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Analysis of the Technology Hardware, Storage & Peripherals Industry

by

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**An Honors Thesis in partial fulfillment of the requirements for the degree Bachelor of
Science in Business Administration in Finance and Accounting.**

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Executive Summary

The Technology Hardware, Storage & Peripherals industry is stimulated by strong trends across numerous end-markets and categories of products. Advancements in 5G, demand for health-conscious wearable devices, and emerging services for next-generation devices are major prospects for the broader hardware industry through 2022. However, Headwinds such as trade wars, the COVID-19 pandemic, and the recession looming, could alter the healthy trends that are noticed. Enterprise spending is seen to keep improving, but consumer spending is encouraged to take a breather in 2022. As such, the outlook for the Technology Hardware, Storage & Peripherals industry for the next 12 months is neutral. There are many Goliaths in this industry that could tackle the headwinds such as Apple and Samsung Electronics that need to be noted when looking at the industry overall. These companies have the ability to maneuver around the trends that other companies in the industry follow.

Smartphone demand will improve through 2022, in reflection of the shift towards 5G devices and the greater adoption by consumers of these devices due to greater integration of 5G services across the globe. 5G devices are expected to represent 40% of the total smartphone market. Price points for such devices will also be forecasted to be available at lower price points in 2022 with new renditions of the Low-tier flagships to be integrated with 5G hardware. The Premium space of the smartphone market continues to show healthy performance with customer support for higher average selling prices. The products have provided longer refresh rates as they provide customers with support that lasts longer than 3 years, and more storage than previous flagships. Since the declined growth of the smartphone space from 2019-2020, 2022 will represent the second year of growth after growing 5.7% in 2021.

Although the supply limitations for semiconductor parts and logistical issues have caused a delay in shipments and products, the backlog for laptops stays raised. Rising interest in PCs and tablets from schools, businesses, and average consumers in a post-pandemic world has permanently integrated such devices into the lives of many individuals. There is a strong demand for Chromebooks and other-consumer-driven PCs in 2022, continuing from the surge in 2020 and 2021. Business orders are likely to increase with a higher price point relative to consumer devices. The education space continues to place more orders for students, especially since schools have permanently transitioned into a post-pandemic world.

CFRA expects orders for wearable devices to grow at a double-digit percentage basis through 2024 as momentum continues for adoption rates and new product categories. Integration of new sensors within smartwatches is expected to further increase capabilities and tackle new health monitoring solutions. The support for long-term demand will stem from increasing health care initiatives and opportunities arising from corporate wellness programs. The wireless headphone market is oversaturated, however, there is increasing traction with consumers as the trend continues to shift away from wired devices.

The storage market is seen to be growing at a low single-digit percentage growth in the longer term but segmenting the market into different storage types provides a mixed picture. The public cloud is expected to control a greater share of the market with stimulated growth. Flash-oriented storage systems will increase at a steady pace of 10%-plus annually for the next four years. Hard drives are increasingly getting replaced with their solid-state storage counterparts every year and the trend continues to accelerate as Solid-State Drive prices per Gigabyte continue to decline. Enterprises will continue to be the most important player in the market for

storage as data collection for various purposes increases. Security threats for server infrastructure, particularly with cloud storage, and legal issues may cause headwinds for the storage space.

The multiples for the Technology Hardware, Storage & Peripherals industry is expected to shrink over the next year as growth rates will provide more stability after the demand from end-market products over 2021. As companies grow into their multiple, earnings growth is expected to outgrow share price appreciation. This is typical as the business cycle approaches the end stages. The industry currently trades at historical forward averages across numerous metrics. Based on fundamentals, the enterprise-driven aspects of the market will outperform consumer-driven end products.

Industry Overview

The Technology Hardware, Storage & Peripherals industry, classified by the Global Industry Classification Standard by Standard & Poor's, is a part of the Information Technology or IT sector. According to the Global Industry Classification Standard, "The Technology Hardware, Storage & Peripherals industry comprises manufacturers of cellular phones, personal computers, servers, electronic computer components, and peripherals. This includes data storage components, motherboards, audio, video cards, monitors, keyboards, printers, and other peripherals" (GICS). This industry does not include semiconductors as they are classified in the Semiconductors Sub-Industry. According to Fidelity, As of April 11, 2022, the Technology Hardware, Storage & Peripherals industry had a market capitalization value of \$2.93 Trillion. The industry fundamentals as of April 11, 2022, are as follows: Price to Equity ratio of 23.43(Last Year GAAP Actual), Earning Per Share (TTM) of \$5.92, Revenue Growth (TTM vs. Prior TTM) of 27.35%, Return on Equity (TTM) of 139.80%, and a Dividend Yield of 0.65%. It is important to note that the dividend yield is comparatively low compared to other industries in this sector due to the capital needed for reinvestment for growth and expansion, particularly to target Research and Development expenses. In terms of total revenue, the Technology Hardware, Storage & Peripherals industry is the largest industry (27%) and had the third-lowest EBITDA margin (28.37%) in the Information Technology sector for the last 12 months ended March 2022.

According to Schwab, "Technology Hardware, Storage & Peripherals industry is a highly concentrated sector, with just a handful of companies representing more than 50% of the sector's weight, including the two behemoths Apple and Samsung" (Schwab). This information could provide context to the biggest movers of the fundamentals of this sector. Apple commands the majority of this industry making up 90.2% of the total market capitalization. Samsung, Xiaomi, HP, and Dell Technologies are the other major players in this industry.

The S&P Composite 1500 Technology Hardware, Storage & Peripherals index has outperformed both the S&P Composite 1500, and the S&P Composite 1500 Information Technology (Sector) indexes over the last 20 years. (Refer to Figure 1)
The 4 main ETFs that cover this industry are Vanguard Information Technology (VGT), Technology Select Sector SPDR (XLK), iShares US Technology (IYW), and Roundhill Ball Metaverse (METV). (Refer to Figure 1.)

According to Fidelity Research, the projected 5G smartphone market is expected to sell 750 million-plus units in 2022. Specifically, The iPhone projected installed base is expected to grow by 5-9% over the next three years. The estimated market size for the mobile phone market is expected to reach 1.6 billion units by 2022 of which 84% will be comprised of smartphones. Asia is expected to grow with 50-55% of hardware sales originating from that geographic region. PCs and tablets' projected unit growth is expected to decline by 3% due to longer refresh rates for such devices, and the surge of demand decaying after the pandemic. Wearable Technology and devices revenue growth are forecasted at 10-15% annualized for the next three years.

Financial Metrics

According to the CFRA, the industry revenues are expected to grow 5.6% and 5.2% in 2022 and 2023 respectively. There are "secular opportunities and prospects for the broader hardware space through 2023" (CFRA). Semiconductor shortages are largely viewed as transitory so the impact should be minimal in the upcoming years. The majority of the demand is driven by mobile devices in this industry. Apple's revenue share is estimated to top 78% of the

industry revenues mostly contributed by the wearable devices and services segment of the business. In 2021, Apple contributed 72.8% of the industry revenues followed by HP and Hewlett Packard Enterprise (HPE) at 12.5% and 5.4% respectively.

With inflationary pressures in the intermediate term, Gross margins are expected to gradually expand, especially with the major players in the industry. The strengthening dollar provides headwinds for hardware makers. PCs manufacturers and vendors will likely post below industry average margins as they tackle supply chain shortages. Margins for EBITDA for this industry are expected to decline below 30% in 2022 due to rising prices for hardware components and higher logistics costs for supply chain constraints.

In 2013, Apple changed their company's capital structure to actively issue debt. Since then long-term debt has been on the rise until the start of the tax reform changes in 2018. The use of Apple's overseas cash has no longer required the company to raise debt for repurchases. This resulted in a stable long-term debt level for the industry. Companies in this industry are comfortable holding on to higher levels of debt, however, this will likely change as interest rates increase to control high inflation this year and the following year which will lead to a reduction in debt profiles.

Due to Apple's recent claim to become "net cash neutral," there has been a trend in the decline in the cash balance of this industry. According to the CFRA, "As of December 2021, Apple has returned more than \$600 billion of cash to shareholders" (CFRA). Apple also announced a new share authorization program worth \$90 billion and hiked its dividend by 7%. Historically in this industry, cash has been an important metric as technology companies have the ability to generate a significant amount of free cash flow. However, manufacturers are increasingly looking to flat cash levels by returning more excess cash to shareholders instead of increasing their cash position.

As of March 23, 2022, the industry forward Price to Equity ratio of 24.4x is higher than the five-year historical average of 19.2x. It is important to note that multiples have compressed in recent months to reflect the hardware space's growth outlook for 2022. Apple has room to expand its multiple in 2022 and onwards due to the expansion of its service industry, but the core business remains a tough challenge during 2022 and will likely keep the multiple ranges rigid.

Key Industry Drivers

According to the IDC, 5G enabled smartphones will represent 54% of total smartphone shipments by the end of 2022. Android devices will represent the bulk of the 5G shipments, particularly with Chinese brands such as Huawei, Oppo, and Vivo. These brands will put pressure on the Korean giant Samsung. Apple and Samsung's pullout from Russia will further apply further pressure on Samsung and Apple. Esports and mobile gaming will contribute majorly to the 5-G enabled smartphones as they require more bandwidth to play competitively. Worldwide mobile shipments will drop 1.3% in 2022, while Smartphones are expected to rise 1.6% in 2022 and 3.2% in 2023. The growth rate in 2021 for smartphones was 6.2% versus the 1.6% expected rate in 2021 indicating a more mature market and the refresh cycles for smartphones have elongated immensely due to limited innovation in new flagships and increased durability of battery life and software.

The PC segment growth of 15% in 2021 is expected to contract in 2022 to -1% largely due to the fulfillment of large backlogs for notebooks in the education and enterprise spaces in 2021. Demand for consumer-targeted PCs will see moderate growth in 2021, but the enterprise and education spaces will expect to provide a large influx of demand. Despite a moderate unit

growth rate, products for the education and enterprise spaces will allow vendors to grow revenue due to the significantly higher selling prices in this space. Opportunities in the gaming space seem limited as replacement cycles are long, hindering growth.

Similar to PCs, demand for tablets will stabilize in 2022 and is expected to be a mid-single-digit percentage decline. Detachable tablets have increased their presence in the market becoming a direct competitor to the notebook space. Shipments for tablets are forecasted to decline by 4.7% in 2022, as refresh cycles are longer and demand post-Covid stabilizes. Increasing sizes of mobile phone displays also put tablets at risk as there are no significant variances in software between the two platforms, especially with customers that do not require such devices for specific productivity needs. The trend will continue for the next few years unless detachable tablets provide significant hardware and software improvements, becoming a bigger threat to the notebook space.

The focus of the wearable space has primarily been on fitness, however, significant opportunities related to health care capabilities, such as blood oxygen monitors, and ECG sensors have become more common in products. The market also has a lower barrier to entry and allows for new vendors to gain more market share at the expense of other vendors leaving the market. The demand for hearables is rampant with innovation with sunglasses and wireless headphones. Artificial Reality and Virtual Reality technology are seeing more implementation aside from the existing gaming products. Meta aims to provide significant innovation in this area from their Oculus division and the integration of such products into the Metaverse. According to the IDC, unit shipments are expected to increase 15.8% in 2022 and 9.4% in 2023 for wearable devices.

Porter's Five Forces

Threat of new entrants: Although establishment in this industry will require competing with giant manufacturers like Apple or HP and require a substantial amount of capital and investments for infrastructure and technological research, firms with strong distribution channels and financial resources like Google could enter the market with success. Existing vendors will need to continuously innovate to remain competitive against new entrants. Possibilities are abundant in the wearables space, as the market is relatively new, and brands are not clearly defined. Possibilities in the smartphone and hardware space are very limited due to the presence of existing incumbents' strong brands. The threat of new entrants is noted as LOW for the smartphone and hardware spaces, and MEDIUM for the wearables space.

Threat of substitute: The lower-tier PCs could be substituted by smartphones and tablets since the hardware for these products is considerably similar. However, the software advantages of PCs, particularly with applications that run only on Windows or Macintosh, are yet to be implemented into the smaller devices. Apps on smartphones and tablets are increasingly mimicking the functionality of the software in PCs, particularly with detachable tablets. The higher-tier PCs provide significantly higher hardware and performance that will not be available in the smaller devices for the foreseeable future. The threat of substitutes in the hardware and wearable industry is insignificant. Hardware is a core product for many other industries and services, and substitutes for such products will require massive innovation advancements. Wearables follow the same principles as the hardware space since products from the wearables space are not offered by other industries. Again, significant technological advancements will be needed for such products to be substituted. The threat of substitutes for the Technology Hardware, Storage, & Peripherals is noted as LOW for the entire industry.

Bargaining power of customers: Switching costs and customer loyalty is low given the ample variety of products and brands in the market for hardware offerings, strengthening the bargaining power of the customers. The smartphone, notebook, and tablet market seem to provide the least power to the consumers, primarily because of Apple's IOS and Macintosh ecosystem being exclusive to the Apple products, and the strong brand loyalty that comes with this software. Other than Apple, other vendors have to stay competitive with prices and constantly provide better hardware improvements to maintain loyalty with customers. The bargaining power of customers is noted as MEDIUM for the industry.

Bargaining power of suppliers: Many of the incumbents of the industry have massive global supply chains, allowing access to many suppliers across the globe, primarily in Asia. The industry is also highly concentrated on the buyer side when compared to the suppliers, which allows for better pricing points and influence over the suppliers. The strong demand from various industries outside the IT sector for certain raw materials, such as silicon used in integrated circuits, may provide power to suppliers as they transition into bigger enterprises.

Intensity of competitive rivalry: across nearly all end-markets, the competition within the industry is strong. The need for constant innovation is evident in the company's significant expenditure on research and development and marketing. Global players also pose a threat to companies, specifically Chinese manufacturers, as they are able to provide products at a significantly lower price point. Companies are resorting to aggressive marketing strategies due to the low product differentiation and switching costs. Again, Apple's unique software ecosystem provides them a competitive advantage compared to the rest of the market.

Key Valuation Metrics

The Technology Hardware, Storage & Peripherals industry requires investors and analysts to go beyond traditional quantitative methods to assess the outlook of a company. Qualitative analysis needs to provide judgment on the effectiveness of the technology, the competitive environment that surrounds the product, the company's management team and the outlook of their business decisions, and marketing strategies. However, analysis of the financial statements remains a critical step in valuation.

Rapid changes to products and services are very common in this industry. Companies must be analyzed quantitatively and qualitatively on their ability to manage changing variables from technological advancement to changes in the marketing climate. This can determine the quality of the company compared to competitors and their ability to stay flexible during differing market conditions. Historically, the computer industry has provided excellent examples of companies with dominant prowess in their market space that failed to keep up with the technological shifts. International Business Machines Corp. (IBM) and Digital Equipment Corp. (DEC) dominated key segments of the industry, only to lose their positions as the market shifted towards faster, cheaper, and more functional products. Although their deterioration was reflected in the financial statements, investors could have been alerted earlier if they noted the rampant advancements of their competitors.

The strong competitive nature of this industry allows for peer comparisons to provide a strong metric for forecasting a company's situation. Analysis of relative valuation metrics, such as Price-to-Earnings ratios, Enterprise value-to-EBITDA, or any other relative metric, should be significantly considered. However, it is important to find companies that are optimal for comparison. Negating major structural or fundamental differences, companies that produce the

same product or service and address the same target market tend to be valued similarly. Using EBITDA as a relative metric may provide better analysis for companies that have differing debt and tax profiles, and capital structures.

Relative growth rates should also be considered when comparing companies. It is important to identify companies that have growth rates that underperform compared to the average growth rate for the industry. The next step would be to identify the growth rates associated with the area within the industry that the company is conducting business. The outlook for different spaces within the industry is largely varied. It is important to notice the segments of the business as they may provide products or services in more than one area of the industry. Segmenting this information is vital in providing better peer comparison valuations.

Since the industry is largely global with suppliers and vendors in various countries, the geographic footprint of the company can reveal significant information, specifically with tax rates and supply chain constraints.

According to the CFRA, “A company’s income statement shows its operating results over a specific period, and this is a key part of any analytical endeavor. An investor should determine the components and trends of a company’s profits, and then compare these results with those of its competitors” (CFRA). Firstly, an investor should take notice of the short-term and long-term trends in revenues. If the company is a part of a high-growth space of the industry, or if the product cycle is in its early stages, the company should show growth throughout the year or longer depending on the product. Ideally, revenue should show growth in the current period for most established companies in the industry. The data storage space will likely follow a seasonal trend with revenues in the fourth quarter being the strongest. The CFRA notes that this is due to a process called a budget flush where IT departments accelerate their expenditure late in the year to use up allotted funds. However, it is important to note that accelerating revenue for a certain period is not sustainable as it is essentially creating revenue from future periods.

As competitiveness for pricing increases in this industry, significant gross margin pressures have been placed on companies. Gross profit is one of the best measures of profitability in this industry. Successful companies can counter margin pressures by adding higher-margin products to their product categories, increasing manufacturing efficiencies, and maintaining lean inventory levels. The different variables that go into determining the gross profit of a company provide opportunities to minimize costs and provide better profitability metrics. It is important to note that companies may decrease profit margins to increase overall business volume.

Expense line items should be evaluated relative to the specific area in which the company conducts business. Historically, it is common to see expenses rise faster than sales in the technology hardware, storage & peripherals industry to support high-growth prospects. However, established businesses should see revenues grow at a faster rate than expenses.

The balance sheet offers clues to the future results and opportunities of a business. Long-term debt-to-capital ratios vary widely in this industry. Companies with lower-debt profiles tend to be established in the market and have financial flexibility with merger and acquisition deals. Cash and investments provide further analysis of the financial flexibility of a company. Companies with an abundance of cash will likely look to meet debt obligations, repurchase stock, and or, make acquisitions. Data storage vendors with large cash balances have seen a trend in making new strategic acquisitions, particularly with acquiring new data centers. Since the industry is also subject to wide swings in profitability, levels of cash and cash equivalents provide metrics for emergency liquidity and growth potential. Deterioration in the current ratio

should be accounted for as companies should be able to meet their current liabilities. Rapid price declines and obsolescence of products are common in this industry; therefore, investors should focus on the company's inventory levels and ratios. Inventory levels that increase faster than sales growth should be considered with the stage of the product cycle. Sales growth should be faster in products that are late staged, while inventory level may grow faster for products in the early stages. Management of companies should increase inventory turnover to minimize costs associated with holding inventory. It also reveals the company's manufacturing efficiency and optimization of assets. Investors need to note any changes in inventory accounting methods and differences in inventory costing policies for the different areas in the industry when analyzing comparable companies. Free cash flow will allow investors to determine the possible strategies a company will use and clues to the future ambitions of the company. Generally, companies in the growth stage will reinvest cash back into the business to fuel growth. Mature companies that do not earn significant returns on invested capital may offer dividends and/or stock repurchases.

Conclusion

This Technology Hardware, Storage & Peripherals industry has shown tremendous growth in the past decade due to the rapid advancements in technological products and hardware. The rapid need to innovate in this industry has provided customers with an abundance of new products that have better functionality and new capabilities. Although the trends continue to reveal growth, the double-digit, sometimes triple-digit, year-over-year growth is declining to single-digit percentages. The business cycle needs to be considered as it reflects activity in the economy, as it relates to the specific sector of the GICS. Equity investing is cyclical; weights for certain sectors will be changed based on the current position of the economy in the cycle (refer to Figure 6. to see which sectors are underweighted, equal-weighted, or overweighted during the different stages of the business cycle.) Investors need to judge the current state of the economy, especially for high-growth industries. Inflation rates, changes in interest rates, and corporate earnings can reflect the performances of industries and sectors. I believe that we are in the late stages of the business cycle, indicating an underweight in the Information Technology sector. It is important to note that positions in mature, large companies, such as Apple, may provide better performance as they have the capital and infrastructure to navigate through a potential recession. Interest rates are announced to increase over the next year and more, if inflation does not subside, and would prove to provide problems for many companies in the sector. Product innovation requires large amounts of capital and young companies with high growth potential will undoubtedly face financial challenges, especially if the current inflationary environment prevails.

Appendix

Figure 1. 20-YEAR Index performance of the industry, sector, and S&P composite 1500 (Fidelity)

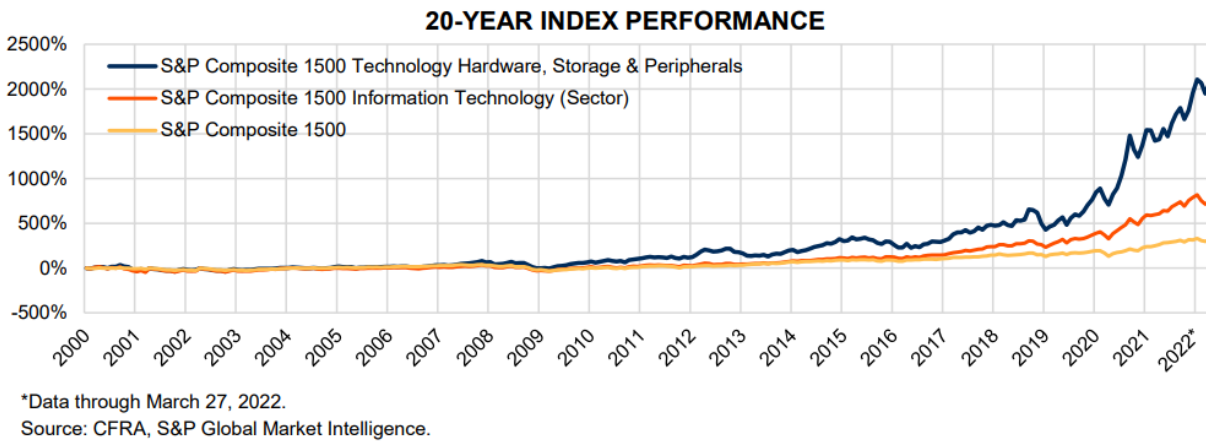


Figure 2. Revenue Growth of industry over last 10 years (CFRA)

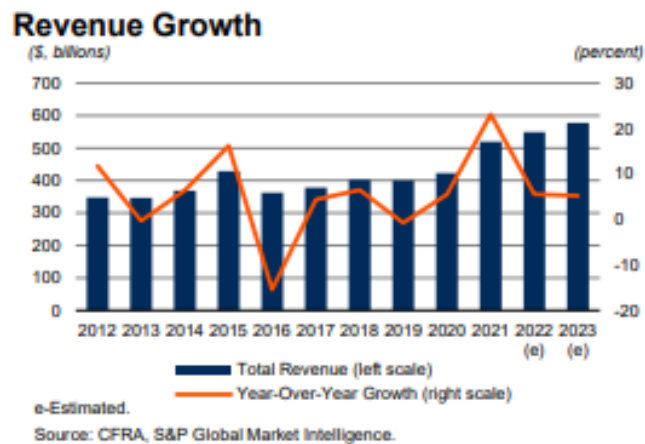


Figure 3. Profit Margins for the industry (CFRA)



Figure 4. Growth of smartphone shipments worldwide (CFRA)

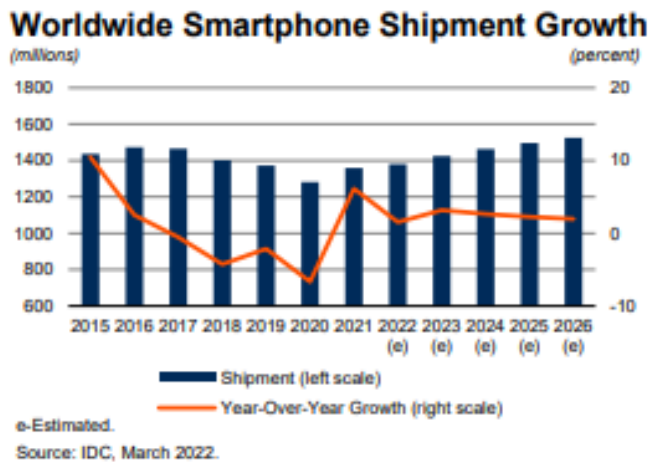


Figure 5. Growth of personal computer shipments worldwide (CFRA)

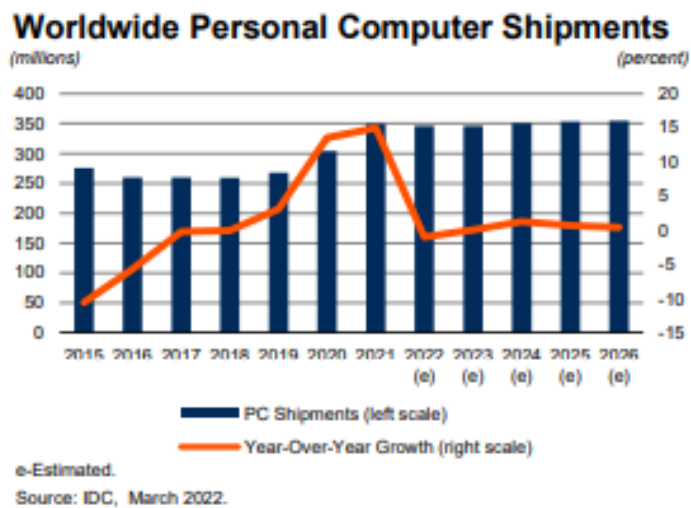


Figure 6. Business Cycle chart with weighting recommendations (Fidelity)

Sector	Early Rebounds	Mid Peaks	Late Moderates	Recession Contracts
Financials	+			
Real Estate	++			--
Consumer Discretionary	+	-	--	
Technology	+	+	-	--
Industrials	++			--
Materials	+	--	++	
Consumer Staples			++	++
Health Care	--		++	++
Energy	--		++	
Communication Services		+		-
Utilities	--	-	+	++

Economically sensitive sectors may tend to outperform, while more defensive sectors have tended to underperform.

Making marginal portfolio allocation changes to manage drawdown risk with sectors may enhance risk-adjusted returns during this cycle.

Defensive and inflation-resistant sectors tend to perform better, while more cyclical sectors underperform.

Since performance is generally negative in recessions, investors should focus on the most defensive, historically stable sectors.

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