
China's Digital Economy—Assessing Its Scale, Development Stage, Competitiveness, and Risk Factors

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Summary

1. According to a think-tank affiliated with China's Ministry of Industry and Information Technology, the Chinese digital economy accounted for 32.9% of the country's total GDP in 2017. China is also moving to harness economic activity in high-tech and patent-intensive industries as part of its "new economy", which is believed to have contributed 22.7% of GDP in 2016.
2. Organizations outside of China have also started to monitor the digital economy. The International Monetary Fund (IMF) estimated that in 2015 the U.S. digital economy accounted for 9.3% of total GDP. If we limit our definition of the digital economy to ICT industries, the contributions to GDP in 2015 were 8.3% in the United States and 7.1% in China.
3. In China, the scale of the digital economy tends to be overestimated due to the inclusion of sectors other than ICT. Moreover, there has been little discussion about the risks of digitalization, including job replacement.
4. As in the U.S., the digital economy in China is a substantial contributor to nominal GDP growth, accounting for approximately 10%. However, the factors driving the growth of the Chinese digital economy are expected to weaken as the e-commerce (EC) market matures and the number of smartphones shipped decreases.
5. In terms of the development stage of its digital economy, China is currently one step below the global front runners. The same is true of the competitiveness of the Chinese digital economy. However, China's platformers, especially the BATs (Baidu, Alibaba and Tencent), derive their competitive strength from the size of their user bases, and their competitiveness is comparable to that of their U.S. counterparts.
6. However, the development of China's digital economy does not necessarily mean that China is making steady progress with its market-oriented economic reforms. Around 40% of all lending to non-financial corporations in China goes to state-owned enterprises, and if the government sector is included the ratio rises to 70%. While the Chinese economy appears extremely strong if we focus solely on the digital economy, we need to remember that the digital economy still accounts for less than 10 % of GDP with a contribution of just 7.4% in 2017.
7. China could face several issues in the near future with the potential to threaten the development of its digital economy. First, to what extent can major IT companies maintain an appropriate distance from the government? Second, will new market entrants emerge to challenge the BATs? Third, how should China address the increasing income disparity that is accompanying the growth of the digital economy?

Introduction

How should we assess China's economic outlook? Depending on the area on which we focus, the answers to this question are likely to be more diverse than in the past. In recent years, attention has focused primarily on the rapid expansion of China's digital economy (数字经济 in Chinese), as symbolized by the success of major Internet-related companies like Baidu, Alibaba, and Tencent (known collectively as the "BATs"). According to the China Academy of Information and Communications Technology, a think tank affiliated to the Ministry of Industry and Information Technology, China's digital economy accounted for 32.9% of GDP and 22.1% of jobs in 2017⁽¹⁾.

In fact China's digital economy continues to achieve remarkable growth. According to McKinsey, China's share of world e-commerce transactions has risen from less than 1% in 2005 to 42.4% in 2016 and is now substantially higher than the U.S. share of 24.1%. By 2016, mobile payments in China had reached \$790 billion, which is 11 times the total for the United States (Wang *et al.* [2017]). These figures are symbolic of the rapid development of the Chinese digital economy.

On the other hand, China has many problems, including excessive debt. There has been little improvement in the structural tendency of state-owned enterprises to accumulate excessive debt, and the fragility of the financial system means that unforeseen events cannot be ruled out (Miura [2018]). There has also been a marked decline in investment efficiency. The amount of investment required to generate a yuan of GDP has risen from 4 yuan in 1998-2007, to 5.7 yuan in 2008-2017, and 6.9 yuan in 2017⁽²⁾. The continuing inefficiency of the old economy, which is dominated by state-owned enterprises, remains a heavy burden on the Chinese economy.

These phenomena are all symbolic of China today. However, views on the Chinese economy vary according to which aspect is emphasized. Some sectors are overflowing with vitality that has thrust China into the lead on a global scale, while others still rely on outmoded structures. In

recent years, the spotlight has tended to focus only on the former. Digital technology is transforming the Chinese economy by continually creating new businesses and employment opportunities. This growth momentum is strong enough to convince people that it will be possible to disregard the various problems affecting China, such as excessive debt and declining investment efficiency.

Yet attempts to quantify the digital economy have only just begun, even at the international level, and we have not even established definitions of what constitutes the digital economy. In this article, we will focus on the rapidly growing digital economy and consider its position in the China economy. In Part 1 will analyze the nature of the digital economy. In Part 2 we will look at ways to assess the scale of the digital economy. This will be followed in Part 3 by an analysis of approaches to the assessment of the development stage and competitiveness of China's digital economy. In Part 4, we will examine several risk factors inherent to the digital economy and show that growth and development are not unconditionally guaranteed.

1. Classifying the Digital Economy According to Business Models

Interest in the digital economy has intensified dramatically in step with technological innovation and the resulting rapid adoption of digital technology, as well as the emergence of giant IT companies in both the United States and China. The mechanism through which attention has focused on IT companies is similar to the pattern that emerged during the IT bubble in the United States in the second half of the 1990s. However, trends in today's digital economy, such as the emergence of the Internet of things (IoT) linking all physical objects, the development of artificial intelligence (AI), and the use of big data, are spreading to a wide range of industries. In that sense, the impact of the digital economy on society and economy

could be comparable to or perhaps even greater than the impact of the Industrial Revolution.

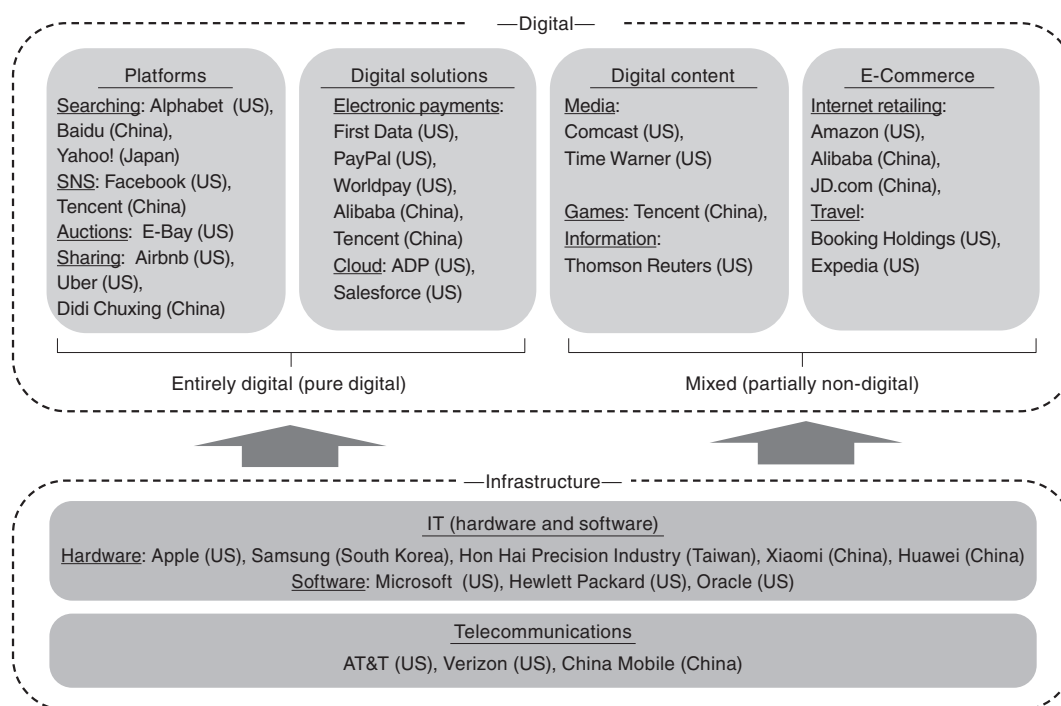
The United Nations Conference on Trade and Development (UNCTAD) has concluded that the digital economy is decisively different from the earlier IT bubble for the following reasons (UNCTAD [2017]). First, new products and services are being created through the analysis of massive amounts of data that are being obtained from smartphones, factory sensors, and other sources and accumulated in the cloud. Second, new types of businesses are emerging through the use of platforms as infrastructure for the distribution of information, products, and services. Third, the performance of information and communications technology (ICT) in the form of both software and hardware has improved to a level at which the use of AI and machine learning can become commonplace.

Although the phrase “digital economy” appears frequently in newspapers and other media, the

specific meaning of the term is often left vague. The main drivers of the digital economy are obviously companies that have achieved rapid growth by creating business models based on the use of ICT, such as Alphabet (which provides the Google search engine), Amazon, and Facebook. In the remainder of this article, we will attempt to categorize the digital economy and provide an overview of it based on the companies that support the digital economy, and on the business models developed by each of those companies.

Fig. 1 provides an overview of the digital economy based on an analysis by UNCTAD. The digital economy can be divided into infrastructure and digital activities based on the use of that infrastructure. The infrastructure segment can be further divided into communications and IT. Companies that manufacture terminal equipment, develop software, and provide IT services fall into the latter category. The digital segment can be broadly divided into (1) platforms, such as search engines,

Fig. 1 Classifying the Digital Economy



Notes: Some data items, such as company names, have been revised by the author.
Source: Compiled by JRI using data from UNCTAD [2017a]

social networking services, and sharing services, (2) digital solutions, (3) digital content, and (4) e-commerce. The first two items are purely digital in the sense that business operations are entirely digital, while the latter two categories consist of mixed activities that include non-digital elements. Examples include the manufacture and delivery of products and services.

Revenues generated by digital activities come from a variety of sources. Providers of digital content, sharing services, and cloud services levy charges from users, while providers of search engines and social networking services rely on advertising. E-commerce and electronic payment companies levy commissions from sellers. However, many companies are diversifying their activities in the digital segment, and Apple, for example, not only manufactures and sells smartphones, but is also involved in electronic payments and music and video streaming. Competition in the digital segment is fierce, and a company's competitiveness depends to a large extent on its ability to enhance its advantage in the market by attracting users and stabilizing its revenue structures.

While there is no international consensus on the definition of the digital economy, it is commonly seen as consisting basically of digital and infrastructure segments, as shown in Fig. 1. Terms like "new economy" and "Internet economy," which are used as antonyms of "old economy" can be regarded as having the same meaning as "digital economy." Because technology is advancing relentlessly, debate about the digital economy focuses solely on the latest technology trends. Debate about the positioning of the digital economy within each national economy, and about the risks and problems involved and how to overcome them has only just begun.

2. Debate over the Size of the Digital Economy

An estimate published in China concerning the size of the digital economy and the new economy

suggests that its scale is extremely large. We will assess the validity of this estimate by comparing it with estimates of the size of the digital economy in the United States by the IMF and the U.S. Bureau of Economic Analysis (BEA).

(1) Digital Economy Contributing a Third of GDP

At a time when a downward trend in China's potential growth rate appears to be inevitable, there is hope that the digital economy will emerge as a new driving force for the economy. For this reason, interest in the digital economy is more intense in China than in developed countries. In July 2017, the China Academy of Information and Communications Technology, a think tank affiliated to the Ministry of Industry and Information Technology, released a white paper on development and employment in China's digital economy. According to the latest version of this white paper (2018), the digital economy contributed 27.1 trillion yuan, or 32.9%, of China's GDP. This means that the digital economy has expanded by factor of 22 in the 15 years since 2002, when it contributed only 1.2 trillion yuan, or 10.3% (Fig. 2).

The digital economy is also playing an important role in employment, employing 170 million people, or 22.1% of the total labor force, in 2017 (Fig. 3). A breakdown by industrial sector shows that 790,000 of these people are employed in agriculture, forestry and fisheries, 50.54 million in mining and manufacturing, and 120.16 million, or around 70%, in service industries. From just 44.11 million in 2007, the number of people employed in the digital economy has increased 3.9 times over a 10-year period. The extremely powerful job creation potential of the digital economy is apparent from a comparison with trends in China's total working population and the number of urban workers, which grew only from 750 million to 780 million and from 310 million to 420 million respectively over the same period.

However, the white paper uses China's extremely broad definition of the digital economy. Ac-

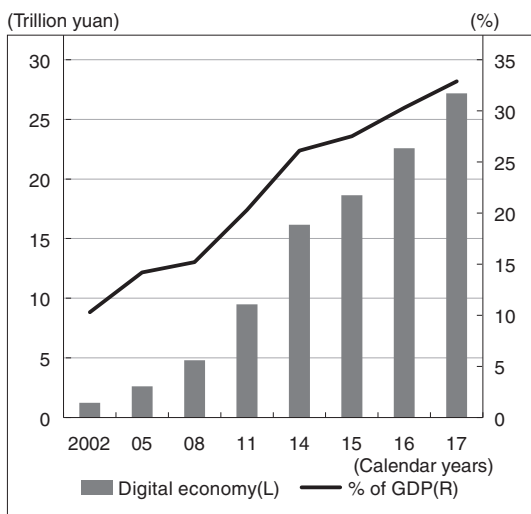
According to the China Academy of Information and Communications Technology, the digital economy consists of core and mixed segments. The core segment of the digital economy is equivalent to the digital economy as defined in Fig. 1 above.

Specifically, it is a combination of activities that are generally included in the ICT sector, specifically ICT equipment manufacturing, telecommunications, the Internet, and computer-related services.

The mixed segment consists of added value and employment generated through the use of digital technology in sectors other than ICT. The value of this segment is determined by calculating the added value resulting from ICT investment based on input-output table data. Specifically, industries are first divided into 139 categories. The elasticity of production factors—ICT capital stocks, non-ICT capital stocks, labor, and intermediate goods—to growth in provincial GDP is then estimated in order to identify the role of ICT investment in pushing up GDP (China Academy of Information and Communications Technology [2017]).

In China's digital economy, the driving force is provided by the mixed segment, which contributed 21 trillion yuan, or 25.5%, of GDP in 2017. This is 3.3 times greater than the contribution from the core segment (6.2 trillion, 7.4%) (Fig. 4). This phenomenon is not limited to China and is occurring throughout the world. The China Academy of

Fig. 2 Size of China's Digital Economy



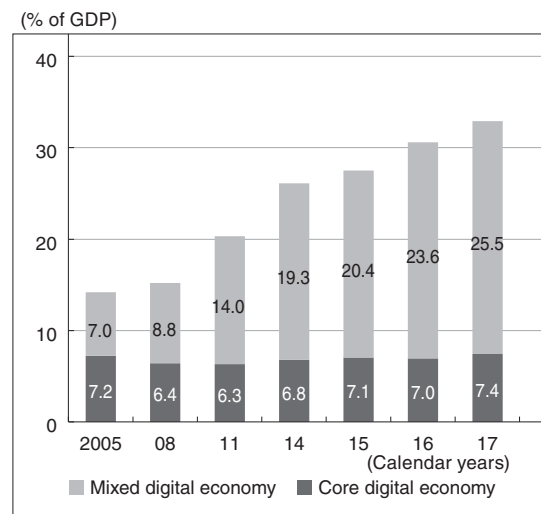
Notes: The data is not available for the years 2003-04, 2006-07 and 2012-2013.
Source: Compiled by JRI using data from the China Academy of Information and Communications Technology [2018]

Fig. 3 Employment in China's Digital Economy



Notes: As for Fig. 2.
Source: Compiled by JRI using data from the China Academy of Information and Communications Technology [2018]

Fig. 4 Breakdown of China's Digital Economy



Notes: As for Fig. 2.
Source: Compiled by JRI using data from the China Academy of Information and Communications Technology [2018]

Information and Communications provides international comparisons in its 2017 report on a study about the development of the digital economy in G20 countries. It estimates the value of the mixed segment of the U.S. digital economy at \$9.5 trillion and the pure segment at \$1.3 trillion. The estimates for Japan are \$2.6 trillion and \$0.8 trillion respectively. In all countries, the mixed segment is bigger than the pure segment, though the ratios vary. In the United States, for example, the mixed segment is 7.3 times bigger than the pure segment.

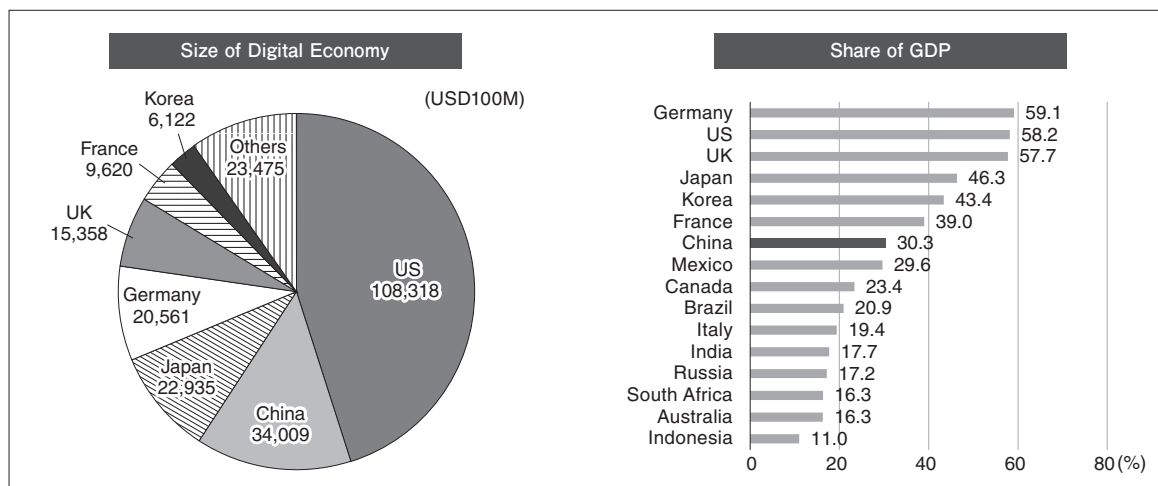
China's digital economy, including the mixed segment, is the second biggest in the world after that of the United States, but China is ranked only seventh in terms of the digital economy's contribution to GDP (Fig. 5). However, China's per capita GDP of \$8,115 is ranked 17th in the G20, so we can conclude that its digital economy is highly developed compared with its economic development stage. Factors that will raise China's ranking include not only its status as a center for smartphone and personal computer production, but also the spread of payment systems based on QR codes, and the shift to a cashless economy in urban areas.

(2) China's "New Economy" Concept

In China, there is also a tendency to use the term "new economy" to refer to economic activities in high-tech and patent-intensive industries. The Institute of Population and Labor Economics of the Chinese Academy of Social Sciences, examined the "new economy" and "new employment" concepts in an October 2017 study on population and labor issues and concluded that these factors were driving major changes in the Chinese economy. The Institute estimated the size of the new economy from input-output table data on the basis that it consists of high-tech industries, strategic emerging industries, and patent-intensive industries.

As of 2016, the new economy was estimated to be contributing 16.8 trillion yuan, or 22.7%, of GDP (Fig. 6). This represents an increase of 4.6 times in the nine years since 2007, when the contribution was 3.7 trillion yuan, or 13.8% of GDP. Like the digital economy, the new economy is divided into "direct" and "indirect" contributions, with the former amounting to 14.6 trillion yuan and the latter 8.1 trillion yuan. The direct contribution consists of added value from industries designated as belonging to the new economy,

Fig. 5 G20 Digital Economies (2016)



Source: Compiled by JRI using data from the China Academy of Information and Communications Technology [2017]

especially the ICT sector, while the indirect contribution is made up of added value generated in segments other than the new economy as a result of inputs from the new economy.

The 14.6 trillion yuan direct contribution from the new economy is substantially larger than the 5.2 trillion yuan figure for the core segment of the digital economy. The reason for this is that the latter is limited to the ICT sector, while the former encompasses a wider range of industries, such as urban commercial complexes and development zones. This is a feature of China's "new economy" concept. However, the 8.1 trillion indirect contribution is smaller than the 17.6 trillion yuan contribution from the mixed segment of the digital economy. This is because the contribution due to digital activities in the latter case is calculated using ICT capital stocks, resulting in the inclusion of a wider range of industries, while in the former case calculations are based on the new economy's share of inputs, which means that the range of industries included is narrower. While the mixed segment of the digital economy includes part of the agricultural sector, agriculture is not included in the indirect contribution from the new economy.

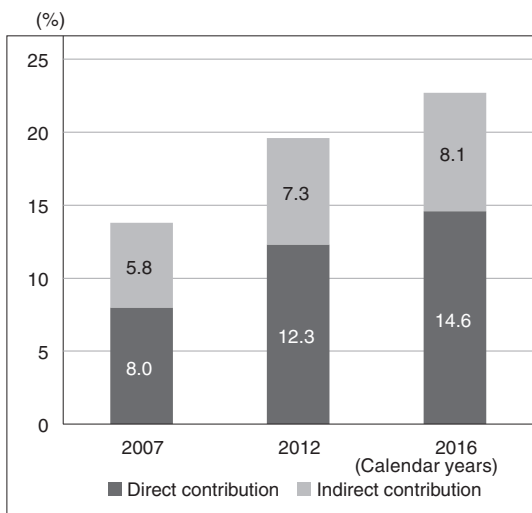
Like the digital economy, the new economy is

also playing an important part in job creation. As of 2016, 128.2 million workers, or 16.5% of the total number in employment, were employed in the new economy (Fig. 7). This total breaks down into 78.19 million people in industries that make direct contributions, and 50.01 million in indirect contribution industries. The number has increased 1.7 times since 2007, when the new economy employed 74.84 million people, or 9.7% of the total labor force. In the 2017 study on labor and population issues, the Didi Chuxing ride sharing business created 17.51 million jobs in the period to 2016, while Alibaba created 30.83 million jobs up to 2015.

The National Bureau of Statistics has also started to monitor the new economy. Having classified the new economy into ① new industries, ② new businesses, and ③ new business models (Table 1), it announced at the end of 2017 the new economy was contributing 14.8% of GDP⁽³⁾.

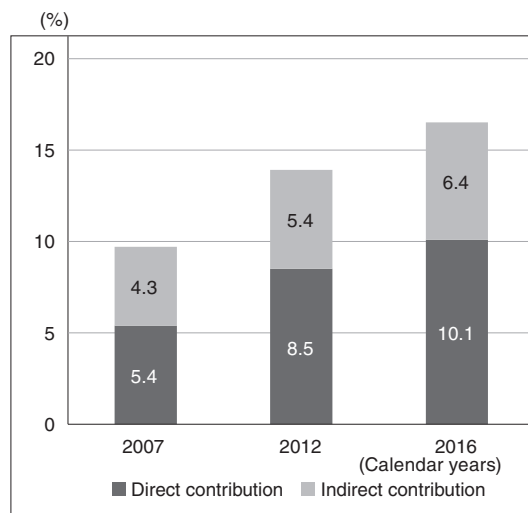
The Bureau is collecting this data both as a way of visualizing the progress of China's shift to a new economic development model through the development of the new economy, which has been a priority for many years, and also to proclaim the strength of the Chinese economy within China and internationally. However, the National Bureau

**Fig. 6 Size of New Economy
(% of GDP)**



Source: Compiled by JRI using Zhang ed. [2017]

**Fig. 7 New Economy Jobs
(Share of Total Labor Force)**



Source: Compiled by JRI using Zhang ed. [2017]

Table 1 The New Economy According to the National Bureau of Statistics

Area	Definition	Representative examples
New industries	New types of economic activities based on new technologies (e.g., high-tech industries, new service industries)	Cloud computing, big data, IoT, 3D printing, intelligent manufacturing, smart transportation, e-commerce, modern logistics, Internet finance
New businesses	Businesses that use new technologies to meet demand for diversified products and services	Connected cars, shared bicycles, crowd sourcing, start-up support, delivery of goods ordered on the Internet, provision of customized products and services
New business models	Unique, highly efficient, and competitive business models based on the combination and reorganization of production factors within and outside of companies	Internet payment services, Internet asset management, social media, Internet gaming, music/video streaming, large-scale shopping sectors

Source: Compiled using National Bureau of Statistics of China [2017]

of Statistics has not yet started to publish data formally. This is because debate is still continuing about ways to quantify the activities of individuals as Internet-based producers and service providers, and the value of various services that are provided for free.

(3) The Digital Economy in the United States

The digital economy cannot easily be measured using the existing Systems of National Accounts (SNA). The IMF has created the ICT sector and content/media sector to represent digital activities in the International Standard Industrial Classification of All Economic Activities (ISIC) and the Central Product Classification (CPC). However, there are some activities that cannot be captured using these classifications, such as matching, cloud computing, and home stays. The way in which data is treated as a resource for the digital economy has also been criticized as outmoded. Data bases are products, but there are no rules about the ways in which data itself should be handled.

After considering these issues, the IMF used previous research to estimate the size of the digital economy in the United States at 9.3% of GDP as of 2015 (Table 2). This consists of 8.3% that is included in the GDP statistics, and 1.0% that is not included. If we adjust the basis for comparison to reflect the fact that China’s digital economy

Table 2 GDP Contribution from the Digital Economy in the US (2015)

	(%)
1. Digital economy (2+3)	9.3
2. Items included in GDP	8.3
ICT equipment, semiconductors, software	2.8
Telecoms, Internet connection services	3.3
Data processing and other information services	0.7
Online platforms (including e-commerce)	1.3
Services enabled by platforms (including sharing)	0.2
3. Items not included in GDP	1.0
Wikipedia, open-source software	0.2
Free media on platforms funded by advertising revenues	0.1
Household fixed asset formation to support Internet connections	0.3
Output by multinational companies based on tax havens	0.4

Notes: Amounts may be overstated, since no adjustment has been made for duplication.

Source: Compiled by JRI using IMF [2018]

includes elements that are not reflected in GDP, and that it has a mixed segment that is not present in the U.S. digital economy, we find that the digital economy accounted for 8.3% of U.S. GDP in 2015, and 7.1% of China’s GDP.

There are defects in the way in which statistics are gathered for the SNA, and the range of items that cannot be captured is expanding in step with the shift to digital activities. As shown in, Table 2, however, the value of the excluded items is not particularly large. Services that are provided via platforms, such as free media, contribute to increases in the consumer surplus, but they exert minimal upward pressure on GDP because the

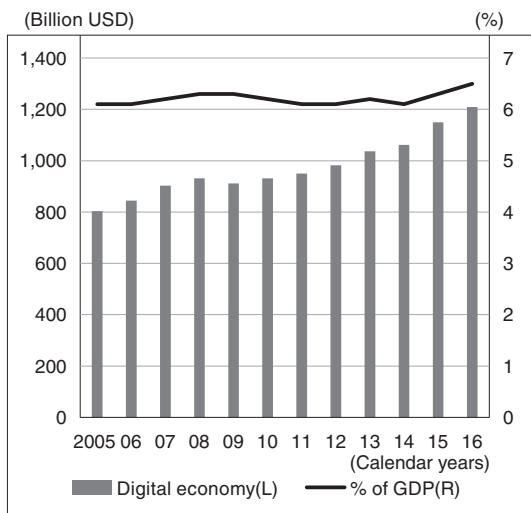
SNA is always based on added value statistics. The same applies to the various services that are spreading through platforms, such as sharing services. Despite the attention focused on the rapid growth of the sharing economy, this area accounts for only 0.2% of GDP, even in the United States.

In Japan, too, when the Cabinet Office produced its first estimate of the sharing economy in July 2018, it found that even when items that cannot be reflected in the GDP statistics are included, the sector was worth only ¥470-525 billion in 2016 (Cabinet Office [2018]). This is equivalent to less than 0.1% of GDP. This appears to be because most sharing services are provided by businesses based on existing but unused facilities, skills, and time, with the result that flow-on benefits to other industries are minimal since there is no large-scale capital expenditure.

In March 2018, the U.S. Commerce Department's Bureau of Economic Analysis (BEA) published a report in which it estimated that the digital economy was worth \$1.2 trillion, or 6.5% of GDP, in 2016, and that it employed 5.9 million people, or 3.9% of the total number in employment (Fig. 8, 9). This is similar to the \$1.3 trillion estimate of the core segment of the U.S. digital economy by the China Academy of Information

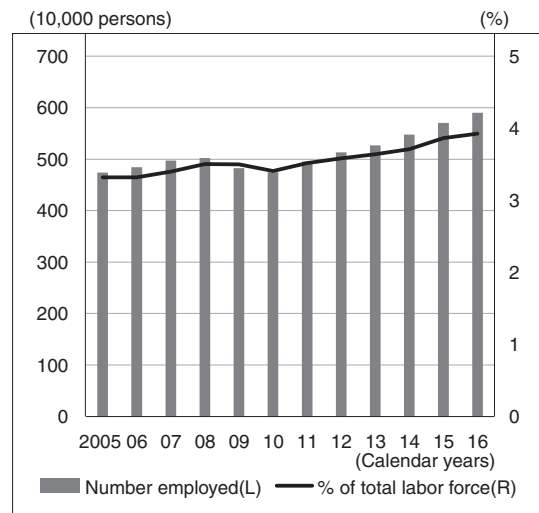
and Communications Technology. The BEA selected 200 industries with strong digital elements from a list of approximately 5,000 industrial categories and grouped them into (1) hardware, (2) software, (3) support services, (4) telecommunications, and (5) e-commerce and digital media. It then aggregated the figures for these groups as the total value of the digital economy (Fig. 10). Since

Fig. 8 Added Value of US Digital Economy



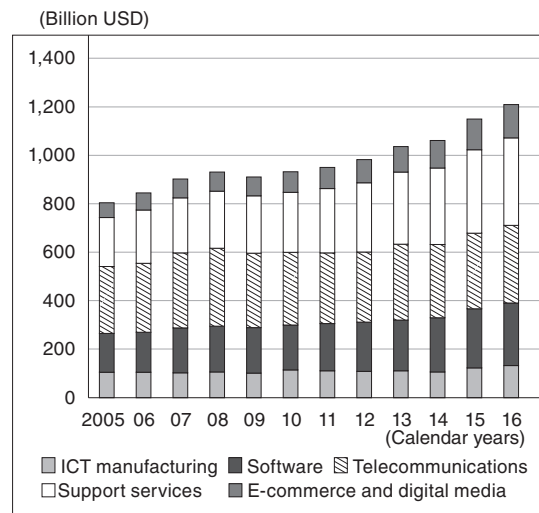
Source: Compiled by JRI using Barefoot *et al.* [2018]

Fig. 9 Employment in the US Digital Economy



Source: Compiled by JRI using Barefoot *et al.* [2018] and Bureau of Labor Statistics.

Fig. 10 Composition of US Digital Economy



Source: Compiled by JRI using Barefoot *et al.* [2017]

this is the same as the method used by the China Academy of Information and Communications Technology in its estimation of the core segment of the digital economy, it is not surprising that the results are similar.

3. Evaluating China's Digital Economy

The scale and growth momentum of the Chinese digital economy are both being overestimated. In this section, we will assess the development stage and level of competitiveness of China's digital economy, with reference to the results of several previous research initiatives.

(1) Interpreting the Data—from Scale to Risk

As the China Academy of Information and Communications Technology (CAICT) has pointed out, to gain an overall picture of China's digital economy, we need to consider not only the core segment of the digital economy, but also the mixed segment. The former accounts for 7.4% of China's GDP, and the latter for 25.5%. Given that the non-ICT sector of the digital economy has a greater influence on the general economy than the ICT sector, as illustrated by the fact that by Taobao, an e-commerce platform operated by Alibaba, has helped to create large numbers of jobs by inducing business start-ups, it seems reasonable to base perceptions of the digital economy on a broad definition.

However, the IMF and BEA estimate the scale of the digital economy more conservatively based on definitions that limit it to the ICT sector. This is because once we start to expand the definition of the digital economy beyond the ICT sector, we face the difficult problem of determining its boundaries. For example, should the digital economy include small and medium-sized manufactur-

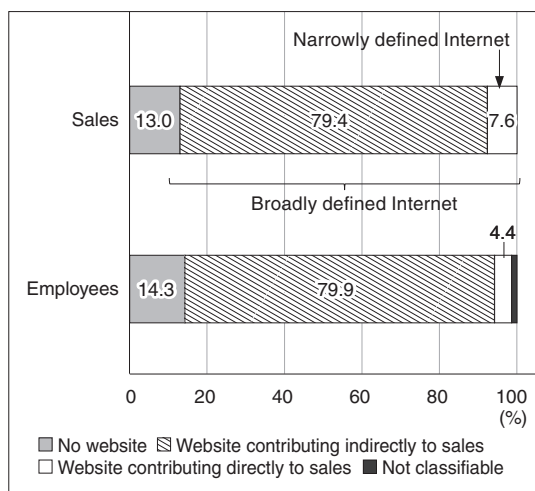
ers and retailers that have entered the EC market after acquiring personal computers and Internet connections, or restaurants that have joined food delivery platforms? While these businesses may have been energized by new demand generated by the use of digital technology, not all of their demand comes from digital sources, while their business operations involve strong non-digital elements. For these reasons, there is scope for debate about whether they should be included in the digital economy.

In fact, if we look at the digital economy based on the broad definition used in China, the scope of the digital economy in developed countries becomes unlimited. According to previous research on the Internet economy conducted by Statistics Netherlands (*Centraal Bureau voor de Statistiek*, CBS) in collaboration with Google and other organizations, if we consider any company or self-employed individual with a verifiable presence on the Internet, such as a website, to be part of the Internet economy, then the Internet economy encompasses almost all economic activity, accounting for 87.0% of sales and 84.3% of jobs in 2015. However, if we limit our calculations to just the narrowly defined Internet economy, which consists only of companies and self-employed individuals with websites that contribute directly to earnings, the contributions fall dramatically to 7.6% of sales and 4.4% of jobs (Fig. 11).

Under this narrow definition, the Internet economy consists only of (1) online stores, (2) online services, and (3) ICT-related services. Businesses with websites that are used primarily to provide information, or those with online stores that cannot be considered their primary means of sales, are not included. This narrower definition of the Internet economy is used because it allows the survey to ascertain the role of the Internet more accurately, and because the purpose of the study is to show how Internet use varies according to company size and location, so that the resulting information can be used in policies designed to bring the benefits of the Internet to companies and regions that have fallen behind.

At first glance, the question of whether to use the broad or narrow definition of the digital

Fig. 11 Internet Economy in the Netherlands (2015)



Source: Compiled by JRI using Oostroom *et al.* [2016]

economy may appear to be merely a technical issue relating to statistics. However, the choice of definitions obviously relates to the aims of those conducting analyses and how they view the significance of the expansion of the digital economy. International organizations are also intensively debating the significance of the digital economy, but while the World Bank and the OECD are focused on policies to spread the benefits of digital technology as widely as possible, the IMF is more interested in the statistical issue of how the digital economy can be reflected in GDP statistics.

These issues are rarely discussed in China. The digital economy is seen as a savior of the Chinese economy, which faces a decline in its potential growth rate. Because the digital economy is also an excellent source of data to show people at home and internationally that China is making steady progress with its transition to a new economic development model, the government wants the digital economy to be as big as possible and is solely interested in policies to expand and strengthen it. However, the development of the digital economy has at times caused social friction due to increasingly serious problems, including the inability of home delivery services to keep pace with the growth of e-commerce, as well as

labor shortages, and deteriorating working conditions.

Various approaches are being trialed in China in an attempt to solve the “last mile” problem, including the installation of lockers and the use of crowdsourcing to recruit delivery personnel. However, intense competition in the home delivery sector is preventing operators from raising their delivery charges, as companies in Japan have, with the result that profit margins in this industry have continued to stagnate. The digital economy, especially in the mixed segment, which includes non-digital elements, can only function if the ICT and non-ICT sectors work together as two wheels on the same cart. If these problems are left unremedied, they will not only hinder the development of e-commerce, but could also trigger a trend toward the division of the labor market due to dominance by major IT companies.

Digital technology is driving job replacement due to automation and the use of AI in the manufacturing sector. China will feel the effects of this trend more than any other country. According to McKinsey & Company, automation will replace 236 million workers by 2030 (Manyika *et al.* [2017]). Research by the Boston Consulting Group indicates that 2.3 million people will lose their jobs by 2027 in the financial sector alone (Boston Consulting Group [2018]). The time has come for risks relating to the digital economy to be debated more deeply in China.

(2) Evaluating the Growth-Driving Potential of the Digital Economy

A problem that emerges when we use the broad definition of the digital economy is a tendency to over-estimate its potential to drive growth. According to the CAICT, the digital economy achieved a nominal growth rate of 20.3% in 2017 and contributed 55% of China’s overall growth rate. As shown in Fig. 4 above, the growth of the digital economy is underpinned by the mixed segment, which in 2017 is believed to have accounted for 6.5% of added value in the agricultural sector,

17.2% in the mining and manufacturing sector, and 32.6% in the service sector (Fig. 12).

However, it seems excessive, even in a Chinese context, to attribute one-half of economic growth to the digital economy. The problem becomes obvious if we look at the digital economy's contribution to employment. As shown in Fig. 3 above, the number of people working in the Chinese digital economy has increased four-fold over the past 10 years, reaching 171.49 million in 2017. This is equivalent to the creation of 127.38 million jobs (Fig. 13). However, when this figure is broken down into urban and rural areas and industrial sectors, we find that there was an increase of 115.09 million jobs in urban areas, and a combined increase of 136.59 million jobs in secondary and tertiary industries. This means that almost all new jobs have been created in the broadly defined digital economy.

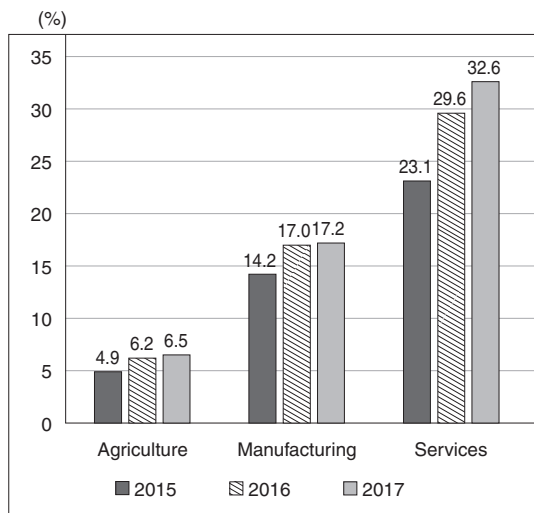
According to the CAICT, while the number of people working in the digital economy increased by 19.73 million over the previous year's level in 2017, the number of new jobs created was 5.52

million, or only 27.9% of the total. This means that most of the remaining 72.1%, or 14.21 million workers, were transferred from the non-digital economy to the digital economy as a result of ICT investment. This includes employees of small and medium-size manufacturers and retailers that entered the e-commerce market, as well as restaurants that joined food delivery platforms, as discussed earlier in this section. The inclusion of this mixed segment causes the digital economy to appear larger than it really is.

If we reassess the growth-driving potential of the digital economy based on the view that the definition should be limited to the core digital economy, the contribution to nominal GDP falls to around 1% of China's nominal GDP growth, equivalent to a contribution ratio of just 10% (Fig. 14). While this contribution ratio is considerably lower than the 55% figure cited earlier in this article, it is still extremely high by world standards and is similar to the 10% ratio calculated by the BEA for the digital economy's contribution to nominal GDP growth in the United States.

However, the Chinese digital economy's growth-driving capacity is expected to weaken gradually. Some industries that have buoyed up

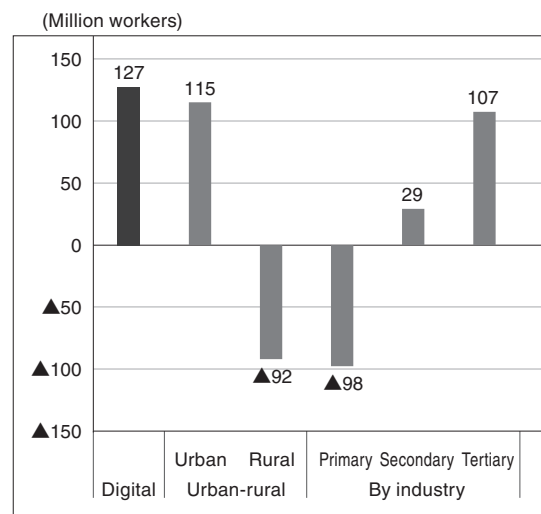
Fig. 12 Contributions of the Mixed Segment of the Digital Economy to Added Value by Industry



Notes: The ICT sector was excluded from calculations for manufacturing and services.

Source: Compiled by JRI using China Academy of Information and Communications Technology [2017b, 2018]

Fig. 13 Labor Force Changes (2002-2017)



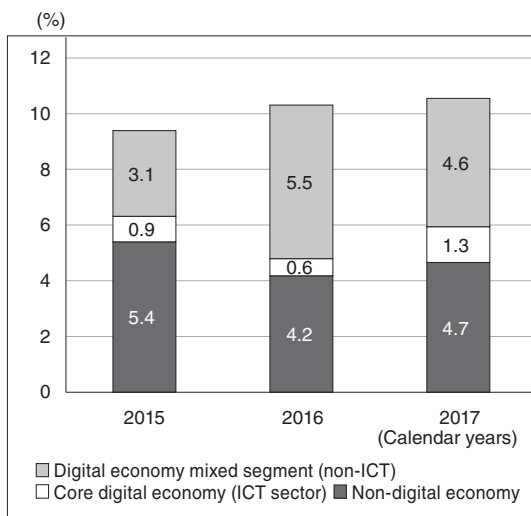
Source: Compiled by JRI using data from the China Academy of Information and Communications Technology [2018] and national Bureau of Statistics (NBS)

the digital economy can no longer be expected to achieve the explosive growth of the past. For example, the bicycle sharing market achieved rapid growth and attracted interest because of the substantial latent demand for bicycle transport, but

there has been a flurry of corporate acquisitions, and the market has now entered a winnowing phase. Similarly, the e-commerce retail market is entering its mature phase, and the rate of growth has started to slow markedly (Fig. 15).

Smartphone shipments are also lower, registering their first double-digit fall with a year on year decline of 12% in 2017, and an 18% decline in the first eight months of 2018 compared with the same period a year earlier⁽⁴⁾. China is the world's leading producer of smartphones, and the industry accounts for a large share of the hardware segment of the digital economy. For this reason, the impact of falling smartphone shipments will be far greater in China than in developed countries.

Fig. 14 The Digital Economy's Contribution to the Nominal GDP Growth Rate

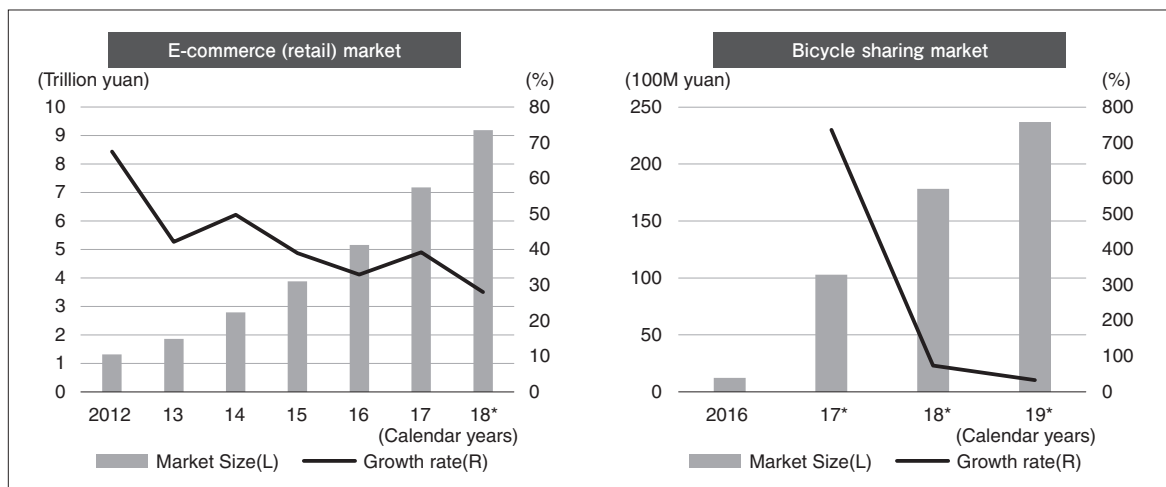


Source: Compiled by JRI using China Academy of Information and Communications Technology [2018a]

(3) Assessing Competitiveness and Development Stage

Japan has fallen behind China in the development of the digital economy and has much to learn from China. The Japanese electronics industry once dominated the world but has now weakened conspicuously, and while Japanese manufactur-

Fig. 15 Slowing Pace of Market Expansion



Notes: "*" denotes an estimate.

Source: Compiled by JRI using China electronics Chamber of Commerce, 2017中国网络零售市场数据报告 [2017 China Online Retail Market Report] (June 14, 2018, <http://www.cecc.org.cn/news/201806/526522.html>), Sohu.com, 2017年中国共享单车市场规模预计将达102.8亿元 [China's bicycle sharing imarket expected to reach 10.2B yuan in 2017], (March 31, 2017, http://www.sohu.com/a/131273118_470383)

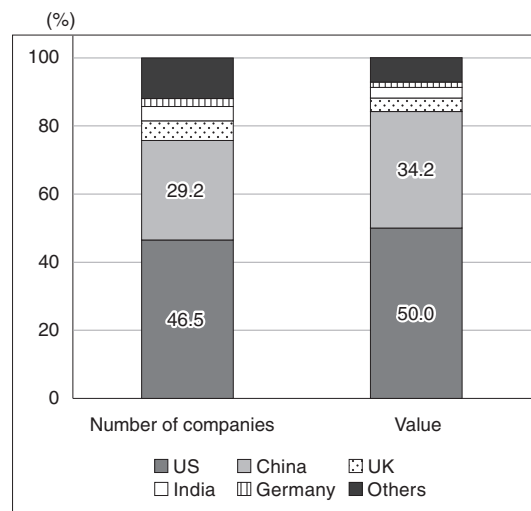
ers have maintained the biggest shares of the domestic smartphone market after Apple, they have a limited presence in the global market and have slipped far behind Apple and Samsung, and even Chinese manufacturers, such as Huawei, Xiaomi, and Oppo.

Japan has not only fallen behind the United States and China in the area of hardware. Major American IT companies, such as Amazon, Google, Facebook, and Apple have established an overwhelming presence in their role as platformers providing products and services used as infrastructure for business and information distribution. China has banned the use of Facebook with the aim of keeping control over information. It has also shut Google out of the market by imposing censorship. At the same time, China has produced IT companies that rival their U.S. counterparts. While the BATs rely heavily on the domestic market, they have started to develop business operations based on global perspectives in such areas as self-driving vehicles, electric vehicles (EVs), e-commerce, mobile payments, and AI.

The superior competitiveness of the United States and China in the digital economy is also immediately apparent from the number of unicorn companies (unlisted companies valued at \$1 billion or more). According to the U.S. research firm

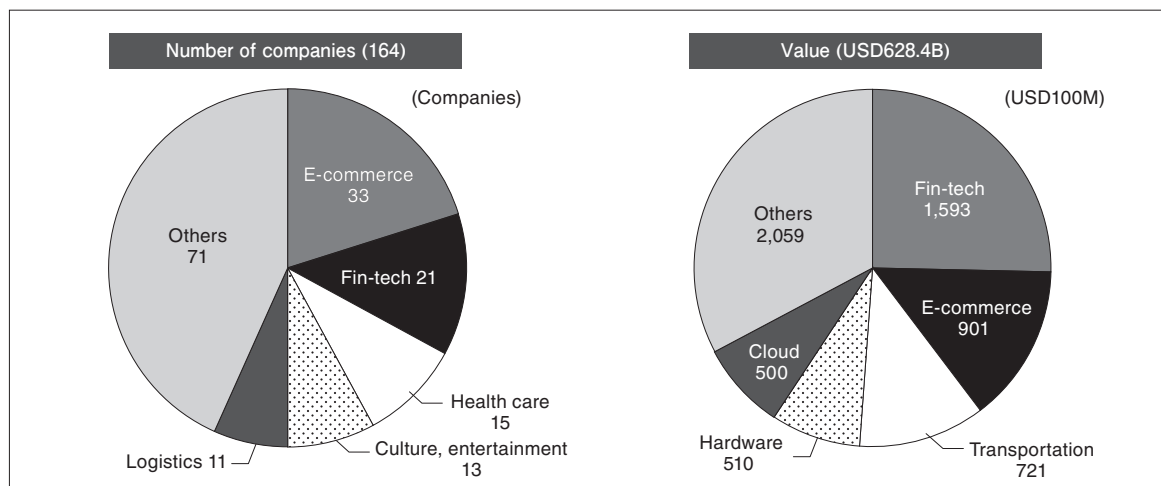
CB Insights, there were 260 unicorns in the world as of August 2018. The value of these companies, the majority of which are in the ICT sector, has reached \$839 billion. With 76 companies worth \$287 billion, China is still far behind the United States, which has 121 companies worth \$420 billion, but China far outranks other developed or emerging countries (Fig. 16). The biggest source of new unicorns is digital sectors, such as e-commerce and fintech (Fig. 17).

Fig. 16 World Distribution of Unicorns(As of August 2018)



Source: Compiled by JRI using CB Insight data

Fig. 17 Distribution of Unicorns in China (End of 2017)



Source: Compiled by JRI using Ministry of Science and Technology data

We can approach the assessment of the digital economy's competitiveness from various angles. Market interest is tending to focus on platformers because of their strong influence. However, overall competitiveness on a national basis may not necessarily be reflected in the role of platformers. While Japan has few platformers that are active on a global scale, it is highly competitiveness in the area of high-performance devices built into smartphones. The question of how to assess the competitiveness and development stage of the digital economy has been widely shared in China, and a number of pioneering studies have been carried out.

One such study is an international comparison of digital economy competitiveness by the Shanghai Academy of Social Sciences. In this study, the competitiveness of 50 countries was calculated based on assessments from four perspectives: (1) infrastructure, (2) industries, (3) innovation, and (4) governance. Infrastructure items include the number of data centers, connection speeds, and the diffusion rate for mobile devices. Industry-related items include the value of production by digital industries, and trade volumes, the size of platformers. Items used to measure innovation include technology levels, the depth of the human resource pool, and access to the latest technologies. Governance items include e-government, legal systems, and security. Data from international organizations was used for all items, and the results were indexed with 100 as the highest possible score. All assessment items were weighted

equally, and the final score was calculated as the simple average of (1) infrastructure, (2) industries, (3) innovation, and (4) governance.

With a competitiveness assessment of 62.07, China was ranked second in the world (Table 3). While China's score was substantially lower than that of the United States, which was ranked first at 85.89, its score was considerably better than those of other developed or emerging countries. China's scores for innovation and governance are not high, but its score for industries is high due to the effect of smartphone exports and other factors. According to the analysis produced by the Shanghai Academy of Social Sciences, the strong competitiveness of China's digital economy signifies that the high-growth phase ended in 2012 and was followed by a shift to the mature phase.

Huawei, which continues to achieve growth as the world's biggest manufacturer of telecommunications equipment, has compiled a global connectivity index (GCI), in which China is included among the world's frontrunners. The GCI is an attempt to measure the development stage of the digital economy from the perspectives of (1) supply, (2) demand, (3) experience, and (4) potential. There are 10 items for each perspective, making a total of 40 items, including ICT investment, the 4G take-up rate, and investment in big data and the cloud for supply, the number of app downloads, e-commerce transactions, and smartphone diffusion rates for demand, broadband speeds, internet access ratios, and fixed and mobile Internet access ratios for experience, and R&D investment,

Table 3 Digital Economy Competitiveness (2016)

Rank	Country	Infrastructure	Industries	Innovation	Governance	Total
1	US	88.20	88.93	83.02	83.41	85.89
2	China	50.30	84.01	58.92	54.97	62.07
3	Singapore	52.30	13.20	83.30	63.54	53.26
4	UK	37.98	31.58	69.47	72.78	52.95
5	Japan	44.14	18.51	78.51	64.30	51.37
6	Korea	47.54	12.98	75.61	67.93	51.01
7	Finland	38.76	7.21	88.09	66.51	50.14
8	Germany	36.87	24.79	75.69	58.19	48.88

Notes: Totals represent simple averages for each item.
Source: Compiled by JRI using Wang, ed. [2017]

ICT patents, and IT human resources for potential.

With a GCI of 51 in 2017, China is ranked 27th among 79 countries (Fig. 18). While the methodology used has much in common with that of the Shanghai Academy of Social Sciences, the size of platformers and the value of production and trade by digital industries are not included in the GCI assessment items. In addition, many of the items, including ICT investment and e-commerce transactions, are based on per capita GDP or per capita of population, with the result that China is inevitably ranked lower. The most obvious difference between the two indices is the fact that the Shanghai Academy of Social Sciences measures competitiveness based on GDP size, while Huawei's GCI looks at the development stage from the perspective of per capita GDP.

So how should we assess the competitiveness and development stage of the Chinese digital economy? The assessment by the Shanghai Academy of Social Sciences clearly lifts China's score by including items such as the value of smartphone exports, which is an inappropriate item since the industry relies heavily on imported parts. It also uses per capita GDP to indicate the development stage of the economy. For these reasons, the GCI appears to be more suitable as an indica-

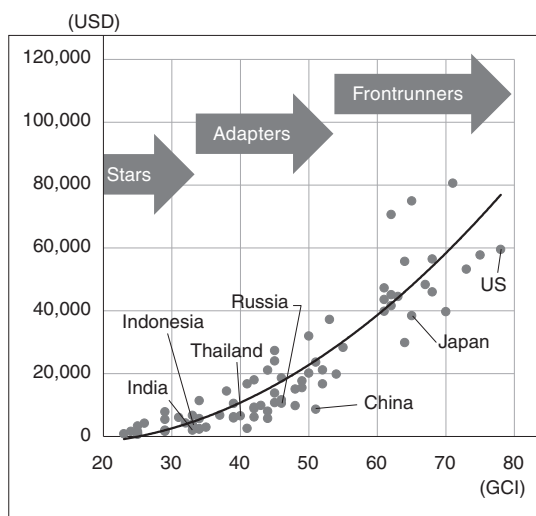
tor of the competitiveness and development stage of the digital economy.

However, many industries in the digital economy are dominated by individual companies, due to the improvement of usability as network benefits emerge with growth in the number of users. Given that user numbers are the source of competitiveness for industries, especially platformers, assessments based on the GCI tend to underestimate competitiveness. As of June 2018, there were 820 million Internet users in China⁽⁵⁾, and we can perhaps conclude that the competitiveness of Chinese platformers is comparable to that of their U.S. counterparts.

4. Risks Facing the Digital Economy

Has China entered an era in which private companies, as typified by the BATs, are driving the economy? In this section we will examine how China's non-digital economy, which accounts for 90% of economic activity, has a greater influence on the Chinese economy as a whole. We will also look at some of the risks confronting the digital economy and show that its growth and development are not guaranteed.

Fig. 18 GCI and Per Capita GDP



Source: Compiled by JRI using Huawei Technologies Co.,Ltd. [2018] and IMF data

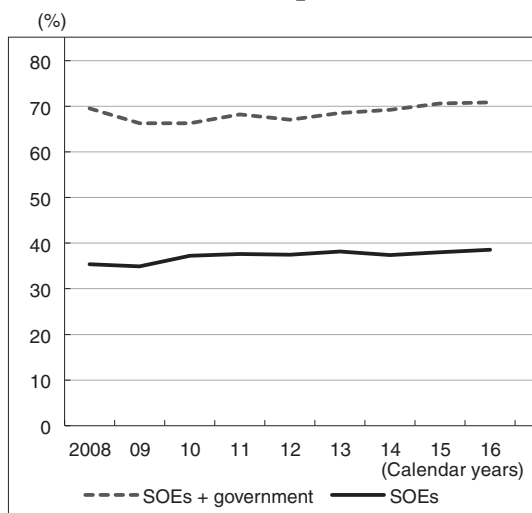
(1) China's Large Non-Digital Economy

On the surface, the development of the digital economy seems to indicate that China is making steady progress with its market-oriented economic reforms. All of China's IT companies, of which the BATs are the most notable examples, are private enterprises, and there are no competing state-owned enterprises. Indeed, the state-owned enterprises' share of economic activity in China is declining across the board. In 2016, state-owned enterprises accounted for only 0.6% of the number of companies in mining and manu-

facturing industries, 6.2% of assets, 3.5% of sales, and 2.4% of profits. State-owned enterprises employ only 14.9% of urban workers and account for just 21.2% of fixed asset investment. As far as can be judged from these data, China appears to have emerged from “state capitalism” dominated by state-owned enterprises and entered an era in which the economy is led by private companies with massive amounts of capital and world-class technology.

However, it would be premature to assume that the emergence of private sector companies will cause the presence of China’s state-owned enterprises to shrink until they can be ignored. For example, state-owned enterprises still receive almost 40% of all bank loans to non-financial corporations, and the inclusion of government loans brings this figure to 70% (Fig. 19). The declining status of state-owned enterprises in mining and manufacturing, employment, and investment has had a negligible effect on bank lending. These distortions in China’s lending structure continue to erode the foundations of the Chinese economy. Examples of this erosion include declining investment efficiency and the excessive debt problem, as mentioned at the beginning of this article.

Fig. 19 SOEs’ Share of Loans to Non-financial Corporations



Source: Compiled by JRI using Chen and Kang [2018]

If we focus on the digital economy, we lose sight of these problems, and only China’s strength is apparent. However, we need to remember that even in 2017, the digital economy accounted for only 7.4% of China’s total GDP (see Fig. 4 above) and thus represents less than a tenth of the overall economy. If there is a crisis situation, such as multiple debt defaults by state-owned enterprises, or crippling cash flow problems affecting small and medium-sized banks, the digital economy would not be immune to the resulting declines in consumer spending and advertising revenues. It would be rash to assume that the digital economy can be the driving force for the Chinese economy, or that it can solve all of the problems confronting the old economy.

(2) Maintaining Distance from the Government a Challenge

A serious issue confronting the major IT companies, such as the BATs, is the kind of relationship that they should build with the government. Chinese IT companies have been able to expand without any government intervention because they are involved primarily in the provision of lifestyle-related services in close proximity to consumers. However, the distance between these companies and the government is shrinking in step with recognition of the fact that their technologies are affecting China’s competitiveness. Both sides have begun exploring new relationships. For example, in March 2018 the government eased the rules to allow companies listed on foreign securities markets to be listed in China as well⁽⁶⁾, while major Chinese IT companies have indicated their willingness to return to China⁽⁷⁾.

In addition, the government is planning to develop the digital economy and strengthen competitiveness by incorporating major IT companies into its industrial policy. The Xi Jinping administration has announced its New Generation Artificial Intelligence Development Plan⁽⁸⁾, which sets out the government’s plans to make China a world leader in AI by 2030. It has identified four priority

fields: self-driving vehicles, voice recognition systems, smart cities, and health care, and designated the cities of Beijing, Hefei, Hangzhou and Shenzhen as special zones. Baidu, iFlytek, Alibaba and Tencent, which have their headquarters in these cities, have been selected to play central roles in the Plan⁽⁹⁾ (Fig. 20).

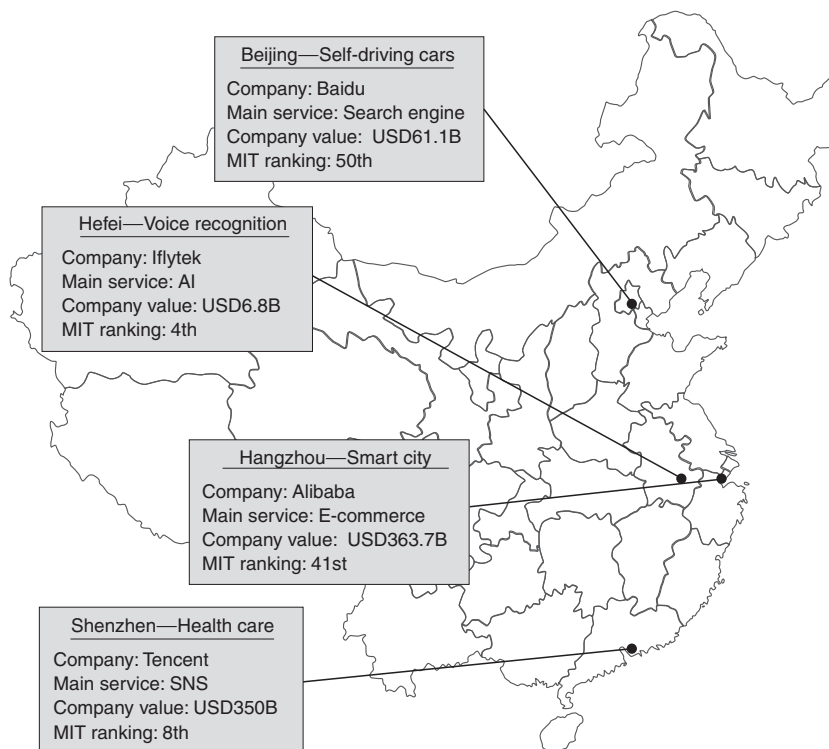
Closer relationships with the government will give companies opportunities to develop technology while also increasing their market dominance. However, there is also a risk that these relationships will lead to government intervention and pressure to act as government policy companies. Symbolic of this situation is the participation of all major IT companies, which should have been in competitive relationships, in the restructuring of China Unicom, one of the three major state-owned telecom companies in China, as a mixed ownership company in August 2017 (Miura [2017]). The

maintenance of an appropriate distance from the government without compromising their management independence is likely to be a major challenge for these companies.

(3) Will Metabolism Continue?

As evidenced by the continual emergence of unicorn companies, the pace of metabolism in China's digital economy is extremely rapid. Tmall.com, which is operated by Alibaba, and JD.com dominate the B2C market, which is the core e-commerce segment, with market shares of 50.7% and 25.5% respectively in 2017⁽¹⁰⁾. However, one start-up after another is emerging in specialized e-commerce markets that focus on specific types of products. For example, NetEase Kaola has

Fig. 20 Four Frontrunner Areas for the Next-Generation AI Plan



Notes: The Massachusetts Institute of Technology (MIT) ranking identifies 50 leading companies that have effectively incorporated innovative technologies into their business models.

Source: Compiled by JRI using "50 Smartest Companies 2017" in MIT Technology Review, June 27, 2017

gained a 25.8% share of the cross-border EC market, which allows consumers to purchase foreign products directly, compared with 21.9% for Alibaba, and 13.3% for JD.com⁽¹¹⁾. Launched in 2015 by NetEase, a major portal site operator, NetEase Kaola has overtaken these two major companies in just three years, albeit in the limited market of cross-border e-commerce.

Competition in the digital economy is intense, and a significant number of companies have been forced to withdraw, despite achieving overwhelming market dominance. This pattern is typified by Microsoft, which established a monopoly in the market for personal computer operating systems (OS) but saw its relative position in the market decline as smartphones superseded personal computers as the primary devices used to access the Internet. The rise and fall of these companies is clearly reflected in stock market trends. Of the 15 Internet-related companies that were among the top-ranked companies in the world in terms of market capitalization in 1995, only Apple remained in 2015 (Table 4). The core business areas of these companies have also changed. In 1995, the top rankings included four Internet providers, but by 2015 platformers dominated.

Will similar changes occur in the Chinese stock market? It is extremely difficult to predict stock

market movements 20 years in the future, but because China's major IT companies are themselves major venture investors, there is a strong likelihood that they are dominating the stock market. In 2016, the BATs accounted for 42% of all venture investment in China, which is a significantly bigger share than the percentage of venture investment provided by the FANGs (Facebook, Amazon, Netflix, Google) in the United States (Fig. 21). In addition, while some investment is carried out to rein in potential future competitors, such as the acquisition of Instagram by Facebook, the range of venture investors in United States is far more diversified than in China.

In the United States, there is growing unease about the increasing market dominance of major IT companies. While the services provided by these companies are strongly supported by users, there is deep-seated concern that monopolistic companies may be preventing new businesses from entering the market. This is reflected in debate about the best policies to achieve both consumer convenience and healthy market development, and measures to restrict the ability of major IT companies to monopolize information and acquire competitors are under consideration⁽¹²⁾.

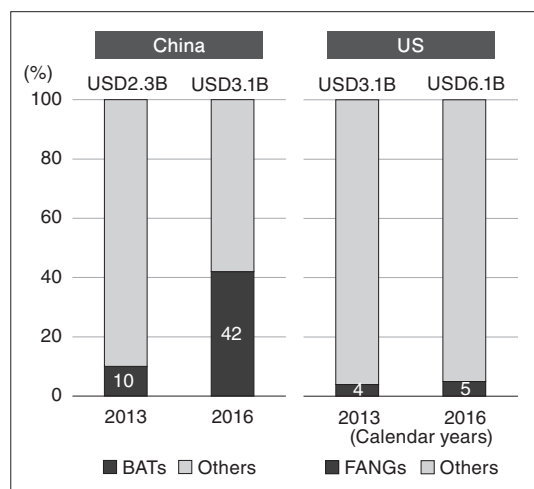
There has been little debate about these issues in China. In 2017, the BATs reportedly increased

Table 4 Aggregate Values of the World's Internet-Related Companies

Rank	1995			Rank	2015		
	Company	Core activity	Billion USD		Company	Core activity	Billion USD
1	Netscape	Software	5.42	1	Apple	Hardware/software	763.57
2	Apple	Hardware	3.92	2	Google	Information (searching)	373.44
3	Axel Springer	Media, publishing	3.32	3	Alibaba	E-commerce	232.76
4	RentPath	Media, rentals	1.56	4	Facebook	Information (SNS, P2P)	226.01
5	Web.com	Web services	0.98	5	Amazon.com	E-commerce	199.14
6	PSINet	Provider	0.74	6	Tencent	Information (SNS, P2P)	190.11
7	Netcom On-Line	Provider	0.40	7	eBay	EC	72.55
8	IAC/Interactive	Media	0.33	8	Baidu	Information (searching)	71.58
9	Copart	Car auctions	0.33	9	Princeline Group	Services	62.65
10	Wavo Corporation	Media	0.20	10	Uber	Services (P2P)	51.00
11	iStart Internet	Provider	0.17	11	Salesforce.com	Services	49.17
12	Firefox Communications	Provider	0.16	12	JD.com	E-commerce	40.71
13	Storage Computer Corp	Storage software	0.10	13	Yahoo	Information (searching)	40.81
14	Live Microsystems	Hardware/software	0.09	14	Netflix	Services (media)	37.70
15	iLive	Media	0.06	15	Airbnb	Services (P2P)	25.00

Source: Compiled by JRI using OECD [2015]

Fig. 21 Venture Investment in the United States and China



Source: Compiled by JRI using Manyika *et al.* [2017]

their share of venture investment to 51%⁽¹³⁾ and strengthened their market dominance⁽¹⁴⁾. If the government continues to tolerate this, and if the BATs begin to play an active role in industrial policy as national policy companies, it could become impossible for newcomers capable of challenging the BATs to enter the market, resulting in a situation that would sap the vitality of the digital economy.

(4) Driving Increased Inequality

The U.S. digital economy had a real average annual growth rate of 5.6% in the period from 2006 to 2016. This is significantly higher than the overall growth rate of 1.5% and helped to buoy up the growth of the U.S. economy. At the same time, the average annual income of employees working in the digital economy rose to \$114,275 (BEA [2018]), or almost double the U.S. average (\$66,498), driving further expansion of income inequality. In his article “Annual Income is Determined by Where you Live” on *PRESIDENT Online*, Enrico Moretti points out that the growth of some cities as new innovation hubs while cit-

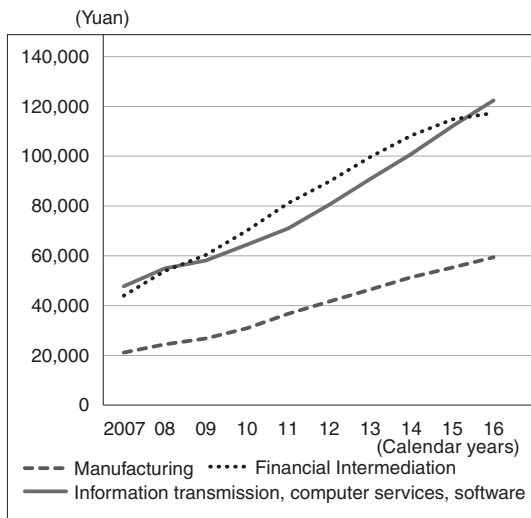
ies with traditional manufacturing industries go into decline has triggered large-scale migration of jobs and wealth. Moretti says that the impact of this phenomenon, which he calls the “great divergence”, is affecting not only the economy but also cultural identity and political values.

Unlike earlier technologies, ICT can easily lead to a “winner takes all” scenario because of the networking effect. ICT sector workers enjoy high incomes, and someone earning \$400,000 is considered middle-class in Silicon Valley⁽¹⁵⁾. At the same time, ICT facilitates automation, putting downward pressure on incomes in the non-digital economy. In the United States, middle-class incomes have stagnated due to the declining competitiveness of manufacturing industries as a result of globalization. There has been almost no movement in the median household income, which rose from \$60,000 in 2000 to \$61,000 in 2017 (2017 prices)⁽¹⁶⁾. Inequality between digital and non-digital sectors is more conspicuous than ever and is reflected in deepening social divisions.

In China, too, wages are highest in the ICT sector. Traditionally the financial sector, including banking, provided the highest incomes, but in 2016, the telecoms, computer services, and software fields moved into the lead in terms of wage levels (Fig. 22). In 2016, the average salary in these industries was 122,000 yuan, which is 2.1 times more than the average manufacturing sector income of 59,000 yuan. Wage levels in major IT companies are extremely high, as evidenced by the fact that Huawei made headlines in April 2018 by offering ¥400,000 as a starting salary in a recruitment advertisement for new engineering graduates in Japan. Even in China incomes in the 200,000-800,000 yuan range are becoming commonplace in these companies⁽¹⁷⁾.

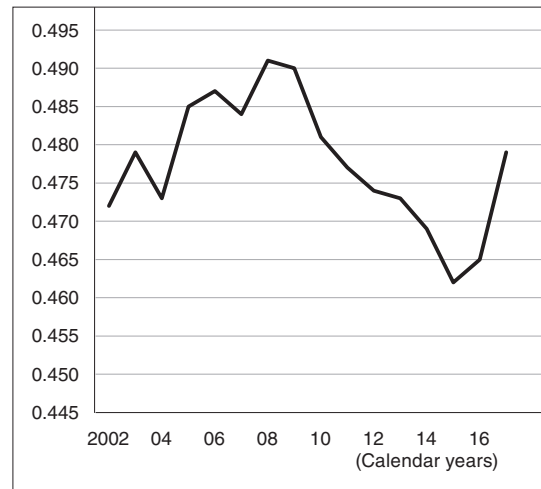
Job numbers in the telecoms, computer services, and software industries are not conspicuously high. In 2016 these sectors employed 3.64 million people, or just 2.0% of total urban workers. Yet this figure represents a 2.4-fold increase over the 2007 level, compared with a 1.4-fold increase in manufacturing jobs, and the percentage of workers employed by these industries is expected to rise further, especially in coastal cities. In

Fig. 22 Wage Variation between Industries



Notes: Based on individual urban workers.
Source: Compiled by JRI using NBS data

Fig. 23 China's Gini Coefficient



Source: Compiled by JRI using NBS data

Beijing, which produces the highest number of unicorn companies, the percentage of the city's work force employed in telecoms, computer services, and software reached 8.5% in 2016. Historically, geographical factors, such as differences between coastal and inland areas, or urban and rural areas, have been the biggest single factor behind the expected of income inequality in China. In the future, however, there is likely to be increasing inequality within or between cities because of growth in the number of workers and rising salary levels in the telecoms, computer services, and software industries.

In fact, China's Gini coefficient, an indicator of income inequality, has been rising since 2016 (Fig. 23). Under the Xi Jinping administration, the Gini coefficient fell as labor shortages caused wages for unskilled workers to rise. This, combined with an unprecedented anti-corruption campaign, helped to ease dissatisfaction about inequality. However, if the Gini coefficient continues to rise, income inequality could again become a social problem. According to public opinion polls carried out by the Chinese Academy of Social Sciences, a government think tank, asset and income inequality ranks alongside differences in rights and treatment between urban and rural areas

as a leading cause of perceived unfairness. These results suggest that there is deep-seated dissatisfaction about inequality (Li, Lu, Zhang ed. [2017]). Because of China's strong competitiveness in manufacturing industries, expanding income inequality is unlikely to trigger social divisions in the way that is happening in the United States. However, the labor market is likely to become increasingly divided between digital and non-digital sectors. There is also a downward pressure on personal consumption expenditure due to inequality will delay China's transition to a consumption-driven economy.

Conclusions

ICT, including big data, the IoT, and AI, has the potential to cause radical socio-economic change. There is an intense interest in developments in China, which is at the leading edge of this trend, and the dynamic changes that are occurring in China have received extensive coverage. Chinese platformers are capable of competing with their U.S. counterparts, and the number of unicorn companies emerging is an indication that China is developing players to drive its digital economy. China's low development stage, as indicated by

the slow spread of the Internet compared with developed countries, should in fact be seen as evidence that there is ample room for further growth in the digital economy.

Nonetheless, China's digital economy cannot unconditionally support the economic development of the entire country. In its 2016 World Development Report, subtitled "Digital Dividends", the World Bank emphasizes the fact that the benefits provided by ICT could be cancelled out by the risks, including (1) the halting of metabolism in the business sector if new entry into markets is hindered by vested interests and regulatory uncertainties, (2) the fact that job creation benefits will be limited if the labor market is divided, and (3) the inability of platform participants to strengthen their capabilities if the Internet is used as a tool for control by the state or elites.

The World Bank report was not written specifically with China in mind. In the Chinese digital economy, there is at present a strong inflow of new companies into the market, creating substantial numbers of new jobs. Although the government monitors information moving across the Internet, including SNS activity, technological innovations are constantly being introduced to enhance usability, with the result that smartphones and the Internet have become indispensable lifestyle infrastructure. However, we cannot be sure how long this situation will persist. The development of the digital economy could be slowed by a stagnating business metabolism and divides in the labor market. Social management systems based on extensive control over information and the use of big data and AI may help to maintain social and political stability, but the ability of the Communist Party to reform itself may be weakened if there are no voices calling for accountability.

In Europe and the United States, there is growing criticism of the major IT companies that are increasingly dominating markets. For example, the percentage of Facebook users who believe that the company adequately protecting their personal information has decreased from 69% to 29% as a result of information leaks⁽¹⁸⁾. Facebook's growth rate is expected to slow significantly as the cost of strengthening its information management sys-

tems balloons. Amazon has meanwhile raised the minimum wages for its employees in response to criticism that it was reaping massive profits through the use of low-wage labor in its shipping and logistics operations⁽¹⁹⁾. One of the factors driving these changes is growing pressure on major IT companies to fulfill their social responsibilities as they strengthen their control over markets and information.

Advances in ICT have raised unprecedented questions in developed countries, including how we should manage personal information and address the negative effects of oligopolization. Answers to these questions vary from country to country, and in some cases the solutions chosen may in fact hinder the development of the digital economy. However, these "growing pains" are part of the process of forming a healthy digital economy. In China, the distances that separate the government, companies, and users are small, and currently there appear to be no factors with the potential to hinder the development of the digital economy. While this is seen as an advantage for China, it could erode the vitality of the digital economy in the long-term perspective.

End Notes

1. 2017年中国数字经济占GDP比重達32.9% [China's digital economy accounted for 32.9% of GDP in 2017], *Economic Information Daily*, April 17, 2018 (http://www.jjckb.cn/2018-04/17/c_137116337.htm)
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