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Winning the H-1B Visa Lottery Boosts the Fortunes of Startups

The opportunity to hire specialized foreign workers gives startups a leg up over their competitors who do not obtain visas for desired employees. High-skilled foreign labor boosts a firm's chance of obtaining venture capital funding, of successfully going public or being acquired, and of making innovative breakthroughs.

Those are among the findings of **Give Me Your Tired, Your Poor, Your High-Skilled Labor: H-1B Lottery Outcomes and Entrepreneurial Success** (NBER Working Paper 26392) by [Stephen G. Dimmock](#), [Jiekun Huang](#), and [Scott J. Weisbenner](#).

US firms access the pool of high-skill foreign workers through the H-1B visa system. Each fiscal year, the federal government issues a fixed number of these visas to for-profit firms. An H-1B visa is valid for three years, and is renewable once for another three years. Opponents of this program argue that foreign workers displace American workers; proponents counter that the US has a shortage of high-skilled labor and that foreign workers fill the gap, spurring investment and innovation by domestic firms.

The researchers surveyed nearly 1,900 startups, most of which were in high technology fields and therefore

Young firms that employ high-skilled foreign workers are more likely to attract high-reputation venture capital and win more patents and citations.

highly dependent on human capital. The study looked at fiscal years 2008, 2009, 2014, and 2015, when H-1B visas were allocated to employers by lottery because demand exceeded the federal cap. Nearly half of the companies in the sample

were in California, 10 percent were in Massachusetts, and 9 percent were in New York. Before participating in the lottery, all the firms had completed at least one round of external financing and none had gone public.

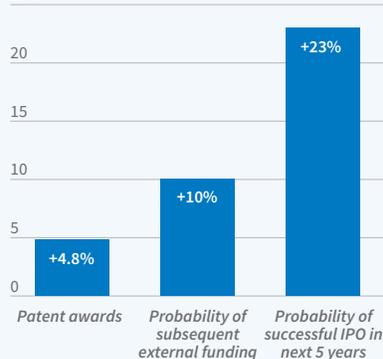
Nearly 60 percent of the firms sampled sought just one visa; only 7 percent applied for five or more. A firm's success in obtaining visas was measured by its "win rate," measured as the number of approved visas as a percentage of the number of applications. The average win rate in the sample was 55 percent. For the large number of firms that applied for just one visa, the win rate by construction was either 100 or zero percent.

The study found that a higher win rate in the H-1B visa lottery was associated with an increase in the likelihood of obtaining external funding. For example, firms with a win rate of 100 percent subsequently received funding in the next three years 49 percent of the time, compared with 41 percent for those with a win rate of zero.

Lottery winners were also more likely to receive funding from high-repu-

H1-B Visa Lottery Success and Firm Performance

Outcome due to a 1-standard deviation increase in H1-B visa lottery wins
25%



Source: Researchers' calculations using data from the US Citizenship and Immigration Services, the Department of Labor, Crunchbase, and the United States Patent and Trademark Office

tation venture capitalists. Association with an elite VC often comes with greater access to expertise, resources and business networks. Winners also received a higher number of patents and patent citations.

The study also considered whether firms later conducted an initial public offer-

ing or were acquired for at least \$25 million (in inflation-adjusted 2008 dollars) — both indicators of a “successful exit” during the post-lottery period. Over a five-year period, a one standard deviation increase in the win rate was associated with a 20 percent increase in the probability of a successful

exit, relative to the baseline exit rate.

While the researchers focused on startups, they point out that their findings could have economy-wide implications since some of today’s successful startups are tomorrow’s large employers.

— Steve Maas

How Have China’s Retaliatory Tariffs Affected US Consumption?

Agriculturally dependent counties in Iowa, which once sold soybeans and pork to China, have experienced greater impact from the US-China trade war than service dependent counties near New York City. How did retaliatory tariffs affect local economic activity?

In **The Consumption Response to Trade Shocks: Evidence from the US-China Trade War** (NBER Working Paper 26353), [Michael E. Waugh](#) finds that changes in trade policy affected consumer spending on durable goods, notably automobiles. He concludes that Chinese retaliation against US tariffs led to concentrated welfare losses.

The study finds that counties highly exposed to trade with China experienced a decline in new car sales relative to counties with little export activity that was directed to China. The relative drop in consumption between 2017 and January 2019 was at least 3.8 percent, and could be as high as 5.5 percent. New car sales are a proxy for overall consumption; they have the advantages of being high frequency — they’re

reported monthly — and being available by county.

The impact of the trade war can be seen starting in July 2018, when China

Formal statistical analysis confirms these findings and suggests that a 1 percentage point increase in exposure to Chinese retaliatory tariffs results in a 1 percent-

Between 2017 and early 2019, counties highly exposed to retaliatory tariffs saw consumption growth drop by at least 3.8 percentage points relative to low-impact counties.

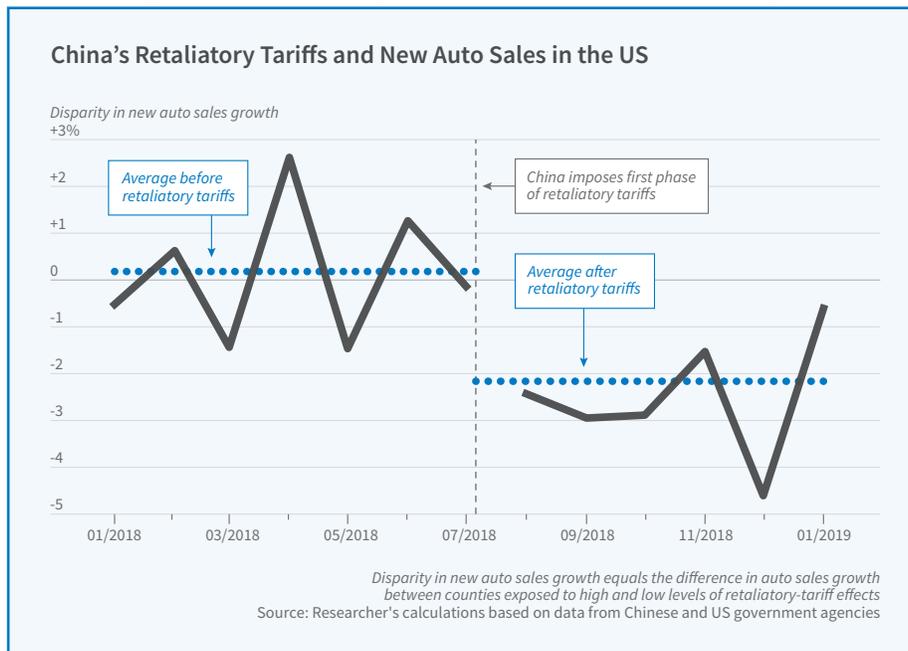
imposed the first of three phases of retaliatory tariffs on US goods. Before that time, auto sales were growing a little over 1 percent a year in both high-tariff and low-tariff counties. After July 2018, sales growth fell in counties of both types, but they fell 2.7 percent in high-tariff counties and 0.5 percent in low-tariff ones.

age point decrease in the growth of sales of new autos.

A drop in car sales can have a significant impact on consumption. On average, the top quartile of trade war-vulnerable counties saw 82 fewer cars sold per year as a result of retaliatory tariffs. If the average new car in 2017 sold for \$36,000,

then the aggregate loss for those counties equaled about \$2.3 billion. The loss when “moderately affected” counties are included is much larger — \$9.3 billion — because there are many more such counties than heavily affected ones.

The estimates probably represent a lower bound of impact, the researcher writes, because a decline in the number of autos



sold doesn't capture other belt-tightening behaviors, such as a shift to purchasing less expensive vehicles.

The study also considers the effects of retaliatory tariffs on employment. A

county with high exposure to exports to China saw, on average, a 1 percentage point decline in overall employment relative to a low-tariff county. For goods-producing jobs, the fall is greater: about 1.5

percentage points. These results support the finding of consumption decline, since employment loss could be one channel to consumption decline.

— *Laurent Belsie*

Credit Booms Forecast Sub-Par Performance of Equities

Rapid growth in credit, which has been linked to slower economic growth and even economic downturns, is also a predictor of below-average equity returns. In **The Leverage Factor: Credit Cycles and Asset Returns** (NBER Working Paper 26435), [Josh Davis](#) and [Alan M. Taylor](#) study returns in 14 advanced economies over the period 1870 to 2015. They conclude that credit booms are followed, on average, by unusually low returns to equities, both in absolute terms and relative to bonds.

The researchers focus on the lagged three-year change in the ratio of total bank loans to GDP in each country as their measure of credit availability, and they grade each year, for each country, as high or low based on this metric. They measure stock returns using a broad-based stock index for each country, and they compute bond returns using returns on bonds with roughly 10 years to maturity.

In the postwar era, the researchers find, the average return to stocks in their sample of countries was 8.9 percent. When lagged growth in the credit-to-GDP ratio was below the median — that is, in periods without credit booms — the return averaged 11.6 percent. But when the credit growth ratio was high, returns the following year aver-

aged only 6.8 percent. When the postwar data are pooled with the earlier historical data, the results point to the same conclusion: Credit booms are associated with

Adding the controls does not eliminate the predictive power of the backward-looking credit growth variable.

To test how useful this finding could

Market leverage has historically predicted one-year-ahead stock returns better than measures of stock market momentum, and almost as well as measures of value.

lower stock returns. Credit booms are also associated with lower absolute returns on bonds, but the effects are much smaller than those for stock returns.

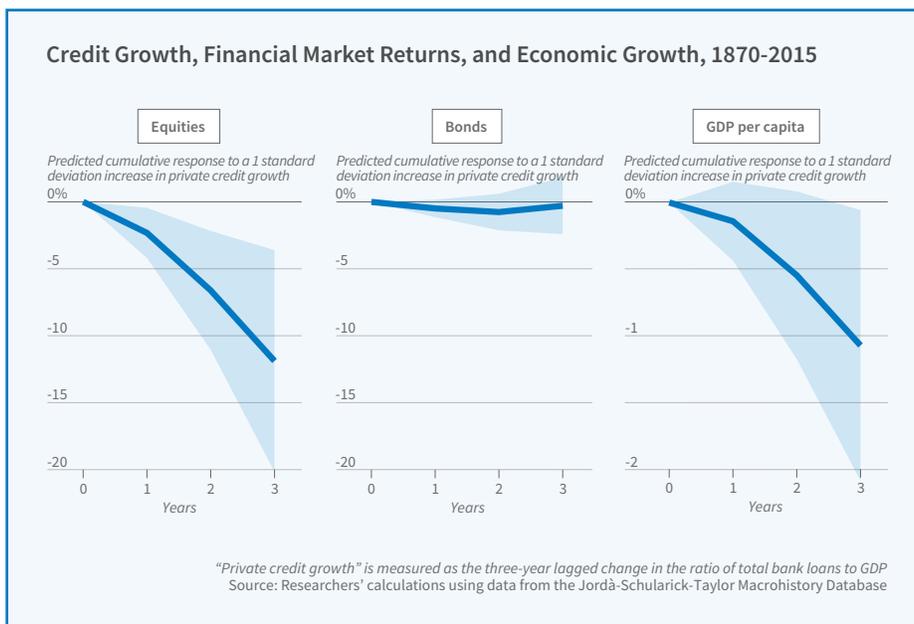
The researchers test the robustness of their results by controlling for other

be for stockholders, the researchers built model portfolios for each country using the postwar data. They varied the portfolio allocation between stocks and bonds depending on the leverage measure and the other predictive measures they considered.

They found that the Sharpe ratio — the ratio of the average additional return associated with adjusting portfolio weights to the additional risk generated by this strategy — for the leverage factor alone was 0.78, better than the analogous measure of 0.70 for momentum but not quite as high as 0.82 for value. A portfolio adjustment rule that uses all three variables — credit

booms, momentum, and value — generates a Sharpe ratio of 0.94. The researchers conclude that credit growth signals can be a useful input for a tactical asset allocation strategy.

— *Laurent Belsie*



variables that may predict stock returns, such as market momentum — a measure of whether recent stock returns have been positive — and value, the ratio of stock prices to determinants of fundamental value such as dividends or earnings.

State-Level Estate Taxes Spur Some Billionaires to Move

While death and some taxes may be certain, US state-level estate taxes can be avoided by moving to one of the 36 states that do not collect them. Some very wealthy individuals do just that. In **Taxing Billionaires: Estate Taxes and the Geographical Location of the Ultra-Wealthy** (NBER Working Paper 26387) Enrico Moretti and Daniel J. Wilson attempt to quantify how state estate taxes affect the residential choices of the very rich, and to estimate whether, when states increase their estate tax rates, the increased revenues collected from those who remain in the state exceed the revenues lost as some well-to-do citizens move away. They use data from the Forbes 400 list of the richest Americans to study the location choices of the very rich.

The impact of state-level estate taxes on the total taxes paid by the estates of wealthy decedents changed significantly in 2001 as a result of new tax legislation. Prior to that year, the federal estate tax included a credit for state estate tax payments. This credit offset virtually all state estate tax payments for very high net worth individuals, making these taxpayers' state of residence largely irrelevant for their total estate tax payments. The researchers point out that because the asset threshold for state and federal estate taxes can differ, even before 2001, individuals with enough wealth to pay state estate taxes, but who were not ultra-wealthy,

could face tax differences linked to their state of residence. But these differences were largely irrelevant for the ultra-rich, with wealth many times greater than the taxable threshold.

Some billionaires seek low-tax states, but raising state estate taxes is still likely to raise total revenue collections in most states.

After 2001, taxpayers became fully liable for state estate taxes. These taxes can be substantial: the researchers estimate that the average state with an estate tax collects \$165 million in incremental revenue in the three years following the death of a Forbes 400 member who lived in the state.

From 2001 to 2017, the number of

an estate tax moved to a state with one. The authors estimate that as a result of cross-state moves, \$80.7 billion in wealth was no longer subject to state estate taxes by 2010.

When designing tax policy, states face a trade-off between the one-time revenue gain from levying an estate tax on taxpayers who die and the ongoing revenue loss of foregone income tax revenues when high net worth taxpayers leave the state to prospectively avoid estate taxes. Using the very common state estate tax rate of 16 percent and assuming that high net

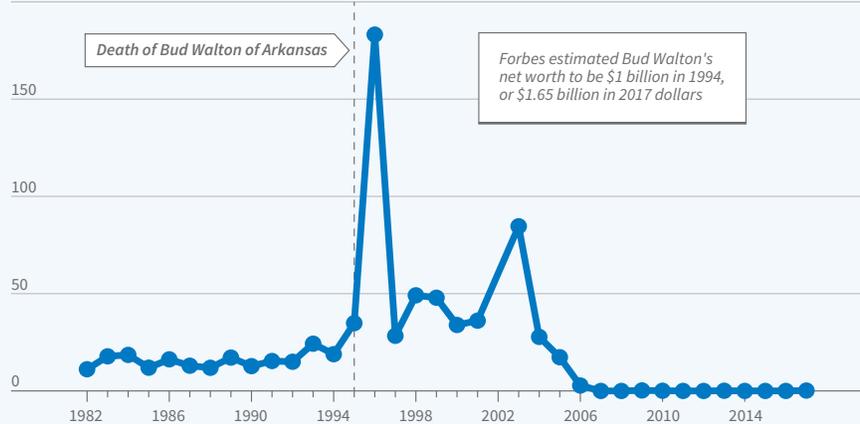
worth taxpayers generally are as mobile across states as the Forbes 400 group, the researchers estimate that the revenues collected from existing state estate taxes exceed the present discounted value of the lost income tax revenues in all states except those with the highest personal income tax rates, notably Hawaii, Minnesota, Oregon, and Vermont. They also calculate that among states without current estate tax, imposing one would

lose more revenue than it would raise in California, Idaho, Nebraska, and New Jersey. If high net worth taxpayers are only half as mobile as the billionaires studied, every state would collect more from state estate taxes than movers would cost it in lost income taxes.

—Linda Gorman

Impact of Billionaire Death on State Estate-Tax Revenues

Arkansas estate-tax revenues (millions of 2017 dollars)



Source: Researchers' calculations using data from Forbes

individuals in the Forbes 400 who lived in states that levied estate taxes fell by 35 percent. Between 2001 and 2010, 21.4 percent of the 376 people on the Forbes list for whom residence and age were available in 2001 moved from a state with an estate tax to one without one. Only 1.2 percent of those living in a state without

Regulatory Changes, Private Equity Markets, and the Decline of IPOs

The National Securities Markets Improvement Act (NSMIA), passed in 1996, has facilitated startups' access to out-of-state private capital by exempting eligible private issuers from complying with the different state securities regulations—known as blue sky laws—in the various states in which their investors are located. By amending the Investment Company Act of 1940 registration requirements, the new law has also made it easier for private funds investing in startups to raise large amounts of capital. Prior to NSMIA, venture capital (VC) and private equity (PE) funds could raise capital from no more than 100 investors if they wanted to avoid having to register as public investment companies and be regulated like mutual funds. NSMIA has made it possible for such funds to raise capital from an unlimited number of investors and still avoid registration if all their investors are “qualified purchasers” — individuals owning at least \$5 million in investments or institutions owning at least \$25 million.

In **The Deregulation of the Private Equity Markets and the Decline in IPOs** (NBER Working Paper 26317), Michael

Ewens and Joan Farre-Mensa suggest that NSMIA-induced changes in regulation have played a significant role in changing the going-public versus staying-private trade-off, helping bring about a new equilibrium in which fewer startups go public and those that do go public are older. Their sample includes all US-based startups listed in the VentureSource venture capital database that raised their first round of private funding between 1992 and 2016. Although VC-backed firms make up less than 1 per-

cent of all privately held firms in the United States, from 1990 to 2016 they accounted for an estimated 42 percent of all US IPOs.

The study finds that NSMIA has

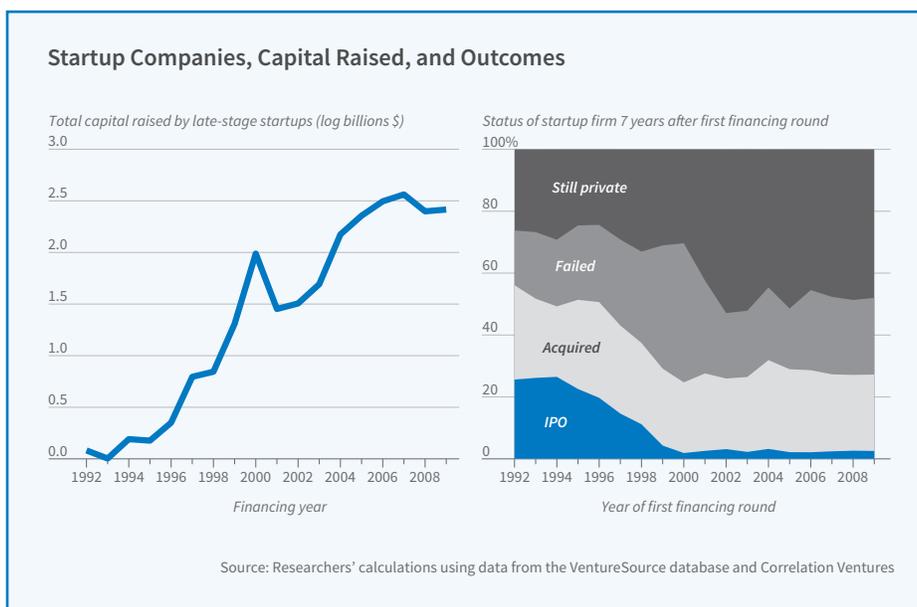
Twenty-six percent of firms first financed in 1994, before a 1996 law that boosted private equity markets, went public through an IPO. Of those first financed in 2000, only 2 to 3 percent did.

increased the ability of late-stage startups — traditional IPO candidates — to raise large sums of private capital, including from out-of-state investors, and enabled VC and PE firms investing in mature startups to raise larger funds. The effects have been strongest in states that had not voluntarily coordinated their blue sky laws prior to the pas-

than doubled from 11 percent for those that raised their first round in 1992 to 26 percent for those that did so in 2006. At the same time, IPO rates have fallen dramatically. Of

companies first financed in 1994, 26 percent went public through an IPO; for those first financed in 2000 or later, the IPO rate has been between 2 and 3 percent. Those firms that still go public tend to be older, with the median number of years from first VC financing to IPO increasing from about four years to seven years over the sample period.

The researchers find that startups whose founders hold a higher equity share are more likely to remain private longer. They point out that there is a tension between the interests of the founders, who prefer to avoid the loss of control and additional regulatory burden associated with going public, and the interests of VC investors, who seek an IPO or acquisition as a way of cashing out of their early-stage



sage of NSMIA. As markets have adapted to the post-NSMIA regulatory environment, the supply of private capital has expanded. In 1995, private startups that were at least four years old raised \$1.3 billion. In 2015 they raised \$33 billion, with over three-quarters of this capital coming from non-traditional startup investors such as private equity funds, mutual funds, and hedge funds.

The researchers show that the fraction of VC-backed startups that were still private 10 years after their first financing more

investments.

The researchers point out that the influx of private capital has potentially reduced retail investors' access to some of the fastest growing US companies. An increasing number of “the largest and most successful firms in the US economy are private. They are not subject to public disclosure requirements, and are not in the portfolios of ordinary stock-market investors, including those invested in index funds.”

—Linda Gorman

Tracing the War on Terror's Impact on Opioid Abuse

The opioid epidemic of recent years has hit military veterans especially hard. Almost 70,000 veterans were treated for opioid use disorders in 2016. Opioid-related mortality, abuse, and overdose rates are all significantly higher among veterans. In a new paper, **Did the War on Terror Ignite an Opioid Epidemic?** (NBER Working Paper 26264), Resul Cesur, Joseph J. Sabia, and W. David Bradford exploit variation in how the armed forces assign units to overseas deployments to assess how combat service affects veterans' opioid use.

The researchers explore three pathways through which deployment to a combat zone could lead to opioid use. First, injuries sustained during the War on Terror may have resulted in legitimate prescriptions for painkillers. Second, the psychological trauma of warfare may have caused some veterans to seek out opioids to self-medicate. Finally, deployment could have exposed service members to new supplies of low-cost opioids, with long-lasting consequences.

The study finds evidence supporting the first two channels. Veterans exposed to combat are 7 percentage points more likely to abuse prescription painkillers than veterans who were not

deployed to a combat zone. This effect is also found for veterans wounded in combat, a pattern consistent with the theory that legitimate opioid prescriptions for wartime injuries can lead to addiction, but the effect is also

Veterans assigned to an overseas combat zone are more likely to abuse opioids, regardless of whether they were exposed to combat during their deployment.

observed for those who were not wounded. In addition, service members exposed to traumatic battlefield experiences are also more likely to abuse opioids, even if they were not injured. Although the third potential mechanism could not be tested with the data at hand, the researchers note that these findings "suggest that addiction may not occur only via one's own physical injuries, but also through psychological, peer-

related, or low-cost supply channels."

Approximately one-third of the relationship between combat exposure and opioid abuse is attributable to war injuries, while the balance is attributable to the psychologi-

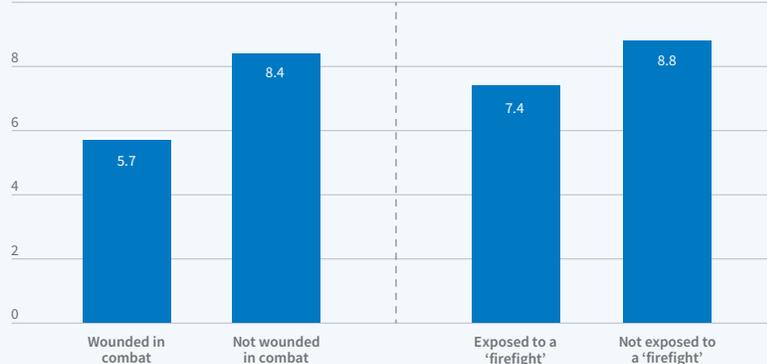
cal trauma of witnessing wartime casualties. The two factors also appear to interact: the effect of combat exposure on opioid abuse is greater among veterans who are suffering from post-traumatic stress disorder.

The rate of opioid-related mortality among veterans increased by nearly 50 percent from 2000 to 2016, from 14.5 to 21 persons per 100,000. In fiscal year 2016, roughly 68,000 veterans were treated for opioid addiction. The researchers estimate that the Department of Veterans Affairs is spending over \$1 billion annually on health-care costs associated with prescription painkiller abuse that resulted from combat exposure during the War on Terror. Another \$470 million is spent on treating heroin use. The researchers note that these figures correspond to the lower bound estimate of the effect of combat on opioid-related health ailments.

—Dwyer Gunn

Combat-Zone Deployment and Prescription Pain Reliever Abuse

Percentage point increase in the probability of pain reliever abuse among service persons, relative to non-combat-zone deployments



Source: Researchers' calculations using data from the National Longitudinal Study of Adolescent and Adult Health

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