



Lessons from the Future: Boosting Growth in an Aging Japan

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EXECUTIVE SUMMARY



Japan has long been a pioneer. It embraced capitalism, industrialization, and modernity earlier and more thoroughly than anywhere else in Asia. Yet it kept a unique national character even through the trauma of war and the shock of defeat and occupation.

Today Japan is a pioneer of another sort. It will see its population shrink to a degree that nowhere in the world has ever experienced outside of war or disease. By 2065, less than two generations from now, the country's population is expected to shrink by one-third, to 88 million from 126 million today. The median United Nations projection has it falling by almost half, to some 75 million, by the turn of the century. This briefing explores how Japan can blunt the impact of this decline by making better use of its labor, capital, and productivity and examines trends already upending traditional hierarchies, like increased workforce participation by mostly female part-time workers. It also asks what a new social contract for Japan would look like. Will women's roles as workers and mothers be more fully recognized, raising both fertility and productivity and slowing the decline in population? Or will little in the social structure change, so that Japan continues its dramatic population decline?

Fewer people means lower consumption growth—fewer cars sold and fewer bowls of rice bought. Low fertility means fewer young people, so companies will face a struggle to find workers. Fewer workers means less funding for pensions, healthcare, and other social services. Governments will face painful choices in how to manage decline, but in the face of declining tax receipts they will resort to some combination of cutting services and issuing more debt. Will this mean a lower standard of living? Or just a different, lower-consumption life? Can a technology-enhanced life make up for these cutbacks, with technologies such as robots, their cobot cousins, exo-skeletons, and digital medical devices helping make life comfortable as more Japanese live longer?

There is understandable fear about the burden on a shrinking number of younger workers forced to shoulder pension and health care costs for a growing number of elderly people. But this dystopian view doesn't consider the potential afforded by well-educated and capable older people in a wealthy country at a time of rapidly changing technological possibilities. This briefing argues that with the right social,

political, and economic choices, most importantly a larger and more equal role for women, a rich and rapidly aging Japan can pioneer a path where its citizens live long, rewarding, and comfortable lives.

What happens in Japan matters for the rest of the world. If the problem in the twentieth century was managing population growth, the challenge in the twenty-first century will be dealing with too few people. From population bomb to birth dearth: Much of East Asia, and indeed the rich world, confronts the challenge of falling fertility rates.

There are opportunities in these challenges. Workers can expect to see their value—and their earnings—go up. But they will also need to work longer. The idea of retiring at 60 will be a thing of the past. Machines will also do more work. Robots that work alongside humans, called cobots, and their factory-focused robot cousins will be two of the ways in which machines will take over much of what people now do. Many prominent economists have suggested that a digital economy, precisely of the type Japan is becoming, eludes measurement by strictly GDP terms and that more emphasis for such advanced societies should be on intangibles that measure quality of life. Life might be both more digital and more local at the same time, with smart cities and digital medicine complemented by locally sourced foods and visits to Japanese mountains, museums, and temples. Fewer people taking fewer trips abroad means a smaller environmental footprint.

Japan is particularly well-positioned to make this transition to a society that has relatively few workers and young people. It is rich, with income per person of almost \$40,000. Japan's research & development (R&D) labs and its manufacturing facilities are among the world's best. A high degree of social cohesion will help. So, too, will the country's low level of wage inequality.

There are significant challenges ahead if Japan is to seize the possibilities presented by a declining population. More flexibility needs to be introduced into the labor market, which is hampered by a two-tier system that prioritizes long-term, mostly male, employees. Given Japan's surge in working women, measured by workforce participation now among the world's highest, Japan would benefit from a narrowing of the gender gap in pay—and a lifting of the very low glass ceiling that too often keeps women trapped in part-time work or in the lowest managerial tiers. Eliminating tax and pension penalties imposed on two-income families would also help. Labor market reforms in the early 1990s made it easier to hire part-time workers. More women joined the workforce, but many were part-time workers. Companies typically don't invest as much in part-timers, so their productivity remains low. The change was good for companies, but it's been bad for workers' overall wages and, arguably, for the economy.

Japan also needs to use capital more productively. Corporations would benefit from embracing a culture of risk-taking. Japan's many world-class conglomerates need to do a better job of capitalizing on their impressive R&D departments. The moves by Japan's \$1.6 trillion Government Pension Investment Fund to improve returns even as it makes a serious attempt to focus on Japan's environmental, social, and governance issues are steps in the right direction.

If Japan seizes the opportunity, it has the chance to pioneer a new social contract to protect the old, the infirm, the unlucky, and even the inept, one that reflects the possibilities that a wealthy, technologically adept country enjoys. With most other rich and even middle-income countries also facing a demographic cliff, the world would do well to watch Japan.

As a wealthy, advanced society, Japan has the opportunity to create a new social contract that maintains high living standards for all, even as its large corporations are becoming more sustainable and inclusive. Under the policies put forward by the government of long-serving Prime Minister Shinzo Abe, Japan is taking meaningful steps to rebalance its social spending to ensure high standards of living for old and young, while at the same time managing its public debt to GDP, which at 240 percent in 2019 is the highest recorded in the Organization for Economic Co-operation and Development (OECD).¹ This briefing examines how Japan can respond to its demographic imperative to make smarter use of labor,

make capital work harder, and use technology to increase productivity, in order to see that growing old and rich is a pleasure, not a burden, for individuals and their society.

INTRODUCTION



Japan is facing the threat of slow extinction. Since 2007, its population has been shrinking and this trend will accelerate. The accompanying charts show the pictures: from a classic population pyramid in 1950, with many young people and few elderly, the country's demographic structure will look like a thin skyscraper by 2100 (see Figure 1). Japan's fertility rate has declined by half since the 1950s. Its

child population (at 12 percent of the total in 2019) has declined for three decades, and is the smallest on record.² As Japan's baby boomers die, and the current workforce ages out, there will be far fewer people to replace them (see Figure 2). By 2050, its over-65 population (now the highest in the world) will rise from 28 percent to 38 percent, even as its total population shrinks by nearly 20 percent or 25 million people.³ Realistically, Japan can only hope to slow the rate of population decline. This is quite literally an existential crisis. Japanese must adapt and muster their collective resources to meet these challenges.

Japan has the highest old-age dependency ratio among the 36 countries in the OECD, a grouping of mostly rich nations that make up some 60 percent of the world economy. There are 46 people aged 65 and older for every 100 people of working age.⁴ By 2050, this will have risen to 74 for every 100.⁵ Japan's labor force during that time will have dropped by a quarter, from its current 67 million to 51 million. Thus, Japan will have lost 16 million workers funding social security benefits. And by then, the OECD estimates, each Japanese worker will be paying taxes and pensions to support 1.2 older people.⁶ Japan is not alone, though its situation is the most extreme. In terms of old age dependency, South Korea will be right behind it, followed by Germany, China, the U.K. and the U.S.⁷

The fiscal burden of an aging society weighs ever more heavily on Japan. More than two-thirds of social security expenditures, which accounted for 34 percent of government spending in 2019, goes toward the elderly, through pensions—the largest component of social security spending—and other benefits, with only about 4 percent aimed at childcare.⁸ Japan's social security expenditures are estimated to hit around ¥190 trillion (\$1.8 trillion*) in 2040—with long-term care costs rising the fastest, followed by medical care costs.⁹ Japan has tried to rein in rising social costs. Back in 1986, the government lowered pension benefits and raised the benefits eligibility age from 60 to 65. A new round of pension reforms is under active consideration. The national consumption tax rose from 8 percent to 10 percent in October 2019. The extra money is intended for expanded childcare and higher education support.¹⁰ Moves by the Government Pension Investment Fund (GPIF), discussed later in the briefing, will help keep a lid on unfunded pension costs.

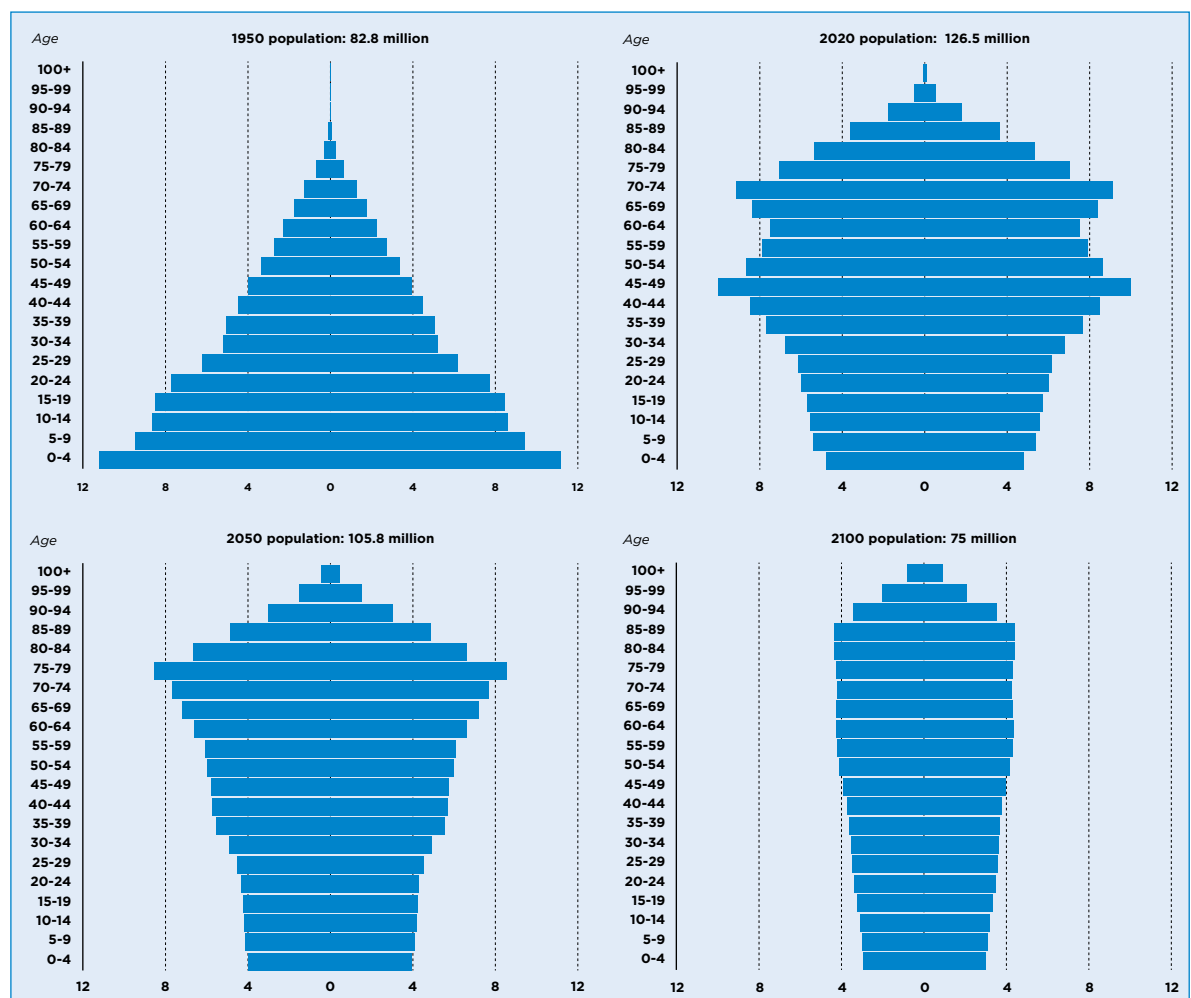
Japan's fertility rate has halved from 2.96 births per woman in the 1950s to its current 1.4. As with many other nations, this is well below replacement level (see Figure 3). This fall has been attributed to a declining marriage rate, people getting married later in life, and to rising economic insecurity, which is linked to the rise of part-time employment. Other factors include a lack of work-life balance—it is not unusual for men to work 80-hour weeks. Their grueling work schedules mean Japanese husbands spend some of the least time on housework, shopping, and child and adult care in the OECD.¹¹ Japanese wives are left alone to struggle with laundry, cooking, and childcare. Daycare is still in short supply—a shortage highlighted when schools were closed in early 2020 because of the COVID-19 virus. Many women, who despite a massive 25 percent gender wage gap are working outside the home more than ever before, often feel they must choose between career or raising a family.

* All currency conversions use an exchange rate of US\$1=¥105.

Japan's older generation of so-called silver consumers are wealthier than other segments of society. As with aging baby boomers in many developed countries, these older consumers are dynamic, report feeling younger than their age, and put a premium on staying fit, spending the most on fitness facilities of any age group in Japan.¹² But the hoped-for tsunami of silver consumer spending has been, in macro-economic terms, barely a ripple. There are some businesses that have benefited from consumers, such as gyms, health-oriented businesses, and e-commerce platforms. Unfortunately, there is no tidal wave of big-spending older consumers to boost Japan's low consumption growth.

Overall, Japan's older consumers are shifting spending around, not spending more.¹³ Relative to younger people, they buy more gifts and spend on their extended families, especially their grandchildren. But Japan's private consumption growth, which grew at 2.4 percent in 2013, the first full year of the Abe administration, has flagged since then to just 0.8 percent in 2019. Private consumption is projected by the International Monetary Fund (IMF) to continue slowing, even as older consumers account for a growing share of the total.¹⁴

Japan's aging consumers control about 70 percent of Japan's roughly ¥1,800 trillion in household assets (\$17.1 trillion).¹⁵ The wealthier ones are a strong market for financial services providers offering trust and estate planning to maximize inter-generational wealth transfer to their families. Japan's estate tax is onerous, with the heir (not the estate) paying the inheritance tax. The basic exclusion amount is very



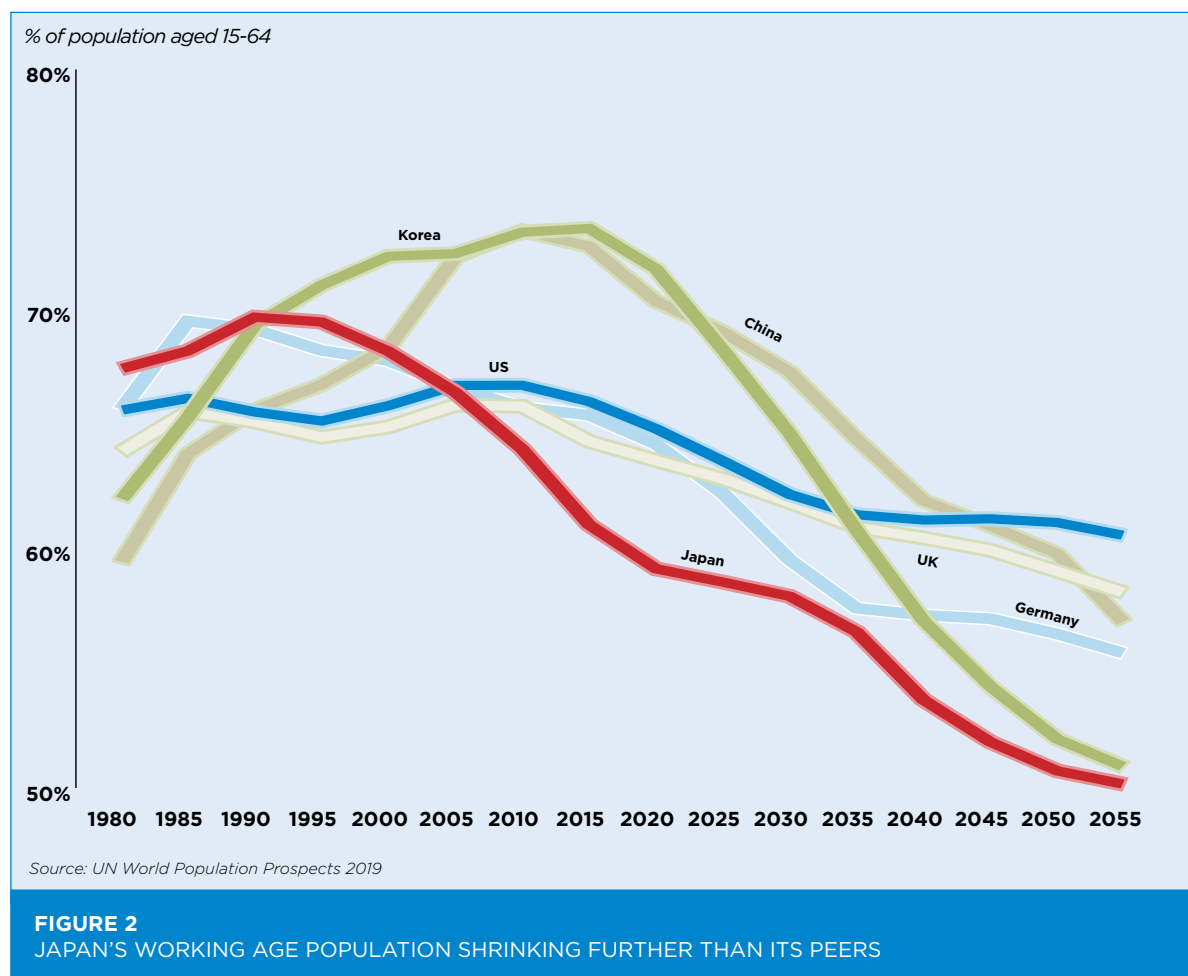
Source: UN World Population Prospects 2019

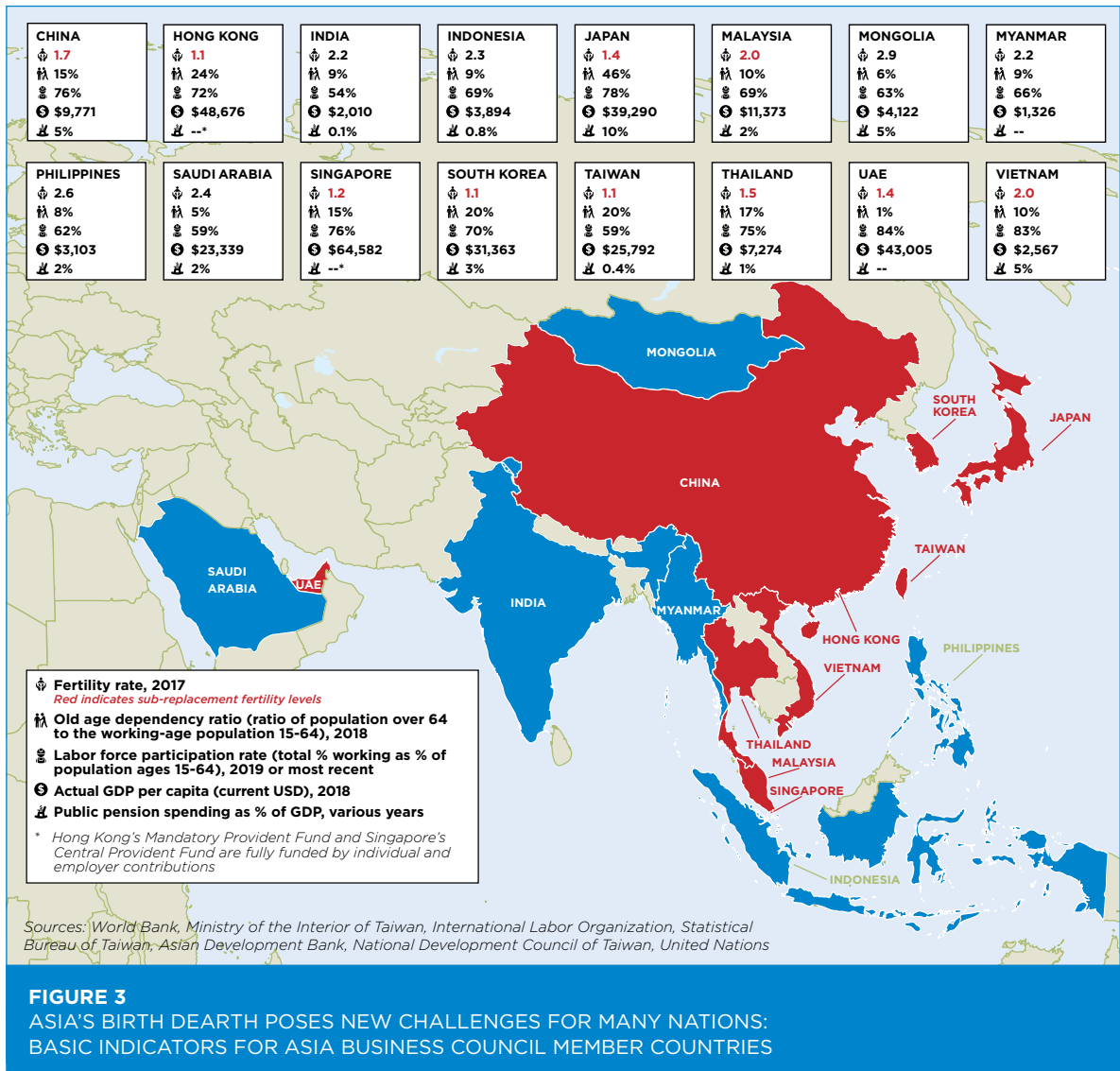
FIGURE 1
JAPAN'S POPULATION STRUCTURE: FROM STABLE PYRAMID TO SKINNY SKYSCRAPER

low. And recent changes to the Japanese Inheritance Tax Law on overseas assets make estate planning even more important.¹⁶

Older unmarried or divorced Japanese women are the exception to the rule of generally well-off Japanese elders. The current pension system, which was designed for post-war families where women typically quit their jobs to have children and become housewives, penalizes single and divorced women. Under the current pension system, such women receive only a small fraction of the pension calculated for married women. These payments will not be sufficient to keep these women above poverty levels. Without reform to the pension system, roughly 50 percent of never-married or divorced women will become impoverished in the next 50 years, compared to only 10-20 percent of widows or married women. Overall, nearly 25 percent of elderly Japanese women overall will be impoverished, versus 10 percent of Japanese men, if no changes are made.¹⁷

Japan's demographic challenge seems paradoxical on some level, as by so many measures Japan is a vibrant, robust, and healthy society. The lifespan of the average Japanese man and woman, at 81 and 87 years respectively, is only surpassed by Hong Kong and Switzerland for men, and by Hong Kong alone for women.¹⁸ Japan provides more equity in education opportunities than OECD peers.¹⁹ As a nation, it is one of the top funders of science and technology R&D.²⁰ Corporate profits are at a record high, unemployment hovers near a 30-year low, and more women than ever are working. And thanks to Abenomics—a series of bold monetary, fiscal, and structural reforms introduced by Prime Minister Shinzo Abe beginning in January 2013, shortly after he took office—per capita GDP growth has accelerated to close to the OECD average, persistent deflation has ended, and the government budget deficit has fallen from 8.3 percent of GDP in 2012 to 2.4 percent in 2019.²¹

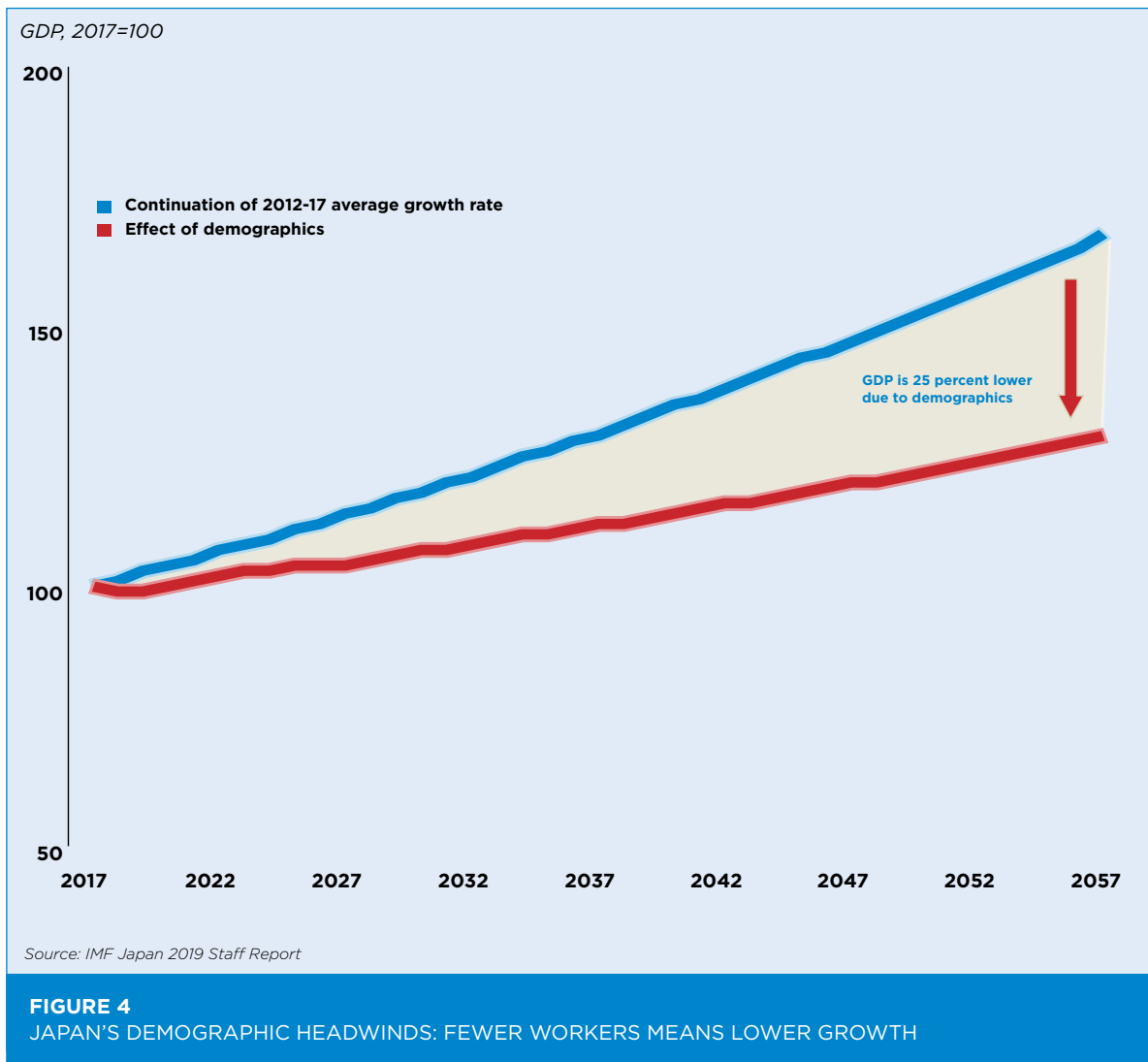




Abenomics is centered on “three arrows.” The first arrow is aggressive monetary policy; the second is flexible fiscal stimulus; and the third comprises a series of structural reforms aimed at supporting reflation, productivity increases, labor supply, and growth. Abenomics aims for 2 percent productivity growth over the long term to enable 2 percent real GDP growth in the face of demographic headwinds from fewer new workers. Japan’s labor productivity is 25 percent below the average of the top half of OECD countries—despite its very high levels of secondary and tertiary education and R&D spending.²² According to the IMF, it is growing at 1.5 percent per year.²³ And Japan’s real GDP growth of 1 percent in 2019 is below target.²⁴ Reflation efforts have fallen short. Under current policies, the IMF finds, Japan’s public debt-to-GDP ratio will continue to rise.²⁵

Implementation of the third arrow of Abenomics, structural reforms, has been slow. Bottlenecks remain in labor, product, and service markets, exacerbated by demographic trends. A shrinking and aging population will depress productivity growth and investment. An analysis by the IMF finds that worsening demographics could reduce real GDP by 25 percent in four decades relative to a scenario where recent growth performance is maintained, unless there are structural changes to Japan’s labor market (see Figure 4).²⁶

The first section of the briefing, on labor, builds on work from the IMF and others to discuss how a rising part-time workforce has depressed labor’s share of the economy. It explores how better thought-



out policies could preserve the flexibility prized by employers. A system that provides more training for part-timers could lead to a big pickup in productivity. It also looks at the crucial role women and non-Japanese play in filling growing gaps in Japan’s labor force, an area where Abenomics’ third arrow has a mixed track record of success. And it highlights the business case for advancing women’s equality in the workplace, which has the potential to boost corporate profits and GDP growth.

The second section explores how the world’s largest pension fund, the \$1.6 trillion Government Pension Investment Fund (GPIF), is using its influence to prioritize environmental, social, and governance (ESG) issues. GPIF’s focus on ESG issues is an attempt to insulate it from the effects of environmental and social problems—notably the risk of assets that may be stranded, or made worthless, as the world shifts away from fossil fuels. Combined with a conscious attempt to raise returns by increasing the mix of investments in stocks, rather than the traditional reliance on bonds, GPIF aims to lower the burden of pension costs on society. The attention to governance should help increase returns in Japan’s corporate sector, where returns on equity have been lower than those of peer nations.

The final section considers how Japan could use technology to complement its shrinking labor force. It examines Japan’s willing embrace of robotics in the manufacturing sector and how collaborative robots can help increase small and mid-sized enterprise productivity. Robotics are part of Japan’s vision of the near future, known as Society 5.0. In this future, Japan works smarter, not harder, and exports its knowledge and experience to help solve the world’s problems, through technology.

LABOR



The effect of aging on Japan's economy will be keenly felt in its shrinking labor force. With the workforce expected to shrink by nearly 20 percent in the next two decades, Japan faces demographic headwinds that could reduce real GDP by 25 percent in four decades relative to a scenario where recent growth performance is maintained.²⁷ More women and more older workers and, to a lesser extent, more

foreign workers, can help fill this decline from, in a business-as-usual scenario, 65 million workers in 2017 to 52 million in 2040. Unemployment is near record lows, at 2.4 percent, and companies are already having trouble finding workers.²⁸ There were 1.4 vacancies for every job applicant as of January 2020.²⁹

Given the shortage of labor, it is a puzzle why wages are not rising in Japan. Since Prime Minister Abe took office at the end of 2012, he has tried to break a trend of falling private sector wages. By 2013, when Abenomics went into effect, wages in Japan's private sector had fallen 11.5 percent from a 1997 peak.³⁰ Despite very tight labor market conditions and economic stimulus, real wages are still below their 2014 level, according to the OECD's 2019 Economic Survey of Japan, and remained stagnant in 2019.³¹

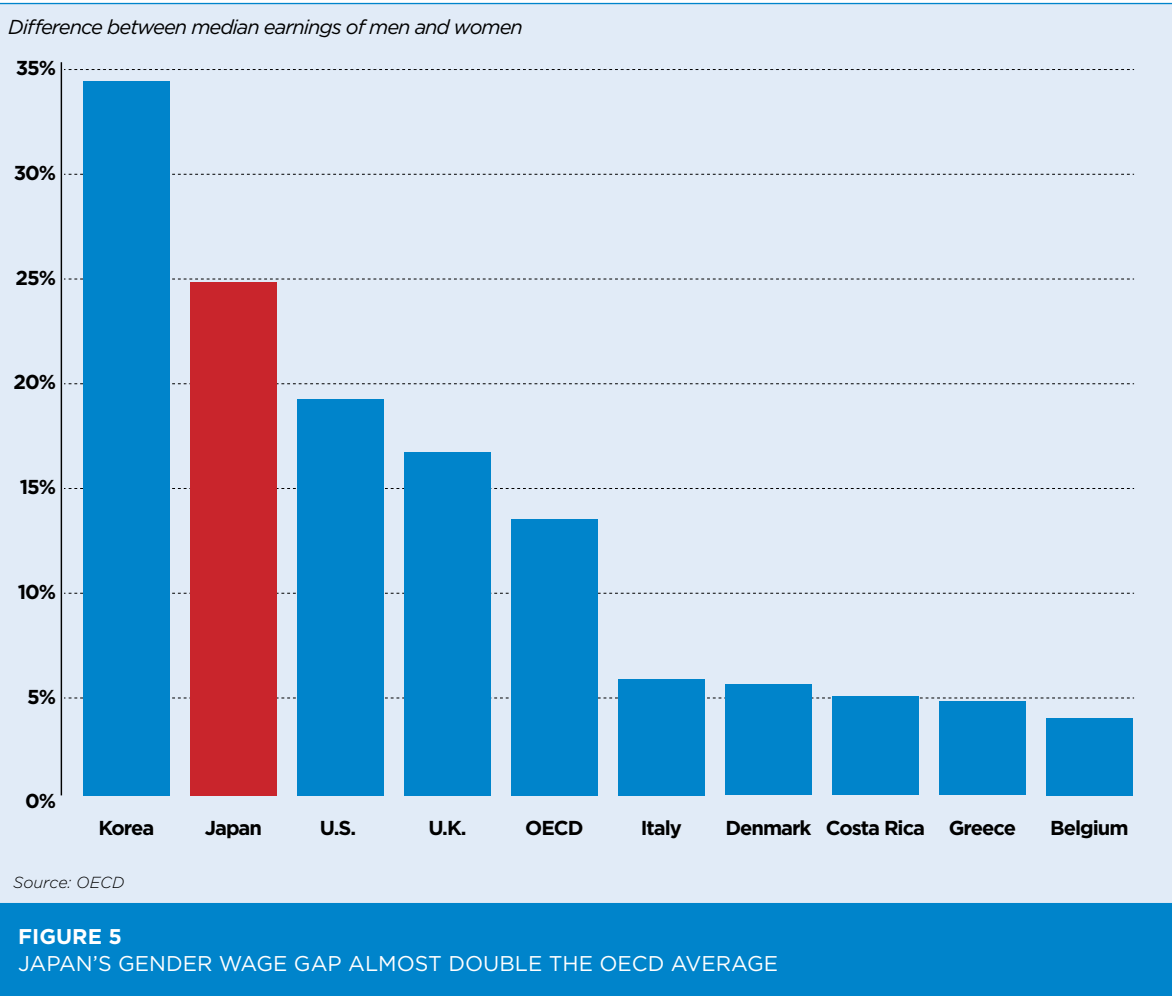
This situation is in contrast to the expectations of experts like Tokyo-based economic strategist Jesper Koll, who in 2014 predicted demographics would boost wage growth. Koll reckoned part-time or non-regular jobs, which come with lower salaries and less training, would fall to 20 percent of the economy by 2019. Koll predicted salaries would rise markedly, and so would marriages and the fertility rate. This has not happened, in part because using a part-time workforce is more convenient for companies, and workers have little collective bargaining power.

The rise of part-time, or non-regular jobs, which are now 40 percent of the job market, is a key culprit in keeping wages soft. The current state of the labor market, with so many part-time positions, is a big shift for Japan compared to the mid-1980s when, by IMF estimates, 85 percent of jobs were full-time.³² Japan's rigid labor market makes it hard to fire full-time workers. Companies like the flexibility of a temporary workforce. A big surge of part-timers came after Japan's asset bubble burst in the early 1990s, helping companies stay competitive in the face of low-cost rivals in South Korea and Taiwan. The Great Recession of 2008 saw an ever greater use of part-timers. Indicative of this trend, Recruit Holdings, a staffing company that brokers part-time workers, ranked among the top 10 market capitalization companies at year-end 2019 on the Tokyo Stock Exchange.

More part-time work has depressed wages because part-timers or non-regular workers are paid 40 percent less than regular workers, according to the IMF, and the vast majority (nearly 70 percent) are women, who face a 25 percent gender wage gap (see Figure 5).³³ Another reason part-time workers are cheaper than full-timers is that employers do not invest in skills-building for them. The IMF attributes the 20 percent productivity gap between regular and part-time workers in Japan's manufacturing sector to part-timers receiving less training.³⁴

Without skills-building opportunities, part-timers are on a track to earn less than full-timers through their lifetimes. According to research by the public policy think tank Research Institute of Economy, Trade, and Industry (RIETI), many people in non-permanent employment and/or working short hours are not making sufficient personal contributions to the public pension system. This lack of adequate retirement savings threatens to rupture Japan's social contract.

The RIETI research also notes that the problem of growing poverty has not yet manifested itself fully because many part-timers rely on supplemental income from family members.³⁵ Retired parents supplement the income of grown children who are often unable to find full-time work. When their aging



parents pass away, RIETI predicts, “a significant number of people will have no family to rely on in their old age,” while their pension benefits, if any, will be inadequate.³⁶

Female part-timers, especially unmarried ones, are most at risk of ending up with insufficient savings for retirement. Poverty statistics show that unmarried or divorced women have a 50 percent chance of living in old-age poverty. If the younger Japanese women working today were more productive and better paid, they would be able to put away more for retirement and pose less of a burden to Japan’s social security system as retirees.

Japan can benefit from changing the terms of its employment of part-timers to include training, and equal pay for equal work. The IMF estimates that training part-timers to be as productive as regular workers would boost the level of Japan’s labor productivity, currently growing by around 1.5 percent annually, by over 7 percent over 20 years.³⁷ In short, if productivity increased among part-timers, pay increases would follow. This would have myriad benefits. It would go some way to addressing Japan’s growing income inequality, as measured by the share of disposable income held by its poorest, which is above the OECD average.³⁸

Raising part-timers’ pay could also increase marriage and fertility rates. Anne Allison, a professor of cultural anthropology at Duke University and editor of *Japan: The Precarious Future*, noted: “The birth rate is down, even the coupling rate is down. And the number-one reason is economic insecurity.” Experts find that the marriage rate is about 30 percent among part-timers in their early 30s, compared to 56 percent among full-time corporate employees in the same age group.³⁹ Ryosuke Nishida, a professor at the Tokyo Institute of Technology who studies labor market trends, explains: “Japan has this idea that

the man is supposed to get a regular job. If you graduate and you don't find a job as a regular employee, people look at you as a failure." There's even a tongue-in-cheek Japanese board game called "The Hellish Game of Life," in which people who don't land a regular job struggle for the rest of the game. Similarly, the anti-heroes in Sayaka Murata's best-selling novel *Convenience Store Woman* live in a state of economic insecurity that makes parenthood remote.

Another area of opportunity for Japan is a further increase in the number of women who work. The Abe administration views this as key to attaining Abenomics' goals of 2 percent real GDP growth.⁴⁰ In Prime Minister Abe's speech at the World Economic Forum Annual Meeting in Davos in 2014, which has now become known as his "womenomics" speech, he said "the female labor force in Japan is the most under-utilized resource," and that "Japan must become a place where women shine."⁴¹ The Abe administration set a goal for female workforce participation of 73 percent by 2020, vowing to decrease the gender wage gap and greatly increase the number of female directors.

To advance these aims, the 2015 Act on Promotion of Women's Participation and Advancement in the Workplace requires all organizations with more than 300 employees to disclose gender diversity data and publish "diversity action plans," including female manager ratio targets. Based on these disclosures, the Ministry of Health, Labor, and Welfare created the ERUBOSHI certification to recognize companies that are leading the way with outstanding performance on women's participation and advancement in the workplace. ORIX Corp., Hitachi Ltd., and Suntory Holdings Ltd. are among the recipients. This sort of non-financial disclosure is part of a growing trend at major Japanese companies toward ESG awareness. Large companies are leading the way. Among small and midsize businesses, which make up 99.7 percent of Japanese companies, fewer than 1 percent have published action plans.⁴²

Japan's most impressive success on the womenomics front has been the female workforce participation rate, which rose from 63 percent when Prime Minister Abe took office in 2012, to 71 percent in 2018 (see Figure 6). This rate is higher than in the U.S. and Europe.⁴³ There are now twice as many double-in-

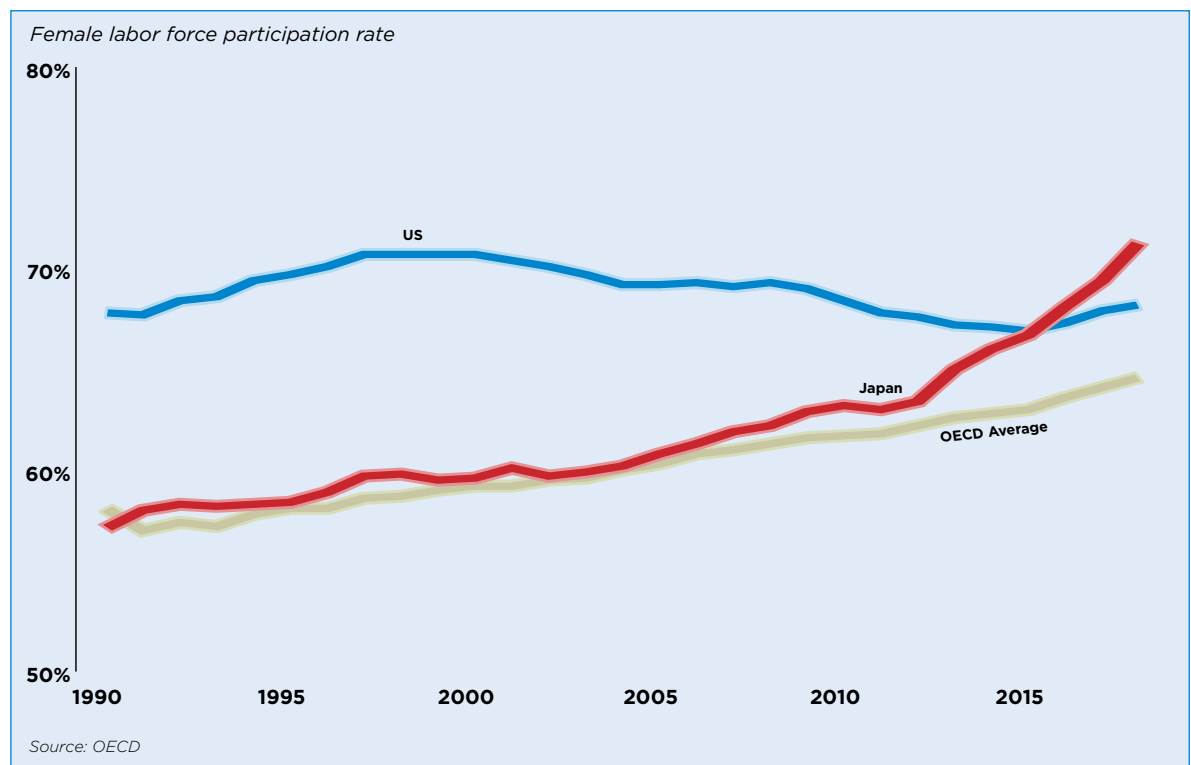


FIGURE 6
MORE JAPANESE WOMEN ARE WORKING, ESPECIALLY SINCE PRIME MINISTER ABE TOOK OFFICE IN 2012

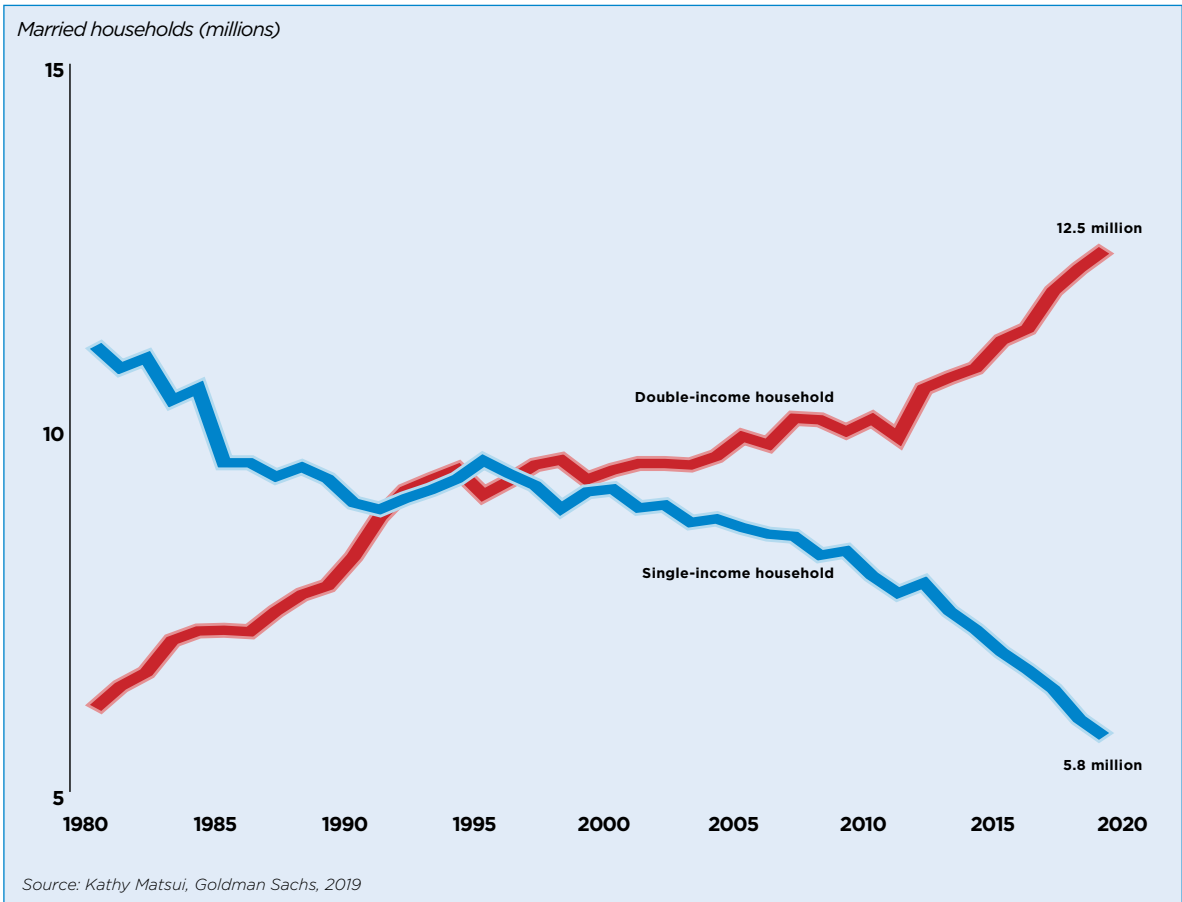
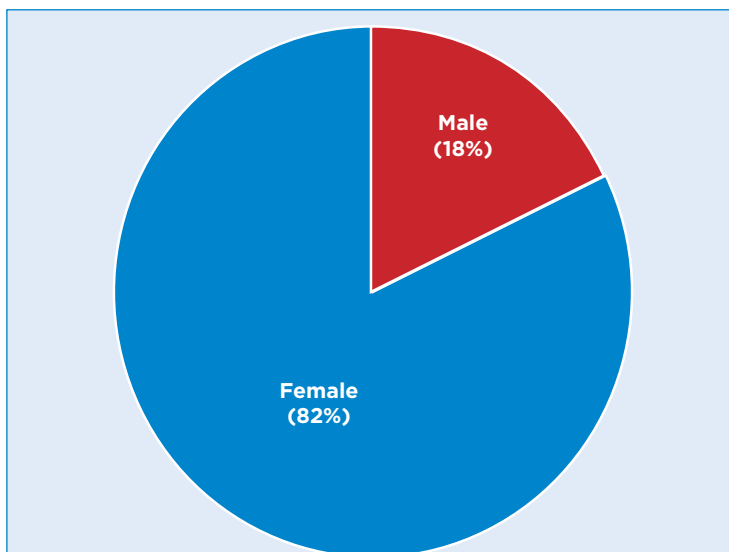


FIGURE 7
GROWTH IN DUAL-CAREER MARRIAGES IN JAPAN SINCE 1980

come married households in Japan as single-income ones (see Figure 7).⁴⁴ However, about half of the new female workers are in non-regular jobs, which come with lower pay and training.⁴⁵



Source: Kathy Matsui, Goldman Sachs, 2019

FIGURE 8
WOMEN COMPRISE MOST NON-CAREER TRACK ROLES

Despite the Act on Promotion of Women's Participation and Advancement, little meaningful progress has been made in getting women into regular jobs, let alone managerial positions. Japanese women are still routinely shunted into non-career track jobs at big companies. Kathy Matsui of Goldman Sachs Japan, who has done extensive research on women working in Japan, wrote in *Womenomics 5.0* that women account for the majority (82 percent) of non-career track roles upon entering the workforce (see Figure 8). Career-track jobs are largely reserved for men. This is one of the reasons women quit working in Japan and one of the things Japan

must change if it wants women to work more. In a survey of over 1,500 Japanese working women, Matsui found that 63 percent of respondents said they quit jobs due to job dissatisfaction, and 49 percent felt stalled in their careers. Only 32 percent of women quit for childcare reasons.⁴⁶

Japanese women receive only ¥75 for every ¥100 that their male counterparts earn. Narrowing this 25 percent gender wage gap would provide another strong incentive for women to work.⁴⁷ Japan ranks 121 out of 149 countries in the World Economic Forum's Global Gender Gap Report, much lower than expected given its advanced economy and GDP per capita ranking, which is 24th worldwide.⁴⁸ Japan's glass ceiling is punishingly low, too. The percentage of female managers at large listed Japanese firms is just 13 percent, about half that of other advanced economies, according to a 2018 white paper on gender equality from Japan's Cabinet Office.⁴⁹ Abenomics' original goal was 30 percent female managers by 2020. That goal has been revised down to 15 percent.⁵⁰ Female representation on boards, a paltry 5 percent, clocks in at just one-fourth that of the U.S. and one-fifth that of Europe.⁵¹

The advancement of women in the workplace promises great rewards. Matsui finds that boosting women's workforce participation to equal that of men's 81 percent would mean a "potentially massive" 10 percent boost to Japan's level of GDP growth. Under her "blue sky" scenario, in which women working full time, measured by the ratio of female versus male working hours, rises to the OECD average (from 81 percent in Japan to the OECD's 85 percent), Japan's GDP growth could rise by as much as 15 percent.

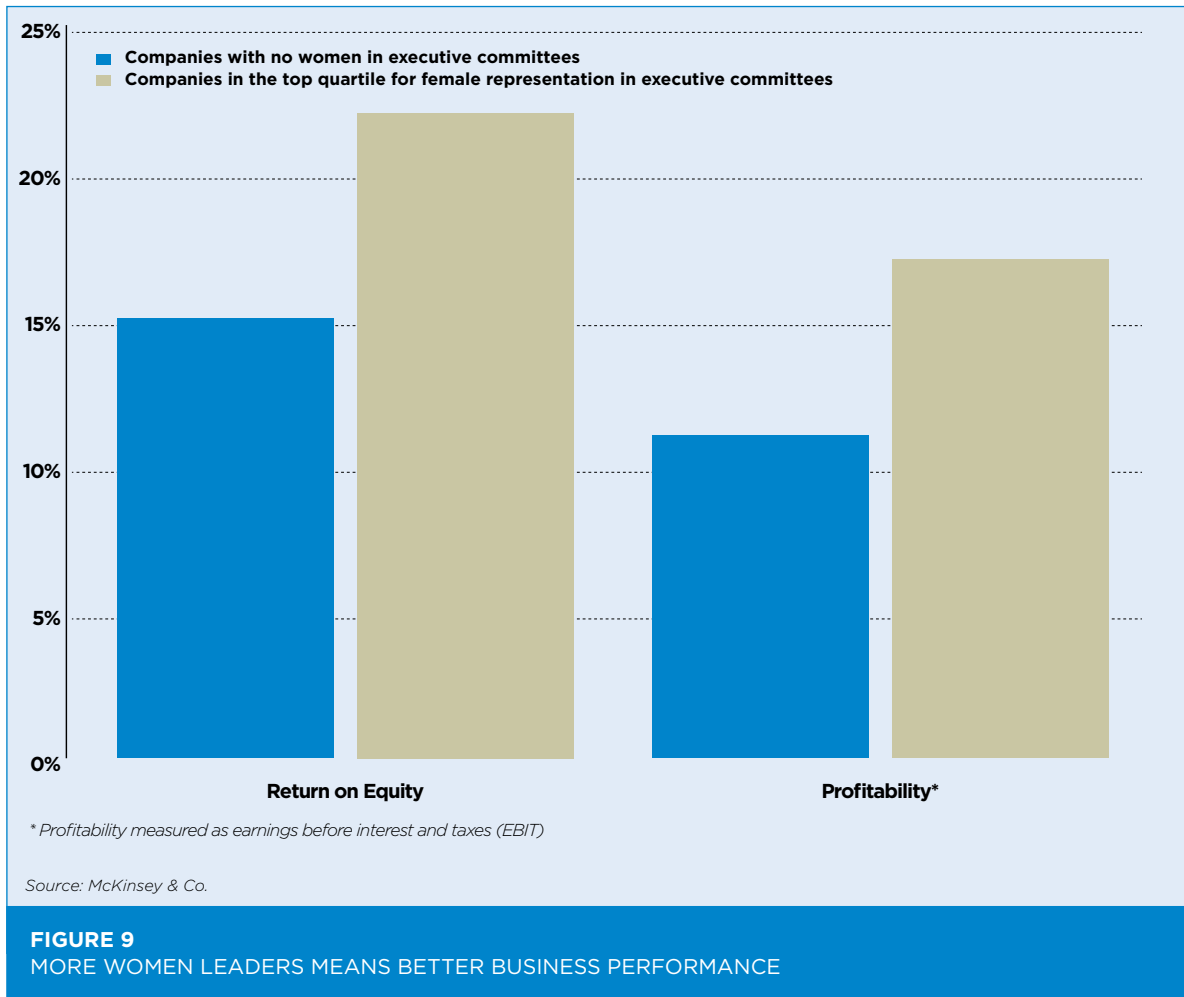
Equally encouraging is the business case on the company level. More women in leadership roles is correlated with better corporate performance. Matsui found that among Japanese listed companies disclosing female managerial statistics, those with the most female managers also had the highest five-year average sales growth and the highest three-year average returns on equity. Conversely, those with the fewest female managers had very low or negative average returns on equity.⁵² These findings are similar to those of a 2017 McKinsey & Co. study which found a strong correlation between the presence of women in company top management and better financial results. Their analysis of 300 companies around the world found the companies with the most women on their executive committees earned a 47 percent higher return on equity and 55 percent higher average profitability than those with none (see Figure 9).⁵³

In order for Japan to benefit from these pickups in productivity and GDP growth, the private sector could lead with better training for part-time workers and by promoting women into leadership roles. New "Equal Pay for Equal Work" legislation begins in April 2020 for large companies and a year later for smaller ones. This new law forbids unreasonable treatment of non-regular employees, and requires regular and non-regular workers to be paid equally if they engage in the same work and possess equal levels of skills, experience, and performance. Disappointingly, an IMF analysis finds this is unlikely to do much to deliver higher productivity and wages, as the gaps in pay are vaguely defined, and the system relies on workers' requests to the firm for information and explanation of gaps rather than on corporate disclosures.⁵⁴

Updating the tax code and social security system also would spur women to work more. The system now penalizes households where both the husband and wife work full time. Couples forfeit the spousal tax deduction of ¥380,000 (\$3,619) if the second earner (typically a woman) makes more than ¥1.03 million (\$9,810) annually. This is a powerful incentive against full-time work. As a further disincentive, Japan's social security law allows second-income earners to collect a pension without paying premiums only if her—and it is usually a woman—annual income remains below ¥1.3 million (\$12,381).

These outdated laws work against Japan's goals for women to work longer, by penalizing working couples as well as singles and those who are self-employed. All must pay the same premium as a married worker once their income exceeds the threshold, but without the additional benefits to spouses.⁵⁵

Working women who want to have children face additional discrimination on top of a gender pay gap and a low glass ceiling. All too frequently, women who announce their pregnancy are demoted to lesser roles or are told by their employers to quit. According to the Ministry for Health, Labor, and Wel-



fare, complaints against employers for demoting or telling women to resign because they got married or pregnant or gave birth, a phenomenon known as “maternity harassment,” have grown by more than 20 percent in the last decade.⁵⁶ Another pressing issue is a shortage of daycare. This has received growing attention on social media through the popular hashtag #Iwantdaycare.

Japan spends less than 0.5 percent of GDP on public services in early childhood education and childcare benefits, while the OECD average is just over 0.7 percent. France and the Nordic countries spend more than 1 percent of GDP—with Sweden and Iceland reaching 1.6 percent and 1.8 percent of GDP. Japan’s spending rate ranks it with the Czech Republic, Ireland, Portugal, and Turkey. The Nomura Research Institute estimates that, by 2023, Japan will need to add 279,000 new day care places as more women join the workforce.⁵⁷ The daycare industry suffers from a persistent labor shortage, in part due to the cruel irony of maternity harassment which forces the mostly female workforce to quit when they become pregnant.

Some relief may come from a 2019 law that provides free early childhood education and care for children aged three to five, and daycare for children up to age two from low-income families. *Womenomics 5.0* author Matsui notes that total daycare capacity has expanded 27 percent, from 2.2 million in 2012 to 2.8 million as of 2018, and the number of children waitlisted for daycare has fallen to an 11-year low of roughly 19,900.

One area of advancement, at least on paper, is parental leave. Japan’s parental leave benefits are now the most generous in the world. Parents can take up to one year of parental leave, two-thirds of it with full pay, paid for by the government, not the employer, after the birth of a child. Unfortunately, women often find themselves shunted to lesser jobs when they return. Japanese fathers are reluctant to take any time off.

The World Economic Forum reckons only about 3 percent take time off when their children are born. The government's goal for 13 percent of eligible fathers taking parental leave by 2020 looks out of reach.⁵⁸ Shinjiro Koizumi, Japan's environment minister and son of former prime minister Junichiro Koizumi, made headlines when he announced he would take two weeks off after the birth of his son. "Child-care leave will not be prevalent," he blogged, "unless we change not only the system, but the atmosphere as well."⁵⁹

Work reforms, including overtime restrictions, took effect on April 1, 2019. Japan's workforce ranks among the highest of its OECD peers in hours worked annually. Shorter and more regular working hours would help the fertility cause.

Another possibility for dealing with future labor shortages is through increasing the number of foreign workers. Economies like Singapore and Hong Kong enjoy high female labor force participation precisely because the ratio of foreign domestic helpers to female workers is relatively high. Japan does not allow foreign workers to work as domestic helpers. (It makes an exception for those employed by foreign executives.) A rethink of this policy could increase Japan's female labor force participation. If more women could get help at home with domestic chores, they might feel freer to work.

Overall, foreign workers make up just over 2 percent of Japan's labor force. Japan's reputation for not being accepting of foreigners in general is borne out by census data showing that 97.8 percent of the population of Japan are Japanese.⁶⁰ While this insularity helped Japan in the past by creating a cohesive society with similar attitudes toward the workplace, its hostility to immigration hurts the country. It makes immigration less likely as a realistic solution without major shifts in cultural attitudes.

Japan approved a new immigration law in December 2018, with the aim of attracting 345,000 foreign workers across 14 industries over five years. But this would fill only around 20 percent of an estimated shortage of 1.45 million workers.⁶¹ The law establishes a new "specified skills" work visa system. The largest number of foreign workers sought are in nursing care, restaurants, construction, and agriculture. Only construction and ship building workers are allowed to reside in Japan indefinitely and bring their families. So far, the visas have had low take-up rates, as many applicants have trouble passing the associated language test.

The reality of working in Japan as a foreigner can be harsh. Currently about 23 percent of Japan's non-Japanese workforce are part of its Technical Intern Training Program, introduced in 1993. As of the end of 2018, the number of technical interns stood at around 328,000.⁶² Many of these are young, unskilled workers from neighboring Asian countries who come to Japan to learn a trade, often borrowing what are for them substantial sums in order to do so. The terms of technical internships are finite, and interns are expected to return to their home countries having learned a skill. However, technical interns too often face unsafe conditions and illegal overtime, despite being covered under Japan's labor laws.

The story of a Vietnamese worker named Nguyen is telling. Nguyen came to Japan as a technical trainee, paying \$9,200 to a broker who signed him up to get on-the-job training as a rebar worker with a private construction company in Koriyama. He found himself instead tasked with cleaning radioactive rubble from Fukushima without protective gear.⁶³ Other stories are less worrying, though well-documented reports of abusive labor practices are widespread. A 2018 Health, Labor and Welfare ministry investigation found that technical interns at about 70 percent of the employers using them were subjected to illegal or unpaid overtime work.⁶⁴

Japan does itself a disservice by not being more welcoming of foreign brain power in the startup and scientific communities. The Japanese government remains reluctant to foster an explicit policy encouraging immigration, worrying that that it would import social problems. Japan seems content to use technical interns for discrete time periods and send them back to their countries. Japan's attitudes toward immigration and foreign workers are unlikely to change in the near term. Therefore, women remain Japan's best hope for increasing GDP and productivity growth.

MAKING CAPITAL WORK FOR BETTER: THE GOVERNMENT PENSION INVESTMENT FUND



Japan has a reputation for long-termism. Its companies are patient, sometimes in the extreme, when it comes to waiting for profits. On a personal level, whether it is the patience of the country's legendary craftsmen or the intensity of students at cram schools, Japan celebrates diligence in the pursuit of long-term rewards. Thanks to sweeping reforms put in place by the giant \$1.6 trillion Government Pension Investment Fund (GPIF), Japan's companies are on track to become more aligned with environmental, social, and governance (ESG) investment thinking (see GPIF box).

Hirohichi (“Hiro”) Mizuno, GPIF’s Executive Managing Director and Chief Investment Officer from January 2015 until March 2020, has put ESG at the heart of the fund’s investing. The new mission: Think about investments over a 100-year horizon and pay special attention to environmental and gender issues in the companies that it buys. Using its influence as a large asset owner, GPIF hopes to encourage Japanese companies to become more sustainable and inclusive. Mizuno believes that investing in companies that are more resilient to climate change and more diverse in terms of gender and viewpoint will increase GPIF’s returns, which have been just over 3 percent annually in the first two decades of the century. If so, less government support will be needed to fund pensions. These changes will likewise contribute to a more sustainable society by nudging companies to improve everything from their environmental performance to their treatment of women.⁶⁵

Mizuno is among a growing camp who believe that Adam Smith’s invisible hand needs a helping hand, as markets have not been efficient when it comes to pricing in costs that are borne by society more broadly, let alone by planet Earth. Farmers and loggers make money cutting down the Brazilian rainforest and burning Indonesian peat to clear land. But the cost in social and environmental destruction is high. Think of the public health effect of air pollution from the Indonesian haze, paid by many countries across southeast Asia.

Until the recent creation of reporting standards like the Task Force on Climate-related Financial Disclosures developed by the Financial Stability Board, an international body that monitors and makes recommendations to promote a stable international financial system, climate risk wasn’t typically addressed in a company’s reporting to stakeholders.⁶⁶ This is something GPIF hopes to change. Such reporting of non-financial risks and actions helps stakeholders assess a corporation’s resilience and climate change preparedness. Likewise, many social and governance goals are left unaddressed in traditional reporting. Mizuno argues that Japan is uniquely suited to taking a patient long-term approach to change. This is another lesson from Japan: By encouraging companies to increasingly measure, manage, and disclose their environmental, social and governance risks, GPIF is showing the way forward to a Japan that is more environmentally sustainable, and is a more inclusive society, especially with regard to gender issues. GPIF’s bold moves on ESG prompted an admiring Harvard Business School case study, “Should a Pension Fund Try to Change the World?”

Mizuno’s approach, while being rapidly adopted by some of the world’s largest asset managers, still rankles those who feel GPIF has no social responsibility and that its only responsibility is to make money. They agree with Milton Friedman’s statement, “There is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits.” Mizuno and other big asset managers and sovereign wealth funds like those of Singapore and Norway increasingly see that in order to survive in a changing world, companies must earn a social license to operate, which includes being mindful of their impact on the environment and on society as a whole. GPIF has lots of firepower

GOVERNMENT PENSION INVESTMENT FUND JAPAN'S FUND TO CHANGE THE WORLD



Hiro Mizuno, GPIF's crusading Chief Investment Officer from 2015 to 2020

The Government Pension Investment Fund (GPIF) does not manage money directly, because its charter does not allow it. But it directs its outside managers to engage in Environmental, Social, and Governance (ESG)-related dialogues with the companies they own.

The lion's share of its equity investments (about 90 percent) is invested in indices that are designed to mirror the return of a broad index like the Tokyo Stock Exchange's Tokyo Stock Price Index (TOPIX).

But GPIF is creating, and investing in, indices which are tailored to its ESG specifications. GPIF has partnered with index creators Morgan Stanley Capital International (MSCI) and Financial Times Stock Exchange (FTSE) to build out four such indices to date, all oriented to Japan-listed stocks. It has plans to expand indices to include non-Japanese equities, also with an ESG orientation, and green bonds.⁹² In 2019, GPIF shifted about \$15 billion of assets under management from broad market-based indices to the ESG indices, shown below.

S&P/JPX CARBON EFFICIENT INDEX

The S&P/JPX Carbon Efficient Index is designed to measure the performance of companies in the TOPIX, while overweighting or underweighting those companies that have lower or higher levels of carbon emissions per unit of revenue.⁹³

FTSE BLOSSOM JAPAN INDEX

The FTSE Blossom Japan Index is designed to invest in Japanese companies that demonstrate strong ESG practices. The index is constructed so that industry weights align with the Japanese equity market, but higher-ranking companies have a greater weight within their broad industries. This index uses the globally established FTSE4Good Index inclusion rules, which in turn are drawn from existing international standards including the UN Sustainable Development Goals.⁹⁴

MSCI JAPAN ESG SELECT LEADERS INDEX

The MSCI Japan ESG Select Leaders Index is designed to invest in companies that have high ESG performance. The index aims to target sector weights that reflect the relative sector weights of the MSCI Japan IMI Top 700 Index.⁹⁵

MSCI JAPAN EMPOWERING WOMEN INDEX

The MSCI Japan Empowering Women Index is designed for institutional investors seeking exposure to companies that are promoting and maintaining gender diversity in their workforce.

Because of the prestige conferred by being an index member, and the implicit promise of greater interest by international ESG-oriented funds that look to GPIF's indices, Japanese companies strive to be included. This desire is prompting companies to increase their measurement and disclosure of ESG factors and promoting greater awareness and sharing of best practices across industries. To accelerate this process, GPIF mandates ESG engagement between its ecosystem of sub-managers, index providers, and ESG evaluators (providers of corporate ESG ratings). GPIF takes a long-term approach, measuring Japan's corporate ESG scoring trends, and working toward improvement through dialogue and engagement. It does not blacklist out-of-favor companies—but they won't be included in its indices either. GPIF's most recent ESG report notes that Japanese companies' ESG scores have not been improving as fast as those of companies from other countries. But it notes that dialogue between Japanese companies and GPIF's ecosystem regarding ESG disclosure is becoming more active and high-level.⁹⁶

and it is taking a unique approach to engagement with the companies it owns, to educate them on the business case for ESG awareness.

GPIF is a so-called universal owner. Because of its size, it owns on average 1 percent of every major stock in the world. Mizuno, who encourages GPIF's managers to have a 100-year time horizon, believes helping the companies it invests in to become more sustainable and inclusive is part of GPIF's fiduciary duty. "We expect to grow to \$4 trillion by 2050. To do that, I really don't think environment, social, and governance issues are irrelevant," he said in a talk to the Cambridge Union in January 2020.⁶⁷ Institutional investors surveyed by Japan's Cabinet Office tend to agree. On the issue of women's advancement, for example, a recent survey by the Cabinet Office showed that almost 90 percent of institutional investors think that information on women's advancement has a material impact on business performance because they find that "ensuring diversity can be expected to lead to innovation."⁶⁸ It is early days yet to see how these actions play out for GPIF's performance. Short-term results are virtually meaningless because companies need time to adapt their strategies. Whether buying more sustainable companies delivers above-market returns over the long-term will be Mizuno's test.

One way to solve Japan's long-term demographic challenges is by making capital work harder, something GPIF's attention to governance should help. Japanese firms have long earned lower returns on equity than their European and U.S. counterparts. Holding too much cash, boards stacked with insiders, and high cross-holdings, (friendly or affiliated companies holding each other's shares), can dampen returns, hinder efficient capital allocation, and are governance red flags. Abenomics reforms now mandate two independent directors on corporate boards. As of 2017, only 27 percent of the largest market capitalization companies on the Tokyo exchange had at least one-third independent directors. In the U.S. and U.K., over half do.⁶⁹

Japan's acceptance of widespread corporate cross-holdings remains an obstacle to good governance. Cross-holdings shield management from pressure by outside shareholders. Although cross-holdings have fallen from more than one-third of Japan's total market capitalization in the 1990s, they still remain high, at around 10 percent currently.⁷⁰

GPIF's attention to governance reforms will help Japanese companies capitalize on their high level of business R&D expertise and human capital, and encourage them to invest their large cash holdings in fixed plant and higher wages to boost productivity growth. Adoption of ESG criteria should also raise returns—if only by avoiding costly mistakes—and thus lower the burden of unfunded pension costs for Japan.

On the environmental front, many companies incorrectly view climate change as something that will happen far in the future, and an issue that is not relevant today. But as former Bank of England Governor and Financial Stability Board Chair Mark Carney notes, "changes in climate policies, new technologies and growing physical risks will prompt reassessments of the values of virtually every financial asset." He says climate change threatens \$43 trillion in assets by 2100.⁷¹ The need for companies and stakeholders to have access to better information around these concerns prompted the creation of the Task Force on Climate-related Financial Disclosures (TCFD).

GPIF actively championed TCFD standards, which Japan adopted in 2019. The Japanese Financial Services Agency, the Ministry of Economy, Trade, and Industry (METI), and the Keidanren (Japan Business Federation) worked together with GPIF on a coordinated TCFD rollout. This move will help GPIF and companies avoid treating climate change as an "unknown unknown" and encourage investment in preparedness. Under TCFD methodology, companies measure, analyze, and disclose business risks and opportunities from climate change. They then report how their climate-related risks and opportunities impact long-term strategic planning.

GPIF filed its own TCFD disclosure. This move detailed its carbon footprint metrics, fossil fuel, and stranded assets exposure. GPIF also measured its portfolio against the 2°C warming target mandated in the Paris Climate Agreement. In the end, the portfolio was on a 3.5°C-plus warming trajectory, much like the world. While some large asset owners, like the Norwegian pension fund, choose to divest companies that don't meet their criteria for transitioning toward a 2°C target, GPIF does not engage in this sort of blacklisting. Its policy is to engage with portfolio companies to promote improvement, rather than divesting and losing its ability to affect change as a shareholder.

GPIF's pivot to ESG is creating positive change in corporate Japan. GPIF's 2018 ESG report notes that global assets under management classified as ESG hit \$37 trillion at the start of 2018. Within that, Japan was the fastest-growing country, with ESG assets having risen to 4.6 times the amount recorded in 2016.⁷² Overseas investors and their advisors continue to focus on ESG in increasing numbers. Glass-Lewis & Co., the large proxy voting advisor, recently revised its Japan voting guidelines for TOPIX Core 30 and Large 70 constituents to recommend against members of any company whose board does not have incumbent or proposed female members. Other large asset owners are following GPIF. Blackrock, Inc., whose \$74 trillion of assets under management at the beginning of 2020 make it the world's largest asset management firm, is the most significant recent convert. In his January 2020 letter to CEOs, Larry Fink, Blackrock's Chairman and CEO, wrote that sustainability would be at the center of Blackrock's investment approach. "Sustainability-and-climate-integrated portfolios can provide better risk-adjusted returns to investors. And with the impact of sustainability on investment returns increasing, we believe that sustainable investing is the strongest foundation for client portfolios going forward."

ESG disclosure is in its infancy worldwide. The actions that GPIF is taking are helping companies begin to measure environmental, social, and governance impacts. Once they have these data, they can begin to manage them. This will not happen immediately, but the time it takes will be well worth it if corporate Japan can blaze a trail toward collective fulfillment of ESG aims, modelled along the line of the UN's sustainable development goals, summed up by the twin goals of sustainability and inclusion.

ROBOTIC FUTURES



Robotics is an area where Japan's experience in manufacturing and deploying robots for use in factory automation will continue to serve it well in its evolution toward Society 5.0, the Abe administrative initiative to use technology as a way of solving larger social problems (see Society 5.0 box). So will the creative vision that inspired cartoon characters like Astro Boy, the robot popularized in the postwar manga series, which served as the inspiration for much of Japan's manga and anime. Japanese society generally embraces robots, perhaps because of their place in the popular imagination, and sees them as predictable, submissive, and hygienic.

Pull up any popular list of robots and Japan's creations will be among them. SoftBank Robotics Corp.'s Pepper, a humanoid robot that retails for about \$1,200, is promoted for use in nursing homes and can understand and respond to simple human speech. Paro, the therapeutic robotic seal from inventor Takinori Shibata, which retails for about \$5,000, both relaxes and motivates dementia patients. Paro's tactile sensors allow it to feel being "stroked or beaten," and it learns to respond in a way the user prefers. Hiroshi Ishiguro, director of the Intelligent Robotics Laboratory at Osaka University and inventor of the humanoid robot, Erica, says his life's goal is to provide her with "independent consciousness." Often described as among the world's most beautiful robots, the demure assemblage can carry on limited conversations. Sample: "I can't move my arms or legs so all I can really do is sit here and look pretty." Her creator has promised Erica will



SOCIETY 5.0 CAN TECHNOLOGY SOLVE SOCIAL PROBLEMS?

The Japanese government has formulated a vision for the future of work and society, called Society 5.0, to help it overcome the country's demographic challenges. This is the plan for a world in which a smaller, more efficient workforce can utilize the latest technological advances to become a "super-smart society."

Society 5.0 is a core part of the Abenomics policy agenda. Japan's budget for science and technology, earmarked for both basic and applied research into digital technologies, has begun to increase after years of flatlining. The science and technology budget remained largely unchanged from 2002 to 2017, at around ¥3.6 trillion (\$34 billion) annually. It increased to ¥3.8 trillion in 2018 and to ¥4.2 trillion in 2019.⁹⁷

Japan's *monozukuri* (excellence in the manufacturing of things), its strength in basic research, and the country's comfort with advanced technology will work in Japan's favor, notes the government's official Abenomics Society 5.0 website. Society 5.0 envisions a sustainable, inclusive socio-economic system, powered by robotics, machine learning, big data analytics, artificial intelligence, and the Internet of Things.⁹⁸

"Japan will have a promising future if it can harness various forms of imagination to change society," agrees the Keidanren (Japan Business Federation), in its *Society 5.0: Co-creating the future* presentation. "It is essential for Japan to create a vision for the society it wishes to create and reform itself."⁹⁹ Keidanren executive chairman Hiroaki Nakanishi, who is also chairman of Hitachi, describes Society 5.0 as a way for Japan, through its technological prowess, to tackle obstacles, including demographic challenges. "We have the potential to solve all these issues. Society 5.0 is really about how to utilize all that digital power to solve all of the social issues."¹⁰⁰

Given that all technology has a political component, Society 5.0 is no magic solution: there will still need to be political and social decisions about which technologies are deployed and how they are used. Technology is moving quickly, perhaps more quickly than society.

someday debut as a newscaster. Also impressive is Sony Corp.'s robotic dog, Aibo. Retailing for about \$2,000, plus an additional fee for cloud storage, Aibos are cute, expressive, and really move like dogs. They are designed to learn from interactions, developing an "emotional bond" with owners over time.⁷³

Pleasure robots are entertaining, but robots for industry are much more established. Kawasaki Robotics built Japan's first domestically manufactured industrial robot in 1969.⁷⁴ Since then, Japan achieved massive scale as a producer of industrial robots, enjoying around a 55 percent share of the market worldwide. Major players include FANUC Corp., Kawasaki Heavy Industries Ltd., Sony Corp., and Yaskawa Electric Corp. Japan is the second-most robot intensive economy in the world, surpassed only by South Korea in terms of manufacturing value-added.⁷⁵ Its automotive and electronics industries are among its most productive, thanks to robots' superior ability to perform repetitive assembly-line tasks tirelessly and with precision.

Robotic technology is advancing to the point where many warehouse and service sector jobs can be eliminated. While countries like the U.S. are threatened by the rise of robots and the implications for rising unemployment, this is welcome news to Japan's shrinking workforce. Japan stands to benefit from further automation, be it in the form of machines that work along with humans, advances in robotic vision and motion capabilities that are making possible the elimination of large logistics workforces, or robots in the home that are increasingly dexterous at performing household chores.

Beyond stationary manufacturing robots, Japan is entering the field of collaborative robots, or cobots, which are designed to share a collaborative workspace with humans. Cobots often take the form of robotic arms that can use multiple tools to perform different functions. Cobots are smaller and more flexible, easier to deploy and program, and safer for people to work with than the older generation of stationary manufacturing robots. Cobots

have onboard safety mechanisms that allow them to work safely alongside people. For example, sensors on the robotic arm will slow down its motion when a human comes into range. Traditional manufacturing robots do not, and their section of the factory is usually caged off from humans.

Cobots' easy operability and growing affordability could provide a significant productivity boost for many of Japan's small- and medium-sized enterprises (SMEs), which employ almost 70 percent of the Japanese workforce but have significantly lower productivity than large companies.⁷⁶ Cobots are not just for manufacturing. Food maker Nippon Flour Mills uses a cobot made by Kawasaki Heavy Industries for seasoning packaged food sold at convenience stores. Japan lags in the cobot market, despite its manufacturers' dominance of the industrial robot market and the place that anthropomorphic robots play in the popular imagination. Universal Robots, a Danish company that was acquired by Massachusetts-based Teradyne in 2015, holds about a 50 percent share of the cobot market.

According to Infinium Global Research, the global cobot market is expected to grow at a 57 percent annual rate to become a \$4.3 billion dollar market by 2023, much faster than the market for industrial robotics overall, which is expected to grow just under 10 percent over the same timeframe.⁷⁷ Japanese manufacturers have been slow to enter. "We didn't expect large manufacturers would want to use such robots, because those robots can lift only a light weight and have limited capabilities," Kazuo Hariki, an executive director at FANUC was quoted as saying.⁷⁸ This is changing. In February 2018, FANUC bought Life Robotics Inc., a cobot maker known for the CORO, an "elbowless" robotic arm which started life as a university project.⁷⁹

This was FANUC's first acquisition in 15 years. It may have something to do with the fact that activist investor Daniel Loeb had taken a position in the family-run company through his hedge fund, Third Point, and was urging governance reforms, including investing some of its famously large cash pile in stock buybacks.⁸⁰ Another Japanese player, Kawasaki Heavy Industries, has teamed up with Swiss capital goods giant ABB to create a common collaborative robot operating interface.⁸¹ They hope it will become an industry standard and help accelerate the adoption of collaborative robots.

Warehouse logistics is a clear area of growth for cobots. A Japanese startup called Mujin is making headlines there. Mujin has developed robot controllers that, in a departure from traditional methods, use algorithms incorporating motion planning and image recognition. A robot controller from Mujin, installed in an industrial robot's arm, makes any industrial robot capable of acting independently and intelligently.⁸² Mujin was spun out of the University of Tokyo and has raised \$75.4 million in venture capital funding from Tokyo venture capital firms JAFCO and the University of Tokyo Edge Capital, as well as Sumitomo Mitsui Financial Group.⁸³

In December 2018, Japanese clothing manufacturer Fast Retailing Co., the world's third-largest retailer and owner of retail brand Uniqlo, installed robotic "pickers" that could grasp soft objects like T-shirts and put them neatly in boxes for shipping, a task robots previously were unable to master. The pickers are made from a Mujin robot controller equipped with motion sensors and 3D vision systems, integrated into robot arms from Yaskawa Electric. This allowed Fast Retailing to replace 90 percent of the workers at Uniqlo's flagship Tokyo warehouse.⁸⁴

As with Fast Retailing, Chinese e-commerce giant JD.com used Mujin robotics to great effect, fully automating a Shanghai fulfillment center in June 2019. Industrial robots and Mujin controllers allow JD.com to run the 40,000 square-meter facility with a staff of only five programmers, eliminating the need for 400 to 500 people.⁸⁵

Another notable company, Spread Co., has developed one of the most sophisticated and cost effective vertical farms. Vertical farming has broad applications worldwide, addressing common problems including soil degradation and climate change-induced declines in agricultural productivity. Spread also helps Japan's agricultural demographic challenges, as agriculture is one of the industries facing severe labor shortages. Spread's Techno Farm grows lettuce in an indoor farm that uses artificial intelligence

and robotic arms to seed, tend, and harvest its crop with precision. Lettuce grows in stacks, hydroponically. Techno Farm recycles 98 percent of the water it uses and produces higher crop yields that are organic and contaminant-free, at a labor cost half that of traditional agriculture.

A 2015 METI report, *New Robot Strategy*, prioritizes robotics in the service sector as a means to raise productivity, while noting that service-sector robots “have yet to gain a foothold in terms of their use and popularity,” partly due to the lack of a “killer application.”⁸⁶ They also face affordability and maintenance challenges.

Robotic exoskeletons can help the understaffed care-giving industry. These suits worn by the user to provide a boost in strength can help Japan’s aging workforce work longer and stronger. Panasonic’s Atoun exoskeleton is a \$5,500 suit that can add 22 pounds of lifting force.⁸⁷ It is used by care givers in nursing and eldercare, who often must lift their patients out of bed and help them stand. The Atoun is also used by older workers employed in manual labor. Panasonic is also working on a wearable which assists in hill-walking, climbing stairs, and walking in rough terrain.⁸⁸ ORIX Rentec Corp. announced in 2019 that it will launch a service allowing corporate clients to rent the Atoun as well as 40 other robot models from 19 manufacturers on a monthly basis.⁸⁹

The Japanese government, through its Council for Science, Technology and Innovation, has rolled out a Robot Revolution Initiative, a ¥100 billion (\$909 million) effort that involves public-private partnerships centered on robotics research, development of international standard-setting to ensure safety, and even a Robot Olympics.⁹⁰

But most of the significant innovation has come from the private sector. Japan’s venture capital infrastructure is still nascent, so most of the R&D dollars are currently within larger companies, like Toyota Research Institute (TRI). TRI’s mission is to develop automated driving, robotics, and other human amplification technologies for Toyota. Gill Pratt, its chief executive officer, earlier worked at the U.S. Defense Advanced Research Projects Agency (DARPA), an agency known for having seeded many military and private sector tech initiatives.

TRI is working on multiple fronts in robotics, including breakthroughs in situational awareness and manipulation skills that make robots for the home feasible. Pratt has written that “many of the base hardware technologies on which robots depend—particularly computing, data storage, and communications—have been improving at exponential growth rates. Two newly blossoming technologies—‘Cloud Robotics’ and ‘Deep Learning’—could leverage these base technologies in a virtuous cycle of explosive growth.”⁹¹

TRI is on the cutting edge. Videos on its website show its robots performing domestic tasks such as loading a dishwasher. And they soon will be able to master the task of recognizing multiple different items like groceries in a bag and putting them away. TRI’s robot can learn new skills from a human teacher and learn behaviors that can adapt to a changing environment. TRI’s robotics platform enables one robot’s learning to be disseminated to multiple robots. And its telepresence robot, which projects a picture of the user on a large mobile screen, allows users to remotely attend events like conferences, interacting with others as if in the same room.

LESSONS FROM THE FUTURE



The population bomb in the rich world has given way to the birth dearth. Doomsday predictions of decline, though, are overdone. A smaller population doesn't have to be a bad thing for a capital- and technology-rich country like Japan. Japanese are well-educated and their companies capable. Japan has made impressive strides in bringing more women into its workforce. It has relatively low inequality

and a strong sense of social cohesion, both of which should make change easier. There are many reforms that will ensure a brighter future. Making more women regular employees, and investing in them, would have the double benefit of raising both productivity and fertility. Getting rid of the tax and pension penalties on double-income couples would help, too. Policy makers can look to places like Nagi to find and promote models for fertility (see Nagi box).

Government is important in setting the rules, but business must implement change. Japan's workplace culture has played a more important role in shaping societal norms than in many countries. By implementing policies that promote women, corporations can change Japan's culture and unlock much-needed productivity gains. They will benefit from higher profitability, too. Diversity isn't just the right thing to do—it is smart business. Companies that pay women equally for equal work—and give them equal opportunities in the managerial and executive ranks—will steal a march on those that don't, and their workforce quality should reflect it. The sharp rise in working women in the last quarter-century shows that Japan can change.

Technology is an indispensable part of the longer, healthier, and more prosperous lives that most Japanese will live. Japan's ambitious Society 5.0 scheme could solve some of the problems associated with aging. The plan is that an abundance of data coupled with Japan's experience in making and using technology-rich products will equip the country to make a transition to Society 5.0, a world as different from the Information Age as the Industrial Revolution was from the Agrarian Age. Big Data connected by the Internet of Things is designed to be converted into a new type of intelligence that will be used in the service of more comfortable and sustainable lives. Technology in the form of autonomous vehicles, for example, will overcome shortages of drivers for goods deliveries and personal transportation.

To realize the ambitious goals of Society 5.0, Japan will need to nurture a culture of innovation and entrepreneurial risk-taking that it typically has been more comfortable borrowing from abroad. Toyota's tie-up with Silicon Valley could point toward more trans-Pacific cooperation. Still, technology is no panacea. Artificial intelligence displays the ingrained biases of its developers. If Japan is truly changing, will we see more assertive female robots and fewer like the demure Erica?

The grand experiment underway at GPIF is another pointer toward a new Japan. Money talks. To have the muscle of one of the world's largest pension funds exerting change on environmental, social, and governance issues—particularly gender issues—could have a dramatic impact. The fund will have to remain focused and engaged with its advisors, and its universe of companies, to ensure that changes are being put into place. The next decade will show if GPIF, in partnership with Prime Minister Abe's womeconomics goals, accomplishes for women's advancement what the market should have done on its own but which a deep-rooted culture of sexism has prevented.

For centuries, kings measured their wealth in large part by the number of subjects they had. That seems hopelessly old-fashioned to us today. In modern societies, where governments derive their legitimacy from the consent of their people, the measure of wealth and progress has often been economic growth—GDP growth, per capita income growth, growth in steel and cement production, and so forth.



BABY BOOMLET THE CASE OF NAGI

Nagi, a small town in Okayama Prefecture about 200 kilometers west of Kyoto, is picturesque farming country. But Nagi is famous not for its scenery but for its babies. With a population of about 6,000, Nagi offers hope that Japan can stem its population decline by wooing women to have more children. From 2005 to 2014, the fertility rate doubled from 1.4 to 2.8, before dropping again to 1.9 currently, according to the IMF.¹⁰¹ The baby boomlet came after Nagi ramped up parental perks, in order to encourage families to settle there and have children.

Benefits include subsidized housing available to families with children, cash payments when children are born, and free healthcare until the children graduate from high school. Families receive a one-time ¥100,000 (\$952) payment for their first child, which rises with each birth, up to ¥400,000 for the fifth child born to the same family. There's also assistance to those who want to send their children to high schools outside of the village, helping overcome a hurdle that dissuades many families from living in smaller towns.

The IMF also notes that financial benefits are not all that matter to families with children. Hospitality and mutual support offered by the local community are equally important. Nagi's Child Home community center is run by mothers themselves with the help of experienced advisors. When its staff need temporary help, elderly volunteers step in. The government provided help with employment by developing a small industrial park to attract small and mid-sized enterprises and helping match workers with jobs. When more mothers continued to work after giving birth, the town's single daycare facility filled up. So it built another one.¹⁰² Even though the fertility rate dropped again after the initial baby boom, the current rate is still close to replacement level. Lessons from Nagi could be helpful to greater Japan.

But by 2050 we might look back on those notions as similarly old-fashioned. The world is moving to a new era of limits—limits on the way we use our planet's resources. We live in a world where rich countries have the resources to see that everyone is fed, housed, clothed, and has some form of health care. Japan, like other wealthy countries, needs to ensure that there is a safety net—especially for elderly women, who are more likely to be poor.

By virtue of demography and cultural cohesion—the country's people often refer to themselves as sticking together like a scoop of rice—Japan is uniquely positioned to be a pacesetter in a new world where the growth is in human expression rather than in physical output. We have conquered the problem of production. The new society will be one of human imagination. If it makes the right choices, Japan can show other countries what this new world holds.

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