation, the plan has an annual COLA that follows the percentage change of the consumer price index (CPI) (DOD Military Compensation, n.d.). This plan is in the process of being phased out due to dwindling service members with 35+ YOS.

2. High-36 Plan

This plan applies to any member entering service after September 8, 1980 (DOD Military Compensation, n.d.). SMs will receive a retirement annuity beginning at their date of retirement. The only difference from the Final Pay plan is the determination of the retiring base pay. High-36 takes the average base pay of the final three YOS (36 months) and applies it to the payout formula:

$$\text{Annuity} = \text{Final 3-Year Base Pay Average} * (\text{YOS} * 2.5\%)$$

3. REDUX Pay Plan

This retirement plan applies to service members who entered into service on or after August 1, 1986, and elected to receive a $30,000 Career Status Bonus at 15 YOS with obligation to serve to 20 years (DOD Military Compensation, n.d.). Eligible

members will automatically be enrolled in the High-36 Plan if not electing the REDUX plan. The payout equation is similar to the High-36 Plan with the exception of subtracting 1 percentage point from the final multiplier for each year of service short of 30 years. This annuity is calculated with the following formula:

$$\text{Annuity} = \text{Final 3-Year Base Pay Average} * ((\text{YOS} * 2.5\%) - (1\% * \text{Years Short of 30 YOS}))$$

The intent of this plan is to incentivize SMs to push retirement closer to the 30-year mark.

Additionally, the REDUX plan comes with a change to the computation of annual COLA adjustment. In this case, COLA is reduced by one percentage point below the increase in the CPI (DOD Military Compensation, n.d.).

Table 1. Current Retirement System Overview. Adapted from Military Compensation (n.d.)

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

Table 2. Multiplier Percentage by Plan. Adapted from Military Compensation (n.d.).

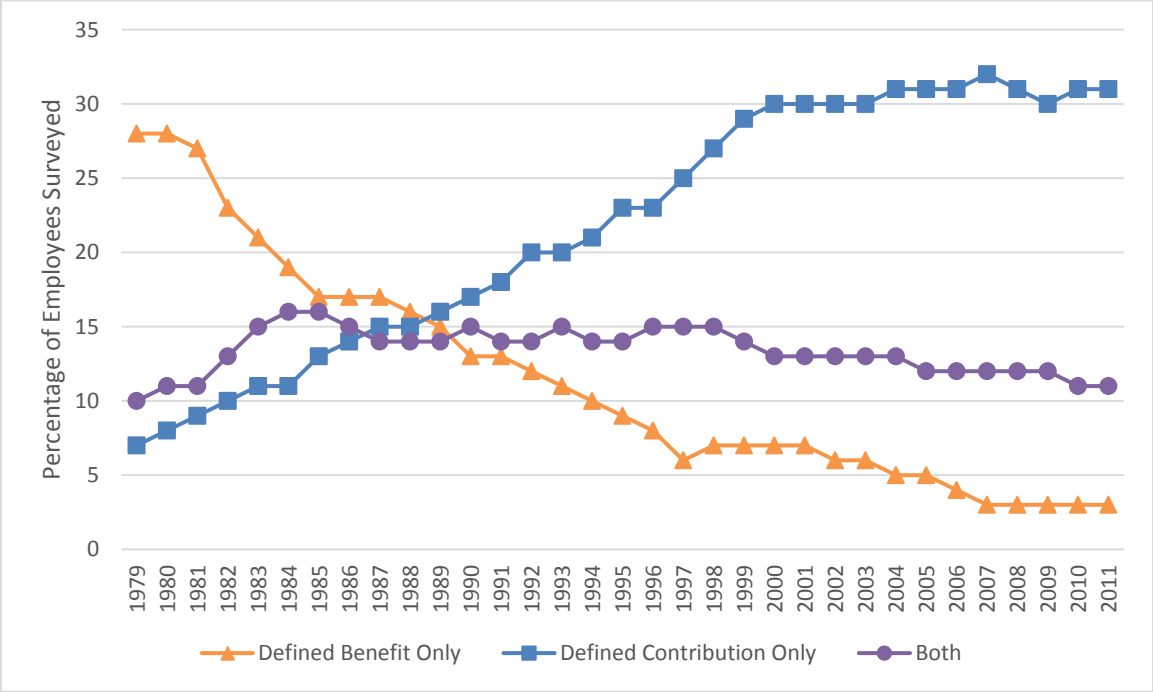
Years of Service	20	21	22	23	24	25	30	35	40	41
Final Pay	50%	52.5%	55%	57.5%	60%	62.5%	75%	80%	100%	102.5%
High-36	50%	52.5%	55%	57.5%	60%	62.5%	75%	80%	100%	102.5%
REDUX	40%	43.5%	47%	50.5%	54%	57.5%	75%	80%	100%	102.5%

D. NEW SYSTEM

The new retirement system is a blended plan based on a reduced defined benefit (DB) and an added defined contribution (DC). Under the new system, 100% of service members reaching two YOS will have access to the retirement plan compared to the private sector percentage of 76% (Bureau of Labor Statistics, 2015). This section will describe the new changes to military retirement benefits as described in the MCRMC's report.

Addition of a DC option to military retirement is lagging far behind the private-sector and the Federal Employees Retirement System (FERS). Over the course of the last 32 years the percentage of private-sector employees enrolled in a DC plan has risen over 300%, while those enrolled in a DB plan has dropped 91%, according to the Employee Benefit Research Institute. Figure 1 shows the trend of DB and DC enrollees from 1979–2011. The accumulation of retirement assets for households has changed significantly with this shift.

Figure 1. Percentage of Private-Sector Workings Participating in an Employment-Based Retirement Plan, by Plan Type, 1979–2011 (among All Workers). Adapted from Christian (2006).



Data from U.S. Department of Labor Form 5500 Summaries through 1998, EBRI estimates 1999–2010 using Pension Benefit Guaranty Corporation, Current Population Survey, and U.S. Department of Labor data.

1. TSP Contribution

The DC portion in its entirety will reside in the TSP. Similar to the 401(k) plans offered in the private-sector, the TSP offers participation in a long-term retirement savings and investment plan. To gain access to the TSP one must be a federal employee or a member of the uniformed services. TSP contributions are made with pretax dollars and grow tax-free until retirement. Taxes are then incurred once you take withdrawals on the account.

Three characteristics make up the DC portion. First, members will receive a monthly contribution of 1% of their base pay upon their service entry date paid by the uniformed services. This is similar to the FERS plan except eligibility usually occurs 6–12 months after you are hired. After completion of two YOS, SMs will be completely vested in their TSP and the 1% contribution will belong to the member. For most FERS

employees the time frame is three years for complete vestment. Second, the uniformed services will match up to a maximum of 5% monthly basic pay beginning at two YOS dependent upon SMs monthly participation in TSP. FERS employees also receive up to 5% matching. Table 3 shows a comparison between FERS and military matching contributions. Members will continue to receive matching funds until they reach retirement eligibility at 20 YOS. Matching will cease even if SMs continue service beyond 20 years. Lastly, SMs will be auto-enrolled in TSP at a 3% monthly basic pay contribution upon entry into service. SMs have the opportunity to raise or lower their TSP contributions as they see fit, or they can terminate participation all together. If an SM chooses to terminate participation in TSP they will automatically be enrolled the following January at 3% monthly basic pay (MCRMC, 2015). FERS employees do not have automatic enrollment.

Table 3. Contribution Comparison. Adapted from Military Compensation (n.d.) and Office of Personnel Management (1989).

Your Contribution	Automatic (1%) Contribution	FERS Contribution	FERS Total Contribution	Military Contribution	Military Total Contribution
0%	1%	0%	1%	0%	1%
1%	1%	1%	3%	1%	3%
2%	1%	2%	5%	2%	5%
3%	1%	3%	7%	3%	7%
4%	1%	3.5%	8.5%	3.5%	8.5%
5%	1%	4%	10%	4%	10%
More than 5%	1%	4%	Your Contribution + 5%	4%	Your Contribution + 5%

2. Continuation Pay

Upon reaching 12 YOS, SMs who are willing and able to obligate an additional four YOS will receive continuation pay. This continuation pay will be separate from additional incentive and recruitment bonuses. The base continuation pay will be equal to

2.5 times the SMs monthly basic pay (MCRMC, 2015). FERS employees do not have a comparable benefit to continuation pay.

3. Retirement Annuity

Very similar to the current retirement system, SMs will become eligible for a DB retirement annuity after completing 20 YOS and will receive this annuity beginning at their date of retirement. The only difference in formula is the reduction of the multiplier percentage by .5%. This annuity is calculated with the following formula:

$$\text{Annuity} = \text{Base Pay} * (\text{YOS} * 2\%)$$

According to the MCRMC report, additional changes include the SM's ability to choose one of three options to receive their retirement annuity benefit. First, beginning at the SM's retirement date they can receive a monthly payment. Second, beginning at the SM's retirement date they receive a lump sum amount, combined with a reduced monthly payment. Reduced monthly payments will continue until the SM reaches eligibility for full social security payments at which point the full monthly annuity would begin. Third, beginning at the SM's retirement date they receive a larger lump sum than mentioned previously with no monthly payments. Once SM reaches eligibility for full social security payments they will begin to receive full monthly annuity payments (MCRMC, 2015).

Table 4. DB Annuity Options. Adapted from Military Compensation (n.d.).

Option 1	Option 2	Option 3
Standard Monthly Payment	Receive Partial Lump Payment Upon Retirement w/ Reduced Monthly Payment Until Eligible for Social Security	Receive full Lump Payment Upon Retirement w/ No Monthly Payment Until Eligible for Social Security

There are some important differences when comparing the DOD's DB annuity to the private sector. If a private company decides to offer a DB annuity to its employees, those employees must be fully vested in the DB plan by five years for cliff (at specific

date) vesting or seven years for gradual vesting (MCRMC, 2015). This practice is mandated by the Employee Retirement Income Security Act for all private sector companies, but does not apply to federal/DOD employees. If DOD was to fully vest SMs according to private sector rules, then they would lose their most important retention tool in building a career military service. For this reason, cliff vesting the traditional 20-year annuity remains a key aspect in this new system.

In the government civilian sector, similar to the DOD's new retirement system, the FERS utilizes a blended system between DB and DC. When comparing the DB annuities of each plans there are some important differences. FERS allows individuals to collect their DB before the 20-year mark. One of the primary differences in the annuity equations is the multiplier. For 20 plus YOS employees receive a .1% increase in their multiplier (Office of Personnel Management, 1998).

Less than 20 YOS: Annuity = High-3 Base Pay * (YOS * **1%**)
20 YOS and greater: Annuity = High-3 Base Pay * (YOS * **1.1%**)

While this .1% increase marginally rewards career service (20+YOS), it pales in comparison to the DOD's plan. We believe DOD is justified in this difference. In general, government civilian employees tend to not move or go overseas as much as active duty military. Retention for government civilians is less of an issue when compared to active duty personnel. Hence, FERS can afford to fully vest their employees at an earlier date and at a lesser multiplier.

4. Other

COLA benefits will remain the same and not affect our current model. COLA is the cost of keeping an assured standard of living in various geographic areas. COLA adjusted salaries are based on changes in a cost-of-living index.

SMs will be grandfathered into the retirement system that was in place on their service entry date. Those "grandfathered in" have the opportunity to opt into the new retirement system.

Authority to modify the YOS requirement to qualify for retirement, currently 20 YOS, should be given to the Office of Secretary of Defense (OSD). This would allow the facilitation of management actions to correct manpower shortfalls and shape the personnel profile as defined by the Secretary of Defense. Any changes made by OSD to the retirement qualification age should not "involuntarily impose retirement program changes on currently serving members" (MCRMC, 2015, p. 39).

Ensuring that the DOD has a sufficient retirement program to keep SMs attracted in an all-volunteer force is crucial. The current retirement system has been in existence with little to no change. While continuing to meet all of the objectives of military retirement, the new system expects to continue or improve the overall benefit to the SM while decreasing costs to the DOD over time. Understanding the different components of the new military retirement system provides the foundation needed to assess the cost savings when tested through multiple assumptions.

III. METHODOLOGY AND ASSUMPTIONS

The purpose of this chapter is to define the methodology and the baseline assumptions we will use to analyze the MCRMC's planning assumptions as they apply to the new cost savings reflected through FY47.

A. METHODOLOGY

Our analysis will rely on Sensitivity Analysis modeling, calculating PV, and accounting for the Government Rate of Borrowing.

For our purposes, Sensitivity Analysis is defined as testing a mathematical system for output uncertainty by systematically changing system inputs or assumptions over a defined range of variability. In our Sensitivity Analysis model, we will construct a linear equation for relative costs (dependent variable) by isolating each MCRMC planning assumption (independent variable). Once the equation/s are complete, we will manipulate each independent variable over a certain range, for example the contribution range of each service member. We will then measure the differences in costs as compared to the baseline planning assumptions of the MCRMC report.

Additionally, within this analysis we will account for the time value of money, or PV analysis. Each of the above sensitivity models will have differing cash flows for each year up to FY47. All future cash flows will have to be normalized to present time - reflecting a certain rate of return or discount rate. In our analysis we will adjust all future cash flows to FY16 constant dollars, which is the same benchmark used in the MCRMC report for their cost savings calculations. We will use the Real Treasury Notes and Bonds Rate or Real Discount Rate specified in most recent change in OMB Circular A-94 change dated January 21, 2015. This specific discount rate is required for U.S. government cost-effectiveness modeling (Donovan, 2016).

For the government rate of borrowing, we must take into account that changing the retirement systems is a federal investment that seeks to decrease federal costs over a period of time. To determine cost savings to the government we must take into consideration the government rate of borrowing. In accordance with guidelines

established in OMB Circular A-94, a comparable-maturity Treasury rate shall be used as the discount rate.

B. DATA COLLECTION

The data source for this project was produced mainly from the DOD Office of the Actuary. The DOD Office of the Actuary sort and compile personal data, which includes active duty military pay grade by YOS, retiree pay, service rank, type of retirement, and current number of retirees for each fiscal year. This MBA project contains retirement data current as of September 30, 2014, end of fiscal year file from the DOD Office of the Actuary. According to the DOD Office of the Actuary (2015), "the pay due to retired members is calculated based on the first day of each month beginning after the month in which the right to such pay accrues" (p. 4). Additionally, it states that "there are limitations to the accuracy of the data retrieved because of reporting delays. The information about many members who retired or died within one month of the September 30, 2014, reporting date may not have processed in time to be included in this report" (p. 4). For purposes of this MBA project and to mirror the Office of the Actuary's methodology, all pay is counted as if it is received on the first day of the month.

Additionally, this report includes data from:

- FY15 force profile by rank and YOS
- FY14 retirement profile by rank and YOS
- FY15 Pay chart from Defense Finance and Accounting Service
- Historical Treasury rates from 1970–2016 from U.S. Department of the Treasury

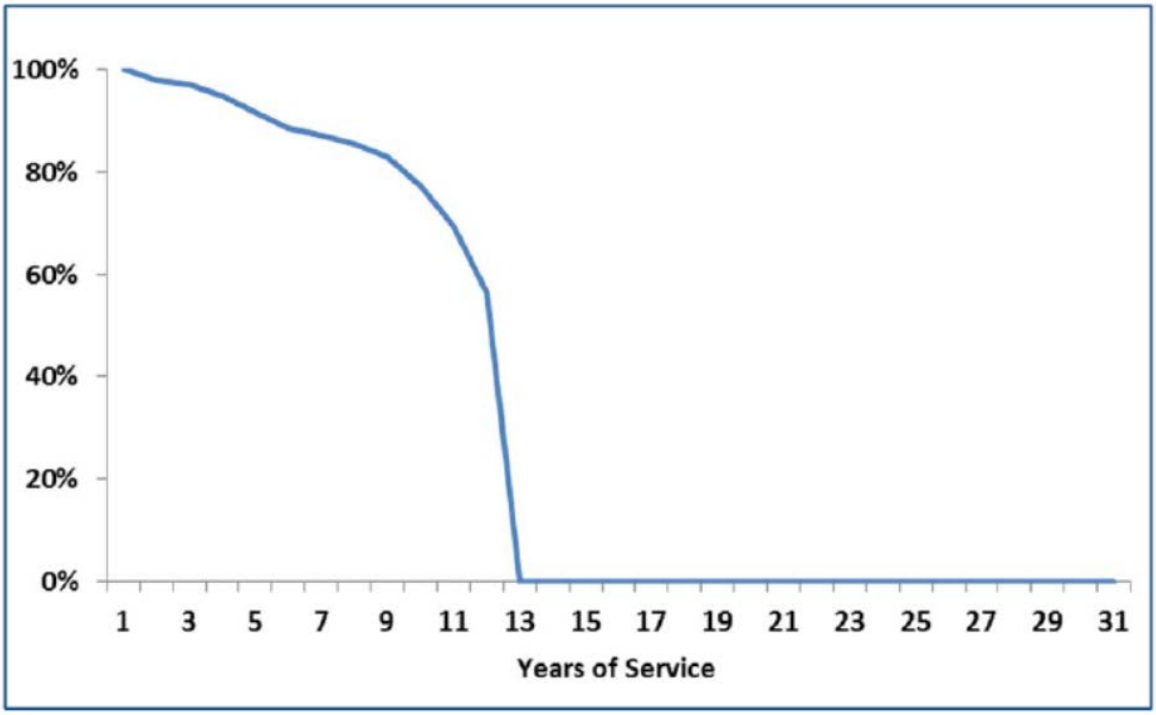
C. ANALYZED ASSUMPTIONS

We will analyze three assumptions that have the greatest impact on the cost savings stated in the MCRMC report. First, we will look at the contribution percentage of each service member. Current savings estimates assume that individuals will take no action towards the planned TSP changes. Under this assumption SMs will be contributing 3% of their base pay resulting from the automatic enrollment process. We will conduct a

sensitivity analysis and calculate how the cost savings differ as SMs contribute the maximum of 5% or the minimum of 0%. A SMs contribution of 0% would still result in a DOD contribution of 1%. Therefore, the test range of contribution percentages range from 1% to 5%.

Second, we will look at the percentage of current SMs opting to enroll in the blended plan. Current savings estimates assume SM opt in rates will be in accordance with Figure 2.

Figure 2. Assumed Percent of Service Members Who Opt into Blended Retirement



Source: Report of the Military Compensation and Retirement Modernization Commission Final Report, January 2015, p. 257.

The above figure is the only reference within this assumption; therefore, the exact percentages used in the MCRMC report's calculations cannot be obtained. Despite this missing data, we will demonstrate cost sensitivities as participation percentages increases or decreases. The Australian Defense Force underwent a similar change to the structure of their retirement system in 1991 (Cunha et al., 2014). Cunha, Menichini and Crocket

found that only 86% of SM with one YOS or less chose the blended option. The MCRMC report reflects a much higher participation rate for those SM with up to five YOS. We will conduct a sensitivity analysis and calculate how the costs savings differ as a function of opt in percentage of current SMs.

Lastly, we will calculate change in cost savings as a function of the government rate of interest. With Treasury rates near zero percent, the cost savings to the government, whether they pay retirement now as part of a DC or later as part of a DB plan, remain about the same. We will examine how the cost savings is affected as the government rate of borrowing fluctuates. To set our testing range we will use the previous 46 years' historical bond interest rates. The year 1981 had the highest interest rate of 15% and 2015 had the lowest at .00% (Board of Governors of the Federal Reserve System, 2016). Using these numbers, we will conduct a sensitivity analysis of government rate of interest ranging from 0% to 15%.

D. ASSUMPTIONS

This MBA project assumes the following:

- For calculation purposes, the new retirement system will go into effect October 01, 2017.
- Any SMs entering service on or after October 01, 2017, will automatically be enrolled into the new retirement system.
- Active duty members who entered service prior to October 01, 2017, have a one-year window to enroll in the new retirement system. After September 30, 2017 they will be locked into the original DB system.
- During the enrollment year (FY17), all officers 0–5 and above and enlisted E-8 and above will remain in the old system. This is assuming the benefits of the old system far exceed the benefits of the new system for SMs with approximately 15+ YOS.
- 100% of active duty SMs will be enrolled in the new retirement system by FY47.
- Current active duty manpower profiles will remain constant for the next 30 years based on FY15 numbers.

- Active duty retirement rate will remain constant based on the FY14 DOD retirement profile.

The following assumptions are being kept directly from the MCRMC report (2015):

- The DB retirement multiplier for the new retirement system is established at 2.0 and is paid to active duty members who serve at least 20 years of qualifying service.
- Continuation pay for the new retirement system is paid to SMs at 12 YOS. active duty members receive 2.5 times their monthly basic pay.
- SMs will receive their DB annuity until they reach a life expectancy of 85 years of age.

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IV. RESULTS

The purpose of this chapter is to show the results of our mathematical tests by which we systematically changed three assumptions over a defined range of variability. We will initially compare short-term and long-term cost savings as they apply to outlays in FY16 constant dollars. Then we will describe the variability in our three tested assumptions through their defined ranges. Finally, we take a look at the low-cost and high-cost scenarios that the DOD could potentially encounter.

A. SHORT-TERM VERSUS LONG-TERM COST SAVINGS

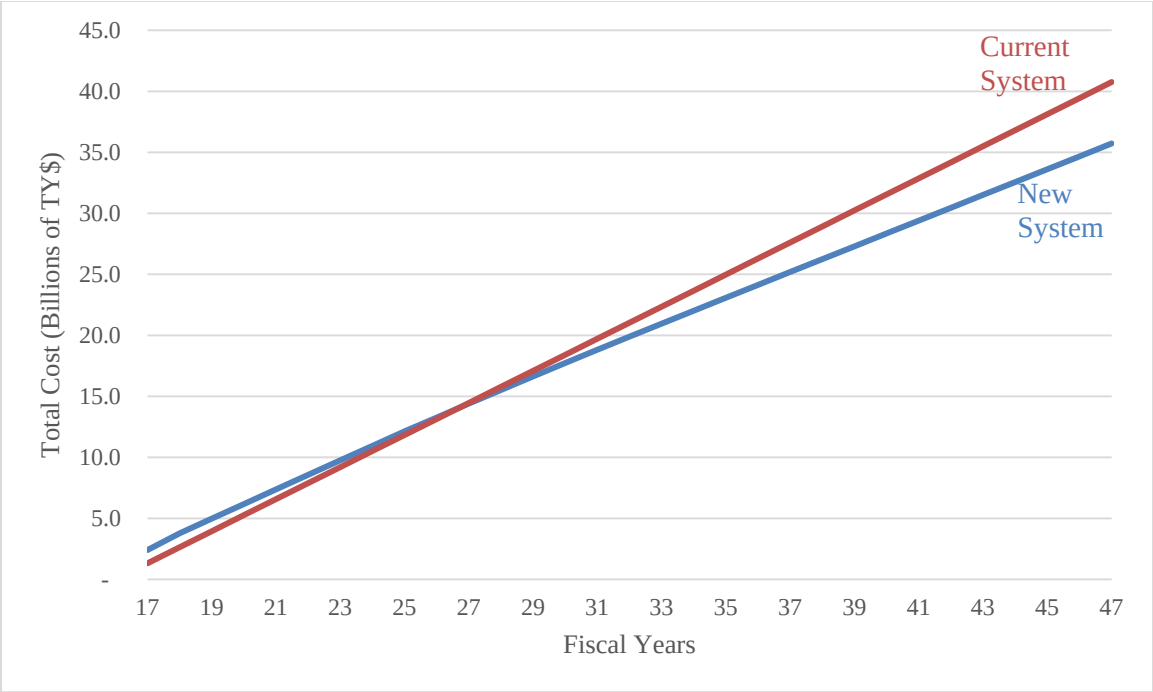
The MCRMC report shows both a short-term estimate (five years out), and a long-term estimate (30 years out). The design of the new system increases outlays in the short term in order to save money in the long term with reduced DBs. Keeping assumptions constant with the MCRMC report, our calculations estimate that in the short term DOD will spend an additional $6.7 billion in expenditures on retirement, not including implementation costs and continuation pay payments. Table 5 shows the breakdown of these costs.

Table 5. Short-Term Cost Comparison (Billions of FY16$)

New System	FY17	FY18	FY19	FY20	FY21
DB Cost	$1.3	$2.6	$3.9	$5.2	$6.5
Contribution Cost	$1.2	$1.3	$1.4	$1.4	$1.4
Total	$2.5	$3.9	$5.3	$6.6	$7.9
Cumulative Total	$26.2				
Current System	**FY17**	**FY18**	**FY19**	**FY20**	**FY21**
DB Cost	$1.3	$2.6	$3.9	$5.2	$6.5
Cumulative Total	$19.5				
Difference	$6.7				

In the long term, the reduced DB offsets the cost of the contribution payments resulting in lower annual costs for the new retirement system. Keeping assumptions constant with the MCRMC report, our calculations estimate that in the long term DOD will have saved $31.7 billion on retirement not including implementation costs and continuation pay payments from FY17 through FY47. Figure 3 shows the total costs of the new retirement system and current system from FY17 to FY47.

Figure 3. Total Yearly Cost Comparison



B. CONTRIBUTION PERCENTAGE AS THE DEPENDENT VARIABLE

In our calculations, we will change the dependent variable of contribution percentage and keep the same assumptions from the MCRMC report. We will analyze the DC cost incurred by government based on the government matching up to a maximum of 5% of SM TSP contribution.

Table 6 shows the total DC cost of the new system based on 86% SM switch rate with an SM contribution range from 1 to 6+%. When the DC contribution rate increases,

more costs are incurred by the government. Our analysis shows that there is an estimated cost range from $12.9 billion to $64.7 billion within the 1 to 5% government contribution range. The delta between 1% and 6+% SM TSP contribution is approximately $52 billion.

Table 6. Total Cost (Millions of FY16$)

SM Contribution Percentage	Total DC (86% Switch)
1%	$12,941
2%	$25,882
3%	$38,824
4%	$51,765
5%	$64,707
6+%	$64,707

Figure 4 represents the total DC cost of the new system based on 86% SM switch rate with a contribution range from 0 to 6+%. As the SM contribution rate increases, more costs are incurred by the government. Since the government will only contribute a maximum of 5%, the highest cost incurred by the government is approximately $64 billion regardless of SM TSP contributions over 5%.

Figure 4. Total Distribution Cost

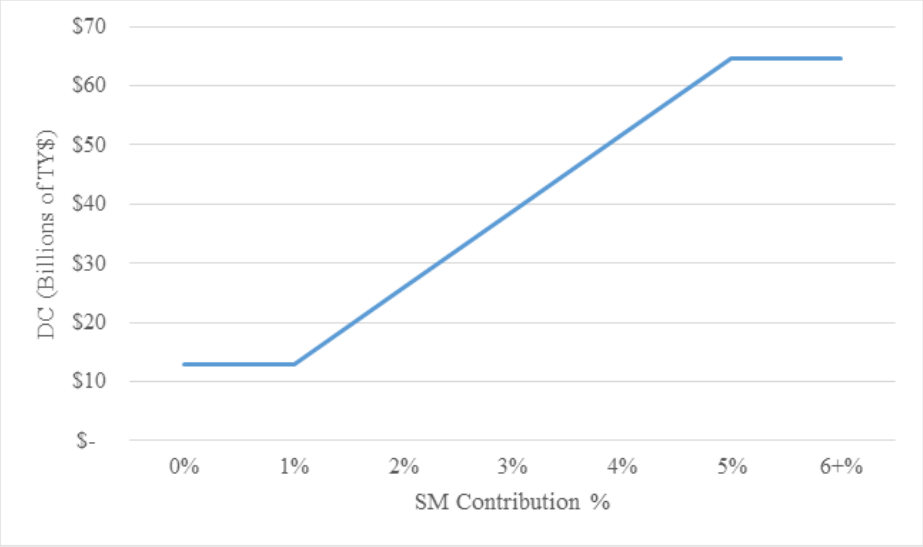


Figure 5 represents the yearly contribution cost of the new program based on an 86% SM switch rate into the new program with an SM TSP contribution range from 1% to 5%. DC precipitously rises from FY17 to FY19 and remains approximately constant for rest of the retirement cycle.

Figure 5. Yearly Contribution Cost FY17–FY47

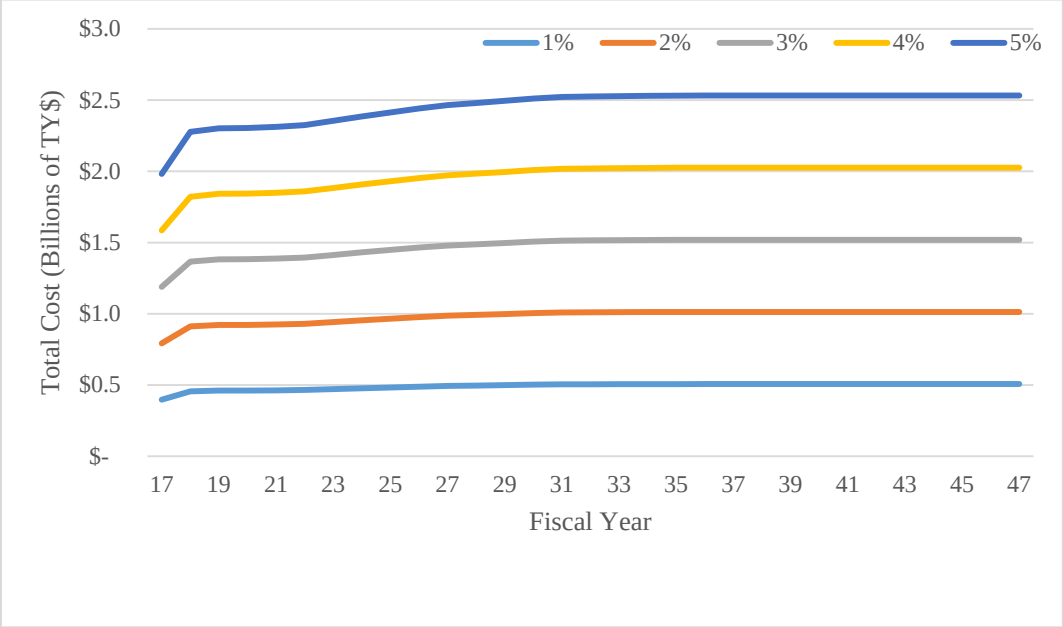
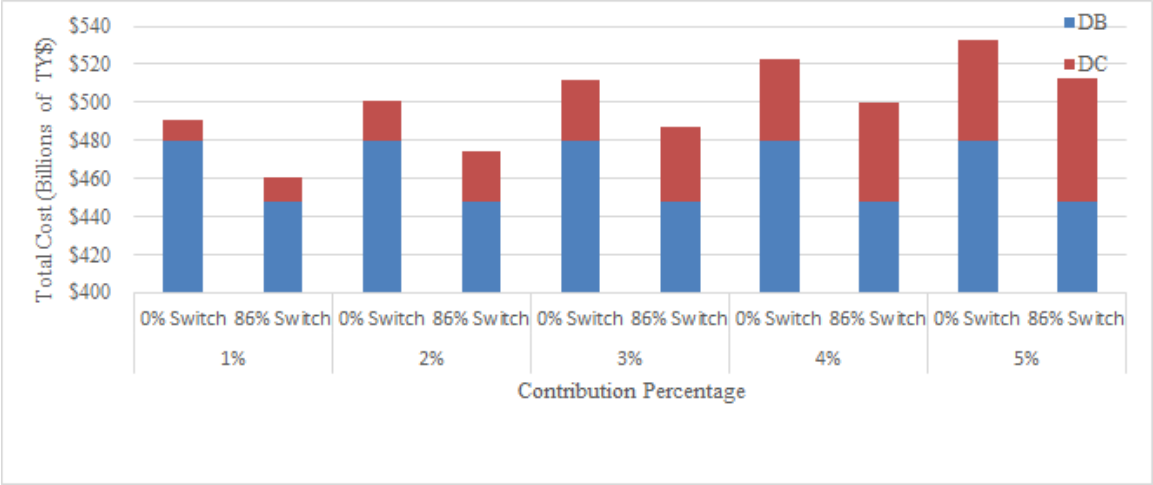


Figure 6 represents the total cost of the new retirement system. The figure is further broken down into 0% SM switch rate and 86% SM switch rate into the new system displaying the total cost comparison. The lower the SM TSP contribution percentage, the less costs incurred by the government.

Figure 6. Total Cost of New Retirement System



This sensitivity analysis provides the understanding of how the SM contribution percentage as the dependent variable can impact the costs incurred by the government of future-year dollars spent on retirement. When presenting cost incurred of future-year dollars, it is important to understand which government contribution percentage is used in the calculation. Decreasing the SM TSP contribution rate will result in lesser costs incurred by the government.

C. OPT-IN PERCENTAGE AS THE DEPENDENT VARIABLE

In this section we analyze the effects the opt-in or SM switch rate will have on overall costs of the new retirement system. Our rate will vary from 0 to 100% of eligible SMs able to switch from the old retirement system to the new during the implementation period. At the close of FY17, these SMs will be locked in their particular retirement plan. The results are shown in Tables 7–8 and Figures 7–9.

Keeping all other MCRMC assumptions constant, Figure 7 shows the total cost of the new retirement system based on the percentage of SMs who switch from the current system to the new system during the FY17 implementation/switch year. When comparing data, the total cost has a $25.6 billion range. As participation rates increase, cost savings increase at a decreasing rate.

Figure 7. Total Cost of New System Based on SM Switch Rate

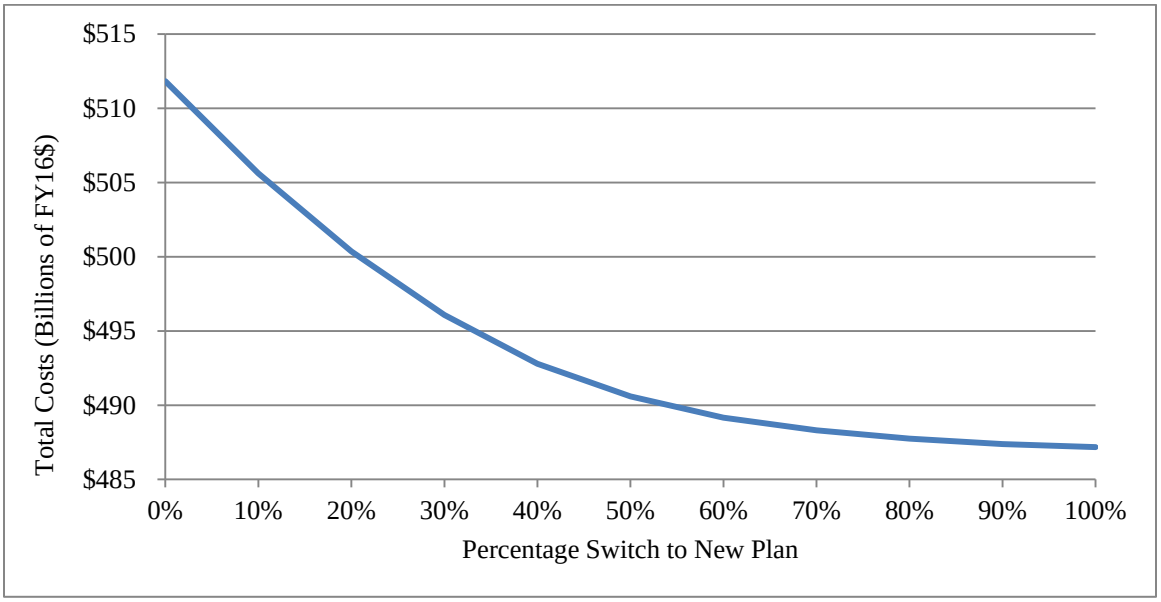


Table 7 shows the total cost values of the new retirement system based on increasing the SM switch rate in 10% intervals.

Table 7. Total Costs Based on SM Switch Rate (Billions of FY16$)

% SM Switch Rate	New Retirement Plan Costs
0%	511.8
10%	505.6
20%	500.3
30%	496.0
40%	492.8
50%	490.5
60%	489.1
70%	488.3
80%	486.8
90%	487.4
100%	487.2

Figure 8 breaks down total SMs between officer and enlisted, and shows their respective impact on the total cost of the new retirement system based on their switch rate. This is done by holding either the officer or enlisted variable at a constant 0% switch rate, while the other is manipulated in 10% intervals.

When comparing the cost variation between officer and enlisted switch rates we see a $9.2 billion range for officers and a $16.1 billion range for enlisted. The larger variation in costs for enlisted is most likely attributed to the 10:1 ratio of enlisted to officers across the DOD enterprise. It only makes sense that enlisted switch rates would have a greater impact on overall costs.

Figure 8. Cost of New System Based on Officer/Enlisted Switch Rate

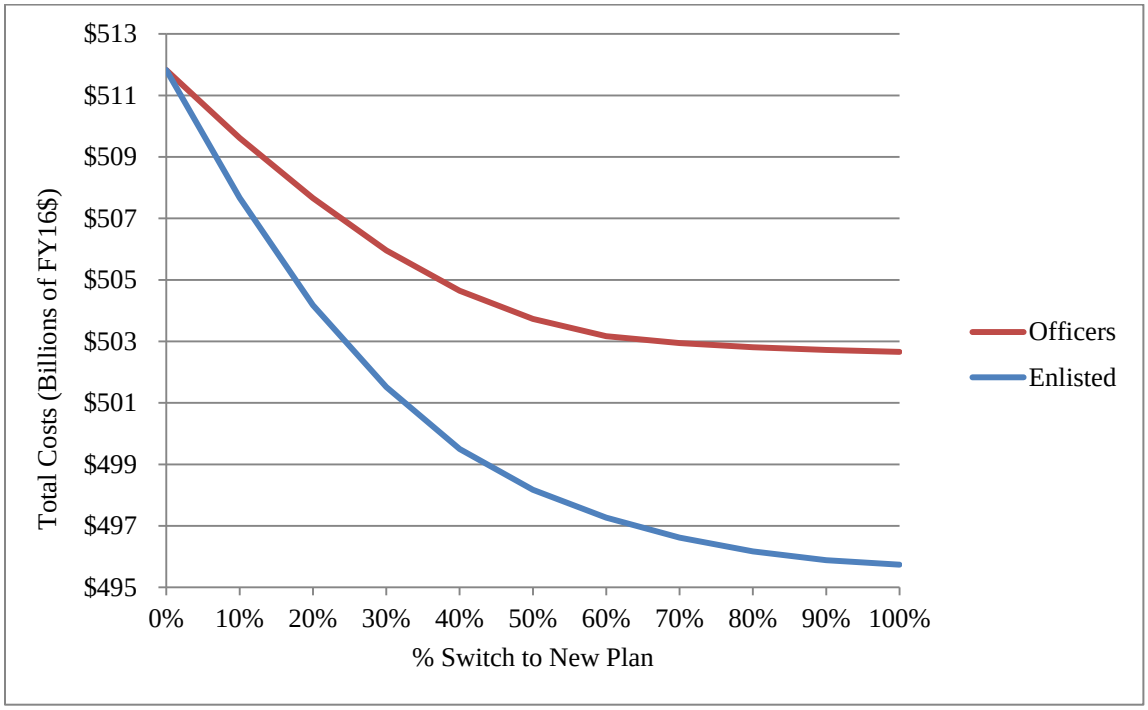


Table 8 shows the total costs of the new retirement system based on changing either the officer or enlisted switch rate in 10% intervals while the other is held at a constant 0%.

Table 8. Total Costs Based on Officer/Enlisted Switch Rate (Billions of FY16$)

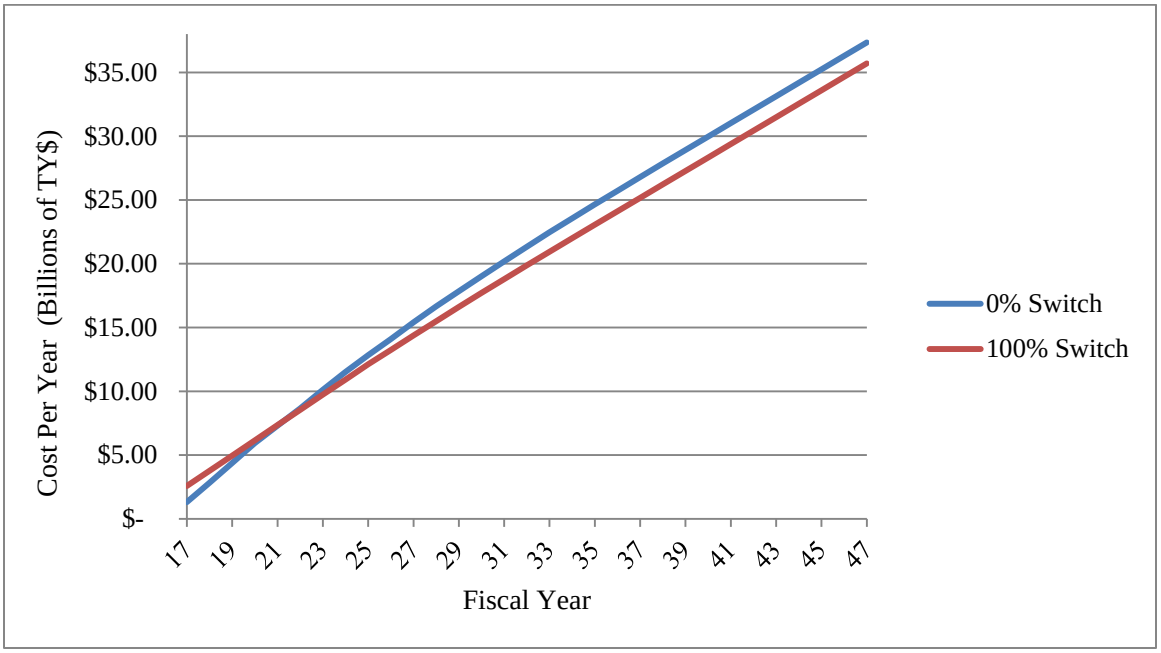
% Switch Rate	New Retirement Plan Costs - *Officers*	New Retirement Plan Costs - *Enlisted*
0%	511.8	511.8
10%	509.6	507.7
20%	507.7	504.2
30%	506.0	501.5
40%	504.6	499.5
50%	503.7	498.2
60%	503.2	497.3
70%	502.9	496.7
80%	502.8	496.2
90%	502.7	495.9
100%	502.7	495.7

Figure 9 shows the cost per FY of the new retirement system assuming a 0% and 100% switch rate.

When comparing the FY17 to FY47 outlays the costs in FY17 increase by $1.3 billion if 100% of SMs switch into the new system compared to 0%. As time progresses, under the new system, DOD begins to realize savings and the initial costs of high participation rates in FY17 results in saving more money in the long-run. By FY47 we see a cost savings of $1.6 million per year - assuming a 100% switch rate.

Although not depicted on Figure 9, the yearly cost difference between switching percentages would decrease over time and eventually equal zero. This is due to retiree mortality. The SMs who declined the option to switch in FY17 would eventually stop collection of their DB annuity.

Figure 9. FY Cost Based on High/Low SM Switch Rate



This sensitivity analysis provides an understanding of how officer, enlisted and total SMs opt-in rate can impact the cost of the new system. It also provides an understanding of the short-range/long-range savings based on this metric. Increasing opt-in rates will save money in the long run, but have more upfront costs during the initial years.

D. GOVERNMENT RATE OF BORROWING AS THE DEPENDENT VARIABLE

Cost savings of the new retirement system for FY17–FY47 in FY16 dollars is $31.7 billion. Holding all other factors constant, changing the government rate of borrowing has significant impacts on the overall and yearly cost savings of the new system. We analyzed the yearly cost flows using government discount rates ranging from 0% to 15% based on historical values. The results are shown in Tables 9–10 and Figures 10–11. New retirement system costs are calculated with a contribution percentage of 3% and an opt-in percentage of 86%.

Table 9 shows a comparison on the new and current retirement system costs in billions of dollars. The cost savings of the new retirement system decreases at a decreasing rate as the government rate of borrowing increases. At rates above 9% the new system becomes costlier than the current system. Historically, interest rates are on average 4.51%. At this rate the new cost savings are only a quarter of the presented savings in the MCRMC report. Figure 10 shows the costs savings graphically.

Table 9. Overall Cost (Billions of FY16$)

Government Rate of Borrowing	New Retirement System Costs	Current Retirement System Costs	Cost Savings of Switching to New System
0%	487.5	519.2	31.7
1%	403.2	427.0	23.8
2%	336.1	353.8	17.7
3%	282.3	295.3	13.0
4%	239.0	248.4	9.4
5%	203.8	210.4	6.6
6%	175.1	179.5	4.4
7%	151.5	154.2	2.7
8%	132.0	133.3	1.3
9%	115.7	116.1	0.4
10%	102.1	101.7	(0.4)
11%	90.7	89.6	(1.1)
12%	81.0	79.4	(1.6)
13%	72.7	70.8	(1.9)
14%	65.6	63.4	(2.2)
15%	59.5	57.1	(2.4)

Figure 10. Total Cost Savings of New Retirement System (FY17–FY47)

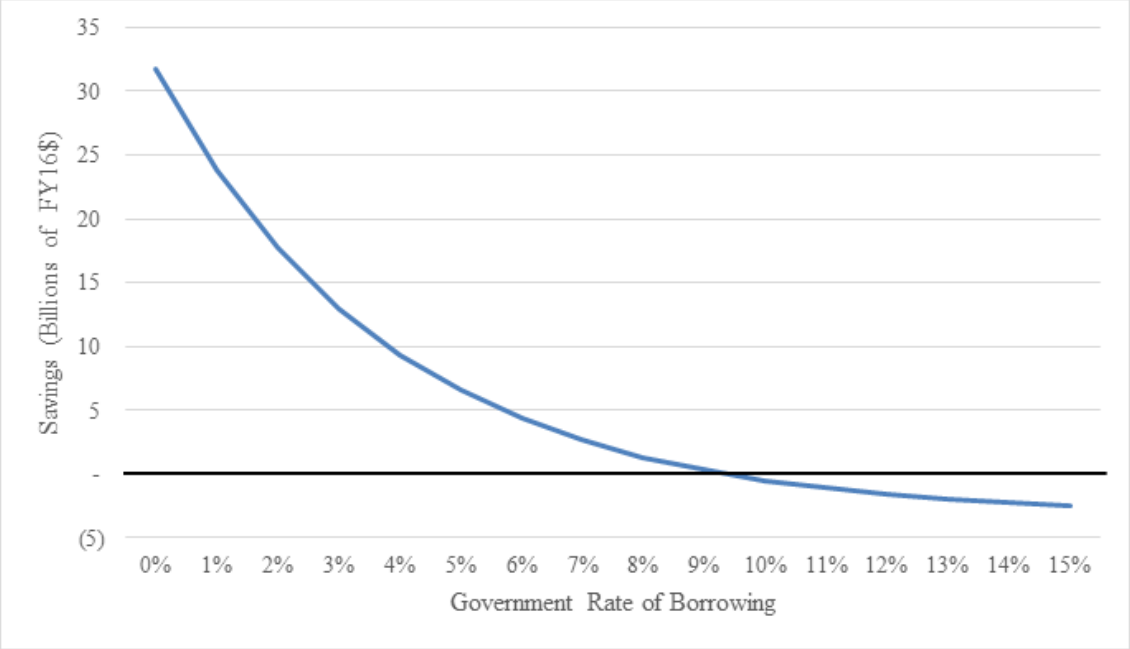
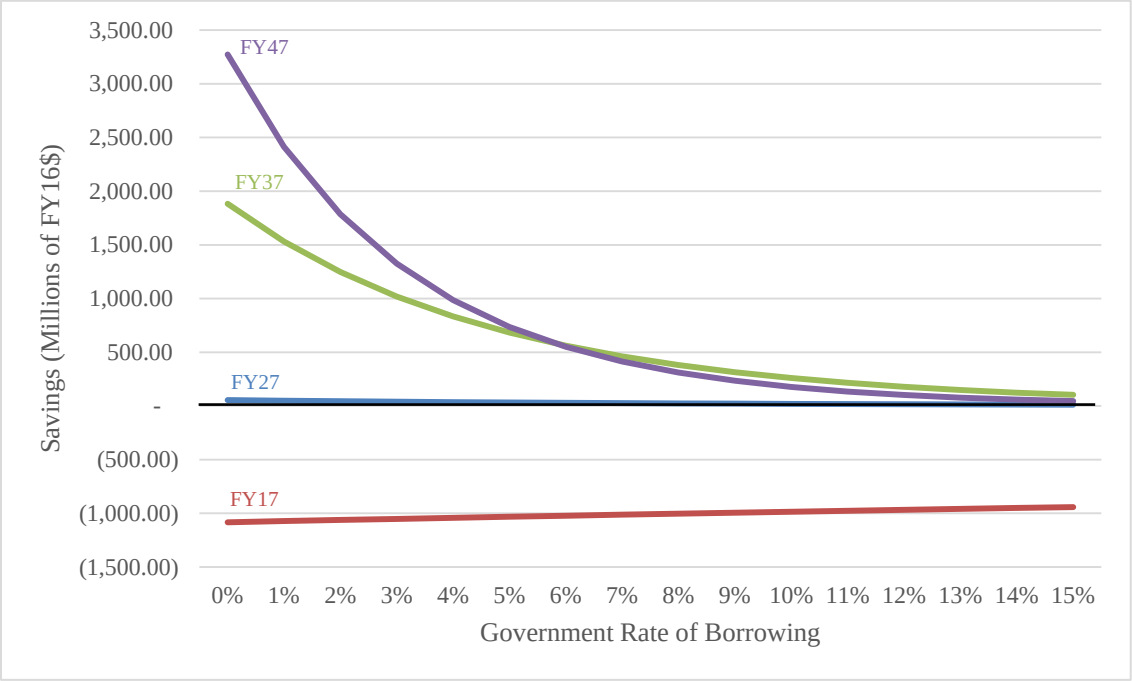


Table 10 shows the yearly cost savings of the new retirement system in 5-year intervals. Costs that are incurred closest to the implementation year are least impacted by the government rate of borrowing while costs incurred in FY47 are most impacted. This chart also shows that the cost savings do not occur until subsequent years after implementation. This is a result of matching contribution payments that do not exist in the current retirement system. Figure 11 is a graphical representation of Table 6 in 10 year intervals.

Table 10. Savings by Yearly Costs (Millions of FY16$)

Government Rate of Borrowing	FY17	FY22	FY27	FY32	FY37	FY42	FY47
0%	(1,083.07)	(659.69)	55.10	989.44	1,882.42	2,730.62	3,272.67
1%	(1,072.36)	(621.60)	49.44	845.01	1,531.22	2,114.61	2,414.24
2%	(1,061.86)	(586.06)	44.40	722.77	1,248.05	1,641.66	1,786.25
3%	(1,051.56)	(552.86)	39.92	619.15	1,019.26	1,277.60	1,325.45
4%	(1,041.46)	(521.84)	35.93	531.18	834.02	996.66	986.33
5%	(1,031.55)	(492.83)	32.37	456.37	683.74	779.32	736.02
6%	(1,021.83)	(465.68)	29.19	392.65	561.59	610.79	550.74
7%	(1,012.28)	(440.27)	26.35	338.30	462.10	479.78	413.21
8%	(1,002.92)	(416.45)	23.80	291.88	380.92	377.72	310.84
9%	(993.73)	(394.13)	21.53	252.17	314.55	298.01	234.44
10%	(984.70)	(373.19)	19.49	218.14	260.20	235.63	177.27
11%	(975.84)	(353.53)	17.65	188.96	215.60	186.70	134.38
12%	(967.13)	(335.08)	16.01	163.89	178.95	148.23	102.11
13%	(958.58)	(317.73)	14.53	142.32	148.77	117.93	77.78
14%	(950.18)	(301.43)	13.20	123.74	123.88	94.01	59.39
15%	(941.93)	(286.09)	12.00	107.72	103.32	75.09	45.45

Figure 11. Total Cost Savings of New Retirement System (FY17–FY47)



This sensitivity analysis provides the understanding of how the government rate of borrowing can impact the costs of future-year dollars spent on retirement. When presenting cost savings of future-year dollars, it is important to understand which government rate of borrowing is used in the calculation. Decreasing this rate will show greater cost savings than may be practical.

E. LOW-COST SCENARIO

The low cost scenario for the DOD occurs if SMs opt out of TSP contribution, interest rates are at or above the 46-year average of 4.51%, and 100% of service members switch to the new system. Table 11 shows the total DC costs, total DC cost and total cost of the system in this scenario.

Table 11. Low-Cost Scenario of New System (Billions of FY16$)

	Short Term (5 years)	Long Term (30 years)
DC Costs	$2.03	$7.36
DB Costs	$15.29	$205.12
Total Cost	$17.32	$212.48

F. HIGH-COST SCENARIO

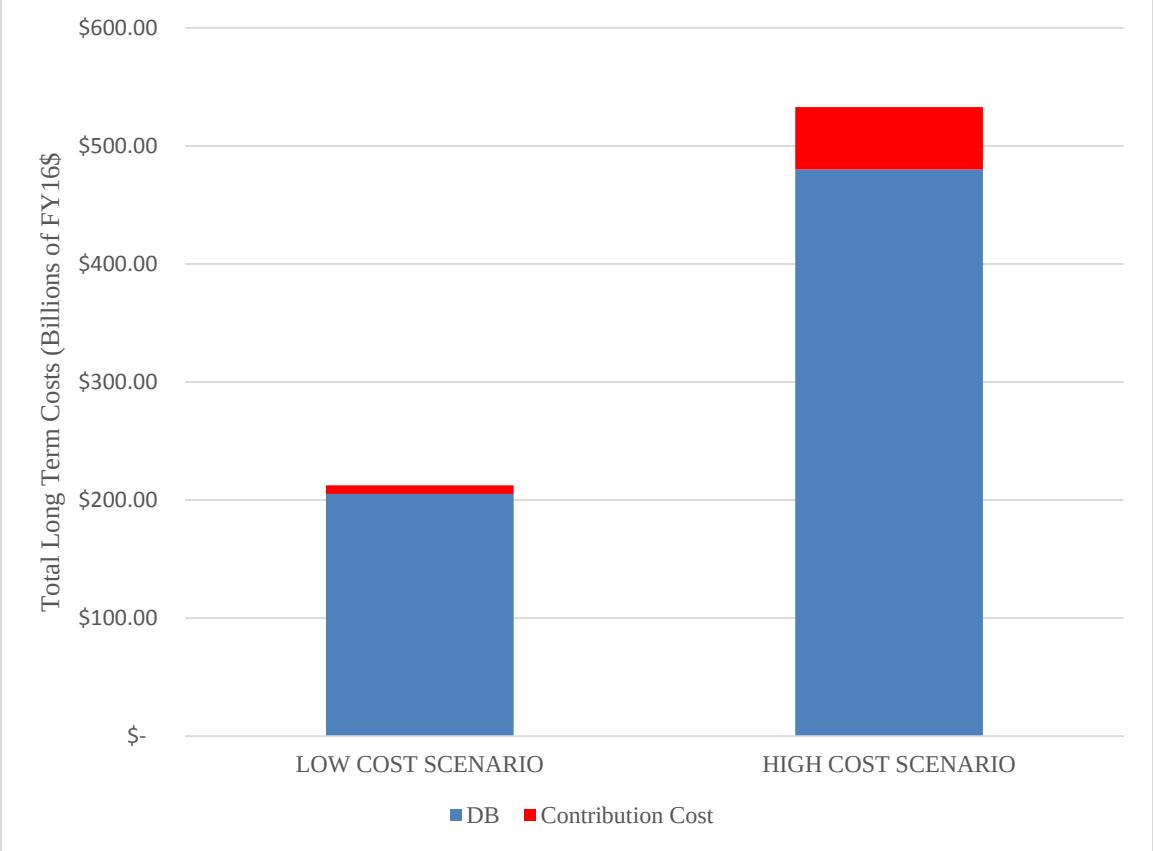
The high cost scenario for the DOD occurs if SMs contribute 5% or higher to TSP, interest rates remain near zero, and no service members switch to the new system. Table 12 shows the total DC costs, total DB cost and total cost of the system in this scenario.

Table 12. High-Cost Scenario of New System (Billions of FY16$)

	Short Term (5 years)	**Long Term (30 years)**
DC Costs	$3.43	$52.84
DB Costs	$19.63	$480.14
Total Cost	$23.06	$532.98

Figure 12 represents the total cost comparison of long term costs between low cost and high cost scenarios broken down by DB costs and DC costs. The low cost scenario caps at $212 billion and the high cost at $533 billion in FY16$. This delta is equal to $321 billion over the course of the next 30 years. These numbers show wide variability based on the underlying assumptions laid out in the MCRMC report. The variables with the greatest impact over cost savings are controlled by SM actions. This uncertainty is a risk that DOD will have to accept.

Figure 12. Total Cost Comparison of Long-Term Costs between Low-Cost and High-Cost Scenarios



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V. CONCLUSION AND RECOMMENDATIONS

A. CONCLUSION

While the new retirement system is estimated to produce cost savings for DOD, the total value of those savings are highly variable based on uncertainty in the cost estimating assumptions listed in the MCRMC final report. Through sensitivity analysis and PV calculations, this MBA project analyzed three of those cost estimating assumptions. The model developed in this project produces a realistic range of cost variation when analyzing TSP contribution percentages, SM switch rates, and variations in the government rate of borrowing.

The model produced the following results:

- When analyzing the short-term and long-term outlays under the existing MCRMC assumptions, the model predicts an added cost of $6.7 billion during the initial five years when compared to the current retirement system. Over the span of 30 years, this cost shifts to an overall savings of $31.7 billion. This is due to the reduced DB of the new system offsetting the cost of the matching contribution payments.

- By varying the SM's TSP contribution percentage range between 1% and 5% (government matching range), the model produces a $12.9 billion to $64.7 billion cost range, respectively, over a 30-year period.

- When analyzing the current SMs opt-in rate from 0% to 100%, the new retirement systems total costs varies by $25.6 billion. As participation rates increase, cost savings increase at a decreasing rate. Additionally, cost variation between officer and enlisted switch rates greatly vary. A $9.2 billion range exists for officers, compared to a $16.1 billion range for enlisted.

- Based on historical values, the government discount rate was analyzed between 0% and 15%. Analysis shows that the cost savings of the new retirement system decreases at a decreasing rate as the government rate of borrowing increases. At rates above 9% the new system becomes more costly than the current system. A 0% rate over the 30-year analysis produces a $31.7 billion savings, while a 15% rate incurs an additional $2.4 billion in costs.

The final simulation conducted a low- and high-cost scenario. The model set the analyzed assumptions to their high/low cost ranges. The low-cost short-term scenario

produced a $17.3 billion cost and a long-term cost of $212.5 billion. The high-cost short-term scenario produced a cost of $23.1 billion and a long-term cost of $533 billion. Over a 30-year period a $300+ billion price difference is worth additional research and analysis by DOD and OSD. Through better analysis of SMs' preferences and future economic trends, DOD can produce a better cost estimation when preparing for future outlays.

B. RECOMMENDATIONS FOR TRAINING AND FURTHER RESEARCH

This project showed that the SM contribution rate offers a wide margin of cost variation. Further analysis should be conducted to better understand SMs preferences of TSP participation. This study would help better estimate future retirement costs. Regardless of the study, the government matching up to 5% of SM TSP contribution is an excellent tool to garner more support for SMs to opt into the new program, and most likely reduce costs incurred by the government over the next 30 years and beyond.

Additionally, this project has shown that as participation rates increase, cost savings also increase. In order for this to occur, additional training and research should be conducted with aims to convert as many grandfathered SM's from the old retirement system to the new system. This would be beneficial for the government, because they could save approximately $25.6 billion if 100% of existing SMs opt into the blended program.

While this project analyzed only three variables with the assumed highest cost variation, it is important to understand how other variables will affect the low-cost high-cost scenarios. The demand for entry into the uniformed services may become more or less appealing based on the new retirement system. For this reason continuation pay amounts will be affected inversely with demand for entry. While not used in this project, applying these future costs is a critical component in addressing the total retirement system costs. Another aspect to consider is how the DOD saves for SMs' retirement benefits. An analysis of the payments made to the Military Retirement Fund could provide important information for future budgetary outlays. Continued sensitivity analysis should address the following areas:

- cost of continuation pay
- costs for the reserve component of DOD
- force structure impacts resulting from the new retirement system
- total retirement compensation to include continuation pay and training/ implementation costs
- Military Retirement Fund payments

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