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THE MODERNIZATION INDEX

An analysis of Navy resource priorities

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Too little money is being spent on modernizing the Navy. Future readiness is being sacrificed to pay for current operations. Ships and aircraft are getting older and the maintenance required to enable the equipment to operate at design specifications is increasingly difficult and expensive. Additionally, the Navy needs advanced ships and aircraft that can meet the challenges of the next generation of combat.

At issue is finding an adequate level of funding to ensure sustainable modernization of the fleet. The Department of the Navy's priority of spending on future readiness has varied widely since the end of World War II. In order to find the correct level, three specific areas must be examined. These involve understanding prior practice and determining the trends and constants.[1]

The areas to examine are:

- What has the historical relationship been between funding for future and current readiness?
- What has the relationship been between funding for future readiness and the size of the overall Navy budget?
- What has the relationship been between funding for future readiness and the vision of the nature of future conflict?

The Chief of Naval Operations was very clear in recent testimony before Congress. In September 2000 he stated, "Our shipbuilding rate is inadequate to recapitalize the Fleet and sustain even the [Quadrennial Defense Review] force. [Aircraft procurement] is not at

[1] For the purposes of this study, Navy outlays and total obligational authority (TOA) are examined beginning with 1945. Data is drawn from Office of the Under Secretary of Defense (Comptroller). *National Defense Budget Estimates for FY2001*, Historical Tables, March 2000.

the rate we need to sustain the size force we need in the future."[2] In response to questions from members of the Senate Armed Services Committee, he provided more detail.

> With regard to our current shipbuilding account, and with regard to our aircraft procurement, we need to buy 160 to 180 aircraft a year in order to sustain the [Quadrennial Defense Review] force. We're looking at 128 right now in the current program, and with regard to shipbuilding, I need nine a year. Navy plans currently call for 6.7 to 7.5 a year.[3]

Comparison of the priority of funding for future readiness (modernization) and current readiness (operations) reveals that the Navy is well beneath historic levels.[4] The priority of spending for future readiness as compared to current readiness has varied widely since the end of World War II. In FY63, future readiness accounted for over half of the Navy budget, while in FY00 it was just one third. The general trend for the past four decades has been of systematic decline.

Despite the overall trend of decline, there have been times when the Navy was able to significantly increase spending on modernization. During periods when the senior Navy leadership had a clear vision of the nature of future conflict, budgets increased and the priority of future readiness increased as well.

Achieving a sustainable, more predictable, level of modernization funding will result in a force that maintains a "steady strain" vice difficult to manage wide variations. Past

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[2] Vernon Clark, Oral Statement of Adm. Vernon Clark, USN, Chief of Naval Operations before the Senate Armed Services Committee 27 September 2000.

[3] Mike Perron, "CNO praises people, warns of shortfalls." News Special, 27 September 2000. Navy Office of Information, Washington, D. C., 2000.

[4] For the purposes of this paper, current readiness (current operations) will be defined by the spending in budget titles Military Personnel (MilPers) and Operations and Maintenance (O&M). Military Housing is often included in this category but, due to its relatively small amount and lack of direct application to combat operations, I have chosen to exclude it from calculations. Future readiness, which I have called "modernization", will include the budget titles Procurement (principally SCN, APN, WPN, but includes others) and Research, Development, Testing and Evaluation (RDT&E). Military construction (MILCON) is often included in this category but, like military housing, is such a small amount that I have chosen to exclude it. Inclusion of both numbers makes such a small change to the outcome and shape of the resultant analysis curves that it makes little difference.

practice and analysis demonstrate that there is a minimum level of future readiness funding that should be maintained.

Given past trends, and looking ahead at what is currently planned for the Navy, some analysis can be made of future trends in the budget. In general, as budgets decrease, the tendency is to prioritize funding of current readiness to the detriment of future readiness. As budgets increase, the priority of future readiness rises. If the vision of future conflict is unclear, continued decline in the funding of future readiness can be predicted. If the Chief of Naval Operations is to make good on his desire to increase the level of future readiness, a recognition of the forces at play pressing the Navy's budgeting decisions will enable him to prepare accurate and effective arguments.

The Modernization Index.

In order to understand how the priority of spending for modernization has varied and what the current trends are, a comparison of future readiness outlays to current readiness outlays is necessary.[5] While the percentage of spending in one category or the other indicates the relative prioritization given to each, a ratio produced by comparing outlays in future readiness to the outlays in current readiness is more useful. This ratio, easily charted across multiple fiscal years, will be referred to as the Modernization Index (MI).[6] It can be used to monitor the relative priority of future readiness in any budget. (See Figure 1).

[5] Outlays, or expenditures, are the liquidation of the government's obligations. Outlays generally represent cash payments. Outlays in a given fiscal year may represent the liquidation of obligations incurred over a number of years. There is a time lag between budgeting funds (congressional appropriation), signing contracts and placing orders (obligations), receiving goods or services and making payments (liquidating obligations). (Taken from Office of the Under Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY2001*, March 2000, Chapter 1, "Definitions".

[6] Modernization Index: (Procurement +RDT&E)/MilPers+O&M). It makes no difference if current (then-year) or constant dollars are used. For the purposes of this analysis, Navy Outlays are taken from the OUSD(C) *National Defense Budget Estimates for FY2001* historical tables.

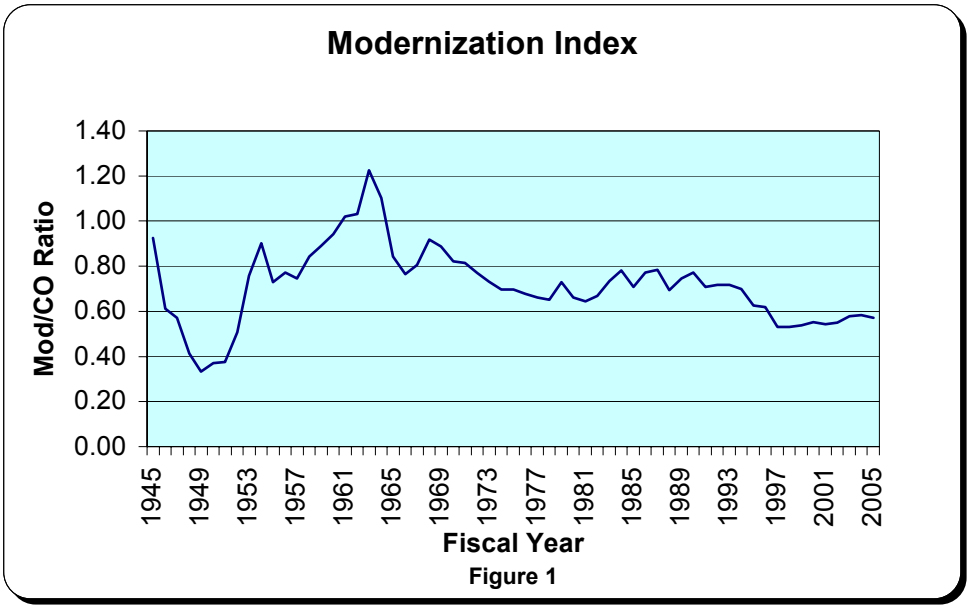

Figure 1

The chart that is developed shows that the priority for funding future readiness has varied widely, but is on a long-term decline. Following World War II, the Navy outlays decreased from the 1945 high of $28,848,000,000 ($369,672,000,000 in constant FY01 dollars) to a low of $3,845,000,000 ($42,206,000,000 in constant FY01 dollars), a real decrease of nearly 90%. During that same period, the share of the budget reserved for future readiness dropped to about 25% of the total, or an MI of .33, the post-World War II historical low. The future readiness share sharply rose again for the Korean War, and then settled briefly.

The peak in the early 1960s shows the response to the perceived "missile gap" and the build-up of nuclear ballistic missile submarines, nuclear attack submarines, the new Forrestal class aircraft carriers and the shift to nuclear aircraft carriers. A quick rise occurred in the late 1960s, a response to the final years of the Viet Nam war, followed by a decade of decline through the 1970s. With the Reagan Administration and the development of the Maritime Strategy, the Navy's outlays increased by about 48 percent over eight years. The MI reached

a high of .77 in 1990, then slowly declined to the current FY00 level of .55. The MI for FY01 is predicted to be about .54.

Trends and Constants.

Navy Total Obligational Authority (TOA) has remained remarkably constant since the end of the Korean War in 1953.[7] TOA has averaged just under $100 billion per annum in constant FY01 dollars. More recently, since 1994, TOA has averaged just under $90 billion (in constant FY01 dollars) with the FY01 TOA being $91.9 billion. (See figure 2).

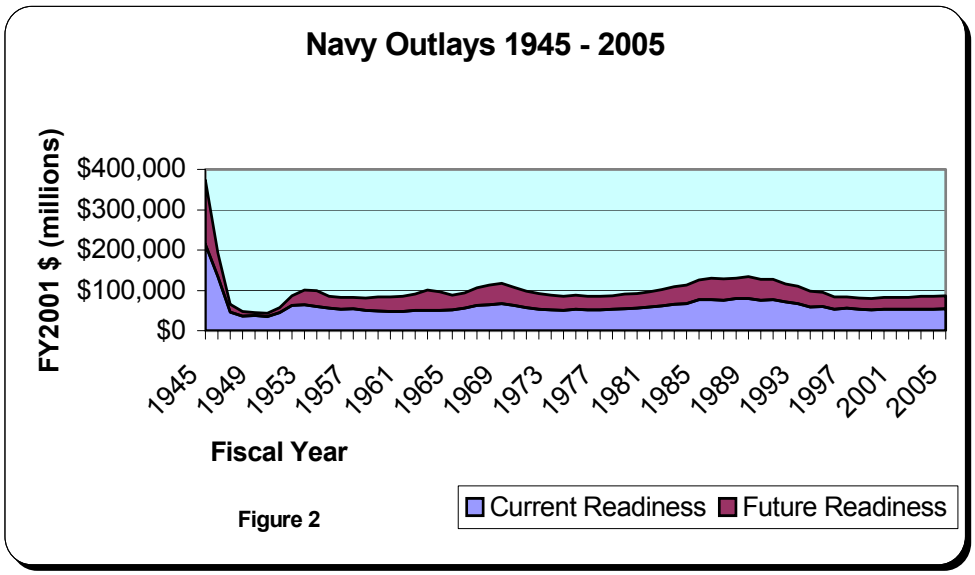

Figure 2

Relative spending between current readiness and future readiness, as measured by the Modernization Index, has averaged .65 since the end of the Korean War, the equivalent of spending about 40% of the budget on future readiness and about 60% on current readiness. The average since the end of the Viet Nam War is about the same and since 1985 has been .63. The FY00 index of .55 (36% future readiness; 64% current readiness) is the

[7] TOA is a DOD financial term that expresses the value of the direct Defense program for a fiscal year. TOA may differ from BA (Budget Authority) for several reasons including the lapse of BA before obligations were

continuation of a long downward trend only briefly checked during the large budget increases of the Reagan administration.

In general, as the Navy budget increased, the MI increased as well, but at a higher rate of increase. For example, in fiscal years 1951, 1952 and 1953, outlays (in real terms) increased from the previous year by 28.4, 63.6, and 13.7 percent respectively. Spending in future readiness outlays increased in those same years by 36.3, 94.2, and 48.1 percent respectively. The same occurred in 1961, 1962, and 1963. In those years outlays increased (in real terms) from the previous year by 1, 7.3, and 5.8 percent respectively. Future readiness outlays increased in those same years by 6.1, 7.8, and 22.4 percent. Similar results can be seen in the early 1980s.

As the budget has decreased, the MI also decreased, but at a greater rate of change. This was observable in the post World War II years, immediately following the Korean War, during the late 1960s, and after the end of the Viet Nam War, and during the force draw down of the early 1990s. For example, during 1970, 1971, 1972, 1973 and 1974, when overall outlays decreased by 7, 8, 6.7, 5.5, and 1.5 percent annually, future readiness outlays decreased by 9.7, 8.7, 7, 5.9, and 5.1 percent annually.

While this behavior cannot be found in every fiscal year, it is more often the case than not and is especially notable in those years of large budget increases or decreases. It is probably a reflection of the relative willingness, capability, and/or desire to purchase new major end items. During times of force draw down, such as after World War II, Korea, Viet Nam, and the Cold War, the CNO has difficulty justifying spending scarce resources on new and expensive equipment. During such periods, the force tends to age, driving current

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incurred, legislation that transfers unobligated balances to other accounts, reappropriations, rescissions, or net offsetting receipts which are deducted from BA but no effect on TOA. (Quoted in part from DOD definitions.)

readiness expenses up in response to increased maintenance requirements. If the operational tempo (OPTEMPO) happens to be high during these times the demands on current readiness funds, principally O&M, increases even more. With static or decreasing budgets, the relative amount of money available for future readiness drops.

The Nature of Future Conflict.

Major budget increases are a response to a perceived threat to national security. Without a threat to the national security, it is difficult to justify increased military force. Identification of potential adversaries becomes the principle issue and then developing a specific force to counter those adversaries.

Along with identifying threats to the national security, recognizing vulnerabilities is also important. While a threat-based approach to force planning was useful during the Cold War, with easily identified adversaries, with the fall of the Soviet Union and general collapse of communism, identification of enemies becomes more difficult. Recognizing national security vulnerabilities along with the necessary force to protect such vulnerabilities becomes a more useful approach. If vulnerability is discovered, the requirement to find additional means to respond increases.[8]

There have been four periods of significant increases in Navy outlays since the end of World War II. These were the Korean War (1950-1953), the Kennedy years (1961-1963), the Viet Nam years (1966-1968), and the Reagan years (1980-1989). During each of those periods, the senior leadership was effectively able to describe a threat or vulnerability to American national security.

[8] Henry C. Bartlett, G. Paul Holman, Jr., and Timothy E. Somes, "The Art of Strategy and Force Planning," *Strategy and Force Planning,* (Third Edition), Newport, RI: Naval War College Press, 2000, 27-28.

Since World War II, the national security strategy was based on the containment of communism. In all of the above periods, a clear threat to the national security was perceived and effectively communicated. The North Korean invasion of South Korea was straightforward. North Korea, supported by the Soviet Union, had to be stopped, thus containing a further spread of Communism. American forces in place were insufficient to deal with the threat, thus presenting a clear vulnerability.

During the Kennedy years, but actually beginning in the late Eisenhower years, there was a growing perception of a "missile gap" with the Soviet Union. Ballistic missiles and nuclear ballistic missile submarines were developed to counter the American vulnerability to Soviet nuclear attack. To protect the ballistic missile submarines and counter the threat of Soviet submarines, American nuclear submarines were required. Additionally, an aging fleet of aircraft carriers needed to be replaced in order to handle larger jet-powered aircraft. With the advent of nuclear power, the decision was made to develop future aircraft carriers with nuclear propulsion.

During the latter years of the Viet Nam War, the administration presented the threat in terms of stemming the spread of communism and preventing a "domino effect" in Southeast Asia. In the 1980s, President Reagan and Secretary of the Navy John Lehman were effectively able to describe a growing Soviet naval threat and a need to increase the Navy to 600 ships.

Once the senior leadership has effectively described the threat or vulnerability, usually by providing a clear vision of the nature of future conflict, the path is clear to develop an unambiguous strategic or operational plan can be developed to meet that threat. The Maritime Strategy of the Reagan administration, "From the Sea", and "Forward From the

Sea" were all attempts to clarify the nature of future conflict from which justification could be drawn to shape the future force. The Maritime Concept being developed now is the next attempt.

The "Ideal" Modernization Index.

Determining if an "ideal" or a minimum level of funding exists for future readiness is problematic. No metric for such a decision exists. While the overall Navy budget is normally constrained by a pre-determined top line of funding, forcing all programs to fit within that limit, the relative prioritization of future and current readiness is usually decided in a battle of competing programs.

Some clues as to what the "ideal" MI might be lay in examining past practice. Modernization Index lows occurred in 1949 (.33), 1955 (.73), 1966 (.76), 1978 (.65), and 1997 (.53). Each low was followed by MI increases lasting several years in response to a perceived vulnerability or threat. MI highs occurred in 1954 (.90), 1963 (1.23), 1968 (.92), and 1987 (.87).

The extreme MI low of .33 in 1949 as the World War II fleet was retired and sailors released from active duty, was recognized as having been too low. The fleet was quickly rebuilt to prosecute the Korean War. With the end of that war, modernization slowed down for two years, but quickly regained momentum with the building of the nuclear fleet of aircraft carriers and ballistic missile and attack submarines, reaching the extreme high of 1.23 in 1963 as the building program climaxed. The MI plunged in three years to the next low of .76.

The "ideal" MI would appear to lie somewhere between the two extremes. The low after World War II is identified as clearly too low, based on the experience of having lost significant combat power by the time the Korean War occurred. The buildup that began in response to the Korean War actually continued with only a two-year drop in the mid 1950s, until 1963. That long-term increase in the MI is most likely a response to the need to modernize the depleted and aging World War II fleet. The extreme high of 1.23 was probably a necessary reaction to the extreme low of .33.

The simple mathematical solution to the "high-low" approach yields a median MI of .78.[9] There is no logical reason to believe that a simple mathematical average of the high and low is the "ideal" MI, but .78 does compare favorably to the index achieved during the latter years of the Reagan administration.[10]

In the late 1970s, there was a general perception that the Navy was dangerously close to not being able to execute its missions. The term "hollow force" was often used. The MI had been on a long decline and was approaching .60 when the Reagan administration entered into the buildup program justified by the Maritime Strategy. In the mid 1990s, again as the MI dropped to .65, concerns were voiced about "unacceptably high risk" for the forces and warnings that pushing modernization programs "down the road year after year" were dangerous.[11] In 1998, the Chief of Naval Operations was sufficiently alarmed to ask Congress for additional funding to correct current readiness problems.[12] In September 2000, as the MI reached .55, the CNO asked for more future readiness funding.

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[9] .33+((1.23-.33)/2)
[10] 1984 (.78), 1986 (.77), 1987 (.78), 1989 (.77).
[11] William A. Owens, Prepared Statement of ADM William A. Owens, USN, vice chairman of the Joint Chiefs of Staff, to the Readiness Subcommittee, House National Security Committee, March 9, 1995.
[12] Garamone, Jim, "Shelton Warns Congress of Readiness Problems," American Forces Information Service, 1 October 1998. The Joint Chiefs of Staff testified before the Senate Armed Services Committee on 29 September 2000.

A recent analysis by the Navy Program Planning and Development Branch (N801) show large APN and SCN procurement shortfalls, or "bow waves. By FY08 the "bow wave" will be $4.8 billion and by FY09 will increase to $5.8 billion.[13] The anticipated procurement shortfalls seem to validate a need for annual future readiness expenditures in excess of $36 billion, perhaps as much as $38 billion. Compared to a total budget of about $90 billion, a future readiness share of $38 billion is the equivalent of a Modernization Index of .73.

More recently, a Congressional Budget Office study determined that currently budgeted levels of spending were inadequate to maintain the current force structure. Specifically, they recommended that if sustainable modernization of the force were to be maintained, spending equivalent to a Modernization Index of .68 was required.[14]

The examples, summarized in Table 1, seem to indicate the desired Modernization Index is somewhere between .65 and .78. While none of the examples is conclusive, the aggregate indicate that the present MI is too low for sustained modernization of the fleet.

Example	Average MI *(1953-2000)*	Median MI *(1953-2000)*	Reagan MI *(1984-1988)*	N801 MI *(bow wave)*	CBO MI *(sustainable)*
Estimated MI	.65	.78	.78	.73	.68

Summary of Modernization Index Examples
Table 1

Impact and Options.

The options for the Navy are few. Either overall spending must be increased or current operating costs reduced. Some combination of the two will also provide a solution as will a change in the national military strategy that significantly reduces deployments.

[13] Navy Program Planning and Development Branch (N801), "Current Program Update", briefing at Naval War College, Newport, RI, 29 September 2000.
[14] U. S. Congressional Budget Office, *Budgeting for Defense: Maintaining Today's Forces*. (Washington DC: September 2000), 15. This study focused on DOD-wide budget authority and recommended a future readiness

If overall outlays remain constant, the only way to increase future readiness is to reduce current operating costs, usually accomplished by reducing force structure. Given current operating trends of more frequent forward deployments and a high tempo of operations, demand on the fleet is high and would become higher if force structure is reduced.

If current operating trends do not change, then additional funding must be provided for future readiness. As the price of ships and aircraft continue to increase, fewer will be purchased, and actual purchasing power will decrease. To ensure purchasing power at least remains constant, TOA must be increased or the price of ships and aircraft reduced by new and imaginative thinking about future warfare platforms.[15]

Assuming a budget of about $88 billion (in constant FY01 dollars), the highest currently contemplated out to FY05, $35.2 billion will have to be spent annually on procurement and RDT&E in order to maintain a Modernization Index of .65, the lowest indicated in the examples studied above. The highest amount currently programmed for future readiness is $31.9 billion in FY05 for a predicted MI for FY05 of .57. If current readiness spending cannot be reduced to pay for future readiness, the only option is to increase modernization outlays by $4 to $6 billion for a total budget of $92 to $94 billion (FY01 dollars).

Current influences on Navy budget resource prioritization militate heavily in favor of current readiness at the expense of modernizing the fleet. To effectively counter these influences and successfully achieve sustainable future readiness, the Navy must present an

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budget authority of $130 billion and current readiness budget authority of $189 billion. (130/189=.68). The figures for FY00 showed an MI of .51 (future readiness = $91 billion, current readiness = $176 billion.

[15] The cost of ships doubles every nineteen years. The cost of aircraft doubles every ten years. (Source: OPNAV N801.) Examples of less expensive alternative include smaller ships such as *Streetfighter* as proposed

understandable case to Congress. The only time the Navy has been able to significantly modernize the fleet is during times when the leadership is able to present such a clear vision and translate it into a force structure that meets national security needs.

While much pressure exists to spend money on current readiness, especially from the Unified CINCs and Fleet Commanders, to ignore future readiness is to ensure a force increasingly incapable of accomplishing missions required for the national defense. A smaller force structure will not support the recent trend of more and longer employment overseas.

The Modernization Index should be used as an instrument to monitor future readiness spending priority. While applying it to build a budget is not recommended, use as a gauge to test how well projected outlays support modernization of the force is useful. Future readiness spending producing an MI less than .65 most likely incurs increasing risk of failure to adequately modernize the fleet.

The trend in future readiness funding is in the wrong direction and must quickly be reversed. The FY01 MI of .54 is inadequate as are the indices out to FY05. The longer the Navy waits, the higher the ultimate cost of modernization. By providing a sustainable, steady strain level of spending, future readiness can be guaranteed.

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by VADM Cebrowski, or increased use of Unmanned Aerial Vehicles (UAVs) for missions now only accomplished by manned aircraft.

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