



Hunting for Opportunity in a Transformed World

The world changed forever in recent weeks.

COVID-19 permits no choice but to be laser-focused on our loved ones' and communities' well-being. Beyond the immediate, we must imagine which routines, schedules and comforts may eventually return and which of them never will. Through all of this, we wish you strength, safety, and comfort in these difficult times.

While recognizing that containing COVID-19's global spread is priority number one, we've been highly attuned to the rapidly shifting market conditions. Amidst the chaos in the public markets, we've identified new opportunities on a rare scale, and **we see much light in the darkness.**

Our fundamental strategy remains investing in tech companies experiencing dislocation, dysfunction, or distress. In many cases, the pandemic world has created an enormous need for rapid, nimble and sophisticated funding to enable the survival and prosperity of these companies. We primarily invest in four discrete sub-sectors¹: (a) Automation & Machine Learning; (b) Next-Generation Networking; (c) Logistics & Distribution; and (d) Payments/e-Commerce. Looking more broadly at the state of the world, we discuss below our view that COVID-19 will leave lasting effects on the global economy and how **4 key post-pandemic trends** will likely lead to increased investment opportunities and outsized returns within our opportunity set.

1. The 'Gig' is Up

COVID-19 pulled back the curtain once and for all on the gig economy. In good times, we turned a blind eye to the reality that businesses relying on short-term contract labor and freelance workers ("gig workers") were rarely profitable. These unprofitable companies who relied on gig workers will not survive the prolonged slowdown in consumer demand that we now expect to see.

Shelter-in-place orders have fundamentally changed consumer habits—in part due to consciousness that many common behaviors increase the risk of viral spread. For example, ride sharing has come to a grinding halt, shared workspaces are mostly empty, and group fitness is shunned. **We believe the practice of social distancing will persist even after the**

¹ White papers authored by Twist Capital on each sub-sector are available by request (info@twistcapital.com)



pandemic subsidies. Individuals will remain fearful of a 'second wave' and embrace an over-abundance of caution when it comes to group and shared services.

This decline in social business models will likewise leave an over-supply of gig workers who, going forward, will want steadier and more permanent sources of income with healthcare benefits. **As such, we estimate that the number of gig workers will decrease by at least 50% as individuals look for new ways to make a living.** To be clear, we expect gig workers in solitary roles (e.g., delivery services) will continue, assuming the underlying business models are profitable.

Importantly, the gig economy often catered to low-skill or unskilled workers. For these workers to gain re-employment in the types of reliable jobs now sought, they need advanced training in value-added areas. **Accordingly, we expect to see a rush towards on-demand education – not just colleges and universities, but also vocational education, especially those geared towards technology skills such as coding.** Online platforms may be the cheapest and fastest way to provide this education. Federal governments (as we've already seen) and the private sector will need to subsidize educational offerings to make this an affordable proposition. By rapidly training and repositioning the workforce, we believe unemployment can be contained in the near/medium-term.

Employers will need to find a way to survive without the cheap and flexible labor supply of gig workers. To be able to afford permanent workers' salaries, employers will require greater production and labor efficiencies. Businesses across all sectors will need tools that free up workers from low-level, process-oriented tasks. **Therefore, we expect meaningful movement towards robotic process automation, especially to software with embedded machine learning capabilities.** Hardware and software that can 'virtualize' human tasks will become critical in allowing businesses to function optimally.

The pandemic has highlighted economic uncertainty for much of the gig economy. Automation and Machine Learning are the tools of tomorrow and require a skilled workforce to develop them. Accordingly, implementation of these technologies across sectors will drive profitability and longevity for employers.



2. Universal(ly) Remote

Throughout much of the world, shelter-in-place orders have suddenly required businesses to ensure a seamless remote work experience for employees. Moreover, both public and private sector constituents are encouraging deliberately distributed workforces to de-risk a cataclysmic event in any single location. One result of the rapid proliferation of remote working is that **we are testing the limits of Internet bandwidth and its underlying infrastructure.**

While a relatively small number of companies were already highly distributed prior to the pandemic, almost every employer is now implementing remote working for all or large portions of their workforce to ensure business continuity. Small and medium-sized businesses are scrambling to patch together an ad hoc remote access program for employees. Unsurprisingly, as IT systems have become more accessible from home, employees are quickly becoming accustomed to remote working and seem to prefer its efficiency. **We expect that the number of remote workers will increase to 65% of white-collar employees globally over the next three years on a permanent basis** (which is c. 2x the current percentage).

The unit economics of co-working spaces were already faltering (*see: WeWork*) before the pandemic. Workers will increasingly resist shared public workspaces in the future due to pandemic-related social distancing habits and a greater awareness of health and safety. If workers keep working remotely post-pandemic, as we expect, a massive upgrade in residential connectivity infrastructure with ‘five-nines’ reliability will be crucial. The race to roll out 5G globally will be of paramount importance as demand for bandwidth has already spiked. **To support the constant data explosion, infrastructure from the backbone all the way to the last mile will need to be upgraded.** With greater bandwidth and cheaper compute and storage capabilities embedded directly within various endpoints (e.g., tablets, sensors, etc.), **edge computing will gain tremendous momentum and, in some cases, displace the cloud.**

Data security will be of paramount importance amongst a highly distributed workforce. The ability to create an airtight environment relies on end-point authentication, encrypted transmission, malware protection, and seamless backup/recovery (amongst other functionality). **We expect that a shift to remote working will drive a cybersecurity investment super-cycle.**

COVID-19 has created a lasting work-from-home paradigm that will require immediate network and technology implementations. Capital deployed to foster these next-generation networks will have an extremely attractive return profile.



3. New World (e-)Order

Consumers have been forced to stay indoors during this pandemic, and they are fully embracing the convenience (and necessity) of home delivery. While both e-commerce and home delivery have been on the rise for years, we believe now is truly a defining moment for e-commerce. Consumers of all ages and genders, notably older consumers who may previously have eschewed online shopping, are permanently shifting their buying habits. **We predict that up to 80% of all non-essential, non-luxury consumer discretionary purchases will be transacted online by 2023.** This prediction is based on our historical trend analyses coupled real-time data being observed during the pandemic.

As online purchases increase, we expect changes to the current payment infrastructure. Purchasers (and merchants) want to streamline the payment process and eliminate fraud. **The number of payment options available to purchasers has become overwhelming, and we see a rationalization amongst payment alternatives.**

The e-commerce trend will take hold at the enterprise level as well. **As the enterprise workforce becomes more distributed (per our prior observations herein), they will demand that procurement for supplies and raw materials be completed online.** This will allow for ease-of-use as well as real-time monitoring and analysis of cost structure, particularly when employees are not centrally located.

In conjunction, both enterprises and consumers will demand shorter delivery times. **A wholesale upgrade in distribution and logistics infrastructure will be necessary to keep pace with increased demand and mission-critical supply chain functions.** To compete with Amazon's end-to-end supply chain, vendors will need to band together in a united fashion to institute major infrastructure changes. Specifically, we foresee standardization of communication protocols and software, massive proliferation of small-scale distribution centers, widespread implementation of warehouse automation technologies, usage of deep analytic tools for continuous optimization, and consolidation amongst vendors of various delivery modes.

As a result of home confinement during this unusual period, the rate of e-commerce adoption will permanently skyrocket. Consolidation and modernization in both payment systems and supply chains will be required to adequately meet demand on a global basis.

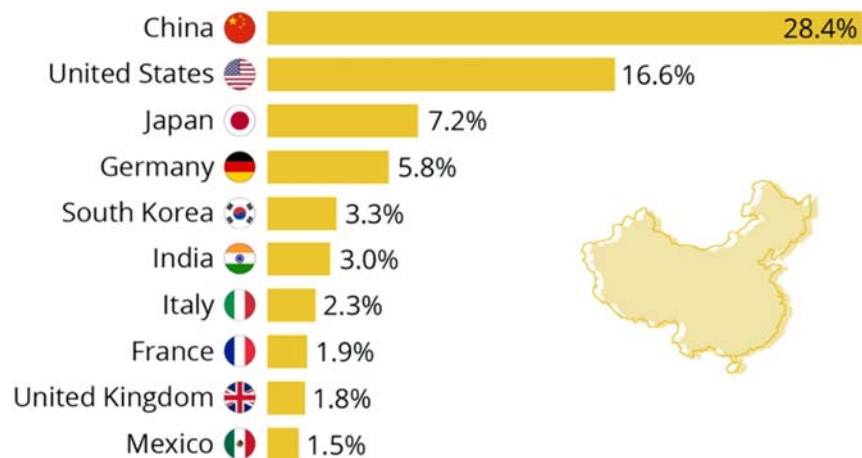


4. China: Swipe Left?

Xenophobic blame on China for COVID-19 could cause enterprises outside of Asia-Pacific to re-evaluate their relationship with the country. It remains to be seen whether China, or even Asia as a whole, will be stigmatized going forward—but, it is not improbable.

Other, more rational factors may prompt a re-evaluation of engaging with China as a business partner (e.g., tariffs, high carbon footprints, national security, etc.). However, the dominant factor remains enterprises' heavy supply concentration and associated risk to production from future disruption. **As a hedge against potential impacts, we expect manufacturing to shift away from China and potentially onshore for highly critical processes (e.g., biopharma and bioengineering);** governments will likely encourage this as a matter of national interest. While Southeast Asia and India may be viable alternatives, we see North America benefiting disproportionately. Mexico, for example, can further capitalize on its adjacency to the world's largest economy by winning a larger share of business brought back to North America—if the country's healthcare system and economy can withstand COVID-19.

Top 10 countries by share of global manufacturing output in 2018²



Any shift in production away from China will take time and capital, but supply chains are the lifeblood of any enterprise, and corporations will spare no expense in re-building / repairing them. In order to offset higher costs of production outside of China, we expect new technology solutions to be implemented ubiquitously. Facility automation (as previously discussed), seamless communications amongst supply chain constituents, real-time analytics, and ability to scale dynamically are prime examples. Countries that seek to benefit from these changes will need to invest in educating and modernizing their workforce expeditiously.

² United Nations Statistics Division



For many reasons, including COVID-19, supply chains will shift away from China. Consequently, North America and other regions will need to re-invest in advanced distribution and logistics technology to ensure business continuity and maximize profitability.

Conclusion:

Our investment strategy is well-positioned to thrive in the new world transformed by COVID-19. An overwhelming number of companies will be capital constrained with traditional funding sources going dark as the economy continues to show volatility and uncertainty. At Twist, we invest with financial sophistication and a macroeconomic lens in specific technology sub-sectors where we have strong conviction and a high probability of outsized returns. Our goal is to build partnerships with companies to withstand economic cycles and jointly create prosperous outcomes. Our results can and will speak for themselves; we stand humble and ready to serve as the principal of choice for the discerning, thoughtful investment managers and asset allocators.

Note: The information provided herein is not intended to provide investment advice. Readers of this note are reminded that all investments involve risk and we encourage you consult with your professional advisors before making any investment decisions.

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