



PGIM

A SILVER LINING

The Investment Implications
of an Aging World

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INTRODUCTION

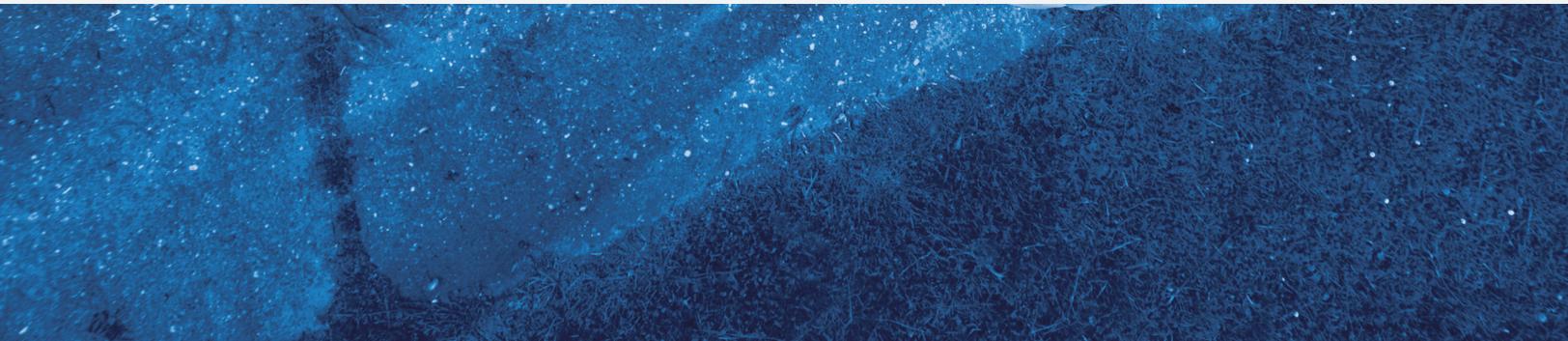
In a move that became front-page news around the world, China announced in late 2015 that it was abandoning its one-child policy. By lifting the restriction 35 years after its introduction, officials were tacitly acknowledging that the one-child law may have taken China down a demographic path that could now threaten its economic growth: a quickly graying population, combined with a dearth of working-age adults. And since most young Chinese adults have no siblings, the so-called 4-2-1 problem — a single child caring for two parents and four grandparents — is intensifying.

China is hardly alone: aging populations are now a worldwide phenomenon and the trend is accelerating. Life expectancies have risen sharply, from a global average of 49 years in 1955 to 72 years today. By 2040, the global population of those aged 65-and-older will reach 1.3 billion, double what it is today. In developed countries, those 65-and-over now outnumber those under the age of 15 for the first time ever. And while aging populations are commonly believed to be a developed-markets issue, two-thirds of the world's seniors live in emerging markets. In fact, even in proportionate terms, the share of elderly people in countries like China, Russia, South Korea, Thailand, and Argentina is approaching that of the developed world.

The aging of the global population will have profound consequences for individuals, businesses, and governments. Retirees will collectively control an increasingly significant share of global wealth and spending; in the US, they already spend more than the much-targeted Millennial generation. Overall consumption patterns will change dramatically and companies need to rethink the products and services they offer accordingly. Governments, meanwhile, must grapple with ballooning pension and health care costs as fewer workers are left to support an ever-growing number of seniors.

The longevity mega-trend also opens up important opportunities for investors around the world. To identify investment ideas that could be accessed by institutional investors, we interviewed a range of investment professionals across PGIM, conducted new proprietary research on consumer spending patterns, and met with industry experts in technology, life sciences, venture capital, demography, and actuarial sciences. We believe institutional investors should focus their attention on five resulting investable themes within the broad areas of real estate, health care, and technology: multifamily condos, senior housing, urban life sciences clusters, pharmaceuticals and biotech, and technology-enabled medical services and devices.

Aging populations are now a phenomenon across both developed and emerging markets, and the trend is accelerating. Investors should consider capitalizing on the opportunities arising from this unprecedented global demographic shift.



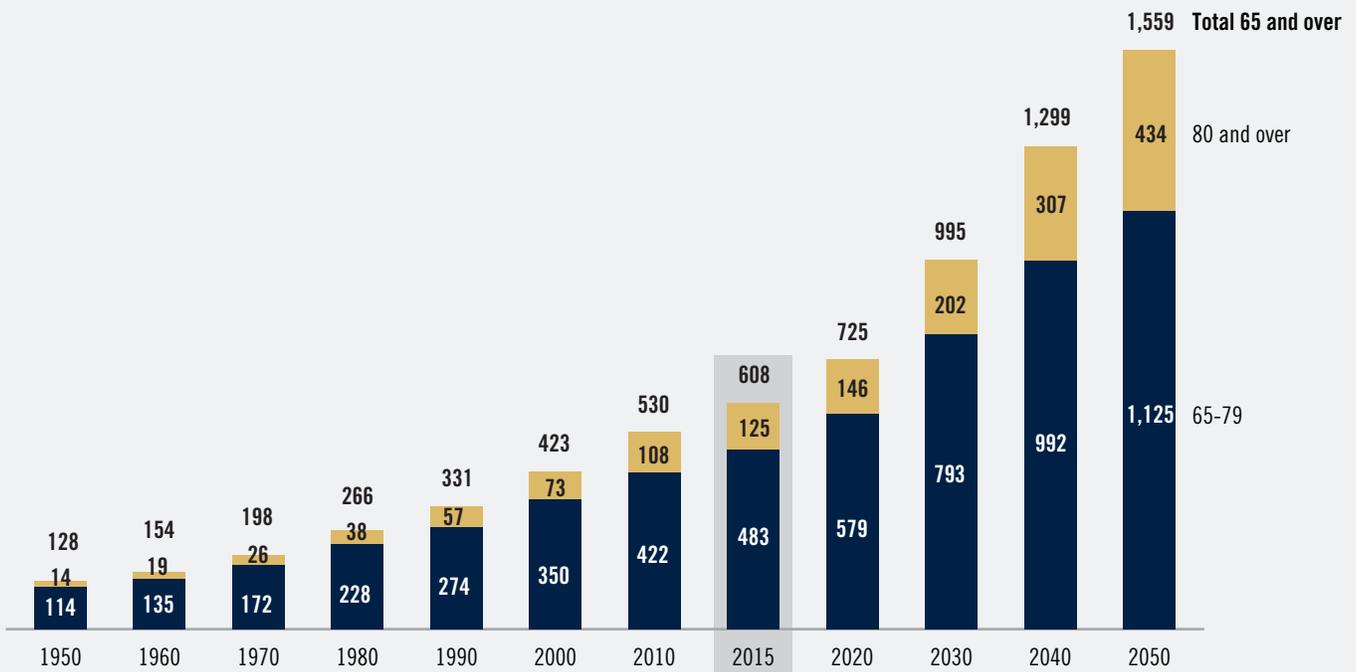
PART 1: A GRAYING WORLD

The world is getting grayer at a dramatic pace. Over the next 25 years, the global population of people aged 65-and-older will double to almost 1.3 billion, according to the United Nations Population Division (Exhibit 1). Even more striking is the growth that will occur within the over-80 age group, which is expected to more than triple in absolute size over the next 35 years, rising from 1.7% of the global population today to 4.5% by 2050.

EXHIBIT 1

The population of people aged 65 and over will double in the next 25 years

Population in millions



Source: United Nations Population Division

The graying population is having ripple effects on social and economic structures the world over, but we believe three key demographic trends capture the most striking implications of global aging:

- For the first time in recorded history, the old will outnumber the young.
- Contrary to popular thinking, two-thirds of the world's elderly live in emerging markets, and many of these countries are aging at an unprecedented pace.
- Over the last century, longevity has often increased faster than demographers forecast — people will likely live even longer than currently anticipated.

For the first time in history, the old will outnumber the young

Decades-long declines in fertility and improvements in health and longevity have combined to bring us to an unprecedented demographic watershed. By 2018, for the first time in history, the global number of adults aged 65-and-over will outnumber children under the age of 5 (Exhibit 2).

This population transformation has been led by the developed world, where it is in some ways even more dramatic: in 2011, for the first time ever, the number of people aged 65-and-over in developed markets surpassed the number of children under

the age of 15. Shortly after 2025, the over-65 population in these developed markets will overtake those under the age of 20, according to UN forecasts, led by countries like Japan and Germany where overall populations are now shrinking.

Emerging markets represent two-thirds of the world's elderly, and many of these countries are aging at an unprecedented pace

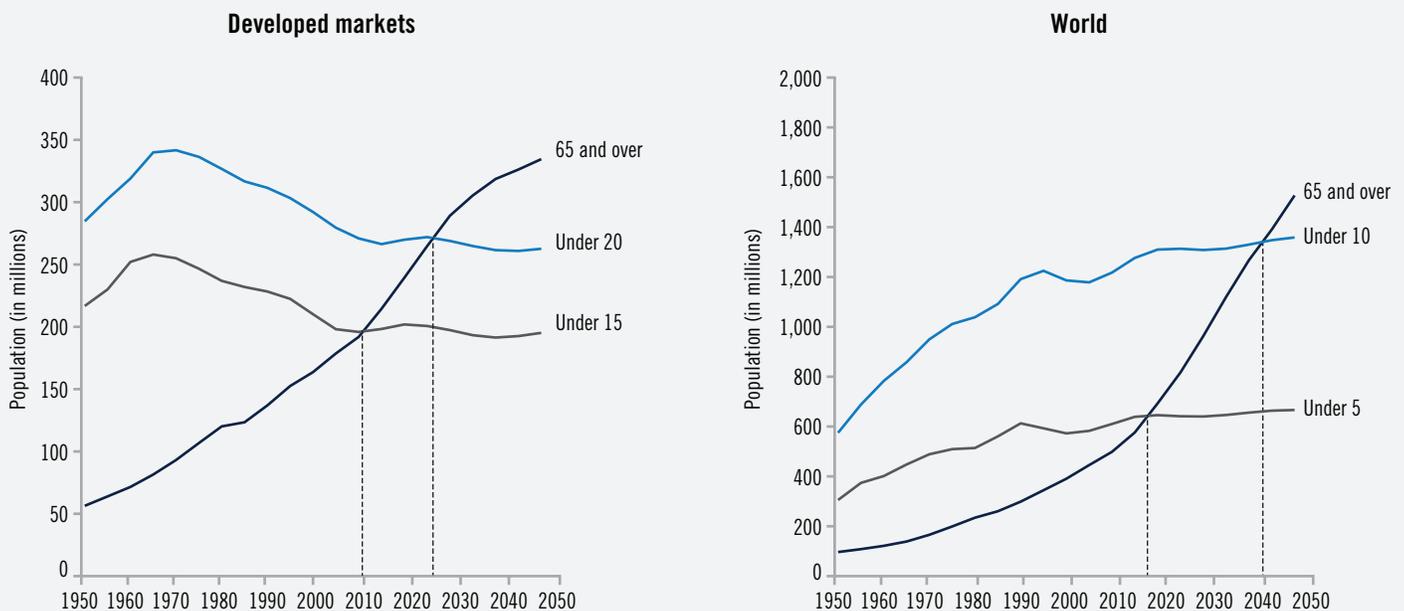
Aging populations are commonly believed to be primarily a developed-markets phenomenon, centered on retiring Baby Boomers in the US and Europe. In reality, however, two-thirds of the world's seniors live in emerging markets, a proportion that is forecasted to rise to almost 80% by 2050 (Exhibit 3).

China alone is home to 131 million people over the age of 65 — more than the number of seniors in the US, Japan, Germany, Italy, and France combined — while India has 74 million people over the age of 65, second to only China. The UN projects that the number of Chinese aged 65-and-over will exceed 355 million by 2045 — greater than the entire current US population.

To be sure, developed markets have the highest *relative* proportion of seniors. Still, the share of elderly people in countries like China, Russia, South Korea, Thailand, and Argentina is approaching that of developed markets (Exhibit 4).

EXHIBIT 2

The old are outnumbering the young



Source: United Nations Population Division

Even more striking is the compressed timeframe for aging in many Asian countries. It took France 115 years, the US 69 years, and the UK 45 years for the proportion of the total population aged 65-and-over to double from 7% to 14%.¹ But it took Japan only 24 years to accomplish that same rise of the 65-and-over population (from 7% to 14%). And an analysis of UN data reveals that China, Thailand, and Korea are forecast to double their share of elderly in just 23, 20, and 18 years, respectively. The pace at which governments, societies, and companies will need to adapt to accommodate this rapid transformation will be quite different from most past experiences.

If the last century of experience is a guide, people will likely live significantly longer than currently anticipated by demographers

A range of views on future longevity improvements exist, with a fairly high degree of subjectivity and uncertainty around any estimates. But if the past is any guide, current longevity estimates are likely underestimated.

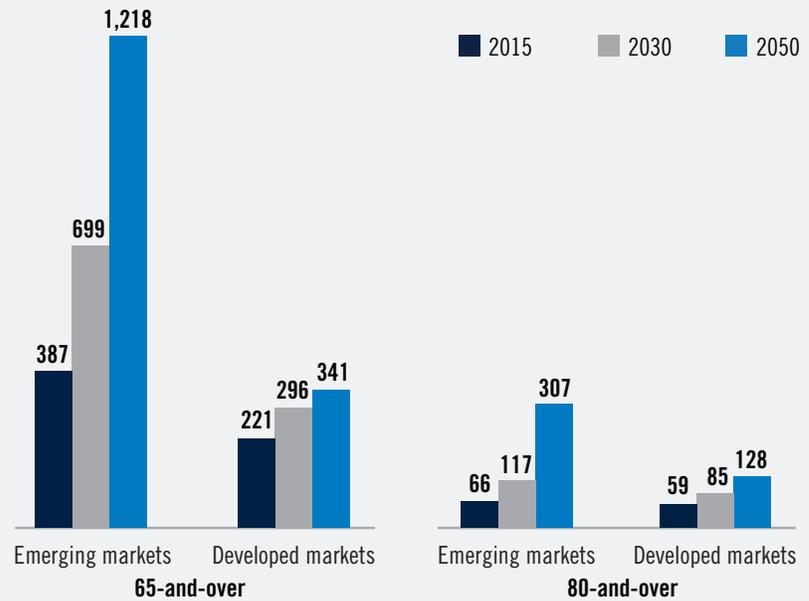
For instance, in 1940, American newborns were forecast to have an average life expectancy of 63. By 1960, based on actual experience to-date as well as adjusted expectations of future longevity, demographers anticipated that the 1940-born cohort would actually live, on average, to age 74. By 1980, that average life expectancy forecast was raised once again, to 75.4 years; by 2010, it stood at just over 78 years. In total, the “class of 1940” gained 15 years of life expectancy between the original forecast in 1940 and the 2010 estimate.

Indeed, actuarial best estimates using base mortality rates and appropriate improvement scales can often be off-target — each update in longevity estimates from 1930 to 1990 undershot the actual increase in longevity. And while the “undershooting” trend in longevity forecasts has reversed since 1990 for US cohorts born prior to World War II, the under-estimation of longevity continues right up to today for the Baby Boomers.

EXHIBIT 3

Two-thirds of the world’s older population lives in emerging markets

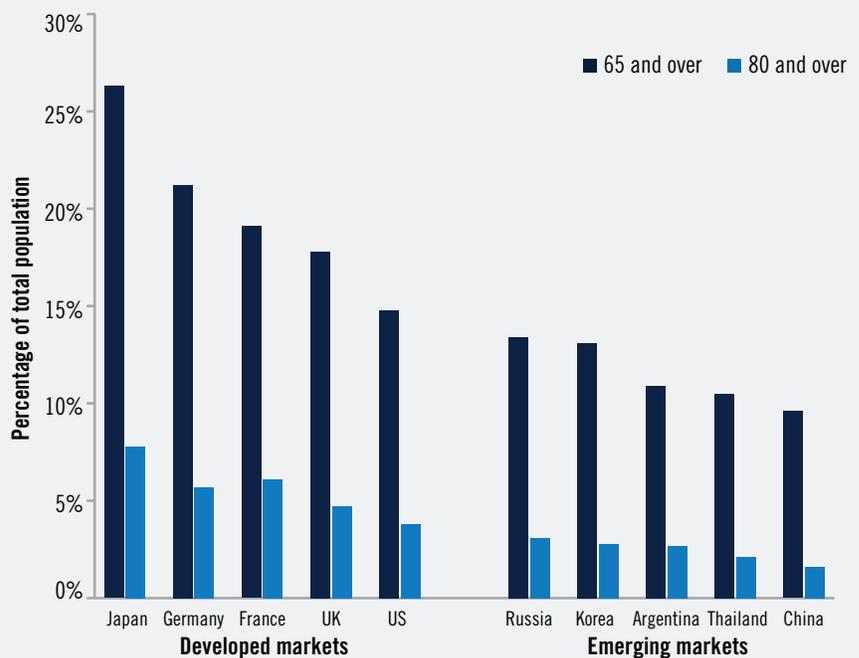
Population in millions



Source: United Nations Population Division

EXHIBIT 4

The relative percentage of the elderly in some emerging markets is approaching developed markets



Source: United Nations Population Division

So what, then, might future life expectancy look like? Global life expectancy has already risen sharply, from 49 years in 1955 to 72 years today, accompanied by a significant narrowing in the life expectancy gap between developed and emerging markets, which now stands at just nine years. Furthermore, life expectancy improvements in many developed markets have been truly remarkable: about one-third of UK babies born in 2012, for example, will live to celebrate their 100th birthdays, according to estimates from the UK Office of National Statistics.²

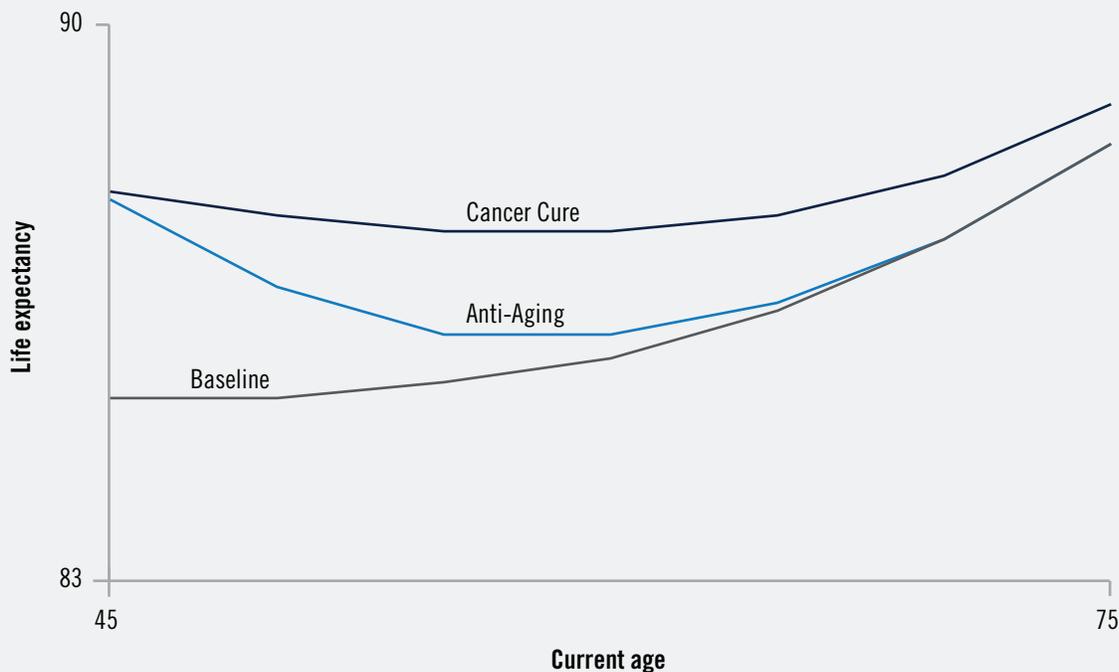
Looking forward, gradual increases in life spans are forecast to continue around the globe, but breakthrough medical discoveries could lead to even greater longevity gains. For example, research by the MacArthur Foundation Research Network indicates that the current US Census Bureau forecasts may underestimate life expectancy at birth by 2.6 years by 2030 and 6.5 years by 2050, thanks to the impact of biomedical advances that either delay

the onset or progression of major fatal diseases or slow the aging process itself.

On a similar note, proprietary Prudential Financial, Inc. (PFI) actuarial analysis shows that significant mortality improvements could potentially result from either a cure for cancer or the widespread adoption of anti-aging genetic treatments (Exhibit 5). Illustratively, a cure for all forms of cancer would potentially have the greatest mortality improvement for middle-aged individuals; a cancer cure may have less of a mortality impact on people in their later years since they are more susceptible to other ailments. Similarly, for anti-aging genetic treatments, those who are younger are likely to benefit the most since it will take many years for the most promising anti-aging research to move from pre-clinical research to successful clinical trials and ultimately to successful application on humans.

EXHIBIT 5

Potential medical advances could significantly impact life expectancy



Note: Analysis based on the US population. "Baseline" assumes mortality improvement follows historical trends. "Cancer cure" assumes, theoretically, a mortality improvement equivalent to a cure for all forms of cancer that becomes quickly and widely used. "Anti-aging" assumes anti-aging technology becomes reality in 25 years.

Source: PFI

Prudential Financial, Inc. of the United States is not affiliated with Prudential plc, which is headquartered in the United Kingdom.

PART 2: THE SILVER ECONOMY

How an aging population chooses to put its disposable income to work will have a material impact on the rise and fall of different sectors in the economy, leading to new challenges and opportunities for individuals, governments, companies, and investors.

In developed markets, retirees make up a greater and increasing share of wealth and spending

Even as the world turns gray, businesses and media alike tend to focus attention on the Millennial generation — those roughly 18 to 34 years old. That is not overly surprising, considering that Millennials now make up the largest share of the US workforce. But in the meantime, more and more members of the massive Baby Boomer generation are entering their senior years. And when they get there, they will collectively control a very significant amount of wealth: according to research from McKinsey & Company, just 11% of investable assets in the US will be held by people younger than 45 by the end of this decade. At that point, the spending power of consumers aged 60-and-older will hit \$15 trillion globally, up from \$8 trillion in 2010, according to forecasts from EuroMonitor.

The 55-and-over population makes up a significant share not just of wealth but also of consumption, spending twice as much as Millennials in the US (Exhibit 6). The same is true in Japan, where almost 50% of total consumption is driven by households whose heads are older than 60, according to an analysis by the Nippon Foundation.

Global aging will reshape consumer spending

The spending behavior of individuals varies in systematic ways as they proceed through life.³ Decisions both major (attending school, rearing children, utilizing financial services, funding medical expenses) and minor (eating out, joining the gym, choosing vacation packages) all vary with age. The upshot: not only are older households growing in number and outspending their younger counterparts, they are also putting their spending

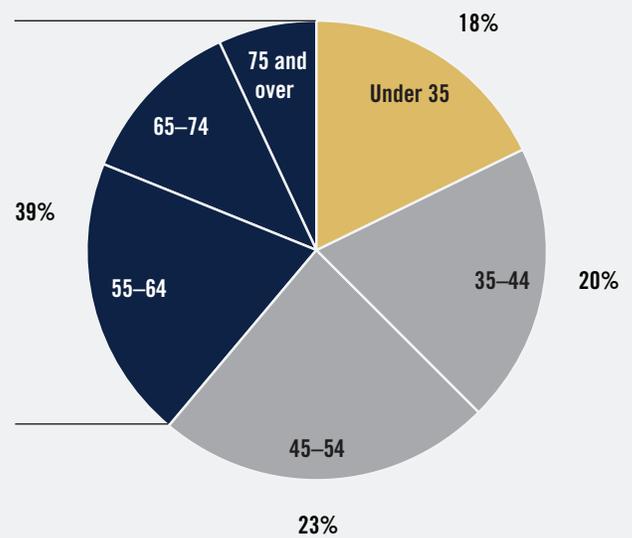
power to work in very different areas, creating profound consequences for the makeup of the global economy (Exhibit 7).

Consumer spending patterns in the US and Japan show similar trends, with spending on medicines, hospitals and nursing homes, other health care services, fuel, and housing repairs and maintenance higher among older households. Conversely, spending on schooling, consumer durables (including owned

EXHIBIT 6

US consumers over the age of 55 spend twice as much as Millennials

Percentage of total spending by age cohort



Source: US Bureau of Labor Statistics

vehicles), and dining out are all lower among older households, indicating the shifting composition of consumption and production in an aging society.

The different spending patterns of older generations will be magnified further as global populations continue to age. In a proprietary study commissioned by PGIM and conducted by Oxford Economics, we analyzed the impact of these evolving spending patterns on the structure of the US economy as it ages over the next 55 years. Of course, many variables may impact future global spending patterns, including changes in behaviors and tastes, changes in relative price, and public policy decisions. Nevertheless, by isolating the impact of demographics alone, the research provides interesting insights into how future spending may be shaped by an aging population.

The results are striking, suggesting a range of industry sectors that will receive significant tailwinds from the aging US population and other sectors that will be fighting demographic headwinds (Exhibit 8).

Our analysis shows that by 2070, real annual spending on nursing homes will be \$325 billion greater than it is today, due *solely* to the demographic tailwind created by a larger older population. (That is on top of the \$300 billion to \$400 billion of annual increased spending projected over that same timeframe from overall economic growth). The aging effect will cause spending on home

health care by seniors living at home to balloon by almost \$90 billion annually. Spending on medicine and drugs, meanwhile, will climb by more than \$40 billion annually over the next 50 years, thanks to the aging of the US population.

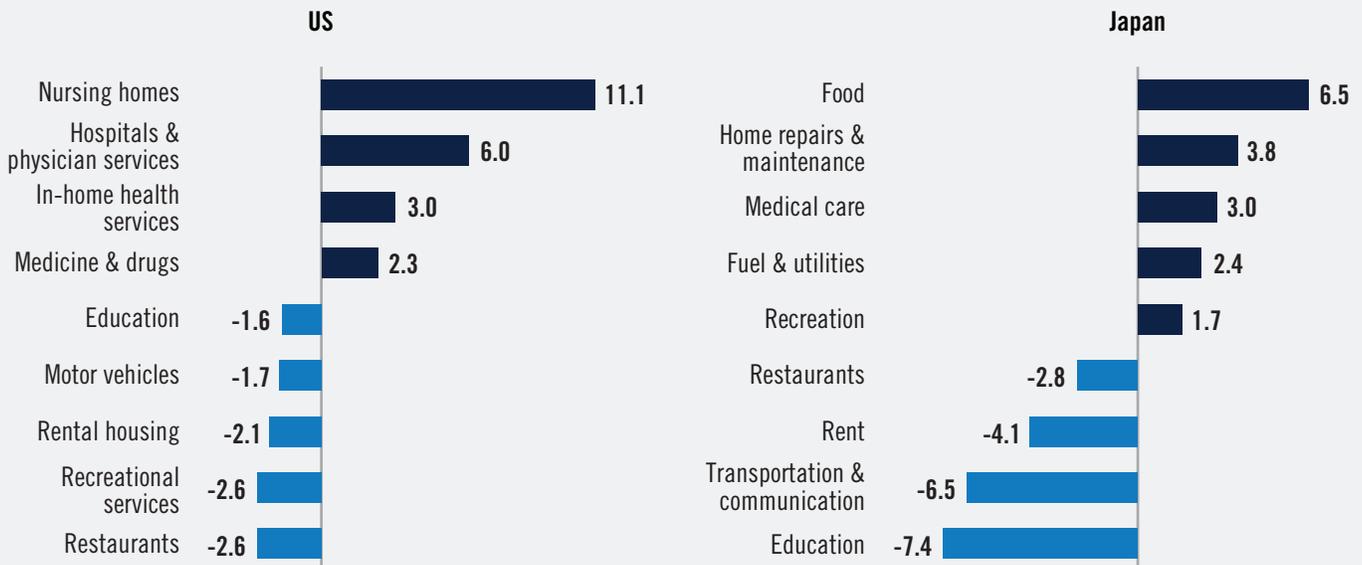
Conversely, certain sectors such as education and dining out may see significant headwinds from the aging population, even as they continue to grow along with the broader US economy. For example, the share of total annual spending on higher education will decrease by an estimated 13% by 2070 and nearly \$90 billion of reduced annual spending in this area will be the direct result of the aging population. Similarly, the restaurant industry's share of overall consumption will decline over the next 50 years, with approximately \$75 billion of reduced annual consumer spending driven by the changing age composition of the US population.

The impact of aging populations on different consumer sectors is certainly not limited to developed markets. For instance, research by McKinsey & Company on China highlights the spending patterns of the 55-and-over population, which experienced the harsh conditions of the Cultural Revolution.⁴ In the country's largest metropolitan areas, such as Beijing, Shanghai, and Shenzhen, 55- to 65-year old residents are focused on the essentials, allocating half of their expenditures to food and very little to discretionary categories such as clothing. By comparison, individuals 10 years younger spend only 38% of their budgets on food, but allocate almost double the amount to clothing

EXHIBIT 7

Older consumers spend money in different ways than younger consumers

Percentage point difference in 2014 household spending between household heads aged 75-and-over vs. 35-44



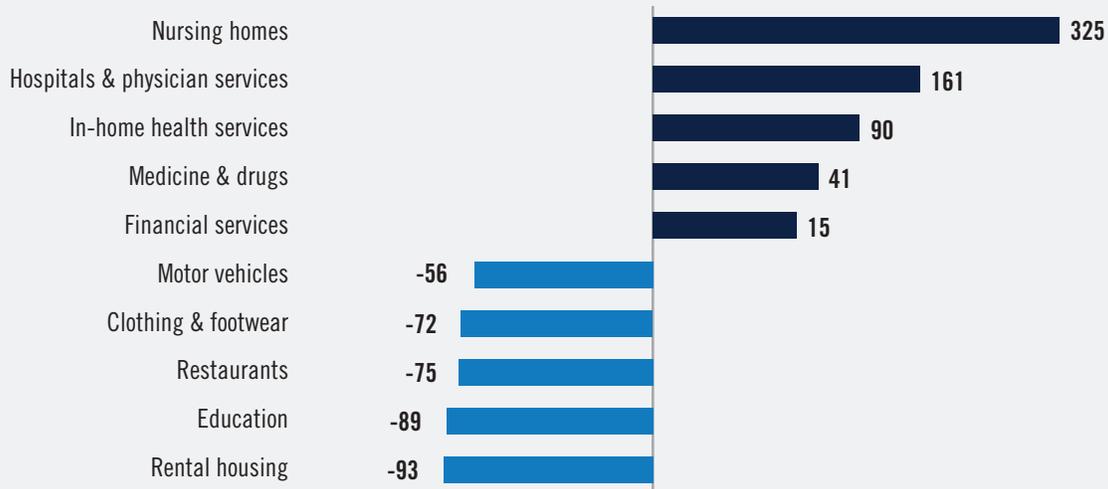
Note: Please see endnotes for category definitions.

Source: Oxford Economics, US Bureau of Economic Analysis, J.P. Morgan Japan, Statistics Bureau of Japan

EXHIBIT 8

In the US, the age effect will have a dramatic impact on certain sectors of the economy over the next 55 years

Headwinds and tailwinds in annual US household spending due to aging, in \$ billions, 2015 vs. 2070



Note: Please see endnotes for category definitions.

Source: Oxford Economics, US Bureau of Economic Analysis

than the older generation. This implies that the next cohort of older consumers in China will demonstrate very different spending patterns, requiring companies to rethink the traditional stereotypes of older Chinese consumers.

In contrast to changes in consumer spending, Baby Boomer investment choices are unlikely to have a major impact on broad asset class returns

Given the sheer magnitude of the wealth controlled by the elderly, their investment choices — the assets they buy, sell, or continue to hold — can have a major impact on the pricing and returns offered by bonds, stocks, real estate, and other asset classes. For institutional investors, this begs the question: will the investment patterns of the elderly be even more impactful than their spending decisions?

Indeed, the specter of an asset market “meltdown” caused by aging Boomers drawing down their financial assets has been frequently raised by analysts for more than a decade. The case for declining returns across *all* asset classes is based primarily on the idea that the Baby Boomers will be net sellers of financial assets to finance their retirements, and smaller-sized subsequent generations will not be able to fill the void as Boomers rapidly sell down. In addition, some observers argue that as retirement approaches, individuals become less willing to tolerate investment

risk and begin selling off riskier investments, creating potential long-term headwinds for certain asset classes.

But while the theoretical case is fairly robust, the empirical support for a strong correlation between asset returns and age structure remains mixed at best.⁵ Research indicates that age-driven changes to broad bond, stock, and real asset returns due to Baby Boomers’ decumulating are likely to be fairly small, slow, and subject to several countervailing forces. For starters, investors are generally forward-looking and recognize how demographic changes will play out, so any future decline may well already be largely incorporated into asset prices. In addition, many Boomers do not decumulate rapidly in old age due to uncertainty surrounding their life expectancy, a desire to leave a bequest, and access to many investment strategies that allow retirees to generate regular income without selling down their portfolios. And even if local market investment appetite wanes because of an aging population, new investments can continue to flow from countries with younger populations, such as Brazil or India. As a result, the empirical relationship between actual asset returns and an aging population remains somewhat unproven.

Of course, capital markets are not immune to demographic change, but any adjustment will be gradual and the prospect of an abrupt demographically induced asset meltdown across the board — or in a broad asset class like equities, bonds, or real estate — appears to be quite unlikely, and hard to disentangle given the number of simultaneous forces at play.

PART 3: INVESTABLE IDEAS RESULTING FROM GLOBAL AGING

Many potential opportunities and challenges resulting from longer life spans will require public intervention, not private investment. For example, pre-commercial, primary medical research on many age-related diseases will still be primarily funded by governments, even if secondary research and development is in the private sector. Nevertheless, the mega-trend of aging is creating important new opportunities for institutional investors. We believe they should focus their attention on two major investment themes: the evolving opportunity set within real estate and new opportunities in health care and technology (Exhibit 9).

EXHIBIT 9

Investment ideas resulting from an aging world



REAL ESTATE

- From homes to condos
- Senior housing
- Eds and meds



HEALTH CARE AND TECHNOLOGY

- Pharmaceuticals and biotech
- Silvertech

Real estate

Real estate represents more than 40% of gross assets of households headed by those aged 65 or older in major developed markets like the US and the UK.⁶ As these older cohorts grow in both absolute and relative size, they will reshape the type, functionality, and level of demand for real estate in their home markets.

Broadly speaking, an aging population will have less demand for student housing, shared rental accommodation, and first-time homes and more demand for second homes, accessible retail locations, home working environments, retirement communities,

and nursing homes.⁷ Across this spectrum of demographic demand drivers, we view three types of investment opportunities as especially appealing; the most opportune time for investing in them will vary across the world, based on where specific countries are in their demographic transitions.

From homes to condos

Baby Boomers across the US are rediscovering the urban lifestyle in cities, town centers, and infill sites. Downsizing “empty nesters” and retirees increasingly want to enjoy the amenities of city living and are trading large, multi-bedroom, suburban dwellings for smaller one- or two-bedroom apartments or condos centrally located and closer to restaurants, cultural

and recreational activities, and (for those Boomers continuing to work) downtown offices. Walkability scores are becoming as important as a building’s amenity list.

These adults in their 60s, still healthy and active, seek accommodations that fit their on-the-go lifestyles where they can partake in daily activities within close proximity to their homes. In particular, they may look to condominium communities that will cater to their specific needs and services, while also affording them the energy of an environment closer to the urban core. Locations such as Raleigh, Atlanta, Nashville, and Austin are examples of areas that offer these types of infill locations to older generations where the urban lifestyle of a New York or San Francisco is being recreated on a smaller scale. “Live, work, play” is the oft-used theme supporting mixed-use development incorporating downtown residences and commercial spaces.⁸

From a geographic perspective, areas with a high population density of people aged 65-and-over are candidates for investment opportunities, and many of these can be found in Florida, New England, and the Midwest. For example, The Villages, a Florida retirement community, was the fastest-growing US metropolitan area for the second year in a row in 2015, according to the US Census Bureau.

Senior housing

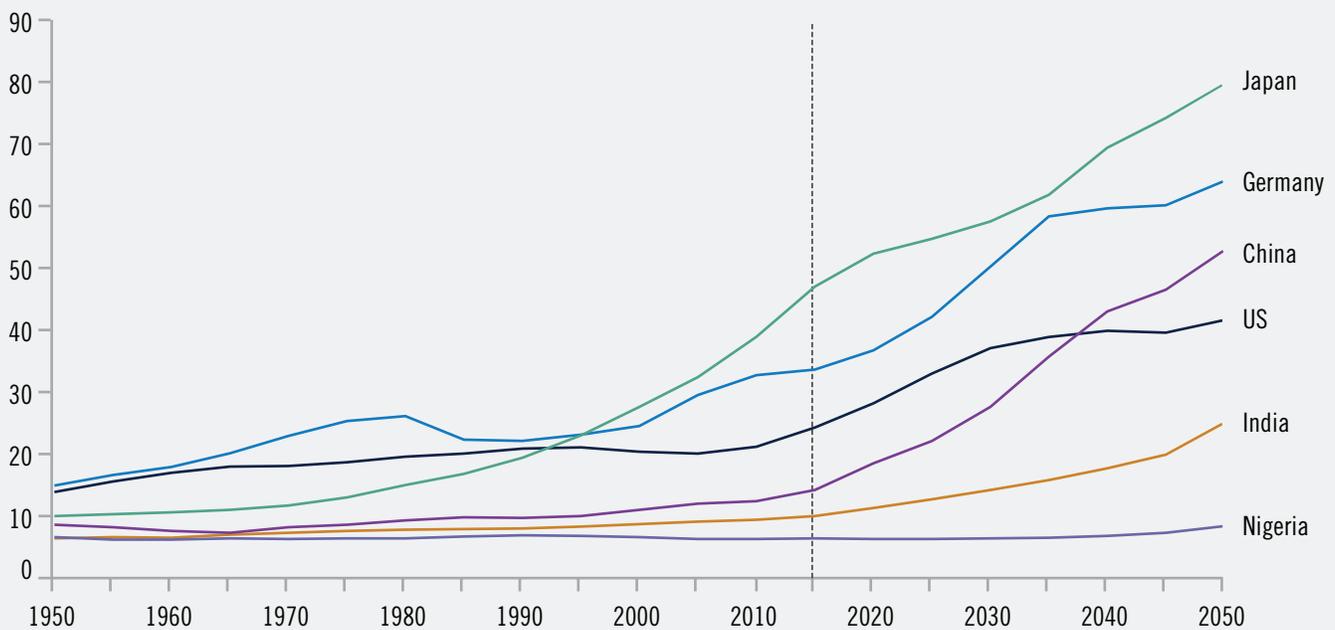
While individuals may wish to live independently for as long as possible, there comes a time when a move to a senior housing community may be needed. Senior housing targets individuals aged 80-and-above, a rapidly growing age cohort in many countries, as noted earlier. At the same time, there are fewer children to provide at-home support to aging parents, resulting in the old-age dependency ratio — the ratio of people aged 65-and-over to working-age adults — rising sharply (Exhibit 10). The problem is particularly acute in Japan, where the growth in older age cohorts is now placing an almost overwhelming burden on adult children to care for the elderly.

While the investment opportunities for senior housing vary significantly by country, this graying population is spurring attractive opportunities for investing in independent living communities (similar to traditional apartments but also offering services such as dining facilities, housekeeping, and recreational activities) and assisted living communities (offering additional support services and generally catering to individuals who need assistance with daily activities, but do not require nursing home care) in a number of real estate markets. Memory care, a type of assisted living community, is a growing specialty that focuses on seniors living with dementia or Alzheimer’s.

EXHIBIT 10

The ratio of seniors to working adults is putting an increasing burden on family caregivers

Old-age dependency ratio: number of people 65 and over per 100 people aged 20-64



Source: United Nations Population Division

According to research firm Senior Housing Analytics, the demand for new senior housing units in the US is projected to surge from 2010 to 2030, representing an increase of roughly 850,000 units — an unprecedented level of industry growth (Exhibit 11).⁹ An example of a premier senior housing community is the San Francisco Towers, which features 250 apartments of various sizes, a formal dining area, private dining rooms and lounges, housekeeping services, a swimming pool and spa, and a rooftop lounge with fireplace.

For investors, a major advantage of senior housing is that, compared to other commercial property types (like hotels, shopping centers, and office buildings), it is much less sensitive to economic downturns. The decision to move into independent or assisted living is typically driven by lifestyle and health issues, and, as such, unrelated to the broader business cycle. Seniors are also less vulnerable to major income swings than the typical apartment renter and they move infrequently. Indeed, occupancy levels in the US have consistently ranged between 85% and 91% over the past five years — even as supply has increased.¹⁰ As a result, rents at senior housing communities have also historically remained relatively stable compared to traditional apartments.

Beyond the US, Japan and the UK are the most attractive opportunities given demographic profiles, percentage of citizens with some form of private-pay insurance, and current lack of supply of senior housing. While Japan’s demographics imply that the largest absolute growth within the 80 to 85 age cohort has just occurred, demand for senior housing has been below that of the US. The reason for this discrepancy is most likely due to cultural norms: Japanese children are often responsible for taking care of their aging parents, and allowing a parent to enter a nursing home can be viewed as going against the grain. Nevertheless, demographic reality is starting to overwhelm tradition, and there are simply not enough working-age Japanese citizens to take care of the graying population.

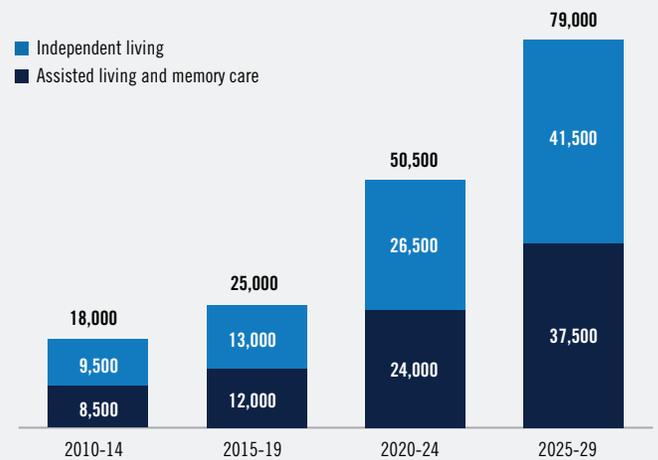
The UK, while having a high reliance on government health care, does have some private and out-of-pocket pay, especially for those who can afford the higher prices of senior housing. Currently, however, the UK does not have a large supply of senior housing communities: owner-occupied retirement housing represents just 2% of the total housing stock.¹¹ Consequently, the penetration rate (the percentage of the population in senior housing divided by the population in the target age range) is around 1% compared to 10% in the US.¹² Given the undersupply and a relatively old stock profile (two-thirds of currently operating senior housing was built over 20 years ago), there is an opportunity to develop new senior housing communities in partnership with established operators, especially in higher-end care homes.

In emerging markets, much uncertainty still exists around China. While there is a nascent and growing private-sector senior housing market, it may take some time for this demographic

EXHIBIT 11

Demand for senior housing units in the US is projected to rise sharply

Projected annual demand growth for senior housing units



Source: Senior Housing Analytics

opportunity to translate into a viable investment opportunity. This is due both to cultural expectations that elder care will be provided primarily by adult children and relatives, and to the legal and political risks that the government may make sweeping policy changes that could hamper a newly forming market. If the Chinese private-sector senior housing market grows, it is likely to represent a significant two-stage opportunity for investors: senior housing for those in their early 70s, followed by a second stage with an older 80-and-over cohort closer to the US model.

Eds and meds

The silver “tsunami” will bring in its wake an increase not only in the incidence of age-related diseases but also in medical research focused on curing these diseases and in health care expenditures to finance these endeavors. We will discuss direct health care investment opportunities in the next section, but an opportunity also exists to play this theme indirectly through an “eds and meds” strategy — specifically, by investing in the real estate required by both biotech start-ups and larger medical companies and research centers that typically cluster around major universities and educational institutions.

Biotech companies and the National Institutes of Health, which leases its lab space despite being a federal agency, have unique needs when it comes to renting workspace. Specifically, they need buildings containing a mix of so-called wet labs, where researchers can work with liquid and gas chemicals under proper conditions, and traditional office space. Among their strict

EXHIBIT 12

Life sciences clusters are the hubs of biotech research and development



KENDALL SQUARE – BOSTON, US



PILL HILL – MISSISSAUGA, CANADA



CAMBRIDGE SCIENCE PARK – CAMBRIDGE, UK



ZHONGGUANCUN SCIENCE PARK – BEIJING, CHINA

Photographs used with permission of: Genzyme, City of Mississauga, Cambridge Science Park

requirements, these facilities must have proper ventilation, backup power, and climate control. Building costs for these facilities can run double that of traditional offices, and it can be even more costly to adapt existing buildings to the specifications needed for life sciences research and development. Nonetheless, the case can be made for potentially strong investment returns, due to the high degree of specialization and constant use of the facilities (the research is never “turned off”), the stickiness of tenants (it is difficult to move research projects that are under way), and low vacancy rates, given the secular growth in the sector.

Life sciences companies tend to be centralized near major research universities and hospitals resulting in highly concentrated clusters. For instance, Cambridge’s Kendall Square neighborhood features more than 125 of these companies within an area of just 2.5 square miles, in no small part due to its

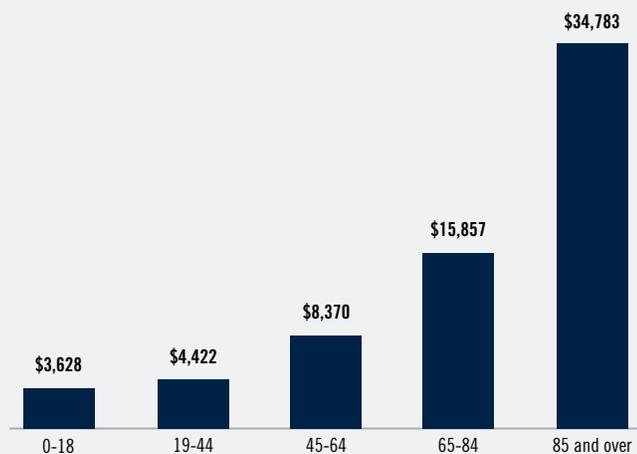
independent hospitals. Competition for lab space is fierce, with low vacancy rates, helping to make Boston one of the largest and most expensive US markets for life sciences firms. Other major clusters in the US have developed in San Francisco, San Diego, Seattle, and Raleigh-Durham.

In the US, Massachusetts alone currently has an inventory of almost 22 million square feet of life sciences lab space, up 34% since 2007, according to MassBio, an industry trade group. Globally, some of the biggest pharma clusters include Oxford and Cambridge in the UK; Munich in Germany; Paris in France; Mississauga in Canada; and Beijing and Shanghai within China (Exhibit 12). In fact, China has featured biotech as one of its seven pillar industries in its latest Five-Year Plan. And in 2012, Russia released its BIO 2020 plan, which aims to increase biotech as a share of GDP to 1% by 2020 and 3% by 2030.

EXHIBIT 13

Personal health care spending ramps up sharply at age 65

Total 2010 per capita personal health care spending by age cohort

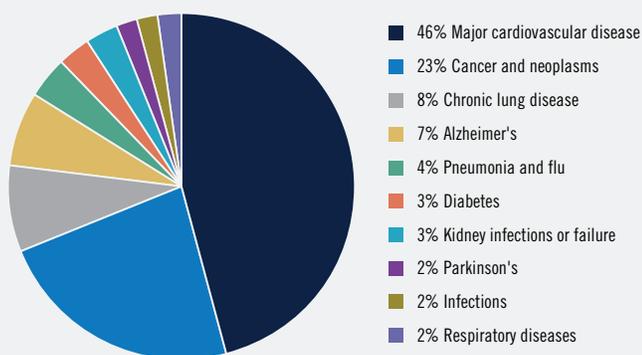


Source: US Centers for Medicare & Medicaid Services

EXHIBIT 14

Top 10 causes of death in individuals age 75 and over in the US

Share of top 10 causes of death in 2013



Note: Does not include dementia or other diseases associated with morbidity.
Source: US Center for Disease Control and Prevention

Health care and technology

The global aging phenomenon has significant implications for the health care sector, given that the bulk of health care spending occurs in old age. In developed markets, health care spending as a percentage of GDP could soar from under 6% in 2010 to 12% by 2060, if costs are not contained, according to the Organization for Economic Cooperation and Development (OECD). For emerging markets, the OECD predicts the impact could be even more severe, with costs tripling as a percentage of GDP.¹³

In the US, health care spending is projected to reach \$5 trillion by 2023, up from just over \$3 trillion today, according to the Centers for Medicare and Medicaid Services. People over the age of 85 spend twice as much as those aged 65 to 84 — who, in turn, spend double the amount of 45- to 64-year-olds (Exhibit 13).

And while life expectancy is increasing around the world, so too is the rate of chronic illness. It is therefore no surprise that the health care sector is expected to add the most jobs within the US in the coming years: the Bureau of Labor Statistics predicts that health care practitioners, support staff, and technical workers will account for about one in every four new jobs added over the next decade. Within the broad health care space, we believe two investment themes are particularly attractive: pharmaceuticals and biotech opportunities in the nearer term and aging-related technology solutions in the medium to longer term.

Pharmaceuticals and biotech

As global aging accelerates, health care costs are ballooning across most of the world's major economies. For example, according to PGIM's proprietary study (conducted with Oxford Economics), annual US household medical drug costs alone will double from just over \$400 billion currently to \$900 billion by 2050. Regardless of whether medical expenses for the elderly are paid for by individuals, public health care systems, or insurers, there is little doubt that an aging society will come with a bigger health care bill that is increasingly being spent on the diseases that impact the elderly (Exhibit 14).

At the highest level, most investors will likely want to ensure that their public equity and debt allocations to the broad life sciences sector adequately reflect the strong secular positioning of health care companies and service providers, as well as pharmaceutical firms with distribution in countries with aging populations. The recent filing of an "Aging Population" ETF in the US, targeting life sciences (and other) companies that provide goods and services to the oldest quartile of the population, is an indicator of the growing popularity of this theme among retail investors. However, many factors influence the broader health care sector (for example, government regulation), so a broad sector bet is a fairly blunt instrument for playing the longevity investment theme.

For a more targeted approach, we believe institutional investors should consider health care-focused venture capital firms whose portfolios of operating companies are weighted towards pharmaceutical and biotech firms targeting diseases that strike the elderly in large numbers, such as dementia, stroke, cancer, Alzheimer's, and Parkinson's. Indeed, there are now some venture capital firms that invest exclusively in the longevity theme. There may also be opportunities to consider venture capital firms with investment expertise in companies specializing in narrowly focused, genetically targeted drugs, especially "personalized" cancer drugs and life-extending gene therapies. Here, research has exploded, especially with the cost to sequence the human genome plummeting from over \$100 million in 2001 to just a few thousand dollars today.

Venture capital investing will naturally require strong manager selection capabilities and a long-term investing horizon (often 10 to 12 years), so the illiquidity factor is an important consideration for institutional investors. Other potential avenues of investment include mid- and late-stage pharma-focused private equity companies, co-investments alongside health care private equity, or health care royalty companies. Royalty companies loan money to biotechs that are mid- to late-stage and take a right to a percentage of royalties from the eventual sale of the drug as part of the deal. This type of investment gives up some of the upside for less risk than traditional venture capital that might invest in early-stage firms. Of course, in the years ahead, there will be a growing opportunity to access pharma and biotech firms oriented towards combating age-related diseases in the public markets as well.

The swift rate of technological change, regulatory uncertainties, and complex intellectual property rights all make concentrated bets in the biotech sector a risky and longer-term proposition. But given the secular trends outlined in Parts 1 and 2 of this paper, the gains will likely be substantial for biotech firms that successfully bring their products to market.

Silvertech

Many of the headline-grabbing innovations emerging from Silicon Valley have targeted the tech-savvy Millennial generation. However, a new wave of start-ups is developing platforms, apps, and devices that aim to help older adults live independently, better cope with dementia and other illnesses, and maintain family, caregiver, and social connections.¹⁴ While a number of barriers still need to be overcome, we believe "silvertech" represents an opportunity that investors will want to closely monitor.

The primary driver for silvertech is the growing opportunity for providers to develop medical devices and technologies that help the elderly remain healthy and active, while staying in their own homes. Indeed, aging in place is a major trend: research by the Society of Actuaries shows that a majority of retirees consider

remaining at home to be a top priority. Governments, for their part, are actively seeking to reduce their spiraling health care costs, and curtailing seniors' use of hospitals and publicly funded nursing homes is part of that effort. A host of new innovations as well as updates to existing technology solutions are being developed to capitalize on the trend:

- **Chronic care.** Personal emergency response pendants are perhaps the most prevalent type of medical device targeted at the aging population. But the category is growing and offerings are expanding, even though near-term demand among the elderly is still nascent. For instance, sensors can be placed around the home, alerting caregivers if a senior misses a meal, does not get out of bed, or leaves the stove on. Companies are bringing to market footwear that can detect falls. "Smart" pill boxes remind seniors to take their medications. And when seniors leave their homes, GPS-tracking technologies allow others to locate them.
- **Mobility.** Start-ups in this category include on-demand, Uber-like services targeting the needs of elderly people and a handy, retractable tripod that lets seniors get up independently when they have fallen down.
- **Care coordination and networks.** Care providers are increasingly focused on the progression of elderly patients once they have left the hospital — an area of increasing policy and litigation focus. Telehealth solutions, while not specifically targeted at aging populations alone, could certainly play an important role in elder care, especially since Medicare has recently begun to experiment with broadening the kinds of remote health monitoring it will cover. For example, in 2014, a start-up which matches older adults with vetted home care workers, raised \$20 million in venture capital from prominent Silicon Valley investors, one of the early successes for the silvertech market.

Given the uncertainty around timing, and the nascent stage of many innovations, silvertech is a longer-term opportunity best accessed through longer-horizon private equity and venture capital funds. But similar to the biotech and pharma investment theme, there will be an increasing opportunity, over time, to access these technology firms in the public markets as well.

In the US, a key driver of profitable private sector investment will be insurance reimbursement for product and service offerings above \$100, the price point at which many individuals may be less willing to pay out-of-pocket. From an investment perspective, medical devices and technologies have a much faster approval process than pharmaceuticals, are cheaper to produce, and can be brought to market more quickly. (The potential payoff, on the other hand, is usually lower). Health care systems and insurance providers typically back these devices because the upfront cost is far lower than the potential outlay required for lengthy hospital or nursing home stays.

EXHIBIT 15

Summary of investment ideas: primary ways to access

INVESTMENT IDEAS		ASSET CLASS						
		Public fixed income	Public equity	Private equity	Venture capital	Direct real estate equity	Direct real estate debt	REITs
Real estate	From homes to condos					✓	✓	✓
	Senior housing					✓	✓	✓
	Eds & meds					✓	✓	✓
Health care & technology	Pharmaceuticals & biotech	✓	✓	✓	✓			
	Silvertech	✓	✓	✓	✓			

Applying a longevity lens to the investment portfolio

The investment themes we have identified in the previous sections can be accessed via a broad range of public and private investment vehicles and asset classes, demonstrating the wide-reaching impact of the longevity mega-trend (Exhibit 15).

Organizing to capture the aging mega-trend

Though some institutional investors have accessed cross-cutting themes — such as inflation — through dedicated multi-asset class investment sleeves, many institutions are not managerially or organizationally structured to implement investment ideas that are broad, thematic, and cross-asset class. While the traditional targeted, asset class-specific structure has served organizations well, CIOs may find it worthwhile to consider additional actions aimed at capturing broader, thematic mega-trends such as longevity. As an example, those actions might include:

- Forming a longevity task force to examine the investment implications of mortality reductions and aging populations across different geographies.
- Evaluating whether a thematically focused, multi-asset class investment sleeve — this could involve investing in opportunities arising from secular trends such as global aging or urbanization — can serve as a complement to traditional asset class-focused sleeves.

- Examining whether restrictions on investment structures or limits on risk exposures might constrain the organization's ability to participate in the longevity opportunity — for example, in the case of longer-term biotech and medical technology investments.
- Exploring potential opportunities to enter into targeted strategic partnerships with third-party asset managers or investment consultants to invest in the longevity mega-trend. Or, one step short of that, incorporating a discussion on the longevity mega-trend into the formal dialogue with asset managers and other counterparties.

In addition, CIOs of pension plans and other institutions with a liability focus will need to carefully evaluate the implications and options resulting from longevity risk to their asset-liability management. This will include considering liability-driven investing, glide path redesign, and risk transfer mechanisms — critical topics across many of our client discussions.

The mega-trend of global aging opens up important new investment opportunities for institutional investors. Aging populations are now a phenomenon across both developed and emerging markets, and the trend is accelerating. Investors should consider capitalizing on the opportunities arising from this unprecedented global demographic shift.

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Endnotes

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Exhibit 7: US — Nursing homes includes proprietary and government nursing homes and homes for the elderly. Hospitals & physician services includes government hospitals, proprietary hospitals, physician services, and medical care and hospitalization. In-home health services includes home health care and nonprofit nursing homes’ and hospitals’ services to households. Medicine & drugs includes prescription and nonprescription drugs. Education includes proprietary and public higher education, nonprofit private higher education services, and commercial and vocational schools. Motor vehicles includes new and used autos and trucks, tires, accessories, and parts. Rental housing includes rental of tenant-occupied nonfarm housing. Recreational services includes casinos, cable TV, sports clubs, and other recreational services. Restaurants includes meals at limited service eating places and other eating places. Japan — Food excludes food away from home. Home repairs & maintenance includes service charges for repairs and tools and materials for repairs. Medical care includes medicines, health fortification, medical supplies & appliances, and medical services. Fuel & utilities includes fuel, electricity, gas, and water charges. Recreation includes package tours, books and other reading materials, and other recreational services. Restaurants includes food away from home. Rent includes rents for dwelling & land. Transportation & communication includes public transportation, private transportation, and communication. Education includes school fees, school textbooks & reference books, and tutorial fees.

Exhibit 8: Nursing homes includes proprietary and government nursing homes and homes for the elderly. Hospital & physician services includes government hospitals, proprietary hospitals, physician services, and medical care and hospitalization. In-home health services includes home health care and nonprofit nursing homes’ and hospitals’ services to households. Medicine & drugs includes prescription and nonprescription drugs. Financial services includes portfolio management and investment advice, commercial banks, other depository institutions and regulated investment companies, financial service charges and fees, and other commissions and services. Motor vehicles includes new and used autos and trucks, tires, accessories, and parts. Clothing & footwear includes men’s, women’s, children’s, and infants’ clothing, shoes and other footwear, and clothing materials. Restaurants includes meals at limited service eating places and other eating places. Education includes proprietary and public higher education, nonprofit private higher education services, and commercial and vocational schools. Rental housing includes rental of tenant-occupied nonfarm housing.

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