

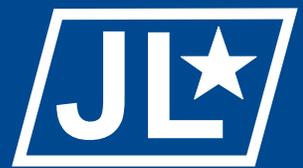
Logistics

Oil and Fuel

War Without Oil: Catalyst for Transformation
Fuel Hedging: Lessons from the Airlines

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If we don't hedge jet fuel price risk, we are speculating. It is our fiduciary duty to try and hedge this risk.

—**Scott Topping, Director,
Corporate Finance, Southwest Airlines**

Special Feature

In 2004, “the Office of Management and Budget (OMB) recommended that the Department of Defense (DoD) engage in a pilot program to test the utility of hedging its fuel costs.”¹ Senior OMB analysts made clear, however, that “the choice about whether or not to hedge should rest with the Department.”² DoD should

act on OMB’s recommendation and develop a strategy to include fuel hedging in its risk-control arsenal.

Developing a risk management strategy would allow DoD to hedge against unwanted budget risks. Hedging eliminates, or at least reduces, oil price volatility, smooths the budget, and improves cash management. Hedging also reduces price distortion that results from charging internal customers a *stabilized price* that does not reflect market prices and thus, does not reflect the actual cost of government purchased energy commodities.

Like DoD, the airline industry is exposed to risks associated with oil price volatility. Airline companies manage price risk using commercial derivatives markets. DoD (particularly the Air Force, since it consumes the most petroleum of all the armed Services) can learn from the airline industry’s approach.

The High Cost of Price Volatility

Every ten-dollar per barrel increase in the price of oil costs the Air Force approximately \$600M per year.³ Due to rising oil prices, the Air Force’s fuel budget for fiscal year (FY) 06 was \$800M more than FY05. The price of fuel continued to skyrocket after the FY06 budget was submitted to Congress, and as a result, the Air Force experienced another \$800M shortfall.⁴

Air Force leaders anticipated they would have to absorb the entire \$800M shortfall, in addition to the plus-up from FY05, and braced for a budget crisis. Historically, the Air Force funds unexpected expenses with an undistributed reduction across all programs, delaying the development and production of critical warfighting systems.⁵ The unexpected FY06 fuel bill was particularly crippling since the Air Force already had \$3.7B in unfunded requirements. Major General Stephen Lorenz, then director of the Air Force’s budget, admitted, “It’s an interesting dynamic. I do not know how it will play out.”⁶

The Air Force faced a similar fiscal challenge in FY05 and was forced to “slow operations [and] throttle back.”⁷ To make it to the end of 2005, the Air Force reduced readiness and pushed over \$1B in operations and maintenance bills into FY06.

Eleventh-hour budget cuts, resulting from Program Budget Directive (PBD) 723, allowed the Air Force to escape much of the financial burden from unfunded FY06 fuel costs, but the other Services were not as lucky. The Pentagon’s comptroller allocated \$1.1B in new Air Force funding, mostly to cover fuel costs, but



Fuel Hedging

Lessons from the Airlines

Lieutenant Colonel (sel) Lawrence Spinetta, USAF



Article Highlights

Financial dictionaries define hedging as making an investment to reduce the risk of adverse price movement. Fuel hedging refers to strategic actions, not necessarily just the use of derivative instruments in commercial markets, to offset commodity price risk.

In this article the author examines developing a risk management strategy that would allow the Department of Defense to hedge against unwanted budget risks. Hedging eliminates (or at least reduces) oil price volatility, smooths the budget, and improves cash management. Hedging also reduces price distortion that results from charging internal customers a *stabilized price* that does not reflect market prices and thus, does not reflect the actual cost of government purchased energy commodities.

Like DoD, the airline industry is exposed to risks associated with oil price volatility. Airline companies manage price risk using commercial derivatives markets. DoD (particularly the Air Force, since it consumes the most petroleum of all the armed Services) can learn from the airline industry's approach.

In contrast to the current approach, hedging would provide a stable budget. Policymakers would know the true cost of their budget decisions because *stabilized prices* would match actual cost. Most importantly, hedging improves cash-flow management to ensure that the necessary funds are available to meet broader corporate objectives. Hedging eliminates the need to seek

slashed \$4B in nonfuel programs from the Army, Navy, and Marine Corps budgets. Although PBD 723 was favorable from an Air Force perspective, it was far from ideal. It delayed the Airborne Laser Program and cut \$100M from the Joint Strike Fighter engine account.

The Air Force suffered less than the other Services in the budget fight to determine offsets for higher fuel costs, but it was not a budget victory.⁸ The Air Force receives no added value for paying more at the pump. Moreover, the Air Force did not escape from the fire. In other words, the Air Force continues to suffer ill effects from the rising cost of jet fuel.

Currently, the Air Force pays \$2.53 per gallon of jet fuel—a 31 percent increase from the previous year.⁹ The Air Force's FY07 budget programs fuel costs vastly below current market prices. To put this in perspective, consider the fact that the FY05 crisis unfolded when the Air Force was paying a relatively cheap \$1.74 per gallon. The Air Force will likely face another budget crisis in FY07 due to high fuel costs.

Recently, the rising cost of fuel forced one major command—Air Combat Command (ACC)—“to make significant changes just to operate.”¹⁰ To pay for unanticipated fuel costs, ACC had to reduce its flying-hour program.¹¹ The flying-hour program is based on the minimum requirements to train aircrew, so any reductions translate into a loss of combat capability and readiness. Budget analysts predict the entire Air Force flying-hour budget will need to be reduced by 10 percent each year from FY08 to FY13.

The Air Force is not alone in its concern over the adverse effects of the rising price of jet fuel. For every \$1.00 increase in fuel, the airlines collectively pay \$425M in additional operating costs.¹² Consequently, most major airlines have developed a risk management strategy and hedge some portion of their jet fuel needs. In fact, the propensity to hedge tends to be positively related to profitability and inversely related to the risk of default. In other words, the more profitable, less financially-troubled airlines tend to aggressively hedge jet fuel prices, whereas the less profitable, more financially-troubled airlines either do limited hedging or none whatsoever.¹³ For example, Southwest Airlines, the only major US airline to remain profitable since the September 11, 2001 terrorist attacks, holds the largest hedging position among carriers, with 86 percent of its jet fuel needs for 2006 capped at \$28 per barrel.¹⁴ This saves Southwest more than \$150M per quarter.¹⁵

The Air Force is not concerned with profitability, but it is concerned with managing shocks to its budget from price volatility. Fluctuations in the price of oil adversely affect the Air Force's ability to ensure the necessary funds are available to finance force modernization and fund operations. The timeline of the federal government budget cycle requires the Office of the Under Secretary of Defense (the Comptroller) to estimate and establish a *stabilized price* for fuel and other fuel-related commodities 18 months in advance of budget execution. Figure 1 diagrams the Defense Department's budget process as related to fuel. Not surprisingly, prices set by the Comptroller often prove wildly inaccurate. For example, last year the Pentagon's forecast was so inaccurate that it had to set a revised oil price that was 50 percent higher than the original price.¹⁶ The problem is that the Services' budgets use inaccurate forecasts and make budgeting decisions based on prices that are not representative of actual costs (see Figure 2).

A Bankrupt Defense Working Capital Fund

DoD is the largest single consumer of fuel in the United States, purchasing 1.8 percent of the country's total transportation fuel needs. The Defense Working Capital Fund (DWCF) is the financial vehicle that DoD uses to annually buy more than \$75B in commodities, including more than 130M barrels of fuel. The DWCF is a revolving fund that derives income from operations. Funds are available to finance continuing operations without any fiscal year limitation. Financial regulations state that fund activities will operate in a business-like fashion and incorporate full costs in determining the pricing of its products. The Comptroller establishes a *stabilized price* for oil, relying largely upon OMB forecasted crude oil prices that are based on oil futures. The Comptroller also adds *surcharges, costs to refine, and net adjustments*.¹⁷ Conceptually, the fund should break even over time. The purpose of *stabilized prices* is to provide the military with budget stability, despite price swings in commodity markets. The idea is to have DWCF reserves absorb gains or losses. In practice, however, the DWCF has neither achieved budget stability, nor protected the armed Services from inflation in oil prices.

Grossly inaccurate forecasts have repeatedly threatened the fund's solvency. Every year since 1992, Congress has either adjusted budget-year fuel prices or appropriated additional money. Mostly, *stabilized prices* have underestimated the market price of oil, resulting in large outflows of fund capital. In FY04, the administration admitted failure in its budget request, and stated, "Due to the difficulties in forecasting fuel prices 10 to 20 months in advance, this year the Administration is requesting an indefinite appropriation to cover the difference between the funds the Department budgets for the purchase of refined petroleum products and the actual market prices the Department pays for fuel (the additional marginal expense)."

Comptroller forecasts consistently prove inaccurate because oil futures are wildly inaccurate predictors of future spot prices.¹⁸ Additionally, the stabilized annual fuel prices used in the Services' budget requests to Congress do not reflect the full cost of fuel because of cash movements and inaccurate surcharges. Over \$4B was moved into and out of the working capital fund from FY93 to FY02. Congress, and to a lesser extent DoD, used much of this money to meet other priorities.¹⁹ A Government Accountability Office (GAO) report examining fuel pricing concluded, "DoD has been trying to successfully implement the working capital fund concept for over 50 years. However, Congress has repeatedly noted weaknesses in DoD's ability to use this mechanism to effectively control costs and operate in a business-like fashion."²⁰

Because the Services estimate their budgets using inaccurate forecasts, budget decisions are based on distorted prices. As a result, funds for other readiness needs are adversely affected.²¹ Underestimating oil prices results in cash outflows from the DWCF. If the forecasts grossly underestimate market prices and the DWCF is not sufficiently capitalized, the Services must scramble to obtain additional funding or take money from other programs to pay for oil price shocks.²² Overestimating oil prices means less money is available for investment. To summarize, the current approach does not "enable customers to plan and budget more confidently," in accordance with the DWCF's mandate.

Article Highlights

supplemental funding due to price fluctuation, eliminates disruptions to nonfuel programs caused by unanticipated requirements to pay higher-than-expected fuel bills, and eliminates fuel prices as a concern for DWCF management.

A prudent strategy involves hedging *incidental* risks that are beyond the Air Force's control, while retaining *core* risks that the Air Force is in a position to favorably influence. The Air Force, like the airline industry, is in the flying business, not the commodities trading business. The price of oil is clearly an *incidental* risk and therefore, it represents the type of risk which ought to be transferred. On the other hand, safety and tactics represent examples of *core* risks, which the Air Force enjoys a comparative advantage in managing.

The author concludes by noting that regardless of which hedging option is selected, DoD should implement a risk management strategy to protect against oil price shocks. Hedging allows for more effective planning and more predictable budget execution. In a sense, DoD officials are speculating by not hedging price risk. The Department of Defense should learn from the airline industry and implement a jet fuel hedging program.

Article Acronyms

ACC - Air Combat Command
DWCF - Defense Working Capital Fund
DoD - Department of Defense
OMB - Office of Management and Budget
FY - Fiscal Year
GAO - Government Accountability Office
MMS - Mineral Management Services
PBD - Program Budget Directive

The Need to Hedge

In contrast to the current approach, hedging would provide a stable budget. Policymakers would know the true cost of their budget decisions because *stabilized prices* would match actual cost. Most importantly, hedging improves cash-flow management

to ensure that the necessary funds are available to meet broader corporate objectives. Hedging eliminates the need to seek supplemental funding due to price fluctuation, eliminates disruptions to nonfuel programs caused by unanticipated requirements to pay higher-than-expected fuel bills, and eliminates fuel prices as a concern for DWCF management.

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Hedging in Commercial Markets

The use of derivatives—financial instruments, such as options and futures contracts, which derive their value from the value of an underlying commodity, security, or index—lets investors take risk, not DoD. Thomas Siems, a senior economist and policy advisor at the Federal Reserve Bank of Dallas, notes, "Derivatives help improve market efficiencies because risk can be isolated and sold to those who are willing to accept them at the least cost."²⁵

The mechanics of hedging in commercial markets are not as complex as they seem. The majority of airlines rely on plain vanilla instruments to hedge their jet fuel costs, including swaps, futures, call options, average price options, and collars.²⁶ Zero-cost collars—buying a call option and selling a put option at the same time so income from selling the put offsets the cost of the call—are particularly attractive since they require no cash outlay and do not involve a speculative return.²⁷ It is also important to note that the value of a call option increases as volatility in

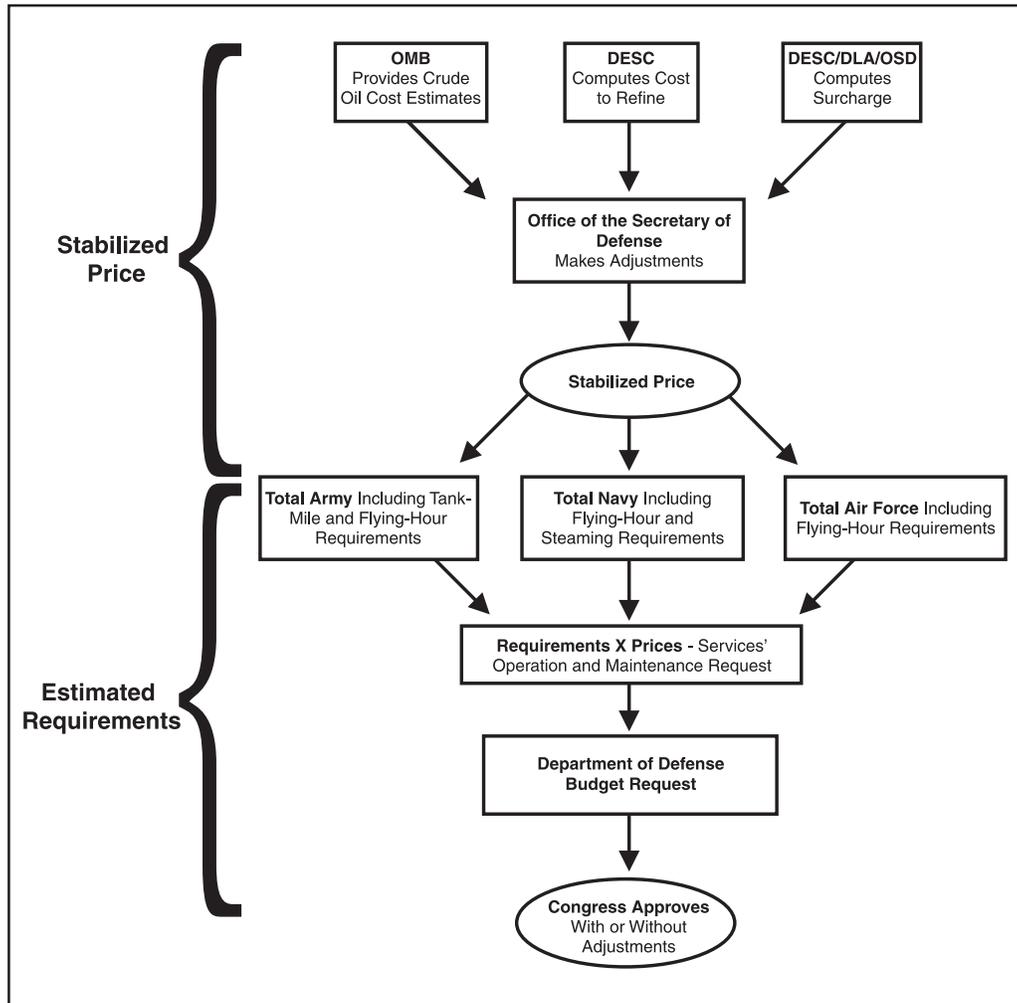


Figure 1. Budget Process for DoD Fuel

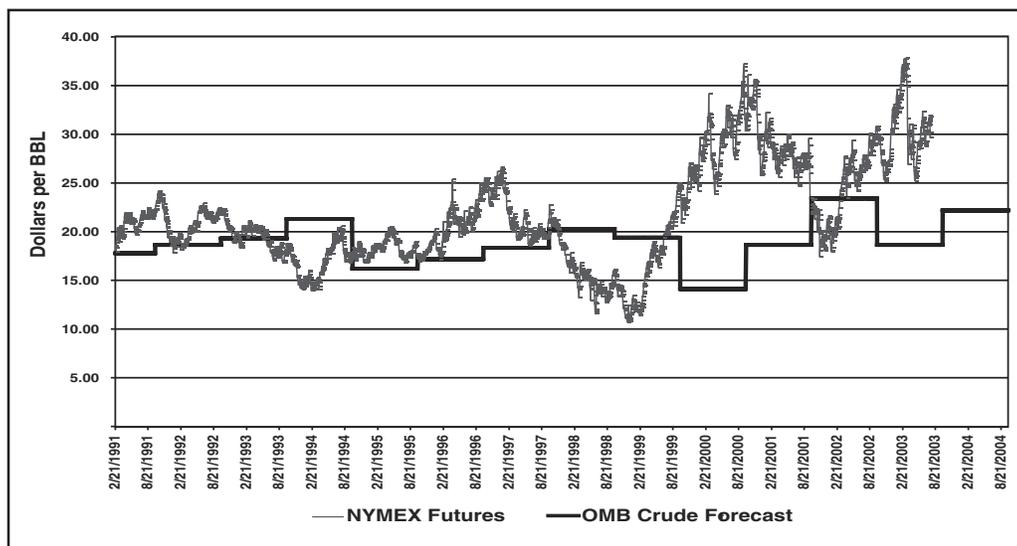


Figure 2. Crude Oil Prices Versus OMB Forecasts

the oil market increases. Because markets tend to react with trepidation when a war breaks out (especially if military action occurs in the Middle East), hedges established before a conflict starts would provide DoD with protection when it needs it most. Added to which, futures do not have the same potential counterparty risk that is endemic with the use of fixed-price contracts. Therefore, fuel support to warfighters is less likely to be interrupted.²⁸

The DoD purchases more jet fuel than any single airline, but far less than the total purchases of the largest US airlines. Delta, American, and United combined, purchase more than twice as much jet fuel as DoD. Consequently, DoD participation in commercial hedging markets would not overwhelm markets. In fact, it would improve market liquidity and hence, efficiency. Presently, the oil futures market enjoys significant liquidity for contracts up to a year. Although there is no regulated exchange for jet fuel trading, over-the-counter markets are active. Typically, airlines use rolling hedges that cross hedge price risk using crude oil and heating oil contracts to hedge price risk beyond a year. However, DoD would not need to engage in such a complex strategy because the DoD is concerned with a shorter timeline. The primary purpose for DoD hedging is to protect against budget risk and hence, the DoD is principally concerned

entitlements grow.³² In addition, the Pentagon faces an increasing population of veterans in need of health care, expensive operations abroad in support of the global war on terror, and cost growth in major acquisition programs.³³ Hedging eliminates the need for supplemental funding to cover higher-than-expected fuel prices, thereby eliminating the political liability associated with requesting additional money from Congress.

The use of derivatives in the commercial market does, however, have a potential political drawback. Because of a lack of understanding, the public may perceive DoD's use of derivatives to be a risky endeavor. The public may make unfair comparisons to scandals involving the abuse of derivatives, such as the bankruptcy of Orange County, California in 1994.³⁴ It is a myth, though, that derivatives are purely speculative, highly-leveraged instruments.³⁵ The derivatives market actually developed from a need to control risk. Proper oversight would eliminate potential for abuse. Moreover, using the appropriate techniques would further reduce risk. The purchaser of a call option, for example, only risks losing the cost of the option premium, yet enjoys unlimited potential upside.

DoD participation in commercial hedging markets would not necessarily be unique. Hedging is common practice in both private and public sectors. Businesses, from small farmers to

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with gross mismatches between stabilized oil prices and market prices during budget execution.

Airline executives know that it is often impossible to pass higher fuel prices on to passengers by raising ticket prices due to the highly competitive nature of the industry.²⁹ Similarly, the DoD is finding it increasingly difficult politically to request supplement funds from Congress to cover unexpected increases in the price of fuel. To cover the current budget shortfall, the Air Force "wants more money from OMB out of the national treasury instead of [the Air Force] having to eat it."³⁰ But, budget realities require fiscal constraint, which leads to major program disruptions. Major General Lorenz remarked,

Remember, the Air Force is just part of the national treasury and the national priorities of America. When you have a \$62.5B supplemental [to pay for the War on Terror] that wasn't even planned on, the hurricane has certainly thrown another dynamic into the budget and deficit spending and tax cuts, [you start to understand] the whole picture.³¹

Although PBD 723 gave the Air Force some relief, the Air Force should not expect a financial rescue in the future. Congress will likely be under acute pressure to curtail defense spending as the Baby Boomer generation retires and the costs of

Fortune 500 companies, rely on derivatives to hedge price risk. Some of the biggest users of derivatives are government and quasi-government agencies. Municipalities, transportation authorities, power cooperatives, and government-sponsored enterprises such as Fannie Mae, Ginnie Mae, and Freddie Mac all rely on hedges to manage risk. Mexico, Brazil, and Chile are just some of the countries that are regular users of oil derivative markets.

The Way Ahead

DoD needs to seek legislative changes from Congress to grant it the authority to establish a commercial hedging program. DoD needs to overcome three legal challenges. First, DoD has no specific authority to engage in transactions involving derivative products. DoD's general procurement is limited to products and services. Second, DoD lacks authority to derive cash benefit from liquidated positions in financial markets. Currently, proceeds from liquidated positions would go directly to the Treasury rather than into the DWCF. Third, the GAO has not addressed whether hedging budget risk is a *necessary expense* for federal agencies. DoD needs to justify the expense of a hedging program as bearing a logical relationship to the appropriation being charged.³⁶

DoD Oil Consumption Facts

- The US military, the largest single consumer of fuel in the United States, uses approximately 1.8 percent of the country's total transportation fuel.
- In FY05, the Defense Energy Support Center (DESC) purchased 130 million barrels of fuel at a cost of more than \$8 billion.
 - Seventy-five percent was for aviation fuel.
 - Fifty-seven percent was for the US Air Force.
 - Fifty-four percent of the Air Force total was for the Mobility Air Force.
- Prior to Operation Enduring Freedom and Operation Iraqi Freedom, DESC purchased approximately 100 million barrels of petroleum annually—enough fuel for 1,000 cars to drive around the world 4,620 times or 115.5 trillion miles.
- US military forces in Iraq use about 1.7 million gallons of fuel a day. On average, every soldier, sailor, and airman in Iraq consumes roughly 9 gallons of fuel a day.

An Alternative

As an alternative to hedging in the commercial markets, DoD could seek legislative authority to engage in an *intergovernmental hedging* arrangement. This option enjoys broad support from the Defense Business Board members.³⁷ They recommended DoD enter into an agreement with the Department of Interior's Mineral Management Services (MMS) group to mutually offset dollar variances resulting from fuel price volatility. By leasing both offshore and onshore energy resources, the MMS generates approximately \$4B per year in revenue. When the price of fuel increases, MMS revenues rise and DoD costs rise. When prices fall, the opposite occurs. Transferring funds from Interior to Defense or vice versa, depending on which department benefits from unanticipated price changes, would afford DoD the benefits of hedging without the cost associated with trading derivatives in commercial markets.

Conclusion

Regardless of which hedging option is selected, DoD should implement a risk management strategy to protect against oil price shocks. Hedging allows for more effective planning and more predictable budget execution. In a sense, DoD officials are speculating by not hedging price risk. The Department of Defense should learn from the airline industry and implement a jet fuel hedging program.

Notes

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 15. Southwest Airline is hedged through 2009, with 25 percent of its fuel needs locked in at \$35 per barrel that year.
 16. Amy Butler, “USAF Fuel Costs Blowout Cuts Weapons Research Funding,” *Aviation Week and Space Technology*, 1 Aug 05, [Online] Available: <http://www.energybulletin.net/7701.html> (accessed 26 Aug 06).
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 20. GAO, “Better Fuel Pricing Practices,” 4.
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 27. A call option is an agreement that gives an investor the right, but not the obligation, to buy a stock, bond, commodity, or other instrument at a specified price within a specific time period. Conversely, a put option is an option contract giving the owner the right, but not the obligation, to sell a specified amount of an underlying security at a specified price within a specified time. Financial strategies that include zero-cost collars do, however, incur administration and transactional costs. These costs could range from approximately \$10 to \$250 million per year, depending on the type of hedges in place and level of risk mitigation.
 28. *Counterparty risk* is the risk that the other party in an agreement will default. DoD’s use of derivatives does not affect the price DoD fuel suppliers will receive for their deliveries. DoD supplies continue to receive a market price, while the counterparty to the futures contract would be liable for the difference between market and contract price. The profit or loss on a futures position is exchanged in cash daily (for example, marked-to-market), which reduces the chance the counterparty will default.
 29. Carter, Rogers, and Simkins, “Fuel Hedging,” 2.
 30. Lorenz, “Inside the Air Force Budget,” [Online] Available: http://www.afa.org/Media/scripts/Lorenz_conf2005.asp.
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 32. In 1962, defense spending as a percentage of GDP equaled 9.3 percent, whereas entitlements constituted 6.1 percent. In contrast, entitlements now account for 11.8 percent and defense spending has been reduced to 4.0 percent. This trend will only accelerate as the Baby Boomer generation retires. Air Force Association, “2006 USAF Almanac,” *Air Force Magazine*, May 06, 62.
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- Lieutenant Colonel (sel) Lawrence Spinetta is an F-15 pilot in the 1st Fighter Wing, Langley Air Force Base, Virginia. He holds masters degrees from Harvard University and the School of Advanced Air and Space Studies. Previously, he served as a CHECKMATE strategist at the Air Staff and as an international affairs fellow at the Council on Foreign Relations in Washington, DC. Lieutenant Colonel (sel) Spinetta is also a certified public accountant, State of Florida.* 

notable quotes

Logistics is the bridge between the national economy and the combat forces, and logistics thus operates as “military economics” in the fullest sense of the word. Therefore, logistics must be seen from two viewpoints. Logistics has its roots in the national economy. In this area, it is dominated by civilian influences and civilian authority. On the other hand, the end product of logistics lies in the operations of combat forces. There logistics is dominated by military influence and by military authority. In this area the major criterion of logistics is its effectiveness in creating and sustaining combat forces in action against an enemy.

—Adm Henry E. Eccles, USN