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THESIS

INCREASING THE SERVICEMEMBERS' GROUP LIFE INSURANCE (SGLI) MAXIMUM PAYOUT

by

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March 2021

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This research addresses the decreasing worth of the Servicemembers' Group Life Insurance (SGLI) payout based on the year a servicemember dies. The SGLI maximum has stagnated at $400,000 for over 16 years and nearly every other servicemember entitlement or benefit has increased in this timeframe. Using four principal steps, this research first determines what the SGLI maximum should be using ordinary least squares (OLS) regression and compounding inflation rates. Second, it conducts trend analysis to determine statistically significant predictors of servicemember death trends and forecasts servicemember deaths, end strengths, and inflation rates for ex post analysis. Third, it determines the feasibility of the proposed increases using historical payout-to-contribution ratios to determine sustainable contribution rates for monthly premiums. Fourth, it discusses alternatives to still provide benefit to servicemembers and beneficiaries, regardless of policy change.

The ultimate recommendation is to increase the SGLI maximum to $525,000 in 2021, then continue to increase at 5-year intervals to correct for inflation, ultimately increasing to $605,000 in 2041 at which point it can be reassessed or have the interval increases continue.

With a 95 percent confidence interval, the models predicted between 757 and 2,596 annual servicemember deaths; total service end strengths between 798,529 and 2,300,810; and inflation rates between 0.44 and 5.56 percent until 2041.

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INCREASING THE SERVICEMEMBERS' GROUP LIFE INSURANCE (SGLI) MAXIMUM PAYOUT

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LIST OF ACRONYMS AND ABBREVIATIONS

AAFMAA	American Armed Forces Mutual Aid Association
ACF	auto-correlation function
AFBA	Armed Forces Benefit Association
AFSA	Air Force Sergeants Association
AUSA	Association of the United States Army
AIC	Akaike's Information Criterion
AR	auto-regressive process
ARMA	auto-regressive moving average process
ARIMA	auto-regressive integrated moving average
BAH	basic allowance for housing
BAS	basic allowance for sustenance
CBA	cost-benefit analysis
COVID-19	coronavirus disease 2019
CPI	Consumer Price Index
CWD	compensating wage differential
DOD	Department of Defense
DFAS	Defense Financial Accounting System
ECI	Employment Cost Index
HEROES	Honoring Every Requirement of Exemplary Service
JMP	a statistical analysis software referred to as "jump"
MA	moving average process
NFAAS	Navy Family Accountability and Assessment System
NOAA	National Oceanic and Atmospheric Administration
OLS	ordinary least squares
PACF	partial auto-correlation function
SGLI	Servicemembers' Group Life Insurance
USAA	United States Automobile Association
USPHS	United States Public Health Services
VA	Department of Veterans Affairs
VSL	value of a statistical life

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ACKNOWLEDGMENTS

I would like to express my sincerest gratitude to all of my professors from the Manpower Systems Analysis program, but particularly Dr. Ryan Sullivan and Dr. Tom Ahn for their guidance throughout my time at the Naval Postgraduate School. The projects they take on are inspirations for positive change for our forces and I strive to be such an asset for others.

I would also like to thank my family for understanding the time and dedication necessary to complete this project and for their patience and support throughout this entire program. I hope that my efforts will benefit other families, should they ever be faced with the tragedy and hardship of the death of a loved one.

For those who have paid the ultimate sacrifice, you are not forgotten.

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I. INTRODUCTION AND BACKGROUND

A. HISTORICAL OVERVIEW

For years, individual colonies provided compensation to families of servicemembers who died in frontier warfare because the Continental Congress lacked both real executive power and funding. It was not until the act of September 29, 1789 that social insurance protection began on the federal level. As time passed, policies evolved to better recompense servicemember sacrifices. Unfortunately, such reforms were not always ratified in a timely fashion, sometimes taking decades post-conflict for entitlements to be fulfilled and death gratuities to be paid to the deserving beneficiaries (Aaronson, 1942).

The current iteration of group life insurance for military members is the Servicemembers' Group Life Insurance (SGLI). Originally approved by Congress in 1965 under public law 89–214, through the concerted efforts of the Department of Veterans Affairs (VA) and Prudential Financial Incorporated (Prudential); beneficiaries of servicemembers who died of a service connected death became entitled to up to $10,000 (Social Security Administration [SSA], 1966), which equates to roughly $82,779 in 2021 dollars (United States Bureau of Labor Statistics [BLS], n.d.). Premium rates were $1 a month for every $5,000 worth of coverage. Servicemembers who desired extra coverage were free to purchase additional life insurance from commercial providers. Supplemental options still exist today, but similar to that era, many providers add clauses exempting hostilities or deaths commonly associated with military service (SSA, 1966).

As shown in Figure 1, the SGLI maximum amount increased roughly every 5 years since its 1965 inception. In September 2005, the amount increased by an unprecedented $150,000 but has stagnated since. Contribution rates have ranged between $0.06 and $0.07 per $1,000 since 2005, with no change to the actual maximum amount (Callan et al., 2011). Using the consumer price index to argue buying power, $400,000 in September 2005 had the same buying power as $526,322 in January 2021, and $400,000 in January 2021 had the same buying power as $303,996 in September 2005 (BLS, n.d.).

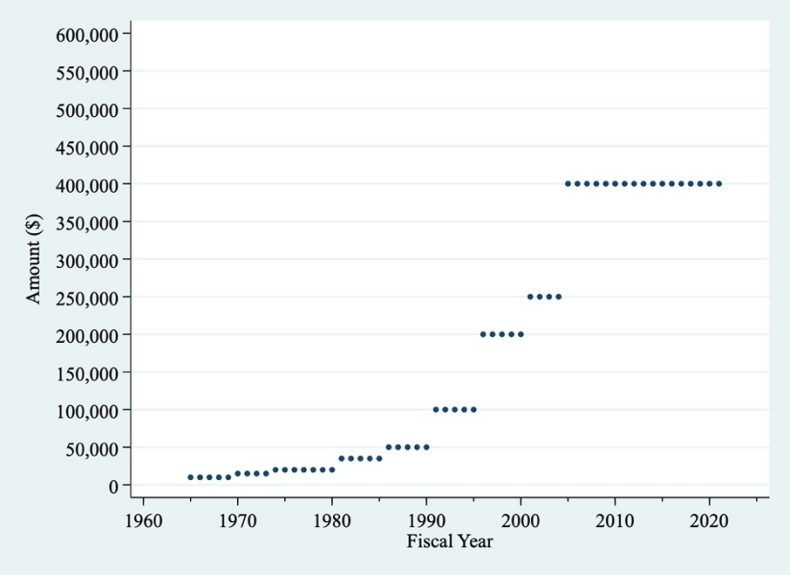

Figure 1. SGLI Maximum Amounts per Year (1965–2021). Adapted from Callan et al. (2011).

B. RESEARCH QUESTION

The ultimate goal of this research is to address the decreasing worth of the SGLI payout based on the year a servicemember dies and to ultimately increase the maximum amount authorized through the SGLI program through an initial correction and then increase at subsequent regular intervals. The maximum option should not stagnate for 16 years. The basic concept of inflation devalues an unchanging amount with each passing year. To determine a feasible solution to this problem, I organized the research into four principal steps. Figure 2 illustrates my intent to first, determine what the SGLI maximum should be based on multiple analyses. Second, conduct trend analysis to evaluate several factors and determine statistically significant predictors of servicemember deaths. Third, determine the feasibility of proposed SGLI maximum increases compared to historical contribution and payout ratios. Fourth, discuss alternatives to the proposals made.

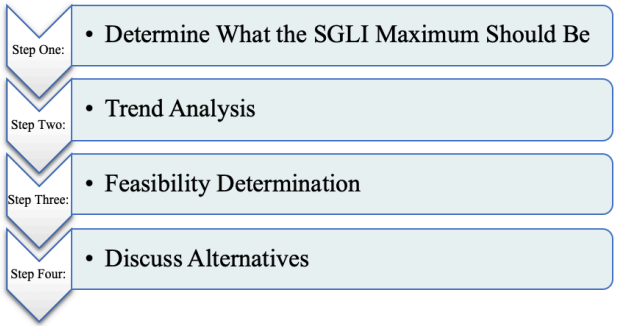

Figure 2. The Four Principal Steps Used to Analyze an Increase to the SGLI Maximum.

This thesis is organized into six chapters. Chapter I provides an introduction with background information. Chapter II establishes conceptual framework with a literature review. Chapter III discusses the data used with descriptive statistics using the four principle steps. Chapter IV addresses the analytical methods used for the four principle steps. Chapter V discusses the results of each principle step and Chapter VI discusses conclusions and policy recommendations. Appendices A, B, C, and D provide more in-depth information about data, methods, and analyses from chapters III and IV.

This is not a cost-benefit analysis (CBA) analyzing every facet of the SGLI program. In the military, leaders are taught to have proposed solutions when a problem is identified. This thesis provides solutions.

C. RELATION TO THE LITERATURE AND CURRENT POLICIES

Since 2005, nearly every other major benefit or allowance for servicemembers have increased. Base pay, basic allowance for housing (BAH), and basic allowance for sustenance (BAS) change annually to account for inflation and other factors (Henig, 2010). They do not always match inflation, but increasing at regular intervals avoids significant disparities between the received entitlements and the actual costs of goods and services. The G.I. Bill and servicemember retirement plans also have changed since 2005.

Figure 3 shows the historical SGLI maximum values with regard to historical inflation rates from fiscal years 1965 to 2021. The navy-blue dots represent historical

maximum values. The green line shows what the interim values would have been if they followed inflation between increases. In years there was a maximum increase, the green line indicates the continuation of the inflation adjustment of the previous year's maximum. The year following a maximum increase, the green line shows the amount of the recent increase, plus the inflation addition to the new maximum compounded until the next increase. The gold line indicates what the SGLI would have been, had it simply followed inflation since its inception in 1965 for $10,000. Every increase of the SGLI exceeded the inflation corrected values at the time of the increase, with the exception of 1981 where the increase lagged inflation by $2,337. To be fair, the inflation rates between 1974 and 1981 were notably large at 12.3, 6.9, 4.9, 6.7, 9.0, 13.3, 12.5 and 8.9 percent, respectively. (Amadeo, 2020; Callan et al., 2011). I am not looking to implement a complete overhaul of the SGLI policy and its governing doctrine.

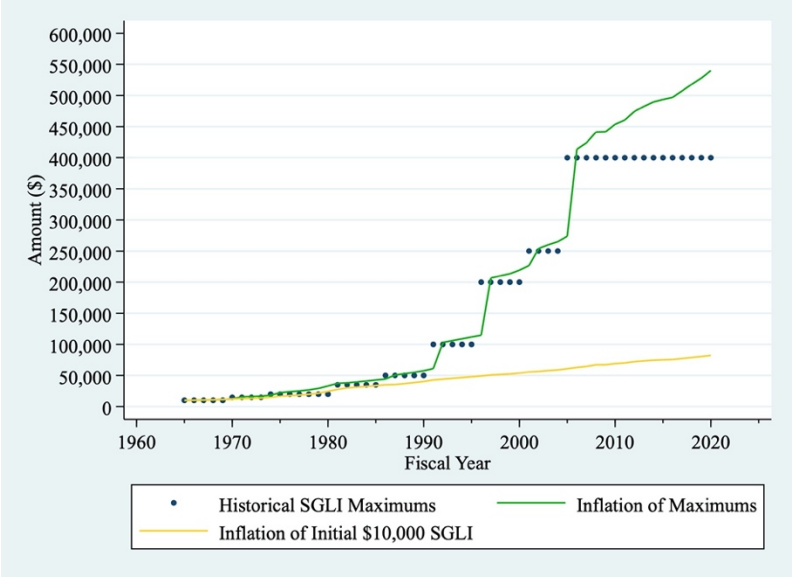

Figure 3. SGLI Values Considering Inflation. Adapted from Amadeo (2020); Callan et al. (2011).

Death is not a topic people are eager to discuss. While there exist articles that examine the value of a statistical life (VSL), the findings vary greatly and most end up using factors such as occupational hazards and or levels of education to determine "values." The SGLI disbursement does not vary by occupational specialty. It does not change based

on branch of service. Under the SGLI, an administrative officer may select the same amount of coverage as a junior-enlisted infantryman sent into the line of fire (United States Department of Veterans Affairs [VA], n.d.). However, with the Honoring Every Requirement of Exemplary Service (HEROES) Act of 2005, servicemembers serving in combat or other specifically designated hostile zones have their montly SGLI premiums subsidized through active duty pay appropriations (S. Resolution 77, 2005). This saves the servicemember less than $30 per month (VA, n.d.).

I am not looking to change this stipulation. Hazard pay and other benefits similarly compensate for such risks incurred during operational deployments and duty assignments. I am framing the compensation argument with sole focus on the SGLI maximum. I am underscoring the fact that the officer or junior enlistee's beneficiaries could have paid off a median single-family home in San Diego, CA, with $400,000 had the servicemember died before 2011, but not after (Los Angeles Almanac, n.d.). Nevertheless, inflation continues to drive up the value of goods and services, leaving surviving beneficiaries to figure out the imposed difference.

D. METHODOLOGY AND RESULTS SUMMARY

1. Step One: Determine What the SGLI Maximum Should Be

Using ordinary least squares (OLS) regression of the historical maximum amounts and other analyses using inflation rates, I determined a reasonable new SGLI maximum for 2021 to be the consumer price index (CPI) corrected amount of $525,000, with an automatic increase to offset the inflation gap every 5 years. This amount will be rounded down to the nearest $5,000 to create a more conservative approach to change, while resolving the issue of future stagnation.

2. Step Two: Trend Analysis

To determine the feasibility of $525,000 and the subsequent incremental increases, it required forecasting servicemember death trends to anticipate potential surges. Therefore, using factors from 1980 to 2020, I compared total servicemember deaths to total servicemember end strengths as well as the political party affiliation of government

leadership.[1] The results provided no arguably reliable statistically significant predictors of drastic fluctuations in servicemember deaths.

To create the estimated values for ex post analyses, I used data from 1980 to 2020 with auto-regressive integrated moving average (ARIMA) modeling, to forecast total annual servicemember deaths from 2021 to 2041 via time series analysis and data splitting. My model predicted between 757 and 2,596 servicemembers will die each year until 2041, representing a 95 percent confidence interval. The forecasted predicted values are more precisely estimated at 1,677 deaths annually. Based on recent trends, I would estimate the average total to be less than 1,000. There have not been more than 1,600 annual deaths since 2007. However, I used the predicted values as a conservative estimate for my analysis (Defense Manpower Data Center [DMDC], 2021b).

For servicemember end strength, I used JMP[2] time series forecasting in lieu of ARIMA modeling since no models would sufficiently validate. This predicted end strengths between 798,529 and 2,300,810 until 2041, representing a 95 percent confidence interval. The forecasted end strength is more precisely estimated between 1,493,721 and 1,549,669, assuming similar trends of those between 1980 to 2020 (DMDC, 2021b).

3. Step Three: Feasibility Determination

To determine the feasibility of $525,000 and the subsequent forecasted increases, I focused on debt-to-income ratios of historical servicemember deaths[3] against the historical weighted average contributions of those who elected for the SGLI[4] (United States Department of Veterans Affairs [VA], 2020b). I then used the predicted deaths and predicted servicemember end strengths to compare the payout to contribution ratios from

1 Political party affiliation being the political parties of the President, House Majority, and Senate Majority.

2 JMP is a statistical software commonly referred to as "jump."

3 Assuming conservatively that every deceased servicemember opted for the maximum SGLI for the given timeframe, thus receiving the maximum payout.

4 Of those eligible for the SGLI, an average of 96.9 percent of servicemembers opted for the SGLI between 2006 and 2019. Of that 96.9 percent, an average of 89.6 percent opted for the maximum amount and 10.4 percent opted for an amount between $50,000 and $350,000 (VA, 2020b).

1980 to 2041.[5] Looking solely at the specified ratios of the maximum SGLI amounts and not factoring in any gains or losses of Prudential's investments, I then used Microsoft Excel Solver to generate contribution amounts that would equate to the same ratios as previous years.[6] The proposed increased maximums would require a conservative contribution rate raise from the current 2021 rate of $0.06 to $0.072, up to $0.102 in 2041 for every $1,000 worth of coverage desired to maintain the 1980 to 2020 ratio. Using the 2005 to 2020 ratio would require contribution rates between $0.061 and $0.085 between 2021 and 2041 (BLS, n.d; Callan et al., 2011; DMDC, 2021b; VA, 2020b).

Historically, the individual rates exceeded $0.102 between 1965 through 1983. However, even with high contribution rates, the total monthly premiums maxed out at $5.25 during this timeframe for a $35,000 policy in 1981. With my proposed 5-year increases, the monthly contributions for the increased maximums would range between $32.08 and $79.06 through 2041 if using the 2005 to 2020 ratio and $33.67 to $94.76 for the 1980 to 2020 ratio (BLS, n.d; Callan et al., 2011; DMDC, 2021b; VA, 2020b).

4. Step Four: Discuss Alternatives

The OLS analysis estimates a lower 2021-corrected maximum value and increases at a slower rate than my other two calculated increases. This also means it will track below expected inflation rates (BLS, n.d; Callan et al., 2011; DMDC, 2021b; VA, 2020b). However, if this course of action is selected, any amount of increase would still be better than the status quo.

If Prudential increased their premiums, servicemembers might end up paying more than premiums offered through alternative life insurance providers (Navy Mutual, 2021). However, staying solely with Prudential would minimize effort and streamline the process to maintain a known trusted provider for servicemembers. By seeking a complete policy shift or just a top-off from an alternate provider, the servicemember could save money, but be faced with potential clauses, medical evaluations, or other protocols and red tape.

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5 Combat duty subsidies are not factored into the calculations (S. Resolution 77, 2005).

6 The payout to contribution ratios averaged 1.071 between 1980 and 2020 and 1.289 between 2005 and 2020 (BLS, n.d; Callan et al., 2011; DMDC, 2021b; VA, 2020b).

Regardless of whether Prudential or any other policymaker completely rejects the proposal to increase the SGLI, I recommend at the very least, educating servicemembers in a more effective manner. By stating facts, servicemembers would be presented with factors to consider when determining the necessity of supplemental life insurance such as home prices, support networks, and the general duration of sustainability under loss of the servicemember's income. Tables, figures, and discussions throughout this thesis lay out items of comparison to the SGLI's worth. Showing a servicemember the trends of housing prices and time series graphs of inflation is far more effective than sending an email stating: "update your SGLI and make sure you are adequately covered." There are only so many hours in a day and servicemembers already face doing more with less. I recommend against imposing coercion or bias. I do however, recommend providing a better baseline and enabling time to think about needs vice speeding through the process of validation and verification to satisfy a command compliance tracker.

E. IMPLICATIONS OF THE FINDINGS

This research is a legitimate attempt to help others. I have personally sought out supplemental life insurance to suit my family's needs, but in my opinion, this should not be the solution to the lack of policymakers' action over 16 years. I hope to educate others: policymakers and servicemembers alike, on the empirical reality of the status quo; raising awareness of what it is and what it should be. This is to help inform those who do not know what they do not know.

The propensity to enlist depends on a lot of factors. Recruiters appeal to patriotism and nationalism, but if people do not feel valued, they will be less willing to accept the risk. By increasing the amount payable to a servicemember's beneficiaries upon ultimate sacrifice, it at least acknowledges and better monetizes the gratitude for their service.

Now while many believe it poor taste to put a monetary value to a person's life, this is the essence of life insurance programs. To put it candidly, by not changing the "value" of a servicemember's life, it gives the impression that policymakers do not "value" servicemembers' sacrifices; and by accepting the stagnated $400,000, servicemembers accept that their life is worth less with each passing year.

II. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

A. MOTIVATION FOR RESEARCH

Notwithstanding the coronavirus disease 2019 (COVID-19) pandemic, the armed services have struggled to recruit and retain qualified personnel. Every day, each branch seeks to prevent a servicemember deficit by increasing the propensity to serve. Having spent time within Navy recruiting and holding genuine conversations with peers and colleagues, I noticed a recurring pattern. Many who chose to either not join a uniformed service or not "stay in," did so because they felt viewed as "disposable," or that they were "just another number" to the government.

I was in high school on September 11, 2001. Many of my peers joined to defend our country, willing to give their life for the United States out of pure patriotism. I, however, did not enlist until 2006, and while it was for other reasons, I still acknowledged I was willing to die for the cause. While I knew people who knew people who had died in the line of duty, I never experienced a loss from my own command until I had served over 10 years. He was a single Sailor who was barely two years into his naval career as an officer. At my subsequent command, I helped plan another memorial service for an enlisted Sailor who, on the weekend before his death, had married the 19-year-old woman who was 7 months pregnant with his child. Fortunately, he had updated his paperwork two days after the wedding. Among these tragedies, I was confident the Sailors' life insurance policies would provide adequate compensation to those who suffered such unexpected losses of their loved ones.

When people join the military, they are indoctrinated with brief after brief regarding militarization and all the policies associated therein. Briefs range from uniform wear, to service history to education benefits, banking, and different types of insurance. Consequently, this indoctrination style is flawed because much of the information is directive and provided in such a dry and general context that the audience fails to retain much of the content. The "why" is rarely addressed and the most critical information is lost.

When I was going through my initial training just out of boot camp, I was told by my superiors to stay away from the predatory life insurance salesmen at the local mall. I had the SGLI, and there was no need for additional coverage. Now, to their credit, I was a young single Sailor whose only expenses were gas, car insurance, and a cell phone bill. I lived in the barracks and ate at the dining hall. My SGLI was allotted to my parents and my friends with the intent that they would have a legendary Las Vegas weekend in my honor. The only other times the SGLI was discussed in any form was direction to update beneficiaries. The recurring issue plaguing the forefront of the ranks were changes in dependency status through divorces, marriages, subsequent divorces, and maybe children. The focus was on who got the money, not the essence of the money.

This mindset continued with me until three years ago when I spoke to a Gold Star military spouse who assessed the needs and requirements regarding how far the SGLI would go for her family. As a stay-at-home mother living in a high cost of living area, receiving the current maximum would have required the family to uproot and move to a significantly lower cost of living area—away from their community of peers and classmates, away from comfort and familiarity, to build a new life without their father. She and her husband sought out supplemental coverage and unfortunately it came into play after a tragic accident. But, because she planned for the worst, her children did not have to change schools, move away from their support network, or suffer a financial burden upon the death of their husband and father.

It honestly never occurred to me that my family could face a similar burden in the event I died while on active duty. But, doing the math, $400,000 barely covered 5 years of base pay at my current rank, and it did not cover the cost of the house my husband and I purchased when we received orders to California. At that time, a typical single-family residence in San Diego County, CA, was $618,745. In 2020, the median home price was $703,181. Looking further back, the median home price for the area was $524,719 in 2005, and $325,570 in 2001 (Los Angeles Almanac, n.d.).

Making the connection that the SGLI maximum was $400,000 when I enlisted in 2006, I started piecing together the sobering fact of how much the SGLI was actually "worth." Thinking back to those comments of perceived value by the services, the

arguments now had quantitative merit and proved that by not changing for inflation, a servicemember's "worth" is correlated with the year the servicemember dies.

My best hypothesis for the lack of change in over 16 years is that policymakers do not view it as beneficial for the VA and or Prudential. The significant jump in 2005 was enacted through the HEROES Act (S. Resolution 77, 2005). Servicemember sacrifices were constantly portrayed in the media. However, I doubt anyone in 2005 could have anticipated the tenure of the conflicts our country would endure. Most historical named conflicts lasted less than five years with the exception of the Vietnam War and the Persian Gulf War lasted less than one year (Defense Casualty Analysis System, n.d.). Nevertheless, 16 years later servicemembers continue to die serving their country and are compensated at the same rate as 16 years prior.

Taking this motivation for research, I sought to find a new feasible maximum life insurance amount for all servicemembers and personnel authorized to receive the current SGLI. In doing so, I researched: insurance providers; policymakers and key players; coverage considerations such as inflation, VSL, and annual income; contribution rates; beneficiary nuances; barriers to change; and alternative options.

B. INSURANCE PROVIDERS

Understanding the time, effort, and bureaucratic paperwork involved with government policies, I realized it would be egregious to completely change insurance providers for all uniformed personnel and I see no reason for it. I would only recommend other providers for coverage not sufficiently provided by the SGLI at the servicemember's discretion.

C. POLICYMAKERS AND KEY PLAYERS

As with any major military policy, there are many decision makers regarding the SGLI program. The VA directly administers six life insurance programs and supervises three. The SGLI is one of the three supervised. The premiums for the VA's group policy through Prudential are based on program experience and mutual agreements between them. Every month, the individual member's premiums are deducted via the Defense Finance

and Accounting Service (DFAS) and are then paid to the VA, who then forwards the premiums to Prudential. Prudential records the premiums and maintains investment records independent of the VA. Reserves are held to account for claim fluctuations as required by law. The VA assesses Prudential's reserve balance and if the contingency reserve balance is deemed excessive by the Secretary of Veterans Affairs, the excess funds are then transferred into the VA's SGLI revolving fund account for investment into Treasury securities. Prudential records the insurance liabilities, not the VA, because Prudential assumes the risk of loss per the terms and conditions of the policy (United States Department of Veterans Affairs [VA], 2020a). The Secretary of Veterans Affairs updates the DOD of any changes, pending or approved to the life insurance programs. The Secretaries of the Military Departments and Commandant of the United States Coast Guard are tasked with developing associated regulatory guidance and ensuring their respective members regularly update their coverage (Department of Defense [DOD], 2017). I do not provide recommendations or analysis of the contingent reserve funds. I focus on contribution and payout estimates strictly at the servicemember level.

There are other players involved to include Congressional resolution for ratification (S. Resolution 77, 2005), but ultimately, it is up to the servicemember to determine the appropriate amount of coverage that his or her beneficiaries would need. It is assumed the servicemember will prioritize his or her family's well-being and always be prepared for the future. However, commands often intervene to ensure this paperwork is initiated and or updated regularly because family requirements can change drastically in a short period of time, and sometimes servicemembers need to be reminded of this. The SGLI is not a one-size fits all solution. It is a strategic option that should be implemented and reassessed as appropriate, from both the policymakers as well as the end users. I do provide some baseline factors for consideration when encouraging servicemembers to determine appropriate amounts of coverage, but I do not intend to sway any individual's ultimate decision.

The United States Code calculates military pay increases based on the Employment Cost Index (ECI). The ECI is compiled by the Bureau of Labor Statistics to track businesses' costs of labor. When the ECI increases, so does military pay. The President of

the United States may recommend an increase or decrease to this percentage. However, it would require ratification through Congress if it deviated from the ECI (Henig, 2010). Observing historical trends of previous increases, I used inflation and the CPI versus the ECI to justify increases to the SGLI maximum.

D. COVERAGE

Many life insurance policies incorporate eligibility factors that do not cover certain occupations or preexisting conditions. Often these include war clauses, military service restrictions, or exemptions that confine payout based on cause of death (Rose, 2019). While supplemental insurance providers with indemnity for aviation accidents may not be of interest to military pilots or aircrew, servicemembers in the medical field may consider them a viable option. When considering policies, it is important to read the fine print and ensure the coverage is realistic and applicable to optimally suit one's needs.

The SGLI does not typically require medical examinations to obtain coverage. Preexisting conditions of concern would most likely be vetted prior to joining a service. There have been instances however, of servicemembers reducing their coverage below the maximum amount and later wanting to return to the maximum. In these cases, additional medical questioning emerges (MilConnect, n.d.).

Single servicemembers with little to no debt may not feel the need for hundreds of thousands of dollars of coverage. This is their choice and it is perfectly acceptable. I would however, suggest they consider potential costs incurred by anyone who may have to travel to clean out their residence, retrieve their belongings, or organize a memorial service in a different location (Jowers, 2016). Acquaintances may also be deemed beneficiaries with the implication of care for beloved pets left behind.

True, there are other benefits like the $100,000 death gratuity that are meant to cover the immediate costs incurred upon death, but it has a hierarchy of eligibility and may have limitations for those who are neither immediate family members nor executors (United States Department of Defense [DOD], n.d.). However, it is important to note this is separate from the SGLI. I do not intend to go into detail of benefits other than the SGLI, but mention death gratuity specifically because it fulfills some of the aforementioned

justifications for servicemembers to consider for life insurance. I reiterate that $400,000 or less through the SGLI may be perfectly acceptable for some, but not others.

1. How Much Is Enough?

a. Inflation Approach

Historically, the SGLI maximums increased in roughly five-year increments (Callan et al., 2011). I do not know the rationalization for the uncharacteristic increases in 1996 and 2005. I can only hypothesize it was for incentive purposes. In this research, I considered different methods to increase the maximum while integrating 5- year increases for the next 20 years. Ideally, the rates would adjust annually for inflation, but reconciling the amounts every five years to match inflation, or at least increase at any amount would still prove more beneficial than the status quo. Inflation is presented as a reasonable standard because it is a defining value of economics.

b. Value of a Statistical Life Approach

A study regarding combat casualties and servicemember compensation relating to operations in Iraq and Afghanistan by Armey et al. (2018) provided thorough insight on military VSL, particularly involving combat. It examined the effect of combat deployments to Iraq and Afghanistan on active duty casualties between 2001 and 2012. For their empirical analysis, they discussed different VSL estimates, and concluded $9.6 million was the appropriate VSL. They then used this value, multiplied by the casualty rate determined in their research for a value of $4,603 as an annual compensating wage differential (CWD). They then estimated an average of 5.7 months in-country for servicemembers deployed to Iraq and Afghanistan, so they then divided the CWD by 5.7, ultimately concluding that hazard pay should be increased from $225 to $808 for combat operations in these areas. Their control group was active duty casualty rates stateside (Armey et al., 2018).

This literature was useful regarding the interpretation of casualty rates and identifying deficiencies regarding compensating the risks undertaken by servicemembers. I built upon it in a more general sense. I did not differentiate between overseas contingency operations and stateside deaths, nor did I differentiate between occupations or branch of

service because the SGLI does not pay out differently for cause or location of death. Although it does not require the deductible for combat related deaths, the premiums are still paid for via appropriations and therefore I hold deployability status constant in my calculations because the contributions continue, they are simply subsidized with active duty pay appropriations (S. Resolution 77, 2005).

c. Income Approach

Another academic study reviewed was from by Netzel and Bockenstedt (2019). It analyzed the background and effectiveness of the SGLI program with noted considerations for policy changes. More specifically, they too critiqued the stagnation of the SGLI maximum and held that inflation should be a justification for policy change. They further researched comparable life insurance recommendations and determined the Federal Employee Group Life Insurance policy advocated for 5 times one's annual salary, in addition to other financial advisors who recommended 10 times one's annual salary as coverage targets (Netzel & Bockenstedt, 2019).

One of their preliminary findings was that in 2005, the substantial increase to the SGLI essentially aligned the maximum authorized amount to the 5 times rule, with only less than 1 percent of servicemembers not sufficiently covered. Then by 2019, 6 percent of servicemembers were not sufficiently covered by the 5 times rule because of the imbalance of base pay increasing without increasing the $400,000 maximum (Netzel & Bockenstedt, 2019).

One of the limitations in their research was the lack of proprietary information from Prudential to accurately estimate monthly premiums for policies greater than $400,000 (Netzel & Bockenstedt, 2019). I started with the current contribution rate of $0.06 per $1,000 of coverage for my estimated proposal (VA, n.d.), then adjusted the contribution rates for further analysis using Microsoft Excel Solver. Netzel's and Bockenstedt's (2019) second and third limitations involved time in grade and marital status. For my income-based approach, I used base pay rates alone. I did not factor time in grade, but I did factor in years of service. Promotion rates vary between different service branches and so I selected rough estimates for years of service for each rank with the understanding it was

for benchmark purposes only. If an E-5 servicemember looked at the chart and had more years of service, he or she would know that his or her pay would be greater. Servicemembers understand their timelines better than any chart I could provide in this research, but my goal was to start the conversation. Other pay considerations for dependents can be argued as compensated through the survivor benefit plan or other entitlements. I did not provide analysis for other survivorship entitlements in this research nor any other death benefit.

2. Contribution Rates

In July 2019, the SGLI contribution rate dropped from $0.07 to $0.06 for every $1,000 of coverage (VA, n.d.). The premium decreases were stated as in line with typical insurance industry practices as a response to reserve funds, the economy, and the number of death claims. Per the official VA blog:

> VA insurance continues to place the interests of service members first and foremost by keeping SGLI premiums as low as possible, while also maintaining the necessary reserve levels to ensure funds are available to pay claims and beneficiaries. (Hoffman, 2019, para. 3)

I interpreted this as the SGLI change was on someone's radar, but since it would take more than $100,000 to correct for inflation (BLS, n.d.) rather than acknowledging the shrinking worth of $400,000, the ultimate decision was to offer the $400,000 SGLI on sale.

I believe an increase in the premium rate for a significant increase in coverage is justifiable. Researching the buying power of the 1965 SGLI maximum premium ($2 per month for $10,000) equates to $16.56 paid monthly for $82,779.11 worth of coverage in 2021 dollars. Not considering inflation, but simply using the ratio of $1 for every $5,000 worth of coverage as was the case in 1965, $80 would be paid monthly for $400,000 worth of coverage (BLS, n.d.; Callan et al., 2011).

In the past, whenever the maximum amount increased, every servicemember at the maximum amount was automatically enrolled for the new maximum with automatic increased withdrawals for the new monthly premium. Those who were below the maximum, remained at their rate with premiums adjusting only if rates changed (VA, n.d.).

I recommend the contribution rate guidelines stay the same with rates changing as a blanket policy and not rated differently for varying levels of coverage.

Researching the VA's Annual Benefit Reports from fiscal years 1999 to 2019, statistics showed that of those eligible, an average of 98.7 percent of active duty personnel and 93.0 percent of reservists opted for the SGLI. This equated to an average of 96.8 percent of servicemembers under the SGLI program. From fiscal years 2006 to 2019, after the SGLI increased to $400,000, an average of 99.1 percent of active duty and 92.8 percent of reservists opted for the SGLI. This equated to an average of 96.9 percent with some level of SGLI coverage. Of the active duty servicemembers with the SGLI between 2006 and 2019, an average of 93.7 percent selected the $400,000 maximum and 6.3 percent selected a value between $50,000 and $350,000.[7] Of the reserve personnel with the SGLI between 2006 and 2019, an average of 82.1 percent had the maximum $400,000 and 18.7 percent opted for an amount between $50,000 and $350,000.[8] In total, since the SGLI has been $400,000, an average of 89.6 percent of those with the SGLI opted for the maximum and 10.4 percent opted for an amount between $50,000 and $350,000. There was no data available indicating the percentage of personnel relative to the maximums prior to 2006 (VA, 2020b). In my research, I applied these weighted averages when calculating contributions and payouts against end strength and death statistics. Appendix A shows these itemizations by individual years.

E. BENEFICIARIES

In 2005, the HEROES Act made it mandatory for married servicemembers to obtain spouse approval if the member elected for any amount lower than the maximum SGLI amount This literature reiterated the importance of beneficiaries and survivors having a voice in the life insurance determination process (S. Resolution 77, 2005).

In an academic analysis from by Callan et al. (2011), they too analyzed the SGLI program, its history, current issues, and future implications. However, their paper was more

7 The SGLI is only available in $50,000 increments (VA, n.d.).

8 Noted total in excess of 100 percent due to source data rounding (VA, 2020b).

of an in-depth qualitative analysis regarding the SGLI program that was in response to a sensationalist article from Bloomberg, which cast Prudential in a negative light. There was some debate about the way Prudential was carrying out payments to beneficiaries because they were withholding payouts in turn for granting 0.5 percent interest on the amount withheld. However, their research concluded the article misled the public, and Prudential was acting legally and ethically fair. The authors did note that they were unable to differentiate between the nuances of revenues vice profits regarding Prudential's accounting practices (Callan et al., 2011).

Again, understanding there is a trusted method of collaboration between the VA and Prudential, I aim to hold those policies and procedures constant. I do recognize COVID-19 had and continues to have significant impacts on the economy and the financial positions of life insurance companies across the board.

F. BARRIERS TO CHANGE

1. Funding and Resources

Researching the financial posture of Prudential showed they faced severe adversity from the Coronavirus pandemic. Not only was there an abnormal surge in insurance claims, but the 2020 stock market collapse negatively affected their investments. At the beginning of May 2020, shares had declined about 41 percent and their credit losses after taxes were forecast at about $2.4 billion over the next three years. In spite of this, Prudential claimed these losses as manageable (Nguyen, 2020). The 10K for Prudential is not expected for release until after completion of this research, but their 10Q from November 2020 gave insight into the impact of COVID-19 on their finances. They claimed the disruption in the global economy and troubled financial markets adversely impacted their cash flows, financial condition, and may continue to adversely impact future operations. The risks of their investments manifested in insurance liabilities, elevated mortality rates, as well as policyholder behavior. These trends are expected to continue, at least short-term. Prudential expects further impacts to their operations and continues to manage the impacts to the best of their ability. For the 3 months and 9 months leading up to the end of fiscal year 2020, Prudential reported net losses of $182 million and $2.759 billion, respectively,

blaming market conditions for negative results (Prudential Annuities Life Insurance Corporation, 2020).

Understanding an SGLI increase will not be an overnight solution, I would presume that Prudential's financial situation will continue to improve based on the overall stock market rebound since March 2020 and the growing distribution of COVID-19 vaccines. In addition, the VA continues to assist with reserve management and the ratio of servicemembers dying from COVID-19 is significantly less than the general population. That being said, I still sought out potential mitigating factors to determine statistical significance or correlation for insight on servicemember death fluctuations. With these answers, it could further help with resource planning.

2. Motivation

An additional explanation of the stagnated SGLI could simply be ignorance. The fact that it has not changed in 16 years due to lack of demand signal is certainly plausible. If no one has called out the stagnation, why should Prudential or the VA proactively seek to change policy. This research is intended to act as a demand signal.

G. ALTERNATIVE OPTIONS

Understanding the likelihood of general ignorance on the nuances of life insurance, realistic education is conceivably the best option for optimizing benefits at the lowest cost. Servicemembers believing the SGLI through Prudential is the only option hinders the potential for servicemembers to obtain the coverage they actually desire or need. By assuming Prudential has a monopoly, other insurance suppliers are left unused. Without significant competition, Prudential maintains their current business practices without adjustment because there is no indicator for change. Servicemembers need to realize there is an oligopoly for military-centric life insurance plans. That other providers exist and will provide coverage for servicemembers at competitive rates (Air Force Sergeants Association [AFSA], 2021; American Armed Forces Mutual Aid Association [AAFMAA], 2021; Armed Forces Benefit Association [AFBA], n.d.; Association of the United States Army [AUSA], 2021; Navy Mutual, 2021; United Services Automobile Association [USAA], 2021).

I acknowledge several other institutions that offer life insurance for servicemembers. This research makes no endorsement or guarantees of any particular one, and I do not and will not receive any compensation in any form from any provider. They were chosen at random by using internet searches for "military life insurance." Understanding the variation in policies, member-specific eligibility, and varying rates and coverage amounts for the options out there, this research only lists providers for servicemembers to seek out the criteria that best suits their preferences. In addition, some of these providers use underwriters to handle the policies for the specific organizations and I do not want to provide inaccurate information that may sway a decision. To reiterate, this research does not pursue the changing of the SGLI provider and the alternatives are meant to be used as an educational reference point. When listed, they are in alphabetical order, not any particular form of ranking.

III. DATA AND DESCRIPTIVE STATISTICS

The overall data from this research spanned over the course of 1965 to 2021 with focus on specific timeframes noted accordingly.

A. STEP ONE: DETERMINE WHAT THE SGLI MAXIMUM SHOULD BE

With my primary argument centered on the effects of inflation, I obtained historical inflation rates from a personal finance website called The Balance, and used the CPI calculator from the United States Bureau of Labor Statistics (Amadeo, 2020; BLS, n.d.). I selected inflation as a factor because other servicemember benefits use inflation-based metrics to influence increases (Henig, 2010). For future projections, I used OLS regression values of historical SGLI maximums from 1965 carried forward. I also used a straight CPI estimate of 3 percent per year. Thirdly, I used a combination auto-regressive moving average process, both of the first order (ARMA (1,1)) for time series forecasting, then used data splitting to predict future United States inflation rates. For the third model, I used data from 1982 to 2020 to forecast future inflation rates through 2041. I selected this range of because the 1970s had an average inflation of 7.41 percent and 1980 reached 12.5 percent. These values significantly biased the forecasted estimates and so the data was left-censored to a more representative sample of expected inflation for the training and test sets (Amadeo, 2020).

Life insurance disbursements offer to beneficiaries what the member would have provided if they were still alive and earning income. The 5- and 10-year income equivalencies are not intended to be all-inclusive solutions, but rather a stopgap to allow the beneficiaries time to regain footing. These amounts vary by servicemember, not only by rank, but also with years of service. Because average time in grade varies between the different armed services, I used a single estimate for years of service to establish a reference point. Officer and enlisted base pay rates were obtained from the DFAS website. Warrant officers and elevated pay rates for officers with prior enlisted service in excess of five years were not factored into the analysis (Defense Finance and Accounting Service [DFAS], 2021).

To determine housing price trends, I researched the 10 states with the highest population of servicemembers using data from DMDC.[9] These 10 states equated to 49.1 percent of the servicemembers stationed in the United States for January 2021 (Defense Manpower Data Center [DMDC], 2021a). I then researched median home values near military bases and compared the trends against the SGLI maximums between 2000 and 2015. The SGLI maximum amounts are calculated by fiscal year and the median home prices are annual prices from March of the associated fiscal year (Anderson, 2015).

B. STEP TWO: TREND ANALYSIS

I analyzed total servicemember deaths and servicemember end strengths using data from the Defense Manpower Data Center (DMDC) from 1980 to 2020. Although eligible for the SGLI, data for the United States Coast Guard was not included in this analysis (DMDC, 2021b). To analyze empirical relationships between political party affiliations of the President, House Majority, and Senate Majority, I obtained data from official government websites (DMDC, 2021b; History, Art and Archives, United States House of Representatives, 2021a; History, Art and Archives, United States House of Representatives, 2021b; and United States Senate, 2021). Further details of trend variables are provided in chapter IV. I acknowledge determining the significance of each factor will not alone justify increasing the SGLI, but they may prove valuable insight.

C. STEP THREE: FEASIBILITY DETERMINATION

I derived historical SGLI contribution rates from multiple sources to include VA historical records, previous research, and official reports (Callan et al., 2011; Hoffman, 2019; VA, 2020a; VA, 2020b; and). I derived servicemember enrollment data from VA Annual Benefit Reports (VA, 2020a).

9 The top 10 states with the most servicemembers in January 2021 are from highest to lowest: California, Texas, Virginia, North Carolina, Florida, Georgia, Washington, Maryland, Hawaii, and South Carolina (DMDC, 2021a).

D. STEP FOUR: DISCUSS ALTERNATIVES

Searching for military-friendly providers online, I identified American Armed Forces Mutual Aid Association (AAFMAA), Armed Forces Benefit Association (AFBA), Air Force Sergeants Association (AFSA), Association of the United States Army (AUSA), Navy Mutual, and United Services Automobile Association (USAA) as a few providers for optional life insurance policies. The variation in policies, eligibility, and other details are beyond the scope of this research and are subject to change. Rather than give sweeping generalizations of possibly dated information, these providers are listed for servicemembers to seek out the providers that suit their own preferences. Initial research showed stipulations for nicotine users and specific age groups. It is recommended that individual research be conducted by the servicemember to determine his or her own specific needs (AAFMA, 2021; AFBA, n.d.; AFSA, 2021; AUSA, 2021; Navy Mutual, 2021; USAA, 2021).

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IV. ANALYTICAL METHODS

A. STEP ONE: DETERMINE WHAT THE SGLI MAXIMUM SHOULD BE

1. OLS

Using Equation 1, I regressed historical SGLI maximum values (*sgli_max*) over time (*year*), to estimate the average annual increase from 1965 to 2021.

$$\text{sgli\_max}_t = \beta o + \beta 1 \text{year}_t + \varepsilon \quad (1)$$

The variable *sgli_max* indicates the value of the SGLI maximum for a given year ($_t$). Figure 4 represents these values with navy-blue dots. The variable *year* indicates a given year, defined as a fiscal year, ending September 30 of the associated year. For years the maximum increased, there is no delineation of amounts over the course of the year. The calculations use the new maximum for the affiliated fiscal year, regardless of when the change actually occurred. The gold line in Figure 4 shows the estimate that for every additional year since 1965, the SGLI maximum increased an average of $9,247 (Callan et al., 2011).

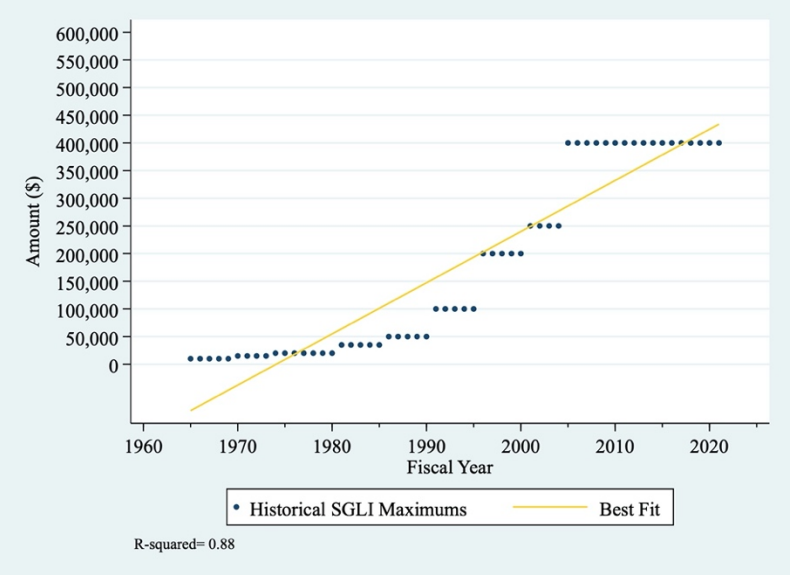

Figure 4. OLS Regression of SGLI Maximum Values by Year (1965–2021). Adapted from Callan et al. (2011).

Using strictly the OLS regression, the SGLI maximum for 2021 should be $433,929 or $430,000 per my recommendation of rounding down to the nearest $5,000. To forecast into the future, I multiplied the β_1 multiplier of $9,247 by 5 years and added it to $430,000. This gave a value of $476,235 for 2026. Rounding this value down to the nearest $5,000, I again added the 5-year β_1 multiplier for a value of $521,235. I continued this process out to 2041. The first two rows of Table 1 show the OLS estimated maximum for 2021 and forecasted recommended values to 2041 (Callan et al., 2011).

Table 1. Outlook of Estimated Maximums Using Various Inflation Forecasting Methods (2021–2041). Adapted from Amadeo (2020); BLS (n.d.); Callan et al. (2011).

	2021	2026	2031	2036	2041
OLS Regression Estimate	$433,929	$476,235	$521,235	$566,235	$606,235
Recommended SGLI Max (OLS)	**$430,000**	**$475,000**	**$520,000**	**$560,000**	**$605,000**
CPI Estimate	$526,321	$608,619	$701,361	$811,492	$933,216
Recommended SGLI Max (CPI)	**$525,000**	**$605,000**	**$700,000**	**$805,000**	**$930,000**
Inflation Estimate	$533,061	$614,427	$707,489	$817,779	$945,413
Recommended SGLI Max (Inflation)	**$530,000**	**$610,000**	**$705,000**	**$815,000**	**$945,000**

2. Inflation Adjusted

To estimate an inflation-based value, I used the CPI calculator to estimate the buying power of $400,000 when the amount was established in September 2005, compared to the buying power in January 2021. This gave a value of $526,321 (BLS, n.d.).

To forecast the CPI for the next 20 years, I used a constant estimate of 3 percent per year. After individually compounding the 3 percent CPI and adding that to the forecasted inflation, then rounding down to the nearest $5,000 every 5 years, I then used those rounded down amounts as the new baselines on which to further compound inflation

for subsequent intervals. The middle two rows of Table 1 show the CPI estimated maximum for 2021 and forecasted recommended values to 2041.

I separately used the historical inflation rate calculated at the end of December 2005 and multiplied it by $400,000, then multiplied that product by 0.25 to get an estimated inflation increase for just the last quarter of 2005 since the maximum changed to $400,000 in September 2005. I then added that amount to $400,000 and compounded it for subsequent inflation through 2020. This method gave me a value of $533,061 for January 2021. Figure 5 illustrates the inflation effects on $400,000. The horizontal axis start date is September 2005 and progresses in one-year increments. The horizontal navy-blue dots represent the unchanging $400,000 maximum. The upward-sloping green line represents the inflation corrected amounts for a given year since the increase, and the downward-sloping red line represents the value of the $400,000 for the corresponding year (Amadeo, 2020).

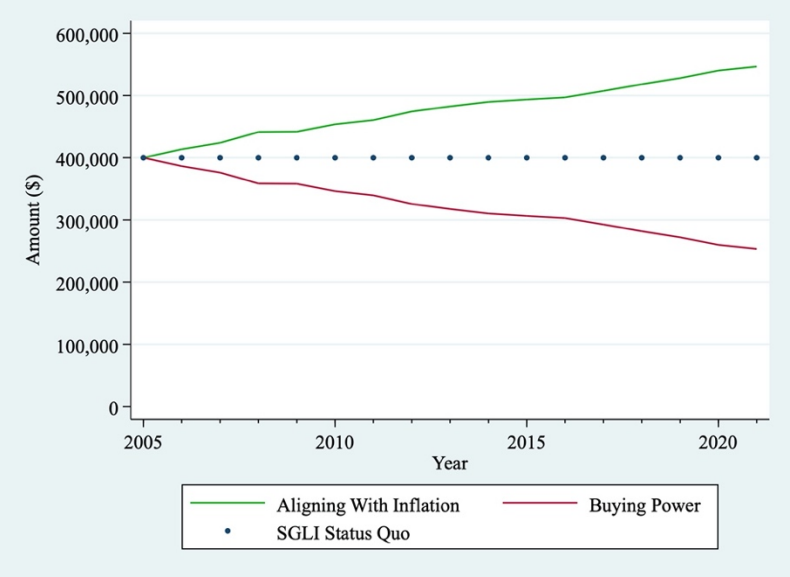

Figure 5. Factoring Inflation Against $400,000 (2005–2021). Adapted from Amadeo (2020); Callan et al. (2011).

To predict the United States inflation rate for the next 20 years, I used an ARMA(1,1) process for time series forecasting and then used data splitting to validate my

model. ARMA (1,1), predictes estimated inflation for the next 20 years to be between 0.44 and 5.56 percent with a 95 percent confidence interval. The actual predicted values were all very close to 3.0 percent, but I used the actual predicted values in my inflation forecast calculations (Amadeo, 2020). Figure 6 illustrates the ARMA(1,1) predicted inflation rates with a purple line. The green line is the actual historic inflation rates since 1982, and the gray dashed lines represent the 95 percent confidence interval of the predicted values. The bottom two rows of Table 1 show the estimated inflation corrected maximum for 2021 and forecasted recommended values to 2041.

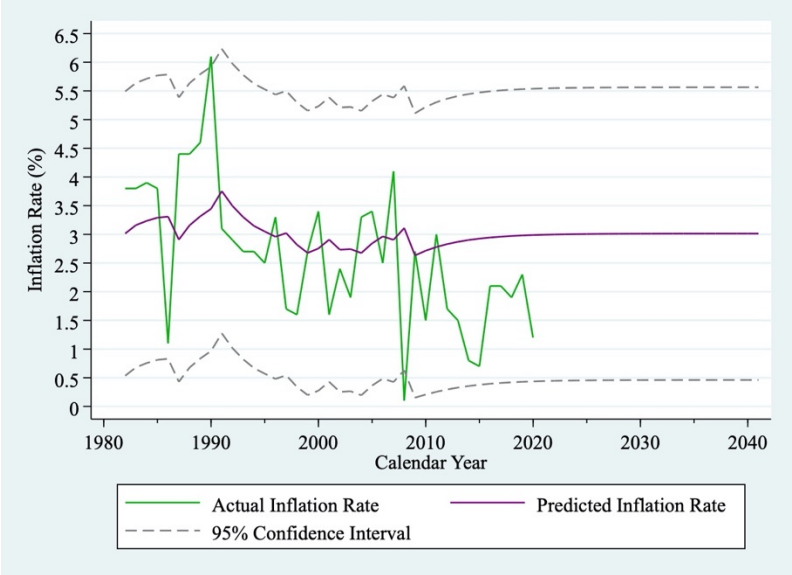

Figure 6. Historical and Predicted Inflation Rates Using ARMA(1,1) (1982–2041). Adapted from Amadeo (2020).

Figure 7 illustrates the values from Table 1. The gold dashed line is the estimated OLS value for a given year and the gold dots are the proposed OLS SGLI maximum estimates, rounded down to the nearest $5,000 at the noted 5-year intervals. The light blue dashed line and dots represent the similar values for the CPI estimates and recommended corrected maximums. The purple dashed line and dots are for the inflation corrected and forecasted estimates. (Amadeo, 2020 and Callan et al., 2011). Ideally, these rates would adjust annually for inflation, but a 5-year increase interval is also reminiscent of pre-2005

reformations (Callan et al., 2011). Figure 8 overlays the forecasted estimates beside the historical SGLI maximums represented by the navy-blue dots.

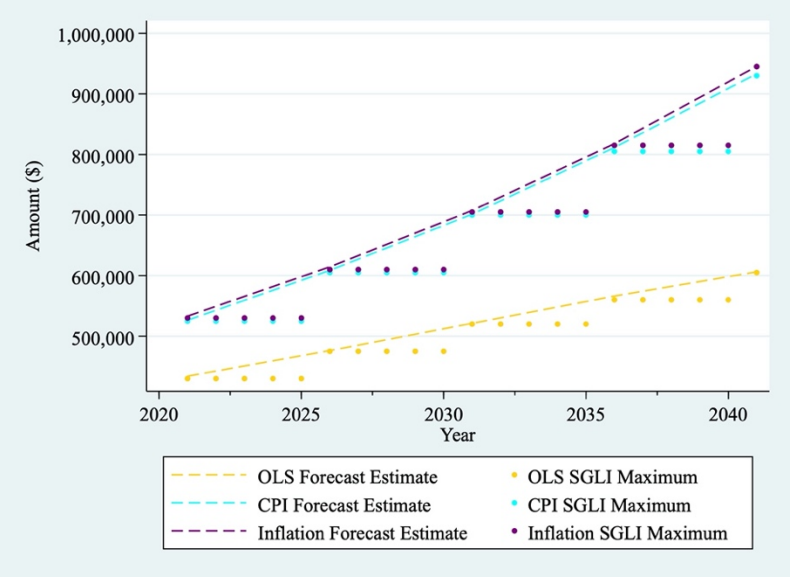

Figure 7. Outlook of Estimated SGLI Maximums Using Various Inflation Forecasting Methods (2021–2041). Adapted from Amadeo (2020); BLS (n.d.); Callan et al. (2011).

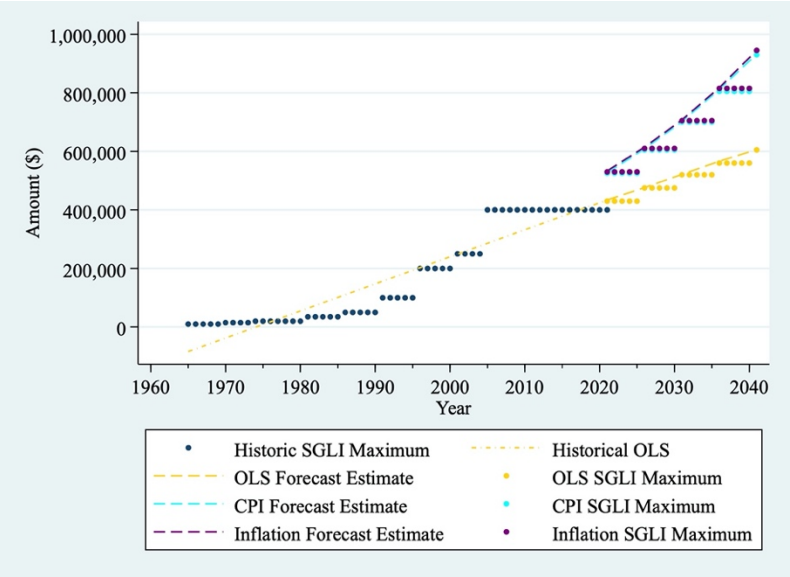

Figure 8. Historical SGLI Maximum Values Compared to the Outlook of Estimated SGLI Maximums (1965–2041). Adapted from Amadeo (2020); BLS (n.d.); Callan et al. (2011).

3. 5- and 10-Year Income

Using data from DFAS, Table 1 from Appendix B shows the income-based analysis against the status quo by rank and estimated years in 2021. The 5- and 10-year multipliers determine the suggested coverage amounts recommended in Netzel's and Bockenstedt's (2019) research. The multiplier columns note if the values are more or less than the current SGLI maximum with the values in green if under the current maximum value and red if above. The top-off columns fill in the delta between the multipliers and $400,000. Green with parentheses shows the corresponding multiplier is below the current SGLI maximum by the amount in the parentheses. The red values without parentheses in the top-off columns indicate the amount required to reach the corresponding top-off. The final column shows the years of income $400,000 equates to for the different ranks and years of service (DFAS, 2021; Netzel & Bockenstedt, 2019). Again, these values are for gauging purposes i.e., this table is not meant to imply a servicemember could spend 20 years receiving E-1 pay.

4. Housing Trends

Upon determining the top 10 states with the highest population of servicemembers using data from DMDC, I selected a base from California, North Carolina, and Washington to calculate home price trends. California was ranked number one for servicemember population, North Carolina was ranked number four, and Washington state was ranked number seven (DMDC, 2021a). I then researched median home values near the eight bases affiliated with San Diego, CA; Joint Base Bragg-Pope in North Carolina; and Joint Base Lewis-McChord in Washington state. Figure 9 shows the comparisons between the median home prices and the maximum SGLI values between 2000 and 2015. San Diego, CA bases consistently had median home prices above what the SGLI offered. North Carolina homes tracked relatively closely but stayed below, and Washington homes tracked relatively lower than the maximum SGLI amount (Anderson, 2015; DMDC, 2021a).

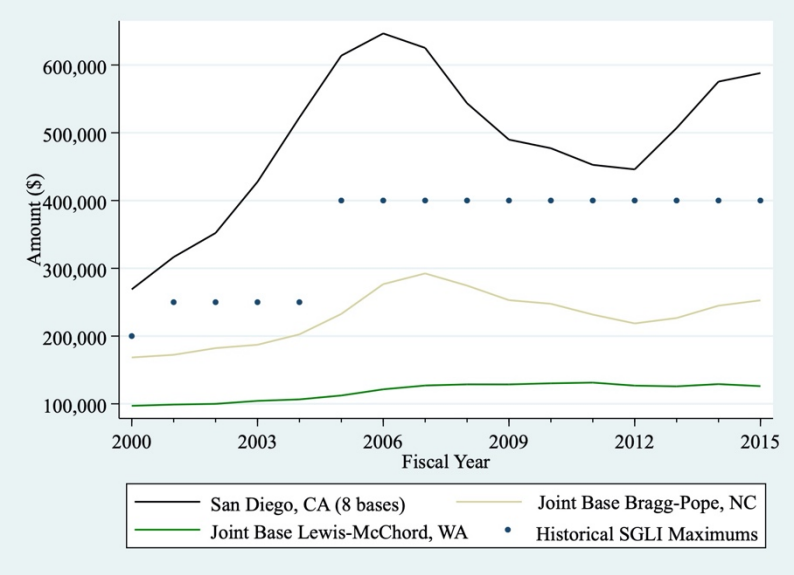

Figure 9. Median Home Price Trends for Selected Military Concentrated Areas (2000–2015). Adapted from Anderson (2015); Callan et al. (2011): DMDC (2021a).

This information is useful because beneficiaries living in one location may or may not be able to afford to either stay in their preferred location, or move to an area of greater support following a tragedy based on the cost of living. I acknowledge the $400,000 will still cover mortgage or rent payments for years after a death, it just will not cover as much as the previous years did.

B. STEP TWO: TREND ANALYSIS

1. Empirical Relationships Using OLS and Logit

I used Equations 2 and 3 for OLS and Logit modeling to examine empirical relationships between servicemember deaths, servicemember end strength totals, and partisan affiliations of government leadership (DMDC, 2021b; History, Art and Archives, United States House of Representatives, 2021a; History, Art and Archives, United States House of Representatives, 2021b; and United States Senate, 2021).

$$\text{death}_t = \beta_0 + \beta_1 \text{SME}_t + \beta_2 \text{PresD}_t + \beta_3 \text{HseD}_t + \beta_4 \text{SenD}_t + \varepsilon_t \quad (2)$$

$$\ln(\text{death}_t) = \beta_o + \beta_1 \text{SME}_t + \beta_2 \text{PresD}_t + \beta_3 \text{HseD}_t + \beta_4 \text{SenD}_t + \varepsilon_t \quad (3)$$

The subscript "t" ($_t$) indicates a given year, defined as a fiscal year, ending on September 30 of the indicated year. The timeframe of this trend analysis is 1980 to 2020. When "years" are referred to for generalization purposes, this timeframe is implied unless otherwise specified. The dependent variable death (*death*) indicates the total number of servicemembers who died in a given fiscal year. This number includes all active duty, full time support, and National Guard and reservists who died while in an activated status for the noted timeframe. This number does not include United States Coast Guard members or any other personnel not in the armed services.[10] The log of deaths (*ln(death)*) was used to extrapolate percentage point changes when used as the dependent variable. The variable servicemember end strength (*SME*) includes the total number of servicemembers, including all active duty, full time support, and full time equivalency of activated National Guard and reservists for the noted timeframe (DMDC, 2021b). President political affiliation (*PresD*) is a binomial variable: 1 if democrat, 0 if republican. House Majority political affiliation (*HseD*) is a binomial variable: 1 if the House Majority was democrat, 0 if republican. Senate Majority political affiliation (*SenD*) is a binomial variable: 1 if the Senate Majority was democrat, 0 if republican. The variables *PresD, HseD, and SenD,* were not given in the original dataset, but were extrapolated from research and combined with the dataset (DMDC, 2021b; History, Art and Archives, United States House of Representatives, 2021a; United States House of Representatives, 2021b; and United States Senate, 2021).

Table 2 displays the OLS regression estimates between servicemember deaths and the log of servicemember deaths. Equation 2 fit the data more closely to the regression line at 58.9 percent versus the 58.0 percent fit of equation 3, but these were not good representations of the data at a 95 percent confidence interval. The only statistically significant variable was *SME* (DMDC, 2021b; United States House of Representatives, 2021a; History, Art and Archives, History, Art and Archives, United States House of Representatives, 2021b; and United States Senate, 2021).

[10] The armed services data provided includes the United States Army, United States Air Force, United States Navy, United States Marine Corps, affiliated full time support personnel, and activated full time equivalencies of reservists, and National Guard personnel (DMDC, 2021b).

Table 2. Summary Statistics of Variables (1980–2020)

	(1) death	(2) ldeath
SME	0.001** (0.000)	0.000** (0.000)
PresD	-191.342 (147.090)	-0.160 (0.104)
HseD	168.274 (209.242)	0.107 (0.146)
SenD	-52.554 (127.578)	0.040 (0.089)
Constant	-97.942 (544.523)	6.171*** (0.366)
Observations	41	41
R-squared	0.589	0.580

Standard errors in parenthesis
*p<0.05, **p<0.01, ***p<0.001

Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021a); History, Art and Archives, United States House of Representatives (2021b); United States Senate (2021).

2. Forecasting Servicemember Deaths

Using the ARIMA time series analysis to predict servicemember deaths using the data from DMDC, I plotted the known servicemember deaths from 1980 to 2020. The auto-correlation function (ACF) was stationary with no significant positive autocorrelation past lag 3 (it cut out at lag 3). It had a damp sinusoidal exponential decay and the partial auto-correlation function (PACF) cut out at lag 1 (DMDC, 2021b).

I therefore searched for a valid model using Akaike's Information Criterion (AIC). MA(3) had an AIC of 570.27 with 37 degrees of freedom. All parameter estimates were statistically significant while exhibiting stationary and uncorrelated ACF and PACF residuals. The residuals exhibited overall normality with only a minor skew, as well as constant variance (DMDC, 2021b).

Using data splitting, I withheld the test set of the last 13 years of data (2008 to 2020), equating to 31.71 percent of the data. The MA(3) model validated appropriately and all parameter estimates were statistically significant with p-values less than 0.05. The model accurately predicted 12 of the 13 test set observations at a 95 percent confidence interval. Ultimately, this predicted between 757 and 2,596 servicemembers will die each year until 2041, at a 95 percent confidence interval. The forecasted predicted values are more precisely estimated to be 1,677 annual deaths. Based on recent trends, I would anticipate the average total to be less than 1,000. There have not been more than 1,600 annual deaths since 2007. However, I used the predicted values as a conservative estimate for my analysis. Figure 10 depicts the results of my model with the actual annual servicemember deaths represented by the yellow line, the predicted servicemember deaths from my MA(3) model represented by the orange line, and the 95 percent confidence interval shown as the gray dashed lines (DMDC, 2021b).

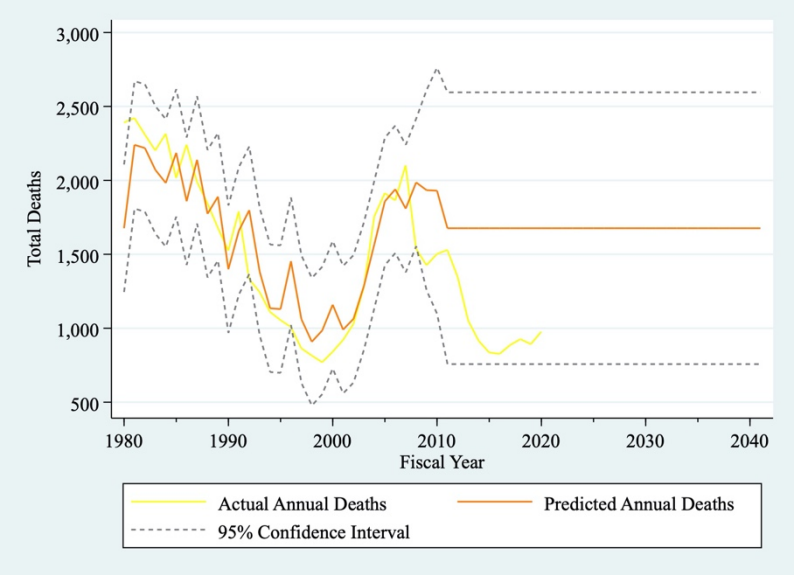

Figure 10. Historical and Predicted Servicemember Deaths Using MA(3) (1980–2041). Adapted from DMDC (2021b).

C. STEP THREE: FEASIBILITY DETERMINATION

To determine the feasibility of the proposed SGLI maximums, I started with debt-to-income ratios of historical servicemember deaths against the historical weighted average contributions of those who elected for the SGLI. I conservatively assumed that every servicemember that died opted for the maximum SGLI for the given timeframe. Using historical averages, the weights I used were derived from an average of 96.8 percent of servicemembers opting for the SGLI between 2006 and 2019, and of that 96.8 percent, an average of 89.6 percent opting for the maximum amount, with 10.4 percent opting for an amount between $50,000 and $350,000 (VA, 2020b).

To predict servicemember end strengths I used JMP time series forecasting in lieu of ARIMA modeling since no models would sufficiently validate. Figure 11 shows the predicted end strengths between 798,529 and 2,300,810 until 2041, representing a 95 percent confidence interval (gray dashed line). The forecasted end strength is more precisely estimated between 1,493,721 and 1,549,669, assuming similar trends of those between 1980 to 2020 (DMDC, 2021b).

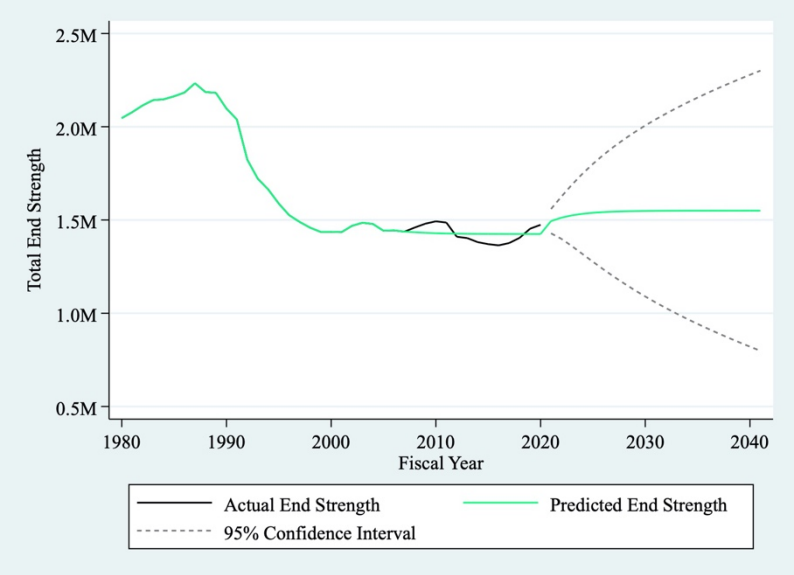

Figure 11. Historical and Predicted Servicemember End Strengths Using JMP (1980–2041). Adapted from DMDC (2021b).

I then used the predicted annual deaths and predicted servicemember end strengths to compare payout to contribution ratios from 1980 to 2041. The average debt-to-income ratio between 1980 and 2020 was 1.071. The average between 2005 and 2020, when the SGLI was $400,000 was 1.289. The breakdown of annual historical and forecast contribution to expenditure comparisons are in Appendix C. Understanding the SGLI is not a vacuum-entity of Prudential where death gratuities are only paid out from contributions, I held Prudential's investments and other financial considerations constant over time and only sought to compare the ratios themselves (Callan et.al., 2011; DMDC, 2021b; VA, 2020a).

D. STEP FOUR: DISCUSS ALTERNATIVES

Regardless of the outcome of this research, the data could and should be presented to servicemembers as a signal of the potential for requiring a top-off, depending on one's needs. Table 1 of Appendix B in particular shows estimated income comparisons that would lay a foundation for discussion regarding how much is enough for each individual servicemember. Group life insurance policies can be a tremendous benefit with their blanket coverages. However, as Table 1 of Appendix B also shows, the blanket does not cover all members equally (DMDC, 2021b; Netzel & Bockenstedt, 2019).

AAFMAA, AFBA, AFSA, AUSA, Navy Mutual, and USAA are just some of the available providers for supplemental life insurance policies. These were noted as being appropriate for servicemembers, but there may still be other non-military providers that may still satisfy servicemember requirements. Again, rather than provide information full of stipulations, these providers are listed for servicemembers to seek out the providers that suit their preferences with the most current information (AAFMA, 2021; AFBA, n.d.; AFSA, 2021; AUSA, 2021; Navy Mutual, 2021; USAA, 2021). Similar to the financial struggles faced by Prudential, it is certainly possible other providers are facing similar challenges.

V. RESULTS

A. STEP ONE: DETERMINE WHAT THE SGLI MAXIMUM SHOULD BE

Figures 7 and 8 and Table 1 showed the results of different methods used to estimate potential values of an increased SGLI maximum with subsequent increases. Rounding down to the nearest $5,000, OLS regression estimated $430,000 as a 2021 corrected maximum, increasing up to $605,000 in 2041 (Callan et al., 2011). CPI analysis estimated $525,000 as the 2021 corrected maximum, escalating to $930,000 in 2041. The inflation method corrected the maximum to $530,000 in 2021, with increases to $945,000 in 2041 (Amadeo, 2020).

Table 1 of Appendix B showed the breakdown of base pay multipliers and how many years of income $400,000 equates to for different ranks and years of service. The predicted increase to $525,000 shifts the balance of how many ranks fall under the 5- and 10-year rules, but it is not a drastic correction. The totals may shift with subsequent increases, but that will depend on base pay increases as well. Allowing servicemembers to select their own amount using the suggested multipliers of 5- or 10-year base pay estimates would require the option to have coverage ranging from an estimated $100,000 to $1,000,000 for 5-year multipliers and $200,000 to $2,000,000 for 10-year multipliers in order to cover all paygrades using 2021 base pay rates (DFAS, 2021; DMDC, 2021b; Netzel & Bockenstedt, 2019).

The median home price analysis showed that it depends on where the beneficiary lives, wants to live, and the costs associated in order to determine sustainability of the SGLI payout. All factors that should be discussed with the servicemember when determining the appropriate amount of coverage.

B. STEP TWO: TREND ANALYSIS

1. Empirical Relationships Using OLS and Logit

Appendix D provides statistical output to provide a more detailed evaluation of the process and methods used in trend analysis. The figures show what appear to be predictable

relationships between variables, but the tables show further analysis from which to base more factual analysis.

Per the OLS conducted for Equations 2 and 3 and described in Table 2, the only statistically significant variable was servicemember end strength. This concludes for every servicemember end strength increase of 1,000 servicemembers for a given year, there will on average be an estimated one additional servicemember death. There were no statistically significant trends between servicemember deaths and the partisan affiliations of government leadership. Servicemember end strength was kept in the regression to mitigate for drastic fluctuations in manning levels by reducing omitted variable bias (DMDC, 2021b; History, Art and Archives, United States House of Representatives, 2021a; History, Art and Archives, United States House of Representatives, 2021b; United States Senate, 2021).

Table 3 shows the results for the hypothesis tests to determine the likelihood of servicemember deaths increasing compared to the previous year based on the given variables. By rejecting the null, I determined a democratic President, House and Senate Majority all have the same likelihood of increasing servicemember deaths from the previous year. The pseudo R-squared value was 0.299, indicating a relatively good fit, however their likelihood of increasing servicemember deaths was overall low (DMDC, 2021b; History, Art and Archives, United States House of Representatives, 2021a; History, Art and Archives, United States House of Representatives, 2021b; United States Senate, 2021).

Table 3. Hypothesis Test for Determining Likelihoods of Predicting Servicemember Death Increases

	chi2	Prob > chi2
PresD	2.79	0.0948
HseD	**2.54**	**0.1111**
SenD	2.63	0.1048
PresD=HseD=SenD	**9.43**	**0.0241***
SME	1.40	0.24

p-values *<0.05, **p<0.01, ***p<0.001

Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021a); History, Art and Archives, United States House of Representatives (2021b); United States Senate (2021).

Table 4 shows the predicted probabilities of servicemember deaths increasing compared to the previous year for House and Senate Majorities, by whether there was a republican or democrat President. All options were statistically significant at a 95 percent confidence interval with the exception of a democratic president with a republican House and Democratic Senate Majority. Again, the pseudo R-squared value was 0.299, indicating a relatively good fit (DMDC, 2021b; History, Art and Archives, United States House of Representatives, 2021a; History, Art and Archives, United States House of Representatives, 2021b; United States Senate, 2021).

Table 4. Predicted Probabilities of Servicemember Deaths Increasing from the Previous Year Based Presidential Party

	PresR	PresD
HseR SenD	**0.8709***	0.5664
HseR SenR	**0.9899*** **	**0.9501*** **
HseD SenR	**0.9997*** **	**0.9985*** **
HseD HseD	**0.9958*** **	**0.9787*** **

p-values *<0.05, **p<0.01, ***p<0.001

Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021a); History, Art and Archives, United States House of Representatives (2021b); United States Senate (2021).

Table 5 shows the odds ratios for the effects of servicemember end strength, and political party affiliations of government leadership on the likelihood of servicemember deaths increasing compared to the previous year. A democratic House Majority was the only statistically significant variable, but the pseudo R-squared value was 0.1901, indicating a less than ideal fit, therefore I would not consider these ratios to be valid predictors (DMDC, 2021b; History, Art and Archives, United States House of Representatives, 2021a; History, Art and Archives, United States House of Representatives, 2021b; United States Senate, 2021).

Table 5. Odds Ratios of End Strength and Partisan Government Leadership on the Likelihood of Servicemember Deaths Increasing from the Previous Year

	deathinc
SME	1.00 (0.000)
PresD	0.194 (0.178)
HseD	35.20* (58.796)
SenD	0.0686* (0.087)
Observations	40
Pseudo R-squared	0.299

Exponentiated coefficients;
Standard errors in parenthesis
p-values *<0.05, **p<0.01, ***p<0.001

Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021a); History, Art and Archives, United States House of Representatives (2021b); United States Senate (2021).

2. Forecasting Servicemember Deaths

Ideally the accuracy of the forecasting models would have been greater than 95 percent and the MA(3) model used to predict servicemember deaths had a 92.3 percent forecasting accuracy. Again, there are many factors that influence the likelihood of servicemember deaths that span beyond the capabilities of this research and so although not optimal, this model was used with a 95 percent confidence interval to provide at least some level of reference for ex post analysis. The model predicted between 757 and 2,596 servicemembers will die each year until 2041. The forecasted predicted values averaged closer to 1,677 annual deaths (DMDC, 2021b).

C. STEP THREE: FEASIBILITY DETERMINATION

It is possible to maintain levels of debt-to-income ratios similar to historic trends. It would however, require increasing contributions from servicemembers with each subsequent increase.

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VI. CONCLUSIONS AND POLICY RECOMMENDATIONS

A. CONCLUSIONS AND DISCUSSIONS

1. Step One: Determine what the SGLI Maximum Should Be

Depending on every servicemember's individual situation, supplemental insurance may be required at any time, regardless of rank or time in grade. The tables throughout this thesis and appendices were provided to show a snapshot of present-day estimates and other considerations. This is where servicemember education becomes important. Costs of living vary by state and five years of income may be more than adequate if the beneficiary has a degree, stable income, or decides to live in a low cost of living area.

2. Step Two: Trend Analysis

My Logit model correctly predicted 75.00 percent of the observations and the rest of the analyses proved low consistency of statistical significance and reliability pertaining to predictors. There could be measurement error based on the specific dates of death and Presidential terms. This research does not attempt to identify specific dates of servicemember deaths, and Presidential terms were calculated from the years of term majority. House and Senate Majorities were calculated using term majority dates from session records. In addition, multicollinearity may be present due to lasting effects of contingency operations inherited across Presidential terms and the fact that between 1980 and 2020, there were republican Presidents for an average of 59 percent of the time. This leads me to believe that checks and balances have worked to ensure that no single omnipotent entity can increase servicemember deaths, which should be reassuring to a life insurance provider.

As previously mentioned, the data for this analysis is not ideal. To have a better overall picture dates could be honed in to a scale smaller than annually, and additional factors could be analyzed. Named conflicts and overseas contingency operations were considered for this research, but the amount of collinearity was too high with multiple operations overlapping time-wise and the DMDC data not specifying such a level of specificity for casualty data. In addition, there are other eligible entities who may receive

SGLI payouts that were not considered in this dataset. United States Coast Guard data was not included in this analysis, neither was commissioned members of the National Oceanic and Atmospheric Administration (NOAA), United States Public Health Service (USPHS), and midshipmen of service academies. Their data trends could also affect SGLI payout to contribution ratios.

For this analysis, the goal was to identify blatant predictors aside from large scale conflicts. Researching trends in cause of death may also provide insight for certain predictors, but again, that is beyond the scope of this research.

In spite of not accurately forecasting servicemember death trends, I would not necessarily discount the forecasting model based solely on this analysis. Using a data set with only 41 observations is not optimal for accurate predictions, especially when operating right at the edge of standards for data splitting. Of greater note is the fact that there were significant events that biased the data. Years of egregious inflation rates in excess of 6 percent and the years before and after September 11, 2001 resulted in trends that were challenging to account for. As time passes, more observations will provide more data points from which to predict.

3. Step Three: Feasibility Determination

Without conducting surveys of personnel, it is unknown as to the buy-in of servicemembers to the increased contributions that will inevitably come with increased maximum amounts. Historic trends were used for this analysis and the predicted confidence intervals encompassed a substantial range of possibilities.

Considering these analyses, as well as Prudential's disclosed status regarding COVID-19, I would still recommend increasing the SGLI maximum amount at this time. I would expect policymakers to reject the idea based on the inability to predict future servicemember deaths and the concern over funding. This research did show that incremental increases would create more financial strain as time progressed assuming a conservatively high average of servicemember deaths. However, any increase in the near future and with or without incremental increases is still better than the status quo.

4. Step Four: Discuss Alternatives

Ultimately it should be up to the servicemember to ensure his or her beneficiaries are prepared in case of a catastrophic event. However, they require the tools to make these decisions. Educating servicemembers on what to consider and how to approach life insurance will not have the same gravitational effect on everyone, but to those who receive the compensation, it will matter to them. It is possible not everyone will opt for a new increased maximum amount, but based off of historical trends, I would expect greater than 85 percent is likely (VA, 2020b). I acknowledge that some survivors will choose to remain in a high cost of living area, while others would prefer their support network at a lower cost of living area. I also acknowledge the SGLI payout may not even go towards housing at all. There are countless factors to consider, but money should not drive the decision to be emotionally supported or not.

Even if all attempts of an increase are rejected, and no statement for intent of increasing the maximum is ever made, I would hope the education for financial responsibility and awareness for our servicemembers improves and that those who truly need it seek it out before it is too late.

Death is a difficult topic to discuss openly. Among my colleagues, I encountered members who never took this information seriously. For "next of kin" they would write fictional characters and make other off the wall comments on official casualty related documents. Unfortunately, many had the mindset that once they died, whatever issues were left would not be their problem anymore. So, why bother?

As beneficial as it could be, I am not recommending a formal training session annually, but a simplified flyer or quick reference illustrating the differences in rank and how far $400,000 can actually go may provide tremendous context. When a member checks in or out of a command, has a change in family status, or promotes to a higher rank, he or she could look at the sheet and be reminded that the proportionate amount will shift and enable him or her to adjust the SGLI benefits as desired.

B. POLICY RECOMMENDATIONS

Nevertheless, I therefore recommend the SGLI maximum from Prudential be increased at the very least to $525,000 and increased to the following amounts as shown in Table 6. The contribution rates need not be followed, they were simply used to determine feasibility. I am sure the VA and Prudential have better analysts to determine true feasibility. I focused on the conservative ratio since 1980, whereas the more recent ratio appears far more affordable and appealing from the servicemember perspective. For clarification, I do not intend for this to be a tremendous knee-jerk reaction that stagnates similar to 2005. Yes, this would increase the SGLI maximum $125,000 similar to the $150,000 raise in 2005, but that $150,000 raise came 5 years, not 16 years after the previous increase (Callan et al., 2011). Increasing the SGLI maximum amount would also send a message to servicemembers, the argument of "feeling valued" may be addressed on some level. Recruiting and retention may also see greater improvements. Regardless, our servicemembers deserve to be compensated more appropriately for deaths that occur in the line of duty.

Table 6. Proposed SGLI Increase for 2021–2041 with Contribution Options. Adapted from Callan et al. (2011); DMDC (2021b); VA (2020b).

Fiscal Year	CPI Maximum Amount	CPI 1.071 Contribution Rate (per $1,000)	CPI 1.071 Max Monthly Contribution Rate	CPI 1.071 Max Annual Contribution Rate	CPI 1.071 Debt to Income Ratio
2021	525,000	$0.072	$37.67	$452.04	1.503
2022	**525,000**	**$0.085**	**$44.77**	**$537.21**	**1.249**
2023	525,000	$0.092	$48.19	$578.31	1.151
2024	**525,000**	**$0.095**	**$50.13**	**$601.54**	**1.100**
2025	525,000	$0.098	$51.31	$615.72	1.071
2026	**605,000**	**$0.099**	**$59.99**	**$719.92**	**1.053**
2027	605,000	$0.100	$60.55	$726.64	1.042
2028	**605,000**	**$0.101**	**$60.92**	**$731.04**	**1.034**
2029	605,000	$0.101	$61.16	$733.96	1.030
2030	**605,000**	**$0.101**	**$61.32**	**$735.89**	**1.026**
2031	700,000	$0.102	$71.08	$852.93	1.024
2032	**700,000**	**$0.102**	**$71.16**	**$853.93**	**1.023**
2033	700,000	$0.102	$71.22	$854.59	1.022
2034	**700,000**	**$0.102**	**$71.25**	**$855.03**	**1.021**
2035	700,000	$0.102	$71.28	$855.33	1.021
2036	**805,000**	**$0.102**	**$81.99**	**$983.85**	**1.021**
2037	805,000	$0.102	$82.00	$984.01	1.020
2038	**805,000**	**$0.102**	**$82.01**	**$984.11**	**1.020**
2039	805,000	$0.102	$82.01	$984.18	1.020
2040	**805,000**	**$0.102**	**$82.02**	**$984.22**	**1.020**
2041	930,000	$0.102	$94.76	$1,137.09	1.020

APPENDIX A. SGLI ELECTION DATA

Table 7. Servicemember Election of SGLI (1999–2019). Adapted from VA (2020b).

Fiscal Year	Total Active Duty Eligible for SGLI	Total Active Duty With SGLI	Total Reservists Eligible for SGLI	Total Reservists With SGLI	Total Servicemembers Eligible for SGLI	Total Servicemembers With SGLI	Percentage of Active Duty With SGLI	Percentage of Active Duty Without SGLI	Percentage of Reservists With SGLI	Percentage of Reservists Without SGLI	Total Percentage of Servicemembers With SGLI	Total Percentage of Servicemembers Without SGLI
1999	1,456,187	1,420,539	859,664	798,371	2,315,851	2,218,910	97.6	2.4	92.9	7.1	95.8	4.2
2000	1,448,553	1,411,441	860,300	799,967	2,308,853	2,211,408	97.4	63.8	93.0	7.0	95.8	4.2
2001	1,454,047	1,434,429	878,373	847,435	2,332,420	2,281,864	98.7	1.3	96.5	3.5	97.8	2.2
2002	1,507,138	1,475,732	871,646	820,024	2,378,784	2,295,756	97.9	2.1	94.1	5.9	96.5	3.5
2003	1,581,512	1,548,000	815,770	762,000	2,397,282	2,310,000	97.9	2.1	93.4	6.6	96.4	3.6
2004	1,564,547	1,532,000	832,910	776,000	2,397,457	2,308,000	97.9	2.1	93.2	6.8	96.3	3.7
2005	1,537,087	1,512,000	811,747	747,000	2,348,834	2,259,000	98.4	1.6	92.0	8.0	96.2	3.8
2006	1,514,645	1,503,000	802,338	755,000	2,316,983	2,258,000	99.2	0.8	94.1	5.9	97.5	2.5
2007	1,508,828	1,496,000	787,591	742,000	2,296,419	2,238,000	99.1	0.9	94.2	5.8	97.5	2.5
2008	1,513,003	1,497,999	806,993	751,001	2,319,996	2,249,000	99.0	1.0	93.1	6.9	96.9	3.1
2009	1,545,911	1,530,000	822,693	766,000	2,368,604	2,296,000	99.0	1.0	93.1	6.9	96.9	3.1
2010	1,577,273	1,562,000	827,440	770,000	2,404,713	2,332,000	99.0	1.0	93.1	6.9	97.0	3.0
2011	1,573,067	1,560,000	815,943	761,000	2,389,010	2,321,000	99.2	0.8	93.3	6.7	97.2	2.8
2012	1,537,369	1,525,000	819,369	758,000	2,356,738	2,283,000	99.2	0.8	92.6	7.4	96.9	3.1
2013	1,514,332	1,504,000	810,560	748,000	2,324,892	2,252,000	99.3	0.7	92.2	7.8	96.9	3.1
2014	1,471,447	1,461,000	822,265	740,000	2,293,712	2,201,000	99.3	0.7	90.0	10.0	95.9	4.1
2015	1,437,555	1,425,000	788,412	732,000	2,225,967	2,157,000	99.1	0.9	92.8	7.2	96.9	3.1
2016	1,426,269	1,415,000	785,890	729,000	2,212,159	2,144,000	99.2	0.8	92.8	7.2	96.9	3.1
2017	1,419,400	1,406,000	775,160	716,000	2,194,560	2,122,000	99.1	0.9	92.4	7.6	96.7	3.3
2018	1,440,190	1,427,000	757,331	698,000	2,197,521	2,125,000	99.1	0.9	92.2	7.8	96.7	3.3
2019	1,436,596	1,423,000	667,529	619,000	2,104,125	2,042,000	99.1	0.9	92.7	7.3	97.1	2.9
Average 99-19	**1,498,331**	**1,479,483**	**810,473**	**754,086**	**2,308,804**	**2,233,568**	**98.7**	**4.2**	**93.0**	**7.0**	**96.8**	**3.2**
Average 06-19	**1,493,992**	**1,481,071**	**792,108**	**734,643**	**2,286,100**	**2,215,714**	**99.1**	**0.9**	**92.8**	**7.2**	**96.9**	**3.1**

Table 8. Servicemember Election of Different Coverage Amounts (2006–2019). Adapted from VA (2020b).

Fiscal Year	Total Active Duty with $50k-$350k of SGLI	Total Active Duty with $400k of SGLI	Total Resesrvists with $50k-$350k of SGLI	Total Resesrvists with $400k of SGLI	Total Servicemembers with $50k-$350k of SGLI	Total Servicemembers with $400k of SGLI	Percentage of Active Duty with SGLI, Totaling $50k-$350k	Percentage of Active Duty with SGLI, Totaling $400k	Percentage of Reservists with SGLI, Totaling $50k-$350k	Percentage of Reservists with SGLI, Totaling $400k	Total Percentage of Servicemembers with SGLI, Totaling $50k-$350k	Total Percentage of Servicemembers with SGLI, Totaling $400k
2006	45,724	1,457,276	63,126	691,874	108,850	2,149,150	3.0	97.0	8.4	91.6	4.8	95.2
2007	72,274	1,423,726	110,766	631,234	183,040	2,054,960	4.8	95.2	14.9	95.2	8.2	91.8
2008	84,914	1,413,086	106,122	644,878	191,036	2,057,964	5.7	94.3	14.3	85.9	8.5	91.5
2009	98,620	1,431,380	109,206	656,794	207,826	2,088,174	6.5	93.6	14.3	85.7	9.1	91.0
2010	97,370	1,464,630	117,721	652,279	215,091	2,116,909	6.2	93.8	15.3	84.7	9.2	90.8
2011	86,095	1,473,905	123,994	637,006	210,089	2,110,911	5.5	94.5	16.3	83.7	9.1	91.0
2012	93,663	1,431,337	130,292	627,708	223,955	2,059,045	6.1	93.9	17.2	82.8	9.8	90.2
2013	84,516	1,419,484	138,546	609,454	223,062	2,028,938	5.6	94.4	18.5	81.5	9.9	90.1
2014	89,902	1,371,098	152,679	587,321	242,581	1,958,419	6.2	93.9	20.6	79.4	11.0	89.0
2015	96,247	1,328,753	161,327	570,673	257,574	1,899,426	6.8	93.3	22.0	78.0	11.9	88.1
2016	105,373	1,309,627	169,455	559,545	274,828	1,869,172	7.5	92.6	23.2	76.8	12.8	87.2
2017	112,848	1,293,152	173,073	542,927	285,921	1,836,079	8.0	92.0	24.2	75.8	13.5	86.5
2018	111,021	1,315,979	178,226	519,774	289,247	1,835,753	7.8	92.2	25.5	74.5	13.6	86.4
2019	114,248	1,308,752	164,363	454,637	278,611	1,763,389	8.0	92.0	26.6	73.5	13.6	86.4
Average 06-19	**92,344**	**1,388,728**	**135,635**	**599,007**	**227,979**	**1,987,735**	**6.3**	**93.7**	**18.7**	**82.1**	**10.4**	**89.6**

APPENDIX B. INCOME BASED ANALYSIS OF STATUS QUO

Table 9. 2021 Base Pay Comparisons for E-1 to O-10 Against the Current SGLI Maximum. Adapted from DFAS (2021); Netzel and Bockenstedt (2019).

Years of Service	Monthly Base Pay	Annual Base Pay	5-Year Multiplier	10-Year Multiplier	5-Year Top-Off for $400k	10-Year Top-Off for $400k	$400k Equivalent Years of Service
0.5	$1,650	$19,804	$99,018	$198,036	($300,982)	($201,964)	20.20
1	$1,785	$21,420	$107,100	$214,200	($292,900)	($185,800)	18.67
2	$2,236	$26,834	$134,172	$268,344	($265,828)	($131,656)	14.91
4	$2,714	$32,562	$162,810	$325,620	($237,190)	($74,380)	12.28
8	$3,406	$40,867	$204,336	$408,672	($195,664)	$8,672	9.79
9	$4,115	$49,374	$246,870	$493,740	($153,130)	$93,740	8.10
14	$4,760	$57,121	$285,606	$571,212	($114,394)	$171,212	7.00
17	$5,261	$63,126	$315,630	$631,260	($84,370)	$231,260	6.34
20	$6,612	$79,344	$396,720	$793,440	($3,280)	$393,440	5.04
1	$3,396	$40,750	$203,748	$407,496	($196,252)	$7,496	9.82
3	$5,117	$61,402	$307,008	$614,016	($92,992)	$214,016	6.51
6	$6,312	$75,740	$378,702	$757,404	($21,298)	$357,404	5.28
12	$8,067	$96,800	$484,002	$968,004	$84,002	$568,004	4.13
18	$9,556	$114,671	$573,354	$1,146,708	$173,354	$746,708	3.49
24	$11,812	$141,743	$708,714	$1,417,428	$308,714	$1,017,428	2.82
27	$13,790	$165,478	$827,388	$1,654,776	$427,388	$1,254,776	2.42
30	$15,935	$191,225	$956,124	$1,912,248	$556,124	$1,512,248	2.09
33	$16,608	$199,300	$996,498	$1,992,996	$596,498	$1,592,996	2.01
38	$16,608	$199,300	$996,498	$1,992,996	$596,498	$1,592,996	2.01

The 5- and 10-year multipliers determine the suggested coverage amounts recommended in Netzel's and Bockenstedt's (2019) research. The multiplier columns note if the values are more or less than the current SGLI maximum with the values in green if under the current maximum value and red if above. The top-off columns fill in the delta between the multipliers and $400,000. Green with parentheses shows the corresponding multiplier is below the current SGLI maximum by the amount in the parentheses. The red values without parentheses in the top-off columns indicate the amount required to reach the corresponding top-off. The final column shows the years of income $400,000 equates to for the different ranks and years of service (DFAS, 2021; Netzel & Bockenstedt, 2019)

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APPENDIX C. HISTORICAL AND FORECAST DEBT-TO-INCOME RATIOS

Table 10. Historical Expenditure to Contribution Ratios Using Historical Contribution Rates (1980–2020). Adapted from Callan et al. (2011); DMDC (2021b); VA (2020b).

Fiscal Year	SGLI Historical Maximum Amount (*sgli_max*)	Contribution Rate (per $1,000)	Monthly Premium for Maximum Amount	Annual Premium for Maximum Amount	Total Deaths (*death*)	End Strength (*SME*)	Servicemembers with SGLI (*SME**0.969)	Servicemembers with SGLI Maximum ((*SME**0.969)*0.896)	Annual Servicemember Contributions (Servicemembers with SGLI Maximum *Annual Premium)	Prudential Expenditures (*death* * *sgli_max*)	Debt to Income Ratio (Contributions / Expenditures)
1980	$20,000	$0.150	$3.00	36.00	2,391	2,046,010	1,982,584	1,776,395	$63,950,220	$47,820,000	0.7478
1981	**$35,000**	**$0.150**	**$5.25**	**63.00**	**2,421**	**2,077,695**	**2,013,286**	**1,803,905**	**$113,645,994**	**$84,735,000**	**0.7456**
1982	$35,000	$0.116	$4.06	48.72	2,310	2,114,117	2,048,579	1,835,527	$89,426,881	$80,850,000	0.9041
1983	**$35,000**	**$0.116**	**$4.06**	**48.72**	**2,202**	**2,142,617**	**2,076,196**	**1,860,272**	**$90,632,428**	**$77,070,000**	**0.8504**
1984	$35,000	$0.080	$2.80	33.60	2,315	2,146,702	2,080,154	1,863,818	$62,624,291	$81,025,000	1.2938
1985	**$35,000**	**$0.080**	**$2.80**	**33.60**	**2,016**	**2,162,955**	**2,095,903**	**1,877,929**	**$63,098,429**	**$70,560,000**	**1.1183**
1986	$50,000	$0.080	$4.00	48.00	2,241	2,183,165	2,115,487	1,895,476	$90,982,860	$112,050,000	1.2316
1987	**$50,000**	**$0.080**	**$4.00**	**48.00**	**1,990**	**2,233,065**	**2,163,840**	**1,938,801**	**$93,062,430**	**$99,500,000**	**1.0692**
1988	$50,000	$0.080	$4.00	48.00	1,845	2,185,692	2,117,936	1,897,670	$91,088,172	$92,250,000	1.0128
1989	**$50,000**	**$0.080**	**$4.00**	**48.00**	**1,679**	**2,181,478**	**2,113,852**	**1,894,012**	**$90,912,555**	**$83,950,000**	**0.9234**
1990	$50,000	$0.080	$4.00	48.00	1,525	2,097,674	2,032,646	1,821,251	$87,420,044	$76,250,000	0.8722
1991	**$100,000**	**$0.080**	**$8.00**	**96.00**	**1,789**	**2,038,821**	**1,975,618**	**1,770,153**	**$169,934,719**	**$178,900,000**	**1.0528**
1992	$100,000	$0.080	$8.00	96.00	1,332	1,822,789	1,766,283	1,582,589	$151,928,559	$133,200,000	0.8767
1993	**$100,000**	**$0.080**	**$8.00**	**96.00**	**1,245**	**1,721,060**	**1,667,707**	**1,494,266**	**$143,449,497**	**$124,500,000**	**0.8679**
1994	$100,000	$0.080	$8.00	96.00	1,110	1,663,362	1,611,798	1,444,171	$138,640,398	$111,000,000	0.8006
1995	**$100,000**	**$0.080**	**$8.00**	**96.00**	**1,055**	**1,587,860**	**1,538,636**	**1,378,618**	**$132,347,343**	**$105,500,000**	**0.7971**
1996	$200,000	$0.080	$16.00	192.00	1,008	1,525,569	1,478,276	1,324,536	$254,310,839	$201,600,000	0.7927
1997	**$200,000**	**$0.085**	**$17.00**	**204.00**	**864**	**1,489,183**	**1,443,018**	**1,292,944**	**$263,760,662**	**$172,800,000**	**0.6551**
1998	$200,000	$0.080	$16.00	192.00	815	1,458,635	1,413,417	1,266,422	$243,153,008	$163,000,000	0.6704
1999	**$200,000**	**$0.080**	**$16.00**	**192.00**	**770**	**1,435,914**	**1,391,401**	**1,246,695**	**$239,365,439**	**$154,000,000**	**0.6434**
2000	$200,000	$0.080	$16.00	192.00	840	1,436,116	1,391,596	1,246,870	$239,399,113	$168,000,000	0.7018
2001	**$250,000**	**$0.080**	**$20.00**	**240.00**	**920**	**1,434,551**	**1,390,080**	**1,245,512**	**$298,922,786**	**$230,000,000**	**0.7694**
2002	$250,000	$0.080	$20.00	240.00	1,029	1,468,504	1,422,980	1,274,990	$305,997,700	$257,250,000	0.8407
2003	**$250,000**	**$0.065**	**$16.25**	**195.00**	**1,280**	**1,485,077**	**1,439,040**	**1,289,379**	**$251,429,001**	**$320,000,000**	**1.2727**
2004	$250,000	$0.065	$16.25	195.00	1,756	1,478,291	1,432,464	1,283,488	$250,280,106	$439,000,000	1.7540
2005	**$400,000**	**$0.065**	**$26.00**	**312.00**	**1,913**	**1,442,348**	**1,397,635**	**1,252,281**	**$390,711,719**	**$765,200,000**	**1.9585**
2006	$400,000	$0.070	$28.00	336.00	1,864	1,444,007	1,399,243	1,253,722	$421,250,435	$745,600,000	1.7700
2007	**$400,000**	**$0.070**	**$28.00**	**336.00**	**2,101**	**1,437,359**	**1,392,801**	**1,247,950**	**$419,311,059**	**$840,400,000**	**2.0042**
2008	$400,000	$0.065	$26.00	312.00	1,538	1,459,980	1,414,721	1,267,590	$395,487,979	$615,200,000	1.5555
2009	**$400,000**	**$0.065**	**$26.00**	**312.00**	**1,426**	**1,480,408**	**1,434,515**	**1,285,326**	**$401,021,636**	**$570,400,000**	**1.4224**
2010	$400,000	$0.065	$26.00	312.00	1,502	1,492,800	1,446,523	1,296,085	$404,378,454	$600,800,000	1.4857
2011	**$400,000**	**$0.065**	**$26.00**	**312.00**	**1,529**	**1,486,364**	**1,440,287**	**1,290,497**	**$402,635,032**	**$611,600,000**	**1.5190**
2012	$400,000	$0.065	$26.00	312.00	1,344	1,410,178	1,366,462	1,224,350	$381,997,320	$537,600,000	1.4073
2013	**$400,000**	**$0.065**	**$26.00**	**312.00**	**1,051**	**1,403,066**	**1,359,571**	**1,218,176**	**$380,070,779**	**$420,400,000**	**1.1061**
2014	$400,000	$0.070	$28.00	336.00	915	1,381,180	1,338,363	1,199,174	$402,922,338	$366,000,000	0.9084
2015	**$400,000**	**$0.070**	**$28.00**	**336.00**	**836**	**1,370,516**	**1,328,030**	**1,189,915**	**$399,811,401**	**$334,400,000**	**0.8364**
2016	$400,000	$0.070	$28.00	336.00	826	1,364,026	1,321,741	1,184,280	$397,918,117	$330,400,000	0.8303
2017	**$400,000**	**$0.070**	**$28.00**	**336.00**	**885**	**1,376,346**	**1,333,679**	**1,194,977**	**$401,512,148**	**$354,000,000**	**0.8817**
2018	$400,000	$0.070	$28.00	336.00	926	1,404,400	1,360,864	1,219,334	$409,696,152	$370,400,000	0.9041
2019	**$400,000**	**$0.060**	**$24.00**	**288.00**	**892**	**1,453,279**	**1,408,227**	**1,261,772**	**$363,390,251**	**$356,800,000**	**0.9819**
2020	$400,000	$0.060	$24.00	288.00	976	1,474,123	1,428,425	1,279,869	$368,602,263	$390,400,000	1.0591

Table 11. OLS Forecast Expenditure to Contribution Ratios Using (1980–2020) and (2005–2020) Ratios. Adapted from Callan et al. (2011); DMDC (2021b); VA (2020b).

Fiscal Year	OLS Maximum Amount	OLS 1.071 Contribution Rate (per $1,000)	OLS 1.071 Max Monthly Contribution Rate	OLS 1.071 Max Annual Contribution Rate	OLS 1.071 Debt to Income Ratio	OLS 1.289 Contribution Rate (per $1000)	OLS 1.289 Max Monthly Contribution Rate	OLS 1.289 Max Annual Contribution Rate	OLS 1.289 Debt to Income Ratio
2021	$430,000	$0.072	$30.83	$370.00	1.504	$0.062	$26.76	$321.08	1.733
2022	$430,000	$0.085	$36.67	$440.10	1.249	$0.070	$30.08	$360.96	1.522
2023	$430,000	$0.092	$39.46	$473.57	1.151	$0.075	$32.24	$386.92	1.409
2024	$430,000	$0.096	$41.07	$492.89	1.100	$0.078	$33.66	$403.92	1.342
2025	$430,000	$0.098	$42.04	$504.47	1.071	$0.080	$34.59	$415.14	1.301
2026	$475,000	$0.099	$47.09	$565.07	1.053	$0.082	$38.90	$466.79	1.275
2027	$475,000	$0.100	$47.54	$570.52	1.042	$0.083	$39.35	$472.25	1.258
2028	$475,000	$0.101	$47.81	$573.74	1.035	$0.083	$39.66	$475.89	1.248
2029	$475,000	$0.101	$48.03	$576.40	1.029	$0.084	$39.86	$478.31	1.240
2030	$475,000	$0.101	$48.16	$577.98	1.026	$0.084	$39.99	$479.93	1.236
2031	$520,000	$0.102	$52.82	$633.89	1.024	$0.084	$43.88	$526.58	1.232
2032	$520,000	$0.102	$52.87	$634.46	1.023	$0.085	$43.95	$527.38	1.230
2033	$520,000	$0.102	$52.92	$635.03	1.022	$0.085	$43.99	$527.91	1.229
2034	$520,000	$0.102	$52.92	$635.03	1.021	$0.085	$44.02	$528.26	1.228
2035	$520,000	$0.102	$52.97	$635.60	1.020	$0.085	$44.04	$528.50	1.227
2036	$560,000	$0.102	$57.04	$684.49	1.020	$0.085	$47.44	$569.32	1.227
2037	$560,000	$0.102	$57.04	$684.49	1.020	$0.085	$47.45	$569.44	1.227
2038	$560,000	$0.102	$57.04	$684.49	1.020	$0.085	$47.46	$569.52	1.226
2039	$560,000	$0.102	$57.04	$684.49	1.020	$0.085	$47.46	$569.57	1.226
2040	$560,000	$0.102	$57.04	$684.49	1.020	$0.085	$47.47	$569.60	1.226
2041	$605,000	$0.102	$61.62	$739.49	1.020	$0.085	$51.28	$615.40	1.226

Table 12. CPI Forecast Expenditure to Contribution Ratios Using (1980–2020) and (2005-2020) Ratios. Adapted from Callan et al. (2011); DMDC (2021b); VA (2020b).

Fiscal Year	CPI Maximum Amount	CPI 1.071 Contribution Rate (per $1,000)	CPI 1.071 Max Monthly Contribution Rate	CPI 1.071 Max Annual Contribution Rate	CPI 1.071 Debt to Income Ratio	CPI 1.289 Contribution Rate (per $1000)	CPI 1.289 Max Monthly Contribution Rate	CPI 1.289 Max Annual Contribution Rate	CPI 1.289 Debt to Income Ratio
2021	525,000	$0.072	$37.67	$452.04	1.503	$0.061	$32.08	$384.93	1.765
2022	525,000	$0.085	$44.77	$537.21	1.249	$0.069	$36.42	$437.08	1.535
2023	525,000	$0.092	$48.19	$578.31	1.151	$0.075	$39.22	$470.67	1.414
2024	525,000	$0.095	$50.13	$601.54	1.100	$0.078	$41.05	$492.59	1.344
2025	525,000	$0.098	$51.31	$615.72	1.071	$0.080	$42.25	$507.01	1.301
2026	605,000	$0.099	$59.99	$719.92	1.053	$0.082	$49.61	$595.27	1.274
2027	605,000	$0.100	$60.55	$726.64	1.042	$0.083	$50.21	$602.58	1.256
2028	605,000	$0.101	$60.92	$731.04	1.034	$0.084	$50.62	$607.44	1.245
2029	605,000	$0.101	$61.16	$733.96	1.030	$0.084	$50.89	$610.69	1.237
2030	605,000	$0.101	$61.32	$735.89	1.026	$0.084	$51.07	$612.86	1.232
2031	700,000	$0.102	$71.08	$852.93	1.024	$0.085	$59.23	$710.77	1.229
2032	700,000	$0.102	$71.16	$853.93	1.023	$0.085	$59.32	$711.89	1.227
2033	700,000	$0.102	$71.22	$854.59	1.022	$0.085	$59.39	$712.64	1.225
2034	700,000	$0.102	$71.25	$855.03	1.021	$0.085	$59.43	$713.14	1.224
2035	700,000	$0.102	$71.28	$855.33	1.021	$0.085	$59.46	$713.47	1.224
2036	805,000	$0.102	$81.99	$983.85	1.021	$0.085	$68.40	$820.75	1.223
2037	805,000	$0.102	$82.00	$984.01	1.020	$0.085	$68.41	$820.93	1.223
2038	805,000	$0.102	$82.01	$984.11	1.020	$0.085	$68.42	$821.04	1.223
2039	805,000	$0.102	$82.01	$984.18	1.020	$0.085	$68.43	$821.12	1.223
2040	805,000	$0.102	$82.02	$984.22	1.020	$0.085	$68.43	$821.17	1.223
2041	930,000	$0.102	$94.76	$1,137.09	1.020	$0.085	$79.06	$948.72	1.223

Table 13. Inflation Forecast Expenditure to Contribution Ratios Using (1980–2020) and (2005–2020) Ratios. Adapted from Callan et al. (2011); DMDC (2021b); VA (2020b).

Fiscal Year	Inflation Maximum Amount	Inflation 1.071 Contribution Rate (per $1,000)	Inflation 1.071 Max Monthly Contribution Rate	Inflation 1.071 Max Annual Contribution Rate	Inflation 1.071 Debt to Income Ratio	Inflation 1.289 Contribution Rate (per $1000)	Inflation 1.289 Max Monthly Contribution Rate	Inflation 1.289 Max Annual Contribution Rate	Inflation 1.289 Debt to Income Ratio
2021	$530,000	$0.072	$38.03	$456.34	1.503	$0.061	$32.38	$388.60	1.765
2022	**$530,000**	**$0.085**	**$45.19**	**$542.32**	**1.249**	**$0.069**	**$36.77**	**$441.24**	**1.535**
2023	$530,000	$0.092	$48.65	$583.82	1.151	$0.075	$39.60	$475.15	1.414
2024	**$530,000**	**$0.095**	**$50.61**	**$607.27**	**1.100**	**$0.078**	**$41.44**	**$497.28**	**1.344**
2025	$530,000	$0.098	$51.80	$621.59	1.071	$0.080	$42.65	$511.84	1.301
2026	**$610,000**	**$0.099**	**$60.49**	**$725.87**	**1.053**	**$0.082**	**$50.02**	**$600.19**	**1.274**
2027	$610,000	$0.100	$61.05	$732.64	1.042	$0.083	$50.63	$607.56	1.256
2028	**$610,000**	**$0.101**	**$61.42**	**$737.09**	**1.034**	**$0.084**	**$51.04**	**$612.46**	**1.245**
2029	$610,000	$0.101	$61.67	$740.02	1.030	$0.084	$51.31	$615.74	1.237
2030	**$610,000**	**$0.101**	**$61.83**	**$741.97**	**1.026**	**$0.084**	**$51.49**	**$617.92**	**1.232**
2031	$705,000	$0.102	$71.59	$859.02	1.024	$0.085	$59.65	$715.84	1.229
2032	**$705,000**	**$0.102**	**$71.67**	**$860.03**	**1.023**	**$0.085**	**$59.75**	**$716.97**	**1.227**
2033	$705,000	$0.102	$71.72	$860.69	1.022	$0.085	$59.81	$717.73	1.225
2034	**$705,000**	**$0.102**	**$71.76**	**$861.14**	**1.021**	**$0.085**	**$59.85**	**$718.23**	**1.224**
2035	$705,000	$0.102	$71.79	$861.44	1.021	$0.085	$59.88	$718.57	1.224
2036	**$815,000**	**$0.102**	**$83.01**	**$996.08**	**1.021**	**$0.085**	**$69.25**	**$830.95**	**1.223**
2037	$815,000	$0.102	$83.02	$996.23	1.020	$0.085	$69.26	$831.12	1.223
2038	**$815,000**	**$0.102**	**$83.03**	**$996.33**	**1.020**	**$0.085**	**$69.27**	**$831.24**	**1.223**
2039	$815,000	$0.102	$83.03	$996.40	1.020	$0.085	$69.28	$831.32	1.223
2040	**$815,000**	**$0.102**	**$83.04**	**$996.45**	**1.020**	**$0.085**	**$69.28**	**$831.37**	**1.223**
2041	$945,000	$0.102	$96.29	$1,155.43	1.020	$0.085	$80.34	$964.02	1.223

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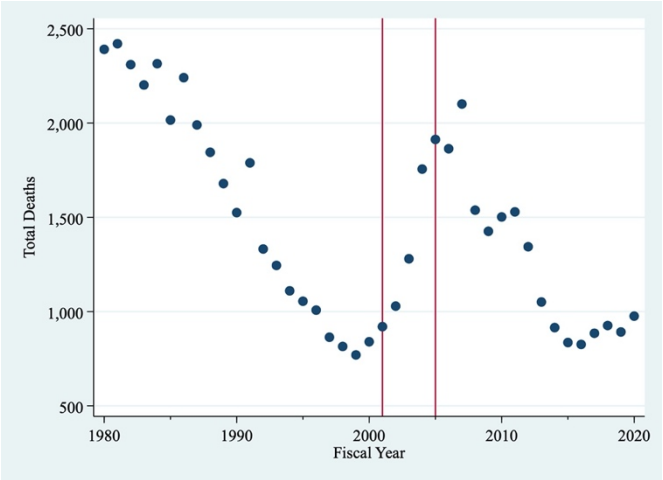
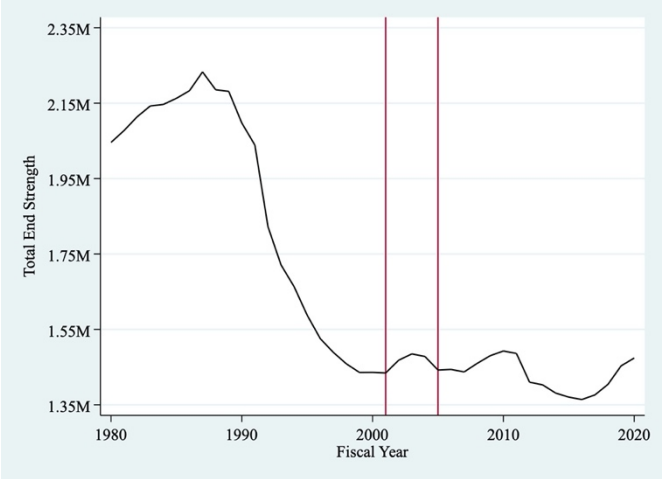
APPENDIX D. TREND ANALYSIS FIGURES AND TABLES

A. TREND ANALYSIS FIGURES



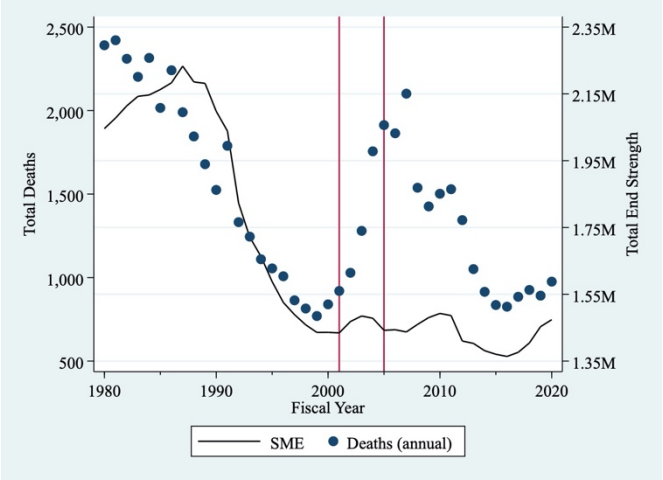
Historical servicemember deaths from 1980 to 2020. The left red line indicates fiscal year 2001. The right red line indicates fiscal year 2005, the year the SGLI increased to $400,000.

Figure 12. Annual Servicemember Deaths (1980–2020). Adapted from DMDC (2021b).



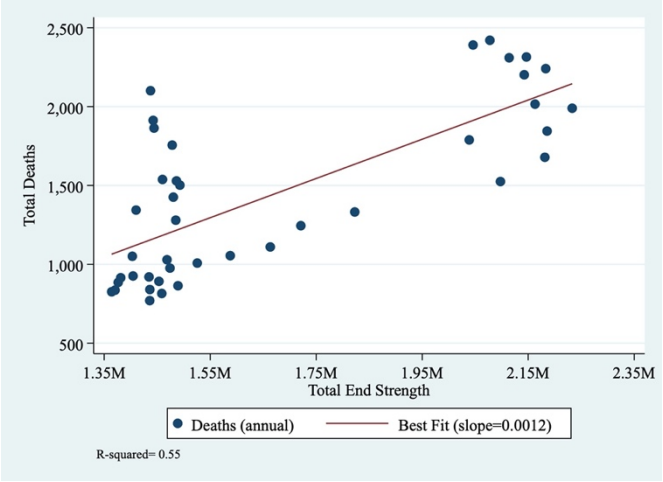
Historical servicemember end strength from 1980 to 2020. The red lines indicate 2001 and 2005, respectively.

Figure 13. Total End Strength Per Fiscal Year (1980–2020). Adapted from DMDC (2021b).



Historical servicemember deaths overlaid on total end strength for 1980 to 2020. The red lines indicate 2001 and 2005, respectively.

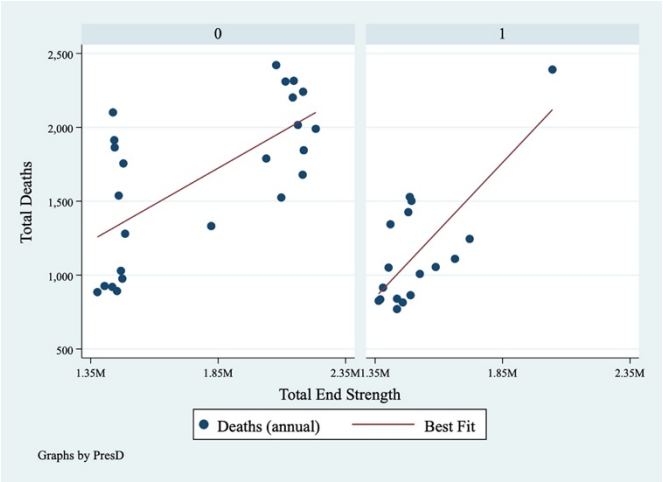
Figure 14. Annual Servicemember Deaths and Total End Strengths (1980–2020). Adapted from DMDC (2021b).



Correlation between servicemember deaths and end strength for a given year. On average, for every 1,000 servicemember end strength increase, an average of 1 additional servicemember dies for a given year. This estimation is statistically significant with a p-value of 0.00 with the model describing roughly 55 percent of the data.

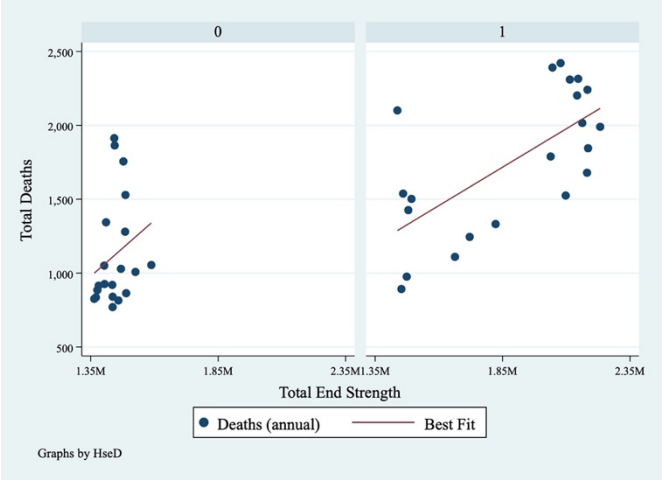
Figure 15. Servicemember Deaths Compared to End Strength (1980–2020). Adapted from DMDC (2021b).

B. ANNUAL DEATHS COMPARED TO END STRENGTH FOR PARTISAN GOVERNMENT LEADERSHIP



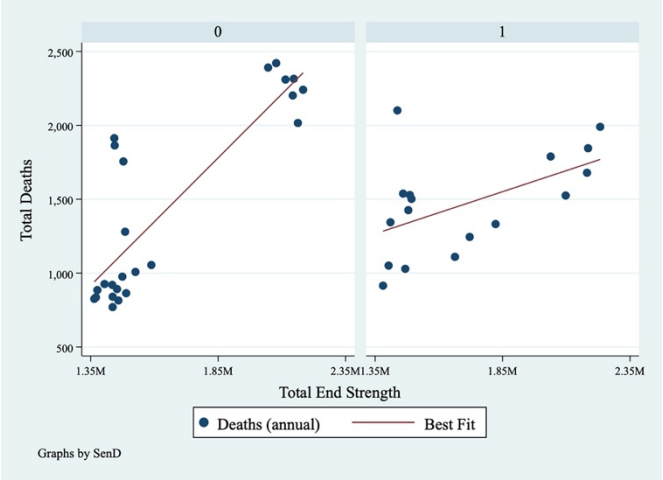
Total servicemember deaths per year compared to servicemember end strength when there was a republican President (left), compared to a democratic President (right).

Figure 17. Servicemember Deaths Compared to End Strength for Republican and Democratic Presidencies (1980-2020). Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021b).



Total servicemember deaths per year compared to servicemember end strength when there was a republican House Majority (left) compared to a democratic House Majority (right).

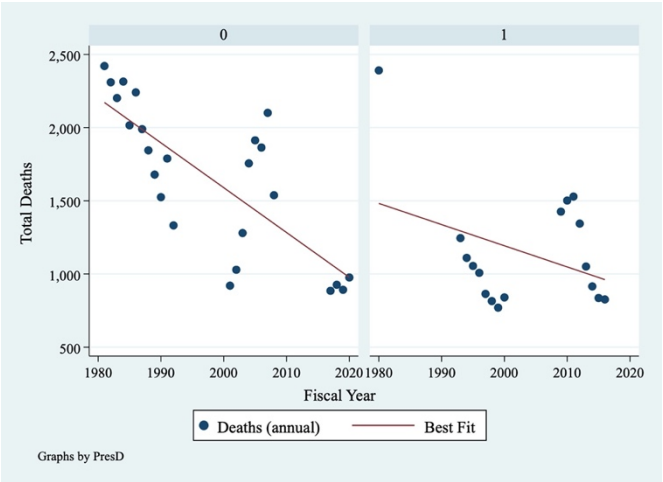
Figure 18. Servicemember Deaths Compared to End Strength for Republican and Democratic House Majorities (1980–2020). Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021a).



Total servicemember deaths per year compared to servicemember end strength when there was a republican Senate Majority (left) compared to a democratic Senate Majority (right).

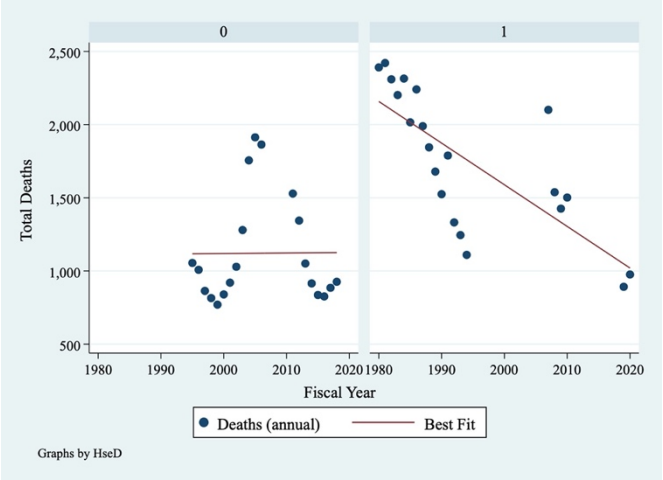
Figure 19. Servicemember Deaths Compared to End Strength Per Senate Majorities (1980–2020). Adapted from DMDC (2021b); United States Senate (2021).

C. DEATHS PER YEAR FOR PARTISAN GOVERNMENT LEADERSHIP



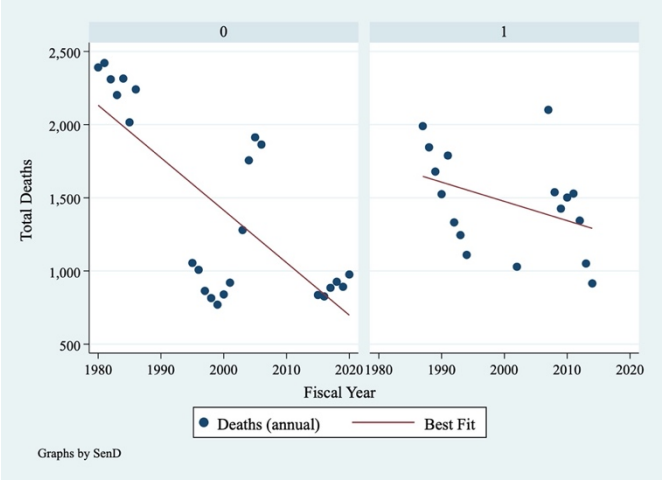
Total servicemember deaths per fiscal year when there was a republican President (left) compared to a democratic President (right).

Figure 20. Annual Servicemember Deaths For Republican and Democratic Presidents (1980-2020). Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021b).



Total servicemember deaths per fiscal year when there was a republican House Majority (left) compared to a democratic House Majority (right).

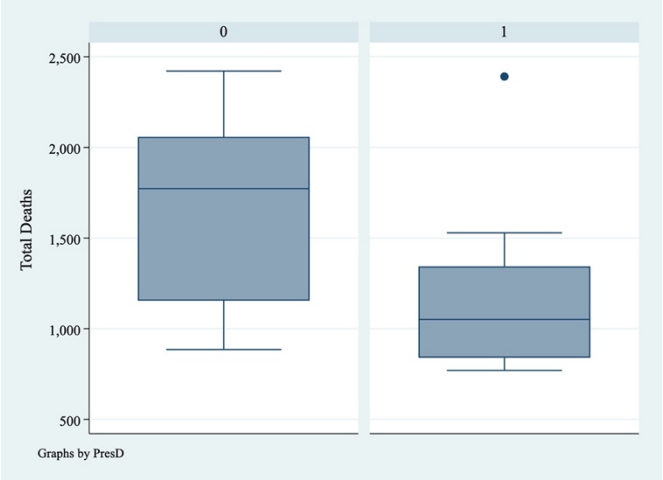
Figure 21. Annual Servicemember Deaths Per House Majorities (1980–2020). Adapted from DMDC (2021b); History, Art and Archives, United States House of Representatives (2021a).



Total servicemember deaths per fiscal year when there was a republican Senate Majority (left) compared to a democratic Senate Majority (right).

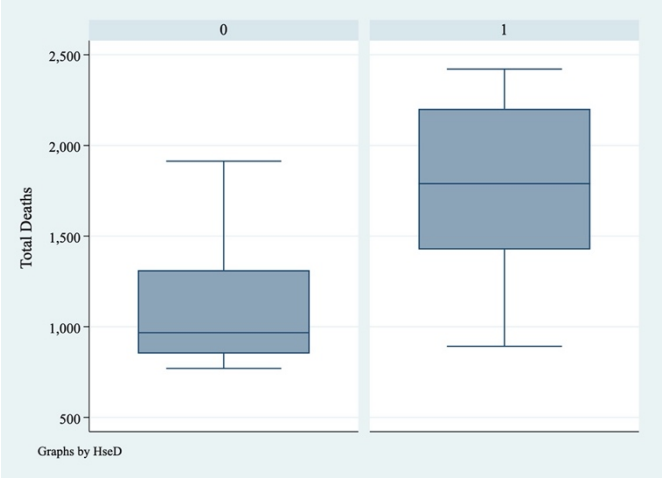
Figure 22. Annual Servicemember Deaths Per Senate Majorities (1980–2020). Adapted from DMDC (2021b); United States Senate (2021).

D. AVERAGE ANNUAL DEATHS PER PARTISAN GOVERNMENT LEADERSHIP



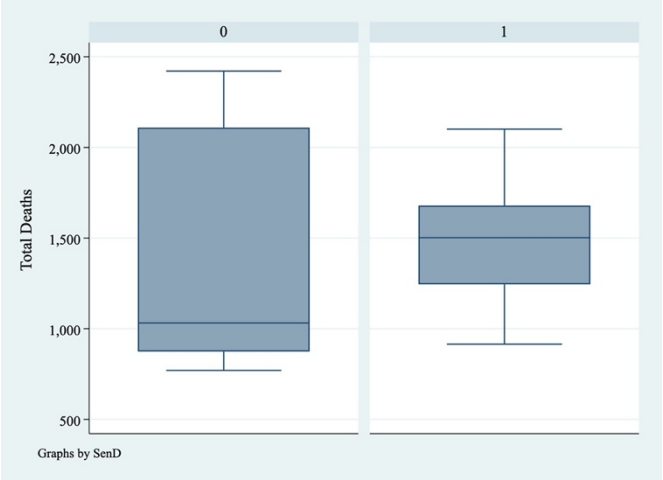
Average annual servicemember deaths with a republican President (left) compared to a democratic President (right), with a 95 percent confidence interval.

Figure 23. Average Servicemember Deaths Per President's Political Affiliation. Adapted by DMDC (2021b); History, Art and Archives, United States House of Representatives (2021b).



Average annual servicemember deaths with a republican House Majority (left) compared to a democrat House Majority (right), with a 95 percent confidence interval.

Figure 24. Average Servicemember Deaths Per House Majority. Adapted by DMDC (2021b); History, Art and Archives, United States House of Representatives (2021a).



Average annual servicemember deaths with a republican Senate Majority (left) compared to a democrat Senate Majority (right), with a 95 percent confidence interval.

Figure 25. Average Servicemember Deaths Per Senate Majority. Adapted by DMDC (2021b); United States Senate (2021).

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