Morgan Stanley

WEALTH MANAGEMENT

SPECIAL REPORT

Global Investment Committee | January 04, 2023

The Next American Productivity Renaissance

While investors are focused on the most obvious legacy of the COVID pandemic—40-year-high inflation—we contend that the crisis has catalyzed a more powerful regime shift: a once-in-a-generation shock to the labor market and how we think about work, accompanied by systemic reengineering of the business process. A unique combination of demand and supply factors has emerged, igniting a multiyear US capital investment cycle that is apt to usher in stronger growth and greater productivity.

While the past 13 years of secular stagnation disproportionately advantaged financial assets, we see the next investment cycle featuring new economic drivers that will produce leaders among industrially oriented and scaled technology suppliers. Customers, in turn, will leverage new infrastructure and automation processes, along with real assets, to drive a steep change in profits and asset utilization. With productivity gains helping to contain inflation, personal income, business dynamism and wealth equality should also be enhanced. Look for opportunities in health care, financials, energy, industrials, defense and real estate, as well as among enterprise-focused tech companies that will be the data-era enablers.

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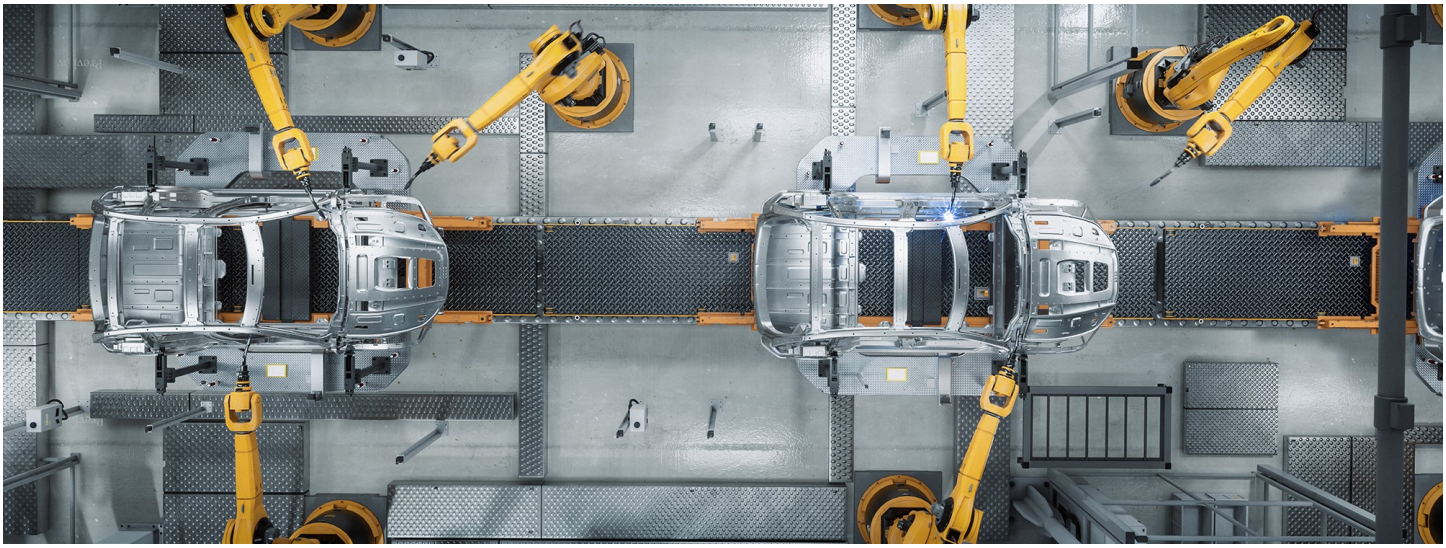
Special thanks to Barron Thomas for all of his contributions to this report.



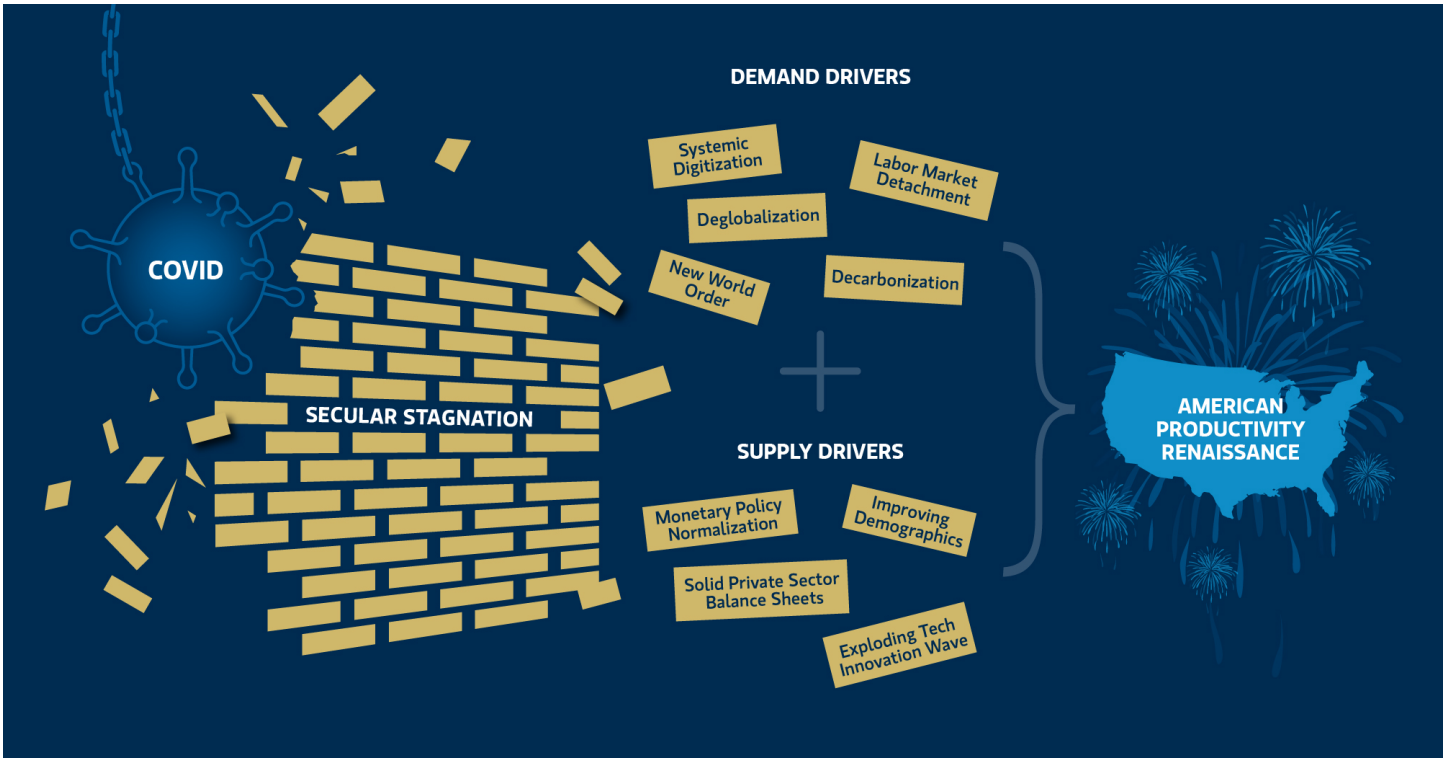
Executive Summary

Given the human devastation and disruption of the COVID-19 pandemic, it may be hard to see any silver lining. But one may exist—at least in macroeconomic terms and for the benefit of investors. After 13 years of secular stagnation following the Great Financial Crisis of 2007 to 2008, COVID was a once-in-a-generation productivity shock, transforming the nature of work and accelerating structural changes demanding new capital investment. Advancing ideas we first posited in our previous Special Reports—"Beyond Secular Stagnation" (September 2016), "The Capex Conundrum and Productivity Paradox" (November 2017), "Are Private Equity's Best Days Gone?" (January 2020), "Policymakers and the Pandemic" (November 2020) and "The Five Ds of Inflation" (May 2021) —this report suggests that the upcoming capital spending supercycle will be powered by at least five major transformational demand drivers: digital disruption and scaled automation of services businesses; structural labor market detachment and the need to substitute capital for labor; advancing deglobalization and infrastructure spending; accelerating decarbonization and the embrace of a hybrid energy sustainability model; and geopolitical adjustments leading to a new world order.

While economic pressures around globalization, decarbonization and the upending of the post-WWII geopolitical order were already building in early 2020, we contend that it took the systemic shock of COVID to catalyze those developments into animating economic drivers. Perhaps more profoundly, while those developments created the need and incentive for investment, a further differentiator this time is that the supply side of the economy is primed to enable the new investment cycle (see Exhibit 1).

We focus on four foundational underpinnings supporting capital supply for this spending boom. First is the near-historic health of private sector balance sheets, which have repaired through more than a decade of deleveraging, regulation and all-time low interest rates. Second is the transition of workforce demographics—from aging baby boomers to tech-savvy millennials and Gen Zers—providing the human capital accelerant that has been missing over the past decade. Third is the maturation of the fruits of a broad and deep innovation surge that is only now coming to light—the product of the "golden age of private equity and venture capital." Finally, there is the normalization of Federal Reserve policy, optimizing capital allocation toward leaders while starving "corporate zombies" as we finally move toward positive real interest rates.

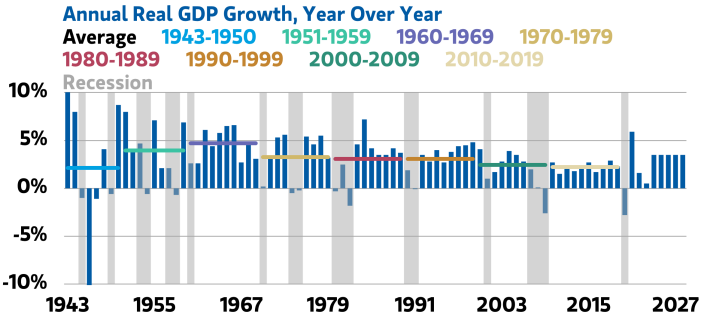
Exhibit 1: COVID Was a Transformative Regime Changer



Source: Morgan Stanley Wealth Management Global Investment Committee (GIC)

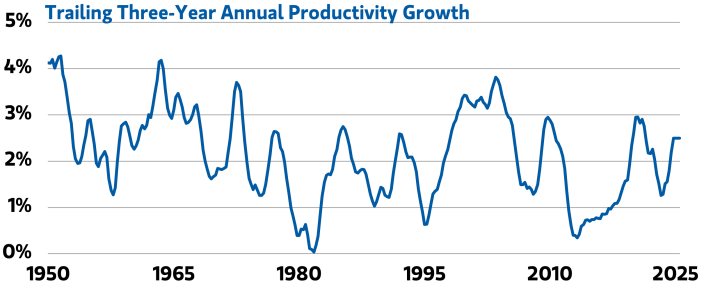
Last decade's technology J-curves were highly concentrated around the smartphone ecosystem and the asset-light consumer industries it spawned. Unlike then, this decade's J-curves include a wide variety of scalable technologies that are likely to enhance economy-wide profitability. We believe that this matching of supply and demand drivers, born of shock and crisis, is bound to unleash an investment and business reengineering boom in the next economic cycle—one that will support stronger growth, normalization of interest rates and above-average productivity gains while serving as an important counterweight to growing income inequality and political populism (see Exhibits 2a and 2b).

Exhibit 2a: We Expect Stronger Growth in the Next Economic Cycle ...



Source: Bloomberg, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Dec. 15, 2022

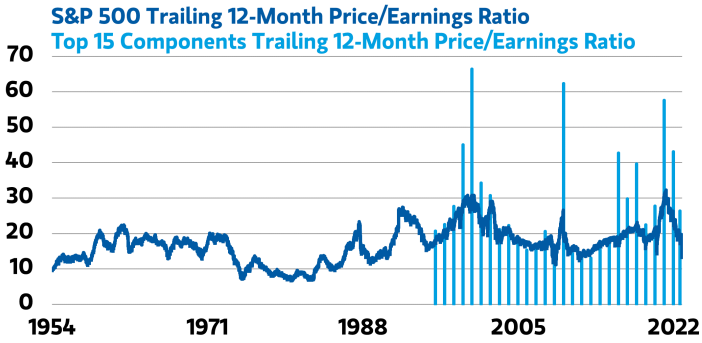
Exhibit 2b: ... as Well as Improved Productivity



Source: FRED, Morgan Stanley Wealth Management GIC as of April 30, 2022

For the stock market, the implication of this economic transformation is that investors accustomed to riding the leaders of the past—through passive index exposure and a reliance on weak global growth, disinflation and a heavy-handed Fed—are apt to be disappointed. In fact, we strongly assert that we will witness a material shift in equity market leadership, completely upending the "age of secular stagnation" and the narrow megacap consumer tech leadership of the past 13 years (see Exhibit 3).

Exhibit 3: Top-15 Company P/E Ratios Are Greater Than the Market's P/E Ratio



Note: Top-15 company data beginning in January 1990.
Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Dec. 21, 2022

Secular stagnation produced a handful of megacap tech monopolies whose success was linked to the smartphone ecosystem of social media and e-commerce, in which profit margins were optimized through network effects of customer acquisition, creation of closed and captive "customer gardens" and exploitation of user-produced content to sell advertising. The leaders of the post-COVID capital spending supercycle, however, are likely to be of a different sort and to come from different sectors. Notably, as transformational as the 15-year-old smartphone has been, its impact on industrial productivity and income growth has been poor; it has aided consumer empowerment but done so in a decentralized, disinflationary and anti-scale way. As business cycle pendulums swing, we are now transitioning to a phase in which it is the tech takers —not just the makers, as the biggest consumers of their own cooking—who reign.

In its simplest form, the investment implication is to move away from passive, market-capitalization-weighted indexes to equal-weighted ones, or preferably to a maximum emphasis on active stock-picking. The next generation of profit-margin-expanders is likely to create wealth through upside surprises to return on capital via transformation of their old economy business models—a pattern not unlike that witnessed in the lost tech decade of 2000-2009 when the "tech wreck" ushered in a shift in market leadership toward financials.

Productivity and return on asset (ROA) gains should be driven by a number of developments. Among these are the application of advanced automation technologies to labor-intensive services businesses; the fundamental revamp of manufacturing and research and development (R&D) infrastructures in industrial and basic cyclical industries; and an acceleration in drug discovery via leveraging of artificial intelligence (AI) and quantum computing. The transfer of value from commercial and office real estate to multipurpose residences should also be a factor, as should new opportunities for public/private partnerships, which are likely

to get renewed focus, especially around national defense, space exploration, cybersecurity, public health research and green energy.

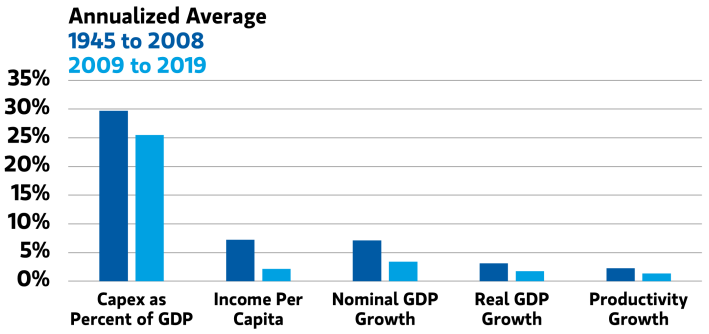
For clients wishing to invest in the productivity renaissance theme, we advise an active and fundamentally based, multi-asset approach. It should entail repositioning of portfolios and a fresh look at opportunities in financials, health care, energy, industrials and consumer services sourced from both the public and private sphere. It means considering that returns may be higher in private credit than in private equity next cycle and that opportunities in commodities and real assets may be superior.

Introduction: America's Coming Productivity Renaissance

One of the foundational frameworks we have embraced in the last decade to understand the behavior of the economy and to inform our analytical approach to asset allocation has been the idea that the Great Financial Crisis ushered in an age of secular stagnation. The concept, first articulated by former US Treasury Secretary and Harvard economist Larry Summers, was built on ideas advanced by Carmen Reinhart and Kenneth Rogoff, which suggested that economic growth following a credit-induced crisis and the bursting of a related bubble was typically subpar for several years and that no amount of government spending or accumulation of fiscal debt could transcend the healing power of time. Summers articulated it somewhat differently, suggesting that growth would stagnate under the weight of excess savings, with a dearth of compelling investment opportunities suppressing capital deepening and, in turn, productivity growth—a dynamic exacerbated by an aging population. For the Fed, this lack of robust demand translated into concerning persistent disinflation, to which it responded with record-low interest rates, fed funds often set at the zero-lower-bound and stimulus in the form of bond buying, or quantitative easing (QE), which was aimed at incentivizing risk-taking.

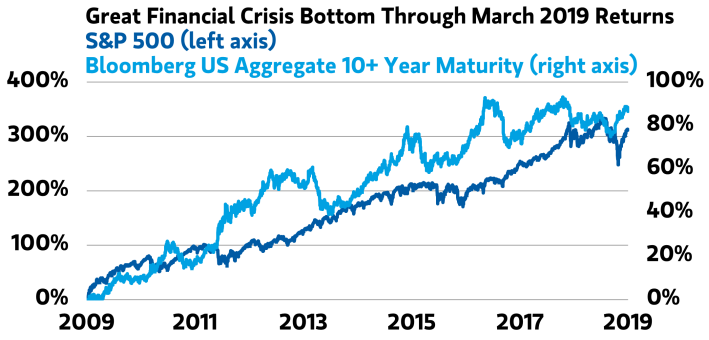
As we illustrate in Exhibit 4, Summers' theory appears to have been vindicated. From 2009 to 2019, real economic growth was subpar, at 2.2% versus the 3.3% post-WWII average, annual capital expenditure as a share of gross domestic product (GDP) averaged approximately 25% versus the historical average of 30% and productivity growth was a disappointing 1.4% per year versus the long-run average of 2.3%. The consequence was real per capita GDP growth for the period of less than 1.5%. Staggeringly, this compares to one of the strongest financial market returns of all time for the same period, as US stocks compounded at close to 15% per year (twice the average rate) and bonds advanced at more than 6% per year, with financial engineering taking center stage (see Exhibit 5). This phenomenon was fueled by a negative real cost of capital, soaring valuations and increasing concentration of corporate commercial power. Rather than "free capital" driving risk-taking investment in real assets, investors, searching for returns flocked to venture capital and private equity in record numbers. As COVID approached, the divergence between financial markets and the real economy was already fueling and inflaming populist political movements, with wealth inequality reaching decades-high extremes (see Exhibits 6a and 6b).

Exhibit 4: Key US Data Declined During the Age of Secular Stagnation



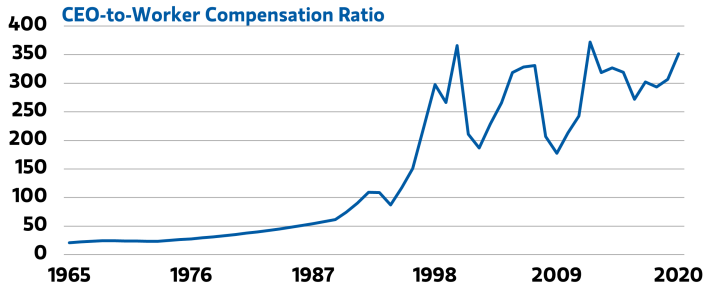
Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Dec. 31, 2019

Exhibit 5: One of the Strongest Periods for US Financial Market Returns in History



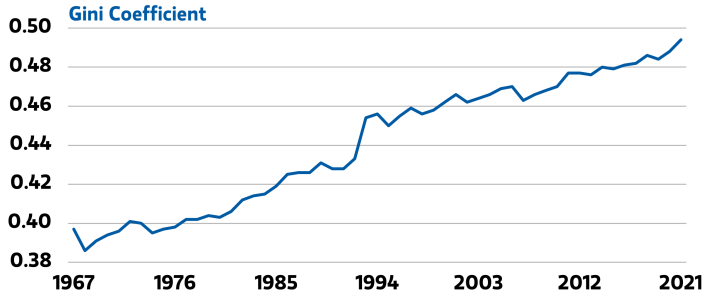
Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Feb. 28, 2019

Exhibit 6a: US CEOs Make Roughly 350 Times More Than the Average Worker



Source: Authors' analysis of data from Compustat's ExecuComp database, the Bureau of Labor Statistics Current Employment Statistics data series and the Bureau of Economic Analysis NIPA tables, Morgan Stanley Wealth Management GIC as of Dec. 31, 2020

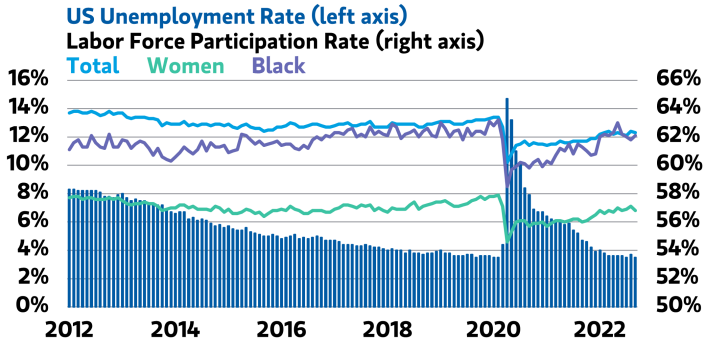
Exhibit 6b: Record-High Income Inequality Has Continued to Climb



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Dec. 31, 2021

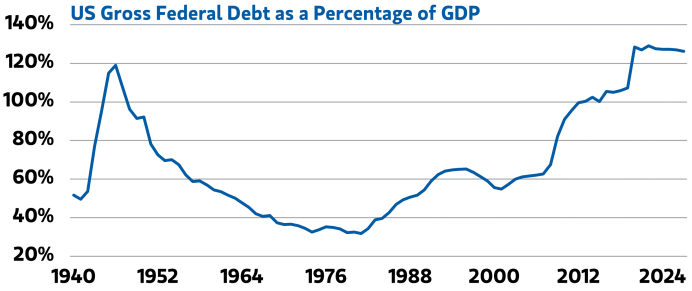
Several other components were critical parts of the economic backdrop leading up to 2020 as well. After one of the longest economic cycles on record, labor markets were showing signs of tightening, with the unemployment rate reaching a 50-year low of 3.5% and the participation rate recovering from Great Financial Crisis levels amid dynamics finally suggesting better labor force inclusion for women and people of color (see Exhibit 7). On the back of 2018's unfunded corporate tax cuts and initial COVID-related emergency spending, federal gross government debt as a share of GDP was already above 107% and on its way to 128% by year-end 2020, nine months into the pandemic (see Exhibit 8). While global energy infrastructure expenditures are now on the rise, annual capital investment in fossil fuels and carbon-based sources had been halved (see Exhibit 9). Furthermore, the seeds of growing trade tensions and the reorientation of US supply chains away from China had already begun with the imposition in January 2018 of tariffs and trade barriers.

Exhibit 7: Labor Force Inclusion Is Improving



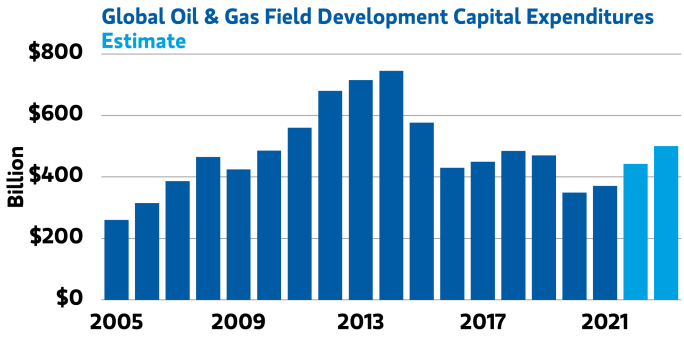
Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

Exhibit 8: US Federal Debt as a Percentage of GDP Has Risen Sharply



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Nov. 30, 2022

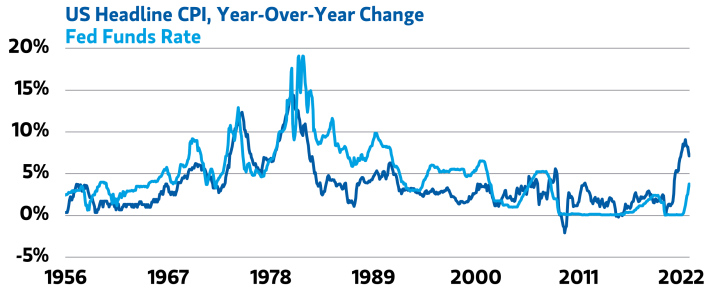
Exhibit 9: Capital Expenditures on Oil and Gas Declined Meaningfully After 2014



Source: Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Nov. 24, 2022

For the Fed, however, the key controversy leading up to 2020 was its inability to wean the economy and financial markets off easy money. Specifically, their program of rate hikes and QE was deemed a failure, as markets crashed amid a liquidity squeeze in December 2018, sending the central bank into accommodation mode once again, with a sudden fed funds cut in January and abandonment of balance sheet reduction efforts. Despite this, by mid 2019 economic growth was already slowing and inflation had once again slipped well below the Fed's 2% target (see Exhibit 10). While policy may have been operating with a lag, investors were nonetheless questioning whether the business cycle—already among the longest on record—was headed for recession. Perhaps more importantly, they were asking whether American secular stagnation was about to morph into a multidecade episode of "Japanification," whereby exiting negative real interest rates was becoming impossible.

Exhibit 10: After Remaining Below 2%, Inflation Accelerated, Leading to Fed Rate Hikes



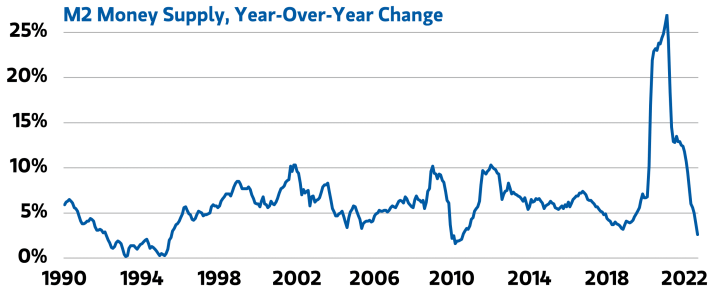
Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Nov. 30, 2022

COVID Pandemic as Economic Catalyst

What began in December 2019 as the emergence of a concerning cluster of SARS-2 coronaviruses in Wuhan, China, was by March 2020 a global pandemic on a scale and magnitude not seen since the 1918 Spanish flu. Not only were global financial markets collapsing —down 34% from Feb. 19 to March 23—but the degree to which public health systems were struggling suggested the need for complete economic shutdown, an action that massively disrupted markets from both the demand and supply sides. By Sept. 5, within the first six months of the government-declared shutdown, the US, according to Johns Hopkins University, had lost as many as 195,000 lives, over three times more than the number of Americans killed in the Vietnam War. As people retreated to their homes, second quarter GDP growth fell more than 9% —the most severe and rapid quarterly decline noted in modern record keeping—and unemployment soared above 14.7%, as more than 20 million workers lost their jobs.

With the lessons of history at their back, policymakers responded on a scale and at a speed the world had never seen before (see the Nov. 9, 2020 Special Report, "Policymakers and the Pandemic: Defining a New Business Cycle"). The Fed immediately cut short-term rates back to the zero bound, and an unprecedented QE program was initiated, allowing the central bank to intervene in markets aggressively to purchase various types of bonds, including US Treasuries, mortgage-backed securities and even some credit instruments. The result was more than a doubling of the Fed's balance sheet in two and half months, with more than $4 trillion in liquidity added to the economy. By comparison, during the Great Financial Crisis, the same amount took the Fed four QE programs and two and a half years to complete. Year-over-year growth in M2 money supply soared to 27% by February 2021 (see Exhibit 11a). Legislators in Washington did their part as well, with nearly $3.5 trillion in spending in 2020, including small business loans via the Paycheck Protection Program (PPP), extended unemployment benefits and direct household transfers. Another $1.5 trillion in emergency aid was granted in the first quarter of 2021.

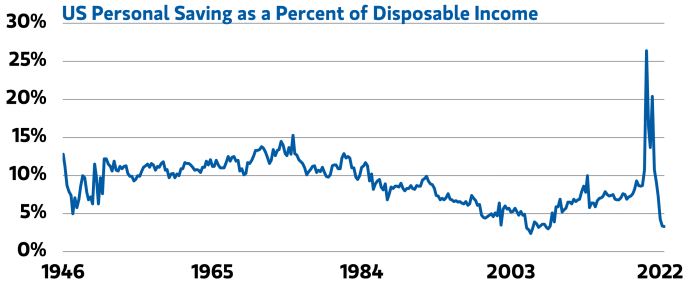
Exhibit 11a: After Peaking in 2021 Money Supply Growth Has Since Declined



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Oct. 31, 2022

All told, in the 12 months ended April 2021, stimulus equivalent to more than 45% of annual GDP was injected into the US economy—more than three times what was spent during the Great Financial Crisis. With the economy closed and activities already restricted, the immediate effect of the combined stimulus was to help bridge the economy through the crisis via savings. In April 2020, the personal savings rate increased above 25% and remained in double digits through the summer of 2021 (see Exhibit 11b). That compared to a 75-year post-WWII level of approximately 9% and a trailing 25-year rate of approximately 6%. Seeing the potential for economic recovery, financial markets forcefully rebounded, surging to all-time highs through 2021, as long-run real rates hit their lows and megacap secular growth stocks reached a crescendo.

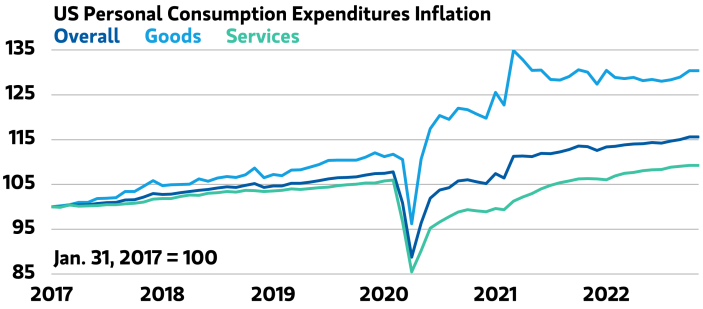
Exhibit 11b: The US Savings Rate Rose Sharply During COVID



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

While the social, psychological and political trauma unleashed by the pandemic is still being assessed, we contend that the immediate consequences of the systemic shutdown, almost instantaneously followed by historically unprecedented stimulus, should not have been surprising. Savings plus pent-up demand spelled a V-shaped recovery for manufactured goods; to wit, American retail sales surpassed pre-COVID levels by May 2020. Services demand, meanwhile, remained subpar, given its human contact intensity and public health risks. This created even more extreme skews in the consumption mix, favoring goods over services and setting up a powerful pull-forward of goods demand (see Exhibit 12). On the supply side, lean inventories, globally complex supply chains and complete factory closures suggested that we were apt to see mismatches between orders and available shipments—a textbook formula for inflation, which the Fed spent most of 2020 and 2021 incorrectly labeling "transitory."

Exhibit 12: Goods Demand Was Pulled Forward as Services Demand Remained Subpar



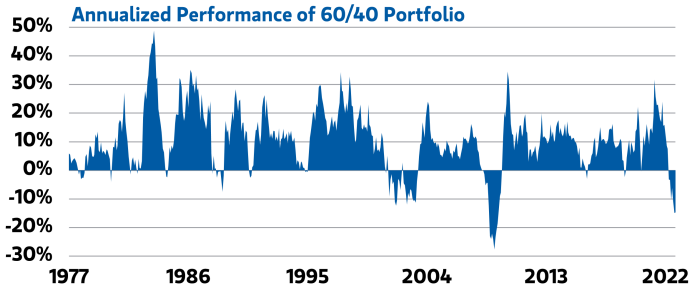
Source: Bloomberg, FactSet, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Nov. 30, 2022

Economic reopening, which began to accelerate through the beginning of 2022, unveiled even more dislocations and imbalances. Tightness in labor and housing/rental markets suggested that the inflation dynamic might be longer-lived, and recovery in services businesses like travel, leisure and entertainment hinted at additional tailwinds for price increases. Complicating matters even more was the rapidly changing global geopolitical backdrop, with the Russia-Ukraine conflict adding commodity market shocks for oil, natural gas and agricultural products and shortages that European countries were not fully prepared for. The result, as we now know, is that the end of the pandemic brought global central banks to a new battle, fighting 40-year-high inflation.

With the Fed deeply behind the curve on inflation and Chair Powell intent on not repeating the mistakes of the past, his channeling of historic inflation fighter Paul Volcker was foreboding. It soon became clear that the policy pivot and removal of accommodation would need to be as radical and swift as the initial crisis response was bold. But to conclude that COVID's only lasting economic legacy is the vicious cyclical bear market of 2022 (one of the worst in 50 years for a traditional 60/40 portfolio, as seen in Exhibit 13), is overly simplistic. Rather, we see COVID as driving and accelerating structural changes, serving as a once-in-a-generation productivity shock and forever changing the nature of work at a time when other supply-side enablers, such as demographics, health of private sector balance sheets and

automation-oriented innovations, are all pointing to a more dynamic business cycle ahead (see Exhibit 1 in Executive Summary).

Exhibit 13: 2022 Was One of the Worst Years on Record for the 60/40 Portfolio

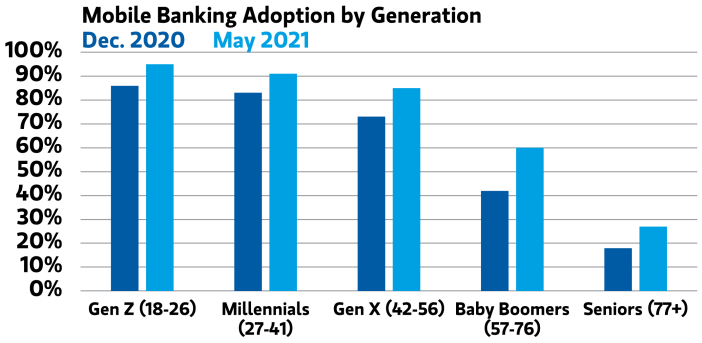


Note: A traditional 60/40 portfolio consists of 60% equities and 40% fixed income.
Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Oct. 31, 2022

Capex Catalyst 1: Digitization of Business Models

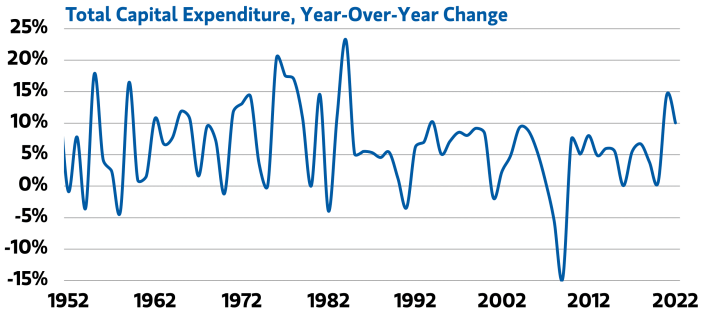
Consider first the immediate imperative of the pandemic-linked economic shutdown. Instantly and systemically, every enterprise had to move into a process reengineering mindset that demanded a "contactless" or "germless" customer experience. That was true of businesses from the largest megacap company to the smallest mom-and-pop shop. On a grand scale and virtually overnight, the US economy moved to maximum penetration of online and mobile interaction—from grocery shopping, to banking, to entertainment, to collaborating and creating (who heard of Zoom before 2020?), and even to some types of health care. In some cases, like online banking (see Exhibit 14), the behavioral transformation was immediate and likely permanent. With movement restricted, almost everything imaginable was suddenly available for home delivery. The digitization of business models catalyzed the first resurgence in capital investment the economy had seen since the 2013-14 hydraulic fracking revolution. It was a pure form of substituting capital for labor. Capital spending grew at an annual rate above 15% in 2021, the fastest pace in the roughly four decades of recorded data and almost twice that of anticipated top-line revenue growth (see Exhibit 15).

Exhibit 14: Cumulative Adoption of Online Banking Continues to Increase



Source: Statista, Morgan Stanley Wealth Management GIC as of May 31, 2021

Exhibit 15: Year-Over-Year Growth in US Capital Spending Is Above Average



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

Biotech and pharmaceutical companies seeking to be the first to solve the vaccine challenge were of course among the entities immediately transformed by the rush to invest. As part of this galvanizing effort, we also saw acceleration in the adoption of AI and machine learning—essentially a swap of processing power for in-lab spending on R&D in order to increase efficiency and save time. Taking advantage of new approaches based on genetic tagging and mRNA technologies, investment has accelerated not only in drug development and discovery but in rapid at-home diagnostics; increasingly combined with real-time health monitoring technology, this is helping to transform medical care. Morgan Stanley & Co.'s health care analysts believe that savings could potentially be big enough to drive the capital-for-labor substitution, with their initial data suggesting that preclinical costs could be cut by 75% and early-stage preclinical costs by more than 50%. At industrywide scale, they estimate that an additional four to eight molecules would be discovered/designed per year—a 10%-15% increase over 2021's output.

More broadly, much of the post-COVID capital spending began out of necessity, as the glaring limitations of local manufacturing capacity and the complexity of global supply

chains revealed their vulnerabilities and as companies had to double down on IT infrastructure security to accommodate remote work. In this atmosphere, a greater share of capital expenditures has shifted toward opportunistic and growth-supporting investments. Efforts focused on making changes first implemented as stopgaps permanent—such as those around cashless and touchless payment networks, customer service automation and drone-based delivery—are among those that have driven upside surprise in sustained spending.

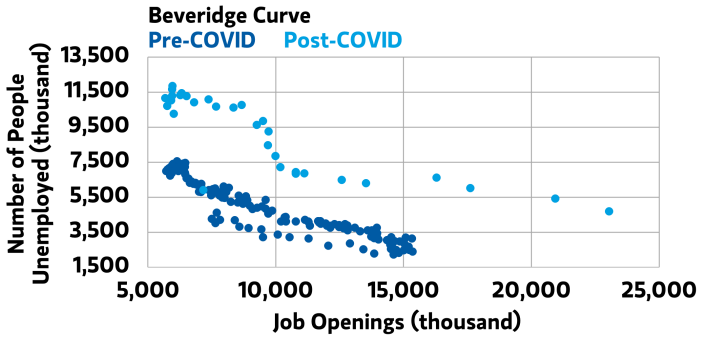
Capex Catalyst 2: The Once-in-a-Generation Labor Market Shock

If the need for business processes to help minimize human contact was the first pandemic-related impulse for accelerated capital investment, as the economy reopened, it was clear that labor constraints would be the second. Not only did it appear that people were reluctant to return to work after the initial trauma of the pandemic, but job openings began to build at a rate far in excess of the number of applicants, fostering record labor market tightness and suggesting that the classic Beveridge curve had shifted (see Exhibits 16 and 17). Weak participation rates were initially blamed on government restrictions like vaccine or testing requirements and the excess savings generated by stimulus. Those populist arguments didn't explain what we observed in the data, however, which was a labor pool increasingly showing signs of structural impairment.

Exhibit 16: A High Ratio of Job Openings to Unemployed Signals a Tight Labor Market

Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Oct. 31, 2022

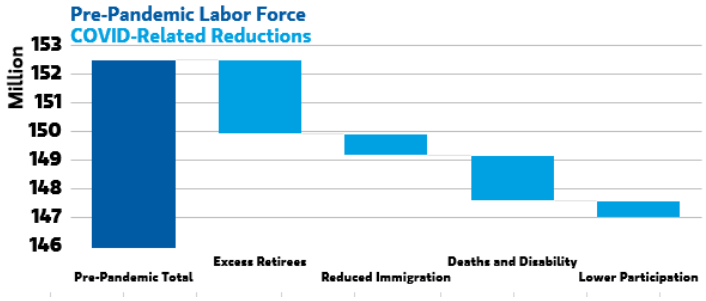
Exhibit 17: The Beveridge Curve Has Shifted Due to the Tight Labor Market



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

We begin our analysis with the immediate changes to the labor supply between February 2020 and the second quarter of 2022. For starters, the pandemic not only impacted the supply of labor due to death and health-related leaves (estimated at approximately 1.5 million, including those lost to COVID and to related long-term disabilities), but it catalyzed a significant catch-up in the baby boomer retirement rate, which had been running below trend for more than a decade. To wit, Morgan Stanley & Co.'s economics team estimates that excess retirements permanently removed between 2.5 and 3.0 million people from the workforce (see Exhibit 18). Closed borders due to public health moratoriums and backlogs in work visa processing likely accounted for a cumulative drag of another 1 to 2 million people. The disruption of the annual flow of new graduates to the workforce was another contributing factor.

Exhibit 18: The Pandemic Has Led to Changes in Labor Force Participation



Source: DHS, American Progress, Bureau of Labor Statistics, Federal Reserve Bank of St. Louis, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

Perhaps more profound than actual reductions in the pool of available labor, however, were the sociological changes to our notions of work, which contributed to structural shortages. Consider how we approached work during the pandemic,

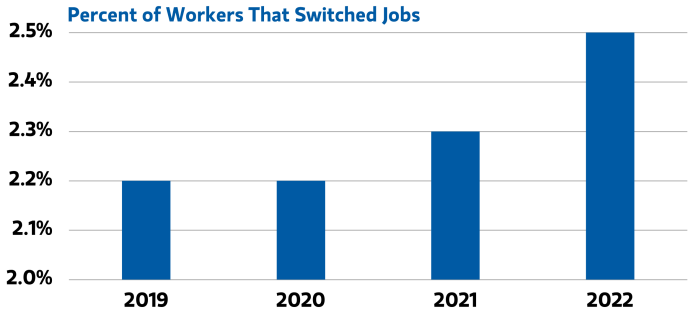
implicitly associating everyone in the labor force with one of three cohorts. First, we identified those professions that were deemed essential. Almost entirely on the services side of the economy, these included health care workers, front-line civil servants like police and firefighters, teachers, and, amid the delivery boom, long-haul truckers, pilots and logistics/warehouse staff. For this cohort, labor force detachment and deteriorating participation rates were driven by burnout from the never-ending daily litany of public health protocols and a renewed appreciation of the risk/reward mismatch. These professions experienced above average separations among workers 55 or older, exacerbating preexisting shortages and materially contributing to wage inflation.

A second dynamic emerged around so-called white-collar employees who were conferred the seemingly permanent benefit of remote/hybrid work-from-home status. Untethered from the office, these workers suddenly won huge freedoms of time and space. Able to save time and money otherwise spent on commuting, they no longer had to budget for a work wardrobe and could invest in their families and personal health in ways they previously hadn't imagined. Now time-shifting many tasks to accommodate a more balanced lifestyle, they could even relocate. In fact, from April 2020 to April 2022, national address changes soared to four times the average historical pace, as COVID ushered in what sociologists labelled the "Great Resignation" and the quit rate soared to more than 7%, nearly double the average of the past 35 years.

Such demographic reordering, in turn, brought additional pressures to bear on rebalancing labor supply and demand. As Michael Goldstein of Empirical Research Partners has pointed out, wage growth for white-collar job changers reached a 25-year high of 8% in October 2022. Although "Zoom culture" and "quiet quitting" had their downsides and were easily "memed" on social media, ultimately remote/hybrid work became the desired model for many entrants to the labor force, especially Gen Zers, as it afforded the most freedom and the strongest health protections.

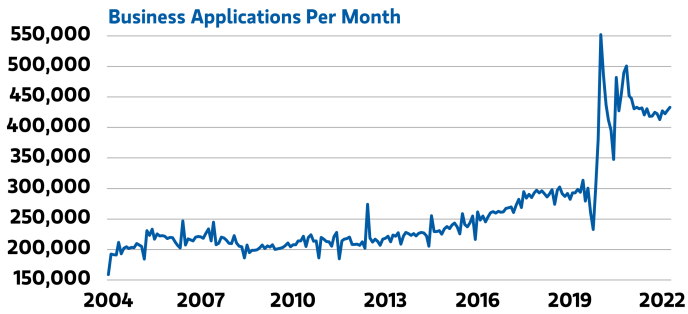
The desirability of the remote/hybrid model stood in marked contrast not only to that of the essential, at-risk worker, but to that of the other, quite large portion of the labor force (estimated at approximately 40%) that was labelled "nonessential." Besides the obvious sociological and psychological scarring of that term, this typically lower-skilled worker was plagued with income uncertainty tied to economic reopening. While government assistance provided some survival bridges, most of those furloughed took the time to search for a new profession and many people switched jobs (see Exhibit 19a). With workers leveraging opportunities to join the remote-worker army, self-employment was aided by dynamism in the gig economy. Cumulative new business applications, filed from April 2020 through mid-2022, are running close to 13.5 million, nearly 10 times the annual average of the past decade (see Exhibit 19b).

Exhibit 19a: More Workers Began Switching Jobs During and After the Pandemic



Source: Pew Research, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

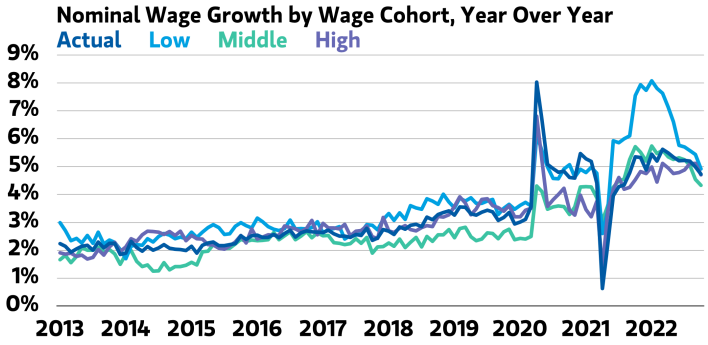
Exhibit 19b: Business Applications Have Risen Amid a Dynamic GIG Economy



Source: US Census Bureau, Bloomberg, Morgan Stanley Wealth Management GIC as of Oct. 31, 2022

The consequence of all this has been a sluggish rebound in labor force participation and, in turn, wage gains driven by labor shortages. As of the time of this publication, the labor force participation rate is a full percentage point below the February 2020 cycle peak of 63.4% and well off pre-Great Financial Crisis levels of between 66.5% and 67.5%. While overall wage growth, as measured by the Employment Cost Index, has been rising at a 5% year-over-year pace, the lower-wage/lower-skill cohorts have experienced the most rapid gains, as we display in Exhibit 20. Given the behavioral underpinnings of the shift in job desirability that emerged during COVID, we think this trend may prove sticky and long-lived.

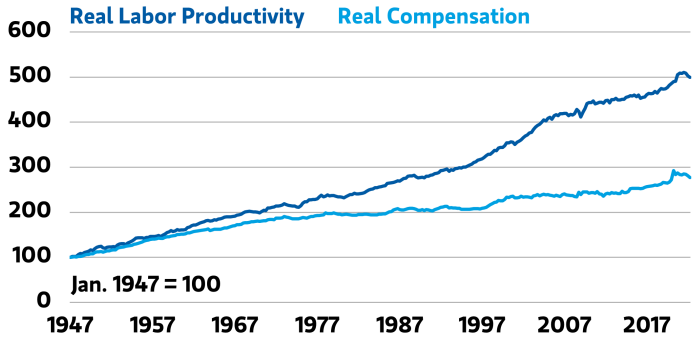
Exhibit 20: Wage Growth Has Been Strongest for the Low-Wage Cohort



Source: Bloomberg, FactSet, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Oct. 31, 2022

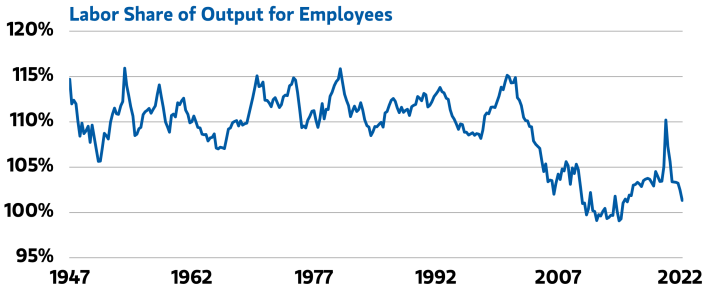
Our US economics team has gone further, extrapolating trends we have observed in the immediate aftermath of COVID to a longer-term structural rise in wages and employee bargaining power (see the Dec. 1, 2022 report from Morgan Stanley & Co. Research, "What the Workers Economy Means for Margins and Markets"). Amid lagging compensation growth, labor share of corporate income declined persistently over most of the past 20 years. According to the team's analysis, we may be approaching the point when it mean reverses, shifting back to the relationship that existed from 1950 to 2000 (see Exhibits 21 and 22). The implication of this renormalization is less about persistent inflation and more about likely pressures on historically high corporate profit margins. These higher-for-longer pressures on corporate profits will likely sow additional seeds for cost-reducing capital investment.

Exhibit 21: Real Wages Have Undershot Productivity Gains



Source: FRED, Morgan Stanley Wealth Management GIC as of March 31, 2022

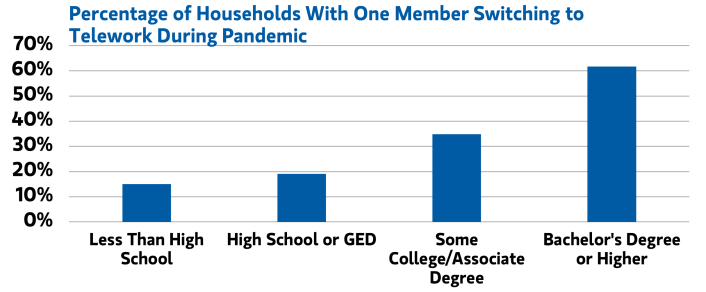
Exhibit 22: Labor's Share of Corporate Income Is Decreasing



Source: FRED, Morgan Stanley Wealth Management GIC as of March 31, 2022

While labor tightness has contributed to inflation through rising wages and prodded companies to consider substituting capital for labor, the changing nature of work also suggests a new paradigm for real estate investment and the allocation of the total value pie. We believe that, in relation to demographic drivers, the US remains undersupplied in housing. While that reality should produce its own support for capital deepening, we see the changing nature of work creating new value drivers for residential housing. Data suggests that nearly 60% of workers with a bachelor's degree began working at home during the pandemic (see Exhibit 23). The implication is that workers wanting a productive and dedicated space for work-at-home activities will increasingly be willing to pay a premium for extra square footage that is private, technology-enabled and ventilated with fresh air. At the same time, the value of inner-city office space whose only differentiating attraction was proximity to commuter lines will likely plummet in favor of smaller, modern and revamped collaborative spaces that will better characterize the optimal office experience.

Exhibit 23: Remote Employment Is Changing the Nature of Work



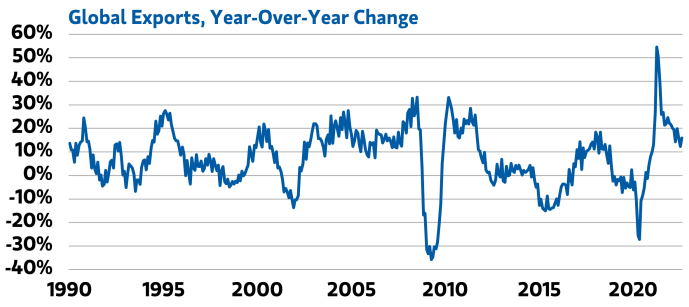
Source: US Census Bureau, Bloomberg, Morgan Stanley Wealth Management GIC as of March 31, 2021

Capex Catalyst 3: Deglobalization

The next demand driver of American capital spending is deglobalization. What started in 2018 with Trump administration trade tariffs targeting perceived unfair practices and a lack of sufficient protections for American intellectual property in China quickly morphed into a global trade slowdown (see Exhibit 24). But the experience around the COVID pandemic took the standoff to a new level. Beyond the emotions and conspiracy theories around the origins of COVID were the realities that globally integrated supply chains were a huge obstacle amid a worldwide pandemic. Notably, national strategies for containment varied, and virus intensity cycled in an out of sync across geographic regions. Furthermore, strategic inventories and stockpiles within the American retail and wholesale systems had been built for just-in-time financial optimization, not as strategic buffers.

As is usually the case in a crisis, vulnerabilities were immediately exposed—some among simple products viewed as necessities, like health care supplies and medical masks, and some in high-growth and critically strategic areas. These included semiconductors, automotive components and electric vehicle batteries, as well as vital raw materials. As noted in the 2022 Council of Economic Advisers report, COVID revealed a state of "American supply chains that are efficient but brittle—vulnerable to breaking down in the event of pandemic, a war or natural disasters—which have become ever more frequent. Because of outsourcing, offshoring and insufficient investments in resilience and sustainability, our supply chains are complex and fragile."

Exhibit 24: Global Trade Slowed Substantially Amid Trade Tariffs and COVID



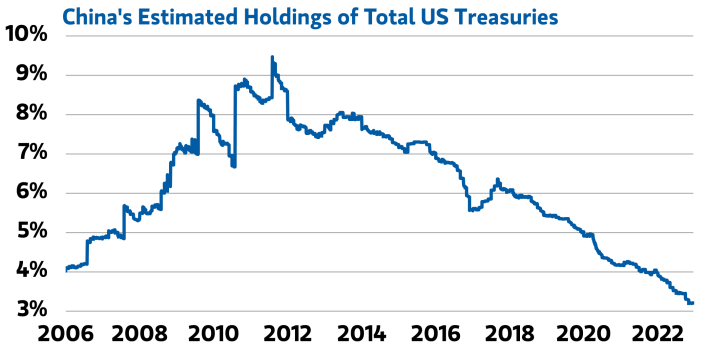
Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Aug. 31, 2022

With the strong US dollar arguing for continued strength in imports of consumer goods, industrial machinery and intermediate parts, China's zero-tolerance COVID policy made lockdowns in that country the norm and weighed down production volumes across the emerging markets, adding urgency to supply chain reconfiguration. Further, as inflation linked to supply chain constraints began to build, so did the political rhetoric around onshoring, a narrative that only gained fuel under President Biden's banner of "Build Back Better." Energized by the passage of spending bills like the $1 trillion Bipartisan Infrastructure Bill and the $50 billion CHIPS Act for US semiconductor investment, along with $369 billion in energy infrastructure spending inside the 2022 Inflation Reduction Act, companies have been sensitized to the potential advantages of rethinking their global sourcing strategies.

Still, few examples of a regime shift around globalization could be more powerful than that of the traumatic Russia-Ukraine conflict and its impact on European energy dependence. With energy-rationing plans being developed, winter gas stockpiles being built and fiscal subsidization schemes on the drawing board, high inflation and the likelihood of recession are sowing the seeds of political discord. Ultimately, we expect an unprecedented fiscal response from the European Union, as it finally meets the existential threat with cooperation and syndicated financial risks and burdens.

Recrafting energy dependencies, however, will likely set the tip of the spear for realignment of trade blocs. US currency-linked sanctions against Russia, especially the seizure of Russian US dollar foreign exchange reserves, were unprecedented. While China has been growing its share of trade with the rest of the world, resulting in the renminbi gradually accounting for a larger portion of foreign exchange reserve markets, and slowly reducing its dominance in the US Treasury market (see Exhibit 25), we expect an acceleration in new trade blocs among NATO allies in light of events in Ukraine. For China's part, given the new agenda for President Xi Jinping's third term, its "Belt and Road Initiative" was likely only the beginning, as it aims to increasingly secure supply of critical technology components and as US protection of intellectual property intensifies.

Exhibit 25: China Is Becoming Less Reliant on the US Dollar

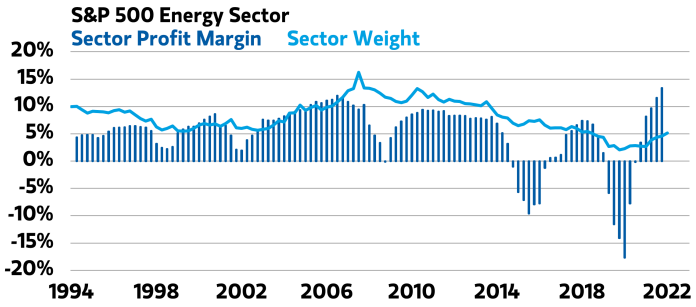


Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Dec. 16, 2022

Capex Catalyst 4: Decarbonization

The US essentially secured energy independence with the hydraulic fracking revolution of the mid-2010s. Furthermore, despite cancellation of the controversial Keystone XL pipeline project, it has continued to guard against vulnerability to OPEC via strengthened ties to Canada and Mexico through the United States-Mexico-Canada agreement (USMCA). That said, overall North American investment in energy-related projects for discovery, transport and transmission stalled at roughly $470 billion per year from 2015 to 2022, according to the International Energy Agency. Although spending on clean energy rose by 20% during those years (to approximately $230 billion), the increase came exclusively from reduction in fossil fuel and carbon-linked investments. Unchanged spending over the last seven years of the business cycle, against a backdrop of mostly solid economic growth, falling unemployment and limited productivity improvements, amounted to declining energy intensity. The S&P 500 energy sector, once 12% of the index's market capitalization, shrank to less than 3% amid deteriorating margins (see Exhibit 26).

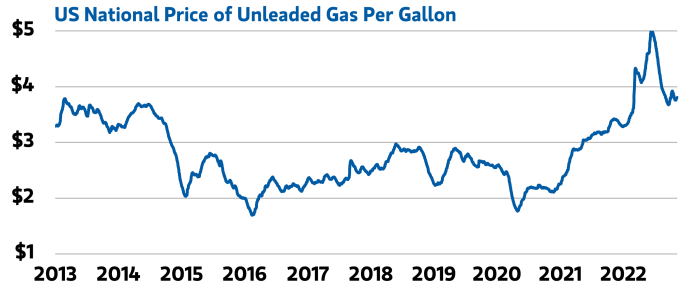
Exhibit 26: The Energy Sector's Weight Shrank as Margins Deteriorated Before the Recent Rebound



Source: Bloomberg, Strategas, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

The spring 2022 surge in US gasoline prices, however, reopened the debate around energy sustainability. In the weeks following the onset of the Russia-Ukraine conflict, the average price pierced $5 per gallon, historically eye-popping in nominal terms (see Exhibit 27). Although many on both sides of the climate change controversy were operating from positions of political self-interest, it was clear that the path toward decarbonization would need to be relitigated—probably not in the form of an all-or-nothing discussion premised on starving fossil fuels out of existence, but as part of a dialogue about a managed transition toward lower-carbon footprints, optimizing all energy sources.

Exhibit 27: Prices at the Pump Increased Amid the Russia-Ukraine Crisis

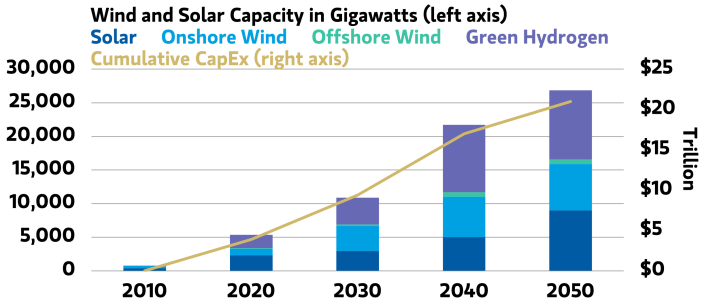


Source: Bloomberg, Strategas, Morgan Stanley Wealth Management GIC as of Dec. 14, 2022

Geopolitical necessities and urgency around supporting EU energy independence from Russia—not to mention refilling the partially drained US Strategic Petroleum Reserve—are slowly catalyzing a return of traditional energy capital expenditure. Impetus for the next step will likely come from the Inflation Reduction Act (IRA). Although, as noted above, the fiscal spending headline for clean energy is around $400 billion over 10 years, that meaningfully understates the cumulative impact given the plan's 30/70 public/private spending breakdown through tax incentives. Its provisions largely focus on influencing consumer behavior and significantly upgrading energy infrastructure, especially that linked to clean electricity generation. They're also geared toward supporting growing ambitions to electrify the US automotive fleet and boost the energy efficiency of new homes.

The Zero Lab at Princeton University, working with the nonpartisan Energy Innovation and Technology think tank, has suggested that incremental spending above designated IRA amounts could reach $100 billion per year by 2025 and as much as $200 billion by 2030. That is clearly significant, given the extent of industry spending today. As we illustrate in Exhibit 28a, according to Morgan Stanley & Co. Research analysts, total annual capital expenditures on clean energy would approximately double by 2030. As Empirical Research Partners' Goldstein points out, capex is not excessive relative to GDP growth over the past decade, with peak energy-linked capex still less than the 2% of GDP that spelled overbuilding in the 1970s and 2010s.

Exhibit 28a: Clean Energy Capital Expenditures Could Increase Dramatically



Source: Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Nov. 8, 2021

This incremental spending comes on top of what Morgan Stanley & Co.'s autonomous vehicles analyst Adam Jonas already labeled "the mother of all capex cycles" in an April 2022 report on electrification of the transportation infrastructure. Per his team's forecasts, reimagining global renewable energy infrastructure and related supply chains will require $10 trillion to $20 trillion of accumulated capex through 2040 and production of as much as 20 to 40 TWh of battery capacity (see Exhibit 28b). Needless to say, there will likely be many beneficiaries here—from those involved in the construction of charging infrastructure to the building of smarter, cleaner highways based on the Internet of Things.

Exhibit 28b: Estimated Annual Capital Expenditures Required for the Grid and EVs

Grid	Vehicles
25k TWh per year globally	**~20T 2040 Global Vehicle Miles**
68 TWh per day x 3 days of supply = **~200 TWh**	~1.5Bn 2040 Global EV Parc x 80 kWh battery capacity = **~120 TWh**
20-year useful life	10-year useful life
10 TWh **x** **$80Bn capex per TWh** **=** **$0.8T capex**	**12 TWh** **x** **$80Bn capex per TWh** **=** **~$1T capex**
Total = ~$1.8T capex	

Source: Our World in Data, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of April 8, 2022

Capex Catalyst 5: New World Order

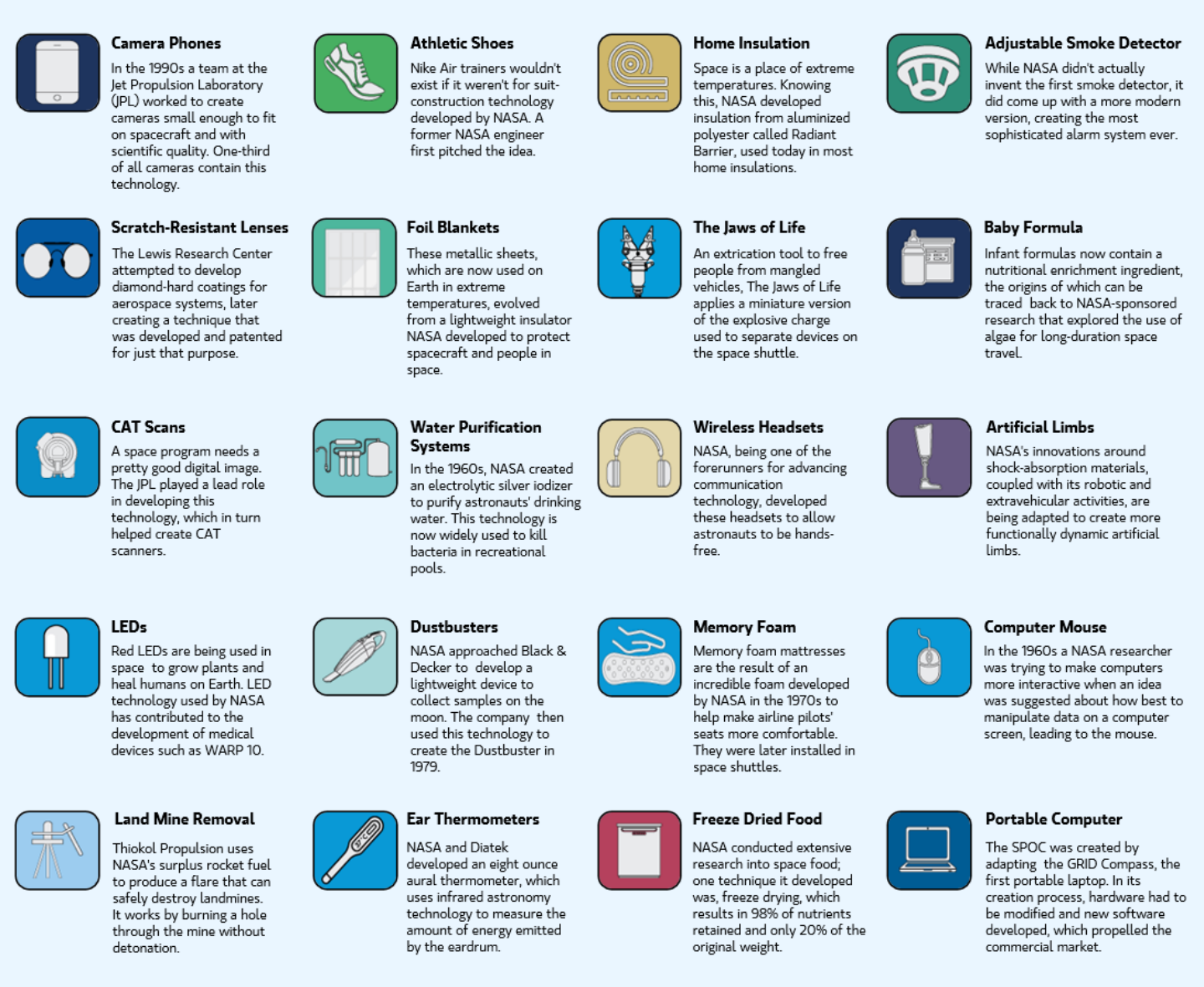
The final driver of accelerated capital investment coming out of COVID is the clear shift in the geopolitical balance—one that concretizes genuine disagreements among nuclear superpowers Russia, China and the US. Some have referred to this development as multipolarity. Our simplistic read is that the world, post-COVID, is no longer that of the post-Soviet era and its 40 years of stability for Continental Europe. Nor is it that of the post-2000 trade globalization era, characterized by mutually beneficial trade integration of China and the West.

Meanwhile, emerging markets, for their part, are no longer a large and similarly behaving bloc; rather, they have diversified their strategic allegiances and dependencies, with national self-interest much closer to the forefront. For many, like India, optimization strategies may involve playing the US and China off each other by forging strategic economic and geopolitical ties to both. The implication globally is for a massive acceleration in nation-state-level spending, not unlike that experienced in the Cold War period of the late 1950s to the 1980s. Public, private and hybrid funding of national programs for defense, cybersecurity, public health, space travel and surveillance are likely, as are national and strategic R&D programs. As was the case during the height of these partnerships, especially in the 1960s, they may accelerate economy-wide innovation and productivity (see Exhibit 29).

Critically, this comes at a time when defense spending was already on the rise in the aftermath of the Russian invasion of Ukraine, and modernization of the US military infrastructure has already generated some bipartisan interest in Washington. Defense spending is up 8.5% in 2022 and is forecast to sustain annual gains of at least 5% in upcoming budgets, despite congressional gridlock. Morgan Stanley & Co. analysts forecast that Department of Defense spending, as a share of annual GDP, is likely to rise from approximately 4.7% toward the 6% level maintained during the early 2000s in the wake of 9/11.

Space exploration, travel and communication (from the perspective of both proactive and reactive satellite surveillance) is another dimension of the new geopolitics. While not directly linked to defense, it is connected to opportunities for a massive step-up in capital investment, as NASA re-engages in human-based exploration after a 50-year hiatus. Building on the legacy of the Apollo missions to the moon, the Artemis program is emblematic of what we see as a multiyear regime shift linked to multipolarity.

Exhibit 29: Twenty Space Travel-Related Innovations



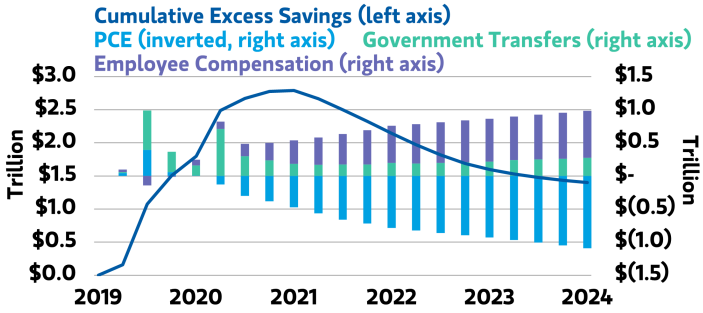
Source: NASA, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of May 20, 2016

The final dimension of capital spending that is likely to be sustained through the cycle is that devoted to cybersecurity. While this may not be a new investment theme, given the rich valuation of stocks in the sector, the scope of concern has escalated—from protection of personal information and social media channels, to election meddling, to protection of physical infrastructure, such as power, communication and electrical grids. Market researchers from Gartner estimate that this year's $188 billion cybersecurity market will expand at an 11% compound annual growth rate through at least 2027. While hacker intensity from both private and state-sponsored actors continues to escalate, secular drivers of increased network vulnerability are emerging from the surge in remote and hybrid work, the transition from VPN-based network architectures to zero-trust network access and the shift to cloud-based storage and delivery.

Supply Side Enabler 1: Healthy Private Sector Balance Sheets

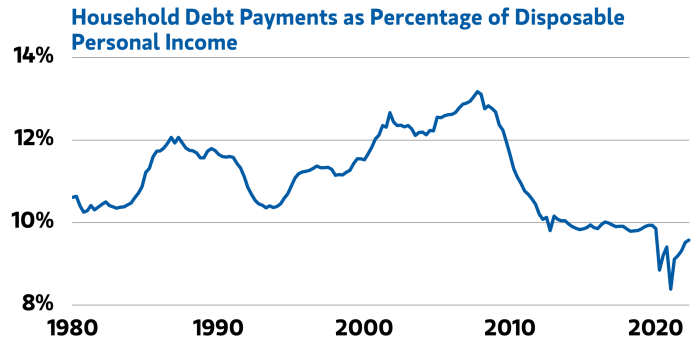
While demand is coming from many sources, the number-one enabler of a capital spending supercycle is the balance sheet strength to finance it. Specifically, we have asserted that following COVID, the US private sector is enjoying its strongest financing position in 40 to 50 years. Beginning with households, while stimulus payments were an effective bridge in preventing a deterioration of personal consumption, the pandemic induced forced savings that are still providing a significant buffer. As of Nov. 1, household excess savings were estimated at $2.1 trillion—down approximately 30% from December 2021, but still substantial, especially given that the savings rate relative to disposable income has normalized (see Exhibit 30a). Perhaps more critically, households have repaired their total balance sheets, rationalizing mortgage obligations and reducing dependence on credit cards. In aggregate, their debt service as a share of disposable income, at less than 10%, is near a 40-year low (see Exhibit 30b).

Exhibit 30a: Excess Savings Have Recently Declined But Remain Substantial



Note: 2023 and 2024 estimates reflect Morgan Stanley & Co. Research forecast.
Source: Bureau of Economic Analysis, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Oct. 31, 2022

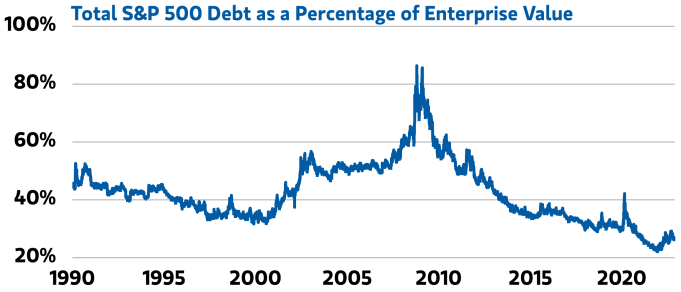
Exhibit 30b: Houshold Debt as a Percentage of Disposable Income Has Decreased



Source: FRED, Bloomberg, Morgan Stanley Wealth Management GIC as of March 31, 2022

Trends are similarly sanguine for corporations, with cash as a share of total assets sitting at an all-time high and debt as a share of enterprise value near a 30-year low (see Exhibit 31). In the past decade, corporations have aggressively optimized their balance sheets, exploiting historically low rates and locking them in over long periods. Based on the current amount of investment grade issuance outstanding, rate sensitivity is incredibly low, as the next refinancing wall doesn't hit until 2028. Furthermore, in the last cycle companies gave preference to share buybacks over capital investment, contributing to the aging capital stock and fostering pent-up demand for capex targeting both maintenance and a combination of growth expansion, cost savings and automation.

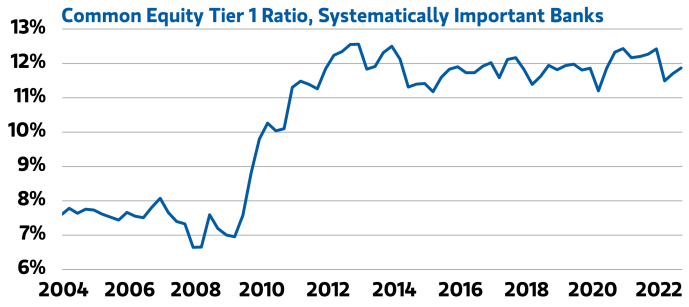
Exhibit 31: Company Debt Ratios Have Declined Since the Great Financial Crisis



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Dec. 15, 2022

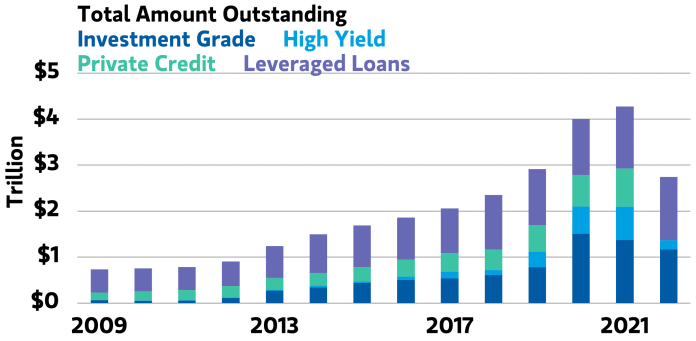
Perhaps most importantly, the strength of private sector balance sheets has been underpinned by the repair of the country's banking system. America's systemically important banks have been recapitalized to the point of being fortress-like, with ample excess capital available to be returned to shareholders via share repurchases and dividend payments. While this has largely been the work of an aggressive regulatory regime, stress testing, and multilayered bank oversight, the results have created a deep reservoir that can easily absorb standard cyclical loan losses without massive credit curtailment. As we illustrate in Exhibit 32, since the Great Financial Crisis, the Tier 1 capital ratio has increased from a pre-crisis level of 7.5% to approximately 12%. A burgeoning shadow banking system, which has nearly doubled to more than $15 trillion over the past decade, is contributing to solid access to funds for those corporate capital projects with superior positive real returns (see Exhibit 33).

Exhibit 32: Bank Balance Sheets Have Fewer Liabilities Since the Great Financial Crisis



Source: Bloomberg, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

Exhibit 33: Funding Remains Available For Corporate Capital Projects

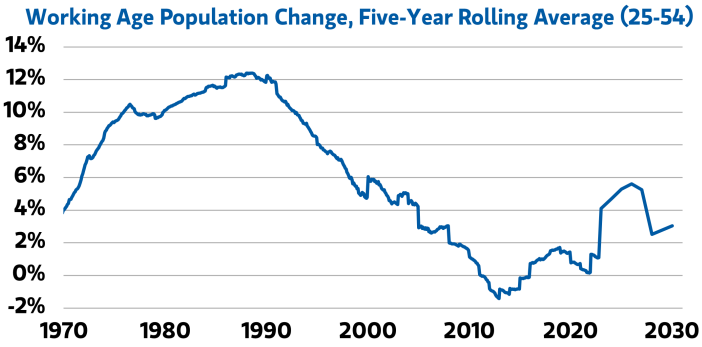


Note: Private credit data for full-year 2022 is not yet available.
Source: Bloomberg, Morgan Stanley Wealth Management GIC; investment grade and high yield as of Dec. 21, 2022; leveraged loans as of March 4, 2022

Supply Side Enabler 2: Improving Demographics

Beyond the financial means to sustain increased investment, we expect capital spending and the productivity it unleashes to be supported by improving demographics, which have inhibited US economic growth for the last decade and a half, as the five-year trailing growth rate of the prime working-age population (25-54) remained consistently below 2% (see Exhibit 34). Not only is that critical cohort primed to reaccelerate—providing a material tailwind for US economic growth—but after declining in 2021, for the first time in over 14 years the median age of those in the cohort is going to fall, continuing to do so for roughly the next decade and reinvigorating our workforce with tech-savvy natives, including Gen Zers, as they age in. We anticipate that this generational turnover will help accelerate innovation and automation trends, as has been the case in other periods of material shifts toward a younger workforce.

Exhibit 34: We Expect Stronger Demographic Trends Next Cycle



Source: FRED, Bloomberg, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022.

Supply Side Enabler 3: Proliferation of Innovation J-Curves

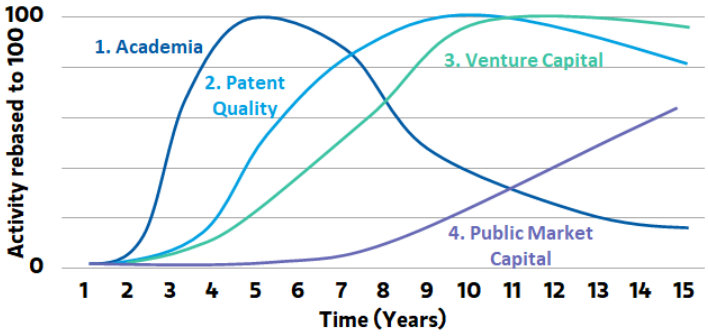
The commercialization of this *enterprise-level* innovation is an additional enabler of strong capital investment. As we have noted above and in much of our prior work, one of the interesting conundrums of the past business cycle has been weak productivity growth against the backdrop of a capital market that has produced a historically disproportionate concentration of technology leaders linked to the consumer-centric smartphone ecosystem of social media and e-commerce. According to our analysis, a primary feature of J-curve maturation during the age of secular stagnation was excessive concentration on battery life, mobility, photographic optical quality and data/content storage in the cloud. While the smartphone was undoubtedly revolutionary and transformative in terms of consumer behavior, price transparency and 24/7 information availability, implementation of related technologies didn't lead to economy-wide scaling of productivity gains. On the contrary, for first movers—able to build mammoth walled gardens premised on free user-generated content that supported advertising while erecting barriers to entry and enjoying network scale—market share concentration opportunities were outsized. But for the users of those technologies, productivity gains were wildly diffuse, with faster and more convenient transactions creating extra time that more often than not was filled by nonproductive activities like gaming, media consumption, shopping and socializing.

As part of their "Moonshot" innovation framework, analyst teams from Morgan Stanley & Co. Research recently concluded that public market innovation opportunities tend to follow a very specific sequencing pattern—from academic research, to patent intensity, to venture funding (see Exhibit 35). Contemplating the post-COVID innovation cycle with this in mind, we can celebrate several developments suggesting that innovation commercialization will be meaningfully above

average in the next decade. As we detailed earlier, the magic of financial repression and "free money" produced unprecedented growth in venture capital and private equity (see Exhibits 36 and 37). This upsurge allowed funding of a wide variety of diverse and disruptive technologies—from AI, to natural language processing, to machine learning applications.

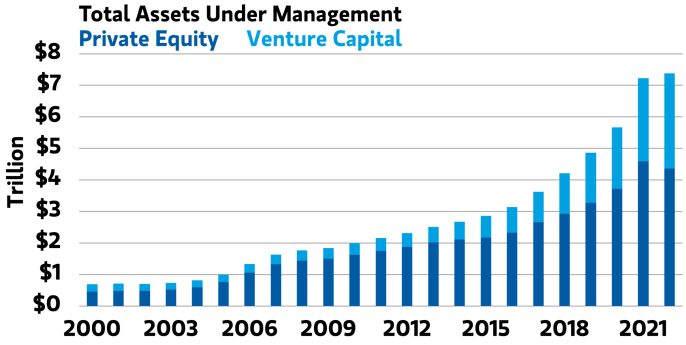
Along with the Internet of Things and robotics sensing, these technologies are coming together with strong potential for services business automation. As noted by Morgan Stanley & Co. Europe equity strategist Edward Stanley et al. in their Sept. 14, 2022, piece "Thematics: Moonshots": "Exponential growth of data is growing. The last 70 years' focus has been on the supply side of technology—fueled by Moore's Law—and cramming more functions onto a chip. But we are now shifting to the demand side as we move from learning to acting in computing. As a result, computing demand has become more powerful but less intuitive, and this shift to the demand side is resulting in creative disorder and a new era of innovation that will drive the Data Era." (See Exhibit 38.)

Exhibit 35: Public Market Innovation Opportunities Follow a Specific Pattern



Source: PitchBook, WIPO, Google, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Sept. 14, 2022

Exhibit 36: Venture Capital and Private Equity Assets Under Management Have Increased



Source: PitchBook, Morgan Stanley Wealth Management GIC as of Nov. 30, 2022

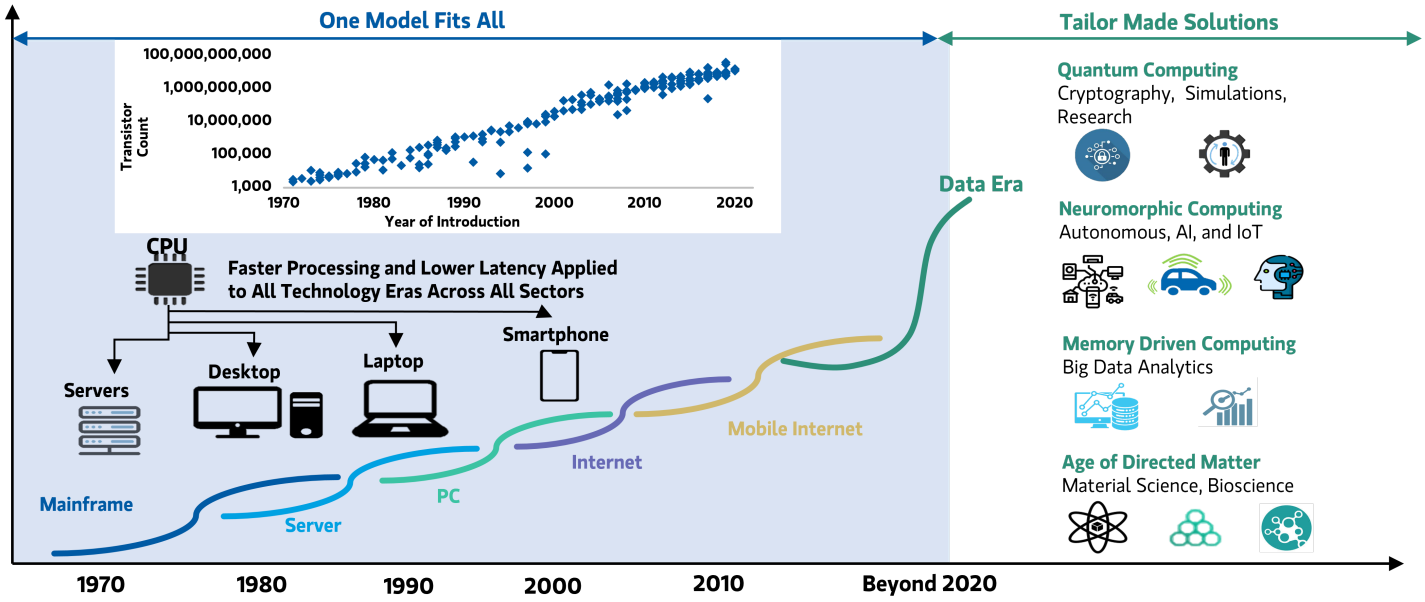
Turning "big data" into insights that can be applied to complex decision-making is the next horizon, and the availability of cheap computing power—accessible on the cloud with ever more sophisticated data analytics—suggests rapid democratization. This, in turn, shifts the axis of transformative power from the hardware/software makers to the "tech takers"—those who use their data to make better decisions more quickly and at lowest cost. Morgan Stanley & Co. Research has called this return to real asset investment the transition from "bits" to "atoms." Exhibit 39 identifies some potential opportunities, which just happen to focus on those more capital-intensive stories: clean energy, smart manufacturing, supply chain infrastructure, AI and machine learning.

Exhibit 37: Asset Class Performance Quilt, 2002-2022

2002	Commodity 23.90%	Global Fixed 22.37%	Fixed Income 10.26%	Real Estate 2.82%	Cash 1.78%	High Yield -1.37%	EM Equity -6.16%	DM ex US Equity -15.80%	Small Cap Equity -20.48%	Large Cap Equity -22.10%	US Venture -47.13%
2003	US Venture 63.13%	EM Equity 55.82%	Small Cap Equity 47.25%	Real Estate 40.69%	DM ex US Equity 39.42%	High Yield 28.97%	Large Cap Equity 28.68%	Commodity 22.70%	Global Fixed 19.36%	Fixed Income 4.10%	Cash 1.15%
2004	Real Estate 37.96%	EM Equity 25.55%	DM ex US Equity 20.38%	Small Cap Equity 18.33%	Global Fixed 12.54%	US Venture 12.42%	High Yield 11.13%	Large Cap Equity 10.88%	Commodity 7.60%	Fixed Income 4.34%	Cash 1.33%
2005	EM Equity 34%	Commodity 17.50%	Real Estate 15.35%	DM ex US Equity 14.47%	Large Cap Equity 4.91%	Small Cap Equity 4.55%	Cash 3.07%	High Yield 2.74%	Fixed Income 2.43%	US Venture -5.07%	Global Fixed -8.65%
2006	Real Estate 42.12%	EM Equity 32.17%	DM ex US Equity 25.17%	Small Cap Equity 18.37%	Large Cap Equity 15.79%	High Yield 11.85%	US Venture 8.45%	Global Fixed 8.16%	Cash 4.85%	Fixed Income 4.33%	Commodity -2.70%
2007	EM Equity 39.38%	US Venture 27.37%	DM ex US Equity 12.44%	Global Fixed 11.03%	Commodity 11.10%	Fixed Income 6.97%	Large Cap Equity 5.49%	Cash 5%	High Yield 1.87%	Small Cap Equity -1.57%	Real Estate -7.39%
2008	Fixed Income 5.24%	Global Fixed 4.39%	Cash 2.06%	High Yield -26.16%	US Venture -32.6%	Small Cap Equity -33.79%	Commodity -36.60%	Large Cap Equity -37%	DM ex US Equity -43.56%	Real Estate -48.21%	EM Equity -53.33%
2009	EM Equity 78.51%	High Yield 58.21%	US Venture 54.73%	Real Estate 37.13%	DM ex US Equity 33.67%	Small Cap Equity 27.17%	Large Cap Equity 26.47%	Commodity 18.70%	Global Fixed 7.53%	Fixed Income 5.93%	Cash 0.21%
2010	Small Cap Equity 26.85%	Real Estate 19.63%	EM Equity 18.88%	Commodity 16.70%	High Yield 15.12%	Large Cap Equity 15.06%	US Venture 11.06%	DM ex US Equity 8.95%	Fixed Income 6.54%	Global Fixed 4.95%	Cash 0.13%
2011	Fixed Income 7.84%	High Yield 4.98%	Global Fixed 4.36%	US Venture 2.39%	Large Cap Equity 2.11%	Cash 0.10%	Small Cap Equity -4.18%	Real Estate -6.46%	DM ex US Equity -12.21%	Commodity -13.40%	EM Equity -18.42%
2012	Real Estate 27.73%	US Venture 20.67%	EM Equity 18.23%	DM ex US Equity 16.41%	Small Cap Equity 16.35%	Large Cap Equity 16%	High Yield 15.81%	Fixed Income 4.21%	Global Fixed 4.09%	Cash 0.11%	Commodity -1.10%
2013	US Venture 48.82%	Small Cap Equity 38.82%	Large Cap Equity 32.39%	DM ex US Equity 21.02%	High Yield 7.44%	Real Estate 3.67%	Cash 0.07%	Fixed Income -2.02%	EM Equity -2.6%	Global Fixed -3.08%	Commodity -9.60%
2014	US Venture 25.11%	Real Estate 15.02%	Large Cap Equity 13.69%	Fixed Income 5.97%	Small Cap Equity 4.89%	High Yield 2.45%	Cash 0.03%	EM Equity -2.19%	Global Fixed -3.09%	DM ex US Equity -4.32%	Commodity -17.30%
2015	US Venture 23.19%	Large Cap Equity 1.38%	Fixed Income 0.55%	Cash 0.05%	Real Estate -0.79%	DM ex US Equity -3.04%	Small Cap Equity -4.41%	High Yield -4.47%	Global Fixed -6.02%	EM Equity -14.92%	Commodity -24.70%
2016	Small Cap Equity 21.31%	High Yield 17.13%	Large Cap Equity 11.96%	Commodity 11.40%	EM Equity 11.19%	Real Estate 4.06%	DM ex US Equity 2.75%	Fixed Income 2.65%	Global Fixed 1.49%	US Venture 0.36%	Cash 0.33%
2017	US Venture 55.82%	EM Equity 37.28%	DM ex US Equity 24.21%	Large Cap Equity 21.83%	Small Cap Equity 14.65%	Global Fixed 10.51%	Real Estate 10.36%	High Yield 7.5%	Fixed Income 3.54%	Cash 0.86%	Commodity 0.70%
2018	US Venture 8.52%	Cash 1.87%	Fixed Income 0.01%	High Yield -2.08%	Global Fixed -2.15%	Large Cap Equity -4.38%	Real Estate -5.63%	Small Cap Equity -11.01%	Commodity -13.0%	DM ex US Equity -14.09%	EM Equity -14.57%
2019	US Venture 53.66%	Large Cap Equity 31.49%	Small Cap Equity 25.52%	DM ex US Equity 22.49%	Real Estate 21.19%	EM Equity 18.44%	High Yield 14.32%	Fixed Income 8.72%	Commodity 5.40%	Global Fixed 5.09%	Cash 2.28%
2020	US Venture 67.91%	Small Cap Equity 19.96%	Large Cap Equity 18.40%	EM Equity 18.31%	Global Fixed 10.11%	DM ex US Equity 7.59%	Fixed Income 7.51%	High Yield 7.11%	Cash 0.67%	Commodity -3.50%	Real Estate -9.04%
2021	US Venture 23.15%	Large Cap Equity 28.71%	Commodity 27.1%	Real Estate 26.09%	Small Cap Equity 14.82%	DM ex US Equity 12.62%	High Yield 5.28%	Cash 0.05%	Fixed Income -1.54%	EM Equity -2.54%	Global Fixed -7.05%
2022 YTD	Commodity 17.76%	Cash -1.75%	High Yield -11.28%	Fixed Income -14.08%	Large Cap Equity -17.20%	Global Fixed -18.09%	Small Cap Equity -18.40%	DM ex US Equity -18.52%	EM Equity -24.12%	Real Estate -25.45%	US Venture -58.1%

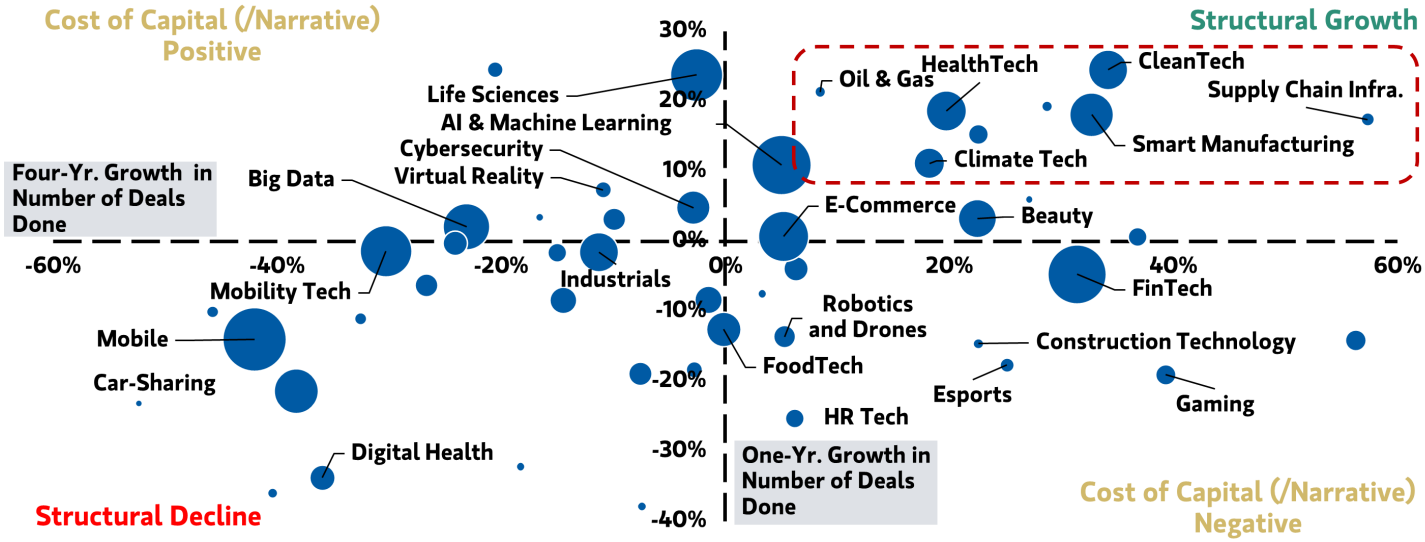
Note: The red boxes indicate negative returns for an asset class during the adjacent year.
Source: Callan Institute, Morgan Stanley Wealth Management GIC as of Dec. 7, 2022

Exhibit 38: Computing Demand Shifts Are Driving a New Era of Innovation



Source: OurWorldinData, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of June 17, 2021

Exhibit 39: Some of the Leading Structural Growth Opportunities Are in Capital-Intensive Industries



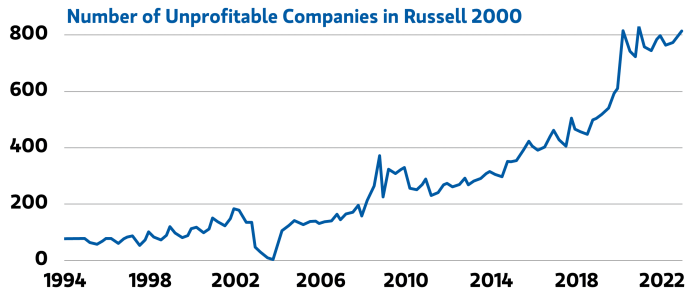
Source: PitchBook, Morgan Stanley & Co. Research, Morgan Stanley Wealth Management GIC as of Nov. 8, 2022

Supply Side Enabler 4: Fed Ends Era of Negative Rates

The final enabling factor for the American productivity renaissance is the departure from a decade of negative real interest rates premised on disinflation, with this shift setting the stage for more rational and longer-term capital discipline. We recognize that this may sound counterintuitive on its face, as higher real and nominal rates don't immediately incent investment. As a decade of financial repression proved, however, low rates don't necessarily create those incentives either. We have noted how "free money" creates inefficiencies, starving the strongest ideas while in many cases directing capital to unprofitable zombie operations with no hope of long-run sustainability. It is, rather, growth and the potential for wealth creation (improved returns through productivity gains) that create investment incentives.

As we have noted, those factors are likely to be present in the coming decade. With economic normalization taking annual real growth back toward 3% and inflation back to the 2%-3% range, while helping to push personal income solidly into positive territory, real asset returns should begin to swamp the attractiveness of those available simply through financial engineering and capital markets. The record number of unprofitable companies in the Russell 2000 (see Exhibit 40) makes it clear: Creative destruction is the cleansing event that powers capitalism.

Exhibit 40: A Record Number of Russell 2000 Companies Have Been Unprofitable



Source: Bloomberg, Morgan Stanley Wealth Management GIC as of Sept. 30, 2022

Concluding Market Implications

For investors, the implications of the American productivity renaissance are nuanced. On one hand, normalization of economic variables also means normalization of valuations, a factor that negatively impacts the expensive long-duration growth stocks that make up today's passive equity indexes. But productivity and higher economic growth are notable positives for many underappreciated companies poised to exploit technology disruption to advance their business models.

This is especially true for traditional cyclicals in both the manufacturing and services businesses, as they should see widening margins just as revenue tailwinds from digitization, deglobalization, decarbonization, demographics and multipolarity in the global order have kicked in. So, this is a time for active stock-picking and setting portfolios up for a shift in leadership—away from the great companies (but no longer great stocks) of megacap consumer tech and toward areas like health care, energy, financials, enterprise tech and infrastructure.

Disclosure Section

Risk Considerations

For index, indicator and survey definitions referenced in this report please visit the following: https://www.morganstanley.com/wealth-investmentsolutions/wmir-definitions

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Glossary

Beveridge curve, or UV curve, is a graphical representation of the relationship between unemployment and the job vacancy rate, the number of unfilled jobs expressed as a proportion of the labor force. It typically has vacancies on the vertical axis and unemployment on the horizontal. The curve, named after William Beveridge, is hyperbolic-shaped and slopes downward, as a higher rate of unemployment normally occurs with a lower rate of vacancies. If it moves outward over time, a given level of vacancies would be associated with higher and higher levels of unemployment, which would imply decreasing efficiency in the labor market. Inefficient labor markets are caused by mismatches between available jobs and the unemployed and an immobile labor force. The position on the curve can indicate the current state of the economy in the business cycle. For example, recessionary periods are indicated by high unemployment and low vacancies, and high vacancies and low unemployment indicate expansionary periods.

J-curve effect refers to a "J" shaped section of a time-series graph in which the curve falls into negative territory and then gradually rises to a higher level than before the decline.

M2 is a measure of the money supply that includes all elements of M1 as well as "near money." M1 includes cash and checking deposits, while near money refers to savings deposits, money market securities, mutual funds and other time deposits.

Mean reversion is the theory suggesting that prices and returns eventually move back toward the mean or average. This mean or average can be the historical average of the price or return, or another relevant average such as the growth in the economy or the average return of an industry.

Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets.

Hypothetical Performance

General: Hypothetical performance should not be considered a guarantee of future performance or a guarantee of achieving overall financial objectives. Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets.

Hypothetical performance results have inherent limitations. The performance shown here is simulated performance not investment results from an actual portfolio or actual trading. There can be large differences between hypothetical and actual performance results.

Despite the limitations of hypothetical performance, these hypothetical performance results may allow clients and Financial Advisors to obtain a sense of the risk / return trade-off of different asset allocation constructs.

Investing in the market entails the risk of market volatility. The value of all types of securities may increase or decrease over varying time periods.

This analysis does not purport to recommend or implement an investment strategy. Financial forecasts, rates of return, risk, inflation, and other assumptions may be used as the basis for illustrations in this analysis. They should not be considered a guarantee of future performance or a guarantee of achieving overall financial objectives. No analysis has the ability to accurately predict the future, eliminate risk or guarantee investment results. As investment returns, inflation, taxes, and other economic conditions vary from the assumptions used in this analysis, your actual results will vary (perhaps significantly) from those presented in this analysis.

The assumed return rates in this analysis are not reflective of any specific investment and do not include any fees or expenses that may be incurred by investing in specific products. The actual returns of a specific investment may be more or less than the returns used in this analysis. The return assumptions are based on hypothetical rates of return of securities indices, which serve as proxies for the asset classes. Moreover, different forecasts may choose different indices as a proxy for the same asset class, thus influencing the return of the asset class.

Alternative investments often are speculative and include a high degree of risk. Investors could lose all or a substantial amount of their

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Equity securities may fluctuate in response to news on companies, industries, market conditions and general economic environment.

Investing in foreign markets entails risks not typically associated with domestic markets, such as currency fluctuations and controls, restrictions on foreign investments, less governmental supervision and regulation, and the potential for political instability. These risks may be magnified in countries with emerging markets and frontier markets, since these countries may have relatively unstable governments and less established markets and economies.

Investing in currency involves additional special risks such as credit, interest rate fluctuations, derivative investment risk, and domestic and foreign inflation rates, which can be volatile and may be less liquid than other securities and more sensitive to the effect of varied economic conditions. In addition, international investing entails greater risk, as well as greater potential rewards compared to U.S. investing. These risks include political and economic uncertainties of foreign countries as well as the risk of currency fluctuations. These risks are magnified in countries with emerging markets, since these countries may have relatively unstable governments and less established markets and economies.

Investing in commodities entails significant risks. Commodity prices may be affected by a variety of factors at any time, including but not limited to, (i) changes in supply and demand relationships, (ii) governmental programs and policies, (iii) national and international political and economic events, war and terrorist events, (iv) changes in interest and exchange rates, (v) trading activities in commodities and related contracts, (vi) pestilence, technological change and weather, and (vii) the price volatility of a commodity. In addition, the commodities markets are subject to temporary distortions or other disruptions due to various factors, including lack of liquidity, participation of speculators and government intervention.

Investing in small- to medium-sized companies entails special risks, such as limited product lines, markets and financial resources, and greater volatility than securities of larger, more established companies.

Bonds are subject to interest rate risk. When interest rates rise, bond prices fall; generally the longer a bond's maturity, the more sensitive it is to this risk. Bonds may also be subject to call risk, which is the risk that the issuer will redeem the debt at its option, fully or partially, before the scheduled maturity date. The market value of debt instruments may fluctuate, and proceeds from sales prior to maturity may be more or less than the amount originally invested or the maturity value due to changes in market conditions or changes in the credit quality of the issuer. Bonds are subject to the credit risk of the issuer. This is the risk that the issuer might be unable to make interest and/or principal payments on a timely basis. Bonds are also subject to reinvestment risk, which is the risk that principal and/or interest payments from a given investment may be reinvested at a lower interest rate.

High yield bonds (bonds rated below investment grade) may have speculative characteristics and present significant risks beyond those of other securities, including greater credit risk, price volatility, and limited liquidity in the secondary market. High yield bonds should comprise only a limited portion of a balanced portfolio.

Duration, the most commonly used measure of bond risk, quantifies the effect of changes in interest rates on the price of a bond or bond portfolio. The longer the duration, the more sensitive the bond or portfolio would be to changes in interest rates. Generally, if interest rates rise, bond prices fall and vice versa. Longer-term bonds carry a longer or higher duration than shorter-term bonds; as such, they would be affected by changing interest rates for a greater period of time if interest rates were to increase. Consequently, the price of a long-term bond would drop significantly as compared to the price of a short-term bond.

Yields are subject to change with economic conditions. Yield is only one factor that should be considered when making an investment decision.

REITs investing risks are similar to those associated with direct investments in real estate: property value fluctuations, lack of liquidity, limited diversification and sensitivity to economic factors such as interest rate changes and market recessions.

Principal is returned on a monthly basis over the life of a mortgage-backed security. Principal prepayment can significantly affect the monthly income stream and the maturity of any type of MBS, including standard MBS, CMOs and Lottery Bonds. Yields and average lives are estimated based on prepayment assumptions and are subject to change based on actual prepayment of the mortgages in the underlying pools. The level

of predictability of an MBS/CMO's average life, and its market price, depends on the type of MBS/CMO class purchased and interest rate movements. In general, as interest rates fall, prepayment speeds are likely to increase, thus shortening the MBS/CMO's average life and likely causing its market price to rise. Conversely, as interest rates rise, prepayment speeds are likely to decrease, thus lengthening average life and likely causing the MBS/CMO's market price to fall. Some MBS/CMOs may have "original issue discount" (OID). OID occurs if the MBS/CMO's original issue price is below its stated redemption price at maturity, and results in "imputed interest" that must be reported annually for tax purposes, resulting in a tax liability even though interest was not received. Investors are urged to consult their tax advisors for more information.

Asset-backed securities generally decrease in value as a result of interest rate increases, but may benefit less than other fixed-income securities from declining interest rates, principally because of prepayments.

The returns on a portfolio consisting primarily of environmental, social, and governance-aware investments (ESG) may be lower or higher than a portfolio that is more diversified or where decisions are based solely on investment considerations. Because ESG criteria exclude some investments, investors may not be able to take advantage of the same opportunities or market trends as investors that do not use such criteria.

Companies paying dividends can reduce or cut payouts at any time.

Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets.

Because of their narrow focus, sector investments tend to be more volatile than investments that diversify across many sectors and companies. Technology stocks may be especially volatile. Risks applicable to companies in the energy and natural resources sectors include commodity pricing risk, supply and demand risk, depletion risk and exploration risk. Health care sector stocks are subject to government regulation, as well as government approval of products and services, which can significantly impact price and availability, and which can also be significantly affected by rapid obsolescence and patent expirations.

Nondiversification: For a portfolio that holds a concentrated or limited number of securities, a decline in the value of these investments would cause the portfolio's overall value to decline to a greater degree than a less concentrated portfolio. Portfolios that invest a large percentage of assets in only one industry sector (or in only a few sectors) are more vulnerable to price fluctuation than those that diversify among a broad range of sectors.

Growth investing does not guarantee a profit or eliminate risk. The stocks of these companies can have relatively high valuations. Because of these high valuations, an investment in a growth stock can be more risky than an investment in a company with more modest growth expectations.

Value investing does not guarantee a profit or eliminate risk. Not all companies whose stocks are considered to be value stocks are able to turn their business around or successfully employ corrective strategies which would result in stock prices that do not rise as initially expected.

Rebalancing does not protect against a loss in declining financial markets. There may be a potential tax implication with a rebalancing strategy. Investors should consult with their tax advisor before implementing such a strategy.

The indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment.

The indices selected by Morgan Stanley Wealth Management to measure performance are representative of broad asset classes. Morgan Stanley Wealth Management retains the right to change representative indices at any time.

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