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Tracking China's economic path

By Hongbin Li and Scott Rozelle

KEY TAKEAWAYS

- China's changing economy threatens to leave millions of rural residents behind. Underinvestment in rural human capital, from infants to blue-collar workers, may spur polarization and complicate China's quest to become a high-income country.

- China's efforts to curb greenhouse gas emissions are unique but can make a big difference in combating global climate change and warrant close attention.

- The legacy of China's population control policies has proved unpredictable, persistent, and problematic.

- The tone of the debate on China in the United States directly impacts how Chinese citizens assess authoritarian rule at home.

As the United States and China enter a new and contentious phase of their relationship, Stanford scholars are setting and expanding research agendas to analyze China's economic development and its impact on the world. The newly launched Stanford Center on China's Economy and Institutions (SCCEI, pronounced "SKY") was formed by the Stanford Institute for Economic Policy Research (SIEPR) and the Freeman Spogli Institute for International Studies (FSI) to support their work.

The goal of SCCEI and its affiliated faculty is to provide a dispassionate, fact-based architecture that can help policymakers, business leaders and the general public navigate the fraught relationship between the U.S. and China.

This policy brief outlines the scholarship already underway by some of SCCEI's affiliates. It includes a range of research on the world's most populous country: education and wage disparities; workforce transformation; emissions trading; China's one-child policy; and the effect that racism against Chinese students in America has upon their views about authoritarian rule. As the center matures, research agendas will expand and focus on trade, global supply chains, technology, intellectual property rights, worker productivity, and a range of developing issues affecting the connection between Washington, D.C., and Beijing and the rest of the world.

Get smart: Uneducated workers and cognitive delay hamper China's workforce

Roughly 500 million people in China's 780 million-strong labor force *do not have a high-school education* (Rozelle and Hell, 2020). China's overall education rate is one of the lowest in the middle-income world, according to OECD. Comparing China's human capital with that of other countries, it is not only systemically lower than South Korea, Ireland, and other "graduates" out of middle-income status, it is also lower than virtually all other middle-income countries.

According to China's own 2015 census data, just 30 percent of the labor force between the ages of 18 and 65 had ever attended high school, which is less than the average of other middle-income countries (36 percent) and well below the OECD average (78 percent).

China's census also shows that, in 2010, only 12.5 percent of the overall labor force was college educated, lower than that of most other middle-income countries. In other words, China's workers lag behind not only the countries that have graduated from middle to high income in terms of secondary and tertiary education levels but also their middle-income peers.

Less-educated workers may become increasingly unemployable as China's economy upgrades. As wages rise and automation and global supply chains render China's low-skilled workers redundant, the undereducated can *become a burden to society and hamper growth* (Levy, 2008). No accurate assessment of China's future growth is complete without answering the question: What is going to happen to these 500 million undereducated people and their families?

Making a living: How changes in China's economy are driving wage polarization

Wage rates in China, which once rose for professionals and low-skilled workers alike, are becoming increasingly polarized — increasing for professionals but declining for those in low-skill, labor-intensive jobs (Rozelle et al.,

2020). One of the defining features of China's economy between 1995 and 2015 was the increase in pay for both low-skilled workers and professionals in nearly every segment of the economy.

In fact, wage rates for manufacturing, construction, and informal service-sector jobs rose fastest. But China's economic structure has recently started to change, and the wage trend has reversed among workers. Those with white-collar jobs are earning more in their paychecks, as demand increases for jobs in the technology, higher education, finance, and health care sectors — particularly at a time when there is a shortage of people to fill those roles.

By contrast, there is a growing glut among low-skilled jobs in the informal sector — including unpaid family labor, casual shop keepers, and street vendors — thanks to trends in globalization and automation that have led to layoffs. This trend has been fueled by the flow of labor out of manufacturing and construction, two industries where employment has been flat or declining since 2013.

This wage polarization is a symptom of a broader problem. With a relative scarcity of skilled workers, and too many low-skilled workers, countries can fail to get their economies to rise up the value chain and, as a result, become stuck in the middle-income trap where low employment, crime, and social unrest are more likely.

Behind before they start: Cognitive delay rampant among China's rural infants

As China expands educational opportunity and better trains its labor force, one under-appreciated factor may stand in the way: cognitive delay among rural infants.

Almost three of every four infants in China are growing up in rural and migrant communities. SCCEI researchers aggregated 41 empirical studies conducted in the past 10 years involving 19,762 healthy children under age 5 in rural China (Emmers et al., 2021). The review revealed that as many as 45 percent of rural babies were at risk for cognitive delays, slightly more than the rate in other

middle-income countries. The rate in high-income countries, including the U.S. is closer to 15 percent.

Low cognition in the first three years of life has been shown to *lead to worse schooling, employment, income, and health outcomes later in life*, as well as higher rates of crime and social problems (Heckman, 2006). While parents in rural China love and have high aspirations for their children, they tend not to know how to raise infants in a way that prepares them to thrive in a modern economy. One of the main sources of the problem is rooted in insufficient stimulation of infants from caregivers. Studies in China show that close to half of rural caregivers rarely read, sing, or talk to their babies, either because they are absent working or do not realize how important such engagement is.

While other middle-income countries, such as Brazil and Peru, have launched sweeping initiatives in recent years to address cognitive delay among infants, the issue has yet to find substantive traction among policymakers in China, but it is an issue they must contend with. No amount of school expansion will compensate for poor outcomes in the critical first years of life.

Measuring up: U.S. college students score well compared with peers in top STEM countries

Universities contribute to economic growth and national competitiveness by equipping students with higher-order thinking and academic skills. But little is known about how the skills of undergraduates in science, technology, engineering and mathematics (STEM) fields compare across countries. To address this issue, a team of researchers led by Prashant Loyalka at Stanford University surveyed and tested tens of thousands of students from four countries that *produce about half the STEM graduates in the world* — the United States, China, India and Russia. They found stark differences in skill levels and skill gains across countries and between elite and non-elite institutions. Students from China and the United States enter college with critical thinking skills that are much

higher than peers in India and Russia. Students from China also have much higher levels of math and science skills than students in India and Russia at the start and middle of college. During college, however, students in India, Russia, and the United States make relatively large skill gains. By the end of college, STEM graduates in the United States have higher levels of critical thinking and major-specific skills than students in the other three countries. These gaps in skill levels and gains provide insights into the global competitiveness of STEM university students across nations and institution types.

One-child policy: Not the main driver of fertility decline in China

From 1979 to 2015, China's one-child policy was the world's most stringent attempt at population control. But was this policy effective? And what impact has it had on the world's most populous nation? While China's one-child policy is often credited with dramatically cutting the country's population growth, this is *not borne out by the evidence* (Chen et al., 2013).

More than half of China's decline in fertility occurred *before the policy began* (Singer Babiarz et al., 2018). Other factors such as the decline in infant mortality and the rising costs of raising children played more important roles and suggest the program's impact on fertility was minimal. Still, while the one-child policy was not the prime factor in the reduction in China's population growth, it did have major impacts. For one, the sex ratio at birth soared from 106 males for every 100 females in 1978 to 120 males for every 100 females in 2000, the highest male-biased sex ratio in the world. SCCEI research has shown that the policy accounted for 94 percent of China's total increase in the male-female sex ratios in the 1980s and for over half of the total increases in sex ratios for the 1991–2005 birth cohorts (Li et al., 2011). The 40 million surplus males that are a result of the skewed sex ratio is also an important factor in *the rise in crime* since China's economic reforms began (Edlund et al., 2013).

Rise of the robots: Politics and policy issues driving automation

In recent SCCEI research (Cheng et al. 2019), Hongbin Li and colleagues study the extent and reasons for the rise of automation in China. China's production and adoption of robotic technology have accelerated rapidly in recent years. China topped the list for installations of industrial robots worldwide, exceeding the next four countries combined. Yet, it lags in density of robot usage per 10,000 workers. Currently, robot density is higher in Japan, the U.S., South Korea, and Germany, but the gap is narrowing.

The automobile and electronics industries use the most robots. Since 2009 annual production of automobiles in China has exceeded that of the U.S. and Japan combined. And more the 70 percent of the world's computers and electronics are made in China today. These industries are likely to continue expanding and with them China's use of robots.

China's adoption of robots is driven in large part by a shortage of labor. Although China's original success as the "world's factory" was built upon cheap labor, China has been experiencing both a shrinking labor force and rapidly rising labor costs over the last decade. The rise in robots corresponds with the declining labor force.

Industrial policy also drives robot adoption in China. Forty percent of net profits of the four publicly listed robotics firms are derived from government subsidies, and 15 percent of robot-using firms report having received subsidies for robot purchases. As a strategically important sector, the government aims to increase its global market share of high-end robotics to 45 percent. The threat of job replacement, however, is apparently not a high-priority concern for the government and its citizens. Policies are more motivated by the challenges of labor shortages and rising wages, as well as the imperative to lead a new wave of industrial revolution. The use and production of robots will continue to rise in China in response to market forces and government policies.

Breathing better: China's emissions trading system offers economic and health benefits

China, the world's largest polluter, has pledged to be carbon-neutral by 2060. A major component of its strategy to achieve this goal is to implement a tradable performance standard (TPS), a new and unconventional emissions trading system for reducing emissions of carbon dioxide (CO_2). Once fully implemented, this new system is expected to contribute to half of China's reductions of CO_2. The TPS differs from the more commonly used cap-and-trade (C&T) emissions trading systems prevalent in Europe and the U.S. A key difference is that the TPS is an intensity-based system, under which compliance requires regulated facilities to achieve a ratio of emissions to intended output below some government-established ceiling or benchmark. By contrast, C&T compels regulated entities to keep the level of emissions below a government-specified cap. A recent Center-supported study (Goulder et al., 2020) found that the TPS's benefits in terms of avoided climate-related damages as well as improvements in local air quality will *substantially exceed its expected economic costs*. The study also found that although the TPS is more costly than an equally stringent C&T program with similar coverage, it has a number of offsetting advantages. The TPS leads to smaller increases in prices of electricity and industrial products, which can confer advantages to China in international markets. Also, because the program is intensity-based, the stringency of the program adjusts more flexibly than C&T to changes in the business cycle.

Bad medicine: Antibiotic resistance due to over-prescription is rampant in China

China has one of the highest rates of antibiotic resistance — a major threat to the public that is driven by the unnecessary prescription of antibiotics. To assess whether and why rural clinicians overprescribe antibiotics, Stanford researchers embarked on *a study employing "standardized patients"* (SPs) — actors trained to take on the characteristics of a real patient and to present their fake illness in a standardized way (Xue, et al. 2019). They also used matching clinical vignettes – descriptions of symptoms presented to clinicians corresponding to those described by the standardized patients -- to measure clinician knowledge of antibiotic use for the specific diseases presented.

With the permission of the clinics and hospitals, the unannounced standardized patients (SPs) presented three fixed disease cases, none of which indicated the need for antibiotics. Overall, antibiotics were inappropriately prescribed in 42 percent of SP cases. Compared with SP interactions, which reflect the treatment of actual patients, prescription rates were 29 percent lower in the matching clinical vignettes testing knowledge (42 percent versus 30 percent). Antibiotic prescription dropped even further (to 10 percent) when clinicians were given the correct diagnosis and asked what drugs to prescribe. This suggests that although some over-prescription may be due to factors such as financial incentives tied to drug sales and perceived patient demand, a more significant driver may be deficits in diagnostic knowledge (so-called "diagnostic uncertainty").

Hardening hearts: Anti-Chinese racism may increase support for authoritarian rule

International education exchange programs are often seen as a way to transfer democratic values to non-democratic regions of the world. But what happens when students from China studying in the U.S. encounter discrimination? Based on an experiment among hundreds of Chinese first-year undergraduates in America, Stanford researchers show that *discrimination interferes with the transfer of democratic values* (Fan, et al., 2020). Chinese students who study in the United States are more predisposed to favor liberal democracy than their peers in China. However, anti-Chinese discrimination significantly reduces their belief that political reform is desirable for China and increases their support for authoritarian rule. Moreover, the effects of discrimination are most pronounced among students who are more likely to reject Chinese nationalism. At the same time, encountering non-racist criticisms of the Chinese government does not increase support for authoritarianism.

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