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Abstract

A seminal paper by Hamermesh and Soss modeled suicide as a rational economic decision based on a comparison of the financial costs and benefits of staying alive. Their model is fundamentally flawed and their prediction that suicide rates increase with age is wrong.

Keywords: suicides, health, depression, economic sociology

JEL: I12, I120, Z13

It is Time to Kill the Economic Theory of Suicide

In 1974 Hamermesh and Soss (HS) authored a seminal paper titled "An Economic Theory of Suicide," which applied a model of rational behavior to the seemingly irrational decision to commit suicide. Over the years, HS has been cited by dozens of researchers studying suicides; for example, Yang, Lester, and Yang (1992), Marcotte, (2003), Andrés (2006), Jalles and Andresen (2015), Mann, and Metts (2017), Hasegawa, et al. (2018).

HS has even made it into the mainstream media, including a *Freakonomics Radio* episode (Dubner 2016) about the rationality of suicide. Steven Levitt, the economist who co-authored *Freakonomics*, won the 2003 John Bates Clark Medal, which is given to the leading American economist under the age of 40 and is often a precursor to a Nobel Prize. Stephen Dubner, Levitt's *Freakonomics* co-author, hosts the *Freakonomics Radio* show and presumably goes over the content, at least briefly, with Levitt.

On this episode, Dubner stated that,

> *Dan Hamermesh did what economists do. He wrote a model to determine the conditions under which suicide might be considered a rational choice. He came up with three predictions. Suicide, one, rises with age; two, falls as income increases; and three, falls if your "desire to live" is high. Nothing so radical, but at the time, no one had tried anything like this.*
>
> *Then, Hamermesh plugged some suicide data from the World Health Organization into his model. His predictions were right.*

I will argue here that the HS theory is deeply flawed and one of its two main predictions is, in fact, contradicted by the data.

Hamermesh and Soss

Back in the 1970s, when Hamermesh and Soss wrote their suicide paper, economists were overly fond of mathematically tractable models in which completely rational people are certain of the consequences of their actions and make decisions that maximize their utility.

We now know, thanks to the seminal work of Kahneman and Tversky (1982, 2000), among others, that people are not fully rational. Humans make systematic mistakes—like anchoring and the base-rate fallacy. We also now know that decisions are shaped by the fact that we live in a world often defined by imperfect and asymmetric information; for example, Stiglitz (1974), Stiglitz and Rothschild (1976). People are not completely rational and do not have perfect information.

In the HS model, people are assumed to have perfect information about their futures and make completely rational decisions. Specifically, individuals calculate the annual utility they will derive from the prospective financial costs and benefits each year that they will live. These costs and benefits depend on their age, permanent income (essentially their average annual income over their lifetime), and the cost of staying alive. The only non-economic consideration is a person's "a taste for living," which is a constant "defined for the cohort at birth." When the present value of a person's discounted utility stream falls below zero, she makes the rational decision to kill herself.

HS assume that as an individual ages, the cost of staying alive "at some minimal level of subsistence" increases, while the discounted value of permanent income over one's remaining life expectancy falls, so that every year brings one closer to the breaking point. The model's main predictions are that suicide rates increase with age and are inversely related to permanent

income.

Theoretical Issues

The HS model is obviously incomplete in that it does not explain observed differences in suicide rates by race and gender, nor does it explain why suicide rates are higher in developed countries than in less-developed countries and why there are suicides in wealthy households. However, there are even deeper, more fundamental problems with the model.

There is a grain of truth in the observation that some people, especially among the elderly, find themselves in situations that are expensive, miserable and hopeless. Bed-ridden and wracked by pain, they might decide that their quality of life is not worth the expense born by their families to keep them alive.

But these are not the typical suicides. In California, for example, the median suicide age is 46 years old for white females and 41 years old for white males. How could an unemotional cost-benefit analysis possibly lead to a rational decision by someone in their 20s or 30s to make an irreversible decision to end one's life? We can think of anecdotal cases, but surely these are not typical. A model that cannot explain young suicides is clearly flawed, almost surely because it attempts to impose a rational framework on what is generally an extremely emotional and often impulsive decision—motivated, for example, by jealousy, hatred, humiliation, depression, confusion, or substance abuse.

One flaw in the HS theory is the assumption that the suicide decision depends on a person's discounted value of future annual utility, with no consideration of the sequence in which those utilities are received. Suppose that a 30-year-old male is looking forward to 50 years of positive utility followed by 10 years of misery so extreme that the present value of lifetime utility is

negative. It is not rational, as the HS model assumes, for this person to commit suicide now because he will be miserable 50 years from now. A fully rational calculation of annual utility over one's lifetime and the optimal time to commit suicide is far more complex than the HS model and much too complicated for ordinary people to determine, particularly for young people with decades of uncertainty ahead of them.

A second flaw is the assumption that the future is known with certainty. The future is almost always uncertain in that our lives may go in many different directions, with some paths much happier than others. People in their 20s do not know whether they will marry and who they will marry (or, if married, whether they will divorce and possibly remarry), how many children they will have, what their occupations will be, where they will live, how their investments will turn out, how their health will hold up as they age. As their lives evolve, the number of possible paths diminishes, but there will continue to be considerable uncertainty about what the future holds. Few people can say with certainty whether they will be better or worse off 10, 20, or 30 years from now than they are today.

A third flaw is the assumption that the costs and benefits of staying alive are fixed. People can make choices that affect their lives throughout their lives. A decision to commit suicide is irreversible; so it is not rational to cut off one's options before seeing how one's life evolves. This argument is particularly compelling for the young, who can often make decisions that improve their quality of life—find new jobs, hobbies, spouses, lovers, and other friends. It is far more rational to change one's life than to end one's life. A young person would have to be wretched beyond hope for it to be rational to decide that dying is unambiguously preferable to living, with all the changes that are possible and all the options that are available. Young suicides

must be overwhelmingly irrational.

A fourth flaw involves aggregation issues. Even if it were true that an individual's expected lifetime utility marches inexorably towards suicidally low levels as one ages, the elderly do not necessarily have the highest suicide rates. There is survivor bias in that some of the people who are the most likely to commit suicide when they are old do so before they get old. Even if the inclination for an individual to commit suicide increases as one ages, the number of people who are on the margin may decline as some commit suicide. Those who do live long enough to become elderly may be unusually happy or resilient, and have low suicide rates. For an extreme example, suppose that every suicidal person's life stops being worth living at age 70. There will then be fewer suicides past 70 than at 70.

A fifth flaw in the HS theory is the assumption that the cost of staying alive universally increases as one ages. This may be true for people who need expensive medical treatments, but, for many people, the cost of living declines after the mortgage is paid off and the children leave home. The Golden Years may be wishful thinking for some people, but it is a reality for others. There is, in fact, evidence, that despite physical impairments, the elderly are, overall, the happiest age group (for example, Cornwell, Laumann, and Schumm 2008, Yang 2008). One study (Thomas et al. 2016) of adults between the ages of 20 and 100 concluded that mental health increased linearly with age, with people between the ages of 20 and 30 having the highest levels of stress, depression, and anxiety, and the elderly having the greatest satisfaction with life. These data may well be tainted by survivor bias, but they do demonstrate that we should not necessarily assume as do HS, that the elderly are the most miserable and the most tempted to commit suicide.

Empirical Issues

The HS model predicts that suicide rates increase with age. They look at male suicide rates for 1965-1967 in 21 developed countries, with ages divided into six categories: 15-24, 25-34, 35-44, 45-54, 55-64, and 65-74. They find that the suicide rate rises monotonically with age category in nine countries and that, in eight other countries, the suicide rate increases monotonically, but peaks at age 55-64. They conclude that, "While the evidence presented in this table is by no means conclusive, it does suggest that within a country there is a general tendency for suicide rates to rise with age."

These data neglect females completely and males over the age of 74. In addition, the grouping of suicides into six age brackets conceals some interesting details.

The State of California's Department of Finance (1998, 2009, 2012) has compiled intercensal estimates of the state's annual population by race, gender, and age (from 0 to 100 years old) going back to 1970. The California Department of Health Services (1970-2004) has granted me access to a mortality data base that identifies each decedent's gender, race, date of birth, date of death, and cause of death for the years 1970-2004.

I used these data to calculate the number of suicides and the suicide rate during this time period by gender, race, and age. I calculated suicide rates for whites since this is the only race with enough meaningful data, and combining all races might introduce confounding factors as California's racial population has changed over time.

As noted earlier, the median suicide age is 46 for white females and 41 for white males, which is a serious challenge to the HS model in which suicide rates increase with age.

Figure 1 shows the suicide rates by age, for white Californians who died during the years

1970-2004. The drop in suicide rates for both elderly males and females may well reflect the survivor bias mentioned earlier and reverses the conclusion HS reached when they looked at data that end at age 74. The decline in male suicide rates between the ages of 25 and 65 also contradicts the HS model and the HS data, which may have been muddled by the use of 10-year age brackets. Female suicide rates are also inconsistent with the HS model, rising gradually between the ages of 16 and 50 and then declining after the age of 50.

These detailed data on suicide rates for white males and females are overwhelmingly inconsistent with the HS model's prediction that suicide rates increase monotonically with age.

Discussion

Keynes (1936, 161-162) wrote of investment and consumer spending:

> *[A] large proportion of our positive activities depend on spontaneous optimism rather than mathematical expectations, whether moral or hedonistic or economic. Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits—a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities.*

The same is no doubt true of our decisions to do something negative, including the extreme of taking one's own life. Some human decisions are not well modeled as a dispassionate comparison of the mathematical expectation of quantifiable costs and benefits. Sometimes, people make frankly inexplicable decisions driven by blissful ignorance, unbridled passion, or unjustifiable fears—what Keynes called animal spirits. The fact that people often regret their behavior is compelling evidence that their choices were more emotional than rational and that the

consequences were not taken into account fully. Unfortunately, the consequences of committing suicide cannot be undone.

The attempt to model suicide as a rational decision based on an enumeration of the financial costs and benefits of staying alive is an unconvincing attempt to explain the inexplicable, a modeling exercise that can undermine the credibility of worthwhile economic analyses.

May 14, 2019

Conflict of Interest Declaration

The author declares that he has no conflict of interest.

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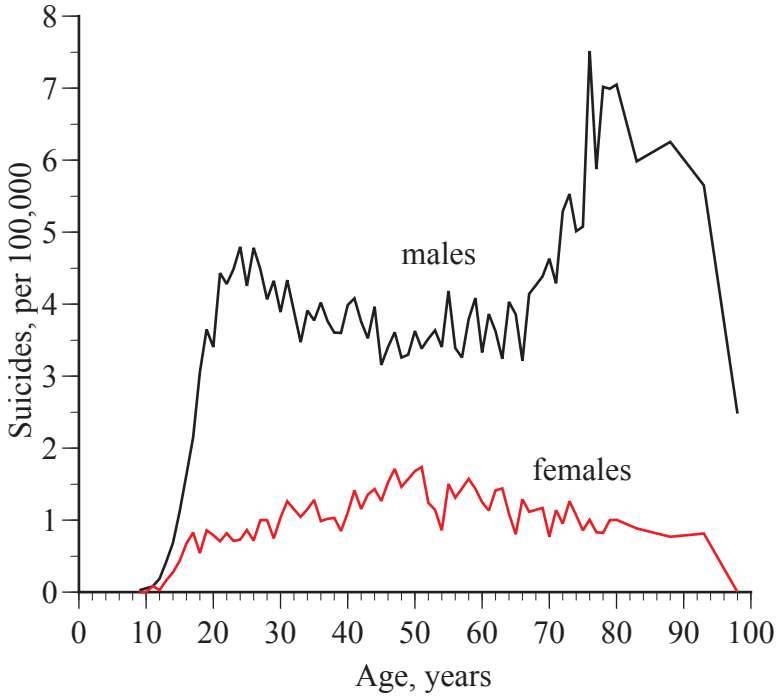

Figure 1, Suicide Rate by Age, White Californians, 1970-2004