Asia's Digital Revolution: A new wave of digital innovation is reshaping Asia, raising the region's growth potential

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Asia is embracing the digital revolution. Companies such as Alibaba, Tencent and Baidu are providing a wide range of services from e-commerce to fintech and cloud computing for customers in China and elsewhere. In Indonesia, GO-JEK offers services including ride-hailing, logistics and digital payments. These and other Asian companies are exploiting advances in artificial intelligence, robotics, cryptography, and big data that promise to reshape the global economy and fundamentally alter the way we live and work, in the same way that the steam engine and electricity did in centuries past. In Asia as elsewhere, the digital revolution is rippling across industries from retailing and banking to manufacturing and transportation.

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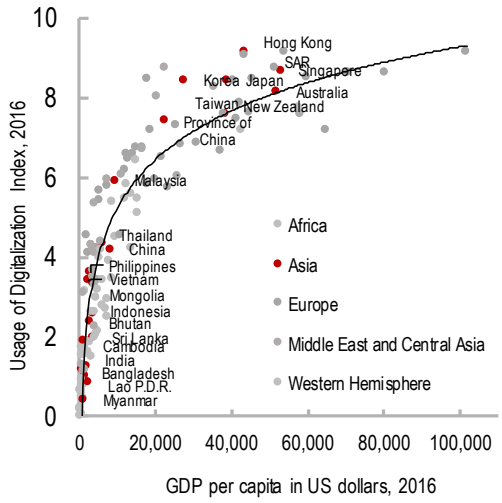
Asia at the forefront

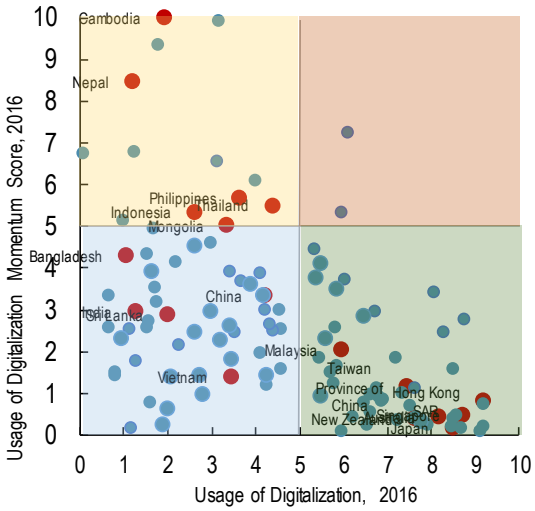
There are Asian players in the lead in nearly every aspect of digitalization, but at the same time, some economies lag significantly behind. Asian economies lie all along the income spectrum, and correspondingly, the region has the highest dispersion of economies in terms of the adoption of digital technologies, with Japan, Korea, Hong Kong SAR, and Singapore being global trendsetters. But at any given income level, Asian economies are at the frontier relative to their global peers (Figure 1). Moreover, even for relatively poor Asian economies, such as Cambodia and Nepal, digitalization is accelerating (Figure 2).

Figure 1. GDP per Capita and Usage of Digitalization
(Index 0–10)



Sources: IMF,World Economic Outlook; International Telecommunication Union; and IMF staff calculations.

Figure 2. Usage of Digitalization: Level and Momentum
(Index 0–10; Momentum change 2012–16)



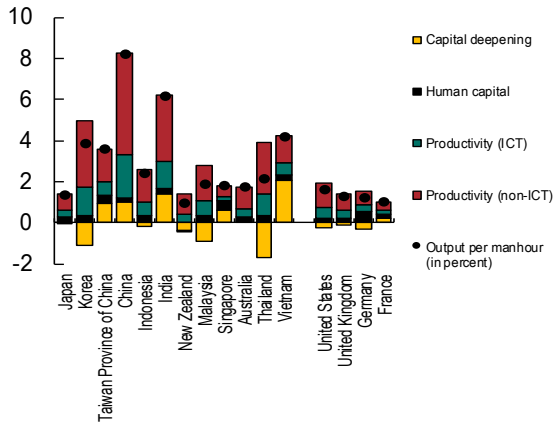
Sources: IMF,World Economic Outlook; International Telecommunication Union; and IMF staff calculations.

E-commerce and fintech—technologies used to exchange goods and services and deliver financial services—are other areas in which Asia leads. For instance, China accounted for less than 1 percent of global e-commerce retail transaction value about a decade ago, but today, that share has grown to more than 40 percent. The penetration of e-commerce, as a percentage of total retail sales, now stands at 15 percent in China, compared with 10 percent in the United States. E-commerce penetration is lower in the rest of Asia but is growing fast, particularly in India, Indonesia, and Vietnam.

In fintech, too, Asian economies have made significant progress, in many cases leapfrogging into new types of technology. For example, in 2016, mobile payments made by individuals for goods and services totaled $790 billion in China, eleven times more than in the United States.

Technological progress can bring enormous benefits by boosting productivity and growth and creating new jobs. And the fact is that Asia has already benefited immensely from digitalization. We find that the diffusion of global innovation was the key driver of growth in Asia over the past two decades, with digital innovation alone accounting for about 28 percent of per capita growth (Figure 3).

Figure 3. Sources of Economic Growth
(Percentage points; 1995–2016)



Source: IMF staff estimates.
Note: ICT = Information Communication Technology.

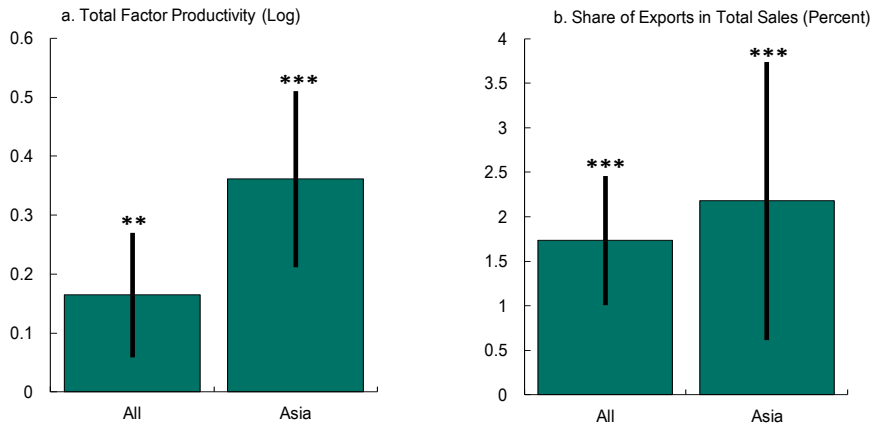
In most of Asia, the share of information and communications technology (ICT) in GDP has increased substantially faster than economic growth. During 2005-15, ICT growth averaged 15.9 percent in India, 13.7 percent in China and 7.1 percent in Thailand, far above their economic growth rates of 7.7, 9.7 and 3.5 percent. In Japan, ICT growth was almost quadruple GDP growth.

And digitalization is becoming a larger component of GDP in many Asian economies. Among the world's top 10 economies with the largest ICT to GDP ratio, seven are in Asia, including Malaysia, Thailand, and Singapore. Importantly, innovation in Asia is tilted toward the digital sector: if we rank countries according to the ICT share of total patents, Asian economies take up the top five slots—further highlighting the potential of digitalization to boost future growth.

E-commerce has the potential not only to support growth, but also to make it more sustainable. For consumers, e-commerce may translate into better access to a wider range of products and services at lower prices, ultimately boosting consumption.

For firms, e-commerce provides new business opportunities and access to larger markets, and thus supports investment. Our analsis shows that, at the firm level in Asia, participation in online commerce is associated with more than a 30 percent increase in total factor productivity (Figure 4a), or the portion of output not explained by traditionally measured inputs of labor and capital used in production. Innovation, human capital, and to some extent access to finance seem to support online firms' greater performance. Finally, we find that firms engaged in e-commerce also export 50 percent more (Figure 4b). Interestingly, e-commerce seems to be especially beneficial for smaller firms in Asia.

Figure 4. Estimated Impacts of E-commerce Participation on Productivity and Export

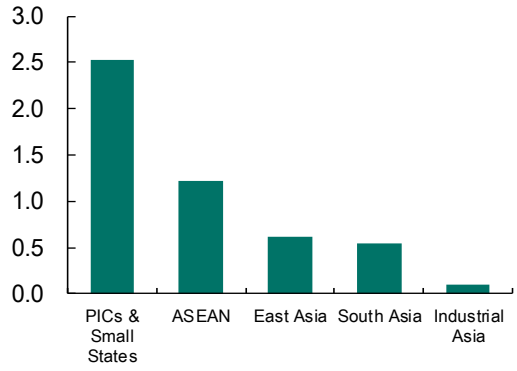


Sources: World Bank Enterprises Surveys; and IMF staff calculations.
Note: These figures illustrate coefficients and confidence intervals from two firm-level estimations: (a) the impact of e-commerce participation on total factor productivity controlling for firms' age, size, foreign ownership, and export status; and (b) the impact of e-commerce participation on the share of exports in total sales controlling for firms' size, age, and foreign ownership. The error bars refer to the 95 percent confidence intervals around the estimated coefficients. For Asia, the estimated coefficients imply that participation in e-commerce is associated with more than a 30 percent increase in total factor productivity and an increase in the share of exports to total sales by about 2 units, corresponding to a 50 percent rise.** p<0.05; *** p<0.01.

Financial technologies can also support potential growth and poverty reduction by strengthening financial development, inclusion, and efficiency. Fintech can help millions of individuals and small- and medium-sized enterprises leapfrog access to financial services at an affordable cost, particularly in poor countries. These technologies may also drive substantial efficiency gains in the financial sector. For example, they can provide cross-border payments that reduce both risk and cost for participants.

Finally, digitalization presents opportunities for improving public finance. Adoption of digitalization by governments by improving reporting of transactions, increase revenue from value-added taxes, tariffs, and other sources. If Asian economies were to move halfway to the global frontier, our analysis shows, VAT revenue could rise by 0.6 percent of GDP. For countries that belong to the Association of Southeast Asian Nations (ASEAN), the gains are estimated at 1.2 percent of GDP, and for small Asian states, which are typically further from that frontier, they are on the order of 2.5 percent of GDP (Figure 5). Digitalization can also improve the efficiency of public spending, including via the targeting social assistance.

Figure 5. Potential Import-VAT Revenue Gains from Closing Half the Distance to the Digitalization Frontier, 2016
(Percent of GDP)



Sources: Fiscal Monitor, IMF; and IMF staff calculations.
Note: VAT = Value Added Tax; ASEAN = Association of Southeast Asian Nations; PIC = Pacific Island Countries.

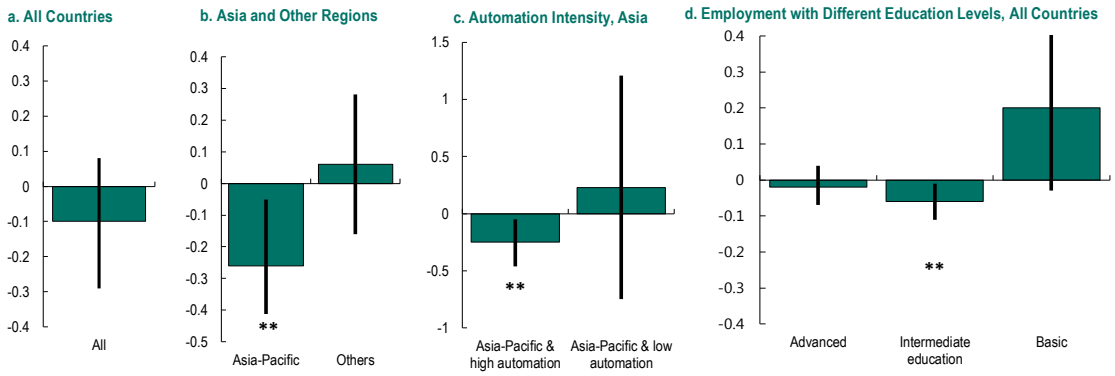
Disruptive effects

These new technologies are automating increasingly complex activities that could previously be performed only by people. Major transitions lie ahead that could match the scale of historical shifts out of agriculture and manufacturing, creating new challenges for policymakers. This new wave of creative destruction will transform jobs and skills, with old jobs and firms disappearing and new ones emerging. Historically, adjustment to change has been difficult, and gains have been spread unevenly.

Automation via industrial robots is one area in which Asia is clearly at the forefront, with fully two-thirds of the world's industrial robots employed in the region. In our study, we analyze the impact of robot usage on employment across a large sample of countries in Asia, Europe, and Americas. Contrary to some observers' worst fears, we find that the productivity-enhancing (and thus job-creating) effects may have offset the destruction of old jobs.

Focusing only on Asia, however, there is a slight negative impact on overall employment, particularly in heavily automated sectors like electronics and automobiles. Furthermore, like others, we find that workers with medium-level education are more vulnerable to displacement than those with either low or high education levels, since jobs that are most susceptible to automation tend to involve routine tasks performed by workers with mid-level skills. In Japan, with its shrinking labor force, increased robot density in manufacturing is associated not only with greater productivity but also with local gains in employment and wages. Japan's experience suggests that countries such as China, Korea, and Thailand that will face similar demographic trends in the future may also benefit from automation.

Figure 6. Estimated Effect on Manufacturing Employment Growth
(Percentage points, associated with one more robot per 1,000 workers, 2010–14)



Sources: International Federation of Robotics; World Input-Output Database; International Labor Organization; and IMF staff calculations.
Note: Figure is based on regressions of the changes in manufacturing employment on the changes in robots per a thousand employees during the period 2010-2014. The left three charts are based on 14 manufacturing subsectors in 40 countries, and the right chart is based on countries for which education breakdown of employment data is available. Intermediate education refers workers with upper secondary and post-secondary non-tertiary education. Bars show the estimated total effects calculated based on the estimate coefficients for each specified group in the horizontal axis. Error bars refer to the 95 percent confidence interval: ** p<0.05.

Fintech also poses risks to the financial sector if it undermines competition, monetary policy, financial stability and integrity, and consumer and investor protection. These technologies may disrupt the business models of established financial institutions and lead to a migration of activities outside the regulated sector. We find that countries with a greater propensity for technological leapfrogging have also tended to see falling levels of traditional financial infrastructure, particularly bank branches. Unlike US counterparts, Asian tech giants, especially in China, have become key providers of financial services, putting competitive pressures on traditional financial institutions. Crypto-assets, an area in which Asia has been a leader, may pose risks related to money laundering, tax evasion, circumvention of capital controls and other forms of illicit activity.

And while digital platforms may magnify the benefits of e-commerce, they raise competition issues. Economies of scale may lead to winner-takes-all dynamics and pose anti-competition concerns, particularly when e-commerce platforms become large. Digital platforms can also pose risks of tax base erosion as some transactions may move to sectors where lower taxation or compliance are lower. They can also shift transactions or profits abroad, outside the tax net.

Striking the right balance

While the digital revolution is inevitable, the outcome—utopian or dystopian—will depend on policies. Policy responses should strike the right balance between enabling digital and addressing risks. Policies to harness digital dividends include: revamping education to meet the demand for more flexible skill sets and lifelong learning, as well as new training, especially for the most adversely affected workers; reducing skill mismatches between workers and jobs; investing in physical and regulatory infrastructure that spurs competition and innovation; and addressing labor-market and social challenges, including income redistribution and safety nets.

Policy priorities differ across Asia (and the world), as economies' initial conditions vary. But considering the inherent global reach of these technologies, regional and international cooperation will be key to developing effective policy responses. The more willing society is to provide support to those who are left behind, the faster the pace of innovation that society can accommodate and still ensure that all members of society end up better off. With the right policies, digital revolution could be a new engine of growth and prosperity for Asia and the world.

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