Commentary

Title:

"Not Taxes, but the Other Thing"

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November 2020

The most precious asset that any person has on this Earth is the finite amount of time they have to live. If for any reason their life is cut short, it is a cost for the individual which is beyond measure.[1] It is a tragedy when someone dies early and misses the opportunity to enjoy life events, such as the wedding of a grandchild.

Much of economic analysis is based upon comparing costs and benefits of different outcomes, so it is useful to attempt to put the costs of lives lost from different events into perspective. In these ongoing times of the Coronavirus Pandemic, it seems only natural to focus on the death toll from Covid-19. In early September of this year, many people took to social media to compare the loss of life in the United States from Covid-19 relative to the 9/11 terrorist attacks of 2001. Consider the following two Twitter posts by academics Paul Krugman (economics professor at the City University of New York and recipient of the 2008 Nobel Prize in Economics) and Laurence Tribe (professor of law at Harvard University):

- Krugman (9/11/20): "So it's 9/11. Hard to remember now how large the terrorist attack loomed in our national psyche; after all, in death toll Covid-19 is already the equivalent of 60 9/11s."[2]
- Tribe (9/10/20): "Tomorrow – 9/11/20 – is the 19th anniversary of the worst day in memory, a day on which 3,000 innocent Americans died needlessly. But Donald J. Trump is directly responsible for at least FORTY TIMES that many avoidable deaths from Covid-19. It's the biggest crime of our lives."[3]

I'm going to set aside the opinion that I think it is despicable and disrespectful to make any sort of comparison that begins to diminish the loss of life from the 9/11 attacks on an anniversary of the 9/11 terrorist attacks.

I also don't think it is reasonable to simply compare the number of lives lost for these two different events, since the attacks of 9/11 were deliberately planned and perpetrated by terrorists with malicious intent to kill innocent people. Contrary to the vile and disgusting suggestion by Laurence Tribe, I don't feel that President Trump is "directly responsible" for "many avoidable deaths from Covid-19." With the hindsight of less than half a year, I do think that there are numerous examples of suggested behaviors and legal restrictions that were put in place by federal, state, and local elected officials in response to Covid-19 which did not effectively slow the spread of the disease and, in fact, inflicted suffering (in terms of health, well-being, and economic conditions) on large segments of society. But I in no way think that President Trump or Governor Cuomo (New York) or Governor Wolf (Pennsylvania) or Governor DeSantis (Florida) clearly intended for their actions (or inactions) to cause more overall harm than good. Consequently, I don't believe that it is reasonable to even suggest that any elected official is responsible for deaths from Covid-19 in the way that the villains who perpetrated the 9/11 terrorist attacks are culpable for the deaths of thousands of innocent people as a direct result of their deliberate actions.

But, in terms of simple loss of life, do the numbers put forth by Paul Krugman and Laurence Tribe paint an accurate and meaningful assessment of these two tragic events? I am writing this about six weeks after their Tweets, so the number of deaths in the U.S. by people who were positive

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[1] Do recognize, however, that while actually dying leads to a cost that an individual would likely be willing to do anything to avoid, people take actions every day that increase their own probability of dying in order to realize relatively small benefits. I just drove to Walmart to buy some groceries, an action which drastically increased the likelihood that I would die this morning, compared to staying home and getting more work done.

[2] https://twitter.com/paulkrugman/status/1304385095047032832?lang=en.

[3] https://twitter.com/tribelaw/status/1304199626292105216.

for Covid-19 is now even higher. As of October 21, 2020, there have been 207,882 deaths in the United States involving Covid-19 as defined by the Centers for Disease Control and Prevention.[4] For comparison, the Federal Bureau of Investigation's Uniform Crime Reporting Program identifies a total of 3,047 murder victims from the 9/11 terrorist attacks.[5] The former figure is over 68 times larger than the latter figure. However, I don't think that this is a reasonable to claim that the total life lost or the costs of lives lost from Covid-19 is more than 60 times that of 9/11.

Let's start by considering some simpler and cleaner made-up examples. If I were told that "Event A" and "Event B" each caused 10 people to die and was asked which one is more costly in terms of lives lost, without any additional information I would say that they are equally costly. But if I were given the additional information that the 10 people who died because of "Event A" were each 9 years old and the 10 people who died because of "Event B" were each 90 years old, I would clearly say that more life was lost (and therefore – all else equal – there were greater costs from lives lost) from "Event A" than from "Event B." This is simply because when people who are not newborns die, they are not losing a full lifetime of life. The expected remaining lifespan for people of different ages is different, and in most cases younger people can expect to have more remaining years of life than older people.

In the United States in 2017 (the most recent year for which projections are available), a 9 year old could expect to live an additional 70.2 years, whereas a 90 year old could expect to live an additional 4.5 years. In expectation, we see that "Event A" results in the loss of 702 years of expected life, while "Event B" results in the loss of 45 years of expected life. Life expectancy at birth in the United States in 2017 was 78.6 years, so in terms of "full lives lost" it is as if "Event A" results in the equivalent of $702 \div 78.6 \approx 8.93$ "full lives lost" and "Event B" results in the equivalent of $45 \div 78.6 \approx 0.57$ "full lives lost."

Should one view the death of a 9 year old as more tragic and more costly than the death of a 90 year old? Yes. It is horrible if a 90 year old dies prematurely and misses the wedding of her grandchild. But it is much more horrible if a 9 year old dies and misses: the rest of his childhood, his own wedding, the birth of his own children, all the events of his children's childhoods, his children's weddings, the birth of his grandchildren, and finally the wedding of his grandchild.

Is the death of a 9 year old exactly 15.6 times worse or more costly (which is what a simple ratio of 70.2 to 4.5 would suggest) than the death of a 90 year old? I don't know. But to me 15.6 times more costly seems much more likely to be in the ballpark than equally costly.

Recognize that this approach values any expected year of life equally, regardless of how old the person who loses the year of life happens to be.[6] Again, I am not claiming that this is the only reasonable way to assess the costs of lost life, but it seems much more appropriate than implicitly assuming that any life cut short is equally costly (regardless of the person's expected remaining lifespan) or attempting to place different "weights" on different expected years of life lost for different people. As a consequence, the amount of "life lost" from an event will depend upon both the number of people who have their life cut short and the age profile of those who have

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[4] See https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm.

[5] See https://ucr.fbi.gov/crime-in-the-u.s/2001/01sec5.pdf (page 302).

[6] The approach being taken here is somewhat similar to the calculation of "value of a statistical life" that is commonly discussed when formulating public policy. However, that calculation involves attempting to attach a dollar value computed as a maximum willingness to pay by a typical person to reduce the probability of death. In contrast, I am not attempting to weight years of life lost by dollars, but simply valuing an expected year of life as an expected year of life.

their life cut short. Under this approach, has the Coronavirus Pandemic resulted in more life lost in the United States than the 9/11 terrorist attacks and, if so, how much more life has been lost?

Let's start by looking at the age profiles of people who have died with Coronavirus and from the 9/11 terrorist attacks. The first two columns in Tables 1 and 2 respectively report the number of deaths in the United States within different age ranges related to Covid-19 (through October 21, 2020) and the 9/11 terrorist attacks.[7] We can see that the age profile (and therefore remaining life expectancy) of people who died with Covid-19 differs considerably from the victims of 9/11 by computing "Cumulative Deaths by Age" and "Cumulative Percentage of Deaths by Age" for each group. For example, looking at Table 2 we see that 470 victims of 9/11 were age 29 or younger – which accounts for 15.4% of victims of the terrorist attacks. The median age of 9/11 victims was in the age range of "35 to 39 years." In contrast, from Table 1 we see that the median age of those who died with Covid-19 was somewhere in the range of "75 to 84 years." Comparisons of the "Cumulative Percentage of Deaths by Age" figures in Tables 1 and 2 further reveal that while more than half of the people who have died with Covid-19 were over the age of 74, less than 1% of the victims of 9/11 were in this same age group.

Figure 1 provides a visual depiction of the age profiles of 9/11 victims (blue curve) and people have died with Covid-19 (red curve), by plotting the figures for "Cumulative Percentage of Deaths by Age" from Tables 1 and 2.[8] The fact that the red curve is so far below the blue curve reinforces that the age profile of 9/11 victims in much younger than that of people who died with Covid-19. The steepness of the blue curve in the middle age ranges (collectively, ages 29 to 59) reveals that the 9/11 attacks killed primarily people in this age demographic. Similarly, the increasing steepness of the red curve at the far right of the graph is a consequence of Covid-19 deaths being disproportionately concentrated among the oldest members of society.

To further understand how these curves summarize the age profile of a set of people who have died from a specific cause, consider motor vehicle accident deaths in the United States in 2018, as summarized in Table 3.[9] The green curve in Figure 1 provides a visual depiction of "Cumulative Percentage of Deaths by Age" from motor vehicle accidents. We can see that deaths from automobile accidents are much more evenly distributed across the entire age range by observing the values in the "# Motor Vehicle Deaths" column or the "Cumulative Percentage of Deaths by Age" column in Table 3. Similarly, the spread of motor vehicle accident deaths over all age ranges is revealed by the fact that the green curve in Figure 2 has a relatively constant slope.

Within Tables 1, 2, and 3 the column labelled "Remaining Life Expectancy" reports the number of years that someone in the middle of the corresponding age range could expect to live.[10]

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[7] Figures in Table 1 are from https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm, and figures in Table 2 are from https://ucr.fbi.gov/crime-in-the-u.s/2001/01sec5.pdf (page 304). There were 34 victims of the 9/11 terrorist attacks with an age listed as "unknown." In Table 2, these individuals were included in the category of age "35 to 39" (which is both the modal age category of victims and the age category of the victim of median age).

[8] Ignore the green curve for now. When plotting these curves, it was assumed that the age of the oldest person who died in each group (which, given the available aggregate data, is not known) was 95 years.

[9] Figures in Table 3 are from https://www.iihs.org/topics/fatality-statistics/detail/yearly-snapshot. 2018 is the most recent year for which this data is available. As was the case with 9/11 deaths, some of the victims of automobile accidents were of "unknown age." These 132 people have been added to the "40 to 44" age range (which was the age category of the victim of median age).

[10] For motor vehicle deaths and Covid-19, use figures from 2017 (the most recent year with estimates available) from https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_07-508.pdf (pages 10-11). For the 9/11 terrorist attacks, use figures from 2001 from https://www.cdc.gov/nchs/data/nvsr/nvsr52/nvsr52_14.pdf (pages 7-8). In

As already noted, the amount of total life lost also depends upon the number of people who have their life cut short because of an event. We can determine total life lost by weighting the average amount of life lost per victim within each age range by the number of victims within each age range. For example, the 3 people between the ages of 17 and 19 who lost their lives on 9/11 collectively lost an expected 180 years of life. The column labelled "Total Years Lost for Group" reports the value from this computation for each age range of people in each group of victims. We can simply add these values together to arrive at a value of total years of life lost from each event.

The 207,882 people who died with Covid-19 as of October 21, 2020 collectively lost 2,782,203 years of expected life.[11] Consequently, the average number of expected years of life lost for each person that died with Covid-19 is roughly 13.4 years. As expected – due to the differences in age profiles – the average number of expected years of life lost for each victim of the 9/11 terrorist attacks was a considerably longer 39.3 years (the corresponding figure for people who died in motor vehicle accidents was 37.6 years). Since life expectancy at birth in 2017 (the most recent year for which estimates are available) was 78.6 years, on average the typical person who died with Covid-19 lost 17.0% of a lifetime. In contrast, the typical person murdered on 9/11 (when life expectancy at birth was 77.2 years) lost a little over half of a lifetime (50.9%).

Finally, we can express these figures in terms of "Equivalent Whole Lives Lost" by dividing total years of expected life lost by life expectancy at birth. Performing this calculation for each group reveals that automobile accidents resulted in the loss of 17,485 equivalent whole lives in 2018. Similarly, the equivalent number of whole lives lost from the 9/11 terrorist attacks was 1,552 and from Covid-19 (as of October 21, 2020) is 35,397. In terms of life lost, the ongoing Coronavirus pandemic has not been 68 times worse than 9/11, but rather about 23 times worse.

It has been said that the only two certainties in life are death and taxes – unfortunately, neither of these is desirable. But when making decisions, the goal should not be to avoid costs at all cost. Instead, good individual decision making and good public policy requires a balancing of properly measured benefits and costs. This includes a levelheaded assessment of costs associated with losses of life. No reasonable person would observe the 17,485 equivalent whole lives lost from motor vehicle use in 2018 and think that a blanket ban on cars is good policy.

When making decisions, individuals should assess the expected costs and benefits of their actions (including, for example, the increased likelihood of death from driving to Walmart). Likewise, good public policy decisions should be based upon sensible measures of costs and benefits. The point isn't that an event that is 23 times worse than 9/11 in terms of lost life is not costly – rather, the point is that incorrectly thinking it is 68 times worse would make us think these costs are three times larger than they are, which could clearly bias reasonable assessments of policies.

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each table, the "Remaining Life Expectancy" for the upper age group (which is not bounded at the top) was set equal to the expected length of remaining life for the median person who was in the corresponding age range

[11] This is likely an overstatement of the lost years of expected life from Covid-19, since many of the people who died with Covid-19 had comorbidities which would make their individual expectation of remaining life lower than what was estimated by the CDC in the report linked above.

Table 1 – Covid-19 Deaths in U.S. (as of October 21, 2020)

Age Range	# Covid-19 Deaths	Cumulative Deaths by Age	Cumulative Percentage of Deaths by Age	Remaining Life Expectancy (2017 data)	Total Years Lost for Group
0	25	25	0.0120%	78.6	1,965
1 to 4	15	40	0.0192%	76.6	1,149
5 to 14	39	79	0.0380%	69.7	2,718
15 to 24	383	462	0.2222%	59.85	22,923
25 to 34	1,628	2,090	1.0%	50.45	82,133
35 to 44	4,206	6,296	3.0%	41.15	173,077
45 to 54	11,093	17,389	8.4%	32.05	355,531
55 to 64	26,525	43,914	21.1%	23.7	628,643
65 to 74	45,015	88,929	42.8%	16.05	722,491
75 to 84	55,089	144,018	69.3%	9.5	523,346
85 and older	63,864	207,882	100%	4.2	268,229
TOTAL	207,882				2,782,203
				Average Years Lost Per Victim =	13.4
				Percentage of Life Lost Per Victim =	17.0%
				Equivalent Whole Lives Lost =	35,397

Table 2 – 9/11 Terrorist Attack Deaths

Age Range	# Terrorist Attack Deaths	Cumulative Deaths by Age	Cumulative Percentage of Deaths by Age	Remaining Life Expectancy (2001 data)	Total Years Lost for Group
0	0	0	0%	77.2	0
1 to 4	5	5	0.1641%	75.25	376
5 to 8	1	6	0.1969%	71.3	71
9 to 12	3	9	0.2954%	67.4	202
13 to 16	0	9	0.2954%	63.4	0
17 to 19	3	12	0.3938%	60	180
20 to 24	117	129	4.2%	56.2	6,575
25 to 29	341	470	15.4%	51.5	17,562
30 to 34	503	973	31.9%	46.7	23,490
35 to 39	612	1,585	52.0%	42	25,704
40 to 44	510	2,095	68.8%	37.4	19,074
45 to 49	369	2,464	80.9%	32.9	12,140
50 to 54	272	2,736	89.8%	28.5	7,752
55 to 59	177	2,913	95.6%	24.3	4,301
60 to 64	79	2,992	98.2%	20.3	1,604
65 to 69	29	3,021	99.1%	16.7	484
70 to 74	15	3,036	99.6%	13.3	200
75 and older	11	3,047	100%	5.8	64
TOTAL	3,047				119,779
				Average Years Lost Per Victim =	39.3
				Percentage of Life Lost Per Victim =	50.9%
				Equivalent Whole Lives Lost =	1,552

Table 3 – Motor Vehicle Deaths in U.S. in 2018

Age Range	# Motor Vehicle Deaths	Cumulative Deaths by Age	Cumulative Percentage of Deaths by Age	Remaining Life Expectancy (2017 data)	Total Years Lost for Group
0 to 12	880	880	2.4%	73.1	64,328
13 to 15	316	1,196	3.3%	65.2	20,603
16 to 19	2,160	3,356	9.2%	61.8	133,488
20 to 24	3,927	7,283	19.9%	57.5	225,803
25 to 29	3,688	10,971	30.0%	52.8	194,726
30 to 34	3,045	14,016	38.3%	48.1	146,465
35 to 39	2,690	16,706	45.7%	43.5	117,015
40 to 44	2,431	19,137	52.3%	38.9	94,566
45 to 49	2,548	21,685	59.3%	34.3	87,396
50 to 54	2,588	24,273	66.4%	29.9	77,381
55 to 59	2,889	27,162	74.3%	25.7	74,247
60 to 64	2,491	29,653	81.1%	21.7	54,055
65 to 69	1,934	31,587	86.4%	17.9	34,619
70 to 74	1,579	33,166	90.7%	14.3	22,580
75 to 79	1,304	34,470	94.3%	11	14,344
80 to 84	1,002	35,472	97.0%	8.1	8,116
85 and older	1,088	36,560	100%	4.2	4,570
TOTAL	36,560				1,374,301
				Average Years Lost Per Victim =	37.6
				Percentage of Life Lost Per Victim =	47.8%
				Equivalent Whole Lives Lost =	17,485

Figure 1 – Cumulative Percentage of Deaths by Age for Covid-19, 9/11 Terrorist Attacks, and Motor Vehicle Accidents