

Arming Costs Humanity More Than War
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Online Appendix

**Calculations of Total War Cost Multipliers for Known Cases:
Iran and Iraq in the Iraq War and the United States in the Afghanistan and Iraq Wars**

We document and explain our calculation of the deaths-to-total-war-cost multipliers for Iran and Iraq in the Iran-Iraq War and for the United States in the Afghanistan and Iraq Wars.

In keeping with the general approach of our paper, where uncertainty arises we resolve it in the direction of maximizing the eventual estimate of the cost of war. By ensuring that our estimated cost of war is likely to be above war's true cost, this reinforces our conclusion that the cost of war is less than that of arming. When calculating the multipliers for these wars, this approach implies resorting to an upper bound on the total cost of the war (since this forms the numerator of the multiplier) and a lower bound on the number of battle deaths (since this forms the denominator of the multiplier). Hence, where there is uncertainty in the number of battle deaths (especially in the Iran-Iraq War), we will take the lowest plausible estimate in order to maximize the resulting multiplier.

Note that we are interested in calculating the total *welfare* loss suffered by each belligerent in these wars, which does not always correspond to the colloquial sense of "cost." In particular, welfare is lost—equivalently, inefficiency or *economic* cost arises—whenever potentially productive resources are diverted to unproductive uses, damaged (in the sense that their productivity is durably reduced), or destroyed (in the sense that their productivity is permanently eliminated). Many costs attributed to these wars by the sources we use are not actually welfare losses, because they simply represent a transfer of productive resources, rather than a loss of those resources. The most important instances of this in these wars relate to oil. Rises in the price of oil due to a war represent a transfer of resources from oil consumers to oil producers. Thus, the increased price of oil arguably attributable to the Iraq War represented a cost to the US economy (and that of any other net oil-consuming country), but not directly to the global economy, as the cost to the US economy is simply transferred as an equal benefit to oil producers. (There are also macroeconomic effects of a change in the price of oil that generate real inefficiency, which we discuss subsequently.). Similarly, loss of oil revenue due to wartime disruption of production and export is a welfare loss only to the extent that the production and export of oil (a productive resource) is delayed until after the wartime disruption ceases. Thus, the disruption of oil industry in Iran and Iraq during their war imposes a delay on the use of their oil, but does not damage or destroy it, so that the welfare loss is only a fraction of the short-term revenue lost. We address these issues as they arise in our discussion of the costs of each war.

Finally, we exclude from our calculations any financing cost of these wars. We will first describe financing costs, and then explain why excluding them only reinforces our conclusion that war costs less than arming. When belligerents spend money on their war efforts or on peacetime arming, they must resort to some combination of increased taxation, borrowing, currency-printing, or diversion from other government expenditures in order to obtain the necessary funds. Each of these has a welfare loss associated with it. Taxation generally distorts the taxed economic activity, leading to inefficient behavior and thus welfare loss. Borrowing requires paying interest or somehow obtaining the funds needed to repay the debt, and may crowd out private investment with higher economic returns. Printing currency results in inflation and devaluation, an implicit tax on holding currency that also generates distortions and welfare loss. And diverting funds from other government expenditures results in the loss of whatever returns those expenditures would have created, such as by providing for education, healthcare, infrastructure, and so on.

The costs of financing war or arming are very real, and sometimes quite large, but they are also proportional to the government spending devoted to each, because the size of this spending determines the amount of funds that must be re-directed to finance the war or arming. If a similar share of both the cost of arming we calculate (which excludes finance costs) and the cost of war we calculate (which excludes finance costs) is made up of government spending, then including the finance costs cannot alter our conclusion about which of the two activities generates more welfare loss: it will simply increase both by the same proportion.

In fact, all of the cost of arming (excluding finance cost) that we calculate is reflected in government spending, because we measure the cost of arming by simply adding up governments' spending on their militaries. However, a sizeable share of the cost of war we calculate is not made up of government spending. Governments generally do not fully compensate those who suffer death or injury in war for the total welfare loss entailed, which means that the cost of war includes some welfare loss that is not reflected in government spending and so does not entail a finance cost.¹ Governments also rely more heavily on conscription and commandeering—in which people and firms are forced into military service rather than being paid enough to induce them to do so voluntarily—in war than in peacetime arming. The more resources diverted to war that are not paid at their market value, the lower government spending is relative to the real welfare loss, and the lower the resulting finance cost.

Because government spending makes up all our calculated cost of arming, but only some of our calculated cost of war, incorporating finance costs would only tip the scale further in favor of the finding that the true cost of arming (including finance costs) exceeds that of war. Our choice to exclude finance costs is thus conservative with respect to our main finding.

¹ The US government, for instance, paid death benefits of only \$500,000 to the surviving families of troops killed in the Afghanistan and Iraq Wars, when their concurrent VSL was more than \$7 million. See Joseph E. Stiglitz and Linda J. Bilmes (2008), *The Three Trillion Dollar War: The True Cost of the Iraq Conflict*, Norton, p. 17.

The Iran-Iraq War

Our calculations of the total-war-cost multipliers for Iran and Iraq in the Iran-Iraq War are drawn primarily from the cost estimates described by Mofid (1990).² In contrast to the sources we use for the US in the Afghanistan and Iraq Wars, Mofid's estimates are not comprehensive because they do not include the cost of the deaths and injuries suffered in war. They also are not adjusted for inflation. We calculate the cost of deaths and injuries for Iran and Iraq using the same methods used in our sources for the US wars, rendering the Iran-Iraq War estimates more comprehensive and ensuring commensurability between these and our estimates for the US wars.

Table 1 displays the values we calculated, based on using the total cost of war either excluding or including the cost of war-induced arming as the numerator, and the VSL of the low estimate of battle deaths from the PRIO Battle Deaths Dataset as the denominator.³ Using the low estimate of battle deaths is conservative since using any higher number would produce a lower multiplier, which would then imply a lower total cost of war over all conflicts.

Table 1: Calculated Values of Multipliers for the Iran-Iraq War

Multipliers calculated for:	Total cost excluding war-induced arming	Total cost including war-induced arming
Iran	$\$2010 \text{ billion} / \$339 \text{ billion} =$ 5.92	$\$2150 \text{ billion} / \$339 \text{ billion} =$ 6.34
Iraq	$\$970 \text{ billion} / \$114 \text{ billion} =$ 8.51	$\$1100 \text{ billion} / \$114 \text{ billion} =$ 9.62
Iran and Iraq aggregated	$\$2980 \text{ billion} / \$453 \text{ billion} =$ 6.58	$\$3250 \text{ billion} / \$453 \text{ billion} =$ 7.17

Iraq:

We first document the precise figures we use from Mofid (1990) for costs other than those of deaths and injuries for Iraq, and our adjustment of these for inflation. Mofid provides a schedule of the estimated non-labor costs to Iraq of the war, including damage to Iraq's infrastructure, loss of gross national product (which includes both the loss of oil revenue and also the effect of any other war-induced disruption of Iraq's economy), the diversion of trade due to attacks on Iraq's ports, and military spending on the war. These costs are computed on

² Kamran Mofid (1990), *The Economic Consequences of the Gulf War*, London and New York: Routledge.

³ This dataset is described in Bethany Lacina and Nils Petter Gleditsch (2005), "Monitoring Trends in Global Combat: A New Dataset of Battle Deaths," *European Journal of Population* 21(3): 145-166. The documentation of the data can be found in Bethany Lacina and Gabriel Uriarte (2009), "The PRIO Battle Deaths Dataset, 1946-2008, Version 3.0: Documentation of Coding Decisions," accessed at <https://www.prio.org/download/datasetfile/10/PRIO%20Battle%20Deaths%20Dataset%203.0%20Documentation.pdf>.

a monthly or annual basis for the course of the war from September 1980 through August 1988, a period of 95 months. Table 2 shows this schedule in billions of current-year US dollars, as well as our conversion of the figures into 2017 US dollars to match the inflation base-year used throughout our paper.

Mofid's total cost figure also includes Iraq's expenditure of foreign reserves during the war, the interest those reserves would have earned had they been left untouched in foreign banks, and the interest that would have been earned had the military spending induced by the war also been invested overseas. We exclude these from our calculations because they represent some of the costs to Iraq of financing its war effort.

Table 2: Annual Non-Labor Costs to Iraq of the Iran-Iraq War in Billions of Current-Year Dollars

Year:	Infra-structure Damage ⁴	Loss to Gross National Product ⁵	Trade Div-ersion ⁶	Total w/o military spending (adjusted to 2017 dollars)	Military Spending on War ⁷	Total w/ military spending (adjusted to 2017 dollars)
1980	2.4	13.9	.15	16.5 (49.1)	0	16.5 (49.1)
1981	9.6	42.9	.6	53.1 (143)	1.3	54.4 (147)
1982	9.6	43.4	.6	53.6 (136)	4	57.6 (146)
1983	9.6	39.4	.6	49.6 (122)	6.6	56.2 (138)
1984	9.6	32.2	.6	42.4 (100.)	10.3	52.7 (124)
1985	9.6	23.2	.6	33.4 (76.1)	9.3	42.7 (97.3)
1986	9.6	15.1	.6	25.3 (56.6)	8.5	33.8 (75.6)
87-88	16	10.3	1	27.3 (58.9)	15.3	42.6 (91.9)
Total				(742)		(869)

Next, we turn to our calculated costs to Iraq of the personnel killed or wounded in battle. Our approach is identical to that used in the Stiglitz and Bilmes assessments of the costs of the Afghanistan and Iraq Wars to the US and therefore aids comparability between the two. To calculate the value of battle deaths, we start with the low estimate of the annual number of battle deaths, drawn from the Battle Deaths Dataset.⁸ We then multiply this number by the VSL for Iraq at the time, which as we explained in the paper is assumed equal to 150 times the contemporaneous gross domestic product per capita of Iraq, taken from the World Bank.

⁴ Mofid (1990, 128) assumes that the damage to Iraq's infrastructure is \$0.8 billion current US dollars per month.

⁵ This is the difference between the bracketed figures in the third and second columns of Table 10.5 (Mofid 1990, 130). The 1987-88 figure comes from the explanation lower on page 130.

⁶ Mofid (1990, 131-2).

⁷ This is the difference between the bracketed figures in the sixth and third columns of Table 10.7 (Mofid 1990, 137). Mofid assumes that the war induced no excess spending in 1980 (presumably, since the war did not start until late that year), and provides a figure for 1987-88 on page 132.

⁸ The documentation of that dataset makes clear how to partition the total annual battle deaths between Iran and Iraq. See Lacina and Uriarte (2009, 315-6).

To calculate the value of non-fatal battle injuries, we first need to estimate their number. We assume it is four times the number of battle deaths. This is equal to the average wounded-to-killed ratio observed in the twentieth century and above the ratio offered in a recent history of the Iran-Iraq War.⁹ The most detailed analysis we could find, which covers only Iran's casualties, found a higher ratio of five to one but based on a lower number of deaths, and offers an upper bound estimate of the number wounded but not killed of 1.1 million, still lower than the 1.2 million non-fatal injuries we assume for Iran based on a 4:1 ratio applied to 300,000 deaths.¹⁰ To value these injuries, we again follow Stiglitz and Bilmes by assuming that each wounded person loses some fraction of their lifetime VSL.¹¹ We assume that the average fraction lost across all those wounded is ¼. This is conservative because it assumes relatively severe injuries: the average wounded person loses a quarter of their lifetime economic productivity.¹² Table 3 shows the results of our calculations.

Table 3: Annual Labor Costs to Iraq of the Iran-Iraq War in Billions of 2017 Dollars

Year:	GDPPC ¹³ (current-year)	GDPPC (2017 dollars)	Deaths ¹⁴ (thousands)	VSL of deaths ¹⁵	Injuries ¹⁶ (thousands)	VSL of injuries ¹⁷	Total
1980	3850.3	11453.71	8.9	15.3	35.6	15.3	30.6
1981	2693.2	7262.46	13.7	14.9	54.8	14.9	29.8
1982	2936.6	7459.27	13.7	15.3	54.8	15.3	30.7
1983	2748	6762.95	13.7	13.9	54.8	13.9	27.8
1984	3090	7289.90	10	10.9	40	10.9	21.9
1985	3113	7091.62	10	10.6	40	10.6	21.3
1986	2970.8	6644.18	10	9.97	40	9.97	19.9
1987	3492.3	7535.50	10	11.3	40	11.3	22.6
1988	3773.4	7818.56	10	11.7	40	11.7	23.5
Total			100	114	400	114	228

⁹ For the century average, see Trevor N. Dupuy (1990), *Attrition: Forecasting Battle Casualties and Equipment Losses in Modern War*, Fairfax, VA: HERO Books. For a more recent military history with a similar ratio for Iraq and lower one for Iran, see Pierre Razoux (2015), *The Iran-Iraq War*, Cambridge, MA: Belknap Press of Harvard University Press, Table 1.1.

¹⁰ H. W. Beuttel (1997), "Iranian Casualties in the Iran-Iraq War: A Reappraisal," *The International TNDM Newsletter* 2(3): 6-17. Accessed at <http://www.dupuyinstitute.org/pdf/v2n3.pdf>.

¹¹ Stiglitz and Bilmes 2008, 97-98.

¹² By comparison, when Stiglitz and Bilmes needed to specify an average fraction lost across casualties suffered by non-US coalition forces in Iraq, they assumed a fraction of only 1/5 (145, fn 39). We would generally expect this fraction to be lower for countries like Iran and Iraq with less advanced medical care, since severe injuries that would be survivable under the US standard of combat medical treatment would be fatal under a lower standard.

¹³ World Bank.

¹⁴ Annual battle deaths data from Lacina and Gleditsch (2005).

¹⁵ Equal to 150 times GDPPC (2017 US dollars) times the number of deaths.

¹⁶ Assumed to be four times the number of deaths.

¹⁷ Assumed equal to 150 times GDPPC (2017 US dollars) times the number of injuries times one-fourth.

Iran:

Next we document the figures we use from Mofid (1990) for costs other than those of deaths and injuries for Iran, and our adjustment of these for inflation. Mofid provides a schedule of the estimated non-labor costs to Iran of the war, including losses reported by Iran's government related to industry, agriculture, energy, telecommunications, housing, and health; the cost of oil given or discounted to Syria in payment for its help in the war; oil discounts given to shippers in order to compensate for the risk of attack; the cost of oil imported for domestic consumption due to the war-induced shortage of domestic oil products; the extra costs of imports due to the loss of port facilities and higher insurance premiums; the loss of oil revenue; and military spending on the war. These costs are computed on a monthly or annual basis for the course of the war from September 1980 through August 1988, a period of 95 months. Table 2 shows this schedule in billions of current-year US dollars, as well as our conversion of the figures into 2017 US dollars to match the inflation base-year used throughout our paper.

Mofid's total cost figure also includes the interest Iran would have earned had its military spending induced by the war been invested overseas. We exclude this from our calculations because it represents one of the costs to Iran of financing the war effort.

Table 4: Annual Non-Labor Costs to Iran of the Iran-Iraq War in Billions of Current-Year Dollars

Year	Iran Gov Estimate ¹⁸	Oil to Syria ¹⁹	Ship per Discount ²⁰	Oil Imports ²¹	Import Redirection ²²	Oil Revenue Lost ²³	Total w/o military spending (2017 dollars)	Military Spending on War ²⁴	Total (2017 dollars)
1980	28.6	0	0	0	.111	2.8	31.5 (93.7)	0	31.5 (93.7)
1981	85.7	0	0	0	.442	5.5	91.6 (247)	8.2	99.8 (269)
1982	44.9	.218	0	2.1	.442	9.0	56.7 (144)	9.8	66.5 (169)
1983	20.4	.254	0	2.1	.442	7.8	31.0 (76.3)	10.4	41.4 (102)
1984	20.4	.246	.509	2.1	.442	14.7	38.4 (90.6)	12.9	51.3 (121)
1985	121	.246	.679	2.1	.442	13.8	138 (314)	6.7	145 (330)
1986	48	.231	.679	2.1	.442	15.3	66.8 (149)	1.6	68.4 (153)
1987	48	.172	.679	2.1	.442	14.7	66.1 (143)	7.9	74.0 (160)

¹⁸ Mofid (1990, 121).

¹⁹ Calculated from items 1 and 2 on pages 121 to 122 of Mofid (1990). He appears to have misplaced a decimal point on the figure of \$11 billion total for oil given to Syria.

²⁰ Assumed to be evenly distributed over April 1984 to August 1988 based on item 3 on page 122 of Mofid (1990).

²¹ Assumed to be evenly distributed from 1982 through 1988 based on item 4 on pages 122-124 of Mofid (1990).

²² Assumed to be evenly distributed over whole war period based on item 5 on pages 124-125 of Mofid (1990).

²³ See pages 126-127 of Mofid (1990).

²⁴ This is the difference between the bracketed figures in the sixth and third columns of Table 10.6 (Mofid 1990, 136). Mofid assumes that the war induced no excess spending in 1980 (presumably, since the war did not start until late that year), and provides a figure for 1987-88 that includes the cost of finance (the returns if the money had instead been invested in US treasuries) on page 125.

1988	32	.097	.453	1.4	.295	0	34.2 (70.9)	0	34.2 (70.9)
Total	449	1.46	3.00	14.0	3.50	83.6	554 (1330)	57.5	612 (1470)

We calculate the cost of Iran's deaths and non-fatal injuries due to the war in the same fashion as we did for Iraq, using the same assumptions and sources described previously.

Table 5: Annual Labor Costs to Iran of the Iran-Iraq War in Billions of 2017 Dollars

Year:	GDPPC (current-year)	GDPPC (2017 dollars)	Deaths (thousands)	VSL of deaths	Injuries (thousands)	VSL of injuries	Total
1980	2441.4	7262.57	26.7	29.1	107	29.1	58.2
1981	2500	6741.47	41.1	41.6	164	41.6	83.2
1982	3008.1	7640.89	41.1	47.1	164	47.1	94.2
1983	3583.3	8818.66	41.1	54.4	164	54.4	109
1984	3568.7	8419.25	30	37.9	120	37.9	75.8
1985	3805.6	8669.41	30	39.0	120	39.0	78.0
1986	4244.7	9493.26	30	42.7	120	42.7	85.4
1987	2617.7	5648.33	30	25.4	120	25.4	50.8
1988	2318.5	4803.98	30	21.6	120	21.6	43.2
Total			300	339	1200	339	678

The United States in the Afghanistan and Iraq Wars

Our calculations of the total-war-cost multipliers for the United States of the Afghanistan and Iraq Wars are drawn primarily from the cost estimates described in Stiglitz and Bilmes (2008) and the publications of the Costs of War Project of the Watson Institute for International and Public Affairs at Brown University.²⁵

We begin by displaying in Table 6 the multipliers we calculated for each war, based on using either the total cost of war excluding or including the cost of war-induced arming as the numerator and the VSL of the US deaths from sources described below as the denominator.

Table 6: Calculated Values of Multipliers for US in Afghanistan and Iraq Wars

Multipliers calculated for:	Total cost excluding war-induced arming	Total cost including war-induced arming
US in Afghanistan War	\$1350 billion / \$28.9 billion = 46.7	\$3040 billion / \$28.9 billion = 105
US in Iraq War	\$2390 billion / \$46.8 billion = 51.1	\$4020 billion / \$46.8 billion = 85.9

²⁵ See <https://watson.brown.edu/costsofwar/>.

US in both wars together	\$3740 billion / \$75.7 billion = 49.4	\$7060 billion / \$75.5 billion = 93.3
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Table 7 displays the costs deriving from US military deaths in each war. However, the US made unprecedented use of contractors to perform functions that in other wars (including US wars before these) were typically performed by uniformed military forces.²⁶ These contractors included armed security forces as well as non-security contractors, both of whom were routinely exposed to combat. Consequently, some were killed; in fact, more contractors were killed in these wars than US troops.²⁷

Although some of the contractors were simply providing auxiliary services, such as building and maintaining facilities for the US military, others were carrying out clear military missions such as guarding bases and providing personal security for officials. One plausible explanation for this new prevalence of military contractors is that the US government substituted contractors for troops in order to avoid the political consequences of deploying troops who may then suffer casualties.²⁸ To better measure the actual level of US casualties in these wars, we therefore include the deaths of these contractors in our totals for the US in these wars. To be conservative, we include only 25.6% of the contractor deaths in Afghanistan and 25.4% of those in Iraq, reflecting the percentage of contractors in each war zone who were US nationals.²⁹ We assume these deaths are distributed over time proportionally to the US military deaths, so that the resulting increase in the VSL of the deaths is also proportional.

Table 7: VSL of US Deaths in Afghanistan and Iraq Wars in Millions of 2017 Dollars

Year:	GDPPC ³⁰ (current-year)	GDPPC (2017 USD)	US Military Deaths in Afghanistan War ³¹	VSL of US Military Deaths ³²	US Military Deaths in Iraq War	VSL of US Military Deaths
2001	37133.6	51425	12	92.6	-	-
2002	37997.8	51773	49	381	-	-

²⁶ See Sean McFate, “America’s Addiction to Mercenaries”, *The Atlantic*, August 12, 2016.

²⁷ See the breakdown of contractor and US military deaths in the major war zones in Neta C. Crawford and Catherine Lutz, “Human Cost of Post-9/11 Wars: Direct War Deaths in Major War Zones”, Watson Institute for International and Public Affairs, September 1, 2021, accessed at https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Costs%20of%20War_Direct%20War%20Deaths_9.1.21.pdf.

²⁸ See Heidi M. Peters, “Department of Defense Contractor and Troops Levels in Afghanistan and Iraq: 2007-2020”, Congressional Research Service, R44116, February 22, 2021, accessed at <https://sgp.fas.org/crs/natsec/R44116.pdf>.

²⁹ These percentages were calculated by the authors as the share of US nationals in the total number of contractors deployed in each war zone, based on the quarterly deployment breakdowns given in Peters (2021).

³⁰ World Bank.

³¹ Annual US military deaths data from iCasualties.org. These figures correspond quite closely with total figures available from the US Department of Defense at <https://www.defense.gov/casualty.pdf>, but are conveniently annualized.

³² Equal to 150 times GDPPC (2017 US dollars) times the number of deaths.

2003	39490.3	52608	48	379	486	3840
2004	41724.6	54143	52	422	849	6900
2005	44123.4	55379	99	822	846	7030
2006	46302	56297	98	828	823	6950
2007	48050.2	56805	117	997	904	7700
2008	48570	55296	155	1290	314	2600
2009	47194.9	53923	317	2560	148	1200
2010	48650.6	54689	498	4090	62	509
2011	50066	54558	415	3400	58	475
2012	51784.4	55286	310	2570	2	16.6
2013	53291.1	56074	128	1080	-	-
2014	55123.8	57076	55	471	4	34.2
2015	56762.7	58703	22	194	8	70.4
2016	57866.7	59099	13	115	20	177
2017	59914.8	59915	15	135	22	198
2018	62805.3	61308	14	129	17	156
2019	65094.8	62412	24	225	12	112
2020	63027.7	59694	11	98.5	11	98.5
2021	69287.5	62678	13	122	-	-
Total			2465	20,400	4586	38,000
Total including contractors			2465 + 1026 ³³ = 3491	28,900	4586 + 1062 ³⁴ = 5648	46,800

Tables 8 and 9 display all the other costs to the US of the Afghanistan and Iraq Wars, respectively. They contain the expenditures listed as Overseas Contingency Operations (OCO) for Afghanistan and Pakistan and Iraq and Syria, respectively, in the budgets of the Departments of Defense and State for each fiscal year. To this is added the war-induced increase in the non-OCO budget due to the need to pay for more recruitment, replace equipment expended in each war, and so on. The next column includes the cost of medical care for veterans, of benefits paid to compensate them for service-connected disabilities, and of the incremental cost of administration deriving from the war-induced increase in the population of veterans receiving these benefits. Finally, we add estimates of the costs suffered by injured veterans and their families that are not fully accounted for in the US government budget expenditures (which arise because the US does not fully compensate these troops for all the costs of their injuries).

Table 8: US Costs of Afghanistan War, other than deaths, in Billions of Current-Year Dollars

³³ The sum of the Afghanistan and Pakistan totals of US contractor deaths, multiplied by .256 to reflect the share of these contractors who were US nationals, from Crawford and Lutz, "Human Cost of Post-9/11 Wars."

³⁴ The sum of the Iraq, Syria/ISIS, and Other columns of US contractor deaths, multiplied by .254 to reflect the share of these contractors who were US nationals, from Crawford and Lutz "Human Cost of Post 9/11 Wars." The footnotes to those columns indicate they should be attributed to the Iraq war zone.

Year:	Funding for Overseas Contingency Operations ³⁵	War-Induced Increase in Budget ³⁶	Veterans' Disability, Medical, and Administration ³⁷	Uncompensated Veterans' Costs ³⁸	Total	Total (2017 USD)
2001	9	4.5			13.5	18.7
2002	14	7			21	28.6
2003	17.6	8.8			26.4	35.2
2004	15.2	7.6			22.8	29.6
2005	20.9	10.5			31.4	39.4
2006	18.8	9.4			28.2	34.3
2007	31.4	15.7		166	213	252
2008	38.8	19.4			58.2	66.3
2009	57.2	28.6			85.8	98.0
2010	107	53.5			161	181
2011	119	59.5			179	195
2012	110	44			154	164
2013	83.7	33.5			117	123
2014	88.1	35.2			123	127
2015	57.8	23.1			80.9	83.4
2016	52.1	20.8			72.9	74.5

³⁵ Drawn from Figure 4, p. 17 of Neta C. Crawford, "The U.S. Budgetary Costs of the Post-9/11 Wars," Watson Institute for International and Public Affairs, September 1, 2021, accessed at https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Costs%20of%20War_U.S.%20Budgetary%20Costs%20of%20Post-9%2011%20Wars_9.1.21.pdf

³⁶ Following the assumptions of footnote 23, p. 7, of Crawford, "The U.S. Budgetary Costs", this is equal to 50% of the Overseas Contingency Operations funding for 2001 to 2011, 40% for 2012 to 2018, 25% for 2019, and 20% for 2020 to 2021.

³⁷ This figure is drawn from Linda J. Bilmes, "The Long-Term Costs of United States Care for Veterans of the Afghanistan and Iraq Wars," Watson Institute for International and Public Affairs, August 18, 2021, accessed at https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Costs%20of%20War_Bilmes_Long-Term%20Costs%20of%20Care%20for%20Vets_Aug%202021.pdf. The upper-bound estimate given there for the total cost of veterans' care for these wars over 2001 to 2050 is \$2,575 trillion in 2020 US dollars. Because the Afghanistan War generated half as many US military deaths as the Iraq War and saw approximately half as many troops deployed on average, we assume it is responsible for one-third of this total. We then adjusted this total to account for the costs owing to US national contractors, which were not included in Bilmes' calculation, who added approximately 41.6% to the US military deaths from the conflict.

³⁸ Stiglitz and Bilmes (2008, 91-113) estimate the net present value of uncompensated costs to current and the projected future injured veterans from both the Afghanistan and Iraq Wars as of 2008 at \$415 billion in 2007 US dollars. We account in Table 7 for the VSL of the troops that died, so subtract this off to obtain a total of \$351 billion, which as with the government-paid costs to veterans we assume is one-third Afghanistan and one-third Iraq. Since their book was published, it has become clear that the total (government-paid and uncompensated) cost to veterans is higher than they anticipated. However, government benefits have also become much more generous, so that fewer of these costs are uncompensated, and our estimate of the government-paid costs is up to date and so accounts for this. We assume the net change in the total uncompensated cost is therefore small, and ignore it. We then adjusted the total to account for US national contractors, in line with the previous footnote.

2017	58.6	23.4			82	82
2018	57.5	23			80.5	78.6
2019	47.8	12			59.8	57.3
2020	49	9.8	1215		1270	1200
2021	37.1	7.42			44.5	40.3
Total						3010

Table 9: US Costs of Iraq War, other than deaths, in Billions of Current-Year Dollars

Year:	Funding for Overseas Contingency Operations ³⁹	War-Induced Increase in Budget ⁴⁰	Veterans' Disability, Medical, and Administration ⁴¹	Uncompensated Veterans' Costs ⁴²	Total	Total (2017 USD)
2003	51	25.5			76.5	102
2004	76.9	38.5			115	149
2005	79.1	39.6			119	149
2006	95.6	47.8			143	174
2007	130	65		288	483	571
2008	143	71.5			215	245
2009	91.8	45.9			138	158
2010	65.3	32.7			98.0	110
2011	47.1	23.6			70.7	77.0
2012	14.7	5.88			20.6	22.0
2013	3.7	1.48			5.18	5.45
2014	4.1	1.64			5.74	5.94
2015	8.4	3.36			11.8	12.2

³⁹ Drawn from Figure 4, p. 17 of Neta C. Crawford, "The U.S. Budgetary Costs of the Post-9/11 Wars," Watson Institute for International and Public Affairs, September 1, 2021, accessed at https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Costs%20of%20War_U.S.%20Budgetary%20Costs%20of%20Post-9%2011%20Wars_9.1.21.pdf

⁴⁰ Following the assumptions of footnote 23, p. 7, of Crawford, "The U.S. Budgetary Costs," this is equal to 50% of the Overseas Contingency Operations funding for 2001 to 2011, 40% for 2012 to 2018, 25% for 2019, and 20% for 2020 to 2021.

⁴¹ This figure is drawn from Linda J. Bilmes, "The Long-Term Costs of United States Care for Veterans of the Afghanistan and Iraq Wars," Watson Institute for International and Public Affairs, August 18, 2021, accessed at https://watson.brown.edu/costsofwar/files/cow/imce/papers/2021/Costs%20of%20War_Bilmes_Long-Term%20Costs%20of%20Care%20for%20Vets_Aug%202021.pdf. The upper-bound estimate given there for the total cost of veterans' care for these wars over 2001 to 2050 is \$2,575 trillion in 2020 US dollars. Because the Iraq War generated about twice as many US military deaths as the Afghanistan War and saw approximately twice as many troops deployed on average, we assume it is responsible for two-thirds of this total. We then adjusted this total to account for the costs owing to US national contractors, which were not included in Bilmes' calculation, who added approximately 23.2% to the US military deaths from the conflict.

⁴² See footnote 36: two-thirds of the Afghanistan plus Iraq figure of \$351 billion in 2007 US dollars is \$234 billion, adjusted for contractors in line with the previous footnote.

2016	11.6	4.64			16.2	16.6
2017	26.3	10.5			36.8	36.8
2018	23	9.2			32.2	31.4
2019	17.4	4.35			21.8	20.9
2020	37.6	7.52	2110		2160	2050
2021	30.3	6.06			36.4	32.9
Total						3970

We exclude three costs that our sources reported for the US wars in Afghanistan and Iraq. First, both Stiglitz and Bilmes and the Costs of War Project include figures for the interest the US government must pay on the debt it incurred in order to fund the Afghanistan and Iraq Wars. This is part of the cost of financing those wars, and so is excluded along with all other finance costs.

Second, the Costs of War Project includes the counterterrorism budget of the Department of Homeland Security in its total budgetary cost for what it collectively terms the “Post-9/11 Wars”, but not in its individual breakdowns of the costs of the Afghanistan and Iraq Wars. We therefore exclude the DHS budget from our totals.⁴³

The last item we exclude is Stiglitz’s and Bilmes’s estimate of the cost of the increase in the price of oil due to the US invasion of Iraq, and the knock-on effects of that price change on the economies of the US and other oil-importing countries.⁴⁴ At the time of their writing (2007), the disruption to the oil market was still ongoing, Iraq’s production of oil was still well below its level immediately before the war, and it seemed clear that the war had been responsible for a substantial increase in the oil price that would be sustained for years. Stiglitz and Bilmes took the reasonable approach of attributing some of the change in the oil price to the war, estimated the direct cost of this as well as the indirect cost of the higher oil price on aggregate demand, and argued that these should be included in the total cost of the war.

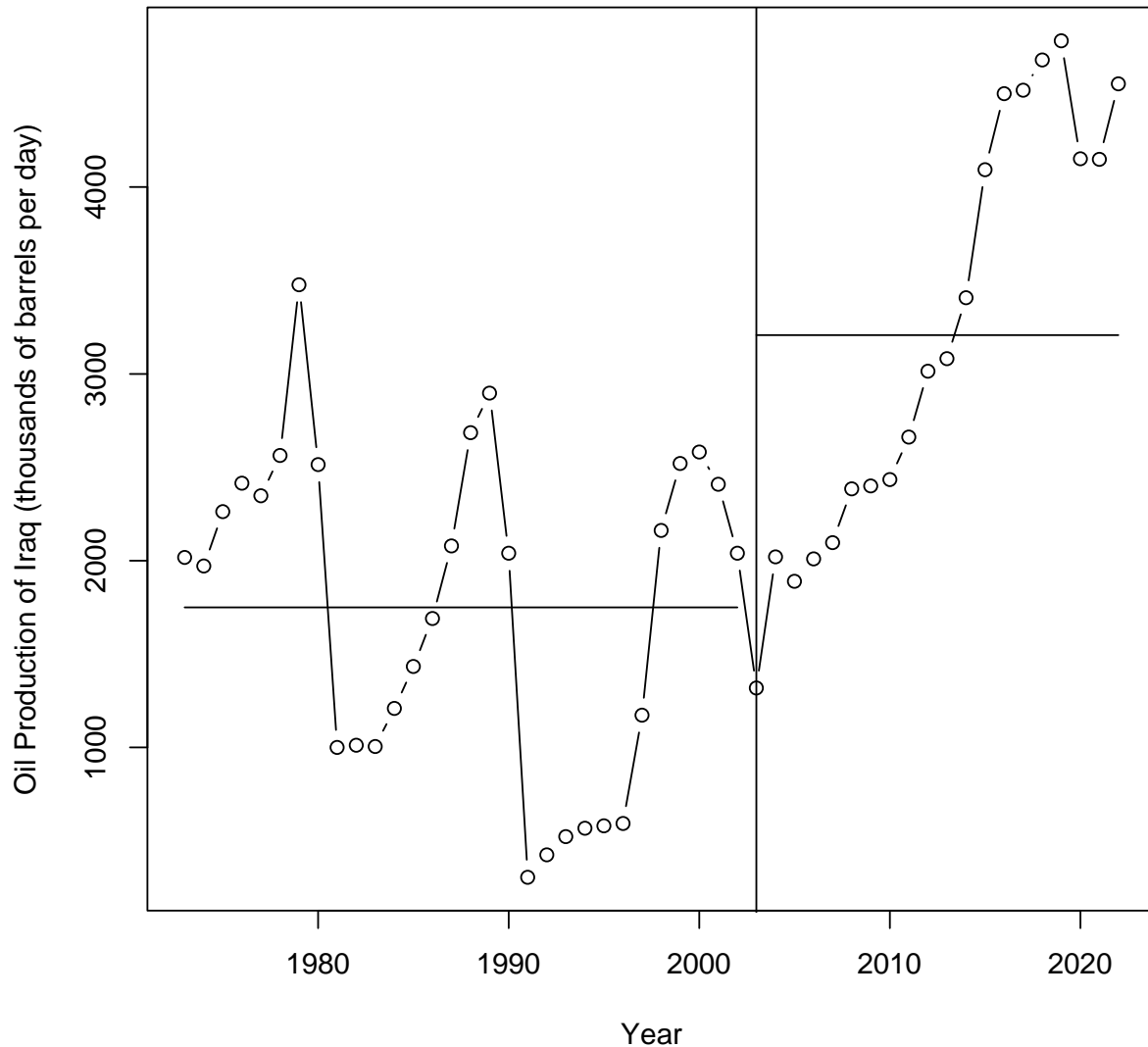
However, from the perspective of 2023, the overall effect of the war on the oil market looks positive, not negative. First, Iraq’s oil production not only recovered from its nadir in 2003, but quickly rose and remained higher than it had ever previously been, and was also much less volatile than it had been before the invasion. Figure 1 shows Iraq’s annual production for each year from 1973 (just after Iraq nationalized its oilfields) to 2022, with data from the US Energy Information Administration.⁴⁵ The vertical line marks the invasion in 2003, and the horizontal

⁴³ For the inclusion of the DHS counterterrorism spending, see Crawford, “The U.S. Budgetary Costs.” For the exclusion of this item from war-specific cost estimates, see Neta C. Crawford, “Blood and Treasure: United States Budgetary Costs and Human Costs of 20 Years of War in Iraq and Syria, 2003-2023”, Watson Institute for International and Public Affairs, March 15, 2023, accessed at <https://watson.brown.edu/costsofwar/files/cow/imce/papers/2023/Costs%20of%2020%20Years%20of%20Iraq%20War%20Crawford%2015%20March%202023%20final%203.21.2023.pdf>.

⁴⁴ See Stiglitz and Bilmes (2008), 114-120, 156-159, 216-229.

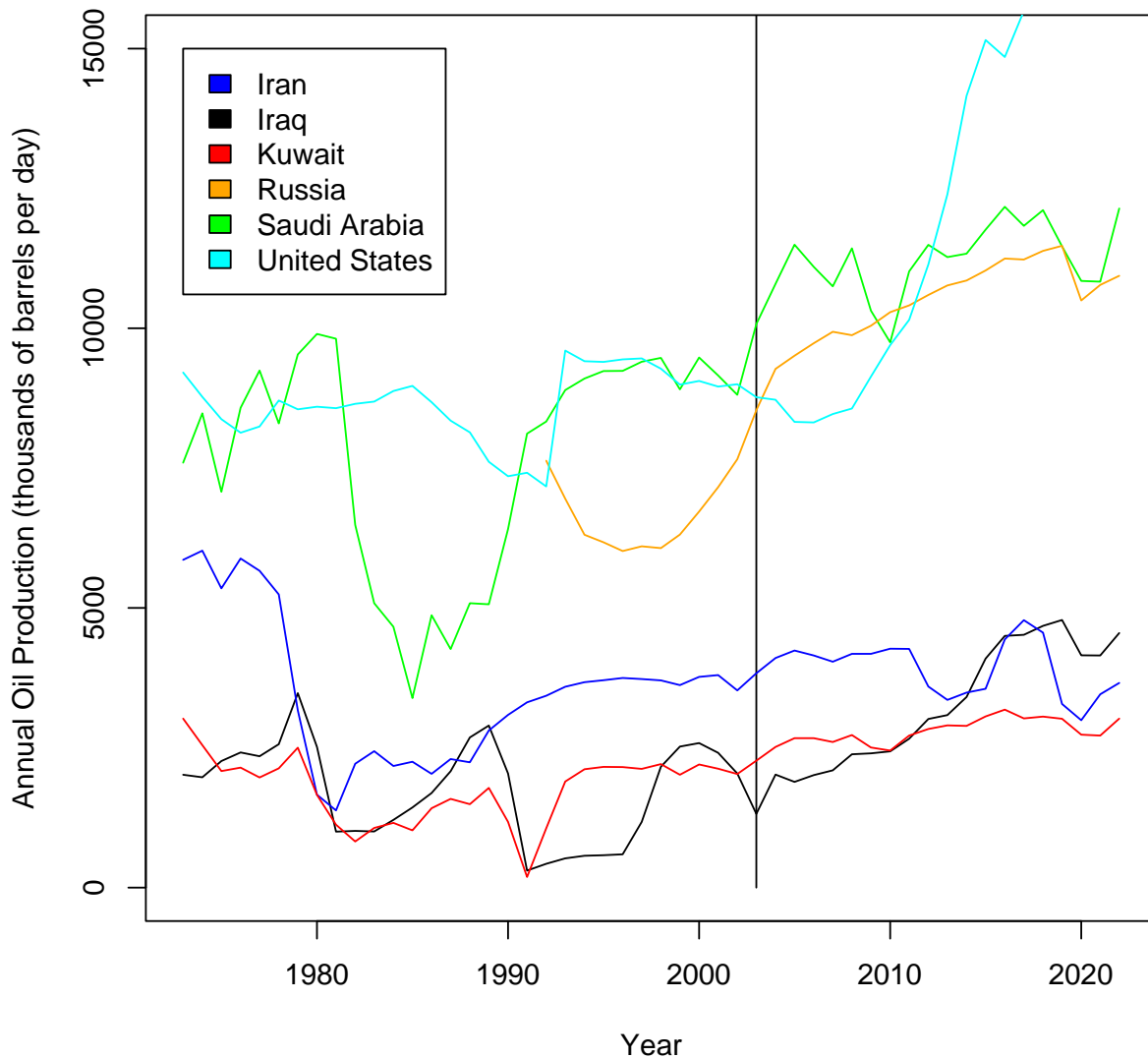
⁴⁵ The data can be accessed at <https://www.eia.gov/international/data/world>.

lines are the average annual production levels for the pre- and post-invasion periods. Iraq's average annual oil production increased by 83% after the invasion. Indeed, the post-invasion average exceeded all but one of the pre-invasion yearly totals. Moreover, until the COVID pandemic of 2020, Iraq's production rose steadily almost every single year after the invasion, rather than experiencing huge swings as it did before the invasion.



The large improvement in the volume and stability of Iraq's oil production cannot be explained entirely by global changes in the oil market. Other major oil producers such as Iran, Kuwait, Russia, Saudi Arabia, and the United States all had higher average production in the post-invasion period, but ranging only from 11% to 57% increases compared to Iraq's 83%. And Iran, Kuwait, and Saudi Arabia all experienced more volatility than Iraq from 2003, defined as

number of instances of multiple consecutive years of falling production, as can be seen in Figure 2.



The long-run improvement in the volume and stability of oil production in Iraq, one of the world's largest producers, is clearly good for oil-importing economies and for the global economy overall. But how much of this can be attributed to the war? Contemporary analysts of US policy toward Iraq commonly noted two plausible alternatives to invasion, which could be thought of as counterfactuals to the war: continued containment, involving sanctions and occasional uses of force against Iraq; or deterrence, meaning the end of sanctions on Iraq and the likely revival of its military and perhaps also its programs to develop weapons of mass

destruction.⁴⁶ Under containment in the 1990s, Iraq suffered its worst decade of oil production and also started a war with Kuwait, seriously disrupting the oil market and causing a drop of production in Kuwait. Under something like a US policy of deterrence toward Iraq in the 1980s, Iraq had its second-worst decade of oil production and also started a war with Iran, seriously disrupting the oil market and causing a drop of production in Iran. It therefore seems most plausible to attribute much of the improvement in Iraq's oil production after the 2003 US invasion to the concomitant regime change and pacification of Iraq's external relations.

Finally, with the benefit of hindsight, it is not at all clear how much of the oil price increase observed leading up to and soon after the US invasion of Iraq can be attributed to it. From early 2002 to its peak in 2008 (when Stiglitz's and Bilmes's book was published), the price of oil nearly quintupled in real terms. Stiglitz and Bilmes attributed a modest portion of this rise to the invasion. However, Iraq's annual production consistently exceeded its pre-invasion average from 2004 onward; the fighting in Iraq died down after the 2007 surge of US troops; and US troops withdrew altogether in 2011 with a stable government in place. Yet the price of oil continued to skyrocket through 2004, 2005, 2006, 2007, and into 2008. Despite a dip during the Great Recession, it averaged roughly four times the (inflation-adjusted) price of early 2002 from 2008 into 2014. The fact that the oil price kept right on rising even after Iraq's production grew to new heights and its political situation stabilized, and remained high long after the war had ended, suggests the war did not have much to do with the price change. Indeed, oil market analysts surely expected the US invasion of Iraq to result in the end of sanctions, increased production and export of oil, and a stabler market due to the establishment of a less aggressive regime, all of which would tend to *lower*, not raise, the price of oil.

We therefore do not include Stiglitz's and Bilmes's assessed cost of the war due to oil effects in our total cost of war.

⁴⁶ See, as examples, Kenneth M. Pollack (2002), *The Threatening Storm: The Case for Invading Iraq*, New York: Random House and Richard N. Haass (2009), *War of Necessity, War of Choice: A Memoir of Two Iraq Wars*, New York: Simon & Schuster.