The pandemic has had a profound impact on our daily lives, so it's natural for me to consider what its longer-term impact might be on our investment opportunities. This is why I am intrigued by historian David Herlihy's The Black Death and the Transformation of the West. According to Herlihy, the high mortality rate of the Black Death in the 14th and 15th centuries, in which the populations of some villages and cities fell by 70 or 80 percent,[1] "gave to Europeans the chance to rebuild their society along much different lines."[2] I wonder about potential parallels to our modern world in the wake of a life-altering global pandemic.

The Black Death arrived in Italy by ship in 1348, spreading across Europe and dismantling social and economic systems, an upheaval that created conditions which ultimately led to a Renaissance of art and architecture, science, technology and trade. As the rigid hierarchical structures of the Middle Ages collapsed, the relationship of capital and labor reversed and economies changed dramatically.

The Black Death reduced both the skilled and unskilled labor force, which raised the cost of employing artisan workers. Eventually, higher wages resulted in labor-saving innovations including the Gutenberg printing press, perfected around 1450, which replaced scribes who had copied manuscripts by hand.[3] With fewer laborers to work the fields, commodity prices rose. Initially, the price of wheat increased with the plague, but then declined toward the end of the 1300s. In contrast, other food grains and animal products continued to rise in price as survivors enjoyed a better standard of living. You can see parallels to today's food inflation and a tight labor market, especially among unskilled labor. It took time for medieval Europe to recover from the Black Death and today, we're still adapting to an unexpected global pandemic. For example, in the U.S., some workers are returning to the office part-time or making other flexible work arrangements.

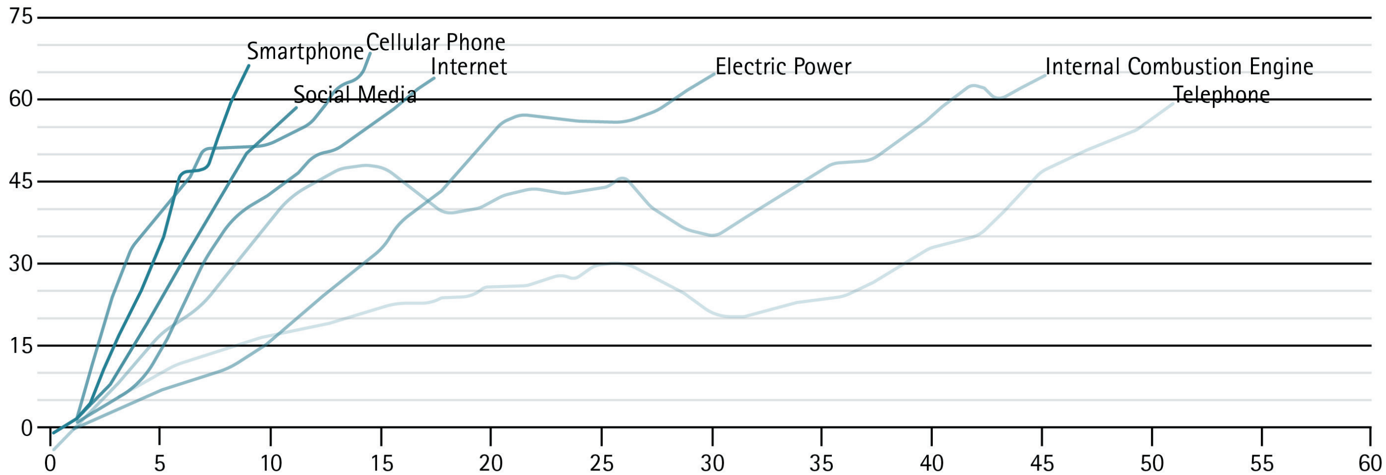
I'm most intrigued by the idea of technological innovation spurred by a tight labor market. COVID-19's mortality rate is high, but hasn't risen anywhere near that of the Black Plague. "1 in 500 Americans have died from coronavirus since the nation's first reported infection," according to CNN.[4] That's a horrifying statistic, but it's far below the rate experienced by medieval Europe during the Black Death. However, COVID-19's impact on innovation could be even more substantial than that of the Black Death because it happened in an environment that's unusually supportive of technological innovation.

British entrepreneur and investor Azeem Azhar, author of The Exponential Age: How Accelerating Technology is Transforming Business, Politics and Society, believes that we're in an age of accelerated technological change. For example, cars powered by internal combustion engines took more than 45 years to go from 10% to 75% market penetration in the U.S.; in contrast, smartphones reached the same milestone in less than 10 years (see graph).

[1] Herlihy, David, 1997, The Black Death and the Transformation of the West, Harvard University Press, p. 17
[2] Herlihy, p. 39
[3] Herlihy, p. 50
[4] https://www.cnn.com/2021/09/15/health/us-coronavirus-wednesday/index.html

Number of years between 10 and 75 per cent market penetration, United States

Source: Horace Dediu, Exponential View analysis



Companies that adapt will thrive. Those that remain stuck in their old ways, on a linear trajectory, will fall behind. "Four broad families of technologies – computing, biology, new energy technologies and novel manufacturing techniques – are rapidly improving at exponential rates," says Azhar[5] Particularly powerful are the advances occurring in artificial intelligence and in the areas of quantum biology and quantum chemistry, which are based on applying quantum mechanics to the respective fields.

Some of these advances rely on improvements in computational speed. As Azhar notes in his book, "The computing revolution shows no sign of slowing down."[6] Indeed, it is "constantly accelerating," as stated by technology researcher Ray Kurzweil.[7]

However, advances do not rely solely on new inventions. It's time-consuming and difficult to create something totally new. Rather, companies can create value by stacking together existing innovations. Jim Mc Kelvey, co-founder of Square, has said that the financial services and digital payments firm became a more than $70 billion market cap company by stacking 14 kinds of existing technology.[8] For example, credit card processing has been around for years, but Square developed a small device that plugs into a smartphone and reads credit and debit cards to process payment—just one of the company's innovations. Combining or "stacking" existing technologies is an approach that more companies are likely to take to advance their businesses.

In a sense, there are parallels in today's stacking to what happened following the Black Death. Herlihy says of Gutenberg's printing press, "… it was only the culmination of many experiments carried

[5] https://www.wired.co.uk/article/exponential-age-azeem-azhar This is a book excerpt.
[6] Ibid.
[7] https://twitter.com/master_pesenti/status/1436242920450011148?s=11
[8] https://twitter.com/bzaidi/status/1311318943177601024

on across the previous century. His genius was in finding a way to combine several technologies into the new art." Today, with our computational power and many new technologies, there is even greater potential for powerful new developments.

I think about these developments as I look for investments for your accounts. If the stacking of existing technologies is a key, I need to recognize earlier the companies that are achieving innovation in this way. This may mean investing in companies with valuations that seem high by traditional fundamental standards of investing. However, such companies' potential for exponential growth may eventually prove quite profitable. When appropriate, in more growth-oriented accounts, I'm establishing small positions in some of these companies after careful analysis of their financial statements and outlooks. Upon closer examination of the cash on a company's balance sheets, some appear more attractive than I had originally thought. I will consider adding to these positions on pullbacks in their prices.

During the past quarter, I made few changes to client portfolios. However, I remain alert to opportunities to improve portfolios with attractively priced investments that offer a margin of safety.

As always, thank you for the trust you have placed in me and in 7Summit Advisors. We work hard to earn that trust each day.

Sincerely yours,

Li Chang