



# How China's Human Capital Impacts Its National Competitiveness

CSIS BRIEFS

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## THE ISSUE

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How will the strengths and weaknesses of China's human capital impact national competitiveness? China's efforts to maintain economic growth, strengthen supply chains, develop strategic science, technology, engineering, and mathematics (STEM) sectors, and secure a modern military edge hinges on the ability to cultivate and utilize human capital. As the United States and other countries increasingly engage in multidomain competition with China, it is critical to start from a clear-eyed understanding of China's human capital and Beijing's strategy for nurturing national talent. Investments in higher education, strategic STEM sectors, and military talent demonstrate key areas in which Beijing is focusing on cultivating human capital. However, China must overcome significant obstacles to innovate as it faces substantial demographic pressures, socio-economic inequalities, and challenges to attracting and retaining top talent both domestically and internationally.

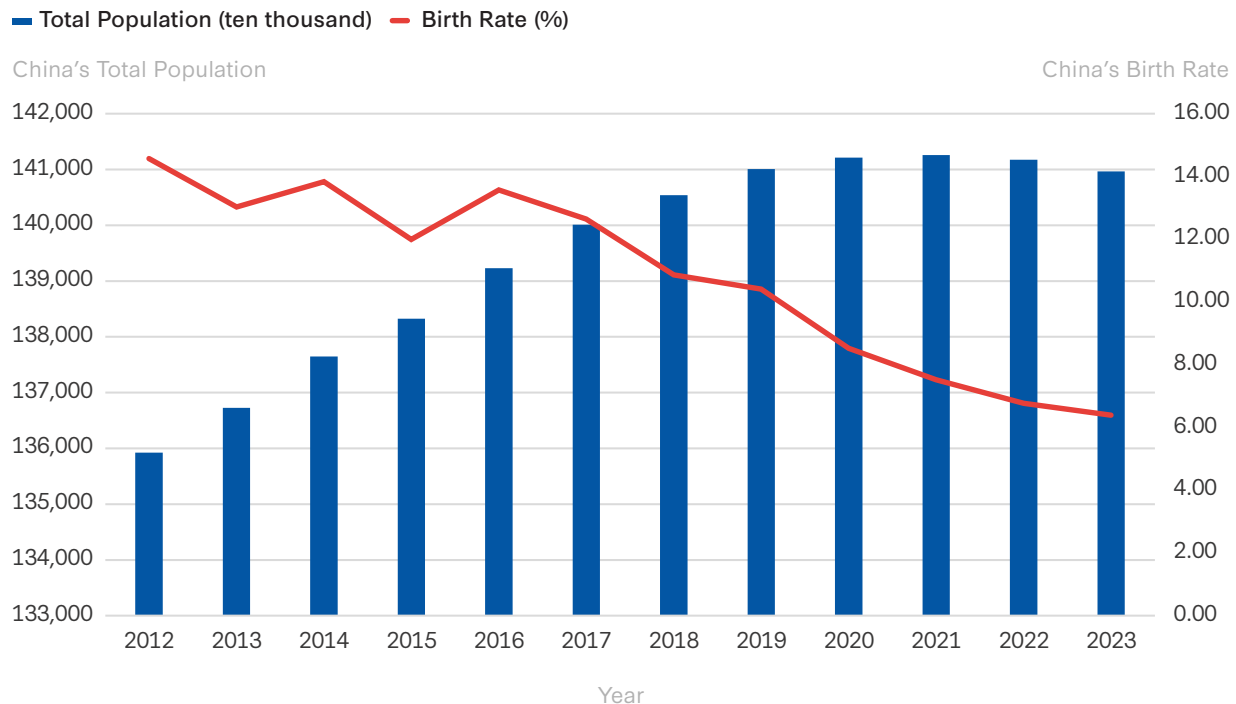
## INTRODUCTION

According to the World Bank, human capital “consists of the knowledge, skills, and health that people invest in and accumulate throughout their lives, enabling them to realize their potential as productive members of society.”<sup>1</sup> Investments in human capital are a major driver of growth for modern economies and the foundation of national capacity to support key technology industries and unlock new scientific discoveries.<sup>2</sup> China's ability to cultivate, attract, and retain human capital—or as Beijing more commonly puts it, national “talent”—will shape its competitiveness vis-à-vis the United States as a global power and impact the future of innovation and talent on the world stage. As Chinese leader Xi Jinping has stated, “talent is a strategic resource to achieve national revitalization and win the initiative in international competition.”<sup>3</sup>

China's massive population provides a foundational

advantage in the supply of talent. The country's rapid economic growth in recent decades can be directly linked to its mobilization of human capital, as China's shift from an agrarian base to more productive industry and services sectors was enabled by a growing share of the population attaining higher education levels and entering the workforce.<sup>4</sup> However, the government's strict population control policies, which until 2016 restricted the majority of Chinese families to only having one child, left China with a rapidly aging population and declining workforce. China's population shrank for the first time in over half a century in 2022 and fell by over two million in 2023.<sup>5</sup> Birth rates have declined precipitously in recent years, from 13.6 per 1,000 people in 2016 to just 6.4 in 2023. One recent study published in *The Lancet* predicts that China's population could decline by nearly 50 percent by 2050.<sup>6</sup>

Figure 1: China's Population and Birth Rate, 2012-2023



Source: National Bureau of Statistics of China, *China Statistical Yearbook 2023* (China Statistics Press, 2023), <https://www.stats.gov.cn/sj/ndsj/2023/indexeh.htm>.

China's human capital challenges are not merely numerical. Xi Jinping sees "original" and "disruptive" technological innovation and self-reliance as critical to China's future development and security.<sup>7</sup> Yet as Beijing seeks to move national industries up the value chain in manufacturing, technology, and services, demand for high-skilled labor is outpacing supply. China thus faces an acute skills shortage.<sup>8</sup> For example, according to the "Manufacturing Talent Development Planning Guide" released by the Ministry of Human Resources and Social Services, China will face a talent demand gap of nearly 30 million workers by 2025 in 10 key focus areas for China's manufacturing industry—such as robotics and semiconductors—or a 48 percent shortage of skilled workers to meet demand.<sup>9</sup> Moreover, persistent inequalities in education and career opportunities for rural populations, including over two-thirds of China's youth, limit the country's future supply of talent.<sup>10</sup>

This brief aims to provide a clear-eyed overview of the Chinese government's national strategy for cultivating talent and the challenges that China's national planners confront in their efforts to do so. First, the brief discusses foundational constraints in China's human capital and how the government is attempting to address them. Next, it examines efforts to create talent pipelines for strategic skill

sets in higher education, science and technology industries, and the military. Finally, it explores China's prospects for attracting and retaining talent across international borders.

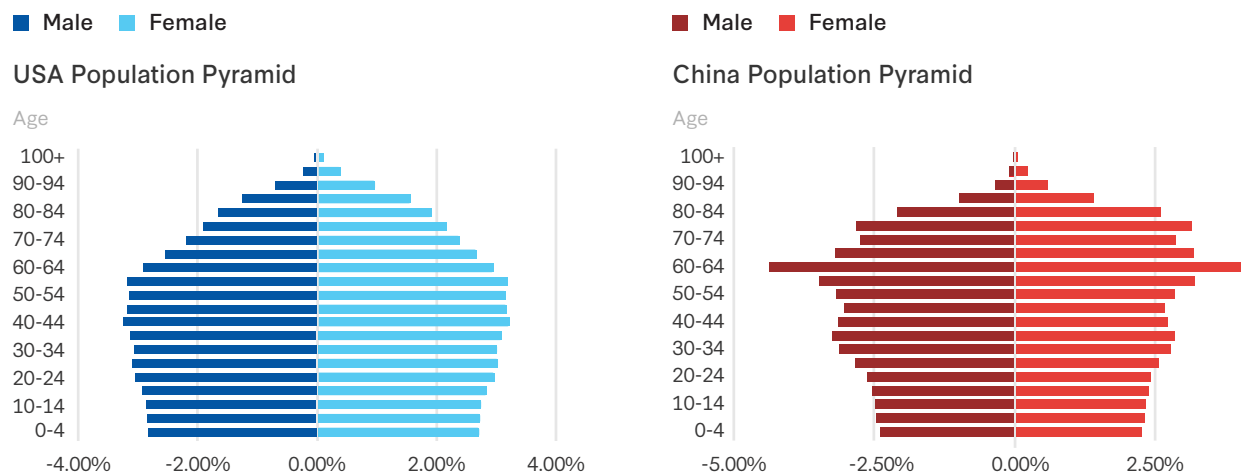
## FOUNDATIONAL CONSTRAINTS IN CHINA'S HUMAN CAPITAL ENVIRONMENT

The ability of an individual to one day enter a enter lab, research institute, or corporate boardroom is impacted by government investments and regulations, societal norms, and access to opportunities that can either promote or limit that individual's potential. In China's domestic context, urban-rural inequities in education and mobility, policies that restrict and repress ethnic minorities, and evolving social norms represent several key constraints on China's ability to fully tap into national talent.

### URBAN-RURAL INEQUALITY

Inequality between urban and rural populations in China presents a critical challenge to the country's economic productivity and opportunities to develop human capital. As wages rise and Beijing promotes higher-value industries that require high-skilled workers, China could face major issues of structural unemployment for low-skilled work-

Figure 2: U.S. and China 2050 Population Pyramids



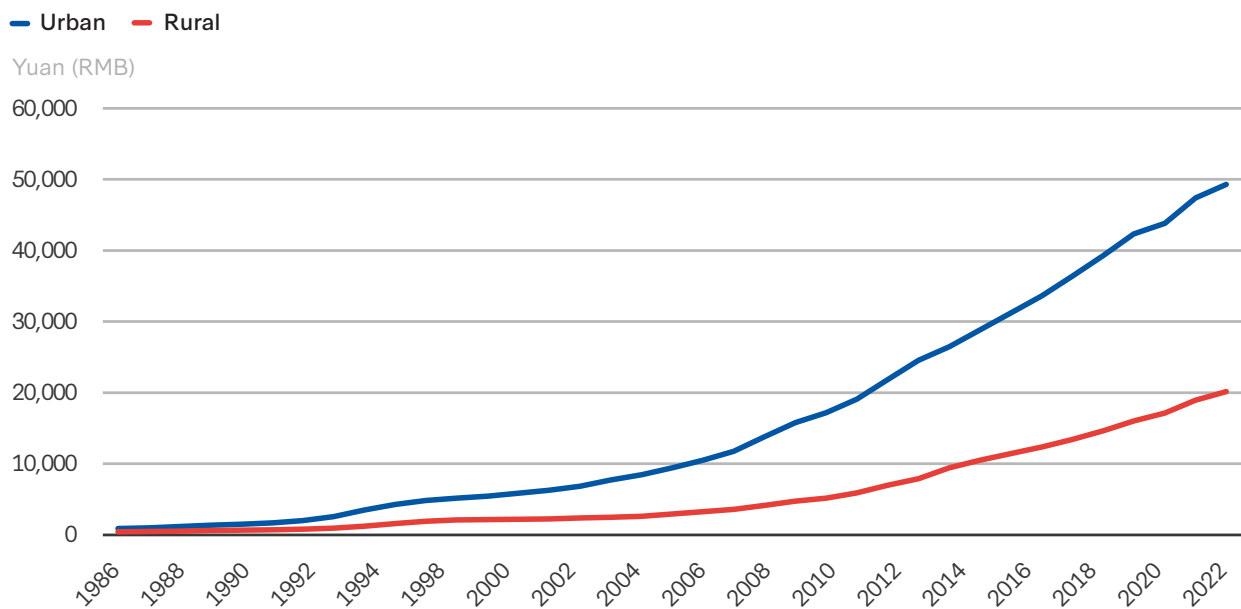
Source: "World Population Prospects 2019," United Nations, Department of Economic and Social Affairs, Population Division, <https://population.un.org/wpp/graphs/>.

ers concentrated in rural areas. Other countries that have escaped the “middle-income trap,” such as Taiwan and South Korea, tended to have higher levels of secondary education that helped transition the workforce from manufacturing to higher-value-added work. In China, low high school graduation rates, pervasive early childhood development challenges, and urban-rural divides codified in regulations such as the hukou system could limit the country’s transition to a high-skilled workforce.<sup>11</sup>

### EARLY CHILDHOOD DEVELOPMENT

While discussions of human capital may first conjure images of PhD graduates or high-skilled tech workers, a growing field of academic study recognizes that human capital cultivation begins in childhood. As 90 percent of a person’s brain development happens by the age of five, research shows that healthy early childhood development is linked to positive long-term outcomes in health, educational attainment, future earnings, and employment—all key aspects for a strong national human capital environment.<sup>12</sup> Since the

Figure 3: Urban-Rural Disposable Income Levels in China



Source: National Bureau of Statistics of China, *China Statistical Yearbook 2023* (China Statistics Press, 2023), <https://www.stats.gov.cn/sj/nds/2023/indexeh.htm>.

18th Party Congress in 2012, the Chinese Communist Party (CCP) has considered children a strategic component of creating a national “talent foundation” and has accordingly undertaken national planning to address issues of early childhood development and primary education.<sup>13</sup>

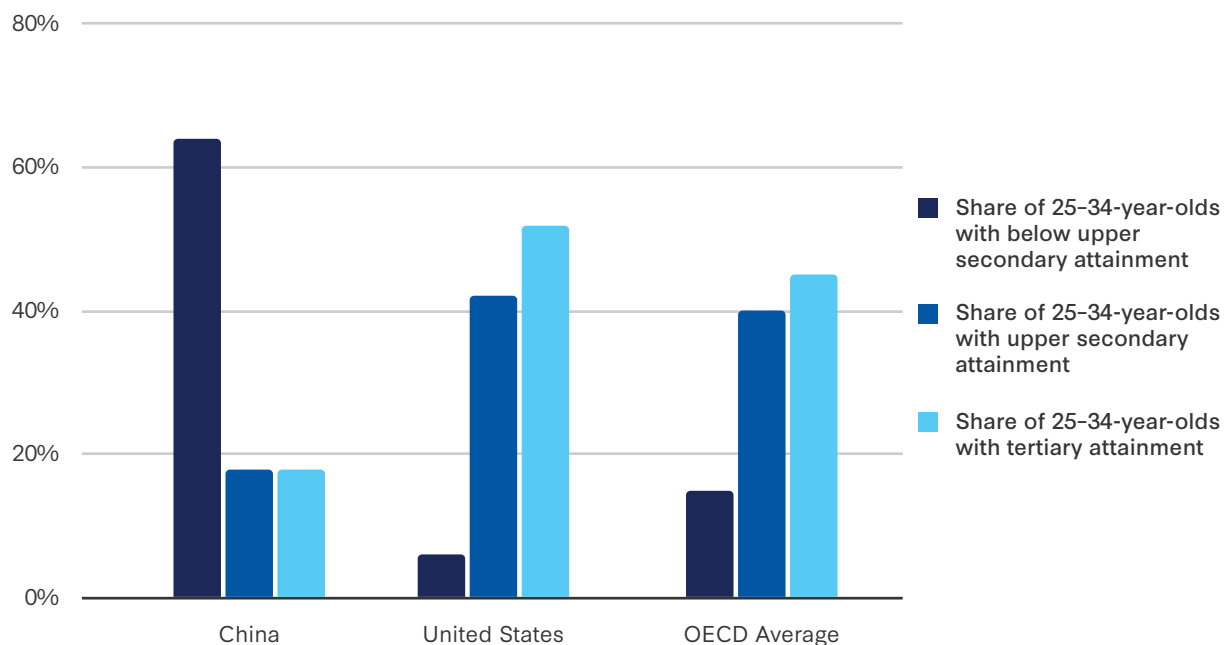
However, early childhood development still presents challenges for China. In particular, urban-rural inequality in China negatively impacts early childhood development in rural areas, evident in studies of health issues and measures of cognitive development, such as the Bayley Test.<sup>14</sup> In terms of children’s health, scholars estimate that 60 percent of elementary school children in rural China are affected by anemia, untreated vision problems, or intestinal worms, all of which negatively impact their ability to learn at a critical age.<sup>15</sup> Studies of developmental delays among infants and toddlers in China show that around 50 percent of rural children exhibit cognitive delays, language delays, and socio-emotional delays in early childhood. For older children of elementary and junior-high age, rates of developmental delays continue to be around 40 percent.<sup>16</sup> Because of the outsized importance of the first few years of life on the development of fundamental cognitive, socio-emotional, and other abilities, low levels of cognitive development at this stage have profound effects

later in life and can include behavioral problems, lower academic achievement, and decreased lifetime income.<sup>17</sup> To address the root of these inequalities, prominent scholars have suggested that interventions to support childhood nutrition and cognitive development in rural areas could prove highly effective.<sup>18</sup> Given that over two-thirds of China’s children come from rural areas, early childhood development is a critical issue not only for ameliorating urban-rural inequality but also for the country’s overall economic future.<sup>19</sup>

## SECONDARY EDUCATION

In the last 70 years, China dramatically expanded the reach of its education system, increasing the national literacy rate from about 20 percent in 1949 to nearly 100 percent in 2021.<sup>20</sup> However, the country’s education system still faces deep-seated challenges in cultivating a high-skilled workforce. Compared to other middle-income countries, China’s high school graduation rate is low. One OECD report estimates that in 2022, as little as 36.6 percent of China’s workforce aged 25–64 years old had finished high school, a graduation rate much lower than most middle-income countries, including Mexico (44 percent), South Africa (50 percent), Malaysia (50 percent), and Indonesia (43 percent).<sup>21</sup>

Figure 4: Educational Attainment of 25-34-Year-Olds, 2020



Source: OECD, *Education at a Glance 2021* (Paris: OECD, 2021), [https://www.oecd-ilibrary.org/education/education-at-a-glance-2021\\_b35a14e5-en](https://www.oecd-ilibrary.org/education/education-at-a-glance-2021_b35a14e5-en).

“As China’s development shifts from factor-driven to innovation-driven, talents become the first resource for development. To fully stimulate and release the talent dividend, the development of Chinese talent undertakings must shift from prioritizing quantity and scale to prioritizing quality and level.” - Shang Qianming<sup>22</sup>

For students that do complete their secondary education, future career and skill development opportunities can be limited by China’s rigid national examination system. Higher education options for Chinese high schoolers are largely determined by their performance on the “gaokao,” the high-pressure national standardized college entrance exam that acts as the single primary factor in college admission. Gaokao scores are weighed much more strongly in determining whether a student is admitted to a university than U.S. college entrance exams such as the SAT, making it extremely difficult for aspiring university students to overcome a bad gaokao score through performance on other scales such as a high GPA or extracurriculars. Designed to offer equal opportunity for students across China, and with societal roots that trace back to the imperial examination system, the gaokao also puts intense social pressure on young students and greatly limits academic options for those who perform poorly. Students who score lower on the tests can only attend programs that likely lack the alumni networks or name recognition needed to give graduates a boost in China’s competitive job market. Indeed, according to a 2017 joint study by researchers from Tsinghua University and UC San Diego, students from China’s more prestigious universities earned 30 to 40 percent more on average compared with their peers who went to lower-tier institutions, a difference that can be ascribed to better career support, networks, and name recognition by potential employers.<sup>23</sup> The prestige of the gaokao also limits the national development of vocational schools, which are separate from the exam system. This lowers the quality and amount of financial resources, infrastructure, and educational personnel these schools receive and thereby reduces pathways for young people to build successful careers beyond the route of doing well on a single test.<sup>24</sup>

## **THE HUKOU SYSTEM AND DOMESTIC MOBILITY**

While the magnitude of urban-rural inequalities cannot be attributed to a single regulatory system, examining

China’s household registration system demonstrates how urban-rural divisions are codified in regulations that limit mobility for rural workers, thus constraining China’s ability to move workers to where their skills could be most productively applied.<sup>25</sup> Adopted in the 1950s, the “hukou” system broadly divides rural and urban citizens. In effect, the system limits access to public goods for rural migrants to China’s cities, causing a host of issues for China’s internal migrants, including limiting access to urban public education, limiting access to healthcare services in cities, and discriminating against rural hukou holders in the labor market. Overall, the hukou system controls the rate of rural-to-urban migration as part of a national effort to limit risk of social instability, which generates a drag on total national economic productivity and worsens rural-urban inequality.<sup>26</sup> According to a 2015 survey by the Institute of Sociology, about 80 percent of China’s students attending vocational colleges came from rural backgrounds, whereas the majority of students at top “elite” universities came from urban backgrounds (65 percent). Meanwhile, rural students made up the majority of students in “ordinary” second- and third-tier universities (56 percent), relegating many rural youths to jobs with lower salaries, fewer benefits, and less stability. This inequality in access to educational resources only hardens rural-urban inequality as the disparity is passed from older generations to younger ones.<sup>27</sup>

The shortcomings of the hukou system are not lost on Chinese policymakers, and both the central government and local authorities are pushing forward reform. In 2014, Beijing launched the National New-type Urbanization Plan (2014-2020), which aimed to facilitate rural migrants’ transition to urban residents. In 2021, the National Development and Reform Commission (NDRC) announced plans to relax hukou restrictions in most cities, while Hainan, Shanghai, and Hangzhou also announced relaxations on living or house-buying restrictions.<sup>28</sup> Though it is too early to assess the results of the hukou reforms, the success of past efforts has been mixed. One central goal of 2014’s National New-type Urbanization Plan was to lessen the gap between social benefits enjoyed by urban versus rural hukou holders in cities, but data show that the gap has instead widened.<sup>29</sup> On the other hand, research on firms exposed to hukou reform shows higher levels of labor market flexibility in cities with hukou reform.<sup>30</sup> In short, though the government is taking steps to improve the hukou system, piecemeal efforts will continue to inhibit

productivity and human capital development in China until there is free labor mobility.

“Starting from the equalization of access to basic public services to implement a redistributive policy with Chinese characteristics, we can also maintain social mobility and expand the sharing of economic development in order to continuously improve the well-being of residents. The special challenge facing China is that the more ample mobility and integration of labor are hampered by the delay in the reform of the household registration system.” - Cai Fang<sup>31</sup>

## **ETHNIC INEQUALITY AND MINORITY POLICY**

The emphasis on social stability at the root of the hukou system also extends to government policies toward ethnic minorities. More than 91 percent of China’s population is Han Chinese, while the remainder of China’s population identifies as an ethnic minority.<sup>32</sup> Significant socioeconomic inequalities between minority groups and the Han majority limit both individual opportunity for social mobility and overall national economic productivity. Studies have found that minorities are paid lower wages on average and that gaps in educational attainment play into the income gap between Han and minority groups, particularly in rural areas.<sup>33</sup> As China seeks to increase the skill level of its workforce, limits on the potential of the 125 million people who identify as ethnic minorities constrain the country’s overall ability to fully utilize its human capital.

However, the Chinese leadership’s ethnic minority policy emphasizes assimilation, stability, and anti-terror work as top priorities.<sup>34</sup> Mass human rights abuses in Xinjiang demonstrate Beijing’s willingness to promote an increasingly repressive regime in the name of fighting terrorism and separatism, regardless of the human cost.<sup>35</sup> Chinese ethnic policy varies by ethnicity and region, but by Beijing’s logic, the common thread running through all 55 of China’s ethnic minorities is their proper place as willing members in a “Chinese national family,” as defined by Xi. While official rhetoric emphasizes the benefits assimilation can bring to ethnic minority populations, it often downplays or ignores problems of cultural loss or rights abuses, as well as the social and economic costs of interethnic divisions within China.<sup>36</sup>

## **LIMITS ON THE INNOVATION ENVIRONMENT**

Alongside the policy systems and social support nets that form the basis of a strong human capital environment, social factors such as norms and popular movements can play an important role in both promoting and limiting potential. From the unique entrepreneurship culture generated in innovation hubs such as Silicon Valley to the impact of racial and economic obstacles in inhibiting innovation, sociocultural factors can both incubate innovation and create barriers for talent around the world. In China, the impacts of gender discrimination in the workplace and a new movement advocating detachment from a competitive workplace culture illustrate how social forces and trends in popular culture can limit China’s ability to fully utilize its human capital resources. Meanwhile, both the unique makeup of China’s state-centric economy and political backlash against prominent entrepreneurs indicate that the country’s environment may be trending in the direction of restricting entrepreneurial potential.

An example of the impact of social movements on human capital utilization can be found in the recent popularity of the “lying flat” movement, which calls for relinquishing the stresses and ambitions of modern life. In April 2021, an online post titled “Lying Flat Is Justice” went viral in China, prompting a flurry of online discussion on the virtues of resigning from one’s job or otherwise eschewing the competitive work culture common in many tech and other high-skilled careers. While it is difficult to measure the real impact of the “lying flat” movement in prompting Chinese workers to withdraw from the workplace, survey data shows that discontent with competitive work culture is widely felt among China’s white-collar workers.<sup>37</sup> In a 2019 employment trends report produced by Zhaopin, a leading career development consultancy, 80 percent of surveyed respondents said that “respect for employees” is the most important factor in corporate culture, while over 50 percent reported feeling that they needed to be on-call 24/7.<sup>38</sup> Zhaopin’s 2020 employment trends report highlighted a lack of trust between employees and employers, with only 10 percent of workers surveyed reporting that they trust their employer.<sup>39</sup> With an already shrinking workforce, China’s growth model can ill-afford burnout and disillusionment limiting the economic contributions of existing workers.

The concrete impact of social issues on economic growth is also evident in data on gender discrimination in

China's workforce. A combination of policy and societal factors has increased barriers for women in the workforce, resulting in a rising gender gap in labor force participation rates in China. For example, while many major economies have seen the workforce gender gaps close in recent decades, China's grew from 9.4 percent in 1994 to 14.1 percent in 2020.<sup>40</sup> Policy changes such as declining numbers of state-supported childcare facilities and social factors such as bias in hiring contribute to this growing gap, resulting in underutilization of China's female workforce.<sup>41</sup>

China's entrepreneurship environment is another area in which economic and social structures may limit innovation. In an economy that stresses the central role of the government, many accomplished young Chinese graduates consider working in the state sector as their ideal job. In a sample survey conducted between 2010 and 2015 of over 30,000 college graduates from 90 colleges in China, 62.5 percent marked the government or state sector as their preferred employer.<sup>42</sup> Such jobs offer safety and security that often is attractive to urban college graduates. However, the dynamism and productivity of state-owned enterprises (SOEs) tends to be lower than that of private companies.<sup>43</sup> As more top talent flows to the state sector, it likely will have a dampening effect on China's economic dynamism. While measuring lost entrepreneurial potential is difficult, research on the employment choices of accomplished college graduates does suggest a trend of top students being diverted from private sector entrepreneurship to the state sector.<sup>44</sup> Along with economic incentives to enter the state sector, social pressures may also discourage would-be entrepreneurs.

Particularly since Alibaba founder Jack Ma's fall from grace in 2020, many international commentators have lamented the end of an era of relative openness for bold entrepreneurs in China amid an increasingly restrictive atmosphere for the private sector.<sup>45</sup>

## DEVELOPING STRATEGIC TALENT PIPELINES

The above sections discussed ways in which regulatory, demographic, and normative constraints on China's human capital environment limit the country's aggregate ability to develop and utilize human capital. The broad impact of these constraints can be difficult to measure, particularly at the level of specific strategic industries. A more direct line between talent cultivation and national policy priorities can be seen in government-led efforts to create domes-

tic talent pipelines for strategic skill sets in STEM, critical technology sectors, and military expertise. Outcomes in STEM PhD growth, cultivation of artificial intelligence (AI) curricula, advances in military education, and increasing research and development (R&D) spending demonstrate areas where government policies are shaping the national human capital to increase in-demand skills and knowledge.

## TALENT PIPELINES IN HIGHER EDUCATION

Growing investment in the higher education system has driven research productivity at top Chinese universities and boosted their global rankings. Between 2012 and 2021, China's Ministry of Education increased spending on higher education from \$24 billion to \$47 billion.<sup>46</sup> Along with helping to grow the international stature of top Chinese universities (between 2010 and 2020, the number of Chinese universities listed in the top 500 on at least one global ranking more than tripled), rising investment in higher education creates pathways to promote specific in-demand skill sets, particularly in STEM.<sup>47</sup> China's growing capacity to cultivate high-level STEM expertise is evident in the increasing number of STEM doctorates produced by Chinese universities each year. By 2025, Chinese universities are projected to produce more than 77,000 STEM PhD graduates per year, more than double the 2010 level of about 34,000 STEM PhD graduates. In comparison, the United States is projected to graduate only approximately 40,000 STEM PhD students in 2025, a figure that includes over 16,000 international students.<sup>48</sup>

Along with increasing investment in the country's higher education system, policymakers are instituting targeted programs to create university talent pipelines for specific skill sets such as cybersecurity, semiconductor manufacturing, and AI expertise. For example, Beijing launched a program to certify World-Class Cybersecurity Schools in 2017, which sets standards across certified schools for education in cybersecurity and allows government bodies to direct what coursework and skill development is integrated into university coursework.<sup>49</sup>

However, growth in STEM PhDs and Chinese university rankings may not capture the full picture of the quality of China's higher education. One study on critical thinking and STEM skills comparing Chinese students to peers from the United States, Russia, and India found that STEM undergraduates in China actually saw critical thinking and STEM skill levels decline over four years in college, a phe-

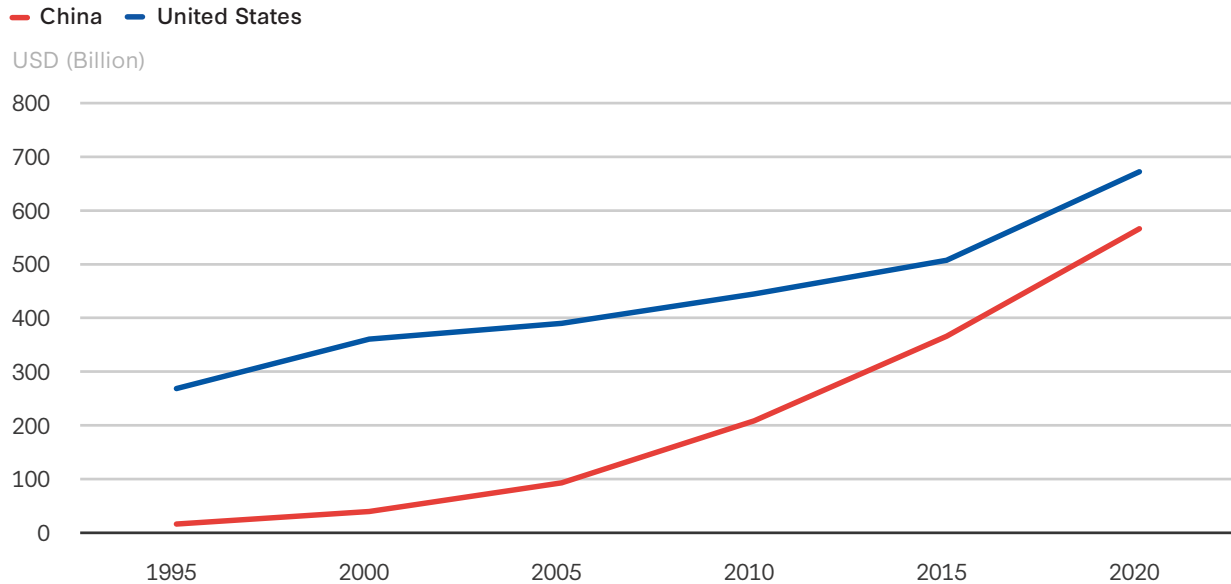
nomenon that scholars posit may be linked to institutional weaknesses in curricula and university program design.<sup>50</sup>

## SCIENCE AND TECHNOLOGY

China aims to become a scientific and technological powerhouse by 2049.<sup>51</sup> In furtherance of this goal, Beijing has

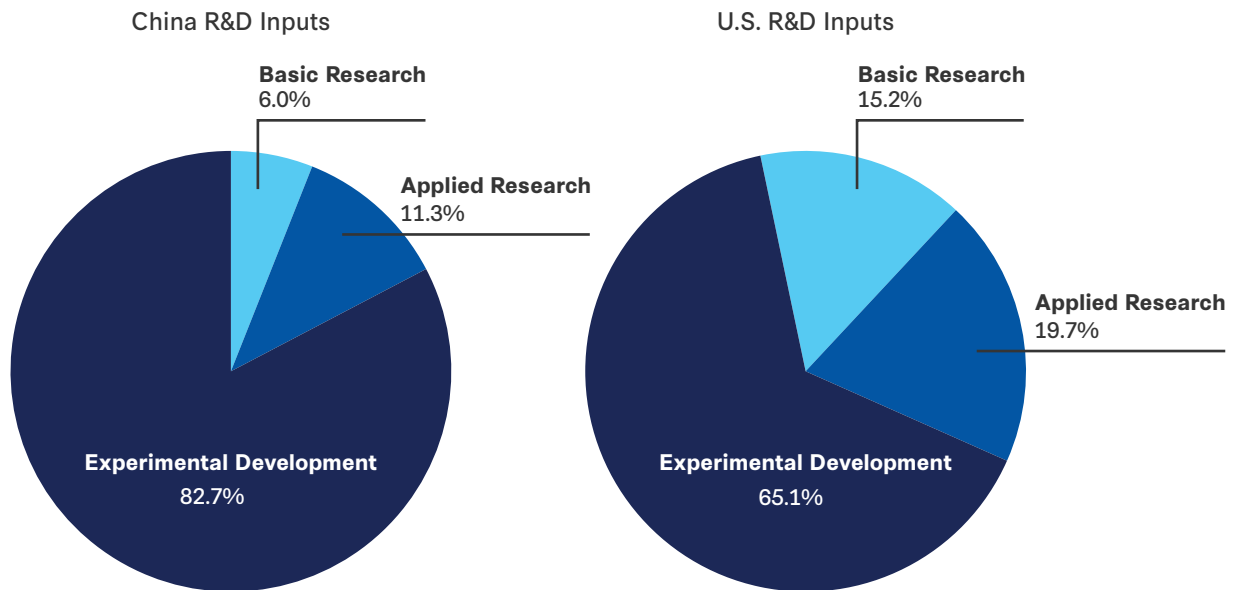
directed significant resources and support for initiatives designed to attract and ensure talent cultivation in the fields of science and technology. According to the National Bureau of Statistics, \$430 billion, or 2.54 percent of China's GDP, was invested in R&D by the government in 2022, an increase of 10.1 percent from the previous year.<sup>52</sup> According

Figure 5: Gross Domestic Expenditures on R&D in Constant USD, PPP



Source: "Gross domestic expenditure on R&D, selected economies, 2000-2021 USD million in constant PPP prices," OECD, <https://www.oecd.org/sti/msti.htm#:~:text=Accordinging%20to%20the%20latest%20data,to%20nearly%202.5%25%20in%202019.>

Figure 6: China and U.S. R&D Inputs by Type of Research, 2020



Source: "Gross domestic expenditure on R&D by sector of performance and type of R&D," OECD, [https://stats.oecd.org/Index.aspx?DataSetCode=GERD\\_TORD](https://stats.oecd.org/Index.aspx?DataSetCode=GERD_TORD).

to the Organization for Economic Cooperation and Development, the United States allocated \$720 billion to R&D in 2020. This makes China the second-largest spender on R&D in the world. China's R&D input in 2020 consisted of around 6 percent in basic research, 11 percent in applied research, and 83 percent in experimental research. In comparison, the United States spent 15 percent of its R&D input on basic research, 20 percent on applied research, and 65 percent on experimental research.<sup>53</sup>

These investments have yielded results. In the 2023 World Intellectual Property Organization's Global Innovation Index, China ranked twelfth overall, moving up two places since 2020.<sup>54</sup> The country also ranked fourth in knowledge and technology outputs, just behind the United States. China also sourced the most peer-reviewed papers.<sup>55</sup> While U.S. articles traditionally comprised most of the top 1 percent of the world's most highly cited articles, studies have found that Chinese research ranked as high as or higher than U.S. work in the top 1 percent of scientific studies in 2019.<sup>56</sup>

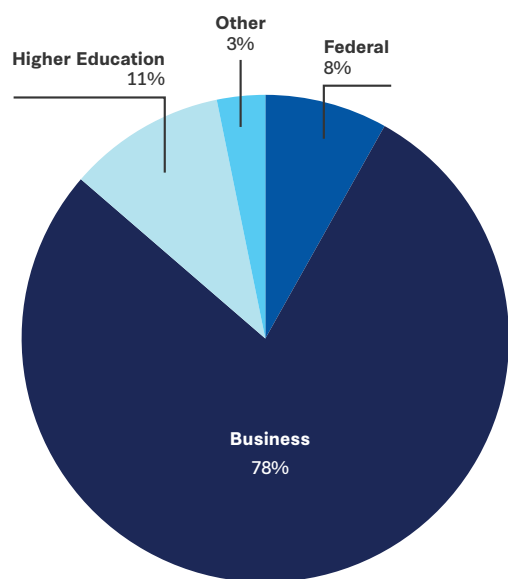
However, a top-down approach to innovation coupled with growing R&D investments is no guarantee of success. According to Fitch Ratings, 49 percent of China's corporate 2020 R&D spending came from SOEs. But compared to private companies, SOEs have been shown to have lower rates of efficiency per dollar in terms of patent output.<sup>57</sup> Government

allocations have been found to have crowding-out effects on private investments in Chinese R&D. A study by Boeing has shown a reduction of around 6.5 percent in private R&D investments in Chinese large to medium enterprises (LMEs) with each standard deviation of government R&D subsidies invested in LMEs.<sup>58</sup> Government-directed R&D also has produced inefficient allocation of resources, following a pattern that has been evident in countries with state-guided scientific development models, tracing back to the former Soviet Union and Japan.<sup>59</sup> Notably, an uptick in R&D subsidies has also correlated with an increase in the misallocation of funds by some of the recipients, which diminishes the return on investment of China's R&D inputs.<sup>60</sup> Furthermore, while Chinese research-intensive universities and firms have gained in international reputation, they still might not be enticing enough to attract the top talents among China's diaspora given that China's higher education institutions are not as well-known as other global knowledge production peers.<sup>61</sup>

### MILITARY TALENT PROGRAMS

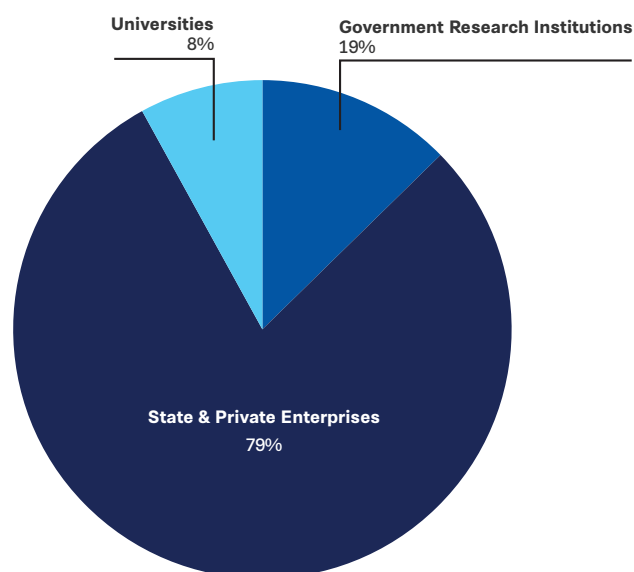
Since taking power in 2012, Chinese leader Xi Jinping has pushed sweeping reforms to modernize the country's military, including through the enhancement of the military's human capital expertise to ensure higher levels of competency and readiness. The Sixth Plenum Resolution of the

Figure 7: U.S. R&D Performance by Sector, 2022



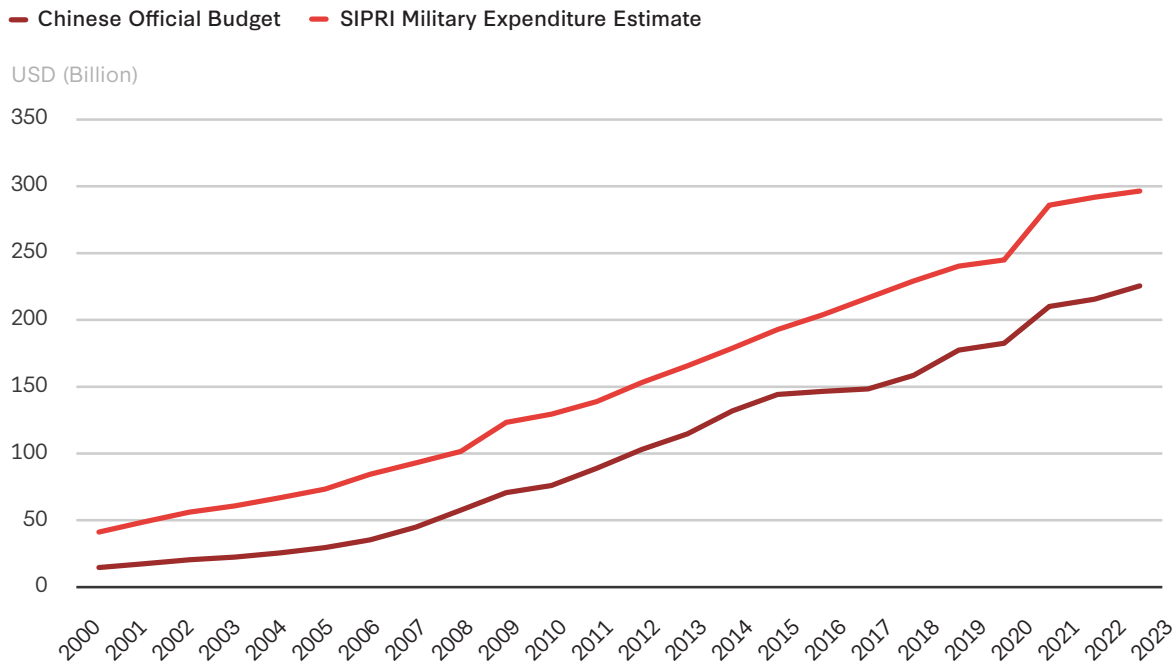
Source: "National Patterns of R&D Resources: 2021-22 Data Update," National Science Foundation, <https://ncses.nsf.gov/data-collections/national-patterns/2021-2022#data>.

Figure 8: China R&D Expenditure by Sector, 2022



Source: "Basic Statistics on Scientific and Technological Activities" in National Bureau of Statistics of China, *China Statistical Yearbook 2022* (China Statistics Press, 2022), [https://www.stats.gov.cn/sj/zxfb/202309/t20230918\\_1942920.html#](https://www.stats.gov.cn/sj/zxfb/202309/t20230918_1942920.html#).

**Figure 9: China’s Military Spending**



Source: “SIPRI Military Expenditure Database,” Stockholm International Peace Research Institute, <https://milex.sipri.org/sipri>; and Ministry of Finance of the People’s Republic of China, “Central Expenditure Budget Tables,” Central Budget and Final Accounts Public Platform, <http://www.mof.gov.cn/zyjsgkpt/zyzfjys/zyys/ysbb/>.

19th Party Congress (a plenum being the annual national meeting of the top officials in the CCP for each generation of the Party Congress) called for strengthening the People’s Liberation Army (PLA) with the recruitment and training of more knowledgeable recruits and proficient talent. This had the objective of establishing a “military education policy for the New Era” (as proclaimed by Xi Jinping regarding China’s goals of modernization and development at the CCP’s 19th National Congress in October 2017).<sup>62</sup>

“Xi Jinping pointed out that we need to reach deep to address prominent issues and problems constraining China’s military talent work, and press ahead in a coordinated way with reform and innovation in identifying, pooling, cultivating and appointing talent.” - Political Bureau of the CCP Central Committee<sup>63</sup>

In January 2022, the Central Military Commission issued an order to enhance and modernize the country’s military talent through improving the military’s capacity and combat readiness.<sup>64</sup> This statement framed the recruitment of talent as critical to the composition of the PLA by ensuring that:

... the barrel of the gun is always in the hands of people who are loyal and reliable to the party, will

strengthen the party’s overall leadership of talent work, implement the party’s organizational line in the new era, implement the responsibility system of the chairman of the military commission, adhere to the political training and inspection of talents, and unswervingly ensure a pure selection and employment of political ecology.

Apart from requiring political adherence to CCP ideology—which some military analysts regard as hampering military effectiveness by taking time away from training to focus on the study of Marxist-Leninism and party policy lines—the government has emphasized the implementation of strong technical capabilities in the training of military personnel with the goal to, as Xi emphasizes, “make fighting and winning wars the starting point and objective of talent work.”<sup>65</sup>

In order to supply this expertise, China’s military has promoted incentives to recruit more educated personnel and improve human capital in the ranks, including through financial bonuses and programs to attract university graduates to enroll as officers. Indeed, one of the major weaknesses in the PLA’s human capital has been a perceived inability to attract educated recruits as wages have risen in coastal urban areas and major cities, which has made the civilian economy more appealing for young Chinese than serving in the PLA.<sup>66</sup> In order to retain talented staff, the PLA offered a pay increase

starting in 2017 for qualified officers which would be drawn from defense budgets that continued to grow by more than 8 percent a year.<sup>67</sup> The PLA also seeks to streamline its recruitment toward a more balanced force with less emphasis on army recruitment and more focus on recruiting talent into other military branches, including the People’s Liberation Army Navy and the People’s Liberation Army Air Force, as well as training and integrating joint force operation capabilities between these branches. These efforts are being followed by new forms of training and military education. The PLA also restructured its professional military education program to increase the quality and competence of PLA personnel by updating curricular changes focusing on emerging fields such as information technology, aerospace, and computer sciences.<sup>68</sup> For Beijing, these reforms in human capital recruitment and training are critical for China’s ability to field a modernized, world-class military.

## ATTRACTING AND RETAINING TALENT

China’s ability to retain domestic talent and attract foreign experts is another key dimension to enhancing national competitiveness. After decades of experiencing “brain-drain” of top talent leaving China to work in the United States and elsewhere, China is trying to reverse the flow to achieve “brain gain” from the rest of the world. Government efforts to incentivize foreign-educated citizens to either return to China or remain in China are well documented in “talent programs.” Immigration may seem unnecessary for a country home to nearly 20 percent of the global population, a “national condition” that opponents within China have cited in arguments against immigration.<sup>69</sup> However, the ability to attract international talent can be critical for flexibility in plugging skills shortages and creating a diverse environment for innovation.

### TALENT PROGRAMS

The cultivation of expertise and knowledge from China’s citizens has been vital to Xi Jinping’s vision of “sharpening China’s competitive edge in human resources.”<sup>70</sup> Through over 200 talent-recruitment initiatives—including the controversial Thousand Talents program and the Young Thousand Talents Program—Beijing has sought to retain Chinese tertiary education students and skilled workers through economic incentives while also making the country an attractive source for academic collaboration and profes-

sional expertise from abroad.<sup>71</sup> By 2018, the Thousand Talents program had attracted nearly 7,000 experts to work in Chinese academia and institutes.<sup>72</sup>

Programs designed to retain homegrown expertise and incentivize overseas Chinese students, researchers, and experts to return to the country have become a key focus of Western discourse on China’s talent strategy. Western analysis of these government-sponsored programs often focuses on their roles in industrial espionage and hollowing out of industries.<sup>73</sup> News stories on China’s talent programs have often focused on indictments of talent program awardees accused of making false statements about their ties to China or stealing intellectual property from Western research facilities.<sup>74</sup> But overemphasizing alleged criminal cases in discourse on talent programs can have a chilling effect on scientific and academic advancement in the United States and obscure the bigger picture of talent programs as part of China’s efforts to bolster its domestic talent base.<sup>75</sup>

Beyond the role of acquiring expertise abroad, the success of talent programs provides insight on the elements of China’s work environment that act as either incentives or deterrents for would-be returnees. Research on efforts by Chinese government institutions, universities, and scientific organizations to attract returnee scholars underlines that beyond monetary and status incentives, non-material aspects of a research environment play an important role in attracting back returnees, such as research climate and academic relationships.<sup>76</sup>

Another hurdle for many foreign and returnee talents coming to China is the country’s circumscribed digital environment. In the context of the global information economy, ready access to the internet is critical to a country’s competitiveness, as open internet access allows individuals to exchange new ideas and integrate breakthroughs elsewhere to accelerate their own research. However, these restrictions have adversely impacted the ability of China’s researchers and academics to access key online resources for information, such as Google Scholar and Springer Nature, not to mention key sources of daily news about global developments, such as the *New York Times* and the *Wall Street Journal*.<sup>77</sup>

### IMMIGRATION

Immigration impacts a country’s ability to draw top international experts and bridge the gap in skills shortages in domestic populations, representing a key component of overall human capital competitiveness. In Xi’s own words, “China’s development needs the participation of world talents.”<sup>78</sup> But

with a legal framework that offers few pathways to permanent residence and with international migrants constituting only 0.1 percent of China's total population, the country's restrictive immigration system is a limiting factor in its access to global talent.<sup>79</sup> Immigration governance reform under the Xi administration has indicated room for change in both legal frameworks and domestic perspectives on immigration. However, immigration controls since the onset of the Covid-19 pandemic point to an increasingly closed system.

The 2010s saw increased momentum for reform to China's immigration system: the State Council described the permanent resident system as an important part of the country's human capital strategy in 2016; Xi touted the strategic wisdom of "gathering talents from all over the world" to the 19th Party Congress; and Beijing established the nation's first national migration agency in 2018.<sup>80</sup> At the onset of the Covid-19 pandemic, however, momentum shifted away from economic-minded immigration reform. Instead, border authorities turned their focus to preventing coronavirus outbreaks, a move that fell in line with broader policy trends that prioritize security and centralization over economic growth in areas that involve international exchange. Though foreign travel to China has resumed since the end of the country's zero-Covid policy, China's foreign population today is severely diminished from 2019 levels, and many businesses are accelerating efforts to localize high-skill jobs rather than relying on international talent to fill key roles in China.<sup>81</sup>

## CONCLUSION

The different aspects of China's human capital outlined in this report all link back to China's ambitions to become a leader across multiple categories of national competitiveness. Chinese policymakers have both sizable advantages and considerable challenges in realizing the country's ambitions. Through the statements of senior leaders and the policies that accompany them, the Chinese government clearly recognizes that the advancement of the country's human capital resources will be pivotal to securing China's

future economic and geopolitical potential. As with other national priorities, China's leaders likely will act with speed to concentrate significant focus and resources on elevating the productivity and innovative capacity of its workforce.

China's growing ability to attract expertise and nurture its human capital ecosystem will have important implications for U.S. policymakers and the American public alike. The more success China achieves in improving the quality of its workforce, the faster the country will innovate and the more nationally competitive China will become on the world stage. With four times the population of the United States, China does not need to match America in per capita productivity to surpass the United States economically. It merely needs to close the gap. Since the United States cannot match China in terms of quantity, it will face an even greater premium to preserve its qualitative edge in workforce talent in the years ahead. ■

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