

CHINA SUPPLY CHAINS DISRUPTION: BACKGROUND AND RATIONALE FOR AN IMPACTFUL ASSET MANAGEMENT SHIFT

BSAMC – Research, Market Insights

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Table of Contents

| | |
|--|----|
| Abstract..... | 3 |
| 1. The Chinese economy and its trade balance | 4 |
| 1.1 Introduction | 4 |
| 1.2 An analysis of Chinese exports (from the point of view of China)..... | 4 |
| 1.3 An analysis of Chinese imports (from the point of view of China)..... | 5 |
| 1.4 An analysis of Chinese imports (from the point of view of each foreign country)..... | 6 |
| 1.5 An analysis of Chinese imports - Focus on the US. | 6 |
| 1.6 An analysis of Chinese imports - Focus on Italy..... | 7 |
| 2. A historical review..... | 8 |
| 2.1 Japan's earthquake and tsunami in 2011 | 8 |
| 2.2 Thailand's floods in 2011..... | 9 |
| 2.3 China's SARS in 2002 & Saudi Arabia's MERS in 2012 | 10 |
| 3. The COVID-19 outbreak and its impact on global supply chains and international trade | 10 |
| 3.1 A brief overview of the COVID-19 impact on the global economy | 10 |
| 3.2 The Institute for Supply Management (ISM) and its latest survey..... | 11 |
| 3.3 An analysis of the decline in production of sectors, industries, and companies affected by the supply chain disruption | 12 |
| 3.4 Effects on international trade: general considerations and focus on US-China trade volumes | 13 |
| 4. The future of the global supply chain and how companies should tackle the challenge | 16 |
| 4.1 Theoretical effects on supply chain management | 16 |
| 4.2 What companies can do both in short- and in the long-run to avoid future disruption | 17 |
| 4.3 The case for supplier territorial diversification..... | 19 |
| 5. Implications from an asset manager perspective: potentially profitable investment strategies regarding different geographies, sectors, and companies..... | 20 |
| 5.1 Our investment recommendations, driven by the supply chain disruption effect | 21 |
| 5.2 Our sector and industry-related investment recommendations | 22 |
| 6. Conclusions..... | 24 |
| References..... | 26 |

Abstract

Until the COVID-19 emergency, China has been the world's workshop. Now, 75% of US companies report that Coronavirus has disrupted their supply chains (ISM, 2020). The result is clear: many companies are now probably regretting their reliance on one single country (and namely China) for purchasing manufacturing inputs, with substantial consequences on supply chain management and international trade.

The analysis begins by introducing the problem and describing Chinese exports, continuing with an overview of the share of imports from China in different countries and sectors, aiming at identifying the most hit geographies and industries. A description of the survey conducted by the Institute for Supply Management (ISM) follows to contribute to determining the dimensions of the phenomenon. Historical similar examples are reviewed. Consequences, also regarding the US-China delicate trade relationship, are addressed, together with a summary of potential countries that would benefit from a regional supply chain diversification. Implications from an asset management perspective, along with potentially profitable investment strategies, are assessed.

1. The Chinese economy and its trade balance

1.1 Introduction

The production of goods and services in the modern economy relies on interlocking supply chains. Due to the interconnection between stages of production, disruption of the supply chain and the production process is recognized as a source of aggregate risk.

Over the past decades, China has become the second-largest economy in the world, accounting for more than 15% of global GDP in nominal values (USD 14.1 trillion, 16.2% share; IMF, 2019) and, incredibly, the biggest economy in the world, accounting for slightly less than 20% of global GDP, when referencing to PPP estimates (USD 27.3 trillion, 19.3% share; IMF, 2019). China has also grown to be the "factory of the world": the country is now the largest recipient of Tier-1, 2, 3, etc.¹ companies, whose work is crucial for the functioning of worldwide giant corporations.

The COVID-19 outbreak is causing serious trouble to the operations and activities of numerous international companies and, consequently, to the global economy. Coronavirus, with its adverse effects on demand and supply levels (we can think about the simple fact that Chinese suppliers are estimated to operate at 50% capacity, with just around 56% of regular staff actively working; ISM 2020), has now disrupted every link connecting segments of the Chinese and global supply chain: suppliers' curtailed production has resulted in components shortages for purchasers and, overall, in supply chain disruption, with potential outcomes both in the medium- and long-term.

1.2 An analysis of Chinese exports (from the point of view of China)²

China ranks as the first country in the world in terms of the value of its exports. In 2018, it exported around USD 2.3 trillion worth of goods globally. It imported USD 1.8 trillion, resulting in a positive trade balance of around USD 419 billion. The list of countries China trades with is diverse and includes the most significant economies in the world (15 major trade partners). Among them, the most remarkable are the following (data as of 2017):

- US: in 2017, it was the largest importer, as its share accounted for around 20% of Chinese exports. As with the sharpening of the U.S.-China trade war, exports to the US have been decreasing over the last two years;
- Asia: 35% of total exports. Hong Kong (11%), Japan (6.5%), South Korea (4.1%), India (2.9%) and Russia (1.8%) are among others;
- Europe: with Germany (4.5%), the UK (2.4%), the Netherlands (1.8%) and Italy (1.3%);
- Other relevant areas: Mexico (2.2%) and Australia (1.9%).

¹ Tier-n company is intended to be the supplier of Tier-n-1 company.

² Here, with Chinese exports we refer to goods exported from China. Shares (%) are relative to total Chinese exports.

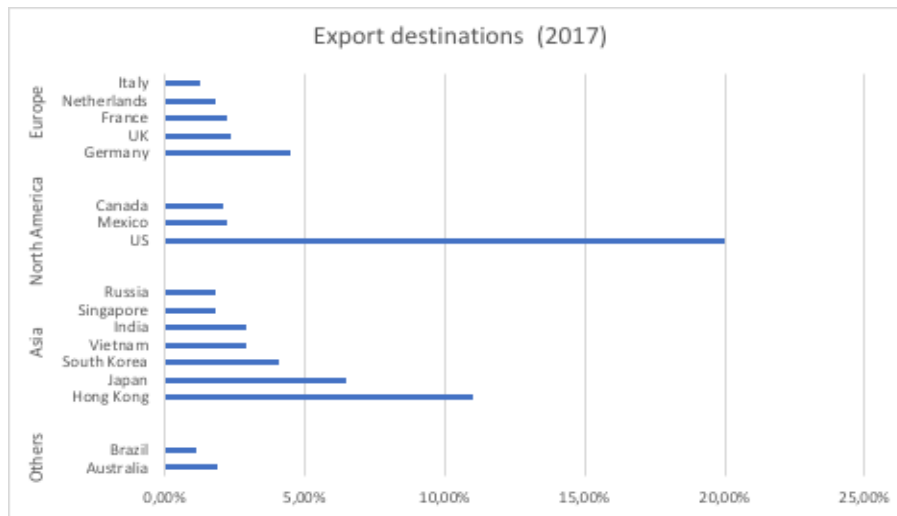


Figure 1 – Export destinations from China (2017). Shares (%) are relative to total Chinese exports.

What does China export the most? As widely known, China has a strong machinery sector, providing computers and telephones, as well as broadcasting equipment and office machine parts (43%). The textile (12%) and metal industry (7.3%) follow. Other substantial sectors include chemical products (4.6%), with products ranging from pesticides and fertilizers to antibiotics, and transportations (4.5%, including products such as vehicle components, passengers and cargo ships, motorcycles). Lastly, stone, glass, plastic, and rubbers exports account together for 3.9% of the total.

1.3 An analysis of Chinese imports (from the point of view of China)³

China is the second-largest importer in the world. Its top imports comprehend integrated circuits (13%), crude oil (9.4%), iron ore⁴ (3.8%), cars (3%), and gold (2.6%). The top import origins of China are the following:

- Asia: South Korea (9.7%), Japan (8.8%), Singapore (3.3%) and Russia (2.5%);
- North America: US (8.7%) and Canada (1.2%);
- Europe: Germany (6.2%), Switzerland (1.7%), France (1.4%) and Italy (1.1%);
- Other relevant areas: Australia (5.5%) and Brazil (3.1%).

³ Here, with Chinese imports we refer to goods imported in China. Shares (%) are relative to total Chinese imports.

⁴ Rocks and minerals from which iron is extracted.

1.4 An analysis of Chinese imports (from the point of view of each foreign country)⁵

How much do world countries rely on Chinese imports? Figure 2 displays data regarding major foreign partners' reliance on Chinese imports. The graph aims at giving a bright prospect of how Chinese supply chain disruption could be devastating for many countries' economies.

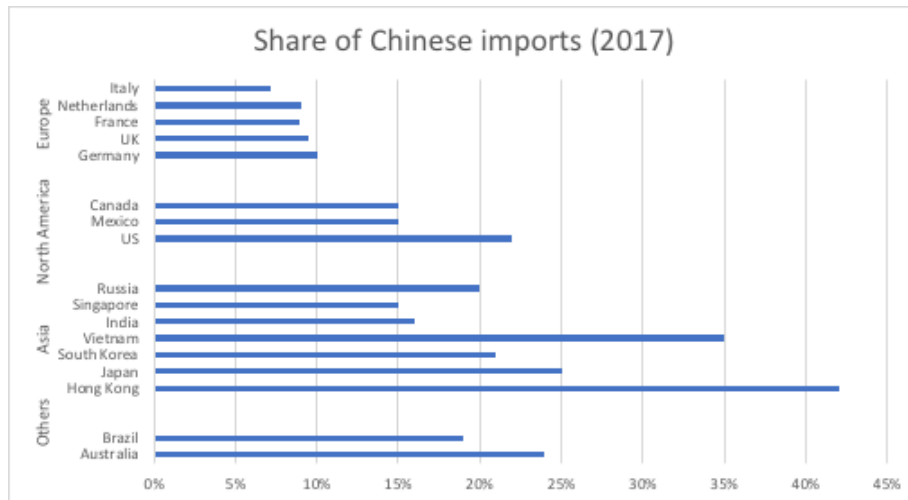


Figure 2 – Shares (%) of Chinese imports, relative to total national imports of each foreign country (2017).

Imports from China consist of a large part of the total imports of each destination, with Asian countries at the top (namely Hong Kong, Vietnam, and Japan, accounting respectively for 42%, 35%, and 25% of their total national imports). In Europe, Germany tops the ranking, with Chinese imports accounting for 10% of total German imports from abroad.

1.5 An analysis of Chinese imports⁶ - Focus on the US.

As seen in paragraph 1.2 above, the U.S. is the first trading partner of China (having as reference absolute values or values relative to total Chinese exports): taking into consideration that the US total imports from China accounted for more than 20% of total US imports and the fact that it has a negative trade balance with China, it becomes evident that the US economy heavily depends on imports coming from China. Here below, we provide an analysis of the evolution of the trade balance between the US and China over the past five years (Figure 3), together with a pie chart describing the categories of US imported goods from China (Figure 4).

⁵ Here, with Chinese imports we refer to goods imported from China. Shares (%) are relative to total national imports of each foreign country.

⁶ Here, as in paragraph 1.4, with Chinese imports we refer to goods imported from China.

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|------------------------------|---------|--------|--------|--------|--------|
| Export | 115,87 | 115,6 | 129,8 | 120,2 | 106,6 |
| Import | 483,2 | 462,4 | 505,2 | 539,7 | 452,2 |
| Total (two-way) Trade | 599,07 | 578 | 635 | 659,9 | 558,8 |
| Trade Balance | -367,33 | -346,8 | -375,4 | -419,5 | -345,6 |

Figure 3 – US exports to and imports from China, total U.S.-China trade, and trade balance (2015-2019, USD billion).



Figure 4 – US imports from China by category (2017).

In 2017, US imported products included broadcasting equipment (14%), computers (10%), clothes (4%), models and stuffed animals (2.6%), other furniture (2.4%), vehicles (2.1%), office machine parts (1.9%), trunks and cases (1.3%) and other plastic products (1%).

1.6 An analysis of Chinese imports⁷ - Focus on Italy

When referring to European and other foreign countries, Chinese imports' features and category distribution follow a path similar to the one experienced by the US. This is also Italy's case.

Since the early 2000s, trade volume between Italy and China has increased five-fold, namely from USD 9.6 billion in 2001 to USD 49.9 billion in 2019. In 2019, China was the third-largest import partner for Italy, providing more than 7% of its imports.

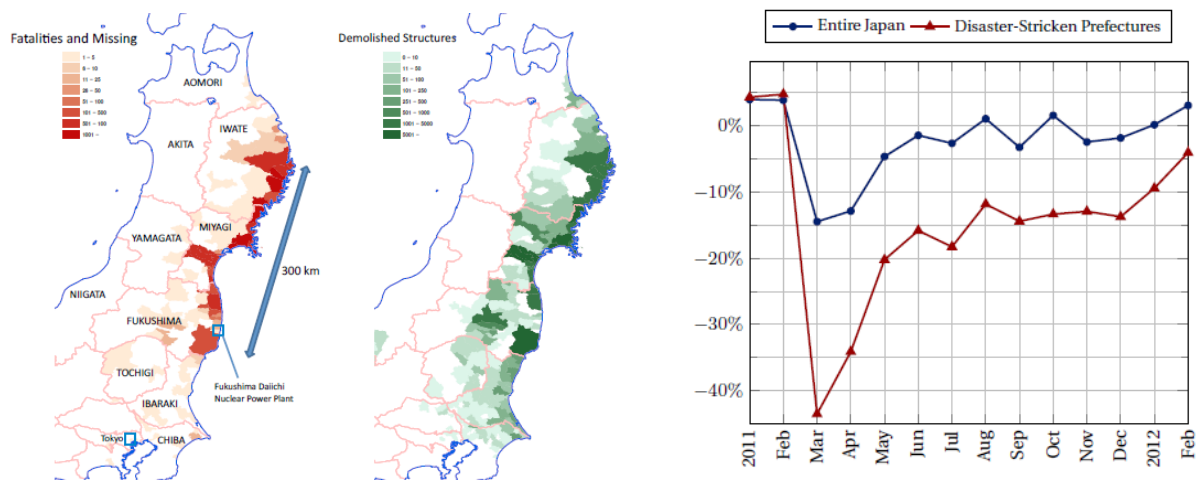
The most valuable share of imports is represented by electrical and electronic equipment, which lead with USD 7.5 billion imported in 2019, followed by machinery and boilers, amounting to USD 6.3 billion. Only these two categories amounted to up to 60% of Chinese imports. The remaining 40% is prevalently made up of apparel articles, organic chemicals, plastics, iron and steel, and medical appliances.

⁷ Here, as in paragraph 1.4 and 1.5, with Chinese imports we refer to goods imported from China.

2. A historical review

2.1 Japan's earthquake and tsunami in 2011

Past episodes have not adequately taught us what supply chain disruptions could mean to the global economy. On March 11, 2011, an earthquake and a subsequent tsunami devastated most of the northeastern coast of Japan. It was responsible for much of the material damage that ensued: it destroyed many infrastructures, such as roads and dams, together with causing several fatalities in the Japanese population (see Figure 5 below).



Figures 5 & 6 – Most hit areas in Japan; the growth rate of national and regional industrial production (2011-2012).

As Figure 6 illustrates, the earthquake and its consequences negatively affected Japanese industrial production, but only temporarily. More importantly, the earthquake disrupted both domestic and global supply chains. The total effects that the supply chain disruption had on the Japanese economy was substantial (JPY 11.4 trillion per year base), two times larger than the estimate of direct damages caused by the disaster.

At those times, Japan was the world's second-largest manufacturer: among other materials, it provided 60% of the world's silicon, an essential raw material. One of the world's leading producers of silicon wafers and ingots in the world was and is Shin-Etsu, which located its primary plant in Fukushima, notoriously close to the epicenter of the earthquake and near the site of the homonymous nuclear power plant. The factory is responsible now for around 22% of the entire world's supply of silicon wafers.

Besides, Japan was and still is the world's largest supplier of liquid crystal displays (LCDs) and LCD parts and materials. Toshiba, a Japanese company, was at the time producing 35% of LCDs and LCD parts in the world. The company was an essential supplier for Apple, providing for crucial components of Apple's iPad and smartphones. After the disaster, the prices for these

components rose by 20%, demonstrating the world's strong dependency on the Japanese supply chain.

In the manufacturing sector, iron, steel, general machinery, electronic components, and motor vehicle parts and accessories suffered a tremendous loss, in addition to the food industry, which suffered some considerable direct damage. To give another example of global reliance on Japan, we can give a look at motor vehicle parts and accessories: on average, a car contains around 100 different microcontrollers, which function as the car's brain; 40% of the world's supply (2010) came from Japan.

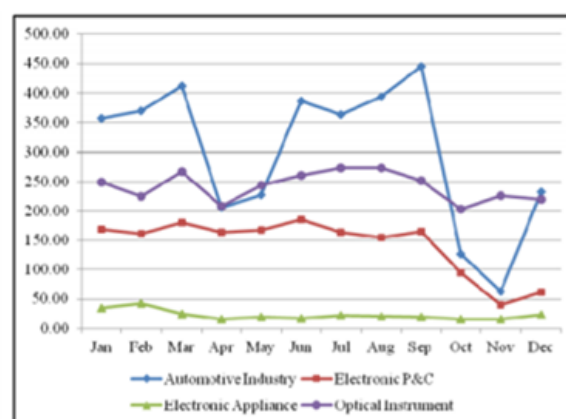
The earthquake did not have any direct effects on the automakers' industry, while the subsequent chain disruption heavily impacted the industry. The problem was due to the industry's characteristic of a complex division of labor involving a vast and extended network of subcontractors. International automakers, such as GM, Ford, and Chrysler, were forced to shut down their plants in the US until the conditions went back to normality.

The global economic effect of the disruption was estimated to be around USD 139 billion. The most affected countries were Japan (39%), the US (25%), China (8%), and the European Union (7%). The most strongly affected industries were transport equipment (37%), primary and fabricated metal (8%), wholesale trade (7%), and other financial intermediation (4%).

It is worthwhile to consider how a company could mitigate the damage through the establishment of multiple supply chains. At the time, global firms considered increasing their inventory levels and the number of lines, suppliers, and facilities to rely upon, together with relocating production centers.

2.2 Thailand's floods in 2011

Some months after the Japanese earthquake, Thailand's economy was severely hit by production and supply chain disruption due to floods. In fact, over the last months of 2011, Thailand experienced tremendous production shutdown consequences.



Source: Office of Industrial Economics, Ministry of Industry, Thailand.

Figure 7 – National industrial production in selected industries (2011).

A drastic contraction of output was the immediate impact of the floods on Thailand's economy. Some of the critical regions were affected by the floods. Although the impact on the economy was expected to be temporary, the slump in the production was remarkable. Delays and disruption of parts and components delivery affected both Thailand and other countries, and many corporations were forced to cease operations. International companies such as Western Digital and Honda Motor were forced to suspend production in central Thailand because of the floods.

Automotive exports exhibited the sharpest decline (50% contraction relative to the previous year), followed by exports in the electronics and electrical appliances industries (-47% and -22%, respectively).

2.3 China's SARS in 2002 & Saudi Arabia's MERS in 2012

Similar series of effects happened during SARS and MERS outbreaks. During SARS (Severe Acute Respiratory Syndrome), restrictions were implemented on travel and many aspects of daily life, interfering trade and manufacturing. However, the effects of SARS and MERS (Middle East Respiratory Syndrome) were trivial compared to COVID-19. China's relative importance in the world economy has grown since then: the world is now much more reliant on China on trade since the country has become the global export leader.

3. The COVID-19 outbreak and its impact on global supply chains and international trade

3.1 A brief overview of the COVID-19 impact on the global economy

We are living in extremely uncertain times. The "World Uncertainty Index" considers 143 countries from 1996 onwards and measures uncertainty by text mining the country reports of the Economist Intelligence Unit. The results are precise: we are now experiencing the highest levels of uncertainty ever recorded.

Due to containment measures, further predictions have been and are being made on world GDP growth. The IMF is indicating that the global economy will surely experience its worst recession since the Great Depression (1929-late 1930s), even underperforming what it experienced during the 2007-2009 financial and economic crisis. OECD has admitted that lockdown measures will inevitably result in significant declines in GDP growth also in the most advanced economies. Most hit sectors and industries, including automotive, airline companies, and energy and primary material industries.

Unfortunately, also unemployment levels' predictions are being negatively revised, referring to the initial predictions made. The International Labour Organization (ILO) stated that current

containment measures are affecting around 2.7 billion workers, which is about 81% of the entire world workforce. Workers living in mid and low-income countries will be the ones carrying the heaviest part of this crisis's burden. Even worse is the scenario for countries that strongly depend on remittances from abroad (i.e., countries for which a big part of their gross national disposable income consists of net unilateral transfers). Current expectations suggest that there will be substantial job losses among migrants: they will not be able to earn income from their jobs anymore, and thus they will not be able to send regular payments back to their home countries.

Containment measures have already started also impacting second and third world countries. The United Nations is worried because the pre-existing disparities among countries will deteriorate, and there will be a reversal of decades of progress in the fight against poverty. All sustainable development groups are expected not to respect their agenda until 2030. Besides, the prospects of industrialization in developing countries will be acutely affected: indeed, they will experience the worst crisis. Countries in such a group sell raw materials. Downturns in their production will inevitably affect total exports and, eventually, governments' budget balance (see oil prices necessary to break-even governments' budget balance, for countries net exporters of oil).

Finally, China, as reported by the BBC, experienced a 13.5% fall in industrial production during the first sixty days of 2020. Being China, the largest exporter in the world, accounting for one-third of total manufacturing goods, one would expect the scenario in the rest of Asia to report inestimable losses. Fortunately, the Asian Development Bank Outlook of 2020 declares that developing Asia has only been hit by a 7.7% fall in industrial production, with India, ASEAN-5 and NIEs countries being the less affected or either still showing a positive growth rate in industrial production.

3.2 The Institute for Supply Management (ISM) and its latest survey

The ISM is the first and leading non-profit professional supply management organization worldwide. Founded in 1915, it is now counting about 47,000 members in more than 90 countries globally, which manages around USD 1 trillion in corporate and government supply chain procurement annually. Its first aim is to drive value and competitive advantage for its members.

On March 11, 2020, the ISM published the results of a first survey upon the effects that the COVID-19 outbreak is having and will have on businesses and their supply chains. Conducted over 628 respondent organizations during the period February 22 - March 5, the survey includes responses by both US manufacturing and non-manufacturing companies. The roles played by respondents range from emerging practitioners to chief procurement officers (CPOs may be in charge of the contracting services and may manage the purchase of supplies, equipment, and materials), with a vast majority of them (73%) vested with important and experience-requiring roles in the firms they represent, resulting, the ISM thinks, in an accurate and reliable survey.

What's the main takeaway of the survey? 75% of the companies participating in the survey reported supply chain disruptions, and more than 80% of the respondents worry that their companies will experience financial distress due to COVID-19.

Regarding transportation and logistics, 62% of companies are experiencing delays in receiving orders from China. Even within China, moving goods has become a hard challenge, with around 48% of the companies experiencing delays. Moreover, 46% of companies reported delays loading goods at Chinese ports. Furthermore, 57% of companies reported more than doubled lead times for tier-1 China-sourced components since late 2019.

Consequently, it becomes clear that COVID-19 is putting a significant strain on supply chain managers, who, in a significant number of cases (the survey says more than 44% of them), do not have a plan in place to address supply disruption from China.

All this situation is impacting the businesses: nearly about 150 publicly traded companies have warned their investors about an almost inevitable downturn of revenues and profits for the first quarter of the year. Results provided by the ISM evidence that 16% of the respondents confirmed that the CFOs of their companies have downwardly revised target revenues of about 5.6% on average due to the Coronavirus (some as much as 15%).

3.3 An analysis of the decline in production of sectors, industries, and companies affected by the supply chain disruption

In the short-term, the spread of the pandemic is causing serious troubles also to the consumer sector, which is an important economic growth driver. In the first six months of the year, retail, catering, and travel services will all experience tremendous financial pressure due to high fixed costs and low sales. COVID-19 outbreak is driving a "Bullwhip effect"⁹ in the global supply chain by forcing firms to reduce or eventually shut down production.

Major industries affected include high technology and modern manufacturing. Some companies are, of course, better prepared for such situations than others, and they will mitigate the impact. Other corporations, instead, are overly reliant on a single supplier for all their crucial inputs: suppliers' geographical diversification in such cases is quasi-zero.

Besides, tech companies, apparel producers, and manufacturers of industrial equipment rely more than everybody else upon their Chinese suppliers. Consequently, they are among the companies that are expected to be hurt the most by the supply chain disruption. Such companies may not be able, in the short term, to meet their obligations and payments. Apple and Microsoft, two giants in the industry, warned investors that sales estimates would not be met due to supply-chain problems.

⁸ Lead time is the amount of time that passes from the start of a process until its conclusion.

⁹ The expression refers to increasing swings in inventory and demand at wholesale, distributor, manufacturer and raw materials supplier levels, in response to shifts in retail demand.

Telecommunication companies are currently facing great danger since fiber optics production, which is of primary importance for 4G plan expansion, is now compromised, also affecting the schedule of China's 5G development.

The other two sectors that will experience severe shortages are photovoltaics and the smartphone industry. Many raw materials involved in the photovoltaic production are sourced from the Chinese supply chain. Some manufacturers can rely on other factories located in other parts of the world or Asia. Still, producers without such an option must find different solutions and adapt to market situations accordingly. Talking about the smartphone supply chain, it is to be noted that it is highly labor-intensive, consequently highly exposed to negative shocks in the workforce.

Large multinationals in the automakers and transport sectors have been forced to shut down their Chinese factories. General Motors has identified a potential parts shortage that could lead to a severe production slowdown and decided to massively stock up essential components to prevent the halt of production. FCA is seeking alternative suppliers, while Toyota has assembled a task force to monitor the pandemic. Potential unavailability of raw materials and components remains the most significant risk factor directly impacting the auto industry, although automakers may try compensating for components shortage through seeking overseas suppliers. It is also to be noted that since the car-buying process is long and takes many trips to and from the dealer, once buyers are not allowed to visit dealers, sales will become impossible.

Consumers have rushed to supermarkets to buy non-perishable goods, such as pasta and toilet paper. Pasta relies on a highly complex supply chain, often going through several countries before arriving in supermarkets. Barilla and De Cecco, the main participants in the industry, significantly rely on wheat from Canada, which is the "world's granary." Fortunately, wheat production and harvesting are mechanical: the wheat is transported by rail, and almost everything is automated. However, the price of the Canadian wheat has picked, increasing by 8.5% since the start of the year.

Nevertheless, if supplies coming to Europe are not appropriately sorted due to labor shortages, there will potentially be shortages in the food supply chain. Italian food factories are still running at full capacity despite a 15% reduction in the workforce. What is at most danger is perishable fruit, vegetable, meat, and dairy products, whose producers are likely to see fewer choices if the crisis goes on.

3.4 Effects on international trade: general considerations and focus on US-China trade volumes

The simultaneous shocks to production, demand, human flows, and supply chain resulted in a significant cutback in international trade flows of goods and services. Supply shrinkage, suspension of transportation services, and lesser movement of people between countries are severely reducing exports and imports of both products and services.

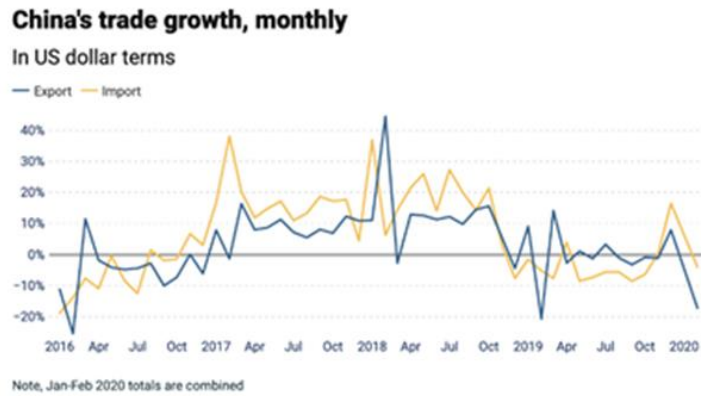


Figure 8 – China's monthly YoY trade growth (2016-2020).

The collected data (see Figure 8 above) reveal that trade and capital flows are reasonably weakening due to the pandemic's development. Each China's trading partner is experiencing a sharp decline in trade flows from and to China. Cross-border and domestic trade activity in China fell by more than half (56%) in just a single week in February. The number of transactions between Chinese companies and international firms dropped by 50% during the same period. The country's imports decreased by 4% in US dollar terms in just January and February 2020, relative to the 2019 same period. Exports dropped by 17%. Considerable declines in exports are to be found among intermediate products such as textile and electric and electronic components.

Imports from China have been declining in all regions across the world, but trade with the US was already in decline due to the US-China trade war. Over the past few months, analysts have been continuously drowning international trade into talks regarding the impact of Coronavirus on the bilateral trade deal between the US and China.

In December 2019, the two countries finalized phase one of the deal, signing it in January 2020. Both countries' authorities could not foresee what was going to happen: the pandemic impaired both nations' ability to respect what was agreed.

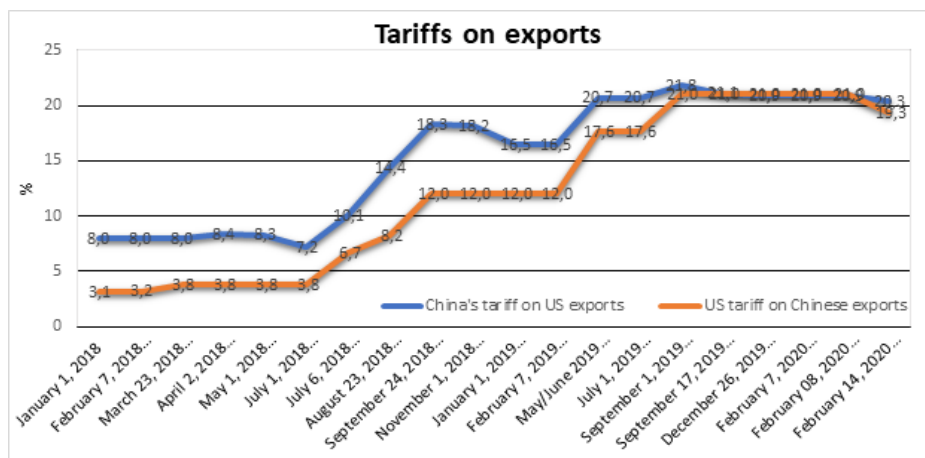


Figure 9 - Tariffs applied to US and Chinese exports, respectively (2018-2020).

On average, US tariffs on imports from China are set to remain sharp at around 19% (more than six times higher than before the trade war; see Figure 9 above). On the other hand, Chinese tariffs on imports from the US will be expensive as well, amounting to around 20% on average.

One of the critical pillars of the deal would have supported a dramatic expansion of US food, agriculture, and seafood product exports. The deal required China to buy at least USD 40 billion in agricultural products from the US. The current US administration considers the export of soybeans one of the most valuable items of export: in 2017, soybeans exports amounted to \$22B, of which 58% were directed to the Chinese market. Nonetheless, the Asian giant has not come even close to hit the target, opting instead for much cheaper Brazilian soybeans. Also, transportation constraints and slowdown in demand are affecting China's import levels.

In a pandemic scenario, demands for essential and non-essential goods (including luxury) diverge. Essential goods are those necessary for living (food and medicine): demand for them remains steady. Dispensable goods' demand sharply declines, since people prefer to save money unless it is strictly necessary. Consequently, it seems nearly impossible for the nation to be able to keep its promise of purchasing USD 200 billion worth of US goods and services by the end of 2021, given the current expectations of growth being around only 1%.

In February, China lifted bans on pet food products, chipping potatoes, infant formula, poultry, and beef products, while it also started imposing bans on American farm goods such as pork, sorghum, soybeans, and wheat.

Another cornerstone of the trade deal was the intellectual property protection plan for which China has yet to deliver. US analysts have estimated property thefts to range between USD 225 and 600 billion a year: this will be the first real test of the stability and involvement of the countries in the deal.

We must bear in mind that there is not much trust between the two sides and that the US, of course, does not like how the line of events is changing. Investors have already started speculating about a new crisis between the two super economies, even if it is clear that neither can afford to do so. Dean Geoffrey, professor at Wharton, pointed out: "I suspect no new crises will extend through the remainder of 2020, above all because both China and the US will do whatever they can to try and engineer something like a V-shaped recovery in the final quarter of the year".

The US government is taking into consideration all the issues that may be encountered while importing Chinese goods and services in future years: diverse complications (regarding areas such as health and biosafety) may arise due to the virus.

Overall, the pandemic may be able to upset the current global economic scenario that sees China as the world's first manufacturer in several ways:

1. Countries may impose bans or more stringent sanitary, phytosanitary and technical barriers to Chinese exports (some of these measures can remain in place for few years);
2. Reduced entry and allowance of Chinese travelers to foreign countries and foreign travelers to China;

3. Reduction of in-person cross-border business deals;
4. A shift of production to alternative locations by corporations currently operating in China (firms will consider nearer and safer locations to prevent supply chain disruptions);
5. A shift of sourcing locations from China to other countries by large global importers of manufactured products (which may be permanent in some cases);
6. A higher cost of transport and logistics services (only a short-term issue);
7. Suspension of production of some international firms in China (both short- and long-term closures).

4. The future of the global supply chain and how companies should tackle the challenge

4.1 Theoretical effects on supply chain management

Considering past supply chain disruptions like the ones mentioned above, this pandemic is by far the most threatening, because it has not only created bottlenecks, but it has also completely stopped production, a scenario that many businesses cannot afford to uphold. However, why international businesses have always struggled against such situations? The reason is always the same: the supply chain is vulnerable.

Manufacturing allows companies to improve efficiency by lowering the cost of their supply chains by reducing inventory. Nevertheless, low inventory levels impair supply chains' ability to withstand sudden shocks, such as the situation we are currently facing.

Globalization has played a paramount role in the establishment of some consolidated centers of production. The globalization of supply chains has resulted in the shaping of defined areas, specialized in the manufacturing of essential products. When times are good, international corporations benefit from the system, providing both cheap overall costs and plentiful supplies, but, in lean times, it deprives them of the ability to fill the gap quickly.

If all businesses operated flexible supply chains, by being able to switch orders in times of stress, the Coronavirus outbreak would not have hit so hard. Only a few companies currently rely upon flexible structures that can meet varying demand needs and supply concerns, thus resulting in better shape than others to mitigate the impact. These companies have succeeded in implementing a diversified base of suppliers from a geographic perspective: in fact, they have reduced their reliance on a single source for their primary commodities and components. Other companies have built strong relationships with their suppliers that enable them to adjust their supply networks in response to demand needs quickly. They are continuously investing in supply chain planning and solutions to face the current problem.

However, the majority of worldwide operating corporations are facing disruptions in their activities. They are not able to get precise data about their inventory levels and to optimize

production. Consequently, these firms are not able to properly distribute goods and services profitably.

The fact that supply chains are managed manually is a direct consequence of them being rigid. Shifting suppliers is a lengthy and complicated process, and this is a luxury many companies cannot afford in distress times.

Managing a situation like the COVID-19 outbreak is even harder because businesses lack supply chain transparency: corporations are unaware of what is happening to their supply chains beyond their Tier-1 suppliers. Even in the case an entity is willing to detect the threats to its production capacity and puts effort into doing that, it will not be so simple. Almost no CEO knows his company's entire supply chain. Tier-1 suppliers only represent the first layer of the supply chain, as they have other suppliers who have, in turn, the third layer of suppliers. Michael Essig, a professor of supply management at the Bundeswehr University, has calculated that Volkswagen has around 5,000 suppliers (Tier-1); each of them has an average of 250 suppliers (Tier-2). In the end, the company relies on around 1.25 million suppliers.

When we discuss supply chain suspension, we directly address the issues regarding manufacturing products and technological input shortages. However, the entire picture is a little more complicated than we perceive. The consequences of the pandemic on supply chain management must be analyzed from disparate perspectives. In this manner, during our analysis, we should keep in mind additional implications such as shortages in labor, travel restrictions, national and regional border closures, issues regarding logistics, and transportation. These factors result in decreased production, eventually leading to shortages in inputs for the client company.

If the client company has not differentiated its supplier base, unwanted consequences may occur. In this case, preparing for an unpredictable disruption and taking measures to mitigate the risks is fundamental for supply chain leaders. Analysts argued that robust and responsive supply chain strategies must be implemented to deal appropriately with future natural disasters or events such as the COVID-19 outbreak. After several historical events, and most recently, the COVID-19 outbreak, companies are slowly figuring out that it is hazardous to concentrate suppliers in a unique geographical area.

Dealing proactively with disruptions of the supply chain network has become one of the most critical issues managers must measure with their selves. Effective management of supply disruptions needs both an optimal design of the supply system that includes strategic moves and measures involving inventory, finance, and demand management.

4.2 What companies can do both in short- and in the long-run to avoid future disruption

The outbreak of the virus began in Asia; thus, the continent was the first one to face COVID-19 implications. Consequently, Asia has been restoring economic activity before than anyone else. The fear of outbreak re-emergence remains, but China is finally trying to return to normality.

Economic activity indicators show that China's economy is starting to go back to pre-crisis levels: air pollution and coal consumption have almost returned to 80% of pre-lockdown levels.

The climate that is pouring out across Chinese cities is characterized by "cautious optimism," which is boosting consumer spending while maintaining, at the same time, some health and distancing precautions. Other Asian countries such as Singapore and South Korea are succeeding in their war against virus' consequences.

Finally, business enterprises are resuming production and activity. However, quarantines and travel restrictions are slowdown factors. The time to restore full operational and labor-capacity will be much longer than usual. Enforcement of precautionary measures is critical for businesses that want to restart production while preserving the health of their employees. Care of employees is the top priority during these times. To educate employees on COVID-19 symptoms and precautions, internal courses on health and safety are imperative.

Screening protocols implementation could be the right card to play. Such protocols will cause a loss of productivity for some time due to the increase in absenteeism, labor shortages, and interruptions. Though, higher expenses related to a complete shutdown of operating activities will be avoided.

Managers should try to diversify suppliers searching for new opportunities in other parts of the world. Mexico, Brazil, India, and Chile are all potential competitor markets to China, and a manager must consider to source there.

What will be the future of those countries and in particular of China? Together with all the negative and disastrous consequences that brought to the world's eyes, the virus put supply chain managers on their guards. China continuously exports raw and intermediate goods all over the world while housing numerous international companies that have benefited from the low workforce's cost.

Global awareness that such a situation could be a repeatable event will inevitably force some alterations in supply chains. Supply chain managers will aim to reconstruct global supply chains in the best possible way to mitigate the impact of such unfortunate occurrences. Most importantly, when coming out of the current pandemic, companies should completely revise their chains, trying to detect any vulnerabilities that could expose them to dangers. Which are the drivers of the potential vulnerability?

- Supplier network (concentration vs. diversification; length of the supply chain);
- Transportation and logistics;
- Financial resiliency;
- Product complexity;
- Organizational maturity.

Considering these potential issues, all companies should consider running stress tests for a different pandemic or similar adverse scenarios: results could be a valuable asset that firms can use to upgrade supply chains. On the matter, identifying the company's Tier-1 and Tier-2 suppliers would be crucial to assess potential supply chain risk.

Active communication is then critical to minimize the sensitivity of the company to its supply chain. Supply chain managers must understand their positions concerning suppliers and how they will be treated in the event of inventory and supply shortages because suppliers may have different and important customers.

Companies' high reliance on a unique supplier located in a single location has not proved to be the right move. Companies' plan must be to restructure global supply chains through territorial diversification and by implementing collaborations with suppliers closer to final consumers, resulting in a more diverse and short supply chain.

Leaders must design resilient supply chains for the future. The first step that companies have to take consists of constituting a supply chain risk function that is mandated to assess supply chain disruption-risk and to adjust firms' structures accordingly. The control center must continuously and adequately monitor the global situation without neglecting any risk factor. The future of supply chain management is evident: new supply chain technologies are getting ahead, improving chains' agility and resilience at no overhead costs.

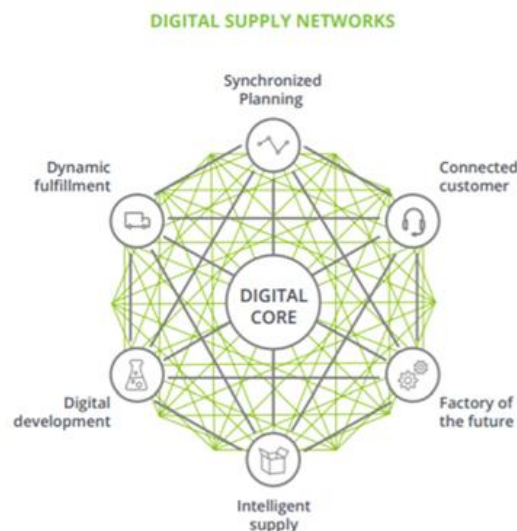


Figure 10 – Supply chain future in a diagram.

4.3 The case for supplier territorial diversification

A company's link and proximity to China has turned out to be a liability rather than an advantage in the long-run, concurring in building up supply chain risks.

International companies and businesses urgently need a rethinking of their economic and strategic independence. In February, the German supply chain consultant firm Kloepfel Consulting surveyed around 1,000 global firms. Results reported that 81% of companies rely on Chinese suppliers.

The outbreak worked as a wake-up call for international companies about the risks of excessive reliance on China's production and workforce. World businesses such as Coca Cola has not been able to provide its factories with all the necessary components for its diet sodas, while Procter & Gamble's 387 suppliers in China have encountered difficulties in resuming production.

Trade War between China and the US and the rising Chinese labor costs were already putting some pressure on managers to decouple their companies from China. Qima, a supply chain inspection company based in Hong Kong, recently published a report stating that demand for inspection services fell by 14% in 2019 concerning the previous year. Nevertheless, the virus is further accelerating the pre-existing slowdown of the Chinese economy by prompting American companies to diversify their suppliers' portfolio away from China. Many analysts expect companies to adopt a "China plus 1, 2, 3" strategy for their supplier structures. Thus, China will undoubtedly remain an essential market for the sales and supply chain, but other countries will join the list and erode its share.

Businesses must diversify. Managers must opt for finding additional suppliers across different countries and continents. This would result in higher costs in their quarterly balance sheets, but it would also guarantee a warranty against future disruption and crises. In the long run, it is safer for companies to have production and supplies more diversified and closer to final consumers.

5. Implications from an asset manager perspective: potentially profitable investment strategies regarding different geographies, sectors, and companies

Stepping from the information included in all the previous paragraphs and by looking specifically at the various types of segmentation of companies provided, i.e., by geography, by sectors and industries, by supply chain layer (e.g., client company vs. Tier-1, 2, 3, etc. supplier company) and other supply chain crucial features (e.g., well vs. bad positioning on length, granularity, and technology level of the supply chain), we can derive the rational basis for our bidirectional investment convictions. The latter should be used by an asset manager to peculiarly tilt its equity asset allocation with targeted overweights and underweights towards the advised segments.

Ideally, if we had access to detailed information about (or were able to estimate in a more or less reliable manner) the full spectrum of the joint probability distributions of companies characterized by the features as mentioned earlier (which can be seen as variables or factors), we would be able to make meaningful predictions about which exact panel of equities to overweight or underweight. This would be a very difficult if not almost impossible exercise. That's why we would like to tackle this issue:

- Firstly, from a theoretical standpoint;
- Secondly, by giving out simplified investment recommendations, based on collected data as shown in the previous parts of the report, concentrating our attention towards most relevant geographies and sectors, namely the ones that are driven by the most intense

supply chain disruption effect, respectively in a positive (winners) and a negative direction (losers);

- Thirdly, by giving a general overview of sectors and industries that are experiencing the best (winners) and the worst (losers) situation concerning the COVID-19 emergency, together with an indication of question-marks (inbetweeners). For geographies, we limited our scope to supply chain disruption related shifts, as discussed at the previous point;
- Lastly, by taking into consideration the effects given by other variables (see paragraph 6).

5.1 Our investment recommendations, driven by the supply chain disruption effect

Following what has been said before, we should choose the right and proper combination of segments, most or least favored by the supply chain disruption phenomenon.

Among the winners, we can reasonably include a panel of companies called *Equity Selection Overweight / Buy* – “Fly to well-positioned suppliers,” formed by entities characterized by:

- Geography: most exposed to Chinese imports (top 5 countries are Hong Kong, Vietnam, Japan, Australia, and the US; these geographies would account mostly for an intranational effect driven by internal demand); low-cost of labor and production (selected areas of South America, South-East Asia, and Africa; these geographies would account mostly for an international effect driven by foreign demand); some geographies (e.g., Vietnam) can see a compounding effect (both intranational and international);
- Sector and industry: most represented in Chinese exports (top 5 categories are computers and telephones, broadcasting equipment, office machine parts, textile, and metals);
- Supply chain layer: supplier (preferably most vertically integrated);
- Length, granularity, and technology level of the supply chain: short (i.e., with few layers), granular (i.e., with many suppliers at the same layer), and high technology level supply chains.

On the other hand, among the losers, we can reasonably include a panel of companies called *Selection Underweight / Sell* – “Escape from badly positioned clients,” formed by companies characterized by:

- Geography: most exposed to Chinese imports (top 5 countries are Hong Kong, Vietnam, Japan, Australia, and the US);
- Sector and industry: most represented in Chinese exports (top 5 categories are computers and telephones, broadcasting equipment, office machine parts, textile, and metals);
- Supply chain layer: client (preferably least vertically integrated);

- Length, granularity, and technology level of the supply chain: long (i.e., with many layers), concentrated (i.e., with few suppliers at the same layer) and low technology level supply chain.

5.2 Our sector and industry-related investment recommendations

As said above, in our analysis, we distinguish three main categories of sectors and industries that will behave differently during the crisis, mainly due to demand-driven causes.

Winners: in most of these sectors, supply chain risk is not even an issue since such services, in most cases, get along without the need for suppliers. The category comprises the sectors that we think will benefit from this situation. With a little effort and intuition, these sectors may prove to be the right choices for investors. Companies in such sectors have the natural ability to invest in innovative and unique opportunities continuously. Among them, we find:

- Pharma & Biotech: companies in this sector are the main actors during COVID-19 times. They are all experiencing some benefits from the crisis. For instance, Moderna, an American biotechnology company, is actively working on a vaccine, while Roche, a Switzerland pharmaceutical company, is providing an immense number of virus-testing kits;
- E-commerce: people have massively increased their online spending. Companies such as Amazon, despite the current common employment trend, is adding new jobs to manage extra demand and capacity. Also, some companies have suspended new orders until they can get rid of precedent ones;
- Logistics and delivery: due to the movement's impossibility, the demand for delivery services has drastically increased. In China, Alibaba Group launched an initiative in response to this demand which consisted of shipping at convenient conditions medical and other essential products all over the Chinese territory;
- Food delivery: companies in the food delivery business have experienced a sharp increase in deliveries demand. The sector has been forced to additional delivery men to satisfy demand through a "no-contact drop-off service";
- Video Conferencing: startup Zoom has benefited infinitely. 2020 sales are growing at an unprecedented pace; the firm's share price is up 50% from the beginning of the year. Other already known branches such as Skype, Teams, and Webex reported sale surges;
- Online entertainment and gaming: platforms such as Netflix, Amazon Prime Video, and Disney+ reported a sharp increase in viewership. Online gaming platforms are also experiencing record volumes;

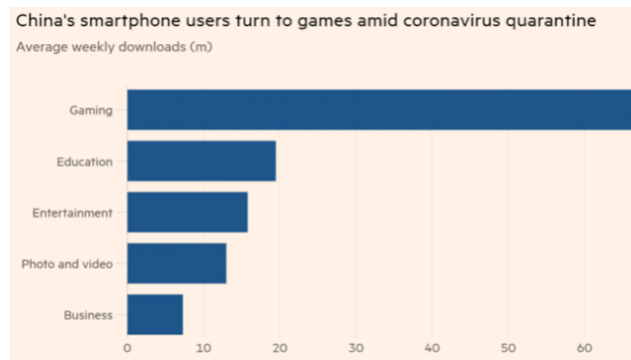


Figure 11 – Surge in game downloads among Chinese smartphone users (2020).

Losers: even if companies in these sectors will succeed in surviving the crisis, they will inevitably be severely damaged. Generally, these sectors implement specific strategies consisting of cutting costs and beating a retreat, coming back in business only once the worst is over. The following sectors are being noticeably hit the most by the outbreak:

- Tourism and travels (airlines, train lines, and cruise lines): international travel could be adversely impacted by up to 25% this year, equivalent to a loss of 2 months of travel (or even more). Analysts have estimated that, once the outbreak is under control, it would take up to 10 months for the tourism industry to get back to its pre-pandemic levels;
- Investment banking: many investment bankers are set to lose their jobs. The shares of the leading US banks are all down more than 30% from the beginning of the year;
- Energy (oil and gas);
- Traditional retail;
- Cinemas;
- Professional sports and entertainment.

Inbetweeners: companies in this category are faced with an important decision, namely whether to adapt their structure and business model to take advantage of new opportunities or not. Therein lies the future of their activities. Sectors which belong to such category are the following:

- Healthcare: some firms in the sector will emerge, giving birth to new ideas that could improve healthcare. Others risk failure and will be kicked off the market. A virtuous example is Baidu, a Chinese digital firm, which has implemented an innovative app ("Fight Pneumonia") to help the government in getting precise and useful data about the pandemic in real-time;
- Manufacturing: many producers will struggle in selling their products due to lower demand for them; the most advantageous solution is to start producing different products than before;
- Education: universities, national schools, and private education did not interrupt their teaching activities. With the population stuck at home, this situation could signify a turning point for educational institutions;

- Banking: most banks will lose money because individuals and companies will experience hard times to pay back their debts. In the case of a recession, the market for financial assets will also fall.

A focus on banking challenges and the case of FinecoBank

Players in the financial industry must be able to identify the long-run changes that we will need to take to adjust to life after COVID-19. It would be wise for many banks that have expanded their branches to every corner of their markets to realize that since the fight against Coronavirus is far from over, now is a good time to invest in an urgent conversion to digital banking solutions.

Until recent times mobile banking solutions were mostly a matter of personal convenience, now it is a matter of safety and pure functionality. There is the risk of a second wave of spikes in cases that could lead once again to mass quarantines. Banks that have looked ahead of times and made these investments are now one step above competitors.

This is the case for FinecoBank: the Italian bank confirmed the target that was established at the beginning of the year. The bank was born-digital; therefore, it had not to go through the process of digitizing its operations. Hence, the new technological competitiveness has pushed many new clients towards FinecoBank, which became a new alternative to what would have been their conventional choices just a few weeks ago. The institution reported that its brokerage fees for the first trimester increased by 110% yearly. In the period from January to March, the corporation reported revenues for EUR 2.1 billion, a significant increase if we compare it with the revenue reported for the same period last year (EUR 1.7 billion).

6. Conclusions

After having clarified our two supply chain disruption related investment recommendations (see paragraph 5.1) and general investment convictions about global sectors and industries (see paragraph 5.2), we conclude by providing some details about risks and other variables acting on our outlook and investment recommendations.

Before going any further, we have to specify that all the recommendations provided above are set like all other things remaining equal ("ceteris paribus"), following a quite accepted and reasonable approach.

However, for a more comprehensive and prudent asset selection (which in our case is focused on equity), we should take into consideration the effect of other variables acting on the investment recommendations. The latter are summarized by the following:

- Monetary policy actions by Federal Reserve, European Central Bank (ECB), Bank of Japan (BOJ), PBOC (People's Bank of China) and other relevant international central banks;
- Fiscal policy actions by international governments and municipalities;
- Healthcare and public security policies by international governments and municipalities;

- Other variables that affect demand, supply, economic growth, and easiness of doing business, i.e., complexity and strictness of regulation, level of corruption and criminal activity, the security of international transactions, etc. (particularly relevant in low-cost of labor and production countries, such as African ones).

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