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A REVIEW OF WAR COSTS IN IRAQ AND AFGHANISTAN

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ABSTRACT

As of this writing, the wars in Iraq and Afghanistan are in their eighth and tenth years, having accrued nearly a trillion dollars in direct military costs. I review the history of cost forecasts for these ongoing engagements, highlighting the differences across them in scope and accuracy, assessing the methods and practice of cost forecasting, and exploring the implications of the war costs themselves. Besides the unanticipated length and breadth of the military conflicts themselves, a related and equally important component of costs is the life cycle of costs associated with caring for veterans. The forecasts we have of such costs imply high levels of public spending per veteran and very high levels of costs associated with pain and suffering per veteran, as high as 10 to 25 percent of lifetime wealth. I also discuss the methods and motivations associated with war cost forecasts by comparing them with other types of aggregate forecasts, which are prone to similar types of errors. The history of war cost forecasts suggests that increasing their frequency and transparency may improve their usefulness in guiding policy.

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As of the summer of 2010, the wars in Iraq and Afghanistan were entering their eighth and tenth years respectively. The cumulative total in direct military costs associated with these conflicts exceeded $750 billion in the summer of 2009 (Belasco, 2009) and has likely reached $800 billion based on trends in monthly spending. Reductions in force strength are currently underway in Iraq, but troop levels have surged in Afghanistan and are likely to remain high at least through the summer of 2011. One notable study estimated that the total present value of all present and future costs associated with these wars might ultimately exceed three trillion dollars (Stiglitz and Bilmes, 2008), but other studies of costs have offered a wide range of estimates (Nordhaus, 2002; Wallsten and Kosec, 2005; Bilmes and Stiglitz, 2006; Bilmes, 2007; Sunshine, 2007; Goldberg, 2007; Tanielian and Jaycox, 2008; Davis, Murphy and Topel, 2009). I list these studies and a subset of their forecasts in Table 1. In this paper, I review the sources of differences across these forecasts and explore implications for the methods and practice of war cost forecasting. I also assess the relative magnitude of present and future war costs in Iraq and Afghanistan

Military actions are costly in many ways for a wide variety of groups, and accurate cost forecasts are important for informing policy. From an economic perspective, assessing the costs of warfare relative to its benefits should be a central component of the decision to engage in warfare. Still, some scholars argue that warfare is an inherently irrational outcome whose costs tend to exceed the benefits, even to those who win (Tuchman, 1984; Gartzke, 1999). But even if war cost forecasts do not appreciably affect policy making, they are still useful for assessing well-being.

Important characteristics of any cost forecast are the geographic and temporal domains over which costs are measured. A forecast of all direct U.S. military costs of actions in Iraq and Afghanistan would include only the funds required to deploy and maintain troops and equipment for the length of deployment. It would omit many other overt budgetary costs such as those associated with compensation for U.S. veterans' disability and death. Another forecast domain might encompass all the incurred liabilities of the U.S. federal government,

regardless of what form they take, from the beginning of the military action through to the indefinite future. A third domain might cover costs borne by all U.S. individuals and institutions, over all periods of time. A fourth could add individuals and institutions in Iraq and Afghanistan or in other affected countries. Cost domains often differ dramatically across estimates, which restricts comparability. The largest extant cost estimate of $3 trillion (Stiglitz and Bilmes, 2008) covers one of the broadest domains. Rather than representing just one or two years' worth of costs, it is a sum of all future costs.[1] The estimate is also broad in the sense that the authors attempt to measure all of the costs associated with the wars in Iraq and Afghanistan that are borne by U.S. individuals, institutions, and governments, rather than just the direct military costs alone.

In the sections that follow, I discuss in greater detail this estimate and other extant cost forecasts, comparing and contrasting their domains and assumptions. Then I assess the relative size of these costs, comparing them with other government obligations, with our means to pay them, and with the population of veterans who bear the private costs. Finally, I provide a discussion of the methods and accuracy of war cost forecasting before concluding with a summary of my findings.

The Attribution, Timing, and Scope of War Costs

There are two important and largely separate dimensions of war costs: the life cycle, or temporal nature of costs; and the scope or breadth of costs across individuals affected by warfare. Extant forecasts often differ across both dimensions. Of the two, the long life cycle of some types of costs, namely the costs associated with treating and compensating wounded veterans, is less well understood and is an often overlooked element of costs associated with warfare. It can also be difficult to attribute such costs to war per se, especially because the

[1]Future costs are expressed in terms of their present value, or the dollar amount that could be invested today at typical market rates so that after accumulating interest, it would equal the future amount. Measured this way, the present value of total costs is the dollar amount that the government would have to place in an investment account today in order to pay off all future costs.

life cycle of veterans' costs can be long.

Attributing Costs to War

Formally identifying costs as attributable to warfare requires specifying a counterfactual: had there been no wars in Iraq and Afghanistan, how much lower would costs have been? The answer is most clear in the case of deployment-related military spending, which would not have occurred without the deployment. It is somewhat less clear for military spending unrelated to deployment, since it may have occurred even without the conflict, though probably in a lesser amount.

In the case of a combat-related injury, it is clear that without a war, and thus without the injury, its cost probably would have been zero.[2] The system of VA disability compensation is designed to identify and measure the severity of combat-related injuries in order to reimburse the veteran accordingly, to a degree which I discuss in a later section. But a large component of publicly provided health benefits for veterans is the routine health care associated with aging. Had the veteran not served, regardless of whether the war occurred or not, these routine costs would have been borne by the public through Medicare, or by the veteran through private insurance.[3] Such routine health care costs should not be counted as part of war costs because they would have occurred in any event. In practice, however, it is difficult to decompose VA health spending into parts that are attributable to aging versus wartime service (Orszag, 2008*b*). Studies focusing on the costs of particular war-related conditions could inform such a decomposition, but they are rare and limited enough that

[2]It is possible that some war-zone characteristics could actually improve some characteristics of the risk environment faced by soldiers, but it is unlikely the improvements would ever outweigh the heightened risk of combat-related injury and death in an active war zone. Buzzell and Preston (2007) find that among troops in Iraq between 2003 and 2006, death rates from non-combat violent deaths were more than 25 percent lower than those faced by U.S. civilians at similar ages and sex. Death rates from disease were almost two-third lower among troops in Iraq. But mortality risks from combat outweighed these beneficial effects, resulting in a total mortality rate for troops that was three times as high as for comparable civilians. Although it is conceivable that the net cost of warfare could actually be negative if combat-related injuries and deaths were somehow rare enough relative to any improvement in the risk environment, such a scenario is unlikely.

[3]If the comparison is between Medicare or the VA paying for care, there is probably little difference in the quantity and total cost of medical care. There could be a difference for any care utilized before the age of 65, which is probably less subsidized and therefore lower outside the VA.

broader surveys of war-related spending are often unable to strike a fine distinction between war-related and other treatments. As a result, aggregate estimates of the net costs of warfare may be biased upward if war results in unmeasured cost shifting, such as out of Medicare and into the system of VA health benefits.

One way to address such confounding is to compare wartime against peacetime spending. Under current law, veterans receive old-age health care in both scenarios, so the difference between them should reflect care and benefits associated with warfare. In a companion paper, I examine historical levels of government spending associated with military outlays and veterans' benefits, and I can compare them across wartime and peacetime (Edwards, 2010). Results suggest that the present value of aggregate veterans' costs typically rises by about a factor of 10 during wartime, owing to a roughly four-fold increase in force strength combined with average benefits that are about 2.5 times higher. Direct military spending appears to increase about 25 percent during wartime.

The Life Cycle of Costs

The difficulty of attributing costs of veterans' health benefits and compensation to warfare speaks to the long life cycle of war-related costs, far past the end of hostilities. While armed conflicts can last many years, their impacts will extend far beyond the period of the conflict because of the impacts on veterans, their families, and communities. Even if the wars in Iraq and Afghanistan were to end tomorrow, capping direct military costs immediately, cumulative war costs would continue to rise over time because there are several ways in which war costs are persistent or semi-permanent in modern societies. Put simply, the human burdens associated with warfare range from permanent to semi-permanent over the lifetimes of combatants, their families, and other people who are directly affected. Combat-related wounds are the clearest example of burdens that may be permanent during the remaining life of the afflicted individual. But an array of research findings suggests that combat exposure and deployment have many other long-reaching and long-lasting effects on human outcomes

(Institute of Medicine, 2010; MacLean, 2010).

As discussed in a recent report by the Institute of Medicine (2010), trends in publicly provided veterans' health and disability benefits illustrate how such costs of war are relatively long-lived. In a companion paper (Edwards, 2010), I examine the life cycle of costs for major U.S. wars from the beginning of the republic. Aggregate payments of benefits to veterans of a particular war typically follow an inverted U-shape over time, beginning low before rising and reaching a peak, then tapering off somewhat more quickly. This pattern is depicted in Figure 1, which plots total real dollars of disability compensation, pensions, and survivors' benefits for each of four cohorts of wartime veterans between 1950 and 1992, ending with the Vietnam cohort. Spending on benefits for the World War II cohort have been the largest overall, and they peaked in 1972 and again in 1980, or roughly 30 years after the end of hostilities. Spending on the World War I cohort, currently the second highest on record, peaked in 1965, almost 50 years after the end of that war. The long right tail in veterans' benefits is especially visible for the World War I cohort, which must have been largely extinct by 1992, and yet was still drawing almost $1 billion annually, presumably in survivors' benefits. For veterans of the Korean Conflict, spending had basically plateaued by 1980 and remained stable, although at a considerably lower level. Spending on the Vietnam cohort was still rising in these data.

Veterans' costs must ultimately decline because of rising mortality in any cohort. The more interesting dynamic is the growth in total costs prior to the peak, after which the force of increasing mortality must exceed the components of growth in benefits. The latter include the determinants of per capita need within the pool of veterans receiving benefits, and the determinants of the size of the pool itself. It turns out that both are important.

Cohorts of war veterans obviously cannot increase in size following the end of the conflict, and physical war injuries tend to be either overt or emerging rather than latent. As a result, one might expect that head counts of veterans on disability rolls should only decrease over time. Figure 2 depicts time series of the number of veterans on disability and pension rolls by

war cohort from 1950 to 2006. In contrast to expectations, these trajectories follow the same inverted U-shaped path followed by total benefits spending in Figure 1, and the time elapsed between the end of the conflict and the peak head count is roughly the same. The rate of decline through age appears to be faster in head counts than in total spending, apparently because real dollars per capita is still rising even when mortality is accelerating. Veterans' disability benefits are designed to replace foregone earnings (Institute of Medicine, 2007; Stiglitz and Bilmes, 2008), and thus are presumably indexed to real wages rather than to inflation alone.[4] Again, the more interesting dynamic is in the build-up to the peak.

The rise in program participation through age within a veteran cohort may reflect any combination of variety of factors, relatively little about which is currently known. Some health impacts of military service may initially be latent, revealing themselves only much later through the natural course of aging, although that is not the case with most physical injuries nor with psychopathologies. It is also possible that injured veterans may not initially seek treatment that does not greatly impair their functioning, but seek treatment only when it becomes burdensome. Some injured veterans may distrust the VA system and try to avoid it as long as possible. Other veterans may not at first fully understand their entitlements to benefits. Bottlenecks in the VA system could contribute to rising usage rates over time within cohorts, if those bottlenecks were persistent rather than relatively brief. It could also be the case that there are service members who earn disability ratings but also remain on active duty, collecting pensions and disability benefits only upon separation many years after the conflict. Any of these factors could be contributing to increases in the number of veterans receiving benefits within a particular cohort.

Figure 3 plots a hypothetical example of aggregate spending on veterans from a single

[4]In the case of health treatments, which are separate from pensions and compensation and thus not included in Figure 1, costs per veteran in the VA health system would rise naturally with age because older individuals are more likely to suffer from multiple conditions that require intervention. The period immediately before death is the most costly (Lubitz and Riley, 1993; Miller, 2001). Rising costs of medical treatment over time would also contribute to increases in per capita costs. The annual growth in average health spending has exceeded the growth in average incomes by 2 to 3 percent in recent decades (Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2009).

war cohort decomposed into functional parts for clarity. Panels A and B depict possible schedules of participation conditional on survival and of real per capita costs, where I have simply assumed exponential growth of 3 and 2 percent per year respectively following the end of the conflict, when the cohort is aged 25. Panel C shows a survivorship schedule for the male 1920 birth cohort from Bell and Miller (2005), which declines gradually at first, reaches 50 percent around age 75, and zero by age 100. Combining these three schedules produces aggregate spending, shown in Panel D, which follows the same inverted U-shaped trajectory found in actual data shown in Figure 1. The peak occurs at age 75 because the mortality rate first exceeds 5 percent at that age. If I were to combine Panels A and C, I would produce a similarly shaped trajectory of aggregate participation with a peak occurring earlier than is shown for utilization in Panel D. The fact that the historical peaks in spending and head counts in Figure 1 and 2 roughly line up suggests that there may be non-monotonicities in participation or per capita cost growth, neither of which have I attempted to capture in Panels A and B.

These results suggest that a long-term perspective will be important for a complete assessment of the costs of armed conflict. In the short run, a variety of factors appear to keep the costs associated with service needs relatively low. But increases in aggregate benefit utilization through age that we see in the data, although they remain somewhat mysterious, imply that costs are bound to rise in the long run before ultimately falling due to mortality.

The Scope and Definition of War Costs

It is useful to categorize war costs according to incidence in order to understand their magnitude. The total costs of war comprise public costs or budgetary costs, which like disability benefits are paid to veterans by taxpayers via governments; social economic costs, to use a term coined by Stiglitz and Bilmes (2008), which are borne by individual veterans and their households; and macroeconomic costs, which are spread over entire economies. They may also include interest costs, the extra spending in the future required to put off the payment

of costs that come due today. Public or budgetary costs, such as direct military spending and veterans' benefits, are the most overt of these costs. Each of the other types of cost is deserving of some discussion.

Economists believe that the cost of traumas can be gauged by measuring the willingness to pay money to avoid them. Although this notion is not universally accepted,[5] it has some parallels in law in addition to economic theory. Juries award financial penalties based on pain and suffering using the same underlying principle: money makes people better off, so it can compensate in at least some way for things that make them less well off, like injuries, health conditions, and even death. Compensation for victims of terrorism and environmental harms is also based in large part on that principle.

Part of the total compensation for an injury can be conceptualized as income replacement. If a debilitating injury reduces or removes altogether the ability to work and earn wages, one component of the cost of the injury is the present discounted value of foregone future earnings. But an important insight is that such lost earnings typically represent only a fraction of the total loss felt by an individual (Viscusi, 1993). Someone who loses a hand, for example, experiences not only a reduction in workplace productivity that lowers wages, but also a reduction in the quality of life that is altogether separate from and compounds the dollar value of the earnings loss. If that individual could have paid a lump sum to avoid the injury, its amount would equal the present value of lost earnings plus the cost of the reduction in quality of life. The willingness to pay should in principle capture both.

A standard terminology in economics is that social costs comprise all costs tied to an action or event, whether borne by public or private individuals, regardless of whether those entities were direct parties to the action or not. The public cost is the portion of the social cost paid by governments via borrowing or tax revenues that is frequently discussed. The Congressional Budget Office (CBO), for example, is charged with estimating the federal

[5]Some view measuring the costs of injuries and other events in this way as potentially leading to socially unjust outcomes. The revealed willingness to pay may arguably depend on the ability to pay, or income, on the rationality of perceptions, on the availability of information, or on other factors that may not be distributed in a socially just fashion across individuals.

government's portion of public costs. While in theory the public costs could meet or even exceed social costs, studies have typically found that veterans' compensation systems do not fully compensate the social or total costs associated with service-related injuries (Wallsten and Kosec, 2005; Bilmes and Stiglitz, 2006; Stiglitz and Bilmes, 2008). As a result, the public costs of war-related compensation for service-related injuries and deaths, which are the most widely cited statistics, will understate the true social costs as they would be measured by aggregated willingness to pay across those afflicted.

The difference between the public costs of treating and compensating injuries and fatalities and their larger social costs is borne by injured veterans and their families, and it has been termed the social economic cost by Stiglitz and Bilmes (2008). The social economic cost is an accounting residual, defined as the willingness to pay to avoid an injury such as losing a limb, minus all disability benefits that partially compensate for the injury.[6] This concept is more complex than that of public costs, and due to the nature of the willingness to pay, estimates tend to vary widely. Markets only implicitly price injuries, such as when higher wages compensate workers who face higher injury risk, which is a standard source of identification in the literature (Viscusi and Aldy, 2003). Even to the extent that markets do this, it is not entirely clear whose well-being is priced. If individuals are altruistic and make decisions based on the well-being of their families and households, then the willingness to pay to avoid an injury should incorporate all adverse effects on families and households as well as on the individual. But the standard approach is to assume that willingness to pay does not incorporate these spillover costs, which should instead be measured separately. The larger social economic costs could then be defined to include costs borne by families and households who lose a member to death, illness, or divorce, for example, but because very little is known about these costs, current estimates typically do not account for them.

A related concept of costs that are external to the individual are the macroeconomic costs.

[6]In calculating the social economic cost of an injury, any health care costs associated with the injury are not subtracted from the willingness to pay because the latter is typically calculated holding wealth or income fixed. The implicit assumption is that health care treats but does not reverse the condition.

These are associated with general equilibrium effects of large-scale events. One example of a war-related macroeconomic cost could be a reduction in the aggregate supply of U.S. human capital if service were widespread such as via a draft. Other macroeconomic effects could derive from a diversion of saving toward war industries rather than privately productive investment, reducing the private capital stock. A third example is that military action in the Middle East typically reduces oil production and raises the price of oil, which dampens global economic growth (Stiglitz and Bilmes, 2008). A more controversial macroeconomic effect of war is the fiscal stimulus associated with government spending.[7]

Another controversial category concerns interest costs, namely the extra spending in the future required to put off the payment of costs that come due today. The federal government has paid all of its current costs and run a budget surplus in only 12 of the 69 years since 1940; in others years it has borrowed funds and paid them back later. Borrowed costs are indeed higher in nominal or real dollars when paid back in the future. But unless government borrowing raises real interest rates, the present discounted value of costs, which takes real interest rates into account in determining the time value of money, remains unchanged by borrowing. As a result, some argue that interest costs do not belong in the calculation of total costs (Orszag, 2008*b*).[8]

Because there are a variety of costs borne by different groups over multiple time periods, war cost estimates often differ because forecasters have defined the cost domain differently. The common ground among forecasts tends to be the direct military spending associated with warfare and occupation, which forms a good basis for comparison. But in many ways

[7]Absent any behavioral response from private spenders, government purchases raise GDP one-for-one. Given a Keynesian marginal propensity to consume out of income, there would be an additional increase in private spending. But Stiglitz and Bilmes (2008) argue that modern economists believe war spending to be detrimental on net, in a clear rebuke of Keynesian thinking. Barro (2009) believes that of all types of government spending, military spending is the least likely type to crowd out private investment or consumption, but that even its net stimulative effect is less than one-for-one. In contrast, the 2009 fiscal stimulus plan was based on assumptions that the government spending multiplier was considerably greater than one.

[8]Gale and Orszag (2004) reveal that budget deficits typically reduce national saving and raise interest rates. Another reason why borrowing might matter is if it produces higher tax rates in the future, and thus larger distortions, disincentives, and dead-weight losses, which tend to rise at an increasing rate with tax rates.

the forecasts of veterans' costs are more revealing.

Estimates of War Costs in Iraq and Afghanistan

Extant cost estimates of Operations Iraqi and Enduring Freedom (OIF and OEF) are typically presented in aggregate dollars, either undiscounted nominal sums or in present discounted value. While relevant for fiscal planning, total dollars of costs do not reveal much about the severity of the implicit burden. The ratio of aggregate costs to the nation's income or gross domestic product (GDP), which indexes its ability to pay, is a better measure of net burden for the country. Similarly, the ratio of total costs to the size of the population that pays them, whether all taxpayers in the case of public costs or the much smaller subset of service members and families in the case of the social economic costs, measures the net average burden on individuals. This section first compares and contrasts estimates of aggregate costs, focusing on the costs of injury and death. Then I discuss the components of costs that are omitted from these studies. Finally I reassess aggregate costs in relative terms in order to gauge the intensity of associated burdens.

Aggregate Costs

The first widely publicized estimate of the cost of a war in Iraq was the $100 to $200 billion suggested by Lawrence Lindsey, President George W. Bush's chief economic adviser, in 2003 (Wallsten, 2006). As noted by Bilmes and Stiglitz (2006), the Bush Administration later labeled that an overestimate, instead preferring figures in the range of $50 billion. By the end of 2005, the total cost of the military operations in Iraq had exceeded $250 billion. By the middle of 2007, the CBO estimated that $602 billion had been spent on military operations and other activities in Iraq and Afghanistan since September of 2001 (Sunshine, 2007).

As recounted by Nordhaus (2002), Wallsten and Kosec (2005), and Wallsten (2006), several government agencies and groups of economists predicted war costs prior to the invasion

of Iraq. Many forecasts acknowledged the great uncertainties involved, typically by specifying an array of scenarios with varying degrees of optimism about the outcome of the war. History has generally proven the pessimistic scenarios to be more accurate.

Nordhaus (2002) estimated that the undiscounted sum of direct military and macroeconomic costs could range between $99 billion and $1.9 trillion depending on the quality of the war outcome. Other researchers differed on the likely scope of war costs and whether they would exceed the benefits of a successful war. Writing in 2003, Davis, Murphy and Topel (2009) argued it was possible that the benefits of war, the foregone no-fly-zone costs and improved economic outcomes in Iraq, could exceed the costs. But they also presented a wide range of possible cost scenarios that included many high-cost outcomes, the largest registering $633 billion for U.S. military, humanitarian, and compensation costs combined.[9]

The top of Table 1, which lists all detailed war cost forecasts for easy comparison, depicts the larger of Nordhaus's two estimates alongside the scenario 6 specified by Davis, Murphy and Topel, which most closely fits reality ex post. Excepting macroeconomic costs and impacts on oil markets, which the latter study omits, Nordhaus's high estimate totals $755 billion, close to Davis, Murphy and Topel's $633 billion. But Nordhaus did not include the costs of death and disability, while Davis, Murphy and Topel followed the lead of Wallsten and Kosec (2005) in estimating the costs borne by veterans and the federal government through the VA. In their middle scenario, shown in the next row of Table 1, Wallsten and Kosec expected military costs would reach $507 billion, or 84 percent of the total present value of $603 billion, with the remaining $96 billion attributable to the costs of fatalities, injuries, and lost wages. This is roughly comparable to the $105 billion in U.S. fatalities and injuries forecast by Davis, Murphy and Topel; the latter used Wallsten and Kosec's results to inform their own analysis. There is controversy surrounding this cost component because it is dependent on estimates of the costs of treating new types of combat-related injuries, and on estimates of the economic harm associated with injuries and death.

[9]Their costliest scenario (7) included these costs plus discounted future costs associated with a return to maintaining the prewar status quo with no-fly zones.

Costs of Injury and Death

The unique contribution of Wallsten and Kosec (2005) was to estimate the lifetime costs associated with traumatic brain injury (TBI), which has been termed the signature injury of OEF and OIF. They report that the present value of treating TBI over a lifetime could range from $600,000 to $4.3 million, and their forecast assumes a value of about $2.2 million. The costs associated with the 2,824 veterans estimated to have been diagnosed with TBI before August 2005 reached $16 billion in present value.

Although the number of troops ever diagnosed with TBI has surely risen over time, the Congressional Budget Office argued that these forecasts are too high for several reasons. Goldberg (2007) states that Wallsten and Kosec overestimated both the numbers of diagnosed TBI's and their severity. He cites 1,950 TBI's diagnosed by December 2006, of which two thirds were mild. Goldberg (2007) and Orszag (2008*b*) also question the assumed cost per TBI. Wallsten and Kosec based their forecasts on the costs of severe head injuries suffered in automobile crashes, in which no protective gear is worn.

In two working papers, Bilmes and Stiglitz (2006) and Bilmes (2007) provided new sets of cost estimates, which are shown in the next rows of Table 1. Both studies forecast much larger costs associated with death and injury, between $400 and $500 billion. Several years later, Stiglitz and Bilmes (2008) forecast a total cost of $3 trillion in present value, $415 billion of which was the uncompensated social economic cost associated with injuries and death. While Stiglitz and Bilmes used Wallsten and Kosec's calculations in some cost areas, their overall figures came out considerably larger, as shown toward the bottom of Table 1. Roughly a factor of 10 separates their estimates of the combined public and social economic costs of injuries and deaths.

Military operations were still ongoing during this period; indeed they intensified during the troop surge conducted in Iraq during 2007, and this raised both direct military costs and the costs associated with wounded veterans. But the CBO estimates (Sunshine, 2007; Goldberg, 2007), which are similar to those of Wallsten and Kosec (2005), provided scenar-

ios that incorporated the surge.[10] Rather, the gap results from a combination of different assumptions about (1) the number of future veterans, which depends on current and future operations; (2) rates of illness and disability, the propensity of veterans to seek treatment, and the ability of the VA system to process them; (3) the costs of treatments or the amount of disability rating and benefits; and (4) growth in the cost of treatments.

Of these, the first element is relatively trivial and depends on war developments and policy. The second is important but also more uncertain, and new knowledge is gained continually. The incidence and degree of TBI affliction and its permanence are unknowns, as are the ability of the VA to identify it and the propensity of veterans to ask VA to do so. Compared to annual data on OEF and OIF veterans treated by VA prior to 2009 presented by Goldberg (2007), Bilmes (2007) assumed aggregate usage that was about 25 percent higher. A recent cost estimate provided by RAND (Tanielian and Jaycox, 2008), shown near the bottom of Table 1, examines the cost of mental health trauma deriving from PTSD, TBI, depression, and other related conditions. That estimate, $10.2 billion in public and social economic costs over 2 years or $5.1 over 1 year, is difficult to compare to the other long-run cost estimates; but it is 5 to 10 times as large as the single-year cost estimates of public disability and VA medical care cited by Sunshine (2007) and Goldberg (2007). The difference could be due to prevalence estimates, assumptions about per capita costs, assumptions about the life cycle of the diseases, or all of these.[11]

[10]Wallsten and Kosec (2005)'s estimate of $96 billion in VA benefits plus social economic costs is in the same ballpark as the total present value of public spending implied by official CBO estimates. The CBO produces 10-year forecasts, which I extended by extrapolation. I specified the same time horizon, 40 years, and nominal discount rate, 4.5 percent, used by Stiglitz and Bilmes (2008). The average age of OEF/OIF veterans is about 29 (Institute of Medicine, 2010), and male cohort life tables forecast by the Social Security Administration Bell and Miller (2005) suggest that their remaining life expectancy should be closer to 55 years, but I used 40 years in order to maintain consistency across estimates. The resulting extrapolation of the CBO estimate is shown in Table 1. My results suggest that the two CBO estimates, Sunshine (2007) and Goldberg (2007), differ slightly but imply a total present value of public spending on VA disability and medical care of around $60 billion, which is more than an order of magnitude below the $717 billion estimated by Stiglitz and Bilmes.

[11]The RAND study collected a telephone sample of about 2,000 OEF and OIF veterans, Seal et al. (2009) examined VA medical records of almost 300,000 veterans. Both studies found a high incidence of mental health ailments. The RAND study, based on self-report, found that 30.7 percent has at least one out of three conditions (TBI, depression, or PTSD). Seal et al. estimate that 36.9 percent had been diagnosed with at least one of a slightly broader set of conditions (including PTSD, depressive disorders, alcohol use disorders,

For long-term forecasts, the third and fourth assumptions play very critical roles. Stiglitz and Bilmes assume that the average cost per OEF and OIF veteran in 2006 was roughly twice as large as what the CBO assumes.[12] Part of this is because in their "realistic-moderate" forecast, Stiglitz and Bilmes use the average cost across all VA patients, not the average across only OEF and OIF veterans in the VA. As CBO has pointed out (Orszag, 2008*b*), veterans from earlier conflicts are older and thus more expensive because of the routine costs of treating diseases associating with aging. Assuming OEF/OIF veterans cost the same as Vietnam and older veterans will surely overstate current costs, but it is unclear whether it also overstates future costs. Average OEF/OIF costs could increase quickly as new knowledge about health conditions and treatments arrives.

Perhaps most importantly, Stiglitz and Bilmes assume that the real average cost of treatments rises 3 percent each year, doubling about every 23 years. CBO forecasts are less clear regarding this assumption, but the 10-year estimates under the high option presented by Goldberg (2007) show an average annual growth rate in total real VA health spending on OEF and OIF veterans of 2.2 percent. Because there will be rapid growth in the population of such veterans, the implicit growth rate in real average costs must be much lower, probably unrealistically low.[13] To be sure, a 3 percent annual rate of growth in real average medical costs is considerably faster growth than assumed for Medicare by its Boards of Trustees (2009), who report that excess growth in health care costs has averaged 2 or 3 percent in recent decades. But based in part on recommendations from technical review panels, they currently forecast it to decline to 1.4 percentage points by 2033, to 0.8 by 2053, and 0.2 by 2083. I find that compared to the assumptions of the Medicare Trustees, an assumption of

and drug use disorders). The prevalence of PTSD was 13.8 percent in the RAND study and 21.8 percent in the VA data.

[12]Both Stiglitz and Bilmes (2008) and CBO (Goldberg, 2007) use spending per capita in 2006 as their benchmark. The former assume spending per OEF/OIF veteran will start at $5,765, the average VA treatment cost across all veterans; the latter assumes it is $2,610, the actual VA health spending in 2006 per OEF/OIF veteran. In their "best case" estimates, Stiglitz and Bilmes assume the number is $3,500, which they chose "after consulting with physicians in the VA treating new veterans."

[13]Bilmes (2007) estimated the OEF and OIF VA population would be growing at an average annual rate of 11 percent over that period, which is actually below the comparable rate of 32 percent observed between 2005 and 2008 according to the CBO (Goldberg, 2007).

3 percent excess annual growth raises the present value of total VA health costs by almost a factor of 2 over a window of 40 years.

Growth in average medical costs and growth in the patient population have the same effect on an actuarial forecast of total costs, and it appears that both are important for the differences in forecasts. Assuming that CBO's estimates of medical cost growth are similar to those of the Medicare Trustees, then the factor of 10 separating Stiglitz and Bilmes's estimate from the CBO's estimate of VA medical and disability costs may be roughly parceled into (i) a factor of 2 separating the initial average health costs, (ii) another factor of 2 deriving from faster growth in average costs, and (iii) a residual factor of 2.5 that must be subsumed in different estimates of the population of OEF/OIF veterans and their propensity to seek and receive care, as well as any other factors.

Omitted Costs of Education and Adjustment

The estimates shown in Table 1 focus on costs associated with deployment and post-deployment health and disability, which are arguably the most important. But there are at least two other types of costs that are less frequently discussed. Education and retraining programs for veterans and their families are costly to the government and to taxpayers, but they are beneficial to recipients and thus may not be commonly perceived as costs at all. At the opposite extreme, there may be social, psychological, and economic costs borne and felt acutely by families and communities who are adjusting to accelerated deployments, reduced dwell times, and reentry following military service (Institute of Medicine, 2010). But these costs are much less overt or clearly understood, and currently we can say very little about them.

Educational benefits, most notably the G.I. Bill, are a war-related cost to the government but also a beneficial investment in the human capital of veterans. Researchers view the midcentury G.I. Bill as having vastly expanded the educational attainment of birth cohorts with high rates of military service in World War II and Korea (Bound, 2002; Stanley, 2003).

The Post-9/11 Veterans Educational Assistance Act of 2008 expanded the G.I. Bill to cover OEF and OIF veterans; that program went into effect in August of 2009. In 2008, the CBO estimated that the bill would cost $51.8 billion over 10 years (Orszag, 2008*a*). That is about four times as large as the CBO's "high option" 10-year forecast of VA medical and disability spending (Goldberg, 2007).

According to statistics reported by the U.S. Department of Education (2009), the real average costs of education have been rising by more than 2 percent per year during the past decade. In other words, education costs are growing roughly as fast as medical costs. Working to reduce educational costs is the relatively short life-cycle of usage per veteran; reentry students typically finish within several years. The same is not the case with VA health care, which is typically provided throughout the entire life of the veteran. Educational benefits may also improve force retention and should improve individual well-being by raising earnings and improving health (Grossman, 2006). But educational benefits are also a potentially explosive source of cost growth because of wide eligibility and rapidly increasing costs of tuition. The volatility of payments for veterans' education subsidies is depicted in Figure 4, which plots federal spending on several types of veterans' payments as shares of GDP since 1940 and forecast to 2014. The G.I. Bill produced a massive surge in spending that reached nearly 2.5 percent of GDP in 1950, five times its share after 1952.

The second component of costs that is less frequently discussed derives from the burdens that may be placed on families and communities by accelerated and lengthened overseas deployment, reduced dwell times between deployments, and reentry adjustments for returning veterans and their families. As reported by the Institute of Medicine (2010), very little is known yet about the conditions fostered by recent changes in military life brought on by ongoing wartime commitments. The challenges faced by veterans and their families of adapting to social and economic conditions are also in a state of flux, owing both to long-term trends like the increase in female labor force participation and the rise in divorce rates, and to short-term trends like the massive disruptions brought about by the recession of 2008.

Costs in this category could derive from juvenile delinquency associated with the absence of parental guidance, the trauma of divorce, domestic violence, and other family trauma. Disruptions in communities that lose workers called up to National Guard or reserve units may be costly as well. However, little is known about the incidence of these events and their connections with wartime service, and less is known about their costs. Their omission is not indicative of any judgment about their relative importance, but the state of knowledge is poor enough to preclude even a guess about how large or small the costs might be. More research is needed in these areas.

Relative Costs

The aggregate costs of wars in Iraq and Afghanistan remain unclear because the conflicts are ongoing, the life cycle of costs is very long, and there is much uncertainty about current and future costs. But even though our current knowledge may be imprecise, it is useful to assess the magnitudes of costs relative to the ability to bear them.

In isolation, an amount like $3 trillion (Stiglitz and Bilmes, 2008) sounds like a very large cost. Compared with the inflation-adjusted direct military costs of past wars, which are shown in Table 2, $3 trillion is certainly large, surpassed only by the massive direct military expenditures incurred during World War II, which amounted to almost $3.5 trillion in 2008 prices. But according to Table 1, direct military expenditures in Iraq and Afghanistan are likely to be more like $1 to $1.5 trillion, or perhaps half the level of World War II spending but also at least twice the real direct cost of the Vietnam war. The rest of the $3 trillion, if that figure is correct, may or may not be historically unprecedented. Without comparable estimates of past public and social costs associated with injuries and deaths and of macroeconomic costs, it is difficult to tell. I assess historical costs of injury and death in a companion study (Edwards, 2010), while Glick and Taylor (2010) estimates the cost of lost trade in several wars in the last century. Both studies find these components tend to be large for historical conflicts.

Costs of roughly the same magnitude as $3 trillion are neither widespread nor entirely unique. The unfunded shortfall in Social Security is currently $5.3 trillion in present value over 75 years (Board of Trustees, 2009), while Medicare's unfunded shortfall is more than twice as large at $13.4 trillion (Boards of Trustees, 2009). Measured relative to these unfunded obligations, which are a combined $18.7 trillion, $3 trillion seems relatively small, only about a sixth as much. The deficit was $1.6 trillion in fiscal year 2009, and the national debt held by the public rose to $7.9 trillion, or about 56 percent of the nation's $14.1 trillion GDP (Office of Management and Budget, 2009) and is projected to rise. As a percentage of annual GDP, $3 trillion represents an addition of about 20 percentage points to the debt-to-GDP ratio. But as a present value of the sum of GDP over 40 years, the total war cost is only 0.4 percent.[14] Like the actuarial balance measures of Social Security and Medicare, this number roughly represents the required increase in the tax rate that would close the fiscal gap over this period. By comparison, the needs of Social Security and Medicare loom larger: 0.7 percentage point over 75 years for the former and 1.7 percentage points for the latter.

Viewed relative to population, war costs again sound relatively high. If costs were apportioned across 300 million U.S. residents, they would produce individual costs of $10,000 per person. This is large in an absolute sense, although it is not large relative to lifetime income, current wealth, or other kinds of household debt per capita. But not all war-related costs are spread equally across all taxpayers or citizens; many costs are more concentrated. Of the costs itemized in Table 1, the $415 billion in social economic costs forecast by Stiglitz and Bilmes (2008) will be borne entirely by the 1.8 million veterans they estimate will have been discharged by 2017.[15] On a per capita basis, the $415 billion in social economic costs

[14] I assume the real interest rate is 1.5 percent while the growth rate of real GDP is 2.9 percent. This produces a total present value of GDP over 40 years of about $750 trillion.

[15] As described earlier, the social economic cost can be conceptualized as the uncompensated pain and suffering and other costs associated with illness and death. It does not include the uncompensated costs of warfare borne by veterans' families and communities, such as may stem from divorce and other family disharmony. If they could be measured, those costs would raise the bottom line.

borne by 1.8 million OEF and OIF veterans is over $230,000 per veteran, a large amount.[16] By comparison, the present value of family gross income may approach $2.5 million for these veterans, implying that uncompensated war costs could represent about 10 percent of remaining lifetime wealth.[17] If the social economic costs are borne only by the 40 percent of OEF/OIF veterans who Stiglitz and Bilmes assume will claim any benefits, the per capita cost would rise by a factor of 2.5 to $575,000 per veteran, reaching 25 percent of lifetime wealth.

If these estimates are correct, the challenge for policy may be to spread the burden of these costs associated with pain and suffering from war wounds more widely. Such costs may be large in aggregate, and they may be very large for individual veterans and their families, but they are not very large for the nation as a whole. In a time of increased fiscal pressures owing to the Great Recession and the aging of the Baby Boom generation, however, it may be very difficult to reallocate such burdens.

The Methods and Practice of Cost Forecasts

Ex Post Assessment of Iraq War Costs

As I have shown, one of the difficulties with comparing war cost forecasts is that they often differ in scope. Forecasts of veterans' health benefits also tend to diverge due to the long life cycle of such costs and differing assumptions about future cost growth. It is more straightforward to compare forecasts of direct military spending, which has a much shorter life span. But military spending is still subject to the large uncertainties associated with

[16]Removing the social economic costs of death, which are obviously not borne by living veterans, changes the average burden to just over $200,000 per veteran. But it would be misleading to omit altogether the costs of death, which to some extent must be felt by survivors.

[17]Real median family income of veterans is probably about $50,000 in 2009, a figure consistent with data from the 2001 National Survey of Veterans for a similar age group inflated to 2009 levels. Real incomes are likely to increase 1.5 percent per year over 55 remaining years of life from an average age of 28, with a replacement rate of 50 percent after age 67. As before, I assume the nominal interest rate is 4.5 percent and the real interest rate is 1.5 percent.

the outcomes of warfare, which renders an ex post assessment of military cost forecasts illuminating. How well have past forecasts managed to capture these uncertainties?

Figure 5 plots an array of forecasts of total direct military costs associated with Operation Iraqi Freedom alongside the unfolding reality of total cumulative costs for each fiscal year since 2003. The four sets of horizontal dashed lines depict projections of the ultimate total present value of costs in 2003 dollars provided by Nordhaus (2002), Davis, Murphy and Topel (2009), Wallsten and Kosec (2005), and Stiglitz and Bilmes (2008), starting from the year in which they were originally made. Each set of forecasts includes at least two scenarios; one includes eight and another three. The dark line rising monotonically upward is the actual cumulative present value of direct military costs as of the listed year, based on data reported by Belasco (2009) translated into 2003 dollars.

The graphic reveals that the forecasts of Nordhaus (2002) seem to have bracketed the unfolding reality fairly well at least up to the present. The forecasts of Stiglitz and Bilmes (2008) were higher than current reality but may ultimately be proved more accurate, given the continued upward trend in the running total. Some forecasts conveyed large uncertainties in direct military spending with the width of their intervals, while others did not. Nordhaus (2002) and Davis, Murphy and Topel (2009) presented relatively wide uncertainty bands, Wallsten and Kosec (2005) forecast a very narrow band, and Stiglitz and Bilmes (2008), whose lower bound overlapped Nordhaus's upper bound, provided a forecast band of intermediate width. Part of this reduction in forecast uncertainty over time may have been due to the increasing revelation that the war would not be short. In addition to being higher, later forecasts are generally also narrower, reflecting less perceived uncertainty than in earlier forecasts.

The record suggests that these war cost forecasts were able to at least roughly capture the range of possible war outcomes. While it is now clear that the scenarios considered by Davis, Murphy and Topel (2009) and especially Wallsten and Kosec (2005) were not pessimistic enough, it is only in the case of the latter that the implied uncertainty band

seems inappropriately narrow. The quality of official government forecasts is somewhat less clear. Sunshine (2007) presented scenarios for future spending on OEF and OIF combined that appear to have a similar breadth. As Nordhaus (2002) recounts, earlier studies by CBO and other governmental agencies before the wars began did not consider more pessimistic scenarios with lengthy occupations. An open question is how and to what extent policy makers have used available costs forecasts to guide their decisions.

Cost Forecasts through History

Nordhaus (2002) observes that governments seem to be historically prone to underestimating the costs of war. Some political scientists and historians have argued that warfare itself is the result of miscalculations or irrationality (Tuchman, 1984; Gartzke, 1999), so it may not be surprising that ex ante cost estimates can be wrong. But Nordhaus suggests there may political gains to forecasting low costs associated with war; consensus to go to war may be more easily achieved if the perceived costs are low.

Many other kinds of government forecasts are also prone to error. In particular, Auerbach (1999) shows revenue forecasts to be of relatively poor quality, overly influenced by short-run developments like business cycles. Long-term projections of population and of large transfer programs like Social Security and Medicare rely heavily on mortality forecasts, which in the past have been consistently too pessimistic (Lee and Miller, 2001). In the case of revenue forecasts, private estimates fare no better than government, suggesting the problem is not rooted in politics or inefficiency as much as lack of knowledge. In the case of mortality forecasts, errors seem to be the result of over-reliance on expert opinion about what the future may hold, which often contrasts markedly with extrapolated trends. There is much debate about long-term forecasts of Medicare and Social Security, with engagement by academic researchers, actuaries, and the Trustees themselves.

Lessons from both types of forecasting are salient here. Forecasting is an inexact science, and expert opinion might be unduly influenced by short-term developments. But while past

trends are often informative, a complete approach should examine them alongside expert opinion. In the present context of war costs, the trend toward reduced fatality rates in warfare and thus greater prevalence of injury and need is a very good example of a long-term trend that should be taken into account in forecasts. Likewise, the trend toward better dissemination of knowledge about veterans' programs, for example via the Internet, will probably increase program participation in future periods more than a static model would suggest.

As I have discussed, there is little agreement across forecasts concerning the costs of treating and compensating injured veterans. But one commonality is that most forecasts have specified an array of possible scenarios in an attempt to address the large uncertainties surrounding the outcomes of armed conflict. At least in the case of academic forecasts, the rough confidence intervals implied by these scenarios were more or less wide enough to capture the worst case scenario as it eventually unfolded. Given that war costs have turned out to be relatively large, the natural questions that arise concern how the U.S. government arrives at military decisions, the degree of risk aversion in its objective function, and how policy advice concerning uncertain outcomes is perceived. These are all deserving topics for further inquiry.

Current Forecasting Needs

The public and Congress receive forecasts of veterans' programs infrequently under the current system. The Congressional Budget Office releases official projections most consistently. CBO's researchers sift through the VA's reports to Office of Management and Budget in order to specify many of their key assumptions. As of this writing, CBO has not publicly updated its forecasts in two and a half years. CBO is charged by Congress with assessing a far wider array of government programs than just those for veterans support, and it may not have the personnel or funding to produce war cost forecasts more frequently. But with CBO projections available only sporadically, it is difficult to assess their quality or the quality of

private forecasts, or to gain a clear picture of veterans' current and future service needs.

The VA Actuary generates an annual actuarial forecast of limited scope for the disability payment system that appears in the VA's Performance and Accountability Report. But there are no long-term forecasts of health care utilization for the VA population. To be sure, the only other long-term forecasts of federal government spending programs are produced by the Social Security Administration and the Centers for Medicare & Medicaid Services. Those two agencies dwarf the VA in terms of service population and budget size; VA health and disability benefits are each roughly $40 billion per year, each around a tenth of the size of Social Security or Medicare. But most states employ actuaries to produce long-term forecasts of future spending on pensions and health care utilization owed to retired public employees in police, fire, and sometimes other agencies like education. Each of these state-level programs are orders of magnitude smaller than the VA system, but long-term actuarial forecasts are produced on an annual basis.[18]

Besides the differences in size, another salient difference between Social Security, Medicare, and VA benefits has to do with the categorization of current and future obligation as either mandatory or discretionary spending within the budget process. Social Security, most of Medicare, and VA disability benefits are mandatory spending categories, meaning that unless Congress were to rewrite the basic laws governing those programs, it must fund the spending each year. Veterans' health benefits are a discretionary part of the budget. The issue that arises is not that discretionary programs are always underfunded; on the contrary, Congress has consistently funded the VA through emergency spending bills. Rather, the fact that veterans' health spending is discretionary has meant that Congress can and typically does follow a wait-and-see approach rather than a more proactive stance as with Social Security and Medicare, both of which have trust funds.

Given that the VA knows its service population the best, the VA has a comparative

[18]It is also true that states' means of financing current and future benefits are generally more constrained than those of the federal government, for example due to balanced budget amendments. This may help explain why states frequently produce long-term forecasts of their retirement and pension systems while the VA does not.

advantage at producing long-term forecasts. If the VA Actuary were expanded with sufficient funding and institutional support, it would best be able to produce long-term forecasts of disability and health care needs that could inform policy. Recategorizing VA health benefits as mandatory spending could help this initiative.

Conclusion

The costs of the wars in Iraq and Afghanistan are large. The present value of war costs is in the trillions rather than millions or billions of dollars. A large portion is attributable to direct military operations, which are funded by general tax revenue and thus represent a burden shared by many current and future U.S. taxpayers. The same is true of macroeconomic costs and the costs of publicly funded veterans' benefits. The nation's ability to pay those costs, while not infinite, also appears to be sufficient. The greater challenge in the case of these costs, whose burden is spread widely, is knowing their size and timing with greater precision.

By contrast, the costs to veterans and their families may be very large. Unlike the need covered by publicly funded benefits, the remaining social economic costs associated with the uncompensated harms of physical and psychological wounds of warfare, are borne solely by veterans and their families. While these costs appear to be small in an absolute sense, they are very large when apportioned out to each veteran who must bear them. Unreimbursed social economic costs of $415 billion, as reported by Stiglitz and Bilmes (2008), spread over a pool of veterans that may reach 1.8 million works out to a average lifetime burden of more than $230,000 per veteran. This is a cost approaching 10 percent of lifetime wealth, rising to 25 percent if apportioned to injured veterans alone. If social economic costs were more than an order of magnitude smaller at more like $25 billion, as reported by Wallsten and Kosec (2005), the average lifetime cost borne by each veteran would be more like $14,000. While small in a lifetime sense, this number is large as a lump sum.

The public costs are likely to rise with time as historical patterns of the life cycle of

veterans' costs imply. While the direct military costs of war are limited, except in the case of indefinite occupation, a possibility that seems remote, the life cycle of costs borne by and associated with veterans themselves is long because their remaining life spans are typically long. Service members now face much greater odds of survival from war wounds Institute of Medicine (2010), but that also means that public support of veterans is also more long-lived. Historically, the peaks in total benefits and in head counts have lagged the end of hostilities by 30 years or more, meaning the maximum effect on annual budgets and on support systems of the current conflicts might not be felt until 2040.

The record of academic war cost projections suggests current methods can capture the vast uncertainties surrounding war outcomes and can provide useful insights for guiding policy. Applying current techniques with greater frequency and transparency is thus likely to yield useful results, given that war costs are large, they will rise over time, and some costs are probably borne entirely by veterans and their families. That said, there are unresolved questions surrounding war cost forecasts, such as how future veterans' costs are likely to unfold, and how the government assesses and utilizes war costs forecasts given their inherent uncertainty. These are important questions for future efforts to address.

Unfortunately, the current system of forecasting the needs of veterans and the costs of meeting them may be underfunded and insufficient. To be sure, long-term cost estimates are highly uncertain and thus easily subject to controversy. Perhaps as a result, the domain appears to have been largely ceded to academics. But in the cases of Social Security and Medicare, which are also the subject of much interest and debate in scholarly and policy circles, the Trustees and Actuaries of both systems are engaged in debate, informed about controversial issues, and they more freely share opinions about the components of long-range forecasts. Expanding the funding and mandate of the VA Actuary could be one way to improve the quality of war costs forecasts. Recategorizing veterans' health spending as mandatory spending similar to Medicare could also help in such an effort.

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Table 1: War Cost Forecasts

Source	Year of forecast	Conflict	Scope of costs	Costs in one year (billions)	Present value over 40 years (billions)
Nordhaus (2002) high case	2002	OIF	Direct military spending		140
			Occupation and peacekeeping		500
			Reconstruction		105
			Humanitarian assistance		10
			Impact on oil markets		778
			Macroeconomic impact		391
			Total		1,924
Davis, Murphy, and Topel (2009) Scenario 6: Longer war, ten-year occupation, major insurgency, 2 percent real discount rate	2003	OIF	Initial military operations		63
			Occupation		410
			U.S. fatalities and injuries		105
			Reconstruction aid and Humanitarian assistance		56
Wallsten and Kosec (2005) middle scenario	2005	OIF	Military operations to date		212
			Future military operations		295
			Public costs of VA disability and medical care and social economic costs of injuries and deaths		96
			Total		603
Bilmes and Stiglitz (2006) moderate scenario	2006	OIF	Military operations to date		251
			Future military operations and defense		419
			Public costs of VA disability and medical care		214
			Social economic		305
			Macroeconomic		1,050
			Total		2,239
			Interest costs		386
Bilmes (2007) moderate scenario	2007	OEF/OIF	Public costs of VA disability and medical care	3.7	425
Sunshine (2007) high option (scenario 2) with 12-month surge	2007	OEF/OIF	Military operations to date	170	601
			Future military operations and defense	170	727*
			Public costs of VA disability and medical care	0.7	69*
Stiglitz and Bilmes (2008) realistic-moderate scenario	2007	OEF/OIF	Military operations to date		646
			Future military operations and defense		1,317
			Public costs of VA disability and medical care		717
			Social economic costs of injuries and deaths		415
			Macroeconomic		1,900
			Total budgetary & social		3,095
			Budgetary, social, and macroeconomic w/o interest		4,995
			Interest costs		816
Tanielian and Jaycox (2008)	2007	OEF/OIF	Public and social economic costs of mental health only	5.1	
Goldberg (2007) high option with 12-month surge	2008	OEF/OIF	Public costs of VA disability and medical care	0.9	57*

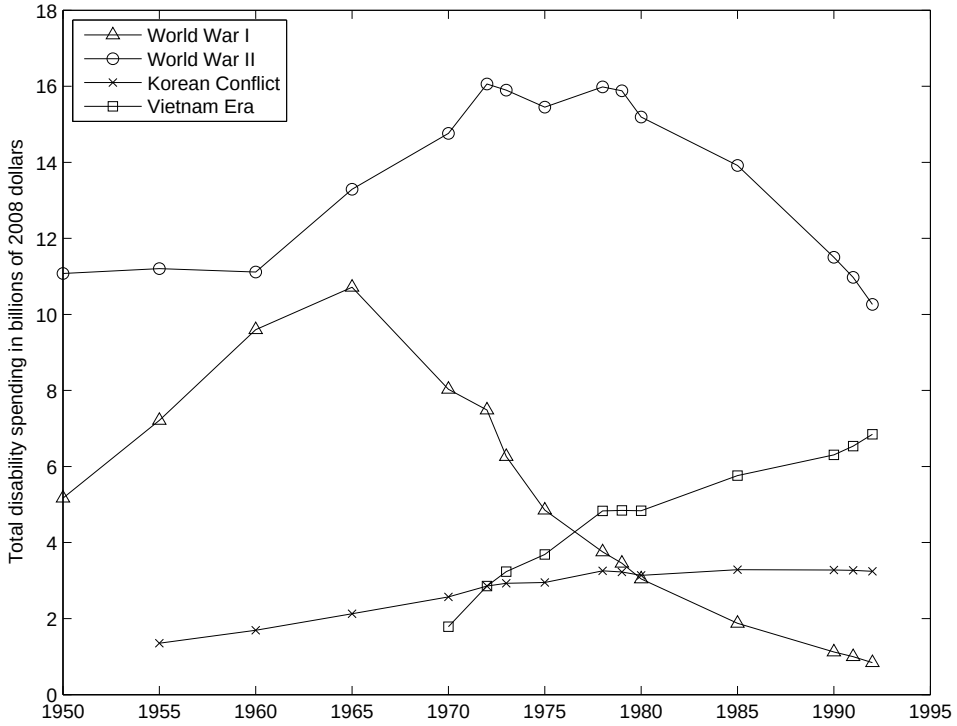
Notes: Asterisks denotes authors calculations based on extrapolation assuming a constant growth rate model to 2048 of the original CBO forecast to 2017, with a nominal discount rate of 4.5 percent.

Table 2: Direct Military Costs Associated with Major U.S. Wars

Conflict	Total direct cost in billions of: Current dollars	2008 dollars	Per capita cost in 2008 dollars	Total cost as % of GDP
Revolutionary Wars (1775-1783)	0.1	2.6	525.2	63
War of 1812 (1812-1815)	0.09	1.3	141.0	13
Mexican War (1846-1848)	0.07	1.9	79.9	3
Civil War (1861-1865)				
Union	3.2	44.8	1,594.5	84
Confederate	2.0	28.0	3,230.1	169
Combined	5.2	72.9	1,981.1	104
Spanish American War (1898)	0.4	11.3	129.3	3
World War I (1917-1918)	16.8	224.0	2,924.6	24
World War II (1941-1945)	285.4	3,403.2	23,956.3	130
Korea (1950-1953)	54.0	394.7	2,662.6	15
Vietnam (1964-1972)	111.0	580.8	2,589.7	12
First Gulf War (1990-1991)	61.0	89.4	359.6	1

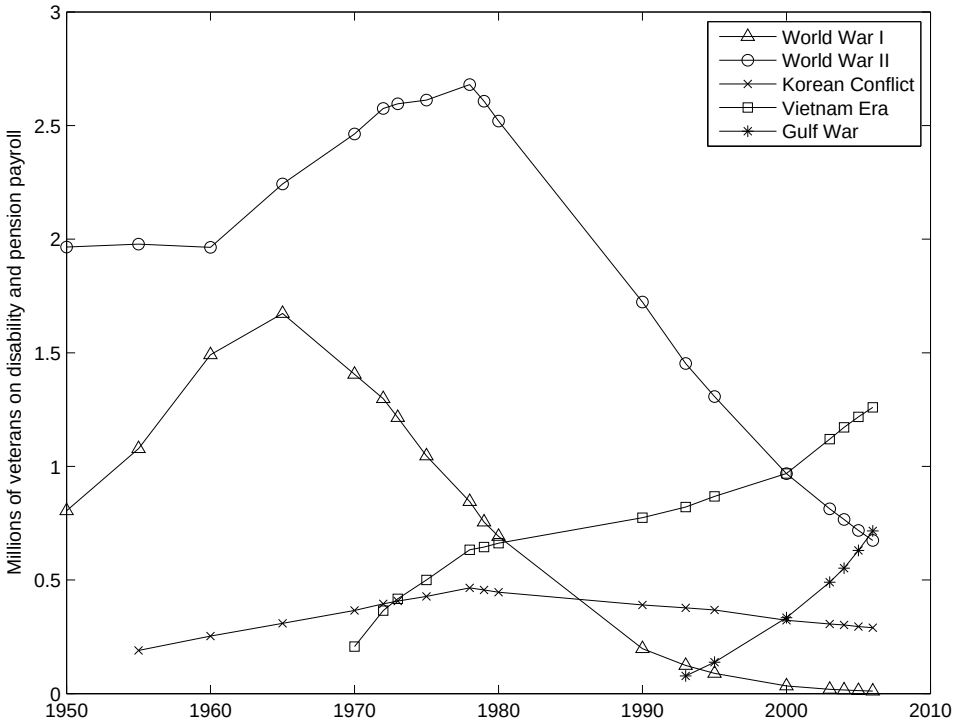
Notes: The source is Nordhaus (2002), who cites U.S. Commerce Department, Historical Statistics of the United States, Government Printing Office, 1975, vol. 2, series Y and Al Nofi, Statistical Summary: Americas Major Wars at http://www.cwc.lsu.edu/cwc/other/stats/warcost.htm. Real costs are inflated to 2008 levels using the GDP implicit price deflator

Figure 1: Total spending on disability compensation and pensions by period of service



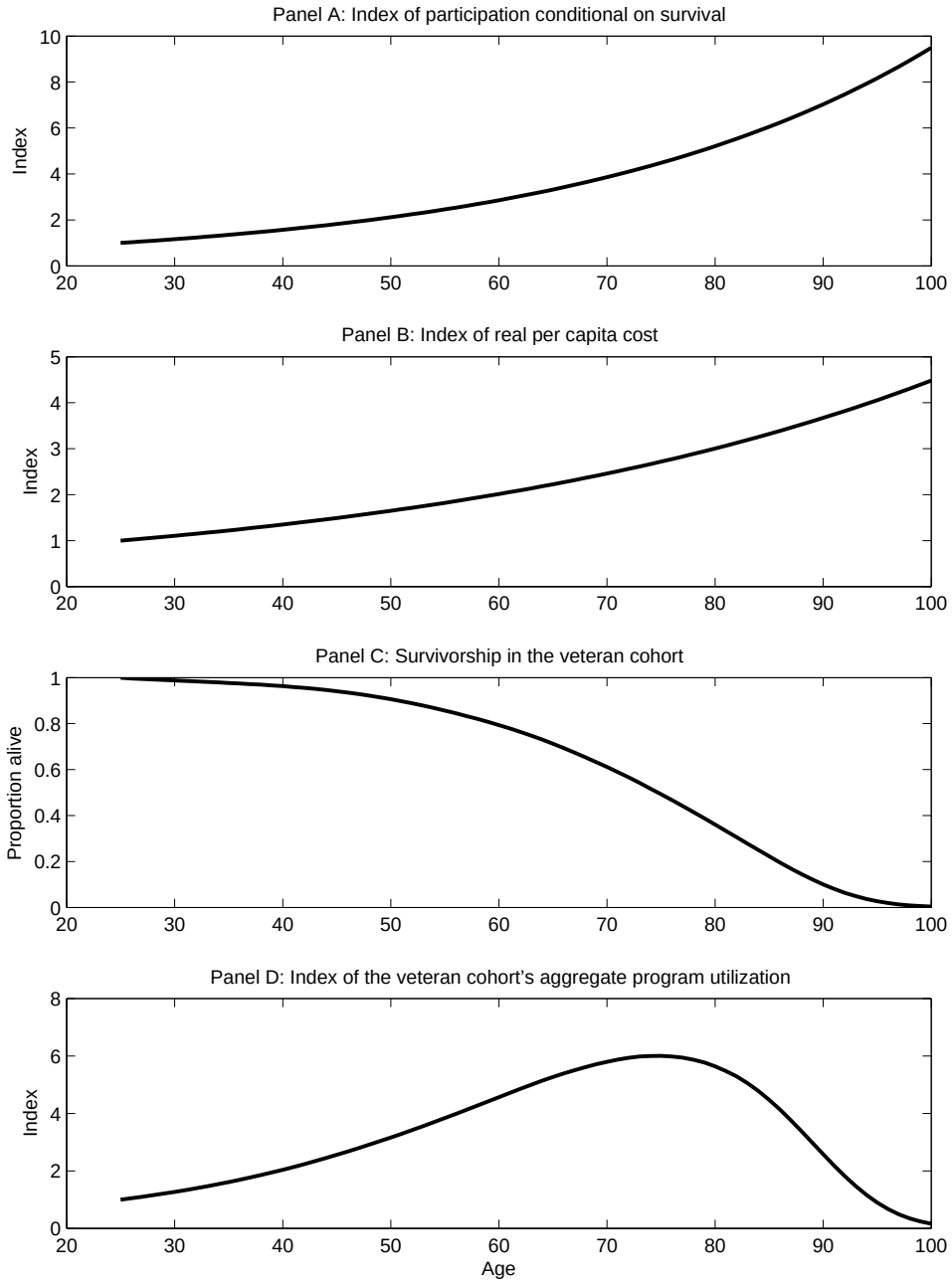
Notes: The data are real dollars of disability compensation and pensions for veterans by period of service, where the nominal amounts are deflated by the CPI. These are totals for the veteran cohort, constructed as the product of the number of veterans receiving benefits, which includes living veterans receiving pensions and deceased veterans whose dependents are receiving survivors' benefits, and the reported average spending per veteran. The source is the Institute of Medicine (2010), which drew the data from the U.S. Census Bureaus *Statistical Abstracts of the United States* from various years, which in turn cite *Annual Reports of the Secretary of Veterans Affairs* and VAs Annual *Performance and Accountability Reports*.

Figure 2: Veterans on disability and pension payrolls by period of service



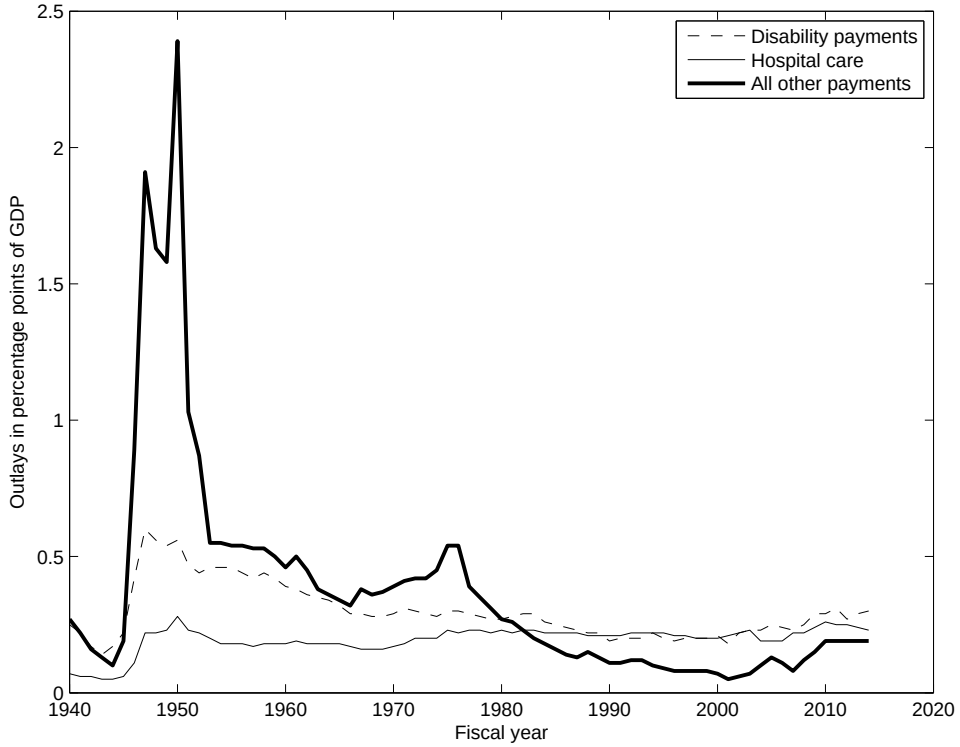
Notes: The underlying data are counts of both living veterans receiving disability pensions and deceased veterans whose dependents are receiving survivors' benefits. For sources, see notes to Figure 1.

Figure 3: The life cycle of publicly provided veterans' benefits



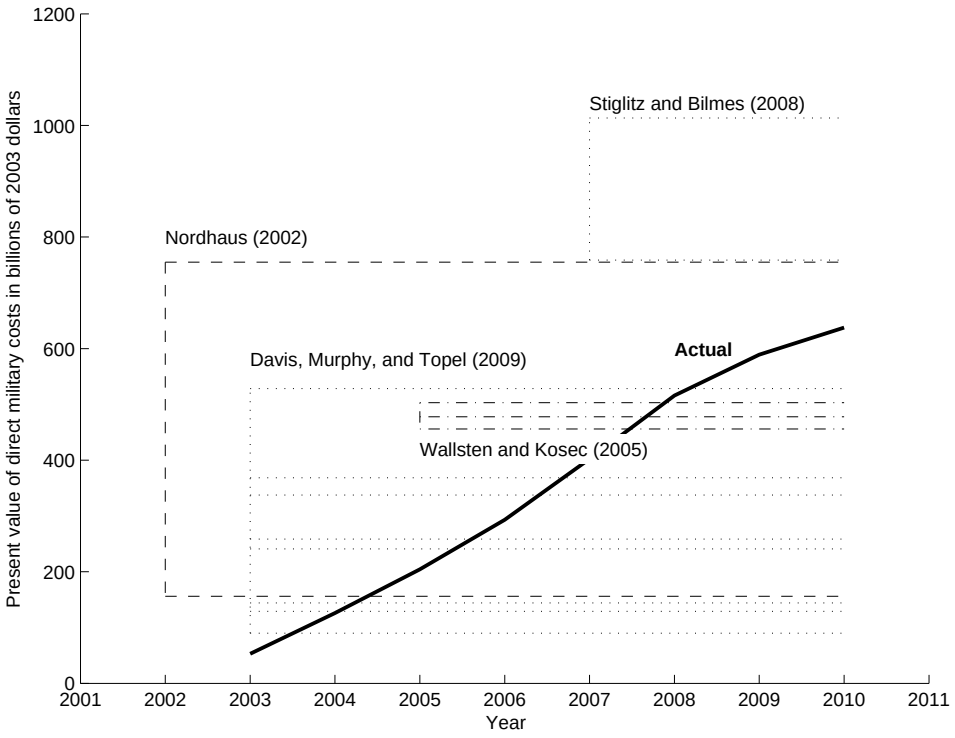
Sources: Data in panels A and B are illustrative and reflect assumptions of steady annual growth in participation and real per capita cost of 3 and 2 percent, respectively. Survivorship data in Panel C are for the 1920 U.S. male birth cohort and are taken from Bell and Miller (2005). Panel D is the product of Panels A, B, and C.

Figure 4: Spending on veterans' benefits by category as shares of GDP



Sources: Budget of the U.S. Government, Fiscal Year 2010. The category labeled "All other payments" includes educational benefits, non-service connected pensions, insurance and burial benefits, and any other payments not otherwise itemized.

Figure 5: Forecasts and realization of total direct military costs in Iraq



Sources: Nordhaus (2002), Davis, Murphy and Topel (2009), Wallsten and Kosec (2005), Stiglitz and Bilmes (2008), and Belasco (2009). The data are forecasts (dashed lines) or the realization (thick black line) of the total present value of direct military costs associated with Operation Iraqi Freedom. All data are in 2003 dollars. Direct military costs consist of those associated with deployment, combat, occupation, reconstruction, and humanitarian assistance. Forecasts of the total present value of costs are plotted as straight lines extending forward from the year they were first released. The actual cumulative present value of direct military costs is constructed from nominal annual flows reported by Belasco (2009) translated into present values in 2003 dollars using the market yield on 10-year U.S. Treasury securities as reported in the Federal Reserve's H.15 release. The actual data are not a forecast; they are the running cumulative spending totals, in 2003 present-value dollars, as of the date shown.