

Managing Through the Global Crisis and Building a Highly Resilient System

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Executive summary

The Coronavirus Disease-2019 (COVID-19) has become a major event affecting the world since the end of 2019. Due to both the disease's characteristics and the complicated social and economic context against which the outbreak occurred, it has had a far-reaching impact on the development of China. China found itself first on the front line against COVID-19, which can be regarded as an "Encounter War", and adopted decisive measures and basically brought the epidemic under control after identifying the virus' features. However, given COVID-19's development into a global pandemic, the epidemic is not expected to end in the short term, and has become a common crisis faced by "a Community of Shared Future for Humankind".

The global economy has already been severely buffeted by the epidemic. With continued spread of the disease, countries have been downgrading their economic outlook and a global economic recession has become a high probability event, possibly leading to further deterioration in the external environment and adding pressure on China's development. Furthermore, it should also be noted that the economic fundamentals of each country are shifting to pessimism. Each country has enacted different measures with different focuses, which has compounded uncertainty for global economic recovery.

After making huge efforts to be the first country to control the epidemic, China took the initiative by sharing its anti-epidemic experience with the world and stepping up the production of anti-epidemic materials to supply to the world. However, a new and shared global challenge lies in spurring economic recovery while controlling the epidemic. In this regard, China has continuously explored new models and became the first country to see a full economic recovery and explore valid models

and experience for recovery.

In the past two decades, large-scale epidemics have occurred one after another, at a rate of almost once every 5 years. China has been severely hit by SARS and COVID-19. The accelerated occurrence of new viruses and increased chance of wide contagion mean that large-scale epidemics may become a periodic test for human society. Countries must formulate strategies to deal with this issue.

From the perspective of development, to develop “**a highly resilient society**” that systematically withstands and mitigates crises will become a common requirement of the global economic community going forward. China has a responsibility to explore successful roadmaps and models for developing “a highly resilient society”, both for the world and China’s own sustainable development. A highly resilient society should possess three building blocks: response, ability to withstand pressure, and sustainability, and these building blocks should be further strengthened in the economy, healthcare, public well-being, communication and digitalization sectors.

COVID-19 has become a “key test” for the integrated response ability of each country. As a pioneer in confronting this test, China learned a series of successful lessons while identifying some issues and drawbacks. Based on four key sectors and 12 dimensions of developing “a highly resilient society”, we conducted an overview of China’s response to COVID-19. Overall, China adopted resolute and systematic measures which reflect its highly efficient abilities to mobilize people from all levels of society to work together, with particular success in terms of the innovative economy, emergency facility development, guarantee of everyday supplies, digital platform etc., and provided helpful lessons for the world. Meanwhile, during this epidemic, China also exposed some existing shortcomings in the economy, healthcare, public well-being, and communication and digitalization, which should become the key focus of measures in the next phase.

We recommended nine key initiatives to transform China into a highly resilient society.

- 1) **Turn around severely-hit industries.** Restore the revenue-generation capacity of SMEs and micro-enterprises issuance of policies to encourage job stability, expand corporate financing channels, big data-driven targeted assistance, and deepen the reform of the business environment. We will promote trade upgrading by building trade facilitation platforms, encouraging “Internet +” IT upgrade throughout the industry chain, and promoting regional trade cooperation.
- 2) **Precisely guide the recovery of investment and consumption.** Continue to deepen reform in the investment sector, seize new investment opportunities, unlock new opportunities for policy formulation, and encourage new investment entities and investment vehicles. Conduct effective stimulus and sophisticated guidance towards consumption recovery and changes in demand.
- 3) **Develop a more resilient supply chain.** Assist in evaluating the supply chain security of key enterprises and industrial clusters, formulate supply chain alternatives, and strengthen resilience of global supply chains. At the same time, proactively research and judge changing supply chain trends and adjust allocation of capacity and integration of supply chains.
- 4) **Digital transformation of the industrial chain.** Capture digital opportunities and bolster risk resistance of manufacturing sector fundamentals, roll out cloud services to meet collaboration demand, and advance policy formulation, implementation of investment, and roll out demonstrations and a service ecosystem.
- 5) **Encourage industries with innovative opportunities.** Promote new models and new technologies, accelerate the roll-out of innovative scenarios. In view of industries rapidly maturing under the epidemic, combined with the opening up of data assets to help build the

foundation of production factors, develop whole-of-industrial chain clusters, and accelerate scenario roll-out through agile management.

- 6) **Early warning response mechanism.** Build an agile ecological and open application platform for government-enterprise cooperation, optimize early warning mechanisms and processes, clarify responsibilities at all levels, and proactively explore emergency risk sharing measures such as specialized insurance for major disasters.
- 7) **Public health system.** Encourage front-end preventive diagnosis and treatment innovation and public health investment, improve public medical systems such as hierarchical diagnosis and treatment, emergency medical care, telemedicine etc, and improve standards underpinning urban emergency health services.
- 8) **Crisis communication.** Adopt the most appropriate communication strategy, optimize release of official information, convey fact-based information, build a system of trust between government and citizens, and improve information transparency.
- 9) **Digital enablement.** Strengthen the buildup of city information flow, break through data barriers to develop basic big data assets, further promote smart government, open up collaboration with the private sector to promote the rollout of application scenarios, set up an emergency management data and application platform, and accelerate the development of user-friendly smart communities.

1. The fight against COVID-19 is a common battle for humanity. China achieved initial victory in flattening the curve and promoted restart.

1.1. Due to unique disease characteristics and occurrence background of COVID-19, its impact could not end in a short time

The Coronavirus Disease-2019 (COVID-19) has become a major event affecting the world since the end of 2019. Due to its characteristics of higher criticality and mortality rate (China: ~ 5.5%, global ~ 6%), high infection (R_0 value at around 3.8-3.9) and long incubation period, COVID-19 differentiates itself from other infectious disease such as SARS, seasonal flu etc. Furthermore, the epidemic occurred in a complicated social and economic background when economic cycle faced downward pressure, the epidemic affected large population base, government took strong measures to prevent and control the virus and social media showed its increasing complexity, so it will have a more complex and far-reaching impact on China.

China was the first country in the world to fight against COVID-19, which can be regarded as an “Encounter War”. Although China initially entered passive phase due to unknown characteristics of the virus, it adopted decisive and systematic measures represented by full lockdown and construction of Huoshenshan Hospital and Leishenshan Hospital after 20th January 2020 when the human-to-human transmission of virus was confirmed and elevated to the Standing Committee of State Council. With full mobilization and efforts of the whole society, China basically controlled the epidemic at national level, avoided its rebound and recovered the economy in full swing.

However, given the current spread of the pandemic worldwide, the inflection point of global epidemic is still far from looming. What needs to arise more attention is that there were some reoccurrence signs in the regions where prevention and control were relatively successful in the early stage. China is faced with the arduous task of “preventing imported cases from abroad and resurgence at home”, so it is expected that the epidemic impact would not end in a short time. It has become a war for the whole humanity to defeat COVID-19, while no single country can succeed this on its own, which highlights the implication of “a Community of Shared Future for Humankind”.

1.2. Huge impact of epidemic on future trend of global economy might exaggerate external environment pressure on development in China

Current epidemic had strong impact on global economy. With continuous epidemic spread and expansion of affected scope, economic impact might evolve from short stagnation to destruction of some growth models, which led to structural impact and flatten output curve and growth rate. Each country degraded its economic outlook and had basically no chance of a rapid recovery except for China. Based on evolution of current trend, global economic recession will become a high probability event, which might further deteriorate external environment pressure of China's development.

In addition to epidemic development itself, we also need to focus on the uncertainties to the future global economy caused by economic fundamentals and national economic response plan of each country. International exchange and flow are moving from a temporary block to stagnation for an uncertain period, global industry chain might swift from a short-term suspension to a cutoff of some weak links, and consumer demand may evolve from temporary delay to loss that is difficult to make up for. Effective feedback from policy incentives may gradually decrease, investor confidence may further decline, even leading to further strengthening of globalization barriers, emergence of secondary risks of the crisis, and so on.

Each country proactively defined plans to mitigate epidemic impact with different focuses and measures. For example, China adopted quite moderate strategy with a focus on adjusting economic structure in the future. Many other countries mainly adopted stimulus plan in typical market economy with a focus on turning around hardly hit SMEs and aiding labors but limited fiscal space and tools. However, based on continuously weakening response to stimulus package by global financial market, this crisis posed challenges to effectiveness of crisis measures. Meanwhile, spillover effect of economic from some countries might have continuous impact and add uncertainty to global economic recovery.

1.3 China continuously contributed anti-epidemic experience and took the lead in recovering economy and proactively exploring new model

After making huge efforts to be the first country to control epidemic, China took initiative to share its anti-epidemic experience to the world and stepped up the productions of anti-epidemic materials to supply to the world. However, a common new global challenge lies in how to control epidemic while recovering economy and promoting recovery in parallel. In this regard, China has continuously explored new model and became the first country to fully recover its economy and explore valid model and experience for recovery.

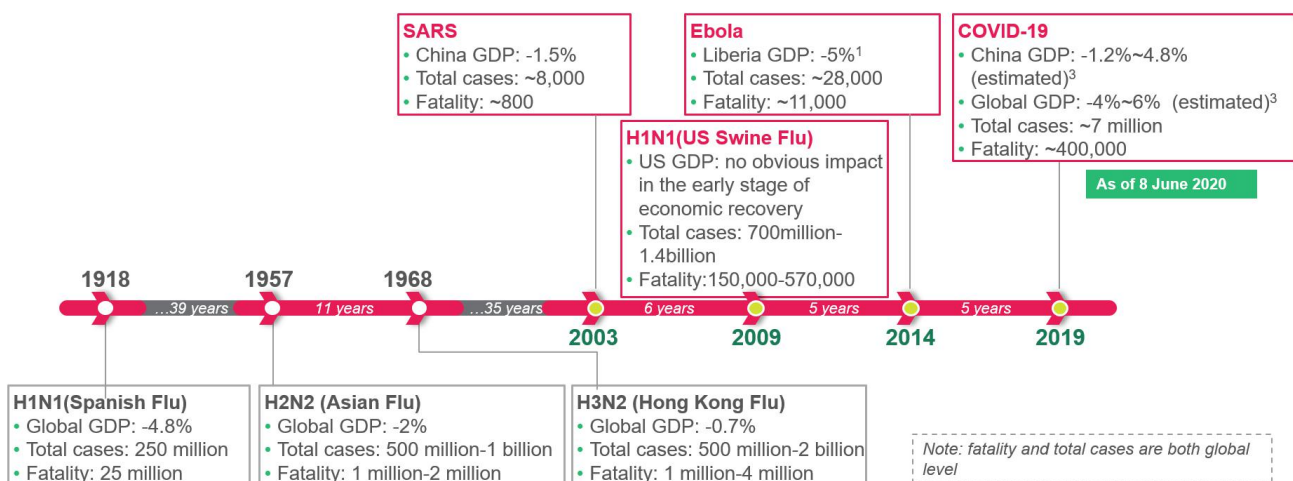
For example, in the aspect of industry system, confronted with restructuring of some industries and uncertainty of reshaping industry, we need to continue to display the advantage of complete and stable industry chain, strengthen confidence of global companies and make up for shortcomings of industry systems; in the aspect of capital, while preparing for embracing risk transmission of global financial market, we need to release security signal to global capital market and assist potential requirements of capital risk aversion; in the aspect of talent, we need to further encourage global talent exchange and development; in the aspect of policy, we need to follow the trend to deepen domestic reform; in the aspect of international relationship and brand, we should further improve country and city image with overseas aid, and further deepen economic cooperation in Northeastern Biosphere and middle Europe etc.

2. Attention must be paid to increasingly high frequency of global pandemic outbreak, while epidemic might become a periodic test

In the past two decades, large-scale epidemics such as SARS (2003), H1N1 (2009), Ebola (2014) and COVID-19 (2019) broke out one after another, with the occurrence frequency of nearly once every 5 years. (See Exhibit 1.) China has been severely hit by SARS and COVID-19. On one hand, such

factors as global climate change, increase of human exposure to wild animals etc. accelerated the occurrence of new viruses; on the other hand, higher population density and mobility led to increased chances of large-scale spread. It is inevitable for us to realize that due to these two aspects of factors, large-scale epidemic might become a periodic test for human society. China gave high priority at national level, as Chinese President Xi Jinping mentioned “major infectious disease and biological safety is a major risk challenge for national security and development and social stability”. Therefore, at strategic level, we have to regard systematic resistance and mitigation against crisis impact including major contagious disease as an important aspect of economic and social development strategy, and refine a series of action plans accordingly.

EXHIBIT 1: Global pandemic broke out more frequently in the 20th century



Sources: public information, literature research, BCG analysis.
¹ GDP decline is affected by both commodity price and epidemic status. ² Common flu mostly occurs in autumn and winter, while H1N1 occurs in spring and summer, and lasts all the time. ³ Refer to World Economic Outlook issued by IMF, April 2020 and forecast report issued by OECD in March, there is still high uncertainty.

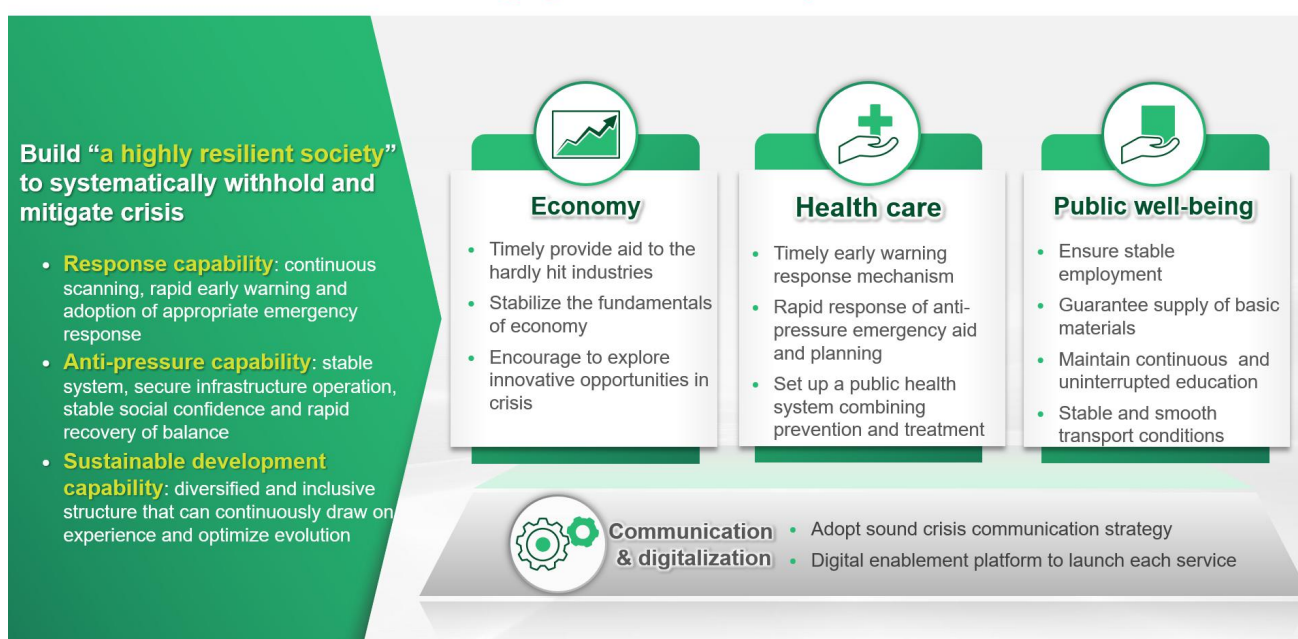
3. To build a “highly resilient society” is a common requirement of global economic community in the future, while China has the responsibility to explore as a pioneer

3.1. “A highly resilient society” has brand-new connotation requirements

The COVID-19 not only poses significant challenge to resilience of economic development but also

re-alarms the periodic testing from epidemic. From the perspective of development, to develop “a highly resilient society” that systematically resist and mitigate crisis will become a common requirement of global economic community going forward. (See Exhibit 2.) As the first country to flatten the curve, standing from the angle of promoting joint development of humanity, China has the responsibility to explore the successful roadmap and model of developing “a highly resilient society” for the world and its own sustainable development.

EXHIBIT 2: Framework of a highly resilient society



We believe that a highly resilient society should possess three building blocks: response capability to release precaution and switch to emergency status; capability to withstand pressure by means of stable system, secured operation of infrastructure, steady confidence from society and the status of rapidly restoring balance; and sustainable development capability by having a diversified and inclusive structure to continuously learn from lessons, evolve and optimize.

A highly resilient society should specifically strengthen itself in economic, health care, public well-being, communication and digital areas:

- **Economic sector.** Be able to timely rescue severely hit industries, stabilize economic fundamentals, and explore and encourage innovative opportunities from the crisis.
- **Medical sector.** Put a timely early warning and response mechanism into place, develop a rapid and pressure-resistant emergency aid and planning response, and build a public health system combined with prevention, control and treatment.
- **Public well-being sector.** Ensure stability of employment and supply of basic materials, continuous education without interruption, and stable and smooth transportation.

3.2. The COVID-19 poses a comprehensive challenge to China in developing a highly resilient society: confronted with a comprehensive challenge in building a highly resilient society posed by COVID-19, China drew on both experience and lessons

The COVID-19 spreading across the globe has become a “key test” for integrated response ability of each country. As a pioneer in confronting with the test, China learned a series of successful experience while identified some issues and drawbacks. Based on four key sectors and 12 dimensions of developing “a highly resilient society”, we conducted an overview of China’s response to COVID-19. (See Exhibit 3.) Overall speaking, China adopted resolute and systematic measures to reflect its highly efficient execution capability of people at each level, distinguished itself in application of innovative economy, emergency facilities development, guarantee of public well-being materials, digital platform support etc., and provided some helpful experience for the world even it was still confronted with uncertainty as a pioneer in fighting against the epidemic. Meanwhile, during this epidemic, China also exposed some existing shortcomings in the sectors of economy, health care, public well-being, communication and digitalization, for example relatively insufficient investment in normalizing the public health care system, which should become the focus and key measures in next phase.

EXHIBIT 3: Overview of China's performance as a highly resilient society

Key dimension of a highly resilient society		Rating	Description
Economy	Turnaround of hard-hit companies	●	There is strong support from government policy, but anti-pressure capability of small, medium-sized and micro-enterprises is to be further improved, and export-oriented economy is challenged
	Cornerstone stability	●	State-owned enterprises played a cornerstone role with fast response, rebound of consumption and investment requires a more precise and targeted guidance, supply chain needs to address anti-risk capability
	Innovation opportunity	●	Emergence of new technology and model reflects a sound digital platform and some sectors still face barriers
Health care	Early warning response mechanism	●	Complete gene sequencing at a record-breaking speed, make efficient decision to lock down cities, but emergency governance system needs further refinement
	Emergency aid & planning	●	One province supports one city of Hubei, each province mobilizes its materials, medical personnel and enterprises have flexibility to produce epidemic prevention materials, such as masks
	Public health system	●	Provide free treatment, admit all suspected and confirmed patients, smart imaging system speeds up frontline diagnosis but normalized mechanism for emergency security should be improved
Public well-being	Employment security	●	Public employment and salary are well protected due to related policy, but post-epidemic job creation, re-employment issues are still to be considered
	Materials security	●	The central government mobilizes materials from each government to ensure supply to the epidemic area, while the public takes initiatives to procure anti-epidemic materials globally
	Education security	●	Suspend schools without halting study, and enterprises donate online education system to support online education
	Transport security	●	Stabilize logistics: logistics companies provide dedicated fast track for anti-epidemic materials; stabilize traffic: launch express train for returned personnel accelerated resumption of work and production
Communication & digitalization	Crisis communication strategy	●	Leverage on thinktank and KOLs to popularize epidemic prevention knowledge, but official communication and international media are to be enhanced
	Digitalization enablement	●	Big data boost government epidemic prevention and control, set up tracking and monitoring network and operators push epidemic prevention recommendation in real time

● Perform well ● Continuous improvement

4. Recommendation of key initiatives to develop China into a highly resilient society

4.1. Emergency aid for severely-hit industries: precisely restore the revenue-generation capability of small and medium-sized enterprises (SMEs) and adopt integrated measures of digitization to support export trades

On the basis of implementing the existing burden reduction policies, we should scale up support in four areas to achieve sustainable assistance to SMEs in weak economic steps, and to cultivate stable revenue-generation capacity. Firstly, more policies to encourage employment stability should be introduced, including implementation of social insurance reduction, exemption and deferral, return of unemployment insurance or research on granting some payroll subsidy. For example, Singapore introduced policies to grant subsidy to employees of SMEs and provide enterprises with 8% cash grant on the gross monthly wages as minimum payroll subsidy. Secondly, efforts should be made to expand corporate financing channels, develop a multi-tier financial service system for large, medium and small-sized banks, non-banking financial institutions and private

institutions, broaden multi-level service coverage for small and medium-sized enterprises, such as financing guarantee, supply chain finance, insurance products and so on. Thirdly, government and companies should cooperate to promote big data credit information, risk control are put into place with certain flexibility, and big data is leveraged to achieve targeted and precise assistance. Fourthly, we should deepen reform of business environment of SMEs and provide regular support, such as online handling of each procedure, “visit the authority department for at most one time to complete the assignment” and special grant in the special period should be incorporated into regular budget of government.

As it is predicted that import and export trade might become a new round of hard-hit industry, a set of measures including digitalization can be adopted to promote trade upgrade. Firstly, emphasis should be put on restart of work for foreign trade companies, while aid service platform in the legal aid, governmental assignment, commercial, legal and financial areas can be offered to assist in solving issues arisen from contract fulfillment. Banks and insurance are collaborated to provide more support to trade finance and facilitate export credit insurance. Secondly, we should encourage IT upgrade of “Internet +” along the industry chain, cultivate new model of digital trade, take the lead in holding online import and export fairs, merchant investment promotion fairs etc, optimize business environment for ports, share digital information with trade counterparties, assist enterprises in saving time in customs clearance to hedge the impact of quarantine and improve the efficiency of bilateral trade. For example, during MERS period Korea Trade-Investment Promotion Agency held online import and export fairs to attract over 100 foreign companies and over 200 local companies. Thirdly, we should master the core of One Belt One Road, proactively optimize trade structure and promote regional trade collaboration, such as the Northeast Asian Ecosystem that recovered earlier in the epidemic.

4.2. Guide recovery of investment and consumption: continue to deepen reform to achieve multi-party participation in the investment sector, guide recovery of consumption in a targeted way based on demand changes

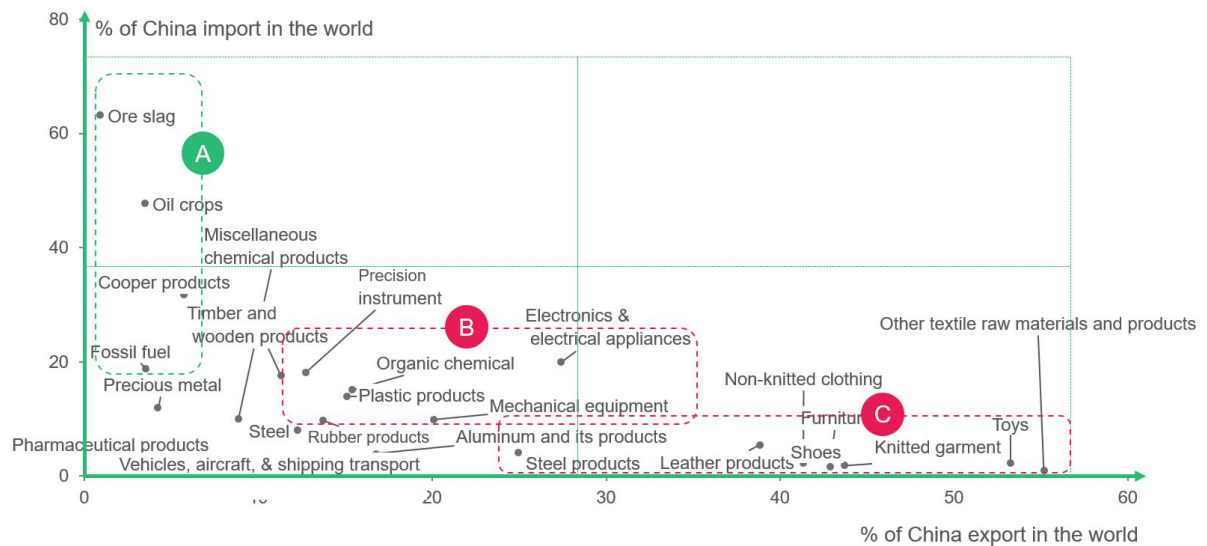
Guide investment, precisely target new demand, continuously deepen reform to achieve multi-party involvement. First of all, we should seize new investment opportunity in public sector, combine new infrastructure construction such as 5G base station, big data center with new demand, including medical supporting equipment, centralized transformation of old municipal facilities, logistics center, to make up for shortcoming areas. Focus should be given on making breakthrough in key technological steps in basic sectors to provide support to new business sectors, so as to boost high-quality development of economic transformation. Secondly, we should promote reform to unlock new opportunities for policy formulation, such as revitalizing economy and market after SARS, and issuing REITs' related regulations in Hong Kong and Taiwan in 2003. Thirdly, new investment entities and investment means should be promoted, while governmental investment plays a guiding role to attract market forces with acute sense of new opportunities to involve, with a focus on further opening up market access and broadening investment entities. Fourthly, efforts should be made to achieve balance among market, debt and capacity, to ensure stability and continuity of policy enforcement.

Guide consumption and conduct effective stimulus and sophisticated guidance towards consumption recovery and demand reform. Firstly, to promote subsidies and reforms aligned with new consumption requirements of health, we should promote subsidies for the consumption of health-related home appliances such as water purifiers, air purifiers and central air conditioners, promote new standards such as food safety and health certification of buildings and business places, and encourage enterprises to improve production and service places with adoption of supporting policies and financial support. Secondly, we should provide direct subsidies for consumers, together with flexible supplement of individual income tax relief, consumption coupon issuance, extension of housing loans, subsidies for low-and-middle income earners' wages, and other measures. Thirdly, subsidies and credit support could be provided at outlet side, such as tax cuts for retailers to encourage promotions, appropriate opening up of data by leveraging new technologies to optimize consumer credit approval.

4.3. Develop a more resilient supply chain: with increase of international supply chain risk, focus on supporting leading companies and industry clusters to evaluate and strengthen the resilience of supply chain

Due to increased risk of international supply chain during this epidemic, we recommend paying more attention to industry segments that are affected by international market and supply chain. (See Exhibit 4.) For example, electronics, machinery and other industries are confronted with risk from international supply chain and market demand, including shutdown of imported spare parts from upstream and weak export to Europe and America from downstream; export order of foreign trade in textile, furniture and toys plummeted with ~20% year-on-year decline due to export in January and February and stagnated demand due to spread of overseas pandemic. On the other hand, international demand for raw materials such as oil and ore is weak, and China, as the main demand side, will benefit from the decline in raw material prices.

EXHIBIT 4: Distribution of China's industry in global import and export



Sources: 2019 OECD data, broker research report, China Customs data, BCG analysis.

All in all, we suggest assisting our companies navigate through the shock on supply chain from two aspects:

Increase resilience of global supply chain. Have a clear picture and evaluate supply chain security of key companies and industry cluster, and develop alternative plan. Take Huawei for example, it recently turned to SMIC over TSMC for Kirin chips of some mobile phones.

Proactively research and judge changing trend of supply chain and adjust allocation of capacity and integration of supply chain. Some basic supply might be returned to developed countries, such as 3M and Honeywell masks, API capacity etc; while other companies might take the lead in restoring supply chain in safer regions, expanding presence in China, such as some automobile and electronics players.

4.4. Transformation of industry chain digitization: capture digitalization opportunity and improve risk resistance capability in manufacturing industry

During the COVID-19, some digitalization barriers in manufacturing industry are having some changes. On one hand, due to continuous shortage of taskforce, rising cost of epidemic prevention and control and demand for close cooperation to achieve flexible production, every company became more active in embracing smart production. On the other hand, production shutdown during epidemic and stage of increasing capacity became a great opportunity to upgrade. Government can grasp this chance to sharpen its weak areas and speed up overall digitalization transformation along the industry chain:

Roll out cloud service to meet collaborative requirement. Proactively identify weak steps, assist upstream and downstream to achieve long distance interface. For example, Ningxia Government assisted their companies in resuming production by means of cloud service such as long-distance synergy and online supply-demand match and offered 54 cloud service products for free.

Advance formulation of policy and put investment into place. Step up to put specialized subsidy and tax incentive into place and coordinate with financial institutions to provide multi-layers of support. For instance, Chaozhou government guided SMEs to introduce applied robot hands and unmanned workshops, and add 2000 new ceramic automation equipment during epidemic.

Roll out demonstration and service ecosystem. Establish smart manufacturing service platform, coordinate with market suppliers to refine roll-out of digitalization scale-up and training services. For example, Guangzhou Development Zone cooperated with BCG and national machine intelligence to build an intelligent demonstration factory, showing 18 industrial demonstration scenes, and Suzhou built an intelligent manufacturing public service platform to meet the needs and service providers. For example, Guangzhou Economic Development Zone worked hand in hand with BCG and SINOMACH Intelligence Technology Co., Ltd to build an intelligent demonstration plant, showing 18 demonstration scenarios of Industry 4.0. Suzhou developed smart manufacturing public service platform to meet requirements of service providers.

4.5. Encourage to innovate promising industry: promote new model and new technology, accelerate the roll-out of innovative scenarios

With regards to online service industries that boomed during the epidemic, such as online education, online office, online entertainment, online government, fresh food e-commerce representing the new lifestyle, and digital infrastructure-related industries such as big data, cloud computing, 5G and AI, we should give full play to China's advantages in mobile internet and digital infrastructure, and seize the opportunity to promote improvement in three aspects:

Lay foundation for production factors. Open up government digital assets, build information foundation for developing digital company and provide support in talent, land, and funding areas.

Cluster of whole industry chain. Firstly, we should rely on cutting-edge technology to take the lead

and develop whole industry chain platform for leading companies. Secondly, focus should be given on scale upgrade, supporting policies for micro-and-small innovative enterprises, and both “quality” and “quantity”. Thirdly, one-stop industry service should be launched to cover scientific research, infrastructure, government service etc.

Enabled by lean management. Set up a digital communication platform to receive corporate demand in real time, promote “one case one discussion” for core pain points such as IP, provide support to difficulties in production and operation, evaluate the application scenarios that are potentially adopted in early stage, and accelerate roll-out of mature scenarios by means of government procurement and introduction of diversified investment.

4.6. Early warning mechanism: develop agile ecosystem for emergency response, optimize early warning response mechanism and processes

Develop agile ecosystem. As for the pain point that emergency resources and capabilities are idle at normal time and insufficient at epidemic time, a collaboration platform has been set up in R&D, essential supply areas to introduce a variety of partners such as SOEs, foreign enterprises, private enterprise and public welfare organizations, and emergency response cooperation mechanism has been signed off. Management functions and life scenarios such as city operation, emergency management and security guarantee are elaborated, an emergency-focused ecosystem featured by openness and cooperation is built, and enterprise cooperation is encouraged to develop a scenario-embedded application.

Optimize response mechanism. Early warning mechanism and processes should be updated regularly, response department with contact details and response time should be clarified, with full consideration given to such factors as time, regions, traffic flow and transport condition. Responsibilities of Disease Control Center, Ministry of Health and regional authority should be outlined clearly to form expert management system.

Explore emergency risk-sharing measures (eg. major disaster special insurance, bond etc.). For example, Japan established a family earthquake insurance system jointly participated by private insurance companies and government after the 2011 earthquake, achieving the hierarchical sharing of disaster risks.

4.7. Public health system: encourage innovation of front-end disease prevention, diagnosis and treatment and investment in public health, refine public medical system and improve supporting standard of city emergency health service

Encourage innovation of front-end disease prevention, diagnosis and treatment and investment in public health. Firstly, establish medical information sharing service platform to rapidly detect emergency health events based on data from electronic health files, test report etc. Secondly, promote internet medical care, encourage online consultation, online revisit of chronic diseases, and family physician services to achieve online diagnosis, prescription distribution, online payment and offline distribution. Promote electronic vouchers of health insurance to support the inclusion of qualified internet medical services into health insurance payment. Thirdly, lower barrier of medical innovation, clarify definition of innovative drug and medical service and offer preferential support with funding and simplified approval to innovative projects. Fourthly, encourage public healthy life, promulgate public health care concepts, strictly inspect the sale of game, encourage the public to conduct health management and push forward the development of commercial health insurance market.

Advance public medical system. Firstly, include infectious disease triage capability into the hierarchical medical system, improve infectious disease diagnosis and treatment capability at primary hospitals, develop the capability of rapid identification, and define proposed follow-up treatment plan at primary hospitals by means of medical resources rotation, talent training etc. Secondly, refine emergency medical system, regularly drill emergency system, empower MOH, CDC and hospitals to organize drilling and mobilize resources targeted for outbreak time. Expert think

tank should be formed to offer decision-making support, which including clinical, epidemiology, medicine and data management. Thirdly, apply long-distance medical capability on a widely basis. Government could take the lead in driving the capability building in the aspects of online consultation, remote diagnosis and telemedicine. Develop digitalization of patient information management to support rapid diagnosis and treatment during outbreak time.

Improve supporting standards of urban emergency health services. It is suggested that the emergency standard, as one of the multi-purpose standards for urban design and construction, should form a normalized mechanism with higher standards. Multi-purpose “wartime” isolation facilities should be incorporated into the urban planning emergency contents, while civilian facilities that can be requisitioned, such as hotels and stadiums, should also be listed, so as to be used for resettlement and isolation of large numbers of people in special periods.

4.8. Crisis communication: adopt the most appropriate communication strategy, optimize release of official information, convey fact-based information and build mutual trust system between government and citizens

Optimize release of official information. Ensure differential coverage of audience, such as holding press conference to communicate with journalists; delivering TV speech by official media and senior officials to the public. Adopt daily communication language to convey mass information, strengthen English communication skills to deal with international media. Meanwhile, focus on verifying important data and key information in advance.

Convey effective information and develop mutual trust system between officials and citizens. Take public opinion into account during communication, proactively share fact-based information: recommendations on uncertainty of epidemic development, government plan and public prevention etc.

Improve information transparency. Provide key factors such as detail information and government

decision-making, release information at first time and public recommendation and reduce possibility of arising rumors.

4.9. Develop smart government, agile management system and smart city with sound information basis, integration of service and management and open ecosystem

Develop people-oriented smart community. Based on performance during epidemic and rapid roll-out of leading technology enterprises, develop smart residential community equipment system, so as to create user image and application scenarios at residential community, analyze community requirements of each group and achieve interaction between human and community in the data-based smart environment. For example, deepen and expand the application scenarios of “health code” that plays an important role in this epidemic prevention process. For example, deepen and explore the application scenarios of “health codes” that play an important role in this epidemic prevention process.

Strengthen city information flow setup. Adopt top-down and bottom-up two-way information flow feedback, improve city’s information acquisition speed and response capability, so as to better guide allocation of people traffic, capital flow and technology flow. Open up data channels among transport, health, commerce and industry, law enforcement departments, define unified technology, data and interface standard to form basic big data assets. Further promote e-government business, improve IT-applied basis for government affairs, broaden online assignment lists, and alleviate inter-department data barriers. Meanwhile, create flexibility to moderately open the data portfolio to market institutions, which is centered with resident and emergency requirements. For example, the Tel Aviv government has opened unclassified information from municipal databases to the public, so that the public and mobile application developers can leverage this information to develop various service applications, one of which is “the Next War”, an award-winning app that allows citizens to identify the location of air defense bunkers in Tel Aviv as quickly as possible and acquire wartime emergency knowledge and skills.

Develop data-driven emergency system. Set up emergency management data and application platform to form integration of recognition, telecommunication, forecast and early warning. Improve big data-based space-time scheduling, and rapidly adjust transport operation and mobilization strategy for outbreak time.

Appendix: Experience and lesson drawn from prevention and control of global infectious disease of same level

Among public health emergencies and infectious diseases of the same level announced by World Health Organization (WHO), SARS, Swine Flu (H1N1), Ebola and COVID-19 are all viruses that occurred in recent years and are susceptible to cause human-to-human transmission, among of which Ebola has the highest fatality rate and H1N1 Flu Virus has the largest spreading scope.

Based on the anti-epidemic experience worldwide and features of each major disease, the anti-epidemic strategies adopted by major countries are as below:

- **SARS.** The Chinese government decisively adopted regional isolation strategy during the epidemic to centralize treatment, reduce mobility and rapidly control epidemic development.
- **Swine Flu (H1N1).** The US government mainly adopted mitigation strategy to ensure that it had sufficient medical resources to deal with treatment peak time during epidemic. In the early stage, US side responded very rapidly. However, based on the judgement of epidemic impact and spreading scope, US decided not to adopt compulsory isolation but speed up research of vaccine to control, so as to curb the virus from spreading worldwide. Due to wide spreading scope and high impact on the public, the detailed disease indicator data are highly unidentifiable.

- **Ebola.** With the aid of international community, three major countries in West Africa adopted isolation strategy. In the later stage of the epidemic, they implemented hierarchical management to maximize the use of local community resources and reduce reply on aid.
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- **COVID-19.** The Chinese government adopted a strong isolation strategy at unprecedented level by locking down 16 cities in Hubei, activating first-level response at 31 provinces and taking measures with different extent to block off flow, so as to effectively delay epidemic spread and safeguard the health and safety of the public with utmost social resources cost.

As of data on 8th June 2020, update upon epidemic progression

Similar to COVID-19, SARS, H1N1 and Ebola also occurred in recent years and are likely to cause human-to-human transmission in all populations

	SARS	H1N1	Ebola (2014)	COVID-19
Affected area	China and 26 others countries and regions	Mexico, US and almost 200 countries and nations	Liberia, Sierra Leone, Guinea and seven other countries and regions	China and 183 other countries and regions
Death	~800	~150,000-570,000	~11,000	~400,000*
Fatality rate	10%	0.03% (Mexico early ~2% ²)	~50% ³	~6%*
Total cases	~8,000	~700 million-1.4 billion	~280k	~7 million*
Contagious	3.0	1.5	2.0	3.8-8.9*
Date of detecting the epidemic⁴	2002.11.16	2009.04.02	2013.12.26	2019.12.8
Sample received by DCC⁵	After 1.5 months	★ After 13 days	After 1 month ⁶	★ After 22 days
Inform WHO⁵	After 3 months	After 16 days	After 3 months	After 26 days
Release virus gene sequence⁵	After 5 months	After 22 days	After 8 months	After 33 days
Activate national prevention	After 5 months ⁷	After 6 months ⁷	After 7 months ⁷	★ After 1.5 months ⁷
Time of ending epidemic⁸	After 7 months	After 16 months	After 30 months ⁸	NA
Key anti-epidemic measures	★ Focus on isolation strategy , isolate patients for centralized treatment, shut down schools, cancel "golden week" etc	Adopt mitigation tactics , rapid response at early stage, fail to adopt isolation tactics, the virus became global pandemic which mainly relies on speeding up vaccine production to prevent and control	★ Mainly adopt isolation strategy, and adopt tier-by-tier management in the later stage , maximally leverage local resources to reduce dependence on aiding.	★ Adopt forceful isolation strategy , Hubei shut down 16 cities to effectively block off infectious means, delay disease spread which has high economic cost

Since 2007, WHO has announced six public health emergencies, five of which are infectious diseases

- Swine Flu (H1N1) 2009
- Polio 2014
- Ebola 2014
- Zika 2015
- COVID-19 2020

If the following diseases occur again, WHO will automatically trigger public health emergencies by default¹

- SARS
- Smallpox
- Other types of polio.
- New flu

★ Epidemic prevention highlight

Sources: public information, BCG analysis. 1. Mark Hall and others, "Health Care Law and Ethics"; 2. According to WHO data on May 21, 2009, Mexico confirmed 3,892 cases and 75 deaths; 3. According to the WHO data, average fatality rate is about 50%, and that in each region is between 25-90%. 4. Calculated based on the diagnosis date of first case or detection date. 5. Estimated since the date of detecting the epidemic. 6. Based on the first round of investigation initiated by the Guinean health department. 7. Estimated by milestone events, such as the emergency measures taken by the Standing Committee of the Politburo on April 17, Obama declared a national state of emergency, Liberia closed most of the border, Wuhan locked down; 8. Based on the declaration of the end of the epidemic in Guinea, West Africa.

Based on the analysis of control and prevention experience from global major epidemic diseases, one takeaway we learned from is that all the measures taken by each country focuses on three aspects of economy, public well-being and governance, during the three phases of epidemic control (detection and early warning, epidemic control and recovery and development).

1) Measures for detection and early warning phase include:

- Research of disease cause: rapidly isolate new virus, identify gene sequence and rapidly judge epidemic;
- Early warning mechanism: timely issue early warning of potential risk to the public and communicate prevention measures to the public;
- Centralized coordination: set up epidemic response team rapidly to unified command, coordination and information release etc.

2) Measures for epidemic control phase include:

- Living security: provide security services for epidemic areas, including unemployment insurance, death insurance and orphan assistance etc.; ensure materials supply in the epidemic areas;
- Medical security: rapidly restore medical services for pregnant women, young children and emergency visit etc.;
- Media management: take initiative to guide public opinions to avoid panic by means of public speech, timely disclosure of information and so on;
- Medical care for epidemic: improve medical care capability and treatment capacity; ensure supply of adequate medical materials by means of activating national strategic reserve, flexibly





mobilizing social resources; subsidize patient and medical personnel;

- Anti-epidemic strategy: select isolation or mitigation strategy based on epidemic progression;
- Level-by-level management: differentiate regions based on priorities; align resources based on specific situations and redirect rely on salvage resources;
- Smart management: activate real-time tracking with network digital tools and release suspicious cases;
- International communication: appoint press spokesmen, improve information transparency and timely update disease progression to global specialized entities.

3) Measures for recovery and development phase:

- Economic policy: adjust fiscal and monetary policy aligned with economic development, and provide targeted measures to SMEs that are seriously affected by the epidemic, such as taxation reduction and alleviation and subsidies;
- Medical security: form a structured and graded health care force and train community health care personnel;
- Public health system: provide fast track approval channels for epidemic vaccine development and production, and establish proprietary large-scale vaccine production plants for epidemic readiness;

- Establish emergency system: constantly optimize the emergency mechanism, with full consideration to the overall picture and implementation details, so as to ensure feasibility.

	Detection and early warning		Epidemic control		Recover and development	
 Health care	Disease cause research Rapidly separate new virus, identify gene sequence, and rapidly judge epidemic	Rapidly set up epidemic response team to carry out consistent command, coordination and information release etc.	Epidemic medical care Enhance health care capacity ¹ to expand treatment capacity; ensure sufficient medical care materials by activating national strategic reserve and flexibly mobilize social materials; subsidize patients and health care personnel	Public health system Form a systematic and tier-by-tier health care workforce and train community health care personnel Provide green approval channels for epidemic vaccine development and production, and set up proprietary large-scale vaccine production plants to prepare for epidemics Provide fast track approval channels for epidemic vaccine, and set up dedicated scalable production plant for vaccine	Emergency system Continuously optimize emergency mechanism, fully consider overall picture and implementation details to ensure feasibility	
	Early warning system Timely warn potential risk of epidemic to the public and popularize prevention means		Health care security Rapidly recover medical services such as pregnant women, young children, emergency and so on			
	Centralized coordination		Anti-epidemic tactics Adopt isolation or mitigation strategy based on epidemic progression ²			
 Public well-being			Tier-by-tier management Differentiate priority areas, match resources in a targeted way, lower reliance on assistance resources			
			Living security Provide unemployment insurance, death insurance, orphan assistance and other security services for the epidemic areas; ensure the supply of materials in the epidemic areas			
			Media management Proactively guide public opinion through public speech, timely disclosing information and other measures to avoid panic			
 Economy					Economic policy Adjust fiscal policy and monetary policy based on economic development, and take targeted measures such as tax reduction and subsidy to SMEs that are seriously affected by the epidemic	
 Communication & digitization			Digital management Activate network digital tools to track and release suspects in real time			
			International communication Appoint spokesperson to enhance the transparency of information; timely update global professional institutions about epidemic development			

Sources: BCG analysis, BCG project experience, expert interviews, public data.

¹Including increasing the number of hospitals, identifying alternate treatment sites, registering medical volunteers, and improving medical declaration procedures. ² The isolation strategy focuses on controlling the source of infection, cutting off the transmission route, while the mitigation strategy focuses on treatment so as to ensure that adequate medical resources are available to help the maximum number of patients.

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