# Affirmative Case

### Advantage 1: Fast Growth

#### Plan solves that the U.S. is not admitting enough permanent skilled immigrants --- this threatens nearly every sector of the economy --- domestic STEM education can’t effectively meet demand despite previous efforts

Kennedy, 6/6/18 --- senior vice president for operations and government affairs, Pittsburgh Technology Council (Brian, “Viewpoint: The need for a common sense immigration strategy,” <https://www.bizjournals.com/pittsburgh/news/2018/06/06/viewpoint-the-need-for-a-common-sense-immigration.html>, accessed on 6/7/18, SS+JMP)

I am not a software engineer, but my job depends on one. I am also not an immigrant, but my family’s livelihood depends on their success. The belief that technology workers and skilled immigrant professionals are essential only to firms like Facebook and Twitter couldn’t be further from the truth.

In Pittsburgh, technology has become deeply rooted in our region’s core industry sectors, including manufacturing, life sciences and financial services institutions. Indeed, those organizations have actually become our largest employers of skilled technology professionals. Technology teams in those organizations play a critical role in driving the employment of thousands of nontechnical employees across their organizations.

Pittsburgh also possesses a vibrant array of emerging startup businesses, powered by amazing entrepreneurs (often immigrants) and fueled by some of the nation’s top venture capital firms.

As they strive to grow and succeed, these businesses are locked in an intense “war for talent” with strong competition for software developers and other skilled technology workers.

Collectively, the industry is working to encourage innovative STEM programs for our nation’s youth. The Pittsburgh Technology Council, for its part, recently hosted more than 300 teachers and high school students as part of its annual STEM Summit.

With that said, we aren’t producing technology professionals quickly enough to meet the demand. This is why we need a common sense immigration strategy that allows American companies to attract the world’s brightest employees to the U.S.

For years, we have warned about the risks of educating the world’s brightest minds at American universities only to force those individuals to leave the U.S. to power the economies of other nations.

Vivek Wadhwa, a distinguished fellow at Carnegie Mellon University, recently published an article in Nature that showcases the magnitude of the risk. Citing data from Crunchbase, Wadwha noted that nearly 100 percent of the world’s unicorns (startups valued at $1 billion or more) had been based in the U.S. in the year 2000. By 2017, Wadhwa points out that nearly 50 percent of unicorn firms were based outside of the U.S.

Blocking the world’s most innovative people from building companies domestically is costing us dearly.

America’s failed immigration policy is threatening nearly every segment of our economy. When companies can’t recruit the critical talent they need to succeed, everyone suffers.

#### Slow growth is coming --- aging populations are become less productive and labor force growth and wages remain low

Yueh, 6/6/18 --- Adjunct Professor of Economics at London Business School (Linda, “Opinion: How the U.S. can avoid a slow-growth future; It’s not just a matter of adding new technology but how well it gets embedded into the job,” <https://www.marketwatch.com/story/how-the-us-can-avoid-a-slow-growth-future-2018-06-05>, accessed on 6/9/18, JMP)

Recent productivity data have led to growing concerns over a slow-growth future. The technologies of today don’t seem to be greatly raising economic growth, and productivity growth has markedly slowed. Economic growth rates across major economies are weaker now than before the 2008 global financial crisis, and not just as a result of the crash.

If companies are more nuanced about how they invest in technology and how they embed it into their operations, then a slow-growth future can be avoided.

The United States, like the eurozone, Japan and the U.K., has been experiencing a slowdown in productivity growth since the mid-2000s. This has led to warnings that growth in these advanced economies has permanently slowed, in part because their aging populations will be less productive.

Could these economies be facing what former U.S. Treasury Secretary Larry Summers describes as “secular stagnation”? This was a term first used by Alvin Hansen in the 1930s to describe slow growth due in part to aging societies, among other issues. Some of Japan’s economic stagnation is thought to be related to its demographics since its population is the oldest and fastest-aging in the world.

Economic growth occurs when workers and capital are added to the economy, along with technology, a well-known result from growth models first developed by the Nobel Prize-winning economist Robert Solow. But an aging population means fewer workers. Fewer workers require fewer office buildings and machinery, which depresses investment and therefore the economic outlook.

Another wrinkle is that the U.S. has been suffering from stagnant median wage growth for decades. Low pay means that some companies hire workers instead of installing more units of capital, which further depresses investment. That means that two factors that drive growth are subdued.

That point of where demographics hits growth seems to be approaching: U.S. labor-force growth has slowed to just 0.2% a year, down from 2.1% from the 1960s to 1980s. A slower growth rate is associated with lower interest rates, and this is seen in the yields of Treasury bonds along the yield curve. In other words, the expectation in bond markets is that the new neutral interest rate, or where the current rate rises will end up, will be lower than the previous average rate of 5%.

The Organization for Economic Cooperation and Development (OECD), the think tank for rich countries, has looked at this issue and finds that weak output growth is a drag on productivity. That brings us full circle in that output per worker or machine can’t increase strongly if overall economic growth remains subdued.

So how much is invested, including in raising the skills of existing workers, matters a great deal to boost growth. It also means that the new path of economic growth, whether it is fast or slow, is within the control of the government and firms as well as workers who can invest in their own human capital to be better equipped to use technology. It is not just the inevitable outcome of an aging society.

But one challenge is that recent technological improvements, centered on information and communication technologies and the internet, do not seem to have raised productivity across the economy as expected. Solow’s 1987 observation that “you can see the computer age everywhere but in the productivity statistics” is known as the Solow paradox. He revisited this question decades later, but concluded that we still do not know whether computers have boosted productivity as the role of computing is still evolving.

Where there have been periods of faster productivity growth, such as in the late 1990s, it seemed to be due to technology being better embedded into business practices. Embedded technology improves the productivity of workers, which increases capital accumulation by slowing down the diminishing returns to capital. Diminishing returns happen when a worker is given more than, say, one computer; that worker won’t produce as much with the second computer as compared with the first one unless he has the programming skills to run an algorithm that allows computing to be done without the worker using it all the time.

If the digital age is to increase productivity and lead to a stronger phase of economic growth, it will require investment in not just R&D, but also peoples’ skills and firms’ practices to embed those technologies into how businesses operate. An example is law firms that are starting to use AI to conduct some aspects of due diligence, which frees up the time of junior associates to undertake other legal work.

Although the Solow paradox is still with us, there are signs that technology is becoming better embedded, such as artificial intelligence that can do computing without a constant human presence. But to ensure that happens requires investment in more nuanced ways — notably in how to embed tech into the workplace. This will vary from firm to firm, but investing in this area, as well as in the well-understood areas of R&D/innovation, will likely generate returns.

It could even lead to a virtuous circle of growth. Seeing higher output per worker could induce more investment by firms as the returns to capital are higher. And more investment in turn raises economic growth rates, and that could help us avoid a slow growth future.

So, reassuringly, demography is not destiny. It is within our control to invest in ways that better embed technologies, which in turn would help us to avoid a slow growth future.

#### Expanding high-skilled immigration boosts total factor productivity --- allowing the U.S. to maintain 3 percent growth despite the aging population crisis

Griswold, 17 --- senior research fellow and co-director of the Program on the American Economy and Globalization at the Mercatus Center at George Mason University (October, Daniel, “Reforming the US Immigration System to Promote Growth,” <https://www.mercatus.org/system/files/griswold-immigration-reform-mercatus-research-v1.pdf>, accessed on 5/9/18, JMP)

AMERICA NEEDS IMMIGRANTS TO GROW AND PROSPER

Central to its economic agenda, the Trump administration seeks to boost the annual growth rate of real US gross domestic product from 2.1 percent (the average rate since 2010) to 3.0 percent or more. The fiscal targets contained in the administration’s fiscal year 2018 budget, released in May 2017, depend on the economy reaching 3.0 percent growth by 2020. Ramping up the underlying trend of US growth by a full percentage point or more will be more practicable if the administration’s economic policies include reforming and liberalizing the nation’s immigration system.

The ability of a nation’s economy to grow is determined by its capital stock, the growth of its labor supply, and how efficiently labor and capital work together—what economists call “total factor productivity.” Immigration directly promotes the second and third while stimulating further investment. Specifically, immigration increases the total number of workers in the labor force while at the same time increasing the average productivity of workers across the economy, immigrant and native born alike. Without a modernization of the US immigration system, achieving 3.0 percent growth will be even more challenging.

Immigration Offsets America’s Demographic Decline

Immigration affects the economy most directly through growth of the labor supply. America in 2017 is undergoing an unprecedented period of demographic transition. The birth rate among native-born women has fallen below the replacement level. Starting around the year 2010, the huge cohort of baby boomers began to retire from the workforce. The growth of the civilian labor force has been falling steadily, from 1.2 percent per year in the 1990s to 0.7 percent per year in the 2000–2010 period to 0.5 percent per year in the current decade.4 The number of working-age Americans (age 25–64) born in the United States to US-born parents has already begun to decline and will shrink by more than 8 million from 2015 to 2035.5 Whatever growth the United States experiences in the workforce in the next two decades will be because of immigrants and the children of immigrants.

Immigrants admitted to the United States each year tend to be younger than native-born Americans and are more inclined to participate in the labor force. According to data from the US Department of Homeland Security, the median age of permanent immigrants admitted to the United States in the past decade is 32.5,6 while the median age of all US residents (including immigrants) is 37.6.7 So the median age of those receiving lawful permanent resident (LPR) status is five years younger than the median age of all US residents.

Immigrants are not only younger than their native-born counterparts but also more inclined to participate in the labor force. The latter is especially true of immigrant men. According to the US Bureau of Labor Statistics, the labor force participation rate of all foreign-born individuals was 65.2 percent in 2016, compared with the participation rate for the native born of 62.3 percent. For foreign-born men, the participation rate was 77.8 percent, a full 10 percentage points higher than the rate for native-born men, 67.5 percent. The participa­tion rate of foreign-born women was slightly lower than the rate of native-born women, 53.4 percent compared to 57.5 percent. The unemployment rate for foreign-born persons in the United States in 2016 was 4.3 percent, compared with an unemployment rate for native-born workers of 5.0 percent.8

Without a growing workforce, US companies will find it increasingly dif­ficult to hire the workers they need to meet domestic and global demand. Man­ufacturing, agriculture, construction, and high technology are among the sec­tors that are expected to suffer the most acute shortages of workers. A declining workforce would slow US growth potential and reduce the relative size of the US economy and US influence in the world.

The continuing slowdown in the growth of the US workforce will also impose a growing strain on federal retirement programs. One measure of the country’s ability to fund retirement programs is the Old Age Dependency Ratio (OADR)—the number of Americans who are 65 and older versus the number of Americans who are in their working years of 25 to 64. The OADR fluctuated within the range of 19 to 24 up until 2010, but with baby boomers now retiring in large numbers, the ratio is expected to climb above 40 by 2030 and reach 47.5 by 2065. If legal immigration were sharply curtailed, as has been proposed, the future OADR would rise even higher. If immigration were cut off immediately, the ratio would reach 55.9 by 2065.9

The smaller the future Old Age Dependency Ratio, the less strain there will be on federal retirement programs. A steady or increased inflow of immi­grant workers helps to spread the cost of funding old-age pension payments across a larger pool of workers, reducing the need to raise payroll taxes, cut benefits, or both.

More Immigrants, More Output, More Jobs

Immigration reform would allow the US economy to grow faster by increasing the number of workers in the labor force and the total number of hours worked per year. Because immigrants are more likely to be of working age than native-born Americans and are more likely to seek work, immigration can help to slow or even reverse the recent trend of declining labor force participation.

An increase in the workforce driven by immigration does not lead to a gen­eral displacement of existing native-born workers. Although the US labor force has more than doubled in the past 50 years, there has been no upward trend in the unemployment rate because the economic activity enabled by the growth in workers has also stimulated demand for workers.10 As the workforce grows, so too does demand for all the goods and services that American households pur­chase, from groceries and cars to education and housing. This increased demand in turn stimulates more production, leading to more employment and the main­tenance of full employment.

A growing workforce also stimulates investment by increasing the returns on capital. While immigration can put downward pressure on wages in certain indus­tries in the short run, the availability of more workers at competitive wages creates incentives for greater investment. And rising investment stimulates more demand for labor, increases productivity, and creates upward pressure on wages. The increased investment spurred by immigration means that, over time, the capital-to-labor ratio grows the same amount even if the number of immigrants increases.11

Immigrants Complement US Workers, Increasing Gains from Specialization

Immigrants do more than increase the size of the labor force. Because immi­grants tend to have different skills than the typical native, they boost the growth of the US economy by filling niches in the labor market. Immigrants tend to be overrepresented at the higher and lower ends of the skill spectrum, while native-born Americans tend to be clustered in the middle skill levels. Immigrants make up 17 percent of the US workforce, but they account for more than one-third of workers in the United States with a PhD in the fields of science, technology, engi­neering, and math (STEM). On the other end of the skills spectrum, immigrants represent 40 percent of those in the workforce without a high school diploma.12

The complementary nature of immigration means that immigrants do not compete directly with the vast majority of Americans for employment. In fact, by providing skills that are in relatively short supply, immigrants enable US workers to be more productive. In the technology area, immigrants make up a disproportionate share of scientists, college professors, and technical work­ers. Native-born Americans are not earning qualifying degrees in numbers suf­ficient to fill the available positions in US industry. By filling those positions, high-skilled immigrants add to the “agglomeration effect” by creating a critical mass of workers in a particular region and industry where ideas can be shared more easily.13 Silicon Valley is the most notable example.

Because of differences in English proficiency, immigrants tend to concen­trate in more technical occupations such as the job of computer specialist. This creates more opportunities for native-born workers, who are more concentrated among managers, sales personnel, and other occupations requiring more interac­tion with customers and subordinates.14

On the lower rungs of the skills ladder, immigrants fill jobs that fewer and fewer Americans are interested in, and they fill those positions at wage rates that allow their industries to remain competitive in the US market. Such jobs require only short-term, on-the-job training and include health service workers, personal service workers, farm laborers, cleaning service and food service workers, con­struction workers, textile machine operators, carpenters, and nonfarm laborers.15 Low-skilled immigrants also fill positions in the growing health and home care service sectors, such as home health aides, nursing aides, orderlies, attendants, personal and home care aides, medical assistants, and maids and housekeepers.16

Such jobs were filled in decades past by adult Americans without a high school diploma, but the number of native-born Americans in that category has been steadily shrinking. From 2000 to 2016, the number of native-born Ameri­cans 25 and older who had not completed high school fell by almost 7 million, from 20.5 million to 13.5 million. As a share of the adult native-born population, the share of high school dropouts has declined in that same period from 13.4 percent to 7.6 percent, and the share continues to decline.17

Contrary to popular belief, a large majority of native-born workers do not compete for jobs with low-skilled immigrants. Studies show that immigration may have a modest negative effect on wages earned by the small and shrinking pool of adult Americans without a high school diploma,18 but the impact on the wages of the other 92 percent of native-born Americans in the labor force is neutral to positive. On the high-skilled end of the spectrum, the impact of immi­gration on the wages of the native born is muted by the complementary nature of the immigrants’ skills. Matthew J. Slaughter, a former member of the president’s Council of Economic Advisers, noted in a survey of immigration and productivity growth, “Skilled immigrants tend to complement, not substitute for, native-born workers in US companies. Companies that hire more skilled immigrants tend to hire more native-born workers as well.”19

A rising share of immigrants in the labor market also encourages Ameri­cans to upgrade their skills with more education and to shift into areas of employment where language skills are more important and tend to be rewarded. As immigrants enter the workforce, Americans tend to stay in school longer to upgrade their skills and their potential earning power. A 2012 study found that an increase in the presence of immigrants in the workforce increased the prob­ability that native-born Americans will stay in school and complete their high school education.20 Other research suggests that in states with a heavier concentration of less educated immigrants, native-born workers are more likely to shift to more com­munication-intensive occupations, where their language skills give them an advantage and where wages are typically higher than in manual jobs. This has the collective effect of raising the productivity of Americans in the workforce.21

Lower-skilled immigrants also boost productivity and output by supplying services that allow higher-skilled Americans to raise their productivity. The 2016 report from the National Academies of Sciences, Engineering, and Medi­cine (NASEM) noted that low-skilled immigrants reduce the price US households pay for immigrant-intensive services such as childcare, eating out, house cleaning and repair, landscaping and gardening, taxi rides, and construction. The affordability of such services allows native-born workers in higher-salaried jobs, especially women, to increase their paid work hours.22

Immigrants promote faster US economic growth because they are generally more flexible about when and where they will work. Immigrants have proven to be more geographically mobile. They are less likely to be rooted in one geographic location and are therefore more will­ing than natives to move to places where demand for their labor is higher than the supply.23 That can mean moving to urban centers of high-tech activity or to rural areas in need of specific kinds of labor, from agriculture to health­care. They are also more willing to work unusual hours, at nights and on weekends, which provides more labor for the economy in a way that is less likely to compete directly with US-born workers.24 Greater mobility serves the overall economy by reducing regional differences in employment and by allowing work to be spread out across time and space.

In summary, immigrants do not ordinarily compete with Americans for a limited number of jobs; instead, they work with and for native-born workers in a cooperative way that lifts the general productivity and prosperity of the United States.

Immigrants Spur Innovation, Patents, and Startups

Immigrants create wealth in America by spurring innovation and founding new companies. Highly skilled immigrants are more likely to file patent applications than their native-born counterparts and are more likely to start new businesses, fueling entrepreneurial activity, providing new products and services, and creating employment opportunities for native-born workers, while raising overall productivity. The patenting and innovation spurred by immigrants allow the United States to shift beyond its production possibility frontier, which raises the speed limit for the economy’s long-run growth potential.

The 2016 NASEM report found that “immigrants are more innovative than natives; more specifically, high-skilled immigrants raise patenting per capita, which is likely to boost productivity and per capita economic growth.” While immigrants account for 13 percent of the US population, they are responsible for one-third of all patent filings in the United States.25

The United States has been the world’s greatest beneficiary so far from the international mobility of skilled labor. The United States has attracted the largest net inflow of global inventors who have filed international patents. Based on data from the World Intellectual Property Organization from 2001 to 2010, a recent study determined that “the United States has received an enormous net surplus of inventors from abroad, while China and India have been major source countries.”26 Again, the prime example is Silicon Valley in California. The same study found that “more than half of the high-skilled technology workers and entrepreneurs in Silicon Valley are foreign-born.”27

Immigrants are also more likely to found new enterprises, from ethnic restaurants to billion-dollar technology companies.28 Some of the most famous and successful US companies today were founded or cofounded by first- or second- generation immigrants. According to a June 2017 report from the Massachusetts Technology Leadership Council, 40 percent of America’s Fortune 500 companies were founded by immigrants or the children of immigrants. A 2016 study by the National Foundation for American Policy found that more than half of the startup companies in the United States today that are valued at more than $1 billion, so-called “unicorns,” were started by immigrants. The 44 unicorn companies founded by immigrants each employed an average of 760 workers.29

As one study of global talent flows concluded, “The weight of the evidence points to high-skilled immigrants boosting innovation and productivity—mainly through increased quantity of skilled individuals pursuing innovative work.”30

“Immigration Surplus” Raises Income of Americans

Immigrants fuel economic growth, wealth creation, and higher average incomes in the countries where they settle. The primary beneficiaries are the immigrants themselves, but native-born individuals are also net beneficiaries. The economies of scale of a larger domestic economy, the economic diversity and complementarities, and the ideas, innovation, and entrepreneurship that immigrants bring create a net gain in wealth for their native counterparts.

Economists call this the “immigration surplus.” It is the net gain available to natives when the economic costs from immigration are subtracted from the benefits. The number is typically small compared to America’s huge economy, but while estimates vary, they are invariably positive. Under conventional assumptions, the annual immigration surplus from the current stock of US immigrants is estimated to be in the range of 0.1 to 0.4 percent of US gross domestic product.31 That translates into $19 billion to $74 billion in today’s economy in the total net benefits accrued to native-born Americans from current levels of immigration.

In a comprehensive 2016 study of the economic impact of immigration on the economies of wealthier nations such as the United States, the International Monetary Fund (IMF) concluded, “Immigration significantly increases GDP per capita in advanced economies.” Specifically, the IMF study estimated that a one-percentage- point increase in the share of migrants in the adult population can raise GDP per capita by up to 2 percent in the long run, mainly through increased labor productivity.32

The IMF study found that immigration had no measurable impact on income distribution in advanced economies. It found that high-skilled immigration did have a larger benefit for the top 10 percent of earners, but the bottom 90 percent also benefited. Low- and medium-skilled immigration “equally increases income per capita for the bottom 90 percent and the top 10 percent.”33

Immigration also exerts a positive influence on US government finances. In general, immigrants tend to produce a fiscal surplus for the federal government, especially for its retirement programs, while imposing more immediate net costs on state and local governments, in particular because of education and incomesupport programs. High-skilled immigrants produce large fiscal surpluses for the government, while low-skilled immigrants tend to have a negative impact.

The NASEM report concluded that an immigrant who arrives in the United States at age 25 with a four-year college education will, over his or her lifetime, contribute a net surplus of $504,000 to the finances of governments at all levels (net present value, 2012 dollars). An immigrant with an advanced degree will contribute almost twice that net amount, $972,000, in his or her lifetime. An immigrant with less than a high school education, in contrast, will impose a net cost of $109,000 over his or her lifetime.34 The IMF study notes that such direct, static analysis may underestimate the full fiscal impact of immigration. A more “dynamic scoring” approach would take into account the spillover impact of immigration on productivity and GDP growth for the entire economy, an effect that further boosts tax revenue.35

In its landmark 2016 study of the economic and fiscal consequences of immigration, NASEM concluded that immigration unambiguously contributes to US economic growth:

Most obviously, immigration supplies workers, which increases GDP and has helped the United States avoid the fate of stagnant economies created by purely demographic forces—in particular, an aging (and, in the case of Japan, a shrinking) workforce. Perhaps even more important than the contribution to labor supply is the infusion by high-skilled immigration of human capital that has boosted the nation’s capacity for innovation and technological change. The contribution of immigrants to human and physical capital formation, entrepreneurship, and innovation are essential to long-run sustained economic growth. Innovation carried out by immigrants also has the potential to increase the productivity of natives, very likely raising economic growth per capita. In short, the prospects for long-run economic growth in the United States would be considerably dimmed without the contributions of high-skilled immigrants.36

Considering the economic and fiscal impacts of immigration, this evidence argues for a revised system that maintains or expands the current number of immigrants allowed while shifting the emphasis to employment-related skills rather than family relationships.

#### Boosting skilled immigration is the best way to achieve consistent 3 percent growth --- injects more workers into the economy

Thompson, 18 --- senior editor at The Atlantic, writes about economics, labor markets, and the media (2/27/18, Derek, “One Simple Way Trump Can Get the Economic Growth He Wants; He isn’t going to like it: It’s more immigration,” <https://www.theatlantic.com/business/archive/2018/02/trump-growth-immigration/554186/>, accessed on 6/10/18, JMP)

The Trump administration’s latest budget, which was released in mid-February, projects 3 percent annual GDP growth for much of the next decade. Most economists consider that forecast to be somewhere between wildly optimistic and historically absurd.

Why? Because consistent 3 percent growth, while the norm for countries like China and India, is exquisitely rare among developed economies. The average annual growth of America’s GDP since the Great Recession has been about 2 percent. Achieving Trump’s dream of growth would require some heroic supercharging of the economy.

There are several ways that economic growth can take off in a country like the U.S. First, the federal government has a wide arsenal of policies to combat recessions. When the economy slips into a funk, the feds can cut taxes and increase spending, thus running a large short-term deficit to combat slow growth. The Federal Reserve can slash interest rates to encourage corporations to borrow and spend more money than they otherwise would.

The most obvious problem with deploying any recession-busting policies now is, well, the U.S. isn’t in a recession. Quite the opposite: The economy is nearly at full employment. Interest rates are already low and most economists expect them to do nothing but rise in the next few years, which should discourage investment and growth. The Republican tax cut, combined with increased spending, will increase the deficit for the next few years—a rarity this deep into a recovery. It’s conceivable that those deficits might provide a bit of a boost. But sustained 3 percent growth isn’t likely.

So, how can a growing economy accelerate? Imagine a factory owner who wants to expand his shoe-manufacturing capacity. The owner can invest in shoelace machines and employee training to increase the per-worker productivity of the factory. He could also simply hire more workers. Just like that hypothetical factory owner, the economy’s growth fundamentally comes from just two things—productivity growth and labor-force growth.

The trouble with rapid productivity growth is that it’s a bit like permanent happiness—much easier to obsess over than to achieve. Indeed, economists obsess over productivity quite a bit, but they often disagree about what increases it, and, as some of them sheepishly admit, they’re not even all that great at measuring it. So far this century, productivity growth in the U.S. has been consistently low—even negative—since the end of the dot-com bubble. Several studies suggest that as rich countries like the U.S. get older, their productivity-growth rates naturally decline. (Since there’s a lot about productivity that puzzles economists, they aren’t entirely sure why this happens, either.) Designing a budget projection around a sudden surge in productivity is a bit like betting one’s life savings on the discovery of alien life on the moon. Not utterly hopeless. But certainly not advisable.

So, what’s the trick to raising GDP if productivity levels are subdued? More workers.

In the second half of the 20th century, economic growth in the U.S. rode a labor-force boom, after the Greatest Generation gave birth to the Boomers, then the largest generation in history. But in the last decade, that demographic wind has turned against the U.S.—and most advanced economies. As the Obama White House said in its 2013 economic report, “real GDP in the United States is likely to be permanently slower than it was in earlier eras because of a slowdown in labor force growth.” It’s not just that population growth is slowing down. What’s more, the share of Americans between 25 and 54 who are working—a statistic known as the “prime age labor participation rate”—has been generally declining since the late 1990s.

There are two simple ways to add more people to the U.S. population: more babies and more immigrants. The trouble with increasing fertility is that no advanced economy seems to have figured out how to do it. The U.S. is in the middle of a protracted lull in baby-making—but so is Scandinavia, and Western Europe, and Japan, and Russia. Low birth rates may simply be a consequence of gender equality and overall prosperity: As a nation’s share of educated women grows, its fertility rate tends to decline, perhaps because working women don’t have the time, money, or interest in raising the sort of large families that were so common (and necessary) in agrarian economies.

Productivity growth is unpredictable, and fertility growth is elusive. What’s left? Well, there’s immigration. Achieving higher growth without another baby boom or accelerating productivity isn’t difficult—if the country simply let in more immigrants each year, GDP growth would almost surely accelerate. More able-bodied workers means more work; more work means more production; and product is, after all, the final noun in GDP.

But Republicans are, quite publicly, pursuing the opposite strategy. The immigration legislation from Senators Tom Cotton of Arkansas and David Perdue of Georgia proposes a 50 percent cut to the nation’s immigration levels. The Trump administration, which has endorsed the plan, said it wants to reduce legal immigration to the United States by half within the decade.

This puts the Trump administration’s economic policies in conflict with its economic projections. Other countries looking to jump-start economic growth in a period of low fertility are liberalizing their immigration policies. Japan, which is further along the aging curve than the U.S., has revamped its immigration laws this century, doubling its share of foreign-born workers (from an admittedly measly 1 percent in the late 1990s to about 2 percent today). Along with strong monetary stimulus, that doubling of the foreign-born population has contributed to stronger growth than Japan would have had otherwise. As I’ve written, the economic case for maintaining and even increasing immigration levels in the U.S. is extremely strong.

The White House is discouraging talented people from immigrating during a period of low productivity and falling fertility while predicting a growth miracle. All budgets are fantasies. But there is a greater sin here than fantastical forecasting. And that is using magical growth projections to cover up for a small-minded immigration policy.

#### Warming causes extinction – scientific consensus – outweighs all impacts

**Deibel, 7** [Terry, Prof IR at National War College, “Foreign Affairs Strategy: Logic for American Statecraft,” Conclusion: American Foreign Affairs Strategy Today]

**Finally, there is one major existential threat to American security (as well as prosperity) of a nonviolent nature, which, though far in the future, demands urgent action. It is the threat of global warming to the stability of the climate upon which all earthly life depends. Scientists worldwide have been observing the gathering of this threat for three decades now, and what was once a mere possibility has passed through probability to near certainty. Indeed not one of more than 900 articles on climate change published in refereed scientific journals from 1993 to 2003 doubted that anthropogenic warming is occurring. “In legitimate scientific circles,” writes Elizabeth Kolbert, “it is virtually impossible to find evidence of disagreement over the fundamentals of global warming.” Evidence from a vast international scientific monitoring effort accumulates almost weekly,** as this sample of newspaper reports shows: an international panel predicts “brutal droughts, floods and violent storms across the planet over the next century”; climate change could “literally alter ocean currents, wipe away huge portions of Alpine Snowcaps and aid the spread of cholera and malaria”; “glaciers in the Antarctic and in Greenland are melting much faster than expected, and…worldwide, plants are blooming several days earlier than a decade ago”; “rising sea temperatures have been accompanied by a significant global increase in the most destructive hurricanes”; “NASA scientists have concluded from direct temperature measurements that 2005 was the hottest year on record, with 1998 a close second”; “Earth’s warming climate is estimated to contribute to more than 150,000 deaths and 5 million illnesses each year” as disease spreads; “widespread bleaching from Texas to Trinidad…killed broad swaths of corals” due to a 2-degree rise in sea temperatures. “The world is slowly disintegrating,” concluded Inuit hunter Noah Metuq, who lives 30 miles from the Arctic Circle. “They call it climate change…but we just call it breaking up.” From the founding of the first cities some 6,000 years ago until the beginning of the industrial revolution, carbon dioxide levels in the atmosphere remained relatively constant at about 280 parts per million (ppm). At present they are accelerating toward 400 ppm, and by 2050 they will reach 500 ppm, about double pre-industrial levels. Unfortunately, atmospheric CO2 lasts about a century, so there is no way immediately to reduce levels, only to slow their increase, we are thus in for significant global warming; the only debate is how much and how serous the effects will be. As the newspaper stories quoted above show, we are already experiencing the effects of 1-2 degree warming in more violent storms, spread of disease, mass die offs of plants and animals, species extinction, and threatened inundation of low-lying countries like the Pacific nation of Kiribati and the Netherlands at a warming of 5 degrees or less the Greenland and West Antarctic ice sheets could disintegrate, leading to a sea level of rise of 20 feet that would cover North Carolina’s outer banks, swamp the southern third of Florida, and inundate Manhattan up to the middle of Greenwich Village. Another catastrophic effect would be the collapse of the Atlantic thermohaline circulation that keeps the winter weather in Europe far warmer than its latitude would otherwise allow. Economist William Cline once estimated the damage to the United States alone from moderate levels of warming at 1-6 percent of GDP annually; severe warming could cost 13-26 percent of GDP. But the most frightening scenario is runaway greenhouse warming, based on positive feedback from the buildup of water vapor in the atmosphere that is both caused by and causes hotter surface temperatures. Past ice age transitions, associated with only 5-10 degree changes in average global temperatures, took place in just decades, even though no one was then pouring ever-increasing amounts of carbon into the atmosphere. **Faced with this specter, the best one can conclude is that “humankind’s continuing enhancement of the natural greenhouse effect is akin to playing Russian roulette with the earth’s climate and humanity’s life support system. At worst, says physics professor Marty Hoffert of New York University, “we’re just going to burn everything up; we’re going to heat the atmosphere to the temperature it was in the Cretaceous when there were crocodiles at the poles, and then everything will collapse.” During the Cold War, astronomer Carl Sagan popularized a theory of nuclear winter to describe how a thermonuclear war between the United States and the Soviet Union would not only destroy both countries but possibly end life on this planet. Global warming is the post-Cold War era’s equivalent of nuclear winter at least as serious and considerably better supported scientifically. Over the long run it puts dangers from terrorism and traditional military challenges to shame. It is a threat not only to the security and prosperity to the United States, but potentially to the continued existence of life on this planet.**

#### Economic Growth is key to stop global warming - innovation

**Switkowski 10** - Former research physicist, is the chairman of the Australian Nuclear Science and Technology Organisation and a former chief executive of the Australian telecommunications company Telstra, Ziggy, Innovation has climate change in hand, Cosmos, 2-3, http://www.cosmosmagazine.com/features/online/3283/innovation-will-produce-solutions-climate-change-problem?page=0%2C0

The combination of slowing population growth, closing the lifestyle gap with the West and the arrival of new clean energy systems supplying more efficient products and processes could stabilise greenhouse effects by century end. Along the way, **adapting to climate changes is a matter of resources and resolve - barriers can be built to withstand sea-level rises, emergency services can be improved, property and personnel can be better protected, and so on.** But the legacy of generations of excessive emissions remains: our climate and environment will be highly stressed and may yet be locked into a runaway warming trajectory. A key headline claim is that the 200-year industrial era has brought the planet to within 100 years of irreversible climate catastrophe and that the responsibility lies with today's generation to prevent such a cataclysmic situation. **This conclusion rests on the assumption that the risk of climate catastrophe is growing faster than the rate at which technology can be developed to mitigate this risk. Is this a reasonable assumption?** The U.S. National Academy of Engineering recently produced a list of the most significant technical **advances of the 20th century. The top 10 included: electrification, automobiles, airplanes, water supply and distribution, electronics, radio and television, agricultural mechanisation, computers, telephony, air conditioning and refrigeration** (the early Internet appeared at No. 13). **Might the 21st century of innovation produce an even more influential list that, if appropriately prioritised, includes the tools to address global warming before runaway effects occur? Today, even seemingly permanent damage such as species extinction appears addressable with emerging gene technology. Tomorrow, geo-engineering (extracting greenhouse gases from the atmosphere), soil sequestration and non-fossil fuel systems may give us all the answers. Is it a modern vanity to presume we must solve technological challenges today that will seem trivial to society next century, especially if our history of technical innovation continues?** (Afterall, as environmental scientist Jesse Ausubel from The Rockefeller University, New York City, noted "At the start of the 20th century there was widespread concern that horse manure and chimney smoke would bury or choke cities.") This reasoning does not suggest global inaction but emphasises the key role that public policy, innovation, research and development must play. Climate change should be a global priority that leads to collaborative focused research efforts to find solutions. Australia's leadership in carbon capture and storage technology is one good example of this. **Nations have to be wealthy enough to make the required long-term investments in R&D.** In any policy choice between economic growth and more conservative, restricted lifestyles, go for growth and wealth creation supporting a culture of innovation every time.

### Advantage 2: Technological Leadership

#### U.S. immigration policies are creating a reverse brain drain that will fuel China’s tech development --- it’s not too late for the U.S. to regain momentum

Sheng, 4/9/18 --- writer, editor and content strategist specializing in business, finance and wealth (Ellen, “Silicon Valley is fighting a brain-drain war with Trump that it may lose,” <https://www.cnbc.com/2018/04/09/trumps-war-on-immigration-causing-silicon-valley-brain-drain.html>, accessed on 5/29/18, JMP)

After six years at LinkedIn, Vikram Rangnekar wanted to go back to his entrepreneurial roots. There was just one big obstacle.

Rangnekar, a cloud computing developer and former Techcrunch50 winner, was working in Silicon Valley on an H-1B visa. Since H-1B visas are tied to jobs, his options were limited: Get a job at another company or try to get a visa on his own and start a company. Both came with one huge drawback: Any change to his job would reset the clock on his green card application. Green cards are allotted by country; the backlog for citizens from populous countries such as India or China is now more than 10 years.

"We decided the indefinite wait was not for us, and we started thinking about our next play," he said.

That next play turned out to be Toronto. "The permanent-resident process (Canada's green card equivalent) is easy, and if you have all the points, it takes less than six months. The government is working hard to help and improve the start-up scene," he said.

Now happily settled in Toronto with his family, he started a site, movnorth.com, to help others like him. "People who have been in the U.S. for 10 to 15 years and still restricted by a work visa are thinking, where can we invest time and have something more permanent?'"

Alternatives to U.S. citizenship

Rangnekar is one of a growing number of highly educated foreign entrepreneurs in the United States who have started looking at alternatives to the obstacle-strewn path to U.S. citizenship. Hardships for foreign entrepreneurs in the United States have increased as of late, thanks to the heightened vetting of H-1B visas, Trump's Muslim ban and an increasingly hostile stance toward immigration.

Trump, through a number of executive orders and memos from various U.S. agencies has started narrowing visa requirements. In February the U.S Citizenship and Immigration Services agency put out a new policy memo requiring "detailed documentation" about H-1B workers employed at third-party work sites to demonstrate that employees are actually filling specialty roles for which they were hired. The move is designed to cut down on "benching" — a practice in which employers hire entry-level software engineers from overseas, pay them the minimum required wage or less and shuffle them to subsidiaries.

Although it is important to close some of the loopholes in the H-1B visa program, these actions could also have unintended consequences. Often lost in the political rhetoric is the fact that immigration is a critical issue for the U.S. economy and our nation's competitive position. The National Foundation for American Policy found that immigrants have started more than half of the country's billion-dollar start-up companies. Some of the more prominent examples include SpaceX and Tesla founder Elon Musk, from South Africa, and Google co-founder Sergey Brin, an immigrant from the former Soviet Union.

The H-1B visa is the primary avenue for skilled immigrants to enter the United States. While it's well known that companies in Silicon Valley rely on H-1B visas, it is also used heavily by companies in New York, Texas and Washington, D.C. A recent Pew Research Center report revealed that between 2010 and 2016, almost a third of visas went to businesses in the New York City area. Increased restrictions and rejections of H-1B visas have companies worried.

Recent reports suggest that restrictions on foreign-born workers could have outsized impact on the tech industry. A recent report from the Silicon Valley Competitiveness and Innovation Project found that the country's largest tech companies rely more on foreign-born workers than domestic ones. In Silicon Valley at least 57 percent of workers in science, tech, engineering and mathematics with a bachelor's degree or higher were born outside the United States, the report said. According to data from the U.S. Department of Labor, IBM applied for 12,381 H-1B visas last year, Microsoft 5,029 visas and Google 4,897.

Brain drain begins

For decades the United States has attracted some of the best and brightest. Now some are starting to see the reverse happen. Vivek Wadhwa, a distinguished fellow and adjunct professor at Carnegie Mellon University's College of Engineering and author of The Immigrant Exodus: Why America Is Losing the Global Race to Capture Entrepreneurial Talent, said that in his current class at Carnegie Mellon, not one of the foreign students is looking to stay. Foreign students from India, China and elsewhere who used to stay are now returning to their home countries to start businesses. This is alarming because it will adversely impact U.S. innovation, Wadhwa said.

"In the next five to 10 years, we're going to be competing with China and India and Singapore and many other countries all over the world for talent like never before," he said.

The U.S. has seen its share of tech "unicorns" drop dramatically in recent years, according to data from CB Insights. Of the 214 unicorn start-ups globally, 41 percent are based in the United States compared to 75 percent in 2013. Meanwhile, the proliferation of tech unicorns from outside has been increasing, especially from China. China is now home to 36 percent of tech unicorns compared to 12 percent in 2014.

If we keep going on the path we are on, China will have more tech unicorns than the United States. China is catching up to the United States in advanced technology on everything from artificial intelligence and gene editing to quantum computing, Wadhwa said, adding that once that happens, "China will be neck-to-neck with Silicon Valley, and then they're going to eat our lunch."

Toughened immigration policies

To be sure, U.S. immigration has been difficult for quite some time, but now Trump's executive orders and antiimmigration rhetoric has further accelerated the trend.

Tahmina Watson, Seattle-based immigration attorney and author of The Startup Visa: Key to Job Growth & Economic Prosperity in America, said she's started to see extreme scrutiny of H-1B visa applications. Routine applications that were once commonly accepted are now sent back requiring more documentation. H-1B visa extensions are facing more scrutiny. Watson is also seeing a sudden spike in H-1B visa denials.

While some of the scrutiny is an attempt to close loopholes in the H-1B program, the result is that talented, legitimate applicants are being turned away. Antiimmigration policies will likely hurt American workers, Watson said, noting that for every H-1B worker, five jobs are created. Another visa that would have been a boost to Silicon Valley's start-up scene has also been quashed. The international entrepreneur rule, or start-up visa, would have allowed qualified foreign entrepreneurs to stay in the United States to build businesses. It was set to go into effect last year but has been delayed and looks to be on the chopping block.

"The shortsightedness will be felt in upcoming months and years. To make America great again, scrutinizing business visas is not the way to go," she said.

Filling the void

As the United States closes its borders, other countries are courting the world's best and brightest to come and start businesses. France introduced a new tech visa program last year, and French president Emmanuel Macron has said he aims to make France a "Startup Nation." Canada launched a program to fast-track visas and short-term work permits for highly skilled foreign workers. When the U.S. Citizenship and Immigration Services department said in June they would stop premium processing of H-1B visas for up to six months, Canada stepped up and said it would fast-track applications. India's commerce ministry and various government arms have created innovation labs and incubators in efforts to develop the country's start-up scene, while China has vowed to invest vigorously in artificial intelligence to create a $150 billion industry by 2030.

"In the wake of our administration's policies, it's becoming easier for others to fill the void," said David Brown, a serial entrepreneur and founder of Techstars, which helps start-ups through accelerator programs and investment. Brown said that Techstar's Toronto program is reaping the benefit of entrepreneurs who are leaving the United States for Canada.

Whether the current tide of people leaving becomes a wave has yet to be determined. But meanwhile, "the rhetoric has got people really stressed. They just want to do work and spend time with their families, not deal with political pressure," said Rangnekar.

"The U.S. is still a great place to be. It's not too late. Silicon Valley is still the most amazing place in the world; people still want to be here if they have a choice. The problem is, we give them no choice," Wadhwa said.

#### Impact: US Deterrence

#### Independently, China is moving aggressively to achieve global A.I. dominance --- Immigration policies will hamstring U.S. efforts to sustain its leadership

Barhat, 5/4/18 --- Toronto-based financial writer specializing in investing, personal finance and other areas of the financial services industry (Vikram, “China is determined to steal A.I. crown from US and nothing, not even a trade war, will stop it,” <https://www.cnbc.com/2018/05/04/china-aims-to-steal-us-a-i-crown-and-not-even-trade-war-will-stop-it.html>, accessed on 5/31/18, JMP)

As U.S. and Chinese officials engage in highly anticipated trade talks, officials from China have asserted that it will not discuss two of the biggest trade demands from the United States. One is about the U.S. trade deficit; the other is an issue that could become the greatest technology war in history: [is] China's push into artificial intelligence.

The United States has good reason to be concerned about China's hard stance. While the ongoing trade war is grabbing all the headlines, it's the tussle for dominance in the A.I. space that could shape the economic fortunes of the two world powers. Overshadowed by the dazzling A.I. advances made by the United States so far, China has been silently but resolutely building an ecosystem that is feeding and fueling its ambition to become a world leader in A.I. by 2030.

Home to tech behemoths like Google, Microsoft, IBM and Apple, the United States is where the bulk of A.I. innovation has taken place. However, there are growing indications that China, with its own army of tech heavy hitters such as Alibaba, Tencent, and Baidu, is moving rapidly to close the gap. For one, the Asian economic giant has all the ingredients it needs to upstage Silicon Valley: generous government coffers, large population, a thriving research community and a society eager for technological change. Its investment in A.I., chips and electrics cars combined has been estimated at $300 billion.

In line with its 2030 vision, the government of Tianjin, a city a couple of hours from Beijing, plans to build a $5 billion fund to support the A.I. development. Money being no object, China is also building a giant $2.1 billion technology park to facilitate A.I. innovation. In a red-hot market for tech, China's A.I. start-ups can raise funds with relative ease. Investors poured $4.5 billion into more than 200 Chinese A.I. companies between 2012 and 2017, according to a white paper produced by Kai-Fu Lee, a former Google and Microsoft executive who now leads a venture-capital firm, Sinovation Ventures.

China's goal is to foster a $1 trillion A.I. industry by 2030. Last month Chinese A.I. start-up SenseTime raised $600 million in a deal led by Alibaba, reported as the largest-ever in the A.I. space. The deal gave SenseTime an implied valuation in some reports of more than $3 billion, or even as high as $4.5 billion.

"SenseTime is the perfect case study in the difference between Chinese and Western technological development," wrote Nicholas Colas, co-founder of DataTrek Research, in a recent report. "Artificial intelligence, and especially the A.I. that powers visual analytics, is a critical technology for a raft of new products. The Western companies have their own advantages, to be sure. But the Chinese model of government sponsorship and private capital is coming on very strong. SenseTime may be the hit investment of the moment coming out of this approach, but it certainly won't be the last."

US research sector could struggle

By contrast, the U.S. research sector could be struggling for funding and policy support under the Trump administration. The American Association for the Advancement of Science said the White House planned to slash science and technology research funding by 15 percent in 2018. Worse, with the recent immigration clampdown, the United States may soon be struggling to attract and retain highly skilled tech experts from around the world that it needs to keep Silicon Valley at the cutting edge of A.I. research and innovation.

There are indications America's grasp of A.I. primacy may already be slipping. According to the White House's National Artificial Intelligence Research and Development Strategic Plan in A.I. research, China had already surpassed the United States, at least in terms of journal articles that mention "deep learning" or "deep neural network," as far back as 2016.

"Sadly, when it comes to science and innovation, the U.S. is moving in reverse by cutting funding for research, denying climate change and cutting investments in education," said Vivek Wadhwa, a distinguished fellow and adjunct professor at Carnegie Mellon University's College of Engineering and author of The Driver in the Driverless Car: How Our Technology Choices Will Create the Future.

U.S. leaders do not appear to be aware of A.I. developments, said Joshua Gans, business professor at the University of Toronto and co-author of Prediction Machines: The Simple Economics of Artificial Intelligence. "President Obama discussed it [AI] on numerous occasions," he said. "[Research funding cuts] is obviously bad news in terms of its ability to nurture scientific leadership. It is shortsighted and will harm the U.S. in the medium-long term."

China's timeline for global A.I. supremacy by 2030 may appear a tad overambitious, but opinions are divided as to whether it's achievable.

Wadhwa, for one, feels China has many obstacles. "Governments can't make innovation by throwing money at it — this only leads to more corruption and bureaucracy," he said. "Innovation comes from people who have diverse ideas, take risks and challenge authority."

Wadhwa's reservation contrasts with the conviction of William Weightman, a Fulbright Fellow researching intellectual property law in China. "While 12 years seems like a short amount of time to achieve such an ambitious target, it's not outside China's scope," said Weightman. "The world should not underestimate China's ability to mobilize a vast amount of resources to accomplish its goals."

He used the example of the first high-speed rail line connecting Beijing and Tianjin, which was completed just in time for the 2008 Beijing Olympics. "Between the vast amount of state resources and the determination of the central leadership, China has a solid foundation on which to build an innovative A.I. sector," Weightman said.

China's potential advantages are many

China's demographics give it an unmatched advantage. The Asian giant has large consumer data (which fuels A.I.), scant regulation restricting the use of it, a supportive government both in terms of policy and funding, a population not overly concerned about privacy and a vigorous tech start-up culture that now boasts one-third of the world's unicorns — start-ups valued at $1 billion or more.

Wadhwa conceded China clearly had an advantage in data, the key to training today's A.I., but said its importance may be overstated. "There will be a new generation of technologies that don't require as much data," he said. "New A.I. techniques which [will] work much differently than today's."

It may also turn out that other things are more important than data, like a culture of innovation and scientific research. And while there is uncertainty around government support for scientific research, "the U.S. still has the most vibrant innovative economy," Gans said. "It also has leadership in science on this front, and if it can nurture that, it can compete."

China still trails the United States in areas such as A.I. research talent and algorithm development, according to Weightman.

Despite government apathy, tech innovation and research projects are taking place all over America, unlike only at a "few big companies and government labs as in China," Wadhwa said. "In risk-taking and technology development, China is only a child, where America is the leader."

Gans said the freer hand of U.S. companies may also be an advantage. "China's tech giants do not operate independently of government, and there is much uncertainty there," he said. "Their U.S. counterparts are freer on many important dimensions."

There is, however, little disagreement over the potentially damaging long-term impact of the U.S. immigration policies, an area where America's loss could be China's gain.

"America's immigration policies are clearly slowing down progress by sending great people home and preventing the world's best and brightest from coming here," Wadhwa said. "This is real stupidity. The closest thing America has had to a free lunch is immigration."

Conversely, China is going all out to actively woo A.I. talent from across the globe. The country has been recruiting highly skilled engineers of Chinese descent currently working in Silicon Valley to return to China.

#### China can feasibly win this technological war --- allows it to undermine U.S. economic and military leadership

Bey, 18 --- Senior Global Analyst, Stratfor (2/6/18, Matthew, “The Coming Tech War With China,” https://worldview.stratfor.com/article/coming-tech-war-china, accessed on 6/5/18, JMP)

The United States is already in the middle of its next great war — even if it's only just starting to realize it. In the latest National Security Strategy, the White House highlighted China's growing technological prowess as a threat to U.S. economic and military might. The Asian powerhouse has taken on a leading role in several critical emerging technologies. Five years ago, by contrast, it was widely perceived as an imitator in technology, not an innovator.

As hard as it may be for Washington to admit, China is catching up in the tech race. The question now is whether tech firms in the United States, a country that embraces private enterprise and a free economy, will be able to keep up with their Chinese counterparts' breakthroughs.

The Disruptive Power of Dual-Use Technology

Chinese President Xi Jinping has made developing his country's technological capabilities a key priority, not only to wean China from its dependence on foreign technology but also to turn it into a leader in innovation. And sure enough, China is gaining ground on its rivals in the tech realm. The country has chalked up an array of impressive achievements over the past few years, including its developments in hypersonic missiles, human gene editing trials and quantum satellites. Of the many emerging technologies China is helping to advance, though, artificial intelligence is perhaps the most significant — for Beijing as well as its adversaries.

Google CEO Sundar Pichai recently posited that the advent of AI was "more profound than ... (that of) electricity or fire." If he oversold the development, he did so only slightly. AI may well be the most important technological advancement of our lifetime. What makes it so critical is that, much like aerospace technology or the internet before it, AI will have applications in military as well as civilian life — and will likely revolutionize both.

In the civilian world alone, AI has practically unlimited uses. The technology already helps power smartphone applications such as visual and audio recognition software and digital personal assistants. As global data collection rates continue to grow exponentially, AI algorithms will inevitably have to take over processing and managing the glut of information. AI will also transform the medical industry, diagnosing and treating various illnesses — to say nothing of the other white-collar jobs the technology will eventually complement or supersede.

The military applications, meanwhile, will be no less impressive. In 2016 an algorithm running on a Raspberry Pi — a $35 computer that fits in the palm of your hand — beat a retired U.S. Air Force colonel every time in a series of simulated dogfights. The computer, moreover, showed no sign of fatigue over time, unlike its human competitor. As AI continues to evolve, it will doubtless work its way onto the battlefield, driving tanks, ships and perhaps even robotic soldiers. The technology's potential for rapid data processing and analysis could give troops on the front lines a more complete picture than ever before of their enemy's position and activities. AI will probably find more applications in asymmetric warfare, too. Islamic State militants in Iraq and Syria have used drones to deliver explosives to their targets, while Houthi rebels in Yemen have deployed unmanned vessels to carry waterborne improvised explosive devices. For now, these vehicles are operated by remote control, but in time, they could give way to autonomous technology.

An Eye on AI

The possibilities of AI aren't lost on the Chinese president. In a feat of meticulous blocking, two influential books on the subject stood on the bookshelf behind Xi during his annual televised New Year's Eve address. Weeks earlier, China's Ministry of Industry and Information Technology released a three-year development plan for AI, part of a larger initiative launched in July 2017 that includes specific goals for such technologies as artificial neural network processing chips, intelligent robots, automated vehicles, intelligent medical diagnosis, intelligent drones and machine translation. China's Ministry of Science and Technology announced in November 2017 that it had formed a sort of dream team made up of the biggest Chinese tech firms — Baidu, Alibaba and Tencent — to lead the country's AI development alongside voice recognition software developer iFlytek. Each of these companies is hard at work cultivating the learning algorithms and hardware, and gathering the data, necessary to build a wide range of functional AI platforms. Baidu, for instance, has started developing open-source programs, such as the autonomous driving platform Apollo, to collect as much data as possible.

Nor is the importance of AI lost on the U.S. Department of Defense. Like his predecessor, Ash Carter, Secretary of Defense James Mattis supports the Pentagon's Defense Innovation Unit Experimental (DIUx), despite calls from Republican lawmakers to roll the project into the Defense Advanced Research Projects Agency. DIUx, headquartered in Silicon Valley, aims to ensure that the military can quickly adapt and integrate innovations that come out of California's tech hub. To that end, it awarded tech firm C3 IoT a contract late last year to develop an AI platform for the Air Force to predict when aircraft and equipment need maintenance.

In the quest to hone its AI capabilities, the Defense Department hasn't lost sight of China's own progress with the technology. The country's sheer size sets it apart from other tech innovators such as South Korea or Japan; China could scale up its rapidly increasing tech abilities and use them against the United States in a way that not even Russia has managed. With that in mind, Mattis made China's rise in tech a centerpiece of his National Defense Strategy, highlighting the U.S. government's need to strengthen ties with emerging tech companies, including AI startups.

**[graph omitted]**

A Space Race for the 21st Century

Today's mad dash for AI isn't the first technology race the United States has run. During the Cold War, the country vied against the Soviet Union to develop a variety of aerospace, nuclear and computing innovations. Washington emerged victorious from that contest; though the Soviet Union focused its efforts almost exclusively on military applications, it lacked the research and development capacity of the United States. The size of its critical industries enabled the United States to outstrip the Soviet Union in military technology while still diverting some of its attention and resources to consumer products.

Like the Soviet Union, China is interested more in national security and defense than it is in the commercial sector. The difference lies in China's size and in its economy.

The country's immensity could make it a more even match for the United States in terms of developing and adopting emerging technologies. Given that the country's population exceeds 1.3 billion people — and that data privacy is a low priority for Beijing — China offers its AI companies a big leg-up over their U.S. competitors by giving them access to a huge pool of data. Furthermore, unlike the tightly controlled Soviet economy that hindered innovation, China's hybrid economy offers individuals and companies incentive to push the boundaries in tech development. The country's model of capitalism isn't one of control, though Western media often portray Chinese tech firms as dependent on Beijing to subsidize and direct their activities. Instead, the central government outlines areas in which it would like companies to operate and provides incentives to encourage competition. AI is one of those areas, and China's tech giants are eager to outpace one another in the field. Aware that it missed the boat with smartphone technology, Baidu, for instance, has set its sights on AI as its opportunity to get an advantage over Tencent, Alibaba and Huawei.

For now, China lags behind the United States in the tech race, especially in semiconductor development. As the gap between them narrows, however, the United States will be forced to respond. The challenge for Washington will be that, unlike earlier dual-use technologies, AI applications will immediately have profound implications for the consumer electronics market. And because the Chinese and U.S. economies are highly integrated with each other, China's achievements even in the commercial sector pose a serious threat to the United States. The question for the United States isn't so much whether China can surpass it in the race to harness emerging technologies; it's how close the Asian country will come to doing so. China is large enough that its tech sector could give Silicon Valley a run for its money in terms of market share if it even comes close to producing the same technologies. For that reason, many U.S. tech firms are trying to withhold some of their advancements from defense applications in hopes of maintaining a competitive edge in the commercial sphere.

Building a Strategy

Once upon a time the United States could rest easy in the knowledge that no other country could match its combination of physical size and technological ability. Now China can. As a result, the current U.S. administration is working to develop a more robust response to the United States' budding rival. The White House's investigations into China's intellectual property policies, calls for greater scrutiny of its foreign investment activities and even proposals to nationalize the fifth generation wireless protocol, or 5G, network are all initial attempts to counter the country's rise in technology. So far, though, these initiatives have only provoked backlash in the United States.

Forging a comprehensive strategy against China will become all the more important for Washington as time goes by. The dizzying pace and unpredictable trajectory of innovation compels tech companies to constantly broaden their horizons or else jeopardize their competitiveness. But as the same firms expand their services into more and more industries, they risk running afoul of U.S. antitrust laws. The more companies such as Google, Amazon and Apple Inc. grow, the bigger the targets on their backs become. Antitrust investigations and busts in the United States, in turn, could give Chinese companies a prime opportunity to catch up to their competition.

#### Tech superiority allows the U.S. to both deter and win conflicts

England, 17 --- former secretary of the Navy and deputy secretary of Defense and currently the chairman of the National Academy of Engineering (12/6/17, Gordon, “US is losing ground on technology superiority,” <http://thehill.com/opinion/technology/363621-us-is-losing-ground-on-technology-superiority>, accessed on 6/5/18, JMP)

A long-held military maxim is to take the high ground and hold it. That may be outdated in today’s electronic and high-tech battlefields, but that notion still holds true for scientific research and engineering. Research is the foundation for engineering invention, and that leadership in engineering underpins our national security and economy. Retaining the high ground in research and engineering is necessary to deter future conflicts, win future wars and maintain our standard of living.

Modern research started about 500 years ago with the development of the printing press. Based on prior approaches, Gutenberg’s printing press made the accumulation and spread of knowledge possible. His printing press enabled widespread learning and the dissemination of new data, thereby providing the foundation for new discoveries. This same process continues today but with a more organized and funded research structure.

For the U.S., the federal commitment to research was made after World War II and housed in the Department of Defense. This decision was largely driven by the need to confront a new enemy — the USSR. That federal commitment to research and engineering generated U.S. military and economic superiority, helping to seal victory in the Cold War. It also led to early-generation microelectronics, nuclear power, GPS and the internet, among dozens more transformational discoveries and many with both military and commercial applications.

How did all this happen? The department recognized the need to stay technically ahead of the enemy. The answer was a network of research laboratories that carried out critical research to advance military technology, much of it also fueling the domestic economy. The department still has this structure but it is now part of a much larger government research and innovation ecosystem that is in partnership with commercial sector research.

In addition to the Defense Department, out of necessity to be globally competitive, the research effort now includes the Department of Energy, the National Institute of Standards and Technology, the National Science Foundation, the National Institutes of Health, university and philanthropy-funded research and a myriad of technology-based companies.

Defense Secretary Jim Mattis indicated the need for this broad inter-agency and commercial research effort in his testimony to the House Armed Services Committee. “New commercial technologies will change society, and ultimately, they will change the character of war,” Mattis said. We must carry out research, “recognize its military potential, and develop new capabilities.”

Yet, we’re seemingly not doing enough to keep the research high ground. The Heritage Foundation recently released its index of military strength. After analyzing various essential components, Heritage ranked the capability of the U.S. Army and U.S. Marines as “marginal” and the U.S. Navy as “weak.” Reviews of our nation’s research capability — by Information Technology and Innovation Foundation and the American Academy of Arts & Science — likewise show that we’re losing ground. Assessments like these are always problematic, but they all indicate a common troubling finding: The U.S. is on a downward trend.

What this means is that our federal laboratories and research institutions aren’t aggressive enough and that the Defense Department is not reaping the rewards of the larger and more competitive commercial sector. Without the competition in the commercial sector that drives rapid innovation and engineering application, the government programs lack urgency. Agencies relying on up-to-date technology and innovation all need bolder and more urgent research plans, and Defense Department needs to more quickly convert the research results into engineering applications to deter, and when necessary, win future conflicts.

Equally important, all these agencies need to break through the barrier of accessing research from the commercial sector. Token steps have been taken but a necessary first step to attract the commercial sector is to dramatically reduce bureaucracy. For the Defense Department that means shaving the voluminous pages of acquisition regulations.

There are very few eureka moments when it comes to scientific breakthroughs. Rather, like Gutenberg’s printing press, scientific advances rely on prior knowledge. As knowledge accumulates, new knowledge is uncovered ever faster. But with this acceleration comes the need for ever more sophisticated equipment, highly educated and experienced researchers and a complex infrastructure of support.

All this takes money, but equally important it requires a predicable source of funding over multiple years. And here the White House and the Congress can be helpful — or not. Funding disruptions, common now at the federal level, cause havoc in the scientific community. It is detrimental to the economy and a disservice to the men and women who serve in the military and to all the nation’s research institutions.

The U.S. military and economy are based on technology superiority and that superiority is underpinned by being the best in the world in research and engineering innovation. Other nations understand this all too well, and they are accelerating their research programs while we seemingly stumble and falter. We do so at our peril.

#### A.I. dominance is critical to prevent war with Russia and China --- other forms of traditional deterrence will fail

Dale & Herbeck, 18 --- \*space operations officer in the United States Air Force, graduate of the Air Force Weapons School and has operational experience in intercontinental ballistic missiles, space-based intelligence collection, and operational level planning at the 609th Air and Space Operations Center, AND \*\*space operations officer in the United States Air Force, graduate of the Air Force Weapons School and has operational experience in both ground-based and space-based missile warning, and operational level planning (3/28/18, Aryan & Brendon, “21st Century Strategic Deterrence: “Beyond Nuclear”” <https://othjournal.com/2018/03/26/21st-century-strategic-deterrence-beyond-nuclear/>, accessed on 6/6/18, JMP)

Introduction

For half of the 20th Century, Warsaw Pact and NATO countries alike wrote the book for how deterrence theory should be applied. In particular, nuclear deterrence played a significant role in the way the U.S. built its national security strategy. Nuclear deterrence was so pervasive that the very word “deterrence” itself became synonymous with nuclear deterrence. However, according to General John Hyten, Commander, U.S. Strategic Command, strategic deterrence in the 21st century does not equate to 20th century deterrence. Strategic deterrence is a multi-polar, multi-domain problem and it is fundamentally different now than it was in last century. The myopic focus on nuclear options in a national deterrence strategy falls short of the critical thinking required to provide U.S. national leaders with the options necessary for effective decision making. Today’s complex social-political environment requires more than just a nuclear element for strategic deterrence to be effective against a diverse set of adversaries. Deterrence today must leverage all six domains of warfare.

So what is deterrence? According to DoD Joint Publication 1, deterrence “influences potential adversaries not to take threatening actions” for fear of the overwhelming retaliation from U.S. military might. More simply, deterrence could be any action that convinces an adversary to not act due to perceived unacceptable costs or because “the probability of success [is assessed to be] extremely low.” For an adversary to believe costs will be unacceptable or that there is a low probability of success, it must assess the U.S. threat as credible and capable, regardless of whether it is nuclear or conventional. Deterrence hinges on the adversary’s assessment of credibility and capability. During the Cold War the Soviet Union believed that use of nuclear weapons would lead to an overwhelming retaliation from the U.S.; and therefore, striking any NATO allies with nuclear weapons was not worth the cost.

Effects of a Multi-Polar Environment

The end of the Cold War brought to a close 50 years of a bi-polar world, and with it the simplicity of employing one strategy to deter a single adversary. The multi-polar world of today brings adversaries who are motivated differently. Both rational and irrational actors must be considered, which also causes national leaders to question the level of success strategic deterrence has on an adversary. Generally, it is believed strategic deterrence is effective only against a rational actor, and not an irrational actor. This is due to the perception that a rational actor will take into account some form of cost-benefit analysis prior to acting versus the irrational actor who might act without any consideration of the losses.

Further complicating the world environment is that potential adversaries are watching and learning from U.S actions. This is not a new concept as adversaries have been studying each other for thousands of years to gain advantage. But General Hyten reminded us in a speech last fall that “in a multi-polar world, everybody watches you [the U.S.] everywhere.” His point was to highlight that since the fall of the Soviet Union, the U.S. has had a spotlight on it where adversaries have been studying the asymmetric advantages of the U.S. and creating specific capabilities and methods to counter those advantages. Thus, we must now recognize that a deterrent method of the past may not be viable in the future. The U.S. must seek out new deterrent strategies.

Nuclear versus Strategic Deterrence

Nuclear deterrence remains the foundation of U.S. deterrence strategy. However, nuclear deterrence cannot be the sole pillar of strategic deterrence since nuclear deterrence is not a one-size-fits-all solution. The most recent National Security Strategy (NSS) reflects this requirement to expand deterrence. As Brian Willis points out in the recent “Multi-domain ops at the Strategic Level” article, the recent NSS and Nuclear Posture Review (NPR) make strides to extend deterrence to the space and cyberspace domains. Creating non-nuclear deterrence options for use against potential adversaries is critical, especially against those actors who do not possess nuclear weapons. Michael Gerson suggests the nuclear taboo reduces the credibility—and therefore the utility—of nuclear weapons, especially against regimes not possessing nuclear weapons or other weapons of mass destruction. This thought process feeds back to the concept of credibility. The adversary must know the capability exists and the U.S. is willing to use it. The U.S. must consider a more balanced approach to deterrence as two of its near-peer adversaries have done. China and Russia are starting to demonstrate new ideas and concepts about strategic deterrence. This new “deterrence” does not solely focus on nuclear weapons or even the military instrument of power. China defines this new way of thinking as “Integrated Strategic Deterrence” while the Russians have called it “Cross-Domain Coercion.”

People’s Republic of China Approach to Deterrence

The PRC’s approach is not focused on preventing actions in a given domain but about achieving certain political goals. Around 2001, PRC military literature started discussing a concept known as “Integrated Strategic Deterrence” which focuses on nonmilitary aspects of national power—diplomatic, economic, and scientific and technological strength—contributing to strategic deterrence alongside space and cyber capabilities. These actions could include demonstrating new capabilities through tests and exercises where international observers are watching, owning the majority of mineral mines that hold a certain type of element, or working with partner countries to launch a new satellite that helps map future droughts and plots areas that are farmable.

In 2007, the PRC tested an antisatellite (ASAT) technology demonstrator against a non-operational weather satellite. This test was publicized as a future scientific technology demonstration. This test demonstrated the PRC had a capability to engage satellites in Low Earth Orbit, which has now been turned over to the People’s Liberation Army (PLA) and is considered an operational military capability. It is also now a credible strategic deterrent in the space domain.

Another piece to the PRC’s deterrence is their dam building operations for water control and hydropower. According to open sources, the PRC owns 45% of the world’s dams with its nearest competitors being the United States at 14% and India at 9%. Dams have the potential to turn water into political weapons to be wielded in war, or instruments during peace to influence actions or behaviors of a neighbor. India is currently concerned with a number of China dam projects and their ability to reduce river flows into India.

The PRC’s “Integrated Strategic Deterrence” does not come without challenges. Unlike the U.S. who has the Department of Defense and Department of State coordinating different types of deterrent actions, the absence of an entity in the PLA to integrate and coordinate the employment of these capabilities makes it difficult to execute. However, it would come as no surprise to the casual observer to see the PLA start executing military, space, and cyber coercive activities in national level exercises in order to move “Integrated Strategic Deterrence” from theory and conjecture to fully operational in limited regional conflicts.

Russia’s Approach to Deterrence

The PRC is not the only competitor thinking about strategic deterrence from a non-nuclear perspective. About 30 years ago, Soviet literature introduced a concept we now know as Reflexive Control. This notion centers on the idea of driving your opponent to make decisions that are advantageous to you. This is commonly achieved through misinformation, either via “leaks” or providing a possible explanation to an unrelated event that causes your opponent to divert attention or respond. That concept has now evolved into “Cross-Domain Coercion.”

“Cross Domain Coercion” is Russia’s ability to orchestrate non-nuclear and informational influence to coerce an adversary. It maintains opaqueness that clouds the nature of aggression as well as the aggressor’s identity. This informational influence was apparent during both the United States elections in 2016 and Catalonia’s bid for independence from Spain in 2017. Multiple United States intelligence agencies have noted Russian misinformation on social media and mass media outlets. This campaign is a prime example of “Cross Domain Coercion” and used a soft instrument of power, in this case information, as a form of deterrence on a global scale. The purpose of this interference is still clouded but it must have satisfied Russian objectives if it was used in Catalonia months after the United States election.

Another form of this type of deterrence is Russia’s cyber-attacks in both Estonia in 2007, and Georgia in 2008. In both cases, the attacks were not solely focused on military targets but against government institutions, banks, ministries, newspapers, and broadcasters. These attacks were meant to confuse the population and drive the government towards compliance with Russian demands.

Whatever the objectives, Russia has telegraphed that future attacks will fall under “Cross Domain Coercion”. The threats against financial and economic institutions as well as those of energy sources will be activated in conjunction with the military component of coercion, such as special operations forces and strategic strike systems in order to influence the target country. With both the PRC and Russia, strategic deterrence is no longer monopolized by nuclear weapons. 21st century deterrence is dam building that has regional implications on precious resources and misinformation campaigns such as Deepfakes where machine learning systems can be trained to paste one person’s face onto another person’s body, complete with facial expressions, and could change the outcome of democratic elections.

U.S. Multi-Domain Strategic Deterrence

Consideration of deterrent effects other than kinetic weapons must be explored. Strategic deterrence “applies to cyber, it applies to missile defense, and it applies to electronic warfare. It applies to every mission in U.S. Strategic Command.” Currently, an adversarial attack can come through any domain, and that is why the U.S. must leverage the multiplicative advantages of all domains. An adversary who is not deterred by a nuclear response may be deterred by fear of a cyber effect which degrades or destroys a country’s economic stability. Or it could be negotiations in the human domain which threaten sanctions against a country’s ability to trade. Maybe it is the threat of an information operations campaign with the goal of removing a governmental regime from power and destabilizing a nation state. Regardless of deterrence method, the adversary must perceive the U.S. as capable and willing to commit to the action for it to be an effective deterrent. The first step for the U.S. is talking about capabilities more openly so adversaries know about our capabilities and the conditions under which they would be employed. This does not mean we share the technical details of a capability, those should remain secret, but a general understanding of the effect created by the capability must be understood. Adversaries are not deterred by a capability if they do not know it exists.

Future Technologies and Deterrence

Technologies on the horizon have huge implications for the future of strategic deterrence. Hypersonic weapons have the capability of delivering multiple payload types to worldwide targets while rendering missile warning detection and missile defense programs obsolete.

Quantum computing has the ability to make encryption unbreakable unless you have quantum technology and increase transmission speeds to levels unheard of in today’s environment. This could deter an adversary from ever trying to break your encryption unless they spend the money to harness quantum computing. Finally, Artificial Intelligence (AI) and “combat cloud” services allow computers to easily share information and make decisions involving civil and economic processes to military tasks without ever needing human interaction. AI comes with colossal opportunities, but also threats that are difficult to predict. According to Putin, whoever becomes the leader in AI will become the ruler of the world.

Leading the Target

The one commonality in the previous paragraph is that the U.S. is arguably not the leader in any of the technologies listed above. The question is why. The U.S. recognizes the threat but does not seem to recognize deterrence in the same lenses as our adversaries. With all of the historic examples above plus the developing technologies, our adversaries are coming up with new deterrence strategies that go beyond nuclear weapons. If the U.S. wants credible 21st century strategic deterrence, we need to look no further than recent PRC and Russian actions. They have shown us that the blueprint to strategic deterrence lies in economic expansion, information attacks, and future technologies. The U.S. needs to start rewriting the textbooks on what strategic deterrence means and start exploring new technologies such as Quantum Computing and AI and how we can leverage them through all instruments of national power and all domains. If the U.S. does not act soon, we could be deterred from intervening in future conflicts that protects our vital interests or closest allies.

#### Global crises are *inevitable* – failure to preserve deterrence risks escalation and nuclear war

Traverton 17 (Gregory Treverton, former president of the Pacific Council on International Policy, senior fellow at the Council on Foreign Relations, Chairman, National Intelligence Council, “Global Trends: Paradox of Progress,” January 2017, <https://www.dni.gov/files/documents/nic/GT-Full-Report.pdf>)

These global trends, challenging governance and changing the nature of power, will drive major consequences over the next five years. They will raise tensions across all regions and types of governments, both within and between countries. These near-term conditions will contribute to the expanding threat from terrorism and leave the future of international order in the balance. Within countries, tensions are rising because citizens are raising basic questions about what they can expect from their governments in a constantly changing world. Publics are pushing governments to provide peace and prosperity more broadly and reliably at home when what happens abroad is increasingly shaping those conditions. In turn, these dynamics are increasing tensions between countries—heightening the risk of interstate conflict during the next five years. A hobbled Europe, uncertainty about America’s role in the world, and weakened norms for conflict-prevention and human rights create openings for China and Russia. The combination will also embolden regional and nonstate aggressors—breathing new life into regional rivalries, such as between Riyadh and Tehran, Islamabad and New Delhi, and on the Korean Peninsula. Governance shortfalls also will drive threat perceptions and insecurity in countries such as Pakistan and North Korea. Economic interdependence among major powers remains a check on aggressive behavior but might be insufficient in itself to prevent a future conflict. Major and middle powers alike will search for ways to reduce the types of interdependence that leaves them vulnerable to economic coercion and financial sanctions, potentially providing them more freedom of action to aggressively pursue their interests. Meanwhile, the threat from terrorism is likely to expand as the ability of states, groups, and individuals to impose harm diversifies. The net effect of rising tensions within and between countries—and the growing threat from terrorism—will be greater global disorder and considerable questions about the rules, institutions, and distribution of power in the international system. Europe. Europe’s sharpening tensions and doubts about its future cohesion stem from institutions mismatched to its economic and security challenges. EU institutions set monetary policy for Eurozone states, but state capitals retain fiscal and security responsibilities—leaving poorer members saddled with debt and diminished growth prospects and each state determining its own approach to security. Public frustration with immigration, slow growth, and unemployment will fuel nativism and a preference for national solutions to continental problems. Outlook: Europe is likely to face additional shocks—banks remain unevenly capitalized and regulated, migration within and into Europe will continue, and Brexit will encourage regional and separatist movements in other European countries. Europe’s aging population will undermine economic output, shift consumption toward services—like health care—and away from goods and investment. A shortage of younger workers will reduce tax revenues, fueling debates over immigration to bolster the workforce. The EU’s future will hinge on its ability to reform its institutions, create jobs and growth, restore trust in elites, and address public concerns that immigration will radically alter national cultures. United States. The next five years will test US resilience. As in Europe, tough economic times have brought out societal and class divisions. Stagnant wages and rising income inequality are fueling doubts about global economic integration and the “American Dream” of upward mobility. The share of American men age 25- 54 not seeking work is at the highest level since the Great Depression. Median incomes rose by 5 percent in 2015, however, and there are signs of renewal in some communities where real estate is affordable, returns on foreign and domestic investment are high, leveraging of immigrant talent is the norm, and expectations of federal assistance are low, according to contemporary observers. Outlook: Despite signs of economic improvement, challenges will be significant, with public trust in leaders and institutions sagging, politics highly polarized, and government revenue constrained by modest growth and rising entitlement outlays. Moreover, advances in robotics and artificial intelligence are likely to further disrupt labor markets. Meanwhile, uncertainty is high around the world regarding Washington’s global leadership role. The United States has rebounded from troubled times before, however, such as when the period of angst in the 1970s was followed by a stronger economic recovery and global role in the world. Innovation at the state and local level, flexible financial markets, tolerance for risk-taking, and a demographic profile more balanced than most large countries offer upside potential. Finally, America is distinct because it was founded on an inclusive ideal—the pursuit of life, liberty, and happiness for all, however imperfectly realized—rather than a race or ethnicity. This legacy remains a critical advantage for managing divisions. Central and South America. Although state weakness and drug trafficking have and will continue to beset Central America, South America has been more stable than most regions of the world and has had many democratic advances—including recovery from populist waves from the right and the left. However, government efforts to provide greater economic and social stability are running up against budget and debt constraints. Weakened international demand for commodities has slowed growth. The expectations associated with new entrants to the middle class will strain public coffers, fuel political discontent, and possibly jeopardize the region’s significant progress against poverty and inequality. Activist civil society organizations are likely to fuel social tensions by increasing awareness of elite corruption, inadequate infrastructure, and mismanagement. Some incumbents facing possible rejection by their publics are seeking to protect their power, which could lead to a period of intense political competition and democratic backsliding in some countries. Violence is particularly rampant in northern Central America, as gangs and organized criminal groups have undermined basic governance by regimes that lack capacity to provide many basic public goods and services. Outlook: Central and South America are likely to see more frequent changes in governments that are mismanaging the economy and beleaguered by widespread corruption. Leftist administrations already have lost power in places like Argentina, Guatemala, and Peru and are on the defensive in Venezuela, although new leaders will not have much time to show they can improve conditions. The success or failure of Mexico’s high-profile reforms might affect the willingness of other countries in the region to take similar political risks. The OECD accession process may be an opportunity—and incentive— for some countries to improve economic policies in a region with fairly balanced age demographics, significant energy resources, and well-established economic links to Asia, Europe, and the United States. An Inward West? Among the industrial democracies of North America, Europe, Japan, South Korea, and Australia, leaders will search for ways to restore a sense of middle class wellbeing while some attempt to temper populist and nativist impulses. The result could be a more inwardly focused West than we have experienced in decades, which will seek to avoid costly foreign adventures while experimenting with domestic schemes to address fiscal limits, demographic problems, and wealth concentrations. This inward view will be far more pronounced in the European Union, which is absorbed by questions of EU governance and domestic challenges, than elsewhere. The European Union’s internal divisions, demographic woes, and moribund economic performance threaten its own status as a global player. For the coming five years at least, the need to restructure European relations in light of the UK’s decision to leave the EU will undermine the region’s international clout and could weaken transatlantic cooperation, while anti-immigration sentiments among the region’s populations will undermine domestic political support for Europe’s political leaders. Questions about the United States’ role in the world center on what the country can afford and what its public will support in backing allies, managing conflict, and overcoming its own divisions. Foreign publics and governments will be watching Washington for signs of compromise and cooperation, focusing especially on global trade, tax reform, workforce preparedness for advanced technologies, race relations, and its openness to experimentation at the state and local levels. Lack of domestic progress would signal a shift toward retrenchment, a weaker middle class, and potentially further global drift into disorder and regional spheres of influence. Yet, America’s capital, both human and security, is immense. Much of the world’s best talent seeks to live and work in the United States, and domestic and global hope for a competent and constructive foreign policy remain high. China. China faces a daunting test—with its political stability in the balance. After three decades of historic economic growth and social change, Beijing, amid slower growth and the aftereffects of a debt binge, is transitioning from an investment-driven, export-based economy to one fueled by domestic consumption. Satisfying the demands of its new middle classes for clean air, affordable houses, improved services, and continued opportunities will be essential for the government to maintain legitimacy and political order. President Xi’s consolidation of power could threaten an established system of stable succession, while Chinese nationalism—a force Beijing occasionally encourages for support when facing foreign friction—may prove hard to control. Outlook: Beijing probably has ample resources to prop up growth while efforts to spur private consumption take hold. Nonetheless, the more it “doubles down” on state owned enterprises (SOEs) in the economy, the more it will be at greater risk of financial shocks that cast doubt on its ability to manage the economy. Automation and competition from lowcost producers elsewhere in Asia and even Africa will put pressure on wages for unskilled workers. The country’s rapidly shrinking working-age population will act as a strong headwind to growth. Russia. Russia’s aspires to restore its great power status through nationalism, military modernization, nuclear saber rattling, and foreign engagements abroad. Yet, at home, it faces increasing constraints as its stagnant economy heads into a third consecutive year of recession. Moscow prizes stability and order, offering Russians security at the expense of personal freedoms and pluralism. Moscow’s ability to retain a role on the global stage—even through disruption—has also become a source of regime power and popularity at home. Russian nationalism features strongly in this story, with President Putin praising Russian culture as the last bulwark of conservative Christian values against the decadence of Europe and the tide of multiculturalism. Putin is personally popular, but approval ratings of 35 percent for the ruling party reflect public impatience with deteriorating quality of life conditions and abuse of power. Outlook: If the Kremlin’s tactics falter, Russia will become vulnerable to domestic instability driven by dissatisfied elites— even as a decline in status suggests more aggressive international action. Russia’s demographic picture has improved somewhat since the 1990s but remains bleak. Life expectancy among males is the lowest of the industrial world, and its population will continue to decline. The longer Moscow delays diversifying its economy, the more the government will stoke nationalism and sacrifice personal freedoms and pluralism to maintain control. An Increasingly Assertive China and Russia. Beijing and Moscow will seek to lock in temporary competitive advantages and to right what they charge are historical wrongs before economic and demographic headwinds further slow their material progress and the West regains its footing. Both China and Russia maintain worldviews in which they are rightfully dominant in their regions and able to shape regional politics and economics to suit their security and material interests. Both have moved aggressively in recent years to exert greater influence in their regions, to contest the US geopolitically, and to force Washington to accept exclusionary regional spheres of influence—a situation that the United States has historically opposed. For example, China views the continuing presence of the US Navy in the Western Pacific, the centrality of US alliances in the region, and US protection of Taiwan as outdated and representative of the continuation of China’s “100 years of humiliation.” Recent Sino-Russian cooperation has been tactical, however, and is likely to return to competition if Beijing jeopardizes Russian interests in Central Asia and as Beijing enjoys more options for cheap energy supply beyond Russia. Moreover, it is not clear whether there is a mutually acceptable border between what China and Russia consider their natural spheres of influence. Meanwhile, India’s growing economic power and profile in the region will further complicate these calculations, as New Delhi navigates relations with Beijing, Moscow, and Washington to protect its own expanding interests. Russian assertiveness will harden anti-Russian views in the Baltics and other parts of Europe, escalating the risk of conflict. Russia will seek, and sometimes feign, international cooperation, while openly challenging norms and rules it perceives as counter to its interests and providing support for leaders of fellow “managed democracies” that encourage resistance to American policies and preferences. Moscow has little stake in the rules of the global economy and can be counted on to take actions that weaken US and European institutional advantages. Moscow will test NATO and European resolve, seeking to undermine Western credibility; it will try to exploit splits between Europe’s north and south and east and west, and to drive a wedge between the United States and the EU. Similarly, Moscow will become more active in the Middle East and those parts of the world in which it believes it can check US influence. Finally, Russia will remain committed to nuclear weapons as a deterrent and as a counter to stronger conventional military forces, as well as its ticket to superpower status. Russian military doctrine purportedly includes the limited use of nuclear weapons in a situation where Russia’s vital interests are at stake to “deescalate” a conflict by demonstrating that continued conventional conflict risks escalating the crisis to a large scale nuclear exchange.

#### New impact: Resource Wars

#### Tech development and innovation are inevitable --- a U.S. lead process is key to equitable distribution of resources necessary to check a global populist backlash against immigrants and trade

Wadhwa, 17 --- distinguished fellow at the Integrated Innovation Institute, Carnegie Mellon University (3/1/17, Vivek, “Boost visas for foreign entrepreneurs,” <https://www.nature.com/news/boost-visas-for-foreign-entrepreneurs-1.21544>, accessed on 5/29/18, JMP)

Immigration has become a toxic subject. In the United States, President Donald Trump is trying to ban or block the entry of refugees and of people from Mexico and parts of the Middle East. Other nations, from the United Kingdom, France and Germany to Australia and Thailand, face political pressure to curb numbers of incomers.

Anger at the erosion of national competitiveness is the root of the rage in the United States, in my view. Increasing financial inequity, changing racial and ethnic demographics and a widening knowledge gap between technology haves and have-nots are other factors. Immigrants and global trade have become the scapegoats.

Blaming foreigners is not new; it happens when people feel disenfranchised. Throughout US history, each wave of immigrants has forced preceding generations to compete. Newcomers often achieve great success, and face resentment. Chinese engineers helped to build US railways in the nineteenth century, but faced riots and even massacres because they were hired on cheap wages preferentially over whites. The Italian immigrants who came after them were blamed for everything from domestic radicalism to organized crime. Then it was the Poles, the Japanese and the Germans who faced abuse.

The United States has gained tremendously from foreign-born inventors. From Alexander Graham Bell, the Scot who invented the telephone, and Nikola Tesla, the Serbian who invented the laser and radio remote control, to Albert Einstein and the wave of scientists fleeing Nazi Germany, immigrants have made the United States the world's leader in technology. Indian and Chinese entrepreneurs fuelled the dot-com boom in the late 1990s. A South African, Elon Musk, founded Tesla Motors and the aerospace firm SpaceX.

But in the past decade, skilled immigration has stalled. Flaws in the US visa system make it hard for well-educated and experienced immigrants to stay. Rather than set up companies and create employment in the United States, foreign-born scientists and engineers have been returning home, taking their ideas and inventions with them. As a result, innovation has become global and the technology playing field has levelled across the world (see go.nature.com/2kmqmjq).

Now, as dark clouds of nativism swirl around Capitol Hill, the country's leaders face an important choice. They can play the populism card, close the doors and watch US global competitiveness fall — or they can welcome the world's best and brightest to boost innovation and create jobs. Technology will advance with or without the United States. The nation needs to decide whether it wants the innovators on its side. Other countries seeking to limit immigration should ask themselves the same question.

Global innovation

Today, Internet companies in China, such as Alibaba, Baidu and Tencent, are among the most innovative and valuable in the world. Facebook has mimicked features of their products; Apple has been accused of copying Chinese innovations in the iPhone 7; and search engine Baidu's artificial-intelligence system is more advanced than Siri. Chinese scientists will soon lead the pack on applying CRISPR–Cas9 gene-editing technology (see, for instance, Nature 539, 479; 2016). India has sent an orbiter to Mars and launched a record-breaking 104 satellites from a single rocket. Its new platform for digital currencies, India Stack, may allow its financial system to leapfrog that of the West. Chilean scientists have built cheap technologies that sanitize water by temporarily changing it into a plasma phase. South Korea has built autonomous cars that it aims to have on its roads before the Pyeongchang Winter Olympic Games in 2018.

One measure of globalization is the number of 'unicorns', technology start-up firms valued at US$1 billion or more. As recently as 2000, nearly all of these were in the United States; other countries could only dream of creating a Google, Amazon or Facebook. By February 2017, of the 213 unicorns in the world, China had given birth to 55 and India 10. The United States is home to only 110 (see 'Global entrepreneurship' and go.nature.com/2fqy5qw); half of those have at least one immigrant founder1 (see 'Foreign talent'). The US share of unicorns is shrinking, and Silicon Valley is facing unprecedented competition.

Gone are the days when, owing to the high costs of the core technologies, US and European research labs held a monopoly on large-scale innovations. Whereas early generations of supercomputers cost tens of millions of dollars, today's smartphones, which outperform them, cost as little as $30. Sensors, artificial intelligence, robotics, genomics and 3D-printing technologies are globally available and inexpensive. Anyone, anywhere, can use these to build world-changing products. Government-built walls of visas and travel restrictions are no barriers to innovation, only to economic growth.

Brain drain

The contributions of immigrants to tech companies are well documented. In 1999, regional economist AnnaLee Saxenian at the University of California, Berkeley, found2 that Chinese and Indian executives were at the helm of 24% of the businesses started in Silicon Valley between 1980 and 1998. That proportion doubled the following decade. My research team worked with her to show that between 1995 and 2005, foreign-born innovators founded 52.4% of technology companies in Silicon Valley and 25.3% nationwide3. We also showed that immigrants generated $52 billion in revenue and employed 450,000 workers in 2005. They filed the majority of patents at technology companies such as Qualcomm (72%) and Cisco (60%), and more than 40% of US government-filed international patent applications had foreign authors4.

Then things changed. A backlog of applications built up for employment-based visas that allow permanent residency (green cards). With sociologist Guillermina Jasso of New York University, we analysed this backlog. As of 1 October 2006, there were almost half a million applicants (more than one million when family members were included). Because only about 120,000 visas are available each year, getting a green card can take a decade5. We forecast that this wait would increasingly frustrate highly skilled workers, leading to a 'reverse brain drain'.

Indeed, by 2012, my team found that immigrant entrepreneurship had stalled. The proportion of companies founded by immigrants fell nationwide to 24.3% and in Silicon Valley to 43.9% (ref. 6). We believe from anecdotal evidence that highly skilled workers are returning to their home countries in even larger numbers today.

These are the people who set up the unicorns in countries such as China and India. Each of those companies has one or more US returnees in senior leadership positions, and restrictive US immigration policies put them there.

Two decades ago, it was the norm for students who came to the United States from China and India to want to stay. No longer. On graduating from engineering courses, most overseas students say that they will work for a short time to gain experience, then return home7. Human-resource directors of companies in India and China tell me that they are flooded with CVs from students from US universities. Working for an exciting start-up such as Baidu or Alibaba is more enticing than being locked into a menial US position for a decade awaiting your green card.

When I visit technology centres in China and India, and increasingly in places such as Mexico City or Santiago in Chile, I see a beehive of start-up activity. As well as social-media and Internet applications, overseas entrepreneurs are designing wearable medical devices, robots, drone-based delivery systems, microsatellites and agricultural-automation systems. They are building self-driving cars, solar technologies and 3D-printing systems to solve global problems.

Meanwhile, the US visa backlog is climbing. I estimate that there are more than 1.5 million skilled workers in immigration limbo in the United States today. Each one is a lost opportunity and a waste of talent.

Everyone loses. The precarious position of foreign-national staff leaves them open to mistreatment by their employers. Rules prevent employees from changing jobs while waiting for their green cards — even to other jobs in the same company. H-1B visas for temporary stays allow employers to replace US workers with people who are paid less than they should be, given their skills. This is one of Silicon Valley's darkest secrets — and it is why tech companies lobby for more H-1B visas rather than more green cards. Skilled people become frustrated as their careers stagnate. The jobs that would have been created in start-ups go overseas.

Unless it changes its immigration outlook, the United States will forgo economic benefits and jobs in a misguided effort to protect both. It will have to watch as the rest of the world leaps ahead. It doesn't have to be this way.

Embrace outsiders

The United States needs to expand the number of permanent-resident visas and clear the backlog. These people are already working in the country legally, and have the experience and skills needed. Retaining them will boost the economy. Accelerated granting of permanent residency could be contingent on buying a house, making investments or starting companies that create jobs. Imagine the benefits of 10,000 new technology start-ups.

We need to make it easy for entrepreneurs abroad to bring start-up firms to the United States. One solution is to provide a 'start-up visa' as a path to permanent residency. This would perhaps be valid for five years, with an upgrade to permanent residency dependent on the firm's employment of US workers. The Kauffman Foundation in Kansas City, Missouri, has estimated that such a visa would create 1.6 million jobs within 10 years and boost the US economy by $224 billion a year8.

The solution to the mistreatment of foreign workers is easy: untether the H-1B visa from the employer. Let people change jobs, and let the market decide what their salaries should be. This would remove the financial incentives for companies to replace Americans with cheaper foreign workers, and would encourage them to hire the best talent.

By becoming the best place in the world for entrepreneurs to study and work in, the United States could again be in the driving seat of technology innovation. Then we can share the resulting prosperity in a more equitable way to mitigate the anger of the electorate.

### Plan

#### The United States federal government should substantially raise the annual limit for employment-based immigrants, eliminate the per-country limits for employment-based immigrants, and exempt the dependents of sponsored immigrants and individuals with graduate degrees in science and engineering fields from the numerical limit.

### Solvency

#### Plan solves by allowing the U.S. to attract sufficient number of permanent skilled immigrants to meet technological needs

Anderson, 5/21/18 --- executive director of the National Foundation for American Policy, a non-partisan public policy research organization focusing on trade, immigration and related issues, former Executive Associate Commissioner for Policy and Planning and Counselor to the Commissioner at the Immigration and Naturalization Service (Stuart, “Will Congress Ever Solve The Long Wait For Green Cards?” <https://www.forbes.com/sites/stuartanderson/2018/05/21/will-congress-ever-solve-the-long-wait-for-green-cards/#34b77973763c>, accessed on 6/7/18, JMP)

If Congress fails to pass new legislation, some of the most highly skilled professionals in America will be forced to leave the country or wait decades for employment-based green cards. How did America become mired in such a mess and what can be done to fix the problem?

The Origins of the Problem

Back in 1990, when the Immigration Act of 1990 was passed, Congress had a chance to secure America’s future as a magnet for top talent from all over the world. It failed in this mission.

First, Congress changed the existing H-1 temporary visa category to H-1B, added new requirements and set an annual limit of 65,000. Employers reached this limit within 6 years – and have also reached it every year for the past 16 fiscal years, encouraging companies to place more workers outside the U.S.

Second, Congress set an annual limit of 140,000 on employment-based green cards (for permanent residence). More than 20,000 of the green cards each year are devoted to immigrant investors, workers for jobs that don’t require a college degree, religious workers and others. More importantly, dependents (spouses and children) count against the 140,000 annual limit, accounting for about half of the total each year.

Third, the Immigration Act of 1990 unwisely retained per-country limits on employment-based immigrants. This continues to make no sense. It would be discrimination if a company said it will only hire a certain number of people of Chinese origin this year, yet collectively U.S. employers are only allowed to gain permanent residence for a limited number of people from any one country. Companies should not care where a person was born and neither should Congress.

Due to the combination of the per-country limit and 140,000 employment-based green card allotment, the National Foundation for American Policy estimates an Indian-born professional in the third preference (EB-3) can wait 10 to 25 years or longer for an employment-based green card. I have met dozens of individuals who have already waited more than 10 years for a green card.

Congress Misses the Technological Revolution

A key reason members of Congress failed in setting workable employment-based immigration limits in 1990 is they lacked imagination – or any sense of our technological future. In short, new technologies created a demand for people with technical skills well beyond the annual limits on H-1B visas and employment-based green cards established in the Immigration Act of 1990.

Back in 1990, the World Wide Web did not exist on a global basis for individuals and nobody knew that e-commerce would become a key aspect of economic life for many consumers. Streaming video? Streaming music? Social media? Online multiplayer video games? Those who set our immigration limits could not have anticipated any of these developments. Establishing flexible or market-based limits, instead of fixing in place rigid caps, would have made a great difference.

Consumer devices, most notably the smartphone, have spawned new industries. Just like Netflix couldn’t have sent bulky videotapes through the mail before the invention of DVDs, Uber and Lyft could not exist without smartphones.

New advances continue to fuel the demand for skilled labor in the U.S. And this comes at a time when only about 20% of the full-time graduate students at U.S. universities in computer science and electrical engineering are U.S. citizens (or permanent residents). “Emerging technologies, such as driverless vehicles, may also be increasing the demand for people with high levels of technical skill, including foreign-born researchers,” noted a recent National Foundation for American Policy report. “Tesla (207 approved new H-1B petitions in FY 2017), Uber (158) and General Motors (179) all employ individuals in H-1B status.”

**The Solution**

This is actually an easy problem to fix. Congress needs to take three steps. First, to alleviate the burden on those waiting the longest, Congress could pass H.R. 392. With 323 cosponsors, the bill has achieved a level of bipartisan support unheard of in this age of polarization.

“Due to an arbitrary per-country cap in the employment-based green card laws, immigrants who come here legally on work visas from India or China face a massive backlog for obtaining their permanent residence,” H.R. 392’s chief sponsor, Rep. Kevin Yoder (R-KS), told me in an interview. “If you do some simple math, you’ll realize many of these individuals will go their entire lives without ever getting their green card. Whereas, there are individuals who come here from other smaller nations that can get one in a matter of two to three years.”

Yoder’s bill would transition to an immigration system that operates without per-country limits in the employment categories. That would dramatically reduce the wait times for those who have already been waiting a decade or more and allow all new entrants to gain permanent residence in a more reasonable time frame.

Second, Congress should raise the annual limit well above the 140,000 now permitted each year for employment-based immigrants.

Third, Congress should exempt the dependents of sponsored immigrants from the numerical limit, as well individuals with graduate degrees in science and engineering fields.

For those who worry this will lead to fewer jobs for U.S. workers, well, stop worrying. “The results of the state-level analysis indicate that immigration does not increase U.S. natives’ unemployment or reduce their labor force participation,” according to a study for the National Foundation for American Policy by economist Madeline Zavodny. “Instead, having more immigrants reduces the unemployment rate and raises the labor force participation rate of U.S. natives within the same sex and education group.”

The Benefits of Solving the Problem

Enacting these reforms is a humane solution that will benefit America economically. If U.S. companies can retain and attract top talent they will better compete in global markets and create more jobs in America. A solution would also help people like Sunayana Dumala.

In February 2017, a racist gunman yelled, “Get out of my country” and shot Srinivas Kuchibhotla and another H-1B visa holder (Alok Madasani) at Austins Bar & Grille in Olathe, Kansas. (Ian Grillot was shot trying to disarm the shooter.) Srinivas Kuchibhotla’s employer applied for his green card in 2010. Because of the per-country limit and numerical restrictions in the employment-based category, the long wait meant Srinivas died before his application was approved. Without permanent residence, his widow, Sunayana Dumala, has no legal right to live permanently in the United States. Rep. Yoder has worked to help Sunayana stay in the U.S., while also seeking a long-term solution to the green card problem for high-skilled immigrants.

Jyoti Bansal has lived the kind of American Dream success story everyone can embrace – but it almost didn’t happened. “I waited 7 years for my employment-based green card and I wanted to leave my job and start a new company but couldn’t,” Jyoti told me in an interview. “What is most frustrating about the green card process is you have no control over a major part of your life. I have friends who became frustrated with the uncertainty and after years of waiting they finally left the United States.”

Finally, in 2007, Jyoti received an employment authorization document (EAD) as part of the green card process. He left his employer and started AppDynamics. The company, which provides the equivalent of a 24 hour/7 days a week MRI for a customer’s website, with clients such as HBO, grew to over 900 people and a lofty valuation of $1.9 billion. That valuation was shattered in January 2017, just before an initial public offering, when Cisco acquired AppDynamics for $3.7 billion.

Jyoti Bansal has moved on to new ventures. But his company that employs over 900 workers and is worth nearly $4 billion almost never got off the ground because of a flawed immigration law. How many scientific breakthroughs and entrepreneurial marvels are

### Framing

#### Util and consequentialism are the only viable ethical frameworks when dealing with questions of war

William H. **Shaw** (San Jose State University) **2011** [“Utilitarianism and Recourse to War” Utilitas Vol. 23, No. 4, December 2011, loghry]

In this context it is worth noting that the reasons many nonconsequentialists have for rejecting a utilitarian or consequentialist account of right and wrong do not apply to UWP. For example, critics of utilitarianism contend that it is insensitive to questions of distribution, that it demands too much of us as individuals, that it can too easily conflict with ordinary moral requirements like keeping one’s promises or telling the truth. They urge that utilitarianism is too impersonal and coldly calculating, and they maintain that it ignores one’s individual attachments and personal commitments and the specific moral obligations that grow out of our various everyday relations with others. They argue that it falters as a personal ethic, having nothing serviceable to say about how individuals should live their day-to-day lives or about what kind of people they should strive to be. However, these criticisms lack bite or miss the mark altogether when it comes to UWP. When war and peace are at issue, we want our decision-makers to focus on the consequences of their actions and to be committed to acting so as to make people’s lives go as well as possible. We want them to be impartial, dispassionate and empirically minded – to be rational deliberators who look objectively at the big picture and the long run, basing their decisions on the most accurate and detailed understanding they can obtain of the circumstances in which they are operating and the likely results of the alternatives open to them.7