PGIM

AFTER THE GREAT LOCKDOWN

New Business Realities and the Implications for Investors

May 2020

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FOREWORD

From a local public health challenge in a single city, COVID-19 has spiraled into a worldwide pandemic – unleashing a cascading series of humanitarian, societal, business and economic crises.

Given the extent of upheaval and uncertainty, it is difficult to predict precisely how the world will be different after the myriad effects of this pandemic have passed. This is exactly the challenge for institutional investors. Now, more than ever, they need to focus not only on the ongoing disruptions but also on how this episode will structurally alter the behavior of companies, consumers and governments well after the Great Lockdown is over.

Our focus in this report is on the long-term structural impact of the coronavirus crisis on companies around the world: How will firms respond to newly discovered operational risks and business vulnerabilities; to potentially permanent shifts in consumer behavior and preferences; and to incremental government regulations and interventions? These questions are critically important for investors as over 50% of a typical institutional portfolio is comprised of corporate debt and equity, both public and private.[1]

To explore these questions, we draw on the insights of over a dozen PGIM investment professionals across our managers. We believe long-term investors who anticipate the enduring transformations catalyzed by this crisis will be best positioned to navigate the investment opportunities and risks after the Great Lockdown.

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INTRODUCTION

The coronavirus pandemic has led to humanitarian, societal, business and economic crises unprecedented in their global breadth and speed – leaving governments, healthcare systems, communities, companies and families overwhelmed. Over a third of the world's population has been in lockdown. Global 2020 GDP growth has been revised down sharply by over 7 percentage points, from +3.3% prior to the crisis to -4.3%. According to the International Monetary Fund (IMF), this episode could result in a staggering $9 trillion in forecasted global output lost by the end of 2021.

Even after the Great Lockdown is over, the crisis is likely to drive major structural and cyclical changes around the world. Economically, the pandemic-induced global recession could reach a magnitude not seen since World War II. Alongside the resulting fiscal and monetary responses, this will impact employment, inflation, savings, investments and macroprudential stability for many quarters ahead. Socially, with minorities and lower income households disproportionately affected, the coronavirus crisis will fuel the growing tensions from widening income and wealth inequality. Politically, the Great Lockdown will escalate the ongoing tussle between globalization and sovereignty as the need for a multilateral response to a pathogen that doesn't respect national borders is countered by the need to close borders to protect our own. PGIM's investment professionals and researchers have explored many of these critical topics over the course of 2020.

> *Even after the Great Lockdown, the crisis is likely to drive major structural changes around the world.*

The scope of this research is focused on a narrower but truly critical topic for long-term institutional investors: How will the Great Lockdown structurally change the way companies think and operate? Will their business models, strategies and actions need to adapt permanently? How will government intervention impact the business environment moving forward? Will companies need to respond to the permanent changes in consumer behaviors and preferences? Which companies will emerge as the new long-term winners and losers after the humanitarian and economic crises are over? These altered decisions by firms around the world will be major drivers of value creation and destruction for years to come across corporate debt and equity, both public and private, as well as commercial real estate.

Drawing on the insights of more than a dozen PGIM investment professionals across fixed income, equity, real estate, alternatives and asset allocation, we believe investors should focus on four structural changes that are likely to reshape corporate business models well after the coronavirus crisis has receded:

- A barbelling of global supply chains into (a) more resilient, diversified, multi-regional supply chains, and (b) "reshored" supply chains returning to their home markets, either because of economic logic or government intervention.
- A transition from efficient and lean "just in time" inventories to fatter, "just in case" inventories, especially upstream, as companies balance inventory costs with supply uncertainty.
- A significant acceleration of the trend towards "weightless" firms – built on capital-light, tech-heavy models centered on investments in software, R&D, data and intellectual property.
- A rethinking of the "live, work, play" urban community model, the co-working office spaces powering the gig economy, and the logistics and warehouse spaces required to support the next wave of e-commerce and online retail.

We explore these four themes and their investment implications in the rest of this report. While this pandemic is still unfolding, and our early hypotheses are necessarily speculative, we believe investors who can separate the short-term noise from the long-term structural changes that may result from the Great Lockdown will be strongly positioned when the dust finally settles.

HIDDEN FRAGILITIES IN GLOBAL SUPPLY CHAINS

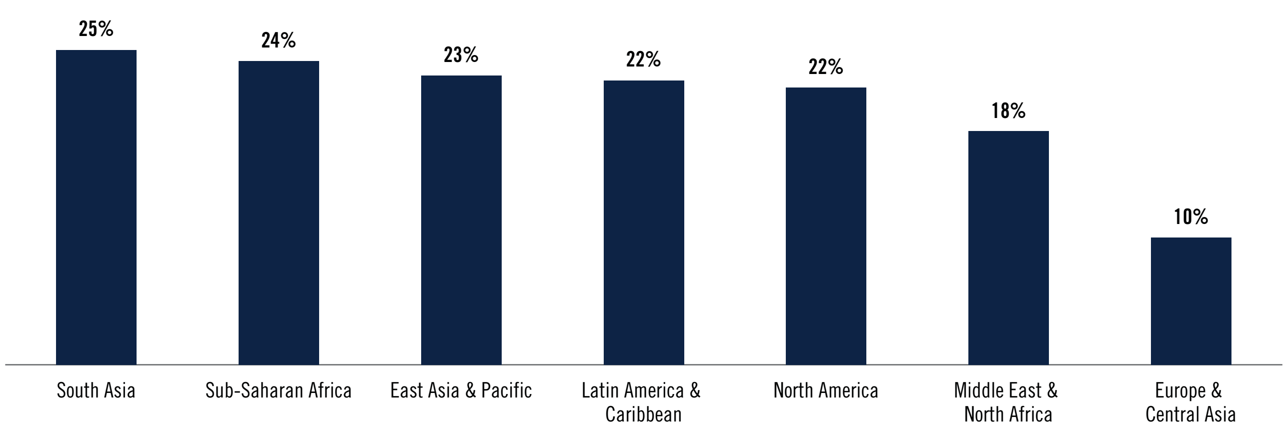
One of the most immediate and damaging impacts from the coronavirus pandemic has been the dramatic breakdown of global supply chains. This process began in China, which now accounts for roughly 20% of all intermediate and capital goods imports globally (see Exhibit 1). As the government implemented restrictions in almost 90 cities, China's manufacturing sector all but ceased operations.[2] Cross-border and domestic trade activity declined over 50% in a single week during the initial peak of the outbreak.[3] The concentration of global corporate supply chains in a small number of low-cost locations led to increased vulnerabilities.

The disruption didn't end there. Having endured the shutdown of Chinese factories in February, Apple, for example, was suddenly met with new shutdowns in Italy, Germany, Malaysia and South Korea – where many of its component makers are located.[4] Meanwhile, nationwide lockdowns in Peru, Chile, Canada and Mongolia halted the mining operations which produce the raw materials for most essential smartphone components.[5]

The COVID-19-related supply chain disruptions extended well beyond manufacturing. Take European agriculture, for example. The lockdown of agricultural workers in key supplier markets like Kenya and South Africa, the shortage of truck drivers and seafarers to transport food, and the inability of seasonal workers from North Africa and Eastern Europe to travel to farms in the EU to gather crops is increasing concerns about dependable supplies of fresh fruit and vegetables.[6] This is especially true in countries highly reliant on guest workers to plant, grow and harvest crops. In the US, meat processing plants across multiple states have been forced to close, with millions of pounds of meat disappearing from the supply chain.[7]

In the service sector, India and Ireland account for over 25% of offshored telecom and information services, both of which went into lockdown.[8] Following Prime Minister Narendra Modi's announcement of a 21-day shutdown, leading Indian outsourcing companies scurried to move desktops into employees' homes, upgrade networks, install high-speed broadband, and even collect employee signatures on nondisclosure agreements.[9] This enormous undertaking caused service providers to fail to meet the terms of their

Exhibit 1: **Share of Total Intermediate and Capital Goods Imports from China**



Note: Values are for 2018.
Source: World Bank WITS, accessed April 22, 2020.

contracts, and some of their clients responded by abruptly bringing these services back onshore.[10]

Furthermore, many firms have discovered they lack real visibility beyond the first tier of suppliers – those who supply directly to them. This is also leading to undetected vulnerabilities and unexpected disruptions further down the supply chain. Over 90% of Fortune 1000 firms had at least one tier 2 supplier in the most impacted regions in China.[11] Lacking visibility beyond one or two tiers, many companies have simply not been able to anticipate shutdowns, disruptions or bankruptcies further down the chain. Looking ahead, suppliers and parts manufacturers with weak balance sheets and limited liquidity may not make it to the other side of the Great Lockdown and may be forced into bankruptcy.

Lastly, every crisis leads to new government policies, institutions or regulations. World War II led to the creation of the United Nations, the World Bank, and the IMF. The September 11th attacks gave us the global war on terrorism and counterterrorism laws across more than 140 countries.[12] The global financial crisis (GFC) led to the Financial Stability Board, the Basel III accord, as well as tighter capital and liquidity standards for banks globally. As COVID-19 exposes inflexibilities and vulnerabilities of key supply chains, the relevant question is not *if* governments will respond to this, but *how*?

Key Implications

While too early for a definitive view, our hypothesis is that post-crisis supply chains will barbell into two divergent segments: one group of companies will lean further into global supply chains but increase resiliency by diversifying geographically across multiple locations. Another group will pull back from offshore supply chains and employ automation to bring activities back to home markets. In both cases, this will accelerate a trend that was already emerging due to the rising labor costs and trade war risks: the diversification of manufacturing supply chains *away* from China to other geographies. In our view, investors will want to monitor five key implications:

1. **Greater geographic diversification of global supply chains**

   Nearly all manufacturing supply chains pass through China, as companies sought linear, cost-effective supply chains over the past two decades.[13] Rising labor costs and pressures from the US-China trade war were already beginning to reverse this trend, and the coronavirus episode will likely accelerate this reversal. Many firms will likely pursue more geographically-dispersed, flexible, and sometimes purposefully redundant sources of supply in order to better withstand regionally concentrated or global supply and demand shocks. Countries like Vietnam and Mexico have already benefited from supply chains diversifying away from China.[14]

   This geographic diversification will be most cost-effective and prevalent in industries where substitute suppliers already exist. For example, global sneaker manufacturers like Nike and Adidas may find places in emerging Asia, like Bangladesh, relatively easy to scale up because some manufacturing capability and know-how already exists.

   In contrast, it would be relatively costly for industries that produce complex, specialized goods, like aerospace parts and systems. Such companies will likely only consider more diversified supply chains if investors really begin placing greater weight on supply chain resiliency rather than pure cost efficiency.

   Should it take off, the geographic diversification trend could extend well beyond manufacturing and China. Many companies are discovering that concentrating outsourced back-office services and call centers in a single country, like India or Ireland, can create significant vulnerabilities. These firms will seek to build some resiliency through multiple offshore service providers in other locations such as the Philippines or Poland. Other companies caught unprepared to handle the effects of the pandemic may also consider diversifying inbound logistics options, ensuring they have alternative ways to bring in supplies, in the event of port disruptions, decreases in air freight capacity or truck driver shortages during the next “black swan” event.[15]

2. **Reshoring and automation of once-global supply chains**

   On the other end of the spectrum, firms that have offshored steps in the supply chain that are now automatable may accelerate their “reshoring.” In particular, companies that rely on specialized components that are critical to the production process may be especially tempted to bring them back home. During the pandemic, distance has complicated life for companies chasing overseas suppliers, coping with other countries' restrictions on the transportation of goods, or trying to understand different national regulations and standards around work. While reshoring may shift the concentration risk to their domestic market, many firms will find it easier to monitor and rely on supply chains closer to home. Globally, there was already an uptick in reshoring activity across chemicals, metal products and electronics.[16] The coronavirus episode may very well broaden this trend.

Reshoring will likely require an increased reliance on automation and robotics. This will allow companies to offset higher costs in their home market by replacing labor costs with upfront capital costs. More speculatively, the global pandemic may bring renewed attention to 3D printing. One of the fastest and most effective ways for companies to adapt to supply uncertainties is to print needed components on site. For example, when the Italian startup Isinnova learned about a shortage in respirator valves, it was able to reverse-engineer a 3D-printed version of the part and begin printing it within a matter of days.[17]

3. **A stronger focus on vendor financial vulnerabilities**

The sharp contraction in global economic activity in 2008 from the GFC left many tier 2 and 3 auto suppliers in the US straining for solvency.[18] Ultimately, dozens of auto parts suppliers filed for bankruptcy the following year.[19] With the COVID-19 shock to the global economy in the early stages, suppliers with weak balance sheets or limited access to liquidity are already straining, and bankruptcies may ensue later this year.

Should these bankruptcies materialize, companies will likely sharpen their focus on the financial strength of key suppliers, potentially favoring larger suppliers with stronger balance sheets. Alternatively, some small suppliers may be subject to additional financial covenants by their clients and required to hold cash reserves to ensure their resilience.

Firms will increasingly recognize additional lessons from the GFC around co-dependencies within a network of shared suppliers. The prospect of a large competitor going out of business is usually thought of as an opportunity to gain market share. However, if the demise of a large player induces bankruptcies up and down the common supply chain it would be highly disruptive to survivor firms as well. During the GFC, for example, some US automakers supported bailouts for their competitors. They were concerned that if a major automaker were to go bankrupt, it would have a cascading effect across the shared network of parts suppliers and ultimately damage their own business.

4. **Greater digitization of supply chains**

Companies that sell finished products typically know production and shipment details for the suppliers who sell to them directly – their tier 1 suppliers. However, they have far less visibility into firms that supply inputs to those tier 1 suppliers.[20] During the pandemic, many companies have been blindsided by closures of these tier 2 and 3 suppliers.

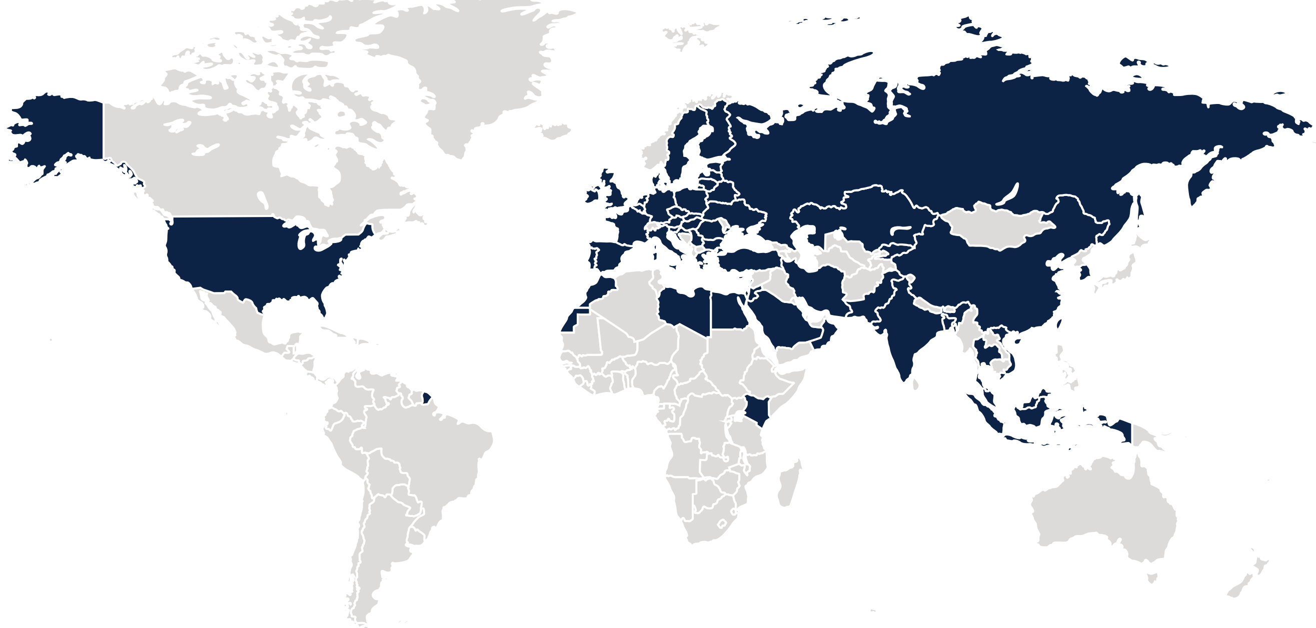
Digitized supply chain management systems that are automated and predictive are critical to enable companies to be more resilient to shocks in the future. They provide firms with a deeper and more timely view of the total value chain all the way down to raw material providers. Digitizing supply chains will provide companies with real-time feedback and enable them to better triage issues and manage bottlenecks as they arise.

5. **A new era of government intervention**

Almost every country has industries deemed simply too important to be left to free markets, such as nuclear plants or AI capabilities. Government intervention in the supply chains of "essential" or "strategic" products – especially food, medical equipment, and pharmaceutical components – will almost certainly increase after the Great Lockdown. Alongside a slew of other proposed government interventions, the rhetoric for supply chain restrictions is building already.[21] A top US trade advisor noted, "We are dangerously overdependent on a global supply chain. Never again should we rely on the rest of the world for our essential medicines and countermeasures."[22] Even NATO is considering whether to produce more essential medical equipment in countries within the alliance.[23]

As countries run dangerously low on food and critical medical items, concerns have mounted over how to source these products in the face of single-country dependency and geographic concentrations in their supply chains. Several governments – including South Korea, Turkey, the EU, and India – have clamped down on exports of medical supplies and pharmaceuticals, while others have restricted food exports (see Exhibit 2).[24]

Exhibit 2: **Export Curbs on Medical Supplies Accelerated in March 2020**



Note: The US imposed its export controls on 3M on April 3, 2020.
Source: Simon J. Evenett, "Tackling Covid-19 Together: The Trade Policy Dimension," *Global Trade Alert*, March 23, 2020.

These crisis measures disrupt sprawling supply chains, depress production and misdirect scarce resources from where they are needed most.[25] Nevertheless, the push for maintaining domestic control over stockpiles and supply chains is only likely to increase.

Governments are likely to adopt both carrot and stick tactics here. On the one hand, domestic firms in newly designated strategic industries should see increased demand from initiating and maintaining strategic stockpiles of key goods, as well as favorable industrial policies meant to shield domestic producers from foreign competition. On the other hand, these same firms are likely to face potentially costly new regulations that might increase reporting requirements and mandate the reshoring of production. In parallel, current exporters of critical goods with small home markets – like Belgium, Costa Rica and Israel – may be net losers from these regulations.[26]

> *The push for maintaining domestic control over stockpiles and supply chains is only likely to increase.*

JUST IN TIME VS. JUST IN CASE

For decades, companies have wrung excess cost and complexity out of their operations. This pursuit of efficiency has led to the extensive use of "just in time" (JIT) production and lean manufacturing. Reducing excess inventory – which can include raw materials, unfinished goods and even final product held at the manufacturer before shipment – is an essential element to streamlining manufacturing. Indeed, the increasing richness of "big data," artificial intelligence, and advanced data analytics has allowed companies to use a broader toolkit to estimate intermediary- and end-consumer demand, and refine their JIT inventory management.

Low inventory ratios are seen as a sign of an efficient, well-managed operation, and companies with lean inventories garner richer valuations from Wall Street analysts.[27] Indeed, one study found that between 1990 and 2002, excess inventories led to a material drag on market returns.[28] This relentless push for minimizing inventory has caused companies to make a trade-off heavily in favor of JIT at the expense of "just in case" (JIC) (Exhibit 3).

This highly orchestrated inventory management has proven to be very efficient during periods of steady demand. Ordering algorithms are adept at sensing seasonal variances and adjusting to small shifts in demand. Some companies even use sensors on shelves to track real-time demand. In the epic turbulence of the ongoing pandemic, however, this finely tuned operation was simply overwhelmed.

Unlike industrial or commercial goods, retail grocers rarely have sprawling global supply chains, and the slew of empty shelves that emerged in March across the US may be reflective of the sudden breakdown of JIT. The supermarket industry came under immense pressure in the 1990s from investors to streamline their inventories to improve profit margins. Large retailers like Walmart, Tesco, Carrefour and Target, already adept at JIT techniques, saw opportunities to capture market share and margins in the grocery space and entered that realm of retail. Large supermarket chains responded by utilizing JIT technique themselves to decrease the size of distribution centers, reduce their overhead and boost profitability. Typical supermarket inventory went from several months of stock on hand to about one month.[29]

With little buffer for an uptick in demand, it is not surprising some items in grocery stores sold out in a matter of days in the US. Demand for paper towel, black beans and tuna, for example, soared by 150% in the US during March, and roughly 90% of shoppers said they experienced outages of some items in grocery stores as this inventory was quickly depleted.[30]

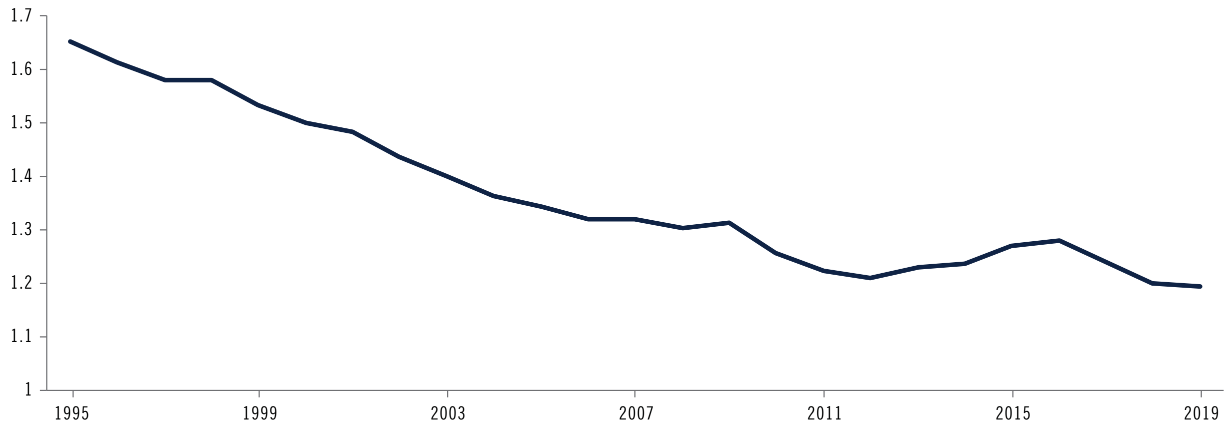
Key Implications

The ongoing pandemic has laid bare the lack of resilience and flexibility in many firms' current inventory management, particularly in upstream industries where substitution opportunities are far more limited. Some companies may respond to this experience by adjusting their tradeoff between JIT and JIC. How should investors think about these issues regarding their portfolio companies?

1. **"Just in time" will continue to prevail in consumer staples**

   In areas where substitutes or other sources of supply are relatively easily found – like toothpaste, milk and other consumer goods – the benefits from maintaining larger inventories of inputs or the final product will likely be outweighed by the ability to use alternative data, AI and machine learning to fine-tune predictions for end consumer demand patterns and adjust inventories at an even more granular level. In addition, given the thin profit margins typical of many consumer staples, the costs of stockpiling and warehousing goods might easily outweigh additional revenues and higher resilience from the ability to handle sudden demand surges. In other words, in areas where goods are fungible and less customized, and generate thin margins, there is not likely to be a tilt toward fatter inventories.

Exhibit 3: **Ratio of US Retail Inventories to Final Sales**



Note: This includes all retail trade except automobiles.
Source: Federal Reserve Economic Data, as of April 23, 2020.

2. Industrial and manufacturing sectors may pivot to fatter "just in case" inventories

While consumer products have many substitutes (beef instead of chicken, low-fat instead of whole milk), industrial goods typically do not – be it spare parts for trucks and planes or specialized medical equipment for a hospital. Companies making capital goods, particularly those with good profit margins and stable demand, are sure to reassess their inventory management of inputs needed to maintain production during turbulent periods. Some may consider the added resilience of a fatter inventory of inputs, especially given the fragility in supply chains exposed during the pandemic. By recalibrating their inventory towards JIC, these firms will ensure they don't again face supply disruptions that halt production, reduce revenues and damage their reputation for reliability. In addition, for specialized manufacturers like medical equipment producers, the profit margins from meeting short-term demand spikes can be attractive. They too may want to consider more resilient and robust inventories of essential components and parts.

> *Additional resilience may lead to less EPS upside, but would create downside protection.*

3. Markets may reconsider how they value the trade-off between fatter inventories and higher costs

Of course, with enhanced resilience from deeper JIC inventories come higher costs. How will investors weigh the additional resiliency in operations and sales during a crisis against the higher cost base?

Perhaps the greater operational resilience will be viewed as a reasonable cost to maintain production in turbulent times and potentially even an opportunity to capture additional "peak demand" sales during future crises if the product is in higher demand during such periods (e.g., medical equipment or temporary housing). For equity investors, additional resilience may lead to slightly less EPS upside, but would create some downside protection. Debt investors may also value the stability in earnings that comes from more resilient production. However, they will likely weigh that against the ongoing lower free cash flows accompanying fatter inventories.

WEIGHTLESS FIRMS WILL ASCEND EVEN FASTER

As we laid out in The Future Means Business, firms around the world have been shedding the assets that have historically defined them – factories, machinery and regional offices teeming with employees. Instead, companies have been going weightless and moving to asset-light models, focusing on investment in intangible assets such as intellectual property, software, online platforms, proprietary data and algorithms. Intangible assets now comprise 70% of the value of the S&P Europe 350 and 85% of the value of the US S&P 500.[31] An acceleration in the secular shift to the weightless firm will be one of the most important business consequences of the Great Lockdown.

As physical distancing measures became widespread globally, countless activities have been forced into the virtual realm (Exhibit 4):

- **Education.** Albeit temporarily, millions of students in developed markets left physical classrooms for virtual ones. Downloads of education apps in the US increased by over 10 times within a two-week span in March.[32]
- **Health care.** People have turned to telemedicine as never before. For example, one of Europe's biggest telehealth providers, KRY International, reported registrations were up more than 200% and it is expanding its network of doctors to keep up with new demand.[33]
- **Remote working.** US downloads of remote working apps in mid-March were more than 15 times greater than at the start of the month.[34]
- **Online retail.** To meet the surge in demand from online shoppers, Amazon hired 175,000 new workers for its US logistics and warehousing operations.[35]

Key Implications

1. **A permanently accelerated trajectory for technology adoption**

   The forced acceleration in the scope and pace of technology adoption during the pandemic will, in many instances, not reverse in the post-pandemic era. Most consumers and employees have had no choice but to grudgingly pay the learning costs of moving to online, remote and virtual solutions. Some evidence suggests previously "tech-resistant" segments – like older Chinese residing in smaller cities – have begun to shop online in greater numbers.[36] But now, having already paid the adoption cost, and experienced the ease of use of these new technologies and online solutions, these late adopters will not revert to their prior habits.

   Unfortunately, this accelerated trajectory also hastens the displacement of traditional incumbents and perhaps even digitally savvy firms that are late off the block. Investors will do well to position their portfolios to avoid this potential trail of destruction as technology-driven superstar firms across many industries further strengthen their dominance. Brick-and-mortar retail businesses that have not made a substantial move to the online world, for example, simply may not survive the Great Lockdown in the face of rising direct-to-consumer sales not only from mainstream consumer brands but elite luxury brands as well. Faced with growing obsolescence risk, investors will want to evaluate the impact of accelerating technological change across their entire portfolio.

2. **Superstar firms cement their place as the new infrastructure of the global economy**

   Prior crises have transformed the competitive landscape, generating new winners and losers. The coronavirus pandemic is different. It has intensified trends already underway and given a further boost to tech-forward companies across all sectors – well beyond the formal technology sector – many of which were already well-positioned for a weightless world.

   The superstar firms that dominated the online realm before the Great Lockdown perhaps gained the most from the abrupt shift to virtual activity, emerging as irreplaceable infrastructure and providers of essential services. Tech conglomerates like Tencent, Microsoft, Alibaba and Amazon, with a sprawling range of services for businesses and consumers, benefited tremendously from the material increase in online activity. They were well-positioned to capture the surges in demand across the virtual world – everything from cloud computing, to music and video streaming, collaboration tools, online shopping and gaming.

Among others, we believe the following sectors are likely to structurally benefit after the Great Lockdown is over:

- **E-commerce.** Online shopping is no longer the bastion of toys, clothing and household goods. Even luxury brands now recognize a direct-to-consumer e-commerce strategy should be their No. 1 priority. While experiential storefronts in flagship locations are fine, an increasing number of luxury consumers are willing to transact online – especially in Asia. For example, though overall Gucci sales declined by 23% in Q1 2020, online sales in mainland China more than doubled.[37]

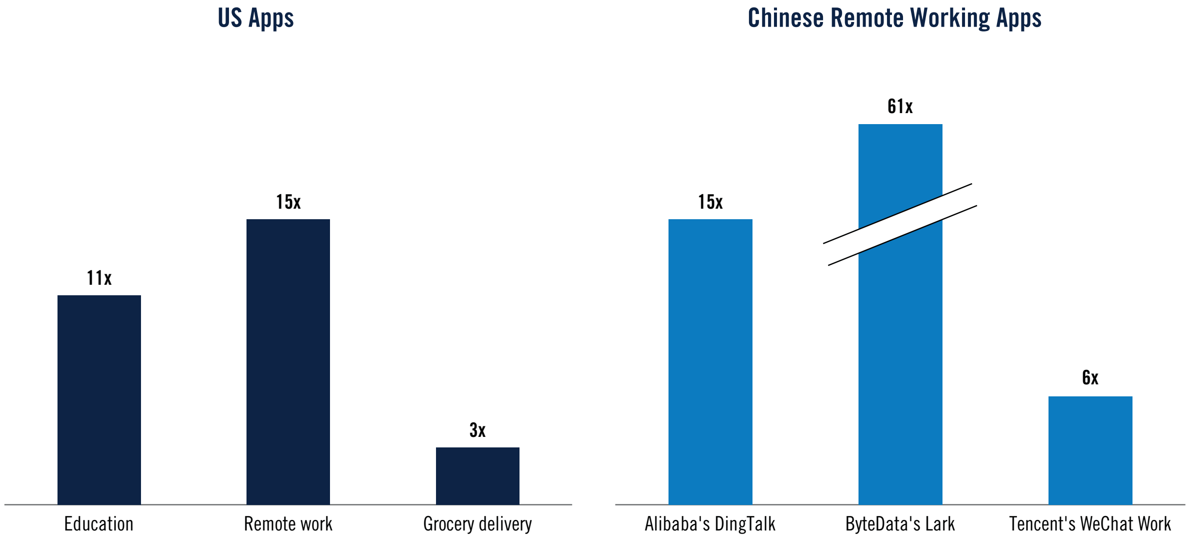
> *Technology companies and investors will be monitoring if the pandemic causes politicians, regulators and the general public to reconsider the trade-off between individual rights and the collective good.*

- **Cloud-based computing.** Most sophisticated technology companies were already operating on low-cost, efficient cloud-based services pre-pandemic. For example, Netflix relies on Amazon's AWS for all of its streaming services. Cloud computing usage surged during the COVID-19 pandemic; Microsoft saw an eightfold increase in demand for its US cloud services in regions with lockdown orders.[38] Additionally, tech software and service companies that leverage cloud-based technology will also thrive – including call centers, information security and cloud-based technology infrastructure.
- **Videoconferencing and remote working applications.** Microsoft Teams recorded an all-time high of 2.7 billion meeting minutes in a day on March 31. And the number of video calls on the app over the last week of March increased more than 10 times compared to the first week.[39] Collaboration tools will likely see permanently higher usage long after the crisis ebbs. Employers in the public and private sector have experienced how efficiently many types of interactions and meetings can be conducted virtually rather than in person. As a result, many business executives will not revert to pre-crisis levels of business travel. Discussing a project with colleagues will no longer require a conference room – just a collaboration app.
- **Streaming entertainment services.** With so many confined to their homes, gaming and video streaming has skyrocketed during the Great Lockdown, as did virtual reality applications. Data usage from gaming in the US, for example, increased 75% the week of March 16 compared to the prior week.[40] Almost 30% of Gen Z, Millennials and Gen X Americans said in March they plan to subscribe to a new video streaming service.[41] Netflix reported almost 16 million new subscribers in Q1 2020, with most in Asia, Europe and the Middle East.[42] While not all new users will maintain their subscriptions after the Great Lockdown, there will also be significant hysteresis – an enduring change in habits even after the catalyst for them is over. Some of these new subscribers will never want to return to cable TV with ads and pre-set times for shows.
- **Internet pipes and plumbing.** With more activity online than ever before, it is only natural that consumers and businesses will demand faster internet and wi-fi connections. Telecom companies providing this internet infrastructure – the pipes and plumbing of the virtual world – will benefit from the structural shift to greater online activity. New and faster technologies, like 5G wireless networks, will also see greater demand as commercial and consumer usage broadens. This will also likely increase governments' focus on 5G and escalate tensions between the US and China around technology infrastructure.

3. Big data: From villain to savior?

Going into the Great Lockdown, technology firms faced significant regulatory uncertainty – a "techlash". Data

Exhibit 4: **Increase in App Downloads During Covid-19 Outbreak**



Note: Data for the US shows the increase between March 2 and 16. Data for remote working apps in China shows the increase from January 22 through February 20.
Source: Statista, as of April 24, 2020.

privacy was a key concern, whether it was used to target the social media feeds of specific individuals with "fake news," especially after Russia's alleged efforts to spread disinformation during recent US and French national elections or the Cambridge Analytica scandal around Brexit. Governments around the world have launched efforts to protect individuals' data, from the EU's General Data Protection Regulation (GDPR) to new laws in places such as India, Morocco, Brazil, South Africa and Taiwan.[43]

During the Great Lockdown, the same sensitive personal data collected from cellphones and mobile apps has been deployed by governments to enforce public health measures and slow the spread of the coronavirus. This personal data has allowed governments across Asia, Europe and North America to track potential patients, react quickly to suspected surges in localized infections and see how well communities have been adopting restrictive movement measures. The large tech firms, which already capture geolocation and other forms of personal data, have even embraced this role and quickly created new apps and tracking mechanisms. From Alibaba's Alipay Health Code to Apple and Google's contactless tracing technology, tech giants are emerging as critical players in the official response to the pandemic.

What happens next is still clearly speculative, but technology companies and investors will certainly be monitoring if this episode causes politicians, regulators and the general public to reconsider the trade-off between individual rights and the collective good. Many of the initiatives to collect and use personal data for public health surveillance may end once the virus is stopped.[44] However, societies may well reassess the trade-off between personal privacy and public safety. Increased surveillance – in at least some societies – might be viewed as a useful tool for officials during exigent circumstances and with appropriate oversight, rather than a strict violation of privacy rights, though clearly the risk of misuse by authoritarian regimes is high.

If sensibilities regarding personal data privacy shift, the implications for weightless firms reliant on this data may be significant. As the world emerges from its crisis mindset, tech firms might be better positioned to blunt some of the blowback they have been receiving around privacy and better preserve the business models that have served them so well.

RETHINKING BUILDINGS AND OFFICES

The enduring changes to the economic landscape, business models and human behavior we have laid out in this paper might potentially lead to structural shifts in commercial real estate (CRE) that are substantially more far-reaching than the impact from prior viruses, such as Ebola, SARS, MERS, H1N1 and Zika.

Some of these shifts will add momentum to long-standing real estate trends such as the growing need for logistics, warehousing, cold storage, cell towers, data centers, remote working and affordable housing – as well as the downward spiral of department-store-anchored retail shopping malls. Other trends may be slowed or disrupted, such as the use of coworking spaces, denser office footprints and the move back to urban centers. As companies and their employees adjust their lives after the Great Lockdown, investors will want to monitor these potentially significant second-order effects on real estate markets.

Key Implications

1. **Offices will adapt but not disappear**

   If the mass restlessness during the Great Lockdown has demonstrated one thing, it is that humans are social animals who need to interact with others. Our identities are tied not just to our family and communities but also to our workplaces. It is where people interact, collaborate, innovate and socialize. While a sharp global recession will be a strong cyclical headwind for the office sector, the long-term structural need for office space will likely remain robust. Nevertheless, the "new normal" in the office sector may be quite different, and real estate investors will want to monitor three potentially significant changes.

   First, the impromptu remote working experiment unleashed by the Great Lockdown will further untether employment from a desk in an office. Remote working was already on the rise: a recent study of over 18,000 professionals from a range of industries across 96 companies found that 70% are working from somewhere other than their office one day a week and 53% work remotely half the week or more.[45] The experience from the Great Lockdown will only turbocharge this trend. As a result, companies will increasingly think of an office or a desk as being less tied to a single employee. Commonplace practices like hoteling and hot-desking arrangements for groups of employees who shuttle in and out of the office on different days will almost certainly get an additional boost.

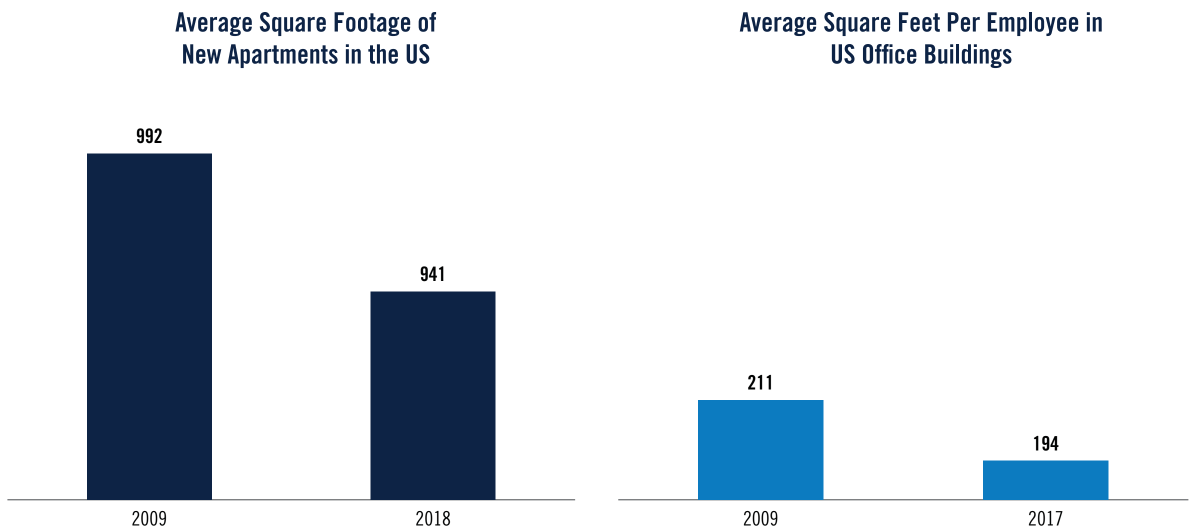
   Second, as concepts of personal space and a sanitized work environment become paramount, the attractiveness of coworking arrangements with open designs and opulent shared amenities will decline. Sharing working spaces and amenities with strangers – no matter how lavish the cappuccino machines – will be less acceptable to employees and untenable for employers trying to keep their workforce safe and healthy.

   Third, the densification of office spaces, driven by shrinking technology footprints and new layout designs, will likely halt (Exhibit 5). While past pandemics have not led to significant changes in office density, given the scale of the Great Lockdown, public health officials in some jurisdictions may seek to amend building codes to lower the occupant density of buildings. And, whether building codes change or not, companies will need to adapt office layouts to make them less dense to secure employees and satisfy new sensibilities around personal space. Some of these changes may well be temporary. For instance, offices and cubicles will almost certainly need to be redesigned to provide for greater spacing between employees; new visual cues will be needed to ensure social distancing in shared spaces like elevators, restrooms and meeting rooms; and cafeteria tables will need to be re-spaced.[46] However, what is likely to permanently change is that future office footprints will be designed with the flexibility to rapidly implement these measures when needed.

2. **Further momentum for industrial and logistics**

   The sharp contraction in global demand resulting from the Great Lockdown will be a significant cyclical headwind for real estate investors to navigate going forward. Restricted cargo movements and sharply

Exhibit 5: **Residential and Office Building Density has Been Declining in the US**



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reduced economic activity worldwide will be front of mind for some time. However, looking beyond the steep economic downturn, there are a few structural changes that long-term investors will want to closely monitor.

First, the Great Lockdown has created a new segment of online consumers ready to shop for groceries and other perishables. Even after physical distancing measures have eased, fewer customers may insist on feeling the firmness of a tomato in their own hands. This will only amplify the decade-long rise of e-commerce and add additional demand for warehousing, logistics and distribution – especially "last mile" cold storage options near major population centers. Indeed, demand in the warehouse and logistics sector can be extremely sensitive to small increases in online ordering and inventory levels. It is even possible some grocery stores today – already equipped with cold and frozen storage capabilities – evolve into pure distribution and delivery centers.

Second, the strain on complex, global supply chains – as discussed earlier – will likely lead to a permanent rise in some nearshored and reshored manufacturing activity. This will likely be combined with some firms opting for fatter inventories of inputs and a larger "safety stock" to increase reliability and resilience. In addition, reshoring will likely get further impetus from sectors designated "strategically critical" by governments who may legislate to bring production of these goods back home or massively increase stockpiles of them. All these factors are likely to drive up long-term demand for warehousing and distribution facilities across the EU and the US (especially inland port locations like the US East Coast) – but also in locations like Eastern Europe which serves the EU market, or Mexico and Canada for the US market.

3. **Residential properties will place an additional premium on safety and space**

The Great Lockdown will likely increase the frequency of remote working and could permanently increase our need for safe personal space. This may have several consequences for the housing sector.

First, the trend in urban centers towards "micro-units" – smaller-than-studio apartments with large communal amenities such as saltwater pools and in-house movie theaters – may potentially reverse. As more people place a premium on larger apartments and open-air common spaces, these micro units will become less attractive.

Second, investors will want to monitor if the centripetal pull to city centers and the accompanying "live, work, play" lifestyle may begin to reverse, triggering a return to the perceived safety of more spacious suburban living. For Millennials, the pandemic may increase the attractiveness of suburban towns, especially as growing remote working arrangements reduce one of the perks of living downtown – short commutes to work. It might also give pause to empty-nesters considering moving into an urban center. Additionally, there may be a boost in demand for single-family homes – which is increasingly transforming into an institutional asset class – as people place greater value on the ability to secure their family and have their own backyard. The extent of these changes will, of course, be localized, depending on how deeply COVID-19 impacts a region and the extent to which cities rely on tourists and visitors, for example Las Vegas or Macau.

Conclusion

The effects from the cascading crises induced by the coronavirus are still emerging and the contours of the world following the pandemic remain very unclear. In the near term, a severe global recession will dominate the attention of firms, policymakers and investors. At the same time some more-enduring structural changes will emerge (Table 1). Our research has identified several potential secular changes. Only time will tell which ones will be etched into the corporate landscape long after the financial scars from the Great Lockdown have healed. It is imperative that long-term investors look past the immense disruption of today to consider how this episode will transform the investments in their portfolios tomorrow.

Table 1: **Themes and Key Implications**

Themes	Key Implications
Hidden Fragilities in Global Supply Chains	■ Greater geographic diversification of some global supply chains away from China for manufacturing ■ Reshoring and automation of once-global supply chains ■ A greater focus on evaluating vendor financial vulnerabilities, as firms increasingly favor large vendors with strong balance sheets ■ Greater digitization of supply chains to increase transparency across the total value chain and to better manage future disruptions ■ A new era of government intervention focused on reshoring and stockpiling of critical medical goods and food
Just in Time vs. Just in Case	■ Just in time inventory management will continue to prevail in consumer staples that have many substitutes ■ Industrial and manufacturing sectors that rely on inputs with fewer substitutes are likely to pivot to fatter "just in case" inventories ■ Markets may reconsider the trade-off between fatter inventories with more resilient production and the resulting higher costs
Weightless Firms Will Ascend Even Faster	■ A permanently accelerated trajectory for technology adoption as once-reluctant consumers are forced to accept digital solutions ■ Superstar firms further strengthen their position as the new essential infrastructure of the global economy ■ Societies will reassess their trade-off between personal data privacy and public safety potentially softening the "techlash" from regulators
Rethinking Buildings and Offices	■ Personal space will become paramount leading to a rise in remote working, a decline in coworking arrangements and a headwind to increasing density of office space ■ Industrial and logistics properties will see increased demand from e-commerce and the reshoring of manufacturing activities ■ Residential growth may shift to larger units and a flight to suburbia

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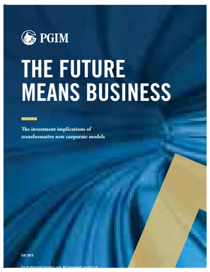

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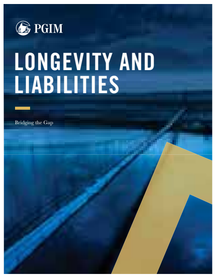

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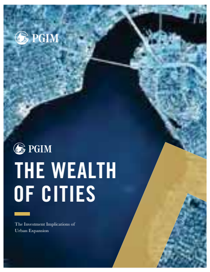

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