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Final Draft

Aging Populations & The Effects on Society

Introduction:

Life expectancy has been gradually increasing since 1840, however age-related

conditions continue to be the leading cause of death in many countries. Heart disease, cancer,

chronic lower-respiratory diseases, and stroke are the top four causes of death in the United

States, all of which are age-related conditions. Although humans have been aging at a slower

rate, aging remains an inevitable, biological process that no one can overcome. This single,

accepted truth has been the motivating factor into research of anti-aging technologies using

artificial intelligence (AI). Researchers are challenging the imminent truth surrounding the aging

process. Many advances in the world of AI show significant prospect of a longer, more

productive life absent of aging. A cure to aging, something that seemed so unattainable just a few

years ago, has become a topic of interest among academics and researchers, alike. However, the

conversation does not stop there. Life-extension has the potential to significantly impact the

economy, political system, and social structure worldwide. Studies have found that the aging of

societies has already begun to transform societies in ways that require a policy response. As AI

anti-aging technologies make headway and life expectancy continues to rise, significant social,

economic, and political implications will result that will require society to adapt and respond. I

will discuss the potential AI anti-aging technologies and then use Japan as a case study and

model to analyze the effects that increased life expectancy will have in society.

A Cure to Aging - AI Anti-Aging Technologies:

AI is growing at such a rapid speed, partly due to the amount of research and development that major companies, like Google, Apple, and Facebook are investing. These and companies, alike are pursuing a cure for aging. The investigation of anti-aging processes has sparked a myriad of experiments, many of which are using geroprotectors - treatments that promote a healthy, long life. Because there are no specific genes that are the cause of aging, geroprotectors work to combat age-related diseases and the mechanisms that contribute to the aging process (Ball 30). For example, companies are working to find ways to prevent cells from senescing, which is the process when cells stop dividing -- a characteristic of the aging process (Ball 30). The use of common drugs as well as the development of other forms of combattants to aging are all forms of geroprotectors that are being explored in effort to combat the many ways in which aging occurs (Batin 403). Currently, companies are using artificial intelligence to determine whether geroprotectors will work on the molecular structures, as is the case with the technology called Atomwise (Batin 404). Other companies are exploring their own technologies to contribute to the anti-aging movement but the majority are focusing their research on the molecular, cellular, and DNA level. Hundreds of geroprotectors exist, but the cost of experimentation is quite high, slowing the research process. As companies continue to invest research in geroprotectors, more will continue to be developed, which will push anti-aging technologies closer and closer to reality.

Despite this optimism, the anti-aging revolution is faced with challenges that are slowing the development of this technology. In reality, little is known about the cause of aging. There are so many ways in which aging occurs, which means that there are a number of variables to test (Ball 30). Attempting to find a single treatment that will be able to cure the varying ways in which aging occurs complicates research. In addition, anti-aging experiments require decades

and centuries to perfect the treatments. Advances in life extension are slow to move forward, despite many new discoveries of geroprotectors. Because of the variability of aging, as well as the extended time it takes to perfect a treatment, a cure for aging seems out of direct reach. Extensive research must be conducted on the aging process, itself, as well as anti-aging treatments. Despite these pushbacks, humans, altogether, are living longer and getting older. As society explores possible ways to combat aging, as well as observes society getting older, many discussions are being centered around the implications of this change. What are the implications of increasing life expectancy? How should society adapt?

A Look at Population Aging Without AI Anti-Aging Technologies

Case Study: Japan

By looking at the economic, political, and social climate of Japan, which has the largest proportion of older people in the world, the results of life extension become clear. Japan is home to the largest per capita number of centenarians -- people over the age of 100 -- which has driven up the median age to 47 years old (Weller). This number exceeds the median age in the United States by almost 10 years and is only expected to rise in the coming years, reaching 55 by 2040 (Jeffrey). As Japan's society ages, the proportion of seniors has grown substantially. However, the demographic structure is not the only thing that has transformed in Japan. People have been getting older, but have also been having fewer and fewer children. The decreasing fertility rate has created a situation in which more older people are relying on a fewer number of younger people, leading to economic implications. As the number of retirees increases, there are fewer workers to support the demanding cost of pension benefits. Economic debt has increased as a result. The public debt in Japan has increased at such a significant rate that it was double the size

of GDP in 2013. This crippling debt has left Japan's economy in shambles. The political climate has also been affected by the demographic shift. Japan is characterized by voter apathy that is flourishing amongst younger citizens. Older citizens have much more influence in politics and the younger generations believe that these seniors have the political system rigged. As life expectancy has increased, Japan has been faced with economic and political problems as well changing social dynamics. In an effort to respond, policy-makers worldwide have begun to debate the proper response to these changing conditions. The implications faced by Japan raise the threat of economic, political, and social trouble worldwide as populations, altogether, continue to age.

Economic Response to Population Aging

Economies all over the world will begin to feel the impact of population aging. The burden of supporting the elderly will become a global issue, especially due to the linkages between economies through globalization and trade. The underlying problem, as is the case in Japan, is that there are more seniors depending on a shrinking number of younger people. The decreasing fertility rate is also likely to contribute to this demographic shift. As a result, a larger proportion of output will be directed towards funding for expenditures of the nonworking population, unless the retirement structure changes (Committee on the Long Run). In the United States, once a person reaches 62 years old, they are able to begin receiving full retirement benefits (Retirement Benefits). But as people begin to live longer, they will experience more healthy and productive years of their life -- years that could be spent in the workforce.

Policy-makers are beginning to debate raising the age that people can begin to receive retirement benefits or even creating a mandatory retirement age. Holding off retirement benefits until an older age could incentivize people to save more for retirement over the course of their

life, and consume less (Committee, on the Long-Run). This would, in turn, result in less dependence on retirement benefit programs. Increasing the retirement age could also generate more money for pension funds. As people begin to stay in the workforce longer, they will contribute more money to the pension fund that would have otherwise not have been earned if they had retired. However, as the number of older people in the workforce increase, job shortages may arise and younger workers will find it more difficult to find a job (Committee, on the Long-Run).

By creating a mandatory retirement age, the intuition is exactly the same as raising the retirement age -- a higher savings rate, more money in pension funds, and less jobs. However, the real world effects of such a change may be contrary to intuition. A study conducted on the implementation of a mandatory retirement age in China found that creating a mandatory retirement age would actually reduce the incentive to save because of the increased amount of income that would be generated in the additional required years of work (Stauvermann and Jin 241). It would also result in people working at a lower wage because the economy's growth rate would go unchanged. Lower wages would be offset by the increase in the amount of working people, so the amount of retirement benefits would remain the same. The implementation of a retirement age would simply require people to work longer for little payoff -- a policy that would not hold much popularity.

As opposed to the creation of a retirement age or the delay of retirement benefits, it could be more beneficial to increase subsidies for education (Stauvermann and Jin 244). By decreasing the cost of education, more people will have the ability to complete higher education. People will then be able to enter into more high paying fields and produce a higher income over their life.

Pension funds would increase, as a result, and be able to fund the growing number of retired seniors.

Politics of Aging Populations

As the proportion of older people in populations continue to rise, so too will the proportion of older people in the electorate. The influence that older generations have in politics will increase, which could mean that policies like Social Security or Medicare could be influenced to further benefit the elderly. As is the case in Japan, many younger voters feel that seniors have the system rigged in their favor and are apathetic as a result (Easterbrook). Voter apathy is a problem for the representative systems, as it will only represent the voters who participate in elections.

The aging of populations could also have a major impact in the higher powers of politics. Supreme Court justices in the United States serve lifetime terms with the option to retire as they choose. Typically, they share the same political views as the presidents who nominate them, which means that even when a president's term comes to a close, their political views will be represented through the Supreme Court. Supreme Court justices have a lengthy, impacting influence in politics. As people age and live more productive lives, Supreme Court justices will have the ability to hold their seat and influence politics that much longer. By having the same nine judges assert their viewpoints, social and political progress could be stifled. New, progressive ideas will face opposition from the supreme law of the land.

Social Structure in an Aging Population

Although Japan's social structure has not been found to radically change from the aging of populations, social structures may begin to evolve as people begin to live longer. In the case of marriages for example, couples may begin to feel that the lifetime commitment of 70, 80, or

more years is too much of a commitment for two people. Multiple marriages may, therefore, will become more common (Than). If people are beginning to get married many times over the course of their lives, then people will begin to have kids with more than a single partner, therefore making it normal for children to have many half-siblings (Than). As humans begin to live more productive lives, they may also be able to have kids at older ages, which could mean bigger age gaps in between siblings. These changes would impact the relationships between children and their parents as well as the relationship between siblings. Family and romantic dynamics would shift to adapt to the increasing life expectancy.

Population Aging with AI Technologies

The political, economic, and social implications of gradual population aging that are already present in society will be felt on a much larger scale if AI anti-aging technologies become a reality. Gradual population aging has allowed some time for policy makers to assess the impacts of this demographic shift and debate the best responses. However, it is expected that AI technologies will increase life expectancy at a much greater rate, which will demand a much more urgent response. The economy will be faced with even more pressure to support the growing proportion of older people, politics will be even more influenced by seniors, and social structures will continue to adapt to the aging of the population.

Life-extension has the potential to create extreme disparities between the rich and the poor. The cost of available anti-aging technologies will likely be high when they are first introduced to the market. The wealthier portion of people will be able to afford and access these anti-aging remedies, while the less fortunate people will be unable to. Limited access to such a revolutionary technology might result in long-term economic disparities and physical disparities,

leaving the less wealthy at a significant disadvantage. If the affluent are the only ones with access to anti-aging technologies, they will be living longer and enjoying a more productive life. Their more productive life could result in the earnings of more wealth, which could then produce a feedback loop in which the poor are constantly at a disadvantage.

In addition to the political, economic, and social shifts that society will experience as a result of life extension, populations may also find that a living longer will not produce as happy and productive of a life as one might expect. Technological advances, medical improvements, and enhanced living conditions have increased life expectancy by more than double of what it was in 1900. However, a longer life has not necessarily suggested an increase in happiness. Depression in the United States has flourished and is estimated to affect 16.2 million people today (HealthLine.com). Technology has created the rise of leisure time. In present day, humans use their free time to do things that they value, like spend time with family and friends, read books, and shop. The satisfaction of these activities improves happiness; however, the quantity of leisure time does not necessarily have the same effect (Wang & Man 1816). In a world absent of aging, humans will have more leisure time than has ever been available. With more leisure time comes more boredom. Boredom, in turn, creates feelings that "there is nothing meaningful to do... [as well as] ...feelings of dissatisfaction" – feelings that are associated with depression (Spaeth, Weichold, & Silbereisen). A significantly longer life may result in the further increase of anxiety and depression – diseases that have largely affected today's society.

Conclusion:

The aging of populations has substantially increased the amount of older people in the population. These older, retirees are demanding benefits, which they are depending on younger

generations to produce. The effect of such a demographic shift has resulted in extreme public debt, small population growth, and voter apathy -- implications that have the potential to impact aging societies worldwide. Approaching the economic and political problems that will arise will require new policy implementations. In the case of the economy, for example, increasing subsidies for education could result in higher funding for retirement benefit plans, like Social Security. In politics, in order to reduce the lock that aging Supreme Court justices have in politics, it could be wise to create a term limit. This would allow for the introduction of new, progressive ideas into the political spectrum. If AI anti-aging technologies become a reality, society's response to life extension will become much more demanding, as the transformation is likely to be quicker. Aging is an inevitable biological process that affects every living organism, but as we begin to live longer, dramatic shifts will require society to adapt in new, unfamiliar ways.

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