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HP EQUITY RESEARCH: PRINTING THE FUTURE

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Abstract

This report is part of an equity research on HP Inc. which aims to analyse the company and give a recommendation on whether it is a good investment opportunity, based on our DCF and relative valuation. This dissertation focuses on the current macroeconomic context and its effects on HP, HP's Printing segment, the company's capital structure and cost of equity, and the relative valuation.

The Covid-19 pandemic accelerated the digitalisation of the world and increased the demand for notebooks, but decreased the use of hardcopy printers. In addition, it disrupted supply chains and created a shortage of semiconductors, significantly impacting technology firms. Finally, the high energy and fossil fuels inflation, resulting from the Russia-Ukraine conflict, increased general production costs and, more directly, supplies in the Printing segment. HP has an extremely strong position in the consolidated hardcopy printers market, but we forecast this market to decline significantly. However, the 3D printers market is on the rise and we expected it to have a powerful growth. This is a more competitive market, but HP's investment should grant it a valuable market share.

Adding to our analysis of the personal systems segment, the rest of HP's operations, and our estimated cost of capital, the DCF valuation led us to a share price of \$29.09 as of December 31st, 2023, and a return of 6.50%. The relative valuation confirmed the accuracy of this stock price. Thus, our final recommendation is for investors to hold their HP stock position.

Keywords: HP; Equity Research; Printers; Valuation

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This report is part of the HP Equity Research report (annexed), developed by Rafik Karim Shamsudin and Vasco Maria Dutschke Durão and should be read as an integral part of it.

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Introduction

This paper is part of a joint report, an equity research on HP Inc. Its purpose is to analyse the firm and give investors a recommendation on whether to buy, sell, or hold shares of the firm. The report starts by giving readers an overview of the firm, covering all its segments and the products and services offered by each one, HP's current business strategy, its ownership structure, and the ongoing share repurchase plan. After that, it moves to an analysis of the macroeconomic context and how recent events, especially the Covid-19 pandemic and the Russia-Ukraine conflict, impacted HP's business. Next, it presents an industry overview of the firm's main segments, Personal Systems and Printing, their trends, challenges, and competitive landscape, including an analysis of HP's main competitors. It ends with a valuation that, taking into account the previous factors, analysis how HP's future looks and its different potential scenarios, using a DCF approach to calculate the value of the firm. This approach is completed with a sensitivity analysis and a relative valuation.

This report focuses mostly on HP's Printing segment, one of the company's two main sectors, and essential to its business. It analyses the segment's market and what its future looks like (with the different possible scenarios), thus being crucial to the company's valuation. In addition, it covers the capital structure and cost of equity portions of the main report, needed for the DCF valuation approach, and the relative valuation, which demonstrates to the reader how other valuation methods compare to the main valuation. Furthermore, the macroeconomic section is covered as well, vital for the reader to understand how recent global events impact HP.

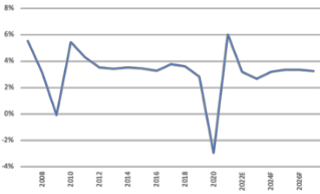
My colleague's report covers HP's other main segment, Personal Systems, including an overview of the market and the segment's future, also indispensable for the company's valuation. Moreover, it also covers the overview of HP's business and strategy, the cost of debt section, and the sensitivity analysis of the valuation.

The analysis done by both of us let us conclude that, although HP operates in a highly competitive market, its strong innovation and R&D capabilities allow it to maintain a robust competitive position. To sum up the analysis, our estimate for HP's share price is \$29.09, and our recommendation is for investors to hold their HP stock position.

Macroeconomic Context & Risks

Covid-19 and the Economy

Graph 1: World Gross Domestic Product, constant prices (percentage change)



Source: IMF

Real GDP across countries had been consistently increasing in recent years, but in early 2020 the Covid-19 pandemic brought a recession. Strong measures to combat the pandemic brought the economy to an almost stop during part of the year. Overall, the pandemic led to a decrease in real GDP of 2.953% in the world, and 3.405% in the USA¹. In 2021, new Covid-19 mutations created a few setbacks, but the ease of lockdowns and restrictions and vaccination efforts helped the economy recover. In addition, in 2020 and 2021, governments and central banks provided monetary and fiscal stimulus to ease the impact of the pandemic. The recovery of the economy in 2021 was directly seen in changes in real GDP: an increase of 6.021% in the World and 5.671% in the USA¹.

HP sells durable goods, which consumption goes together with changes in real GDP. It is expected that sales would go down, but the pandemic made this recession different. Beginning with lockdowns, remote work or hybrid has become a staple for some companies. Furthermore, the pandemic greatly accelerated the digitalization of the workplace. In a study by McKinsey², 85% of correspondents confirm that the implementation of technologies for digital employee interaction and collaboration were somewhat or greatly accelerated by the impact of Covid-19. Notebooks tend to play a big part in this type of work, which could be seen in their increase in sales for HP of 12.4% in 2020, and an even higher increase of 18.5% in 2021. These increases more than offset the decrease in revenue from Desktops and Workstations which happened those years. On the Printing segment, Commercial decrease significantly in 2020, 23.3%, while Consumer decreased just 0.7%. This makes sense since offices were mostly close. According to HP, the decrease in Consumer Printing is justified by a decrease in units produced due to supply chain disruptions³.

In 2020, due to the pandemic, only Notebook revenues grew

Supply Chains, Semiconductors, and Inflation

One of the biggest impacts the pandemic had on the economy was the disruptions of supply chains. With restrictions like lockdowns and social distancing, companies could not carry on with their normal processes. Another common measure was the closure of borders which only aggravated global supply chains beyond the impact of the other measures. In addition, there were great fluctuations in demand further aggravating the situation, with demand for certain products plunged and, at the same time, consumers started panic-buying and holding onto other products, resulting in high fluctuations⁴. Disruptions in supply chains have not ended yet, and HP sees this has a risk to their business (2022 10-K report), admitting to being highly dependent on third-party suppliers in the manufacturing of their products, and even having single source supplier for many of its components, creating an even higher risk.

Out of the supply chain disruptions, the shortage of semiconductors is the most notable one. This

The consumer electronics industry is still being impacted by the semiconductor shortage

¹ Rep. *World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis*. International Monetary Fund, October 11, 2022.

² Lund, Susan, Wan-Lae Cheng, André Dua, Aaron De Smet, Olivia Robinson, and Saurabh Sanghvi. Rep. *What 800 Executives Envision for the Postpandemic Workforce*. McKinsey, September 23, 2020. <https://www.mckinsey.com/featured-insights/future-of-work/what-800-executives-envision-for-the-postpandemic-workforce>.

³ HP's 2020 10-K Report

⁴ Moosavi, Javid, Amir M. Fathollahi-Fard, and Maxim A. Dulebenets. "Supply Chain Disruption during the COVID-19 Pandemic: Recognizing Potential Disruption Management Strategies." *International Journal of Disaster Risk Reduction* 75 (June 1, 2022). <https://doi.org/10.1016/j.ijdrr.2022.102983>.

shortage comes from other reasons as well: the USA-China trade war (USA imposed restrictions on SMIC, the largest chip manufacturer in China), the increasing demand for cryptocurrency mining computers, and weather and production-related accidents; but the Covid-19 pandemic was the major reason for the situation today. At the beginning of the pandemic, scared of a lack of demand, manufacturers of products requiring chips cancelled orders of semiconductors, but the demand for consumer electronics increased significantly with remote work. Semiconductors have a high lead time and multiple firms are also involved in the process of their manufacturing and integration⁵. This created a very high disparity between demand and supply of semiconductors, very much affecting the operations of the consumer electronics industry (and others), in which HP operates. Governments have tried to ease the shortages by incentivising domestic production of semiconductors, for example, the USA with the CHIPS and Science Act, signed in August 2022, and the EU with the European Chips Act, announced in February 2022 and expected to be implemented in the first half of 2023. Although it is not certain when the shortage will end, J.P. Morgan Research⁶ stated that it expects it to be near its end, with more chips being manufactured in the second half of 2022, while Volkswagen does not anticipate the demand of the auto industry to be met until 2024.

Another large consequence of the pandemic was inflation, with the increase in demand and lack of supply. Additionally, sectorial change in demand (services, like travelling and restaurants, to goods) and energy prices (increased with the resumption of the economy and geopolitical tensions) also contributed⁷. These factors led to the inflation in 2021 being the highest in years: 6.391% in the world, and, for the first time in recent years, higher in the USA, 7.364%⁸.

Graph 2: Inflation, end of period consumer prices (percentage change)



Source: IMF

Invasion of Ukraine and Perspectives for the Future

In February 2022, Russia invaded Ukraine following tensions between the two countries and Russia's annexation of Crimea in 2014. The war in Ukraine is still ongoing and it resulted in a humanitarian crisis, as well as worsening the world's economy which was still recovering from the Covid-19 pandemic.

The most important western countries adopted several sanctions against Russia. For example, the removal of Russian banks from SWIFT, the prohibition of new investments in Russia and transfers to the country, and the prohibition of trade with the country⁹¹⁰¹¹. The most important Russian exports are oil and gas, making the price of fossil fuels and energy increased significantly. Traditional ink for printing is petroleum-based, thus the increase in oil price has a direct impact on the printer's industry. In addition, Russia and Ukraine have large market shares in commodity markets, so the war significantly increased prices.¹²¹³¹⁴

⁵ Helper, Susan, and Evan Soltas, Why the Pandemic Has Disrupted Supply Chains § (2021). <https://www.whitehouse.gov/cea/written-materials/2021/06/17/why-the-pandemic-has-disrupted-supply-chains/>.

⁶ Rep. *Supply Chain Issues and Autos: When Will the Chip Shortage End?* J.P Morgan. Accessed October 20, 2022. <https://www.jpmorgan.com/insights/research/supply-chain-chip-shortage>.

⁷ Masayoshi, Amamiya. Rep. *The COVID-19 Crisis and Inflation Dynamics*. Bank of Japan, March 29, 2022.

⁸ Rep. *World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis*. International Monetary Fund, October 11, 2022.

⁹ European Council, EU response to Russia's invasion of Ukraine § (2022). <https://www.consilium.europa.eu/en/policies/eu-response-ukraine-invasion/>.

¹⁰ Russia Sanctions and Export Controls § (2022). <https://www.trade.gov/russia-sanctions-and-export-controls>.

¹¹ Russia sanctions: guidance § (2022). <https://www.gov.uk/government/publications/russia-sanctions-guidance/russia-sanctions-guidance>.

¹² Selfin, Yael, Dennis Tatarov, and Michal Stelmach. Rep. *Russia and Ukraine Conflict: Economic Implications*. KPMG, 2022.

<https://home.kpmg/xx/en/home/insights/2022/03/russia-and-ukraine-conflict-chief-economist-team.html>.

¹³ Caldara, Dario, Sarah Conlisk, Matteo Iacoviello, and Maddie Penn, The Effect of the War in Ukraine on Global Activity and Inflation § (2022).

<https://www.federalreserve.gov/econres/notes/feds-notes/the-effect-of-the-war-in-ukraine-on-global-activity-and-inflation-20220527.html>.

¹⁴ Rep. *Economic Consequences of the Russia- Ukraine Conflict: Stagflation Ahead*. Coface, 2022.

Graph 3: Global Energy Commodity Price Index 2013-2024 (2010 = 0)



Source: Statista; World Bank

The points stated above were expressed in a very high increase in inflation. The IMF expects global inflation to be even higher in 2022, 9.06%, and still high in 2023, 5.068%. For the USA, these values are 6.388% and 2.346%, respectively. Financial markets have also been highly affected and have been very volatile since the beginning of this conflict¹⁵. When it comes to GDP, it has also been very affected. In the USA, in January, real GDP was expected to increase by 4% in 2022, now it is expected to increase only 1.641% and an even lower 0.995% in 2023. In terms of the global GDP, in addition to the Russia-Ukraine situation, it was also affected by China's lower-than-expected GDP, due to further lockdowns and a property sector crisis¹⁶. In January, the forecast was of an increase of 4.4%, while its value now sits at 3.192%, and 2.655% in 2023^{17,18}.

To fight inflation and a further recession, the US Federal Reserve (Fed) raised its target range for interest rates¹⁹. This made the US Dollar appreciate significantly when compared to other currencies, that did not have their banks opt for such an aggressive policy. Furthermore, the global recession also made investors go to the US Dollar which they believe to be safer in times of crisis. The most notable depreciation, when compared to the US Dollar, was the Euro, which also depreciated due to the uncertainty lived and the question of growth in the Euro Zone. The Euro not only reached parity with the US Dollar, but it went below it^{20,21}. It now sits at 1.07 USD. In their 2022 10-K report, HP has stated that, with most of its revenue coming outside the USA, fluctuations in foreign exchange rates like this have a negative impact on its revenues. Furthermore, it can also impact products with components obtained from foreign suppliers.

The U.S dollar has appreciated highly compared to other currencies

Fluctuations in exchange rates may negatively impact HP's foreign revenues

Additional Macroeconomic Risks

In addition to the macroeconomic topics explored above, in their 2022 10-K report, HP identifies other that could negatively impact their business. Most the notable ones are related to international trade: the impact of Brexit in UK sales, restrictions in foreign trade (especially Russia, as mentioned, and China), impact of nationalist sentiment on foreign sales, and supply-chain related issues and cost increases. Other notable topics are climate change and ESG matters. Concerns regarding it can also shift consumers preferences and lead to new regulations impacting the business. Specifically in the Printing segment, we see HP lacking behind competitors in environmentally friendly products (further explored in the Market Overview section). Finally, the company has made commitments regarding ESG and admits that these are its current plans but has no guarantees that it can achieve them, which could hurt it in the future.

Failing to achieve its ESG commitments can significantly hurt HP's brand

¹⁵ Caldara, Dario, Sarah Conlisk, Matteo Iacoviello, and Maddie Penn, The Effect of the War in Ukraine on Global Activity and Inflation § (2022). <https://www.federalreserve.gov/econres/notes/feds-notes/the-effect-of-the-war-in-ukraine-on-global-activity-and-inflation-20220527.html>.

¹⁶ Rep. *World Economic Outlook Update, July 2022: Gloomy and More Uncertain*. International Monetary Fund, July 26, 2022.

¹⁷ Rep. *World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis*. International Monetary Fund, October 11, 2022.

¹⁸ Rep. *World Economic Outlook Update, January 2022: Rising Caseloads, A Disrupted Recovery, and Higher Inflation*. International Monetary Fund, January 25, 2022.

¹⁹ Saphir, Ann, and Howard Schneider. "Fed Delivers Another Big Rate Hike; Powell Vows to 'Keep at It'." Reuters. Thomson Reuters, September 22, 2022.

²⁰ <https://www.reuters.com/markets/europe/fed-set-big-rate-hike-waters-get-choppy-worlds-central-banks-2022-09-21/>.

²¹ De Vijlder, William. "The Euro at Parity versus the Dollar: Causes, Consequences and Outlook." BNP Paribas, July 15, 2022. <https://economic-research.bnpparibas.com/ecotvweek/en-US/euro-parity-versus-dollar-causes-consequences-outlook-7/15/2022.c38424>.

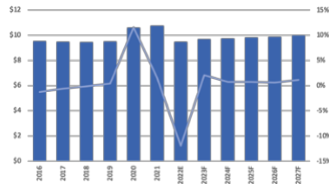
²¹ "Explainer: Why the Euro's Fall below Parity versus Dollar Matters." Reuters. Thomson Reuters, July 13, 2022. <https://www.reuters.com/markets/europe/why-euros-fall-below-parity-versus-dollar-matters-2022-07-13/>.

Industry Overview

Printers Market Overview

HP's Printing segment operates in the Printer and Copier/Hardcopy Peripherals market. The market consists of printers, copiers, and multifunctional systems. It is important to note that it does not encapsulate revenues from HP's Supplies business unit. Furthermore, the market refers to traditional printers and copiers, while HP's Commercial segment also offers 3D printers and new technologies.

Graph 4: Printer and Copier Revenue Worldwide from 2014 to 2027 (in billion U.S. dollars)



Source: Statista

According to Statista²², the market has shown a decreasing trend in recent years but increased significantly in 2020, from \$9.51 bn to 10.61 bn, a growth of 11.6%, and, in 2021, to \$10.78 bn, an increase of 1.6%. These values translate to a market volume of 108.2 and 110.4 million units, respectively. In contrast, IDC estimates²² that the volume for 2020 was only of 94.36 million units, increasing a merely 0.01% from 2019.

Regarding geographic distribution (data from Statista), China is the country with the most revenue in this market, with a value of approximately \$2.5 bn. In 2021, approximately 66.9% more than the second highest. It is followed by the USA, with approximately \$1.5 bn, and then Germany, Brazil, and India. This has been the order of countries by printer revenue for the last couple of years and is estimated to remain the same, at least until 2027.

Printers Trends & Challenges

General Trends & Emerging Markets

There are two trends affecting many industries, including this one: environmental concerns and subscription business models. Aiming to be more environmentally friendly, companies have adapted some of their products or created new ones. The most notable are eco-friendly printers with refillable ink tanks (eliminating cartridge waste), vegetable-based inks (instead of petroleum-based), recycling-friendly cartridges, and refillable cartridges. Epson stands out among the major players in the industry as the leader and pioneer of eco-friendly products. Companies like HP, on the other hand, discourage the use of refillable cartridges instead of original HP cartridges. HP's choice to have its products not officially support other cartridges, although increases supplies revenue, may give it a reputation of lack of care towards the environment and, nevertheless, lower price imitation supplies compete with the company. Then, in today's subscription-based economy, something that is used and replaced regularly like ink for printers becomes a candidate for this kind of model. HP's Instant Ink and Epson's ReadyPrint are just examples, with other players also offering their own subscription services. HP stated that Instant Ink has seen double-digit increase every quarter of 2022³³.

In emerging markets, tank printers, which have the lowest total cost, tend to dominate due to the difference in consumer buying habits. Although they have a more expensive starting point, the cost per print on tank printers is significantly lower. Data from Q3 2018 – Q2 2019 shows tank

Subscription models for printing supplies are showing high growth

²² Rep. *Printers (Hardcopy Peripherals)*. Statista, 2021.

printers made up 30-80% of printer sales in emerging economies²³. Printer companies, like HP, are aware of the fact and have focused on tank printers for these economies to be more competitive, gaining market share thanks to it in 2022²⁴.

▪ Digitalised World and Covid-19 Impact

The printers' market has been facing the increasing challenge of a digital world. For some time now, the world has become more digital as each year passes, reducing the need for hardcopies. For example, physical books are being replaced with their digital counterpart for many people, with the e-book market growing almost 25% from 2017 to 2022²⁵. Furthermore, PCs and tablets or PCs with touch screens made it possible and easy for people to annotate on documents. The Covid-19 pandemic accelerated the digitalization process as organizations started to share documents completely digitally through the cloud, as explained in the Macroeconomic Context section.

A more digital world should hurt the printers' market, but, in an interview with Silicon Republic²⁶, Gary Tierney (at the time, HP's Printing Category Director for the UK and Ireland) argues that it has helped the industry. Cloud-based ecosystems allow people to print from anywhere at any time, harnessing the power of the Internet of Things. In addition, the pandemic also increased security issues affecting the industry: "Cybercriminals are targeting print infrastructure, and as a result endpoint security has become more important than ever before". These points may help the market, with people and organizations upgrading to more capable printers/systems, but only in the short-term.

▪ Advancements in Printing Technologies

There are many advancements in printing technology which ensure that overall printing is far from dying. One example is digital printing, which is the technique of printing digital-based images onto diverse surfaces (e.g., printing images onto t-shirts)²⁷. It has existed for a long time and many hardcopy printers' producers also offer digital printing systems, but companies have been investing in it in recent years, making it less costly and improving its speed and quality, in addition to being more environmentally friendly²⁸. Another printing technology that has a bright future ahead is conductive ink. Conductive ink, which has also existed for some time (e.g., modern public transport tickets), is ink that is able to conduct electricity. It is now being investigated ways of making it cheaper, more eco-friendly, and even recyclable, with the use of different materials^{29,30}. Although it is a more technical printing method, hardcopy printers' producers can harness their printing know-how to adapt and enter this evolving market in the future. These are more niche markets but that can have some positive impact still in the revenues of printer

Digitalization may lead to increased printer revenues in the short-term

Digital printing and conductive ink technologies are becoming more eco-friendly and less costly

²³ M, K. "The Rise of Ink Tank Printers in Emerging Economies - the Rise of Ink Tank Printers in Emerging Economies." contextworld, September 2, 2019.

<https://www.contextworld.com/blog/-/blogs/the-rise-of-ink-tank-printers-in-emerging-economies>.

²⁴ HP's Q1, Q2, Q3, Q4 Earnings Call

²⁵ Statista. "E-book market revenue worldwide 2017-2026 (in million U.S. dollars)." Chart. March 4, 2022. Statista. Accessed December 12, 2022.

<https://www.statista.com/forecasts/1294207/ebook-market-revenue-worldwide>

²⁶ Darmody, Jenny. "The Future of Printing: Are We Facing a Paperless World?" Silicon Republic, September 23, 2021. <https://www.siliconrepublic.com/enterprise/printing-paperless-security-hp>.

²⁷ "What Is Digital Printing?" Xerox. Accessed November 2, 2022. <https://www.xerox.com/en-us/digital-printing/insights/what-is-digital-printing>.

²⁸ Peng, Bo. "Digital Printing Technology and Its Application in Packaging Printing." *The International Journal of Electrical Engineering & Education*, March 25, 2021.

<https://doi.org/10.1177/0020720921996609>.

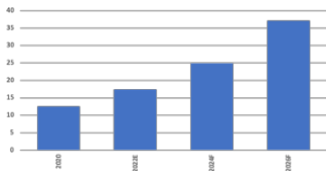
²⁹ Camargo, Jéssica Rocha, Tiago Almeida Silva, Gustavo A. Rivas, and Bruno C. Janegitz. "Novel Eco-Friendly Water-Based Conductive Ink for the Preparation of Disposable Screen-Printed Electrodes for Sensing and Biosensing Applications." *Electrochimica Acta* 409 (March 20, 2022). <https://doi.org/10.1016/j.electacta.2022.139968>.

³⁰ Xu, Jianyu, Hongda Guo, Hongyao Ding, Qiao Wang, Ziqing Tang, Zongjin Li, and Guoxing Sun. "Printable and Recyclable Conductive Ink Based on a Liquid Metal with Excellent Surface Wettability for Flexible Electronics." *ACS Applied Materials & Interfaces* 13, no. 6 (February 2, 2021): 7443–52. <https://doi.org/10.1021/acsami.0c20549>.

companies. HP already offers printers with these technologies, with its Indigo line, and their success will depend very much on HP's investment, to keep up with the market's advancements in technology.

Out of new technologies and trends in the printing industry, the most notable one is undeniably 3D printing. Despite having been first theorised in the 1970s and put to action in the 1980s, only recently has 3D printing started to show its true potential³¹. Its applications are numerous from the manufacturing of detailed and complex parts to large-scale production, healthcare, to even personal use³². According to Statista³³, the market value of 3D Printing Products and Services was \$12.6 bn, in 2020, and 2022 is expected to end in \$17.4 bn, a two-year growth of approximately 38%. Companies are aware of this, as more than 50% of Statista's correspondents state that their expenditure on 3D printing in 2020 was at least \$10,000 and 23% spent more than \$100,000. Hardcopy printers' producers are moving towards 3D printing, with the biggest names in the industry already offering 3D printers. HP already has multiple 3D printers and invests much in it, being the largest 3D printing patent owner in 2021 and releasing a metal 3D printer recently.

Graph 5: Global 3D Printing Products and Services Market Size from 2020 to 2026 (in billion U.S. dollars)



Source: Statista

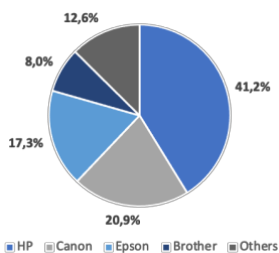
Printers Competitive Landscape

The hardcopy peripherals market is very consolidated. According to data from IDC³³, in 2020, practically 90% of units sold came from only 5 players in the market. HP shipped 41.2% of total units, Canon 20.9%, Epson 17.3%, Brother 8%, and Kyocera Group 2%, with the remaining 10.6% coming from all the remaining players in the market. The consolidation increased slightly since 2018, in which 88.6% of units sold were from these 5 players, while in 2020, 89.4%. Moreover, HP has been slowly strengthening its position as the market leader since 2016, when it had 36.7% of market share.

The threat of new entrants is not high for two reasons. First, in the long-term, the market will decrease very much as the world continues its digitalization trend and with high costs of entry (as in any technology industry), profits would be uncertain, so there is no incentive for new players to join the market. The second reason is brand loyalty. The major players have dominated the market for many years and consumers trust them for printers and copiers, making it harder for smaller players to be able to sell their products. Regarding competition between the major players, there is high competition on price and introduction of new products to differentiate the little possible from competitors, as HP also mention in their annual report.

For markets of promising printing technologies, especially 3D printing, the threat of new entrants is higher. The market is very recent, and it is expected to grow significantly, making it extremely attractive for new players. There are very high barriers to entry, which come mostly from the high investment needed to manufacture and research 3D printing technology. With the cost and price of 3D printers still being high, the competition between existing players is done mostly in product differentiation, may it be in features (including what materials are used to print the object) or in print quality.

Graph 6: Market Share (units) Held by Hardcopy Peripherals Vendors Worldwide in 2020



Source: Statista; IDC

³¹ Savini, A., and G.G. Savini. "A Short History of 3D Printing, a Technological Revolution Just Started." *2015 ICOHTEC/IEEE International History of High-Technologies and their Socio-Cultural Contexts Conference (HISTELCON)*, 2015, 1–8. <https://doi.org/10.1109/histelcon.2015.7307314>.

³² Su, Amanda, and Subhi J. Al'Aref. "History of 3D Printing." *3D Printing Applications in Cardiovascular Medicine*, 2018, 1–10. <https://doi.org/10.1016/b978-0-12-803917-5.00001-8>.

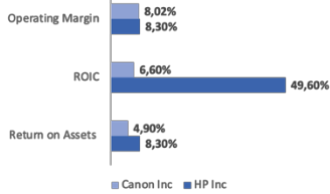
³³ Rep. *Printers (Hardcopy Peripherals)*. Statista, 2021.

Regarding HP's competitors for the Printing segment, the company identifies (in their 10K report) as their main competitors: Canon, Lexmark International, Xerox, Seiko Epson, The Ricoh Company, and Brother Industries. Out of these, we will further analyse the most notable ones.

- Canon

Canon Inc. is a Japanese firm founded in 1933, as Precision Optical Instruments Laboratory. It is most known for its photography products, although it also produces other products like printers, and calculators, for example. The firm's revenue in 2021 (last reported year) was ¥3,513,357 million, around \$25,971 million, increase of approximately 11%. Canon offers different printers, like traditional printers and multifunction systems, commercial printers, and photography-specific printers. Its printing segment accounts for 55% of revenues and grew 7.45%. Canon has similar profitability to HP, but its ROIC is around 87% below. In 2010, the company purchased Océ, a firm focused on printing products, which is now a subsidiary of Canon under the name Canon Production Printing.

Graph 7: HP vs Canon Profitability Comparison



Source: Refinitiv & Analysts' Estimate

- Epson

Seiko Epson Corporation is a Japanese firm founded in 1942, at the time by the name Daiwa Kogyo, Ltd. It is most known for its printers; however, it also offers other products like projectors, smart glasses, robots, and solution services. In 2022, Epson had revenues of ¥1,128,914 million, approximately \$8345 million and a growth of 13.4%. Its printer catalogue is vast, offering both home and office printers, and include its line of EcoTank, a selection of environmentally friendly printers. The firm's printing segment accounted for 69% of the revenues and grew 10.2%. When compared to HP, Canon has a very similar profitability and a ROIC approximately 78% lower, but in line with the peer median. Epson is, currently, one of the most innovative companies in the hardcopy printers' market, leading the race for eco-friendly printers.

Graph 8: HP vs Epson Profitability Comparison

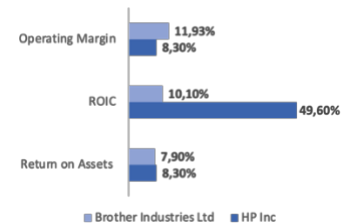


Source: Refinitiv & Analysts' Estimate

- Brother Industries

Brother Industries, Ltd. is a Japanese firm founded in 1908, as Yasui Sewing Machine Co. It offers a range of products, including printers, sewing machines, cutting machines, and IT solutions. Brother's revenues were ¥710,938 million (approximately \$5255 million), in 2022, growing 12.5%. Its printer line-up includes printers for home and office, and of different printing technologies and functionalities for both. The revenues from their Printing & Solutions segment were around 60% of total revenues and grew 10.26%. Comparing to HP, Brother has a higher profitability by 3.6 percentage points and an inferior ROIC by approximately 80%, also in line with the peer median.

Graph 9: HP vs Brother Industries Profitability Comparison



Source: Refinitiv & Analysts' Estimate

Valuation

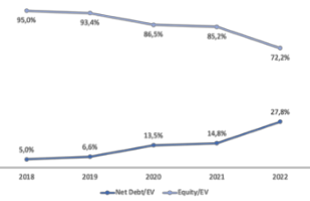
WACC Calculation

The Weighted Average Cost of Capital was used as the discount rate for our DCF valuation. With a D/E ratio of 0.32, an after-tax cost of debt of 3.51% and a cost of equity of 9.79%, we reached a WACC of 8.26%.

■ Capital Structure

In order to calculate the WACC we assumed a constant capital structure for the firm's future. Looking at HP's debt levels, it is considerably higher than its identified competitors, apart from Microsoft and Apple, companies with a much greater size, but also Dell, which has a similar market cap. Out of its competitors, HP's current D/E ratio is only lower than Dell's, Xerox's, and Ricoh Company's. Furthermore, around half of them have negative a D/E ratio, something normal in technology markets since they may be volatile and require more cash for investment in R&D and CAPEX. Despite this, in the last five years, HP maintained a higher D/E ratio, but that has been higher in the last three years. The debt issued throughout the years is mostly for general corporate purposes, like the extinguishment of previous debt, funding of possible acquisition opportunities, working capital and CAPEX. In 2022, a significant amount of debt was issued for the acquisition of Plantronics, so we adjusted the debt of this year to remove this one-off debt increase. We believe that, for the future, HP will maintain similar debt levels as in the last three years, adjusted to the acquisition related debt, so considered for the future capital structure the average of these three years, a D/E ratio of approximately 0.32.

Graph 10: HP's Capital Structure Evolution (2018-2022)

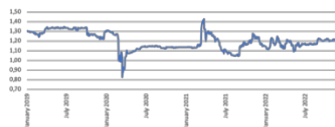


Source: HP's Annual Report

■ Cost of Equity

For To better understand how HP moves with the market we performed a regression on HP's daily stock returns against the S&P 500's ones, starting January 2018. The regression gave us an equity beta of approximately 1.192, with a confidence interval of [1.119,1.265], meaning that, currently, HP is around 19.2% more volatile than the market, when something impacts it. When analysing the 1-year rolling beta, it oscillated very much during the Covid-19 pandemic, as it did with many companies due to uncertainty, but, apart from that, it has been quite constant, especially in 2022. Given this after-pandemic stability, we believe our confidence interval to be accurate. Although this is the case, the rolling beta of recent months has been higher than our base beta, with its current value being 1.22. Thus, a beta of 1.2 should be more accurate for HP. The regression's beta translates to an unlevered beta of approximately 0.949, with a confidence interval of [0.891,1.008]. Using the beta adjusted for the recent values of the rolling beta, we get an unlevered beta of 0.956.

Graph 11: HP's 1-Year Rolling Beta



Source: Yahoo Finance & Analysts' Estimate

Table 1: HP's Weighted Average Unlevered Beta Calculation

	Unlevered Beta	Weight
HP Inc	0,95	55%
Lenovo	0,69	5%
Dell	0,66	15%
Toshiba	0,61	5%
Canon	0,70	10%
Epson	1,08	10%
Weighted Average Unlevered Beta	0,863	100%

Source: Analysts' Estimate

Although the confidence interval is not wide, to further complete our analysis, we analysed the beta from HP's comparable companies³⁴. From its identified competitors, we chose Lenovo, Dell, Toshiba, Canon, and Epson, based on products offered and market cap. Lenovo, Dell, Toshiba, and Canon all have unlevered betas between 0.6 and 0.7. Epson has a much higher unlevered beta of 1.08. This is the only company which mainly sells printers which may the reason for a higher unlevered beta. So, analysing the business focus of these comparable companies, we believe HP's printing segment is the likely reason for the firm's unlevered beta to be higher than its competitors. Corroborating our suspicions, Pinnacle Business Solutions states that the printing industry has a high average beta of 1.75³⁵. Important to note that the printing and printers (hardcopy peripherals) industries are not the same but are undeniably related. Ultimately, we attributed to each company (including HP) a weight, based on their relevancy, to compute a

³⁴ A regression like HP's one was used to calculate each beta

³⁵ Beckert, Paul J. "Top 5 Financial Challenges in the Printing Industry." Pinnacle Business Solutions, June 27, 2019. <https://pinnacle-business.com/top-5-financial-challenges-in-the-printing-industry/>.

weighted average. This resulted in a weighted average unlevered beta of, approximately, 0.863.

Since the weighted average unlevered beta is outside the confidence interval from the regression, and the current rolling beta is higher than the base beta, we decided to slightly increase the beta, and determined an unlevered beta of 0.95. Relevering the beta with the assumed capital structure for the future, we got an equity beta of, approximately, 1.17. This means that we predict HP's stock returns will be more volatile than the market, oscillating 17% more than it. Such beta implies a cost of equity of, approximately, 9.79%³⁶.

Table 2: HP's Unlevered Beta Summary Table

	Lower 95%	Value	Upper 95%
Unlevered Regression Beta	0.891	0.949	1.008
Adjusted to Rolling Beta	-	0.956	-
Comparable Companies Weighted Average	-	0.863	-
Unlevered Beta	-	0.95	-

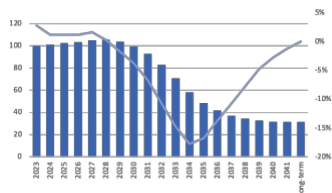
Source: Analysts' Estimate

Base Case

To better forecast the future of HP's Printing segment, we analysed the hardcopy peripherals and the additive manufacturing peripherals separately³⁷. With the inflation following recent macroeconomic events, consumer power has decreased. The hardcopy printers' market being a very mature market, we expect its volume to decrease somewhat significantly in 2022. Although this is the case, with the market still showing signs of small growth, so we expect the market volume to decrease only in 2022 and to slowly grow back to current values in the following years.

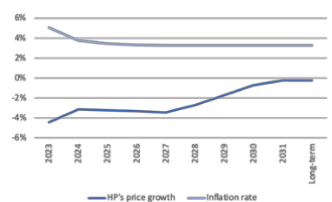
This growth will come mostly from emerging markets, in which sales have been higher, and companies and individuals still upgrading their printers. Even with hardcopies being less used as times goes on, with companies working more through the cloud, security has become more of an issue even with the print infrastructure, as mentioned, so we expect companies and individuals to upgrade to more secure printers for their offices and home offices. Furthermore, increased environmental concern is likely have some impact on the market as customers choose to switch their printers to more eco-friendly ones. Statista's forecast data is congruent with our hypothesis for the market future, so it was used to calculate HP's revenues more accurately. Following the gradual growth, we believe customers will have no reasons to upgrade their printers unless necessary and that the possible growth of emerging economies will not be strong enough compared to the digitalisation of the world. Thus, starting in 2029, after the market volume reaches a value slightly above 105.5 million units, we forecast it to start declining and this decline to be more notable each year. In 2041, we foresee it to reach a state where the world is almost fully digitalised and almost only people in developing economies purchase printers and out of necessity, making the market completely stale at a volume of, approximately, 31.5 million units each year.

Graph 12: Hardcopy Peripherals Market Volume (millions of units) Forecast



Source: Analysts' Estimates

Graph 13: HP's Hardcopy Peripherals ASP Evolution vs Inflation Forecast



Source: Analysts' Estimates

Regarding HP's volume market share for the hardcopy peripherals market, it has shown an average increase of 1.6% in recent years, and we expect it to continue for the next few years. In 2022, it had an estimated market share of 42.5% and we forecast it to grow until 45%, in 2026, and HP to hold it in perpetuity. Although this is a very high market share already, the market is very consolidated in which brand reputation is important. As the market has become very competitive between the big players and will start decreasing in the future, we anticipate that it will not be profitable for the small players, and thus they will exit it, letting HP obtain some extra market share. Moreover, the company has been able to increase its market share in emerging economies with its Big Tank printer and is likely to obtain some more. Concerning HP's average

³⁶ Calculated using CAPM

³⁷ Additive Manufacturing Peripherals revenues were estimated to be 5% of Printing Commercial Revenues

selling price per hardcopy printer, we expect it to decrease significantly. With the competition in the market, HP has stated that it expects high pricing competition in the near future, and so we predict the price to decrease around \$5 yearly until 2027 and, after that, due to lower demand, to continue to decrease but at a lower rate. From 2031 onwards, the price should decrease at the minimal rate of 0.22% yearly and, in 2045 (last forecasted year) be close to \$128.5.

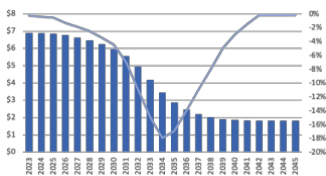
The combination of these factors leads to a decrease in hardcopy peripherals revenues each year. The decrease will gradually increase until 2034, year with a decrease of almost 18%, and from there the decrease will get smaller each year. In the last forecasted years, the decrease will be constant, and follows the price decrease of 0.22%, as the market volume remains unchanged.

In 2045, the revenue is forecasted to be approximately \$1.8 bn. We project both Consumer and Commercial revenues to follow these growths. Regarding the revenue division between the two, they have become more balanced with the pandemic, and we think it will continue to be so, as remote and hybrid work have become more standard. As office printers tend to be more advanced and expensive, Commercial revenue will have slightly more weight, being 55% of hardcopy peripherals revenues, and thus, Consumer will be 45%.

With respect to the additive manufacturing revenues, we expect other printing technologies like digital printing and conductive ink printing, although more advanced, to remain niche in comparison. Hence, we estimate that the revenues for this HP subsegment to follow the 3D printing products and services market. 3D printing is already being adopted in many industries like healthcare and automotive. We predict that the adoption will keep growing considerably, as 3D printing will allow the production of complex parts in a quicker way and with its cost going down. In addition, companies have invested considerably in this technology and are committed to continuing to do so, leading to an even higher growth in the near future. Furthermore, even the recent macroeconomic events did not stop the market from having a double-digit growth. Thus, we predict the market will grow exponentially, even growing more than 20% yearly between 2025-2030. Statista's study corroborates our projection for the near future, so its implied CAGR was used until 2026. Starting in 2031, we anticipate the growth to slow down yearly but nevertheless continuing to grow above the combination of GDP and Inflation and maintain a double-digit growth until 2037. As the adoption of 3D printing becomes widespread throughout all industries and the quality, speed and cost of 3D printing mass production improve, we foresee that the global mainstream production of goods will be done using 3D printing technology. Therefore, we forecast the 3D printing market to grow at the same rate as the economy (combination of GDP and inflation), approximately 6.64%, in perpetuity, and starting in 2041.

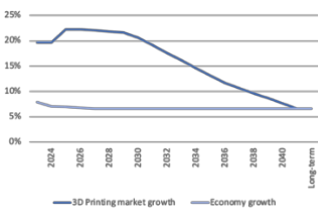
In 2022, HP had an estimated 3D printing market share of 12.1%. With the market still being very recent and players not being fully established, market share is up for grabs. For now, it should depend very much on investment and innovation of players to get it. HP already has multiple 3D printers and has invested much in this technology (in 2021, it was the leading patent owner for it, as mentioned). We expect HP to invest even more, especially in the next few years as they are crucial to establish the company in the market. Part of the previously mentioned R&D increase of \$130 million, in 2025, is dedicated to research new 3D printing materials and applications. Moreover, HP should be able to leverage its printer brand power to capture more costumers. 12.1% is already a very considerable market share for this stage, so, considering the explained

Graph 14: HP's Hardcopy Peripherals Revenues (in billions of US dollars) and Growth



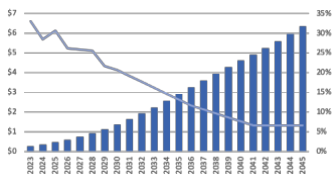
Source: Analysts' Estimates

Graph 15: 3D Printing Market Growth vs Economy (GDP & Inflation) Growth



Source: Analysts' Estimates

Graph 16: HP's Additive Manufacturing Peripherals Revenues (in billions of US dollars) and Growth

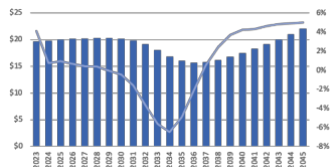


Source: Analysts' Estimates

factors, we anticipate it to grow but not in a large way. It should gradually grow until 17%, in 2028, and remain like this in perpetuity.

The market growth and market share increase lead HP's additive manufacturing peripherals revenues to grow yearly around 30% in the next 3 years, with a gradual decrease in growth from there. Nonetheless, the company will be able to sustain a yearly growth above 20% until 2030, and double-digit growth until 2037. Starting in 2041, it will grow with the economy, just like the market. The revenues in 2045 are forecasted to be approximately \$6.4 bn.

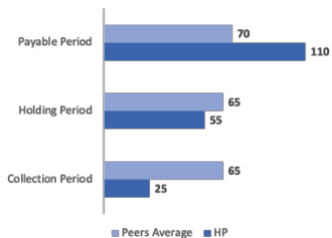
Graph 17: HP's Printing Segment Revenues (in billions of US dollars) and Growth



Source: Analysts' Estimates

As HP sells supplies specifically for their own products, these are dependent of printer sales. Thus, we forecast supply sales to be around 87% of total printing peripheral revenues of the same and previous year combined, following the growth of the two other segments combined. Overall, HP's printing segment will grow very slightly until 2028, but then the hardcopy printers market decline will have a stronger impact than the rise of 3D printing, making the total revenues for the segment decline between 2029 and 2036, year in which revenues will be around \$15.7 bn. From there, the segment will see continuous growth, with the growth gradually increasing each year. For the last forecasted years, the growth will be around 5%, with total revenues in 2045 being approximately \$22.1 bn.

Graph 18: HP and Peers' Cash Conversion Cycle (in days)



Source: Analysts' Estimates

In order to perform well in the 3D printing market and in the development of cellular enabled notebooks with ARM-based chips, HP will have to increase its investment, which will be visible in the firm's PP&E. The company has been focused on site optimisation, so their active properties should not be very impacted, but we believe that they will slightly increase with the investment for these newer technologies, to 17.5 million square feet. On the other hand, following the investment to keep up and try to exceed these markets, and the optimisation, we forecast the PP&E per active million square feet to increase more significantly until 2030, reaching a value of \$24.5 bn. Starting in 2035 we believe total PP&E will follow the company's necessities and grow at the revenue growth rate. When it comes to HP's cash conversion cycle, the company has always leveraged its bargaining power with suppliers and clients to have more beneficial conditions when compared to the industry. We expect it to remain like this and the company to continue its recent trends, stabilising at 25 collection days and 110 payable days. While we forecast the industry values to be, respectively, 65 and 70 days. Contrarily, HP's holding period has been increasing but seems to be stabilising, thus we predict it will stay at around 55 days, with the industry at 65 days, closer to pre-Covid levels.

Scenario Analysis

- **Optimistic Case**

For the optimistic case, we see the hardcopy peripherals market decrease at a slower pace and have a volume of 43.64 million units in perpetuity. In addition, being able to get a bigger market share in emerging markets with Big Tank, HP's market share rises to 48%. The price competition will be slightly less aggressive in the near future. With this scenario, the maximum yearly revenue decrease is close to 14%, still significant, and, although the perpetuity decrease is the same as the base case, the revenues for the last forecasted year are close to \$2.7 bn, almost 50% higher. Here, the 3D printing market has a larger a quicker adoption and has a growth 25% above the

Graph 19: HP's Optimistic Case Total Revenues & Core Margin Forecast



Source: Analysts' Estimates

Table 3: HP's Optimistic Case Summary

Optimistic Case Scenario	
ROIC (FY45+)	14,29%
RONIC (FY45+)	14,58%
WACC	8,26%
Terminal Growth Rate (FY45+)	3,26%
LT Economic Growth Rate	6,64%
Terminal Value	114 146,55
Equity Value (FY23)	\$36 833,02
Implied Share Price	\$37,50

Source: Analysts' Estimates

base case in the first years and maintains stronger growth until 2036. HP notices the growth and becomes more aggressive in the market. Moreover, it can leverage its brand power more, ultimately reaching a market share of 25%. This means that the revenues for the subsegment grow at around 40% for the next 5 years and start to grow gradually less from there. For 2045, the projected revenues are approximately \$12.7 bn, practically double of the base case. The 3D printing revenues have much more impact than the hardcopy ones in this scenario, with total printing revenues only decreasing in one year. The terminal growth rate is slightly above 5%, and revenues for 2045 are approximately \$41.5 bn, around 88% higher.

To get a stronger position in the market, HP's PP&E will increase more as well, with active properties reaching 18.5 million square feet, and PP&E per active million square feet much higher. The company will also have an even better cash conversion cycle, collecting in 20 days, paying in 120, and holding inventory for 45 days.

Conservative Case

In this case, higher environmental concerns and higher post-pandemic digitalization make the hardcopy peripherals market start decreasing immediately, and with a volume of 26.5 million units in perpetuity. HP is not able to get as much share in emerging economies and its reputation decreases for not being as eco-friendly as its competitors, making the firm's market share decrease to 40%. Furthermore, the pricing competition gets more aggressive than anticipated. There are nine years with double-digit negative revenue growth here, and the revenues in the last forecasted year are approximately \$1.1 bn, 37% less than the base case (same perpetuity growth). For this scenario 3D printing will not be as adopted and will only grow at 75% in the first forecasted years, with a gradual decrease from there, and is not expected to become the staple for mainstream production, growing at 3 percentage points below the economy in perpetuity. Disappointed with the growth, HP refuses to make strong investments, and loses market share, stabilizing at 7%. Even in this case, revenues of additive manufacturing peripherals grow at double-digits for five years. For 2045, the forecasted revenues do not reach \$1 bn and are around 85% lower. Finally, supplies sales are also affected, as HP will not be able to protect its printers against imitation supplies as well, and thus decrease to 70% of that year and the previous year's printer sales. HP's lack of commitment to the 3D printer market and the stronger decrease of the hardcopy printer market highly affects total printing sales, with growth only starting in 2039. The terminal growth rate is 1.5% and revenues for 2045 are approximately \$5 bn, around 77% lower.

The lack of investment will be seen in PP&E as well, with active properties only rising to 17 million square feet and very low increases in PP&E per active million square feet. HP will also lose part of its advantage in its cash conversion cycle, collecting in 40 days, paying in 95, and holding inventory for 65 days.

Relative Valuation

To complete our valuation, we decided to do a relative valuation on top of our main DCF approach, using both trading and transaction multiples³⁸. For the trading multiples, we used HP's identified competitors, although with a wide range of market cap, and the multiples EV/Revenue,

³⁸ Data from Bloomberg

Table 4: HP's Relative Valuation Summary

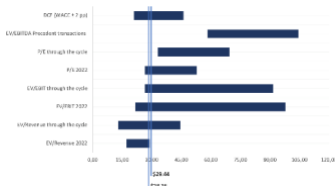
Valuation Method	Lower Bound	Upper Bound
EV/Revenue 2022	17,03	28,86
EV/Revenue through the cycle	12,84	44,51
EV/EBIT 2022	21,72	97,95
EV/EBIT through the cycle	26,43	91,55
P/E 2022	26,56	52,84
P/E through the cycle	33,06	69,45
EV/EBITDA Precedent transactions	58,19	104,56
DCF (WACC = 2 pp)	20,92	46,07

Source: Bloomberg & Analysts' Estimate

EV/EBIT, and P/E. These multiples were analysed both for the last 4 years (2019-2022) and just 2022. Considering the 4 years, the EV/Revenues multiple leads to an implied share price range of [\$12.84, \$44.51], and for just 2022, a narrower range of [\$17.03, \$28.86]. Since depreciation and amortization have a very big impact on technology industries, we decided to use the EV/EBIT multiple instead of EV/EBITDA. The implied share price range for the 4 years was [\$26.43, \$91.55], and for just 2022, [\$21.72, \$97.95]. Finally, for the P/E multiple, the range for the 4 years was [\$33.06, \$69.45], and for 2022 was [\$26.56, \$52.84]. Regarding the transaction multiples, we used data on transactions within the industries of Computers and Office/Business Equipment, from 2018 onwards³⁹. The implied share price ranges from the multiple of these precedent transactions was [\$58.19, \$104.56].

To get a better perspective, we compared the implied ranges from the multiples with a range from our DCF calculation⁴⁰. This gave us an implied share price range of [\$20.92, \$46.07]. When compared with the implied ranges from the multiples, our DCF range coincides partly with the ranges of every multiple, apart from the transaction one. This range is already higher than the rest, likely due to transaction premiums usually present in M&A deals. That being said, the multiples' ranges are generally higher than the DCF one, with our estimated price and current share price being on the lower end of them. This means that the market tends to value the HP higher than our approach, but it is important to mention that valuation by multiples is much less complex and detailed than our assumptions and DCF valuation.

Graph 21: HP's Valuation Football Field



Source: Analysts' Estimates

³⁹ Completed M&A and investment deals, with available EV/EBITDA, within the industries Computers and Office/Business Equipment, announced from 2018 onwards

⁴⁰ Range of plus/minus 2 percentage points from the base WACC, given the base case share price

HP INC.

HARDWARE & SOFTWARE

RAFIK SHAMSUDIN & VASCO DURÃO

COMPANY REPORT

16TH DECEMBER 2022

Continuous Strive for Innovation

Searching for a blue ocean

- Based on a weighted target price of \$29.09 for fiscal year 2023, which is expected to yield a total return of 6.50%, the recommendation for HP Inc. is to HOLD. Share repurchases accounted for 1.51% and dividends paid for 2.43%.
- HP's core operational growth is expected to take a big hit in the upcoming years, as the world continues to transition into a digitalized era, resulting in a decline of traditional printing and personal systems. We expect its revenue to grow at 0.81% CAGR until 2045.
- We believe that HP will aim to maintain its leadership position, through high expenditures in key fast growing market segments such as 3D printing, gaming, and workforce solutions. To enable this investment, it will have to go through a rigorous cost cutting plan, which will reduce its workforce capacity by up to 12% and cost them around \$1 billion to implement all changes.
- HP's performance in the upcoming years will be dependent on two major risk points: 1) consumer preferences shift, as this will shape HP's R&D capabilities focus, and thus their long-term value creation drivers, and 2) competitors' response, which will be the biggest driver for HP's success, as this is a red ocean industry characterized by a fast-changing environment, technology innovation and high price sensitivity, as such, first mover's advantage is key to maintaining a competitive edge.

Company description

HP Inc. is a leading provider of information technology services, with operations in 180 countries. It operates in the Personal Systems and Printing segments, serving both businesses and consumers.

Recommendation: HOLD

Price Target FY23: 29.09 \$

Price (as of 14-Dec-22) 28.36 \$

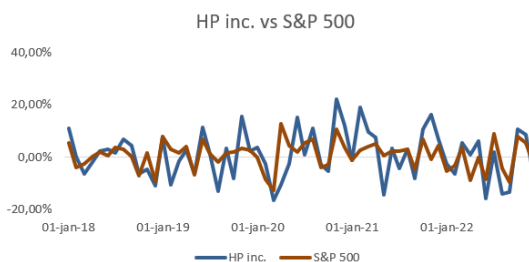
Reuters: HPQ.N Bloomberg: HPQ:US

52-week range (\$) 24.08-41.47

Market Cap (\$M) 29,820

Outstanding Shares (M) 982.15

Source: Bloomberg, Refinitiv & Annual Report



Source: Refinitiv

(Values in \$ millions)	2022	2023F	2024F
Revenues	62,983	64,319	64,598
EBIT	5,250	5,217	5,387
NOPLAT	4,427	4,399	4,543
Comprehensive Income	3,776	3,758	4,341
EPS	3.84x	3.83x	4.42x
P/E	7.16x	7.69x	6.97x
Core Margin (%)	7.03	6.84	7.03
ROIC (%)	51.70	40.95	34.20
FCF/Rev (%)	5.27%	3.92%	1.60%

Source: HP's Annual Report & Analyst Estimates

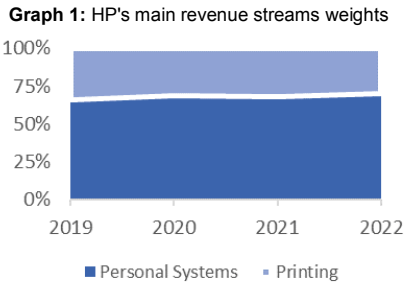
THIS REPORT WAS PREPARED EXCLUSIVELY FOR ACADEMIC PURPOSES BY RAFIK SHAMSUDIN AND VASCO DURÃO, MASTER IN FINANCE STUDENTS OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS. THE REPORT WAS SUPERVISED BY A NOVA SBE FACULTY MEMBER, ACTING IN A MERE ACADEMIC CAPACITY, WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL. (PLEASE REFER TO THE DISCLOSURES AND DISCLAIMERS AT END OF THE DOCUMENT)

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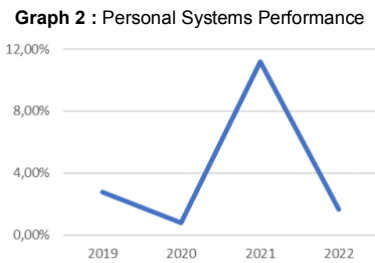
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Company Overview

HP (formerly The Hewlett-Packard Company) was founded in 1939 by Bill Hewlett and David Packard. Over the years, the company has focused on developing and providing a range of hardware components, software, and related services to consumers, SMBs, and large enterprises. In 2015, the company was split into two entities: Hewlett Packard Enterprise and HP Inc. HP Inc. is headquartered in Palo Alto, California, and consists of the Personal Systems and Printing segments, as well as a new segment called Corporate Investments. In this analysis, we will focus on the latter segment.

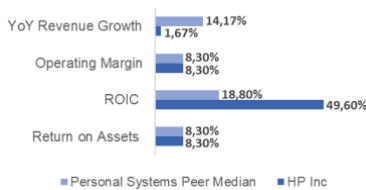


Source: Analysts' Estimates



Source: HP's Annual Report

Graph 3: HP's vs Personal Systems Peer Group Profitability Comparison



Source: Refinitiv and Analysts' Estimates

Personal Systems

In 2022, HP's Personal Systems segment reported a 1.7% increase in total revenue compared to the previous year, making up about 70% of the company's total net revenue. However, the segment's operating margins were 6.6%, a decrease of 0.6 percentage points from the previous year. This was the lowest operating margin among the company's main business segments. When comparing HP's profitability ratios to its peer group median¹, it was found to be on the same levels. However, its return on invested capital (ROIC) was far above the peer medians, supporting its investment thesis. Historically, its ROIC has been 328% higher, on average, when compared to the industry median.

The Personal Systems segment of HP offers products that are divided into two categories: Commercial PCs and Consumer PCs. Commercial PCs are designed for use by businesses and other organizations and are currently the main growth driver for this segment. HP also offers services and solutions related to PC lifecycle management to enterprises. Consumer PCs are designed for consumer use, with a focus on gaming and other leisure activities.

For reporting purposes, these two categories are divided into: Notebooks, Desktops, Workstations and Other. These reported a total YoY growth of 1.7%.

Notebooks consists of consumer notebooks, commercial notebooks, mobile workstations, peripherals, and commercial mobility devices, accounted for about 66,2% of total PS revenue and YoY growth of about -4,4%.

Desktops, which includes consumer desktops, commercial desktops, thin clients, displays, peripherals, and retail POS systems, accounted for around 24,4% of total PS revenue and YoY growth of about 14,4%.

¹ For comparison purposes, Refinitiv values for HP ratios were used as to be consistent, but ROIC values only differed in about 2.1 percentage points from our estimates, while the remaining ratios returned the same values

Workstations, consisting of desktop workstations, displays and peripherals, accounted for about 4.8% of the revenues and YoY growth of about 25,8%.

Other, which aggregates all consumer and commercial services as well as other PS capabilities, accounted for the remaining 4,7% and YoY growth of about 15,6%.

Printing

In its fiscal year 2022, HP's Printing segment was the company's most profitable, representing approximately 30% of its revenue. This segment saw a reported decline of 6.1% and an operating margin of 19.3%, a 1.2 percentage point increase when comparing to last year. The Printing segment includes several solutions, such as office printing, home printing, graphics solutions, and 3D printing and digital manufacturing. It also includes some Samsung-branded supplies. When compared to an industry representative peer group median², HP's operational profitability was slightly higher, around 1.69%. However, when comparing the ROIC, we see a similar situation to the Personal Systems segments, as these on average are far above its peers. Historically, its ROIC has been 852% higher than its peers' median values.

For reporting purposes, the Printing segment is divided into three business units: Commercial, Consumer and Supplies. These reported a YoY growth of -6.1%.

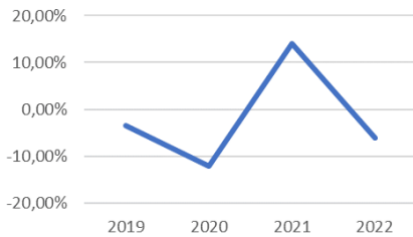
Commercial consists of office printing solutions, graphics solutions and 3D printing and digital manufacturing. This constituted about 22% of total printing revenue and about 0.38% YoY growth. On the other hand, Consumer consists of home printing solutions, which accounted for about 15% of total printing revenue and about - 11% YoY growth.

Supplies comprises a set of products, ranging from ink and laser cartridges to media, graphics supplies, 3D printing and digital manufacturing supplies, targeting to complement the use of consumer and commercial hardware. The segment constituted roughly 62% of printing revenue and posted about -6.9% YoY growth.

Corporate Investments

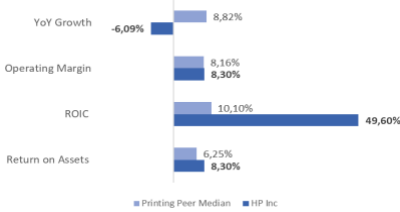
HP's Corporate Investments segment represents a very small portion of the company's revenue, around 0.003% of the FY2022 value. It reported 33.3% decline and a negative operating margin of -11500%. This segment includes HP Labs, which is responsible for the company's research and development efforts, as well as business incubation and investment projects. In the upcoming as HP

Graph 4 : HP's Printing Performance



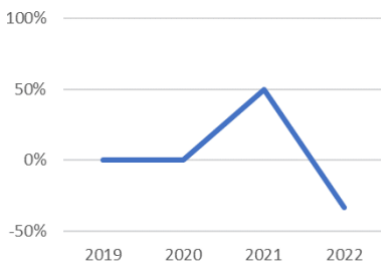
Source: HP's Annual Report

Graph 5: HP vs Printing Peer Group Profitability Comparison



Source: Refinitiv and Analysts' Estimates

Graph 6 : Corporate Investments Performance



Source: HP's Annual Report

² Identified on 10-K and combined present over 90% of the market

continues to invest in these types of ventures, it is expected that this segment will maintain its current profitability performance.

HP's Strategy

- Growth-Oriented Portfolio

As of 2021, regarding the personal systems segment, HP has made two acquisitions which have helped them to drive growth: HyperX and Teradici. HyperX, a key acquisition into bolstering their market position in the gaming industry, more specifically in the peripherals segment, which has already reported a 40%+ growth since the acquisition. The acquisition of Teradici enabled HP to strengthen its capabilities in remote computing services and subscriptions with the creation of HP Anyware. As of 2022, HP has also completed the acquisition of Poly, aiming to further accelerate its presence in the peripherals and workforce solutions segments.



101-250 employees
 Acquired in 2021
 Acquisition Price: \$425 million

In 2021, regarding the printing segment, they entered the Industrial Graphics sector, which has generated \$2 billion in revenue, representing 3% of total revenue. Moreover, their Managed Print Services and Device as a Service offering was expanded to accelerate their digital services business, an area that generated, in 2021, \$4 billion in revenue, representing 6% of total revenue.



101-250 employees
 Acquired in 2021
 Acquisition Price: Not Disclosed

In its fourth quarter presentation, HP mentioned that it has been expanding into new growth categories and extending its service and solution offerings to balance its profitability in the printing segment. The company has also been shifting its business to subscription and contractual models, such as its Instant Ink service, which has surpassed 10 million subscribers and generated over \$500 million in revenue. During its third quarter presentation, HP also mentioned that shipments of its Big Tank and HP Plus printers have helped to rebalance its profitability.



5001-10000 employees
 Acquired in 2022
 Acquisition Price: \$3.3 billion

HP has been focusing on the 3D printing segment, which has been successful with commercial clients, offsetting the decline in consumer demand. HP has invested heavily in this area and has become the largest patent owner in additive manufacturing, with 1,400 active patent families. The company is expected to launch its own commercial metals solutions by the end of 2022.

Collectively, all the previously mentioned segments generated over \$11 billion in revenue, each reporting a double-digit growth.

- Purpose-Driven

HP is setting aggressive target goals to improve operational sustainability and diversity in top management. For example, doubling the number of Black and African American executives by 2050 and reaching 50/50 gender equality in

management by 2030. Another important target is achieving net zero greenhouse emissions across their value chain by 2040, with a 50% reduction up until 2030. The efforts in these areas are driving new business for HP, and, as of last year, their Sustainability Impact programs have driven more than \$3 billion in new sales, representing 5% of total revenue.

- **Future Ready Transformation Plan**

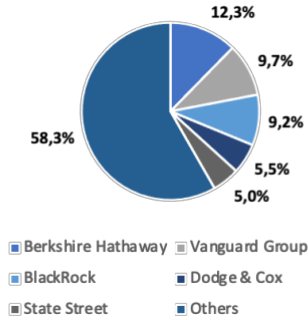
Until 2025, HP has implemented a plan to reduce structural costs that is expected to result in annualized savings of at least \$1.4 billion. The firm will incur in around \$1 billion in restructuring charges, from which \$700 million will be related to workforce reductions, while the remaining \$300 million will be allocated to accelerating HP’s digital transformation and optimizing its portfolio.

Ownership Structure & Share Repurchase Plan

HP Inc. is traded as “HPQ” on the New York Stock Exchange and is part of the S&P 500. As of December 14th, 2022, it has 982,145,796 outstanding shares, corresponding to a market cap of approximately \$27,853.7 million. Its largest investors are some of the biggest institutional investors in the world: Berkshire Hathaway Inc., Vanguard Group Inc., and BlackRock Inc., all owning around 10% of the firm. The investors are predominantly from the USA, holding 81.25% of outstanding shares.³

The company has a share repurchase program which authorized it to repurchase a total of \$15 bn worth of shares. The number of shares repurchased has been increasing, with the firm repurchasing 118 million shares in 2019, 168 million in 2020, and 224 million in 2021, and 124 million in 2022, leaving the company with a budget of \$2.1 bn out of the original \$15 bn. HP Inc. intends to repurchase more shares when opportunistic and to offset dilution, from time to time. Although HP Inc. has been repurchasing shares, it continues to grant more than 15 thousand shares in stock-based compensation yearly. Considering the shares that were either vested or forfeited from this type of compensation, the restricted stock units have been around 30 million in recent years. In 2022, the number decreased by 5%. At the same time as its share repurchase program, the firm has been increasing its dividend per shares. Dividends per share were \$0.64 in 2019, \$0.70 in 2020, \$0.78 in 2021, and \$1.00 in 2022.

Graph 7: HP's Current Ownership Structure



Source: Bloomberg

In recent years, HP repurchased \$12.9 bn worth of shares

³ Data from Bloomberg

Macroeconomic Context & Risks

Covid-19 and the Economy

Graph 8: World Gross Domestic Product, constant prices (percentage change)



Source: IMF

Real GDP across countries had been consistently increasing in recent years, but in early 2020 the Covid-19 pandemic brought a recession. Strong measures to combat the pandemic brought the economy to an almost stop during part of the year. Overall, the pandemic led to a decrease in real GDP of 2.953% in the world, and 3.405% in the USA⁴. In 2021, new Covid-19 mutations created a few setbacks, but the ease of lockdowns and restrictions and vaccination efforts helped the economy recover. In addition, in 2020 and 2021, governments and central banks provided monetary and fiscal stimulus to ease the impact of the pandemic. The recovery of the economy in 2021 was directly seen in changes in real GDP: an increase of 6.021% in the World and 5.671% in the USA⁴.

HP sells durable goods, which consumption goes together with changes in real GDP. It is expected that sales would go down, but the pandemic made this recession different. Beginning with lockdowns, remote work or hybrid has become a staple for some companies. Furthermore, the pandemic greatly accelerated the digitalization of the workplace. In a study by McKinsey⁵, 85% of correspondents confirm that the implementation of technologies for digital employee interaction and collaboration were somewhat or greatly accelerated by the impact of Covid-19. Notebooks tend to play a big part in this type of work, which could be seen in their increase in sales for HP of 12.4% in 2020, and an even higher increase of 18.5% in 2021. These increases more than offset the decrease in revenue from Desktops and Workstations which happened those years. On the Printing segment, Commercial decrease significantly in 2020, 23.3%, while Consumer decreased just 0.7%. This makes sense since offices were mostly close. According to HP, the decrease in Consumer Printing is justified by a decrease in units produced due to supply chain disruptions⁶.

In 2020, due to the pandemic, only Notebook revenues grew

Supply Chains, Semiconductors, and Inflation

One of the biggest impacts the pandemic had on the economy was the disruptions of supply chains. With restrictions like lockdowns and social distancing, companies could not carry on with their normal processes. Another common measure was the closure of borders which only aggravated global supply chains beyond the impact

⁴ Rep. *World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis*. International Monetary Fund, October 11, 2022.

⁵ Lund, Susan, Wan-Lae Cheng, André Dua, Aaron De Smet, Olivia Robinson, and Saurabh Sanghvi. Rep. *What 800 Executives Envision for the Postpandemic Workforce*. McKinsey, September 23, 2020. <https://www.mckinsey.com/featured-insights/future-of-work/what-800-executives-envision-for-the-postpandemic-workforce>.

⁶ HP's 2020 10-K Report

of the other measures. In addition, there were great fluctuations in demand further aggravating the situation, with demand for certain products plunged and, at the same time, consumers started panic-buying and holding onto other products, resulting in high fluctuations⁷. Disruptions in supply chains have not ended yet, and HP sees this has a risk to their business (2022 10-K report), admitting to being highly dependent on third-party suppliers in the manufacturing of their products, and even having single source supplier for many of its components, creating an even higher risk.

Out of the supply chain disruptions, the shortage of semiconductors is the most notable one. This shortage comes from other reasons as well: the USA-China trade war (USA imposed restrictions on SMIC, the largest chip manufacturer in China), the increasing demand for cryptocurrency mining computers, and weather and production-related accidents; but the Covid-19 pandemic was the major reason for the situation today. At the beginning of the pandemic, scared of a lack of demand, manufacturers of products requiring chips cancelled orders of semiconductors, but the demand for consumer electronics increased significantly with remote work. Semiconductors have a high lead time and multiple firms are also involved in the process of their manufacturing and integration⁸. This created a very high disparity between demand and supply of semiconductors, very much affecting the operations of the consumer electronics industry (and others), in which HP operates. Governments have tried to ease the shortages by incentivising domestic production of semiconductors, for example, the USA with the CHIPS and Science Act, signed in August 2022, and the EU with the European Chips Act, announced in February 2022 and expected to be implemented in the first half of 2023. Although it is not certain when the shortage will end, J.P. Morgan Research⁹ stated that it expects it to be near its end, with more chips being manufactured in the second half of 2022, while Volkswagen does not anticipate the demand of the auto industry to be met until 2024.

Another large consequence of the pandemic was inflation, with the increase in demand and lack of supply. Additionally, sectorial change in demand (services, like travelling and restaurants, to goods) and energy prices (increased with the resumption of the economy and geopolitical tensions) also contributed¹⁰. These

The consumer electronics industry is still being impacted by the semiconductor shortage

Graph 9: Inflation, end of period consumer prices (percentage change)



Source: IMF

⁷ Moosavi, Javid, Amir M. Fathollahi-Fard, and Maxim A. Dulebenets. "Supply Chain Disruption during the COVID-19 Pandemic: Recognizing Potential Disruption Management Strategies." *International Journal of Disaster Risk Reduction* 75 (June 1, 2022). <https://doi.org/10.1016/j.ijdr.2022.102983>.

⁸ Helper, Susan, and Evan Soltas, Why the Pandemic Has Disrupted Supply Chains § (2021). <https://www.whitehouse.gov/cea/written-materials/2021/06/17/why-the-pandemic-has-disrupted-supply-chains/>.

⁹ Rep. *Supply Chain Issues and Autos: When Will the Chip Shortage End?* J.P Morgan. Accessed October 20, 2022. <https://www.jpmorgan.com/insights/research/supply-chain-chip-shortage>.

¹⁰ Masayoshi, Amamiya. Rep. *The COVID-19 Crisis and Inflation Dynamics*. Bank of Japan, March 29, 2022.

factors led to the inflation in 2021 being the highest in years: 6.391% in the world, and, for the first time in recent years, higher in the USA, 7.364%¹¹.

Invasion of Ukraine and Perspectives for the Future

In February 2022, Russia invaded Ukraine following tensions between the two countries and Russia's annexation of Crimea in 2014. The war in Ukraine is still ongoing and it resulted in a humanitarian crisis, as well as worsening the world's economy which was still recovering from the Covid-19 pandemic.

The most important western countries adopted several sanctions against Russia. For example, the removal of Russian banks from SWIFT, the prohibition of new investments in Russia and transfers to the country, and the prohibition of trade with the country¹²¹³¹⁴. The most important Russian exports are oil and gas, making the price of fossil fuels and energy increased significantly. Traditional ink for printing is petroleum-based, thus the increase in oil price has a direct impact on the printer's industry. In addition, Russia and Ukraine have large market shares in commodity markets, so the war significantly increased prices.¹⁵¹⁶¹⁷

The points stated above were expressed in a very high increase in inflation. The IMF expects global inflation to be even higher in 2022, 9.06%, and still high in 2023, 5.068%. For the USA, these values are 6.388% and 2.346%, respectively. Financial markets have also been highly affected and have been very volatile since the beginning of this conflict¹⁶. When it comes to GDP, it has also been very affected. In the USA, in January, real GDP was expected to increase by 4% in 2022, now it is expected to increase only 1.641% and an even lower 0.995% in 2023. In terms of the global GDP, in addition to the Russia-Ukraine situation, it was also affected by China's lower-than-expected GDP, due to further lockdowns and a property sector crisis¹⁸. In January, the forecast was of an increase of 4.4%, while its value now sits at 3.192%, and 2.655% in 2023¹⁹²⁰.

To fight inflation and a further recession, the US Federal Reserve (Fed) raised its target range for interest rates²¹. This made the US Dollar appreciate significantly when compared to other currencies, that did not have their banks opt for such an

Graph 10: Global Energy Commodity Price Index 2013-2024 (2010 = 0)



Source: Statista; World Bank

The U.S dollar has appreciated highly compared to other currencies

¹¹ Rep. *World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis*. International Monetary Fund, October 11, 2022.

¹² European Council, EU response to Russia's invasion of Ukraine § (2022). <https://www.consilium.europa.eu/en/policies/eu-response-ukraine-invasion/>.

¹³ Russia Sanctions and Export Controls § (2022). <https://www.trade.gov/russia-sanctions-and-export-controls>.

¹⁴ Russia sanctions: guidance § (2022). <https://www.gov.uk/government/publications/russia-sanctions-guidance/russia-sanctions-guidance>.

¹⁵ Selfin, Yael, Dennis Tatarov, and Michal Stelmach. Rep. *Russia and Ukraine Conflict: Economic Implications*. KPMG, 2022.

<https://home.kpmg/xx/en/home/insights/2022/03/russia-and-ukraine-conflict-chief-economist-team.html>.

¹⁶ Caldara, Dario, Sarah Conlisk, Matteo Iacoviello, and Maddie Penn, The Effect of the War in Ukraine on Global Activity and Inflation § (2022).

<https://www.federalreserve.gov/econres/notes/feds-notes/the-effect-of-the-war-in-ukraine-on-global-activity-and-inflation-20220527.html>.

¹⁷ Rep. *Economic Consequences of the Russia- Ukraine Conflict: Stagflation Ahead*. Coface, 2022.

¹⁸ Rep. *World Economic Outlook Update, July 2022: Gloomy and More Uncertain*. International Monetary Fund, July 26, 2022.

¹⁹ Rep. *World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis*. International Monetary Fund, October 11, 2022.

²⁰ Rep. *World Economic Outlook Update, January 2022: Rising Caseloads, A Disrupted Recovery, and Higher Inflation*. International Monetary Fund, January 25, 2022.

²¹ Saphir, Ann, and Howard Schneider. "Fed Delivers Another Big Rate Hike; Powell Vows to 'Keep at It'." Reuters. Thomson Reuters, September 22, 2022. <https://www.reuters.com/markets/europe/fed-set-big-rate-hike-waters-get-choppy-worlds-central-banks-2022-09-21/>.

Fluctuations in exchange rates may negatively impact HP's foreign revenues

aggressive policy. Furthermore, the global recession also made investors go to the US Dollar which they believe to be safer in times of crisis. The most notable depreciation, when compared to the US Dollar, was the Euro, which also depreciated due to the uncertainty lived and the question of growth in the Euro Zone. The Euro not only reached parity with the US Dollar, but it went below it^{22,23}. It now sits at 1.07 USD. In their 2022 10-K report, HP has stated that, with most of its revenue coming outside the USA, fluctuations in foreign exchange rates like this have a negative impact on its revenues. Furthermore, it can also impact products with components obtained from foreign suppliers.

Additional Macroeconomic Risks

Failing to achieve its ESG commitments can significantly hurt HP's brand

In addition to the macroeconomic topics explored above, in their 2022 10-K report, HP identifies other that could negatively impact their business. Most the notable ones are related to international trade: the impact of Brexit in UK sales, restrictions in foreign trade (especially Russia, as mentioned, and China), impact of nationalist sentiment on foreign sales, and supply-chain related issues and cost increases. Other notable topics are climate change and ESG matters. Concerns regarding it can also shift consumers preferences and lead to new regulations impacting the business. Specifically in the Printing segment, we see HP lacking behind competitors in environmentally friendly products (further explored in the Market Overview section). Finally, the company has made commitments regarding ESG and admits that these are its current plans but has no guarantees that it can achieve them, which could hurt it in the future.

Industry Overview

Personal Systems Market Overview

The constitution of the Personal Systems²⁴ market is made up of three main segments, which encompass all its products, including peripherals, and services: Notebooks, Desktops and Tablets. Currently, HP has a strong presence in all three of these segments, representing roughly 20% of the total market. However, it is worth noting that HP's presence in the Tablet segment is embedded in the Notebook segment as their products are aimed to be "all-in-one" offerings.

²² De Vijlder, William. "The Euro at Parity versus the Dollar: Causes, Consequences and Outlook." BNP Paribas, July 15, 2022. <https://economic-research.bnpparibas.com/ecotvweek/en-US/euro-parity-versus-dollar-causes-consequences-outlook-7/15/2022,c38424>.

²³ "Explainer: Why the Euro's Fall below Parity versus Dollar Matters." Reuters. Thomson Reuters, July 13, 2022. <https://www.reuters.com/markets/europe/why-euros-fall-below-parity-versus-dollar-matters-2022-07-13/>.

²⁴ "Jocelyn, Vayola, and Lodovica Biagi. Rep. Personal Computers (PCs). Statista, 2022.

▪ Notebooks

The notebook segment is the largest segment in the Personal Systems market and includes portable systems for both personal and business use. In recent years, the segment has seen steady growth in global shipments, going from 146 million units in 2014 to 164 million in 2019, a 2.35% CAGR. However, in 2020, the segment saw the biggest growth in its history, with an increase in shipments of 9.6% due to the covid-19 pandemic and the need for portable devices to enable remote work. In the future, the penetration of notebooks into households and businesses is expected to continue, albeit at a slower rate than in 2020.

Graph 11 : Notebook Market Growth

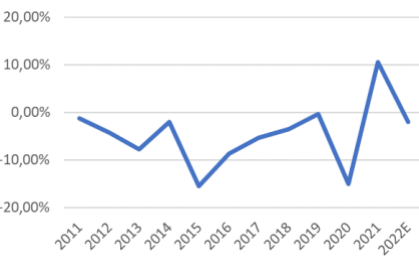


Source: Statista

▪ Desktops

The desktop segment, which includes traditional non-portable workstations, has seen a 5.5% CAGR decline in global shipments from 2010 to 2019, indicating a shift in market preferences. In 2020, the COVID-19 pandemic led to a decrease in market penetration for desktops as more people transitioned to remote work and needed portable solutions. As a result, the desktop segment saw a large YoY decline of about 15% from 2019 to 2020. Currently, global shipments have slightly bounced back from the pandemic drop due to the return to workplace in 2021. However, we estimate this to be a temporary effect, and expect the market to steadily decline the coming years.

Graph 12 : Desktop Market Growth

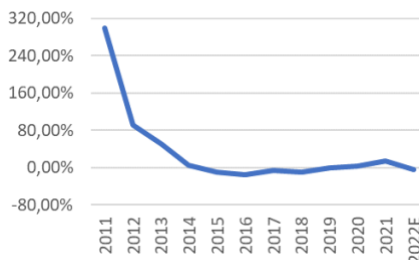


Source: Statista

▪ Tablets

Tablets are the second-largest segment in the Personal Systems market. They once experienced significant growth, with a 126% CAGR from 2010 to 2013. However, since then, the market has seen a decline in both revenues and shipments, by about 6.8% CAGR until 2019. This decline can be attributed to consumers' preference for hybrid tablets, which offer both the portability of a tablet and the functionality of a laptop. Despite seeing a resurgence in 2020 due to increased demand for portable devices during the covid-19 pandemic, of about 4% in 2020 and 14% in 2021, the market is expected to continue declining in the future as consumers continue to opt for more efficient devices.

Graph 13 : Tablet Market Growth



Source: Statista

Personal Systems Trends & Challenges

▪ Remote Working and E-Learning

The PC market saw a significant increase in growth in 2020 due to the need for remote working and e-learning. Businesses found that productivity was the same while allowing for cost savings. HP's CEO mentioned that they experienced a lot of demand from the commercial PC segment due to increased spending for hybrid

Companies continue to invest heavily in remote work, even after a generalized return to the physical workplace

work solutions. In the future, portable and efficient devices will be the norm as people want to be able to work and learn from anywhere. This presents a great opportunity for HP to focus on innovation in the hybrid work solutions sector. HP has already begun this with the acquisition of Poly (\$ 3.3 billion) and the launch of the Dragonfly Folio product.

- Cellular-Enabled Notebooks and 5G

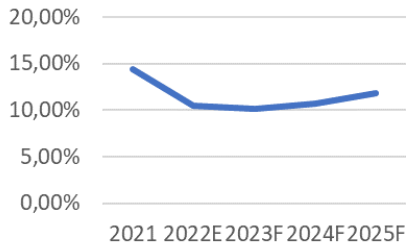
The main threat to the PC market are smartphones²⁵, as they offer essentially the same services but in a more efficient, smaller, and convenient size. In addition, they tend to be cheaper than traditional notebooks, and with the rise of 5G, they allow users to have high speed fast reliable internet connection anywhere without the need for a Wi-Fi connection. The uprising of cellular-enabled notebooks allowing users to be connected anywhere is a strong opportunity for HP to explore, with possibilities of even partnering with major players in the telecommunications industry to better enhance their capabilities. Global shipments for these products have drastically been increasing, with a growth of about 35.5% CAGR from 2018 to 2020 and predicted growth of around 7.2% CAGR until 2025. In addition, the number of expected mobile subscriptions for mobile devices are expected to reach 541 million by 2027, posting 10.32% CAGR from 2022.

Graph 14: Growth in Mobile Subscriptions for Mobile Devices, Forecast



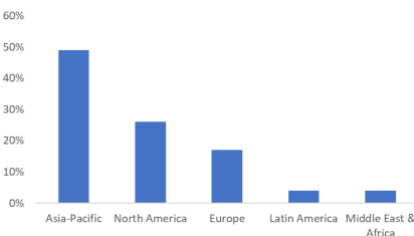
Source: Statista

Graph 15: Video Game Market, Forecast



Source: Statista

Graph 16: Video Game Market by Region



Source: Statista

- Gaming²⁶

In HP's Q2 2022 Earnings Call, HP's CEO mentioned that one of HP's key areas for the next few years would be gaming as they strongly believe this segment still has lots of growth to be captured, in addition to, mentioning during the Q3 Earnings Call, that gaming will continue to grow in popularity. For example, Statista expects the global gaming market to grow at 10.90% CAGR until 2025, when compared to its 2022 expected value, reaching an all-time high of \$268.81 billion in value. In terms of regions, it is expected that the Asia-Pacific region will be contributing to around 47% of this value, with North America and Europe following behind with weights of 27% and 18%, respectively. The reasoning behind a continuous investment in this trend is further backed by the growth of eSports, as this market is expected to have a CAGR of 21% from 2021 to 2029, reaching a total value of about \$5.48 billion in size²⁷.

- ARM-based Chips^{28,29}

²⁵ Rep. Global PCs. New York, State of New York: MarketLine, 2021.

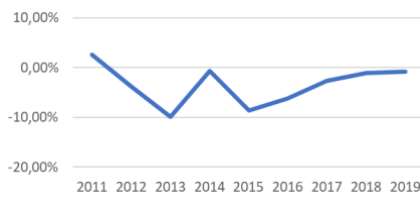
²⁶ Jocelyn, Vayola, and Lodovica Biagi. Rep. Video Gaming in the United States. Statista, 2022.

²⁷ Jocelyn, Vayola, and Lodovica Biagi. Rep. ESports Worldwide. Statista, 2022.

²⁸ Alam, Syed, and Timothy Chu. "Top 5 Trends to Impact the Semi Industry in 2022." Web log, December 9, 2021. <https://www.accenture.com/us-en/blogs/high-tech/top-5-trends-to-impact-the-semi-industry-in-2022>.

²⁹ Mattwojo. "Windows on Arm Documentation." documentation | Microsoft Learn. Microsoft, November 11, 2022. <https://learn.microsoft.com/en-us/windows/arm/overview>.

Graph 17: x86-only PC shipments, Historical



Source: Gartner & IDC

The microprocessor industry has traditionally been dominated by x86 architecture, but recently, ARM architecture has been gaining popularity. ARM chips are known for their power-efficient design, making them suitable for mobile processors. Major players in the market, such as Apple and Windows, are now adopting ARM technology. According to Khaveen Investments, in 2020, the ARM architecture was estimated to have a 2% market share. However, according to Gartner & IDC data, x86-only PC shipments have been showing a downward trend since 2011 at around -4.29% CAGR. The shift towards portable and efficient PCs is causing the adoption of ARM chips to be essential for maintaining a competitive advantage, especially in consumer segments. HP has already adopted ARM processors in its HP Elite Folio notebook, and Lenovo has implemented the architecture in its newest line of laptops.

▪ Shift in Consumer Preferences

The PC market experienced growth during the pandemic, driven by notebook sales, but shipments in this segment are expected to slow down by about 80% in the coming years due to rising inflation rates, economic slowdown, and supply chain constraints. As of Q3 2022, the global PC market has reported a 15% YoY decline in total shipments, with HP experiencing the biggest decline at 28%. The biggest concern is the consumer sector for notebooks, as component shortages and cost increases have caused average selling prices to rise, slowing consumer demand. HP reported a 6% decrease in consumer revenues during its Q2 2022 earnings call, partially offset by higher selling prices on the commercial side. However, these prices are expected to decrease in the future due to intense competition, potentially leading to a significant hit to HP's revenue as seen in FY2022 with a 4.4% decrease in notebook revenue. On the other hand, HP faces the problem of having a potential declining subsegment of products, Desktops. Currently, the segment still experiences growth as ASPs are on the rise and some businesses still require them. However, as preferences change and the uprising of digitalization happens, this will not be the case in the upcoming years.

Personal Systems Competitive Landscape³⁰

The Personal Systems market can be considered an oligopolistic market as, globally, it is led by major players each accounting for a significant market share. The degree of rivalry in this market is strong as we see intense price competition on the consumer side, as mentioned in HP's Q3 earnings call, due to smaller players trying to enter the market and compete with larger brands, as well as

Consumers prioritize portability, efficiency, and value for money in personal systems. Traditional options struggle to meet these needs

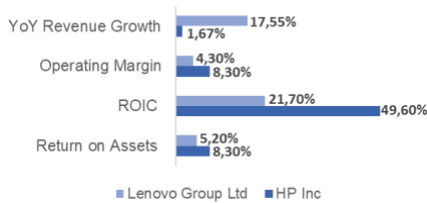
³⁰Gartner Newsroom. Gartner, January 12, 2022. <https://www.gartner.com/en/newsroom/press-releases/2022-01-12-gartner-says-worldwide-pc-shipments-declined-5-percent-in-fourth-quarter-of-2021-but-grew-nearly-10-percent-for-the-year>.

consumers becoming increasingly more price sensitivity as more technology advancements happen at a rapid pace and product offering increases. In addition, the market poses high barriers to entry due to brand recognition being important as major players have strong track records and enjoy high levels of customer loyalty, as well as the nature of the industry requiring high fixed cost structures. HP identifies the following, in their 10-K, as their main competitors: Lenovo Group, Dell, Huawei Technologies, Acer, ASUSTek Computer, Apple, Toshiba, Microsoft, and Samsung Electronics. Out of these, we will further analyse the most relevant ones.

▪ **Lenovo**

Lenovo was founded in Beijing in 1984 and is the leading Personal Systems provider, globally, having a market share of about 24.7%, as of 2021 and posting a revenue of about \$62.310 million in 2022, reporting an 18% growth for the Intelligence Devices Group segment, which has contributed to around 87% of total revenue and is the segment that directly competes with HP through personal systems and other smart devices offering. When compared with HP, Lenovo presents an overall lower profitability, which is reflected on its below peer median operational margin and on a ROIC value 56% lower than HP's.

Graph 18 : HP vs Lenovo Profitability Comparison

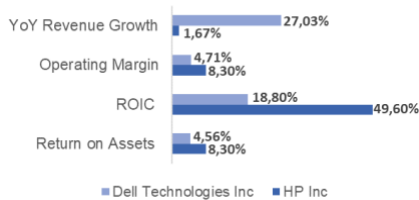


Source: Refinitiv and Analysts' Estimates

▪ **Dell**

Dell is headquartered in Texas, having been founded in 1984 by Michael Dell. As of 2021, Dell reported a market share of about 17.6%, consolidating its position as one the biggest players in the industry. In addition, they posted a revenue of \$61.464 million, reporting growth of about 27% for the Client Solutions Group segment, which includes sales to commercial and consumers of IT hardware and peripherals, is the biggest contributor to the increase in revenues, about 61%, and is the segment that directly competes with HP's personal systems segment. In addition, Dell presents an operational profitability of about 43% lower than HP, as well as lower overall profitability than the peer group median.

Graph 19: HP vs Dell Profitability Comparison

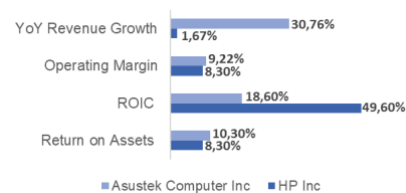


Source: Refinitiv and Analysts' Estimates

▪ **Asus**

Asus was founded in 1989 in Taiwan. As of 2021, Asus had a market share of 6.4% posting revenue of 498,341 TWD million, which equals around \$17,848.47 million, representing around 31% in growth for the PC segment that directly competes with HP, constituting about 93% of sales. When compared to HP, Asus presents a slightly higher operational profitability, around 11%, while its ROIC falls short against HP's in about 62%. Its profitability is on the upper hand of the peer group.

Graph 20: HP vs Asus Profitability Comparison

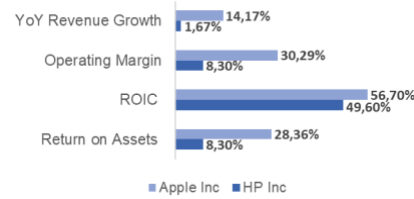


Source: Refinitiv and Analysts' Estimates

▪ Apple

Apple is a technology company founded in 1976 in California. In 2021, it had a 7.6% share of the Personal Systems market. Apple generates revenue from the sale of a variety of consumer technology products, and in 2022, its revenue from Mac sales was \$40.177 million, an 14% increase from the previous year, accounting for 10% of revenue. In terms of operational profitability, Apple has a higher profitability than HP, with its iPhone sales being a major contributing factor and a higher ROIC than HP by 14%. When compared to its peer group, Apple's profitability is far above median values.

Graph 21: HP vs Apple Profitability Comparison

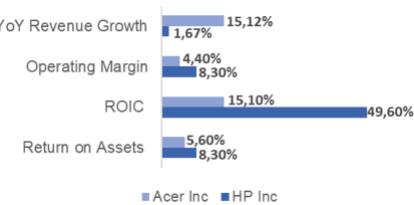


Source: Refinitiv and Analysts' Estimates

▪ Acer

Acer is a Taiwanese technology company founded in 1976 and headquartered in New Taipei. In 2021, it had a market share of around 7.2% in the personal systems market. Acer offers a range of IT hardware products, as well as home appliances and software. In 2021, Acer reported a revenue for its Information Technology segment, direct HP competitor, of 283,316.92 TWD million, or around \$10,147.21 million, a 14% increase from the previous year. When compared to HP, Acer's operational profitability falls short by around 47% and its ROIC by 70%. When compared to its peers, Acer's profitability is also lower than the median values.

Graph 22: HP vs Acer Profitability Comparison



Source: Refinitiv and Analysts' Estimates

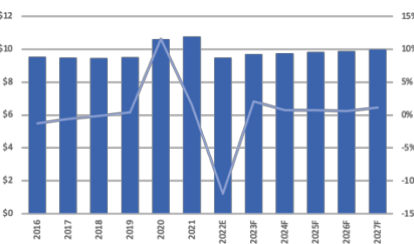
Printers Market Overview

HP's Printing segment operates in the Printer and Copier/Hardcopy Peripherals market. The market consists of printers, copiers, and multifunctional systems. It is important to note that it does not encapsulate revenues from HP's Supplies business unit. Furthermore, the market refers to traditional printers and copiers, while HP's Commercial segment also offers 3D printers and new technologies.

According to Statista³¹, the market has shown a decreasing trend in recent years but increased significantly in 2020, from \$9.51 bn to 10.61 bn, a growth of 11.6%, and, in 2021, to \$10.78 bn, an increase of 1.6%. These values translate to a market volume of 108.2 and 110.4 million units, respectively. In contrast, IDC estimates³¹ that the volume for 2020 was only of 94.36 million units, increasing a merely 0.01% from 2019.

Regarding geographic distribution (data from Statista), China is the country with the most revenue in this market, with a value of approximately \$2.5 bn, In 2021, approximately 66.9% more than the second highest. It is followed by the USA, with approximately \$1.5 bn, and then Germany, Brazil, and India. This has been the

Graph 23: Printer and Copier Revenue Worldwide from 2014 to 2027 (in billion U.S. dollars)



Source: Statista

³¹ Rep. *Printers (Hardcopy Peripherals)*. Statista, 2021.

order of countries by printer revenue for the last couple of years and is estimated to remain the same, at least until 2027.

Printers Trends & Challenges

▪ General Trends & Emerging Markets

There are two trends affecting many industries, including this one: environmental concerns and subscription business models. Aiming to be more environmentally friendly, companies have adapted some of their products or created new ones. The most notable are eco-friendly printers with refillable ink tanks (eliminating cartridge waste), vegetable-based inks (instead of petroleum-based), recycling-friendly cartridges, and refillable cartridges. Epson stands out among the major players in the industry as the leader and pioneer of eco-friendly products. Companies like HP, on the other hand, discourage the use of refillable cartridges instead of original HP cartridges. HP's choice to have its products not officially support other cartridges, although increases supplies revenue, may give it a reputation of lack of care towards the environment and, nevertheless, lower price imitation supplies compete with the company. Then, in today's subscription-based economy, something that is used and replaced regularly like ink for printers becomes a candidate for this kind of model. HP's Instant Ink and Epson's ReadyPrint are just examples, with other players also offering their own subscription services. HP stated that Instant Ink has seen double-digit increase every quarter of 2022³³.

In emerging markets, tank printers, which have the lowest total cost, tend to dominate due to the difference in consumer buying habits. Although they have a more expensive starting point, the cost per print on tank printers is significantly lower. Data from Q3 2018 – Q2 2019 shows tank printers made up 30-80% of printer sales in emerging economies³². Printer companies, like HP, are aware of the fact and have focused on tank printers for these economies to be more competitive, gaining market share thanks to it in 2022³³.

▪ Digitalised World and Covid-19 Impact

The printers' market has been facing the increasing challenge of a digital world. For some time now, the world has become more digital as each year passes, reducing the need for hardcopies. For example, physical books are being replaced with their digital counterpart for many people, with the e-book market growing

Subscription models for printing supplies are showing high growth

Tank printers have a high share of emerging economies printers' market

³² M, K. "The Rise of Ink Tank Printers in Emerging Economies - the Rise of Ink Tank Printers in Emerging Economies." contextworld, September 2, 2019. <https://www.contextworld.com/blog/-/blogs/the-rise-of-ink-tank-printers-in-emerging-economies>.

³³ HP's Q1, Q2, Q3, Q4 Earnings Call

almost 25% from 2017 to 2022³⁴. Furthermore, PCs and tablets or PCs with touch screens made it possible and easy for people to annotate on documents. The Covid-19 pandemic accelerated the digitalization process as organizations started to share documents completely digitally through the cloud, as explained in the Macroeconomic Context section.

A more digital world should hurt the printers' market, but, in an interview with Silicon Republic³⁵, Gary Tierney (at the time, HP's Printing Category Director for the UK and Ireland) argues that it has helped the industry. Cloud-based ecosystems allow people to print from anywhere at any time, harnessing the power of the Internet of Things. In addition, the pandemic also increased security issues affecting the industry: "Cybercriminals are targeting print infrastructure, and as a result endpoint security has become more important than ever before". These points may help the market, with people and organizations upgrading to more capable printers/systems, but only in the short-term.

▪ Advancements in Printing Technologies

There are many advancements in printing technology which ensure that overall printing is far from dying. One example is digital printing, which is the technique of printing digital-based images onto diverse surfaces (e.g., printing images onto t-shirts)³⁶. It has existed for a long time and many hardcopy printers' producers also offer digital printing systems, but companies have been investing in it in recent years, making it less costly and improving its speed and quality, in addition to being more environmentally friendly³⁷. Another printing technology that has a bright future ahead is conductive ink. Conductive ink, which has also existed for some time (e.g., modern public transport tickets), is ink that is able to conduct electricity. It is now being investigated ways of making it cheaper, more eco-friendly, and even recyclable, with the use of different materials^{38,39}. Although it is a more technical printing method, hardcopy printers' producers can harness their printing know-how to adapt and enter this evolving market in the future. These are more niche markets but that can have some positive impact still in the revenues of printer companies. HP already offers printers with these technologies, with its Indigo line, and their

Digitalization may lead to increased printer revenues in the short-term

Digital printing and conductive ink technologies are becoming more eco-friendly and less costly

³⁴ Statista. "E-book market revenue worldwide 2017-2026 (in million U.S. dollars)." Chart. March 4, 2022. Statista. Accessed December 12, 2022. <https://www.statista.com/forecasts/1294207/ebook-market-revenue-worldwide>

³⁵ Darmody, Jenny. "The Future of Printing: Are We Facing a Paperless World?" Silicon Republic, September 23, 2021. <https://www.siliconrepublic.com/enterprise/printing-paperless-security-hp>.

³⁶ "What Is Digital Printing?" Xerox. Accessed November 2, 2022. <https://www.xerox.com/en-us/digital-printing/insights/what-is-digital-printing>.

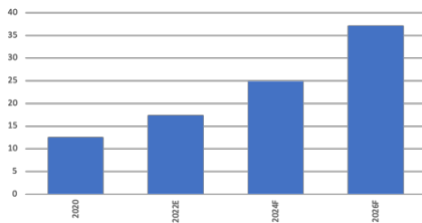
³⁷ Peng, Bo. "Digital Printing Technology and Its Application in Packaging Printing." *The International Journal of Electrical Engineering & Education*, March 25, 2021. <https://doi.org/10.1177/0020720921996609>.

³⁸ Camargo, Jéssica Rocha, Tiago Almeida Silva, Gustavo A. Rivas, and Bruno C. Janegitz. "Novel Eco-Friendly Water-Based Conductive Ink for the Preparation of Disposable Screen-Printed Electrodes for Sensing and Biosensing Applications." *Electrochimica Acta* 409 (March 20, 2022). <https://doi.org/10.1016/j.electacta.2022.139968>.

³⁹ Xu, Jianyu, Hongda Guo, Hongyao Ding, Qiao Wang, Ziqing Tang, Zongjin Li, and Guoxing Sun. "Printable and Recyclable Conductive Ink Based on a Liquid Metal with Excellent Surface Wettability for Flexible Electronics." *ACS Applied Materials & Interfaces* 13, no. 6 (February 2, 2021): 7443–52. <https://doi.org/10.1021/acsmami.0c20549>.

success will depend very much on HP’s investment, to keep up with the market’s advancements in technology.

Graph 24: Global 3D Printing Products and Services Market Size from 2020 to 2026 (in billion U.S. dollars)

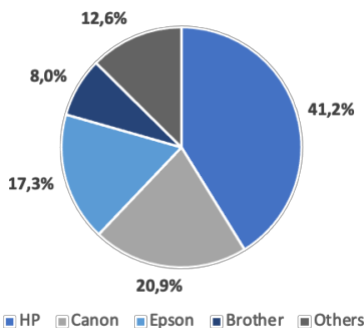


Source: Statista

Out of new technologies and trends in the printing industry, the most notable one is undeniably 3D printing. Despite having been first theorised in the 1970s and put to action in the 1980s, only recently has 3D printing started to show its true potential⁴⁰. Its applications are numerous from the manufacturing of detailed and complex parts to large-scale production, healthcare, to even personal use⁴¹. According to Statista⁴², the market value of 3D Printing Products and Services was \$12.6 bn, in 2020, and 2022 is expected to end in \$17.4 bn, a two-year growth of approximately 38%. Companies are aware of this, as more than 50% of Statista’s correspondents state that their expenditure on 3D printing in 2020 was at least \$10,000 and 23% spent more than \$100,000. Hardcopy printers’ producers are moving towards 3D printing, with the biggest names in the industry already offering 3D printers. HP already has multiple 3D printers and invests much in it, being the largest 3D printing patent owner in 2021 and releasing a metal 3D printer recently.

Printers Competitive Landscape

Graph 25: Market Share (units) Held by Hardcopy Peripherals Vendors Worldwide in 2020



Source: Statista; IDC

The hardcopy peripherals market is very consolidated. According to data from IDC⁴², in 2020, practically 90% of units sold came from only 5 players in the market. HP shipped 41.2% of total units, Canon 20.9%, Epson 17.3%, Brother 8%, and Kyocera Group 2%, with the remaining 10.6% coming from all the remaining players in the market. The consolidation increased slightly since 2018, in which 88.6% of units sold were from these 5 players, while in 2020, 89.4%. Moreover, HP has been slowly strengthening its position as the market leader since 2016, when it had 36.7% of market share.

The threat of new entrants is not high for two reasons. First, in the long-term, the market will decrease very much as the world continues its digitalization trend and with high costs of entry (as in any technology industry), profits would be uncertain, so there is no incentive for new players to join the market. The second reason is brand loyalty. The major players have dominated the market for many years and consumers trust them for printers and copiers, making it harder for smaller players to be able to sell their products. Regarding competition between the major players, there is high competition on price and introduction of new products to differentiate the little possible from competitors, as HP also mention in their annual report.

⁴⁰ Savini, A., and G.G. Savini. "A Short History of 3D Printing, a Technological Revolution Just Started." *2015 ICOHTEC/IEEE International History of High-Techonologies and their Socio-Cultural Contexts Conference (HISTELCON)*, 2015, 1–8. <https://doi.org/10.1109/histelcon.2015.7307314>.

⁴¹ Su, Amanda, and Subhi J. Al'Aref. "History of 3D Printing." *3D Printing Applications in Cardiovascular Medicine*, 2018, 1–10. <https://doi.org/10.1016/b978-0-12-803917-5.00001-8>.

⁴² Rep. *Printers (Hardcopy Peripherals)*. Statista, 2021.

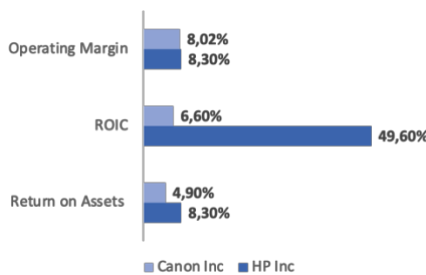
For markets of promising printing technologies, especially 3D printing, the threat of new entrants is higher. The market is very recent, and it is expected to grow significantly, making it extremely attractive for new players. There are very high barriers to entry, which come mostly from the high investment needed to manufacture and research 3D printing technology. With the cost and price of 3D printers still being high, the competition between existing players is done mostly in product differentiation, may it be in features (including what materials are used to print the object) or in print quality.

Regarding HP’s competitors for the Printing segment, the company identifies (in their 10K report) as their main competitors: Canon, Lexmark International, Xerox, Seiko Epson, The Ricoh Company, and Brother Industries. Out of these, we will further analyse the most notable ones.

▪ Canon

Canon Inc. is a Japanese firm founded in 1933, as Precision Optical Instruments Laboratory. It is most known for its photography products, although it also produces other products like printers, and calculators, for example. The firm’s revenue in 2021 (last reported year) was ¥3,513,357 million, around \$25,971 million, increase of approximately 11%. Canon offers different printers, like traditional printers and multifunction systems, commercial printers, and photography-specific printers. Its printing segment accounts for 55% of revenues and grew 7.45%. Canon has similar profitability to HP, but its ROIC is around 87% below. In 2010, the company purchased Océ, a firm focused on printing products, which is now a subsidiary of Canon under the name Canon Production Printing.

Graph 26: HP vs Canon Profitability Comparison

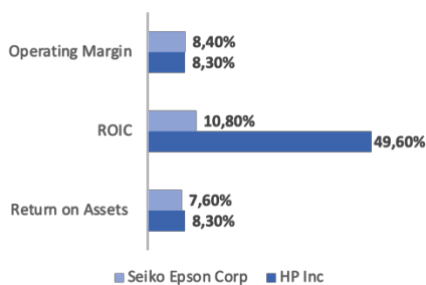


Source: Refinitiv & Analysts' Estimate

▪ Epson

Seiko Epson Corporation is a Japanese firm founded in 1942, at the time by the name Daiwa Kogyo, Ltd. It is most known for its printers; however, it also offers other products like projectors, smart glasses, robots, and solution services. In 2022, Epson had revenues of ¥1,128,914 million, approximately \$8345 million and a growth of 13.4%. Its printer catalogue is vast, offering both home and office printers, and include its line of EcoTank, a selection of environmentally friendly printers. The firm’s printing segment accounted for 69% of the revenues and grew 10.2%. When compared to HP, Canon has a very similar profitability and a ROIC approximately 78% lower, but in line with the peer median. Epson is, currently, one of the most innovative companies in the hardcopy printers’ market, leading the race for eco-friendly printers.

Graph 27: HP vs Epson Profitability Comparison

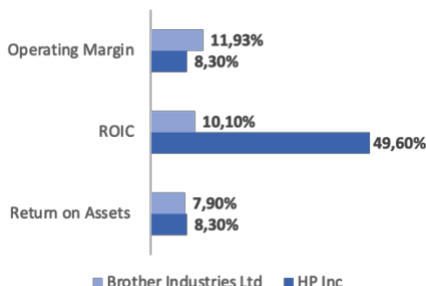


Source: Refinitiv & Analysts' Estimate

▪ Brother Industries

Brother Industries, Ltd. is a Japanese firm founded in 1908, as Yasui Sewing Machine Co. It offers a range of products, including printers, sewing machines, cutting machines, and IT solutions. Brother’s revenues were ¥710,938 million (approximately \$5255 million), in 2022, growing 12.5%. Its printer line-up includes printers for home and office, and of different printing technologies and functionalities for both. The revenues from their Printing & Solutions segment were around 60% of total revenues and grew 10.26%. Comparing to HP, Brother has a higher profitability by 3.6 percentage points and an inferior ROIC by approximately 80%, also in line with the peer median.

Graph 28: HP vs Brother Industries Profitability Comparison



Source: Refinitiv & Analysts' Estimate

Valuation

DCF Approach

We followed the Discounted Cash Flow (DCF) methodology to value HP inc., as it allowed us to better detail our assumptions and capture more accurately what we expect HP’s value to its shareholder is. To value the company, we first forecasted 23 years (2023-2045), in which a comprehensive analysis was made to derive its cash flows, which were then discounted at weighted average of cost 8.26%. Then, we added the terminal value to better capture HP’s long-term effects on its value.

The terminal value was calculated assuming a 2.23% perpetual growth, in line with HP’s main segments peers historical weighted growth at around 2.90%⁴³, as well as the RONIC of 12.66%, in line with the weighted ROIC of 12.86%. Even though, historically HP’s ROIC, on average, has been far above its peers we expect in the long-term that it will regress to similar levels on average, with small fluctuations caused by the industry’s volatile nature.

Our analysis led us to a weighted share price for FY23, considering the probabilities of each scenario happening, of \$29.09, with a total return of about 6.50%, therefore yielding a HOLD recommendation.

Table 1: Base Case DCF Results

Base Case Scenario	Value (in millions, \$)
PV of Unlevered FCFs	\$24 316,06
PV of Terminal Value	\$9 035,87
Value of Operations	\$33 351,92
(+) Non-Core Invested Capital	\$4 992,55
Enterprise Value	\$38 344,47
(-) Value of Net Debt	-\$9 434,95
Equity Value	\$28 909,52
#Shares Outstanding	\$982,15
Implied Share Price	\$29,44

Source: Analysts' Estimate

Table 2: Valuation Summary

Weighted Share Price	2023
Implied Weighted Share Price	\$29,09
Current Share Price (14/12/2022)	\$28,36
Total Return	6,50%
Capital Gains	3%
Dividend Yield	2,43%
Share Buyback	1,51%
Recommendation	HOLD

Source: Analysts' Estimate

WACC Calculation

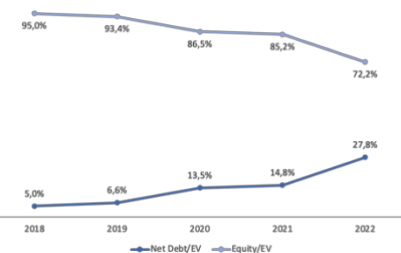
The Weighted Average Cost of Capital was used as the discount rate for our DCF valuation. With a D/E ratio of 0.32, an after-tax cost of debt of 3.51% and a cost of equity of 9.79%, we reached a WACC of 8.26%.

⁴³ (PS Peers Historical Revenue Growth* Terminal PS revenue weight) + (Printing Peers Historical Revenue Growth* Terminal Printing Revenue Weight)

Capital Structure

In order to calculate the WACC we assumed a constant capital structure for the firm's future. Looking at HP's debt levels, it is considerably higher than its identified competitors, apart from Microsoft and Apple, companies with a much greater size, but also Dell, which has a similar market cap. Out of its competitors, HP's current D/E ratio is only lower than Dell's, Xerox's, and Ricoh Company's. Furthermore, around half of them have negative a D/E ratio, something normal in technology markets since they may be volatile and require more cash for investment in R&D and CAPEX. Despite this, in the last five years, HP maintained a higher D/E ratio, but that has been higher in the last three years. The debt issued throughout the years is mostly for general corporate purposes, like the extinguishment of previous debt, funding of possible acquisition opportunities, working capital and CAPEX. In 2022, a significant amount of debt was issued for the acquisition of Plantronics, so we adjusted the debt of this year to remove this one-off debt increase. We believe that, for the future, HP will maintain similar debt levels as in the last three years, adjusted to the acquisition related debt, so considered for the future capital structure the average of these three years, a D/E ratio of approximately 0.32.

Graph 29: HP's Capital Structure Evolution (2018-2022)



Source: HP's Annual Report

Table 3: Synthetic Rating Approach

Synthetic Rating	Value
HP credit rating by Moody's/ S&P	Baa2/BBB
Risk free rate (10Y US Govt Yield)	3,48%
Interest Coverage Ratio (2022)	13,03
Synthetic Rating (Moody's/S&P)	Aaa/AAA
Default Spread (Synthetic Rating)	1%
Default Spread (Actual Rating)	2%
Default Spread (Average)	1%
Cost of Debt	4,61%
After Tax Cost of Debt	3,32%
Country	United States
Market Risk Premium (Bloomberg)	5,39%
Beta of Debt (CAPM Approach)	0,21

Source: Analysts' Estimates

Table 4: Alternative Approach

Alternative	Value
HP's Highest Maturity Bond YTM (2041)	6,11%
Risk free rate (10Y US Govt Yield)	3,48%
HP Moody's rating	Baa
5-Year Cumulative Probability of Default	2,24%
5-Year Recovery Rate	44,09%
Cost of Debt	5,12%
After Tax Cost of Debt	3,69%
Country	United States
Market Risk Premium (Bloomberg)	5,39%
Beta of Debt (CAPM Approach)	0,30

Source: Analysts' Estimates

Cost of Debt

The cost of debt for HP was estimated using two approaches and taking the average of the two estimates to mitigate outlier risk. The first approach, known as the Synthetic Rating Approach, involved obtaining a synthetic credit rating for HP based on its interest cover ratio, which resulted in a rating of Aaa and AAA from Moody's and S&P, respectively. The default spread rate was calculated by taking the average of the synthetic rating and the actual rating given by Moody's and S&P, reaching a value of 1%. The after-tax cost of debt was calculated by adding the risk-free rate⁴⁴ and the default spread, considering HP's effective tax rate, resulting in a value of 3.32%. The beta of debt was calculated using the CAPM, assuming a market risk premium of 5.392%, resulting in a value of 0.21.

The second approach involved taking the yield-to-maturity of HP's highest maturity bond⁴⁵ from Bloomberg and using the 5-year cumulative probability of default and 5-year recovery rate from Moody's to calculate the 3.69% after-tax cost of debt⁴⁶. The final after-tax cost of debt was calculated as an average of the two approaches, resulting in a value of 3.51% and a beta of debt of 0.26.

⁴⁴ U.S Government 10Y Treasury Bond rate – 14/12/2022 from Bloomberg

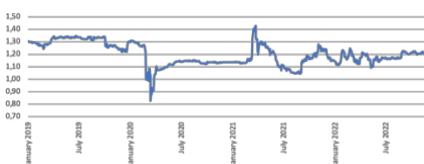
⁴⁵ Maturity Date: 15-Sep-2041

⁴⁶ Rd = YTM – (Probability of Default * Recovery Rate)

▪ Cost of Equity

For To better understand how HP moves with the market we performed a regression on HP’s daily stock returns against the S&P 500’s ones, starting January 2018. The regression gave us an equity beta of approximately 1.192, with a confidence interval of [1.119,1.265], meaning that, currently, HP is around 19.2% more volatile than the market, when something impacts it. When analysing the 1-year rolling beta, it oscillated very much during the Covid-19 pandemic, as it did with many companies due to uncertainty, but, apart from that, it has been quite constant, especially in 2022. Given this after-pandemic stability, we believe our confidence interval to be accurate. Although this is the case, the rolling beta of recent months has been higher than our base beta, with its current value being 1.22. Thus, a beta of 1.2 should be more accurate for HP. The regression’s beta translates to an unlevered beta of approximately 0.949, with a confidence interval of [0.891,1.008]. Using the beta adjusted for the recent values of the rolling beta, we get an unlevered beta of 0.956.

Graph 30 : HP's 1-Year Rolling Beta



Source: Yahoo Finance & Analysts' Estimate

Table 5: HP's Weighted Average Unlevered Beta Calculation

	Unlevered Beta	Weight
HP Inc	0,95	55%
Lenovo	0,69	5%
Dell	0,66	15%
Toshiba	0,61	5%
Canon	0,70	10%
Epson	1,08	10%
Weighted Average Unlevered Beta	0,863	100%

Source: Analysts' Estimate

Although the confidence interval is not wide, to further complete our analysis, we analysed the beta from HP’s comparable companies⁴⁷. From its identified competitors, we chose Lenovo, Dell, Toshiba, Canon, and Epson, based on products offered and market cap. Lenovo, Dell, Toshiba, and Canon all have unlevered betas between 0.6 and 0.7. Epson has a much higher unlevered beta of 1.08. This is the only company which mainly sells printers which may the reason for a higher unlevered beta. So, analysing the business focus of these comparable companies, we believe HP’s printing segment is the likely reason for the firm’s unlevered beta to be higher than its competitors. Corroborating our suspicions, Pinnacle Business Solutions states that the printing industry has a high average beta of 1.75⁴⁸. Important to note that the printing and printers (hardcopy peripherals) industries are not the same but are undeniably related. Ultimately, we attributed to each company (including HP) a weight, based on their relevancy, to compute a weighted average. This resulted in a weighted average unlevered beta of, approximately, 0.863.

Table 6: HP's Unlevered Beta Summary Table

	Lower 95%	Value	Upper 95%
Unlevered Regression Beta	0,891	0,949	1,008
Adjusted to Rolling Beta	-	0,956	-
Comparable Companies Weighted Average Unlevered Beta	-	0,863	-
	-	0,95	-

Source: Analysts' Estimate

Since the weighted average unlevered beta is outside the confidence interval from the regression, and the current rolling beta is higher than the base beta, we decided to slightly increase the beta, and determined an unlevered beta of 0.95. Relevering the beta with the assumed capital structure for the future, we got an equity beta of, approximately, 1.17. This means that we predict HP’s stock returns

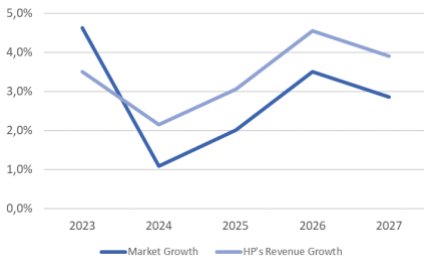
⁴⁷ A regression like HP’s one was used to calculate each beta

⁴⁸ Beckert, Paul J. "Top 5 Financial Challenges in the Printing Industry." Pinnacle Business Solutions, June 27, 2019. <https://pinnacle-business.com/top-5-financial-challenges-in-the-printing-industry/>.

will be more volatile than the market, oscillating 17% more than it. Such beta implies a cost of equity of, approximately, 9.79%⁴⁹.

Base Case

Graph 31: HP's Notebook Revenue Growth vs Market, Forecast



Source: Analysts' Estimate

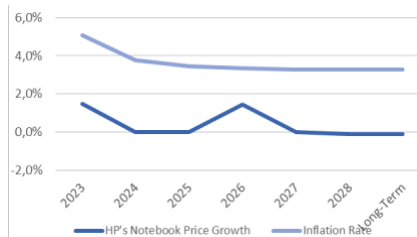
Firstly, to forecast the Personal Systems segment, we analysed in its four subsegments: Notebooks, Desktops, Workstations and Other, deriving a more detailed estimation for HP's main contributing subsegments, as these will drive over 90% of its long-term performance. From our estimations, we gathered that the Notebook market will grow at 2.81% CAGR until 2027, which we believe to be mainly driven by unit growth given that supply chain constraints are expected to ease, in addition, the price is estimated to slightly rise due to component costs but not significant due to expectations of strong price competition in the years to come, and as result, HP's own prices are expected to converge to the market's, around \$700. From 2023-2025, we estimate that HP's investments in gaming notebooks and peripherals will slow down the softening of consumer demand and that their workforce solutions will help to drive commercial unit growth, yielding a 2.60% CAGR for this period, while maintaining its current market share of 24%. From 2025-2027, as we believe that remote working becomes more widespread the notebook market will continue to grow, mainly driven by commercial and peripherals demand. We estimate that ARM processors will increase their adoption rate during this time due to the extra efficiency they provide, and as such will force HP to strongly invest in its development and implementation within its cellular-enabled notebooks, reflected in the 0.2% increase in R&D weight total revenues in 2025, which is an investment of around \$130 million. This will cause a surge in consumer market growth, and consequently HP's, which will yield to higher revenue growth, yielding for this period a CAGR of 4.23% and an increase of 1% in market share, caused by early adoption of this technology by HP, however competitors are expected to soon follow. From 2027 onwards, we expect the market to enter a steady state, with notebooks stabilizing at around 80% penetration rate in households and businesses, and as such HP's growth is estimated to converge with the markets at a 1.8% CAGR and its market share to stabilise. During this period, unit growth is expected to growth at a 1.9% CAGR, mainly driven by peripherals and recurring costumers upgrading their laptops, meaning that HP's level of investment in new products will remain the same. The price is expected to steadily decrease at around -0.1% CAGR, due to the expected technology advancements and competition that will drive prices slightly down, but

Graph 32: HP's Notebook Unit Growth vs GDP, Forecast



Source: Analysts' Estimate

Graph 33: HP's Notebook Price Growth vs Inflation, Forecast



Source: Analysts' Estimate

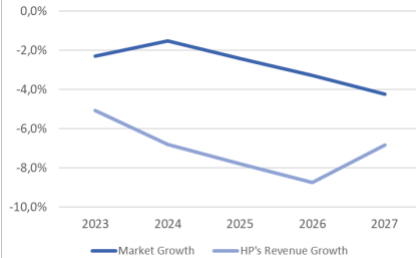
⁴⁹ Calculated using CAPM

not significant as inflation rates are forecasted to remain relatively high at 3.3% annually.

From our analysis, we believe that the desktop and notebook market are inversely correlated, as such, while the Notebook reports a positive CAGR until 2027, we expect the desktop market to report a -2.56% CAGR for the same period, which is forecasted to be driven by both unit and price declines, as consumer and commercial preferences shift causing an overall demand slowdown. From 2023-2025, we continue to see the shipments decline as the need for desktops in households is low and only a small portion of businesses still need them, causing its penetration rate to decline as notebooks rise, effectively leading to HP's slowing down its R&D investment in this area, reflected in a 0.20% reduction in R&D's revenue weight costs from 2023 onwards, additionally, HP's average selling price is still expected to be above the market's at around 6.4% ,on average, yielding for this period's revenues a -4.9% CAGR. From 2025-2027, we estimate that HPs above market average selling price will converge to market's value at \$550 due to lower inflation rates, as well as increasingly lower imbalance between supply and demand. In addition, unit growth will continue to decline as penetration rate for remote working is very high and consumers no longer have the need for non-portable solutions, yielding a -4.80% CAGR for this period. It is important to mention that we estimate that all relevant peers will decline and not continue to invest in this subsegment, leading to HP maintaining its market share throughout its period. From 2027 onwards, we estimate the market to enter a steady state of decline at around -4.14% CAGR as more advanced portable solutions continue to appear on the market, and take market share from desktops, while notebooks remain the norm for businesses and households, alike. In addition, unit growth is forecasted to decline at -3.1% CAGR, and prices at -1.1% CAGR, as even with GDP and inflation rates higher when compared to previous periods low demand for these products will not allow for a positive growth. As HP continuously phases out its R&D costs with the segment, at a rate previously mentioned since 2023, the segment will eventually only contribute around 7.1% of Personal Systems revenues, a downfall from 2022's weight of 24%.

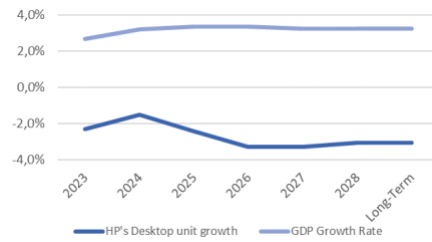
Finally, we estimate that the Workstations segment will have a negative performance, steadily phasing out their revenue weight to around 1% by 2045, We believe this to happen due to the similarity in product offering to the Desktop segment, leading to a similar performance outlook, while the Other segment will maintain its current contribution and follow overall revenue growth, as its product offering is complementary to the main segments.

Graph 34: HP's Desktop Revenues vs Desktop Market Growth, Forecast



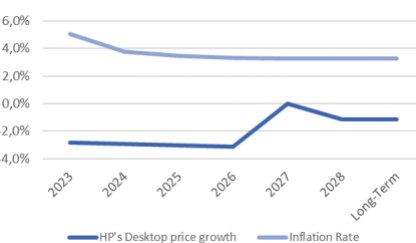
Source: Analysts' Estimates

Graph 35: HP's Desktop Unit Growth vs GDP, Forecast



Source: Analysts' Estimates

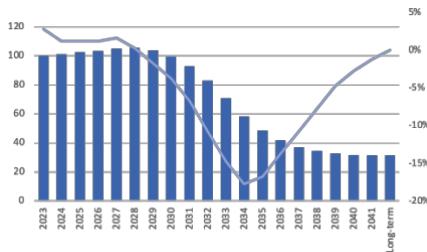
Graph 36: HP's Desktop Price Growth vs Inflation, Forecast



Source: Analysts' Estimates

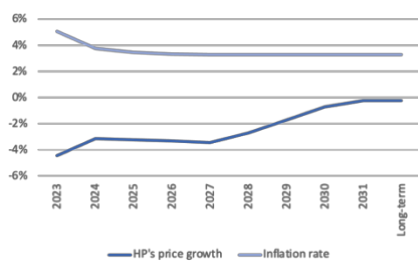
To better forecast the future of HP’s Printing segment, we analysed the hardcopy peripherals and the additive manufacturing peripherals separately⁵⁰. With the inflation following recent macroeconomic events, consumer power has decreased. The hardcopy printers’ market being a very mature market, we expect its volume to decrease somewhat significantly in 2022. Although this is the case, with the market still showing signs of small growth, so we expect the market volume to decrease only in 2022 and to slowly grow back to current values in the following years. This growth will come mostly from emerging markets, in which sales have been higher, and companies and individuals still upgrading their printers. Even with hardcopies being less used as times goes on, with companies working more through the cloud, security has become more of an issue even with the print infrastructure, as mentioned, so we expect companies and individuals to upgrade to more secure printers for their offices and home offices. Furthermore, increased environmental concern is likely have some impact on the market as customers choose to switch their printers to more eco-friendly ones. Statista’s forecast data is congruent with our hypothesis for the market future, so it was used to calculate HP’s revenues more accurately. Following the gradual growth, we believe customers will have no reasons to upgrade their printers unless necessary and that the possible growth of emerging economies will not be strong enough compared to the digitalisation of the world. Thus, starting in 2029, after the market volume reaches a value slightly above 105.5 million units, we forecast it to start declining and this decline to be more notable each year. In 2041, we foresee it to reach a state where the world is almost fully digitalised and almost only people in developing economies purchase printers and out of necessity, making the market completely stale at a volume of, approximately, 31.5 million units each year.

Graph 37: Hardcopy Peripherals Market Volume (millions of units) Forecast



Source: Analysts' Estimates

Graph 38: HP's Hardcopy Peripherals ASP Evolution vs Inflation Forecast



Source: Analysts' Estimates

Regarding HP’s volume market share for the hardcopy peripherals market, it has shown an average increase of 1.6% in recent years, and we expect it to continue for the next few years. In 2022, it had an estimated market share of 42.5% and we forecast it to grow until 45%, in 2026, and HP to hold it in perpetuity. Although this is a very high market share already, the market is very consolidated in which brand reputation is important. As the market has become very competitive between the big players and will start decreasing in the future, we anticipate that it will not be profitable for the small players, and thus they will exit it, letting HP obtain some extra market share. Moreover, the company has been able to increase its market share in emerging economies with its Big Tank printer and is likely to obtain some more. Concerning HP’s average selling price per hardcopy printer, we expect it to decrease significantly. With the competition in the market, HP has stated that it

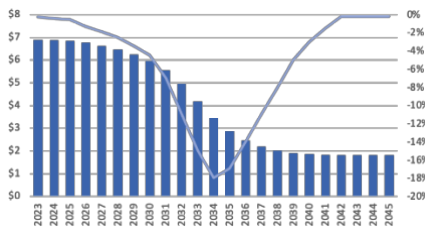
⁵⁰ Additive Manufacturing Peripherals revenues were estimated to be 5% of Printing Commercial Revenues

expects high pricing competition in the near future, and so we predict the price to decrease around \$5 yearly until 2027 and, after that, due to lower demand, to continue to decrease but at a lower rate. From 2031 onwards, the price should decrease at the minimal rate of 0.22% yearly and, in 2045 (last forecasted year) be close to \$128.5.

The combination of these factors leads to a decrease in hardcopy peripherals revenues each year. The decrease will gradually increase until 2034, year with a decrease of almost 18%, and from there the decrease will get smaller each year. In the last forecasted years, the decrease will be constant, and follows the price decrease of 0.22%, as the market volume remains unchanged. In 2045, the revenue is forecasted to be approximately \$1.8 bn. We project both Consumer and Commercial revenues to follow these growths. Regarding the revenue division between the two, they have become more balanced with the pandemic, and we think it will continue to be so, as remote and hybrid work have become more standard. As office printers tend to be more advanced and expensive, Commercial revenue will have slightly more weight, being 55% of hardcopy peripherals revenues, and thus, Consumer will be 45%.

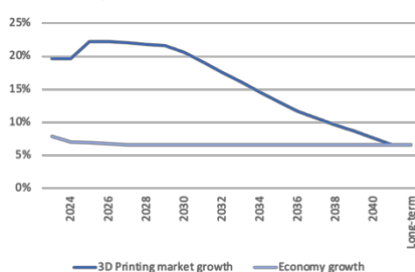
With respect to the additive manufacturing revenues, we expect other printing technologies like digital printing and conductive ink printing, although more advanced, to remain niche in comparison. Hence, we estimate that the revenues for this HP subsegment to follow the 3D printing products and services market. 3D printing is already being adopted in many industries like healthcare and automotive. We predict that the adoption will keep growing considerably, as 3D printing will allow the production of complex parts in a quicker way and with its cost going down. In addition, companies have invested considerably in this technology and are committed to continuing to do so, leading to an even higher growth in the near future. Furthermore, even the recent macroeconomic events did not stop the market from having a double-digit growth. Thus, we predict the market will grow exponentially, even growing more than 20% yearly between 2025-2030. Statista's study corroborates our projection for the near future, so its implied CAGR was used until 2026. Starting in 2031, we anticipate the growth to slow down yearly but nevertheless continuing to grow above the combination of GDP and Inflation and maintain a double-digit growth until 2037. As the adoption of 3D printing becomes widespread throughout all industries and the quality, speed and cost of 3D printing mass production improve, we foresee that the global mainstream production of goods will be done using 3D printing technology. Therefore, we forecast the 3D printing market to grow at the same rate as the economy (combination of GDP and inflation), approximately 6.64%, in perpetuity, and starting in 2041.

Graph 39: HP's Hardcopy Peripherals Revenues (in billions of US dollars) and Growth



Source: Analysts' Estimates

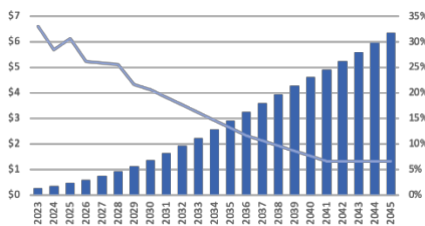
Graph 40: 3D Printing Market Growth vs Economy (GDP & Inflation) Growth



Source: Analysts' Estimates

In 2022, HP had an estimated 3D printing market share of 12.1%. With the market still being very recent and players not being fully established, market share is up for grabs. For now, it should depend very much on investment and innovation of players to get it. HP already has multiple 3D printers and has invested much in this technology (in 2021, it was the leading patent owner for it, as mentioned). We expect HP to invest even more, especially in the next few years as they are crucial to establish the company in the market. Part of the previously mentioned R&D increase of \$130 million, in 2025, is dedicated to research new 3D printing materials and applications. Moreover, HP should be able to leverage its printer brand power to capture more costumers. 12.1% is already a very considerable market share for this stage, so, considering the explained factors, we anticipate it to grow but not in a large way. It should gradually grow until 17%, in 2028, and remain like this in perpetuity.

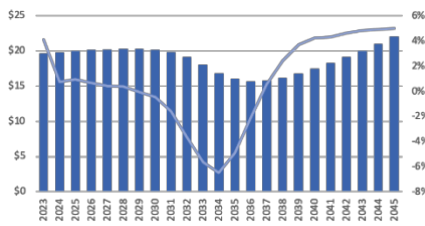
Graph 41: HP's Additive Manufacturing Peripherals Revenues (in billions of US dollars) and Growth



Source: Analysts' Estimates

The market growth and market share increase lead HP's additive manufacturing peripherals revenues to grow yearly around 30% in the next 3 years, with a gradual decrease in growth from there. Nonetheless, the company will be able to sustain a yearly growth above 20% until 2030, and double-digit growth until 2037. Starting in 2041, it will grow with the economy, just like the market. The revenues in 2045 are forecasted to be approximately \$6.4 bn.

Graph 42: HP's Printing Segment Revenues (in billions of US dollars) and Growth

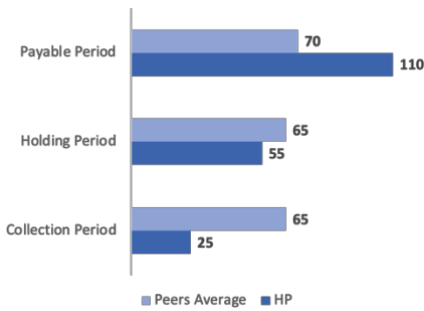


Source: Analysts' Estimates

As HP sells supplies specifically for their own products, these are dependent of printer sales. Thus, we forecast supply sales to be around 87% of total printing peripheral revenues of the same and previous year combined, following the growth of the two other segments combined. Overall, HP's printing segment will grow very slightly until 2028, but then the hardcopy printers market decline will have a stronger impact than the rise of 3D printing, making the total revenues for the segment decline between 2029 and 2036, year in which revenues will be around \$15.7 bn. From there, the segment will see continuous growth, with the growth gradually increasing each year. For the last forecasted years, the growth will be around 5%, with total revenues in 2045 being approximately \$22.1 bn.

In order to perform well in the 3D printing market and in the development of cellular enabled notebooks with ARM-based chips, HP will have to increase its investment, which will be visible in the firm's PP&E. The company has been focused on site optimisation, so their active properties should not be very impacted, but we believe that they will slightly increase with the investment for these newer technologies, to 17.5 million square feet. On the other hand, following the investment to keep up and try to exceed these markets, and the optimisation, we forecast the PP&E per active million square feet to increase more significantly until 2030, reaching a value of \$24.5 bn. Starting in 2035 we believe total PP&E will follow the company's

Graph 43: HP and Peers' Cash Conversion Cycle (in days)



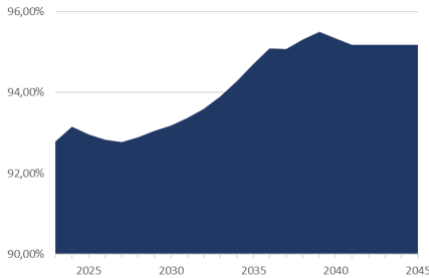
Source: Analysts' Estimates

necessities and grow at the revenue growth rate. When it comes to HP's cash conversion cycle, the company has always leveraged its bargaining power with suppliers and clients to have more beneficial conditions when compared to the industry. We expect it to remain like this and the company to continue its recent trends, stabilising at 25 collection days and 110 payable days. While we forecast the industry values to be, respectively, 65 and 70 days. Contrarily, HP's holding period has been increasing but seems to be stabilising, thus we predict it will stay at around 55 days, with the industry at 65 days, closer to pre-Covid levels.

When it comes to HP's Corporate Investments segment, we forecasted its revenues to remain constant at \$2 million, as per our estimates this is the most accurate to reflect the annual return on HP's incubation and investment projects.

Diving deeper into HP's cost structure, we believe that its gross margin will remain constant because there is no reason to assume higher direct revenue costs, as HP already has an established market position and a strong bargaining power with suppliers. On the other hand, HP's operating margin was estimated to slightly increase, on average, until 2026, reflected through the headcount reduction caused by the Future Ready Plan and lower R&D investment in the Desktop segment, partially offset due to average salary increase at inflation rate to maintain key employees amidst restructurings. In the steady state, we estimate that the operating margin will decrease to a constant 4.83%, mainly driven due to salary increases and the increase in R&D investment yearly.

Graph 44: HP's Core Costs with Taxes as % Total Revenues, Forecast



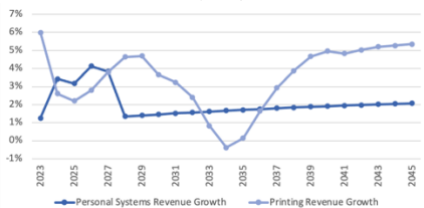
Source: Analysts' Estimates

Scenario Analysis

- Optimistic Case

In our optimistic case for the Personal Systems segment, we see the Notebook market growing at a 3.02% CAGR by 2027, with a perpetuity growth of about 2.8% CAGR. We estimate HP's competitive advantage will be higher in this case driven by a market's stronger adoption of its investments, reflected in a total of 3% increase in market share until 2027 and in a higher revenues CAGR until 2027 of 5.24%, driven by unit growth as prices are forecasted to variate the same as the base case. From 2027 onwards, HP's revenue CAGR is expected to converge to the markets, and steadily increase its average selling price at a 0.4% CAGR, reflecting a higher rise in demand when compared to our base case. On the other hand, we estimate the Desktop market to still decline but at a slower rate of around a 2.36% CAGR until 2027 and in perpetuity by 3.38% CAGR. We estimate that HP will increase its R&D investment in this segment, unlike its competitors, leading to an increase of 2% in market share until 2027 and a revenue CAGR of -2.87%, effectively slowing its decline on the segment. In addition, we estimate the average

Graph 45: HP's Optimistic Case Revenues Growth by Segment, Forecast



Source: Analysts' Estimates

selling price until 2027 to still be slightly above the markets on average. From 2027 onwards, the price is expected to stabilise at around \$550, reflecting HP’s gained presence and demand in the market, while its revenue will decline at the markets’ CAGR.

For the optimistic case, we see the hardcopy peripherals market decrease at a slower pace and have a volume of 43.64 million units in perpetuity. In addition, being able to get a bigger market share in emerging markets with Big Tank, HP’s market share rises to 48%. The price competition will be slightly less aggressive in the near future. With this scenario, the maximum yearly revenue decrease is close to 14%, still significant, and, although the perpetuity decrease is the same as the base case, the revenues for the last forecasted year are close to \$2.7 bn, almost 50% higher. Here, the 3D printing market has a larger a quicker adoption and has a growth 25% above the base case in the first years and maintains stronger growth until 2036. HP notices the growth and becomes more aggressive in the market. Moreover, it can leverage its brand power more, ultimately reaching a market share of 25%. This means that the revenues for the subsegment grow at around 40% for the next 5 years and start to grow gradually less from there. For 2045, the projected revenues are approximately \$12.7 bn, practically double of the base case. The 3D printing revenues have much more impact than the hardcopy ones in this scenario, with total printing revenues only decreasing in one year. The terminal growth rate is slightly above 5%, and revenues for 2045 are approximately \$41.5 bn, around 88% higher.

Graph 46: HP’s Optimistic Case Total Revenues & Core Margin Forecast



Source: Analysts' Estimates

Table 7 : HP’s Optimistic Case Summary

Optimistic Case Scenario	
ROIC (FY45+)	14,29%
RONIC (FY45+)	14,58%
WACC	8,26%
Terminal Growth Rate (FY45+)	3,26%
LT Economic Growth Rate	6,64%
Terminal Value	114 146,55
Equity Value (FY23)	\$36 833,02
Implied Share Price	\$37,50

Source: Analysts' Estimates

HP’s gross margin is expected to slightly increase at by around 7.7%, due to higher bargaining power with suppliers and stronger market leadership. On the other hand, we estimate this to be offset, resulting in an overall lower operational margin driven by R&D investment to sustain HP’s growth in both segments, reflected on the increase of 2.9% in its revenue weight.

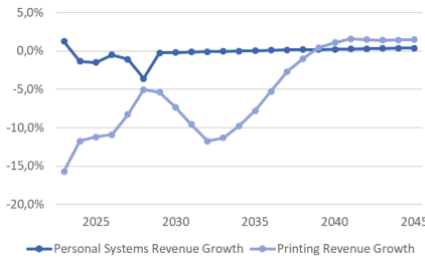
To get a stronger position in the market, HP’s PP&E will increase more as well, with active properties reaching 18.5 million square feet, and PP&E per active million square feet much higher. The company will also have an even better cash conversion cycle, collecting in 20 days, paying in 120, and holding inventory for 45 days.

▪ **Conservative Case**

For our conservative case in the Personal Systems segment, we estimate the Notebook market to grow at 2.61% CAGR until 2027, reflecting a slower growth due caused by the continuous uprising of substitute markets, such as smartphones, as well as slower technology adoption. Until 2027 we expect a

1.52% CAGR. In this case, we estimate that HP’s competitors will have better adoption rates and that given a slow growing market HP will reduce its investment in the segment, leading to decrease of 1% in market share until 2027. In addition, its price is still forecasted to slightly increase and converge to markets’ estimates. From 2027 onwards, we estimate that HP’s revenues will grow at markets’ rate, reflecting its poor investment strategy and overall reduced adoption rate of new technologies within the market, with the price slowly declining as to reflect lack of demand for the market by around 0.3% CAGR. On the other hand, we estimate the Desktop market to further decline, leading to a -2.75% CAGR until 2027, and perpetuity decline of about -5.1% CAGR. We forecast that HP will significantly lower investment in this segment, leading to a loss of about 2% of market share until 2027 to its competitors that carried on with their investments, which ultimately led to a -7.06% CAGR for this period. In addition, HP’s average selling price is still expected to be slightly above markets’ leading to a slight offset of its decline, driven by the commercial sector. From 2027 onwards, we estimate HP to continue decline at the markets’ rate, and its price to steadily decline at 1.3% CAGR, reflecting the significant lack of demand for this segment in perpetuity.

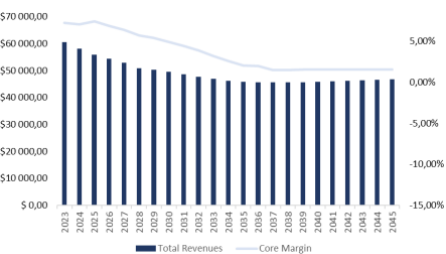
Graph 47: HP's Conservative Case Revenues Growth by Segment, Forecast



Source: Analysts' Estimates

In this case, higher environmental concerns and higher post-pandemic digitalization make the hardcopy peripherals market start decreasing immediately, and with a volume of 26.5 million units in perpetuity. HP is not able to get as much share in emerging economies and its reputation decreases for not being as eco-friendly as its competitors, making the firm’s market share decrease to 40%. Furthermore, the pricing competition gets more aggressive than anticipated. There are nine years with double-digit negative revenue growth here, and the revenues in the last forecasted year are approximately \$1.1 bn, 37% less than the base case (same perpetuity growth). For this scenario 3D printing will not be as adopted and will only grow at 75% in the first forecasted years, with a gradual decrease from there, and is not expected to become the staple for mainstream production, growing at 3 percentage points below the economy in perpetuity. Disappointed with the growth, HP refuses to make strong investments, and loses market share, stabilizing at 7%. Even in this case, revenues of additive manufacturing peripherals grow at double-digits for five years. For 2045, the forecasted revenues do not reach \$1 bn and are around 85% lower. Finally, supplies sales are also affected, as HP will not be able to protect its printers against imitation supplies as well, and thus decrease to 70% of that year and the previous year’s printer sales. HP’s lack of commitment to the 3D printer market and the stronger decrease of the hardcopy printer market highly affects total printing sales, with growth only starting in 2039. The terminal growth rate is 1.5% and revenues for 2045 are approximately \$5 bn, around 77% lower.

Graph 48: HP's Conservative Case Total Revenues & Core Margin Forecast



Source: Analysts' Estimates

Furthermore, HP suffers from supply-chain pandemic consequences as a single-source supplier from whom it was dependent had issues and could not provide the necessary materials, and the semiconductor shortage will not be fully resolved, leading to a price increase. These issues are reflected during the next two years as a decrease in gross margin by 0.5 percentage points. The operating margin is expected to aggressively decline, mainly driven by salary increases, however, slightly offset due to the significant save in R&D investments, about 1.50% in revenue weight.

The lack of investment will be seen in PP&E as well, with active properties only rising to 17 million square feet and very low increases in PP&E per active million square feet. HP will also lose part of its advantage in its cash conversion cycle, collecting in 40 days, paying in 95, and holding inventory for 65 days.

The resulting value from this scenario is very negative, generating a total return for shareholders in FY2023 of -32,98%. This is mainly driven by the capital inefficiency reflected on the long-term lower value creation metrics.

Table 8 : HP's Conservative Case Summary

Conservative Case Scenario	
ROIC (FY45+)	9,29%
RONIC (FY45+)	9,68%
WACC	8,26%
Terminal Growth Rate (FY45+)	0,49%
LT Economic Growth Rate	6,64%
Terminal Value	8 957,36
Equity Value (FY23)	\$17 578,14
Implied Share Price	\$17,90

Source: Analysts' Estimates

Table 9: WACC vs Terminal Growth Sensitivity Analysis

WACC		Terminal Growth				
		0,23%	1,23%	2,23%	3,23%	4,23%
	\$29,44					
6,26%	\$41,53	\$43,36	\$46,07	\$50,50	\$59,21	
7,26%	\$33,92	\$34,86	\$36,14	\$38,02	\$41,10	
8,26%	\$28,31	\$28,80	\$29,44	\$30,30	\$31,57	
9,26%	\$24,01	\$24,27	\$24,59	\$25,01	\$25,57	
10,26%	\$20,63	\$20,76	\$20,92	\$21,12	\$21,37	

Source: Analysts' Estimates

Table 10: WACC vs RONIC Sensitivity Analysis

WACC		RONIC				
		10,66%	11,66%	12,66%	13,66%	14,66%
	\$29,44					
6,26%	\$45,24	\$45,69	\$46,07	\$46,39	\$46,67	
7,26%	\$35,60	\$35,89	\$36,14	\$36,35	\$36,53	
8,26%	\$29,07	\$29,27	\$29,44	\$29,58	\$29,70	
9,26%	\$24,33	\$24,47	\$24,59	\$24,69	\$24,78	
10,26%	\$20,74	\$20,84	\$20,92	\$21,00	\$21,06	

Source: Analysts' Estimates

Table 11: RONIC vs Terminal Growth Sensitivity Analysis

RONIC		Terminal Growth Rate				
		0,23%	1,23%	2,23%	3,23%	4,23%
	\$29,44					
10,66%	\$28,28	\$28,63	\$29,07	\$29,66	\$30,51	
11,66%	\$28,30	\$28,72	\$29,27	\$30,01	\$31,09	
12,66%	\$28,31	\$28,80	\$29,44	\$30,30	\$31,57	
13,66%	\$28,32	\$28,87	\$29,58	\$30,55	\$31,99	
14,66%	\$28,33	\$28,93	\$29,70	\$30,77	\$32,35	

Source: Analysts' Estimates

Sensitivity Analysis

To better understand the variability of our assumptions, it was necessary to perform a sensitivity analysis on our base case terminal value assumptions, as this will be the biggest driver for HP's stock price estimation. We divided this analysis into three sections, each varying the implied calculated share price: WACC vs Growth Rate, WACC vs RONIC and RONIC vs Growth Rate.

From the WACC vs Growth Rate analysis, we can see that the model presents a higher sensitivity to the terminal growth rate at lower WACC values when compared to higher ones, i.e., with higher WACC values the share price will not vary as much with small variations of the terminal growth rate as it would if the WACC value was lower. However, when growth rates are higher, and the WACC is varied we get higher levels of variability than when they are lower, indicating that they present an inverse correlation between them, in terms of their sensitivity to each other.

Now looking at the WACC vs RONIC analysis, we can see that the WACC is a lot more sensitive, in comparison as the RONIC's value from the lowest to highest varies keeping the WACC constant about 3%, while WACC values vary around 54%, keeping RONIC values constant.

Finally, looking at the RONIC vs Growth Rate analysis, we can gather that when compared to the RONIC, the Growth Rate is a lot more sensitive, presenting for the same percentual changes, a variability of about 12%, on average, from its

lowest to its highest values, keeping the RONIC constant. On the other hand, RONIC, in comparison, only presents a variability of about 3%, on average when compared to the same terms.

Relative Valuation

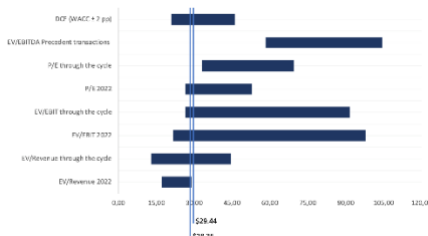
Table 12 : HP's Relative Valuation Summary

Valuation Method	Lower Bound	Upper Bound
EV/Revenue 2022	17,03	28,86
EV/Revenue through the cycle	12,84	44,51
EV/EBIT 2022	21,72	97,95
EV/EBIT through the cycle	26,43	91,55
P/E 2022	26,56	52,84
P/E through the cycle	33,06	69,45
EV/EBITDA Precedent transactions	58,19	104,56
DCF (WACC ± 2 pp)	20,92	46,07

Source: Bloomberg & Analysts' Estimate

To complete our valuation, we decided to do a relative valuation on top of our main DCF approach, using both trading and transaction multiples⁵¹. For the trading multiples, we used HP's identified competitors, although with a wide range of market cap, and the multiples EV/Revenue, EV/EBIT, and P/E. These multiples were analysed both for the last 4 years (2019-2022) and just 2022. Considering the 4 years, the EV/Revenues multiple leads to an implied share price range of [\$12.84, \$44.51], and for just 2022, a narrower range of [\$17.03, \$28.86]. Since depreciation and amortization have a very big impact on technology industries, we decided to use the EV/EBIT multiple instead of EV/EBITDA. The implied share price range for the 4 years was [\$26.43, \$91.55], and for just 2022, [\$21.72, \$97.95]. Finally, for the P/E multiple, the range for the 4 years was [\$33.06, \$69.45], and for 2022 was [\$26.56, \$52.84]. Regarding the transaction multiples, we used data on transactions within the industries of Computers and Office/Business Equipment, from 2018 onwards⁵². The implied share price ranges from the multiple of these precedent transactions was [\$58.19, \$104.56].

Graph 49: HP's Valuation Football Field



Source: Analysts' Estimates

To get a better perspective, we compared the implied ranges from the multiples with a range from our DCF calculation⁵³. This gave us an implied share price range of [\$20.92, \$46.07]. When compared with the implied ranges from the multiples, our DCF range coincides partly with the ranges of every multiple, apart from the transaction one. This range is already higher than the rest, likely due to transaction premiums usually present in M&A deals. That being said, the multiples' ranges are generally higher than the DCF one, with our estimated price and current share price being on the lower end of them. This means that the market tends to value the HP higher than our approach, but it is important to mention that valuation by multiples is much less complex and detailed than our assumptions and DCF valuation.

⁵¹ Data from Bloomberg

⁵² Completed M&A and investment deals, with available EV/EBITDA, within the industries Computers and Office/Business Equipment, announced from 2018 onwards

⁵³ Range of plus/minus 2 percentage points from the base WACC, given the base case share price

Appendix

Income Statement

In millions, USD	Historical								Forecast							
	2019	2020	2021	2022	2023	2024	2025	2026	2032	2033	2034	2035	2042	2043	2044	2045
Core																
Personal Systems																
Notebooks	\$22,928.00	\$25,766.00	\$30,522.00	\$29,183.00	\$30,205.44	\$30,854.73	\$31,798.31	\$33,246.68	\$37,785.88	\$38,469.66	\$39,165.82	\$39,874.58	\$45,208.30	\$46,026.40	\$46,859.31	\$47,707.29
Desktops	\$12,046.00	\$9,806.00	\$9,381.00	\$10,736.00	\$10,189.60	\$9,740.43	\$9,218.58	\$8,638.30	\$6,763.51	\$6,483.58	\$6,215.22	\$5,957.98	\$4,431.95	\$4,248.51	\$4,072.67	\$3,904.10
Workstations	\$2,389.00	\$1,816.00	\$1,669.00	\$2,100.00	\$2,142.50	\$2,071.68	\$2,011.24	\$1,970.42	\$1,570.62	\$1,497.70	\$1,424.30	\$1,350.27	\$803.60	\$719.95	\$634.56	\$547.31
Other	\$1,331.00	\$1,609.00	\$1,787.00	\$2,065.00	\$2,097.86	\$2,104.24	\$2,122.06	\$2,162.86	\$2,274.54	\$2,290.86	\$2,308.34	\$2,326.96	\$2,487.79	\$2,514.96	\$2,543.16	\$2,572.36
Total revenue	\$38,694.00	\$38,997.00	\$43,359.00	\$44,084.00	\$44,635.40	\$44,771.08	\$45,150.18	\$46,018.25	\$48,394.56	\$48,741.80	\$49,113.68	\$49,509.78	\$52,931.63	\$53,509.82	\$54,109.69	\$54,731.06
Printing																
Supplies	\$12,921.00	\$13,586.00	\$12,632.00	\$11,761.00	\$12,487.45	\$12,579.03	\$12,690.27	\$12,785.20	\$12,263.43	\$11,614.41	\$10,871.63	\$10,285.94	\$12,051.16	\$12,631.51	\$13,250.85	\$13,911.76
Handcopy Commercial Peripherals	\$4,381.40	\$3,362.05	\$3,998.55	\$4,013.75	\$3,801.93	\$3,786.79	\$3,767.26	\$3,717.95	\$2,720.32	\$2,313.94	\$1,899.00	\$1,577.42	\$1,008.91	\$1,006.70	\$1,004.49	\$1,002.29
Handcopy Consumer Peripherals	\$2,533.00	\$2,516.00	\$3,287.00	\$2,916.00	\$3,110.67	\$3,098.28	\$3,082.30	\$3,041.96	\$2,225.72	\$1,893.22	\$1,553.73	\$1,290.62	\$825.47	\$823.66	\$821.86	\$820.06
Additive Manufacturing Peripherals	\$230.60	\$176.95	\$210.45	\$211.25	\$281.00	\$361.05	\$471.74	\$595.20	\$1,933.61	\$2,245.61	\$2,574.26	\$2,912.41	\$5,243.64	\$5,591.59	\$5,962.62	\$6,358.27
Total revenue	\$20,066.00	\$17,641.00	\$20,128.00	\$18,902.00	\$19,681.05	\$19,825.15	\$20,011.56	\$20,140.30	\$19,143.07	\$18,067.18	\$16,898.62	\$16,066.38	\$19,129.18	\$20,053.45	\$21,039.82	\$22,092.39
Corporate Investments																
Total revenue	\$2.00	\$2.00	\$3.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00
Consolidated																
Other	-6.00	-1.00	-3.00	-5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Revenue	\$8,756.00	\$6,639.00	\$6,487.00	\$6,293.00	\$6,318.45	\$6,598.23	\$6,163.74	\$6,160.55	\$7,539.63	\$6,810.98	\$6,014.31	\$6,578.16	\$7,062.80	\$7,565.27	\$7,151.51	\$7,825.45
Costs																
Cost of revenue	-47,586.00	-46,202.00	-50,070.00	-50,648.00	-51,721.91	-51,946.89	-52,401.65	-53,203.24	-54,312.23	-53,726.29	-53,085.64	-52,734.91	-57,949.55	-59,157.77	-60,433.35	-61,779.45
Research and development	-1,499.00	-1,478.00	-1,907.00	-1,593.00	-1,498.14	-1,504.66	-1,648.16	-1,541.05	-1,573.17	-1,556.20	-1,537.64	-1,527.40	-1,678.53	-1,713.52	-1,750.47	-1,789.46
Selling, general and administrative	-5,368.00	-4,906.00	-5,741.00	-5,264.00	-5,530.78	-5,441.49	-5,321.65	-5,509.87	-6,764.51	-6,999.71	-7,243.07	-7,494.85	-8,305.08	-8,478.24	-8,661.05	-8,853.97
Amortization from Intangible Assets	-116.00	-113.00	-154.00	-228.00	-351.00	-318.00	-248.00	-239.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Costs	-\$54,569.00	-\$52,699.00	-\$57,872.00	-\$57,733.00	-\$59,101.83	-\$59,211.04	-\$59,619.46	-\$60,493.15	-\$62,649.92	-\$62,282.20	-\$61,866.35	-\$61,757.24	-\$67,933.16	-\$69,349.54	-\$70,844.87	-\$72,422.88
Core Result before Taxes	\$4,187.00	\$3,940.00	\$5,615.00	\$5,250.00	\$5,216.62	\$5,387.19	\$5,544.28	\$5,667.40	\$4,889.72	\$4,528.78	\$4,147.96	\$3,820.92	\$4,129.64	\$4,215.74	\$4,306.64	\$4,402.57
Statutory tax	-879.27	-827.40	-1,179.15	-1,102.50	-1,095.49	-1,131.31	-1,164.30	-1,190.15	-1,026.84	-951.04	-871.07	-802.39	-682.22	-885.30	-904.39	-924.54
Core adjustments	166.52	174.47	232.84	279.78	278.00	287.09	295.47	302.03	260.58	241.35	221.05	203.62	220.08	224.67	229.51	234.62
Core Result	\$3,474.25	\$3,287.07	\$4,668.69	\$4,427.28	\$4,399.14	\$4,542.98	\$4,675.45	\$4,779.27	\$4,123.46	\$3,819.09	\$3,497.94	\$3,232.15	\$3,482.49	\$3,555.10	\$3,631.75	\$3,712.65
Non-Core																
Onco litigation proceeds	-	-	2,304.00	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-operating retirement-related credits	85.00	240.00	160.00	144.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Defined benefit plan settlement gains (charges)	-	-	37.00	-	-	-	-	-	-	-	-	-	-	-	-	-
Acquisition related charges	-35.00	-16.00	-68.00	-318.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restructuring and other charges	-275.00	-462.00	-245.00	-233.00	-247.00	-256.00	-264.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tax indemnifications	-1,186.00	1.00	-1.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Russia Exit Charges	0.00	0.00	0.00	-23.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other net	-11.00	21.00	-22.00	-19.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non Core Result before tax and OCI	-1,422.00	-430.00	2,166.00	-450.00	-247.00	-256.00	-264.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Statutory tax	298.62	90.30	-454.86	94.50	51.87	53.76	55.44	0.00	-88.38	-92.07	-95.92	-99.92	-133.05	-138.60	-144.39	-150.42
Non-core adjustments	992.31	117.04	336.47	-585.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non Core Result before OCI	-131.07	-222.66	2,047.61	-940.67	-195.13	-202.24	-208.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other comprehensive income (loss), net of taxes	-380.00	-18.00	983.00	573.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non Core Result	-\$511.07	-\$240.66	\$3,030.61	-\$367.67	-\$195.13	-\$202.24	-\$208.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financial																
Interest expense on borrowings	-242.00	-239.00	-254.00	-359.00	-502.80	-523.79	-545.66	-568.44	-726.56	-756.89	-788.49	-821.41	-1,093.73	-1,139.40	-1,186.97	-1,236.52
Loss on extinguishment of debt	0.00	-40.00	-16.00	0.00	-61.16	-63.72	-66.38	-69.15	-88.38	-92.07	-95.92	-99.92	-133.05	-138.60	-144.39	-150.42
Financial Result before tax	-242.00	-279.00	-270.00	-359.00	-563.96	-587.50	-612.03	-637.59	-814.94	-848.96	-884.41	-921.33	-1,226.78	-1,278.00	-1,331.36	-1,386.94
Statutory tax	50.82	58.59	56.70	75.39	118.43	123.38	128.53	133.89	171.14	178.28	185.73	193.48	257.62	268.38	279.58	291.26
Financial Result	-\$191.18	-\$220.41	-\$213.30	-\$283.61	-\$445.53	-\$464.13	-\$483.51	-\$503.69	-\$643.80	-\$670.68	-\$698.68	-\$727.85	-\$969.15	-\$1,009.62	-\$1,051.77	-\$1,095.68
Comprehensive income	\$3,772.00	\$3,826.00	\$7,486.00	\$3,776.00	\$3,758.48	\$4,340.78	\$4,466.93	\$4,779.31	\$4,123.50	\$3,819.13	\$3,497.99	\$3,232.19	\$3,482.53	\$3,555.14	\$3,631.80	\$3,712.69
% YoY Growth	-	2%	165%	-49.56%	-0.46%	15.49%	2.91%	6.99%	-5.33%	-7.38%	-8.41%	-7.88%	1.98%	2.08%	2.16%	2.23%

Balance Sheet

In millions, USD	Historical								Forecast							
	2019	2020	2021	2022	2023	2024	2025	2026	2032	2033	2034	2035	2042	2043	2044	2045
Core																
Operating Cash	1,175.12	1,132.78	1,269.74	1,259.66	1,259.66	1,286.369081	1,291.964584	1,303.274729	1,358.889976	1,350.792654	1,336.219699	1,320.286159	1,413.215276	1,441.256013	1,471.305468	1,503.030104
Accounts Receivable	6,031.00	5,381	5,511	4,546	4,405.373566	4,424.538246	4,463.269652	4,531.544566	4,626.002224	4,576.094883	4,521.527943	4,491.654896	4,935.080264	5,038.173566	5,147.363337	5,263.016849
Inventory	5,734.00	5,963	7,930	7,995	7,793.712474	7,827.613894	7,896.138567	8,016.926338	8,184.034981	8,095.7419	7,999.205563	7,946.356028	8,732.124499	8,914.184853	9,106.394612	9,309.232406
PP&E	2,794.00	2,627.00	2,546.00	2,774.00	6,400.00	9,900.00	13,600.00	16,625.00	27,125.00	28,000.00	28,875.00	28,684.23	31,520.64	32,177.83	32,871.66	33,603.85
Accounts Payable	-14,793.00	-14,704	-16,075	-15,284	-15,587.42495	-15,655.22779	-15,792.27713	-16,033.85268	-16,636.06996	-16,619.4838	-16,998.41113	-16,992.71206	-17,464.249	-17,828.36971	-18,212.78922	-18,618.46481
Other Invested Capital	-6,273.34	-2,289	-1,969	-83												

Free Cash Flow Statement

In millions, USD	Historical								Forecast									
	2019	2020	2021	2022	2023	2024	2025	2026	...	2032	2033	2034	2035	...	2042	2043	2044	2045
Core																		
Core Result	3 474,25	3 287,07	4 668,69	4 427,28	4 399,14	4 542,98	4 675,45	4 779,27		4 123,46	3 819,09	3 497,94	3 222,15		3 482,49	3 555,10	3 631,75	3 712,65
(+) Δ Operating Cash	-	42,34	-136,96	10,08	0,00	-26,71	-5,60	-11,31		0,45	8,10	14,57	15,93		-25,82	-28,04	-30,05	-31,72
(+) Δ Accounts Receivable	-	650,00	-130,00	965,00	140,63	-19,16	-38,73	-68,27		27,73	49,91	54,57	29,87		-96,03	-102,91	-108,65	-114,65
(-) Δ Inventory	-	-229,00	-1 967,00	335,00	-198,71	-33,90	-68,52	-120,79		49,06	88,29	96,54	52,85		-169,89	-182,06	-192,21	-202,84
(-) Δ PP&E	-	167,00	81,00	-228,00	-3 626,00	-3 500,00	-3 700,00	-3 025,00		-1 312,50	-875,00	-875,00	190,77		-613,26	-657,19	-693,83	-732,19
(-) Δ Deferred Taxes	-	149,98	-467,09	487,73	1 504,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00		-1,00	-1,00	-1,00	-1,00
(-) Δ Other Invested Capital	-	-1 338,34	-320,00	-1 886,00	1,97	0,16	0,59	1,26		-0,19	-0,53	-0,60	-0,16		1,90	2,04	2,15	2,27
(+) Δ Accounts Payable	-	-89,00	1 371,00	-791,00	303,42	67,80	137,05	241,58		-98,12	-176,59	-193,07	-105,70		339,78	364,12	384,42	405,68
Total Operating Free Cash Flow	3 474,25	2 640,05	3 099,64	3 320,09	2 524,45	1 031,16	1 000,23	1 796,73		2 789,90	2 913,27	2 594,95	3 405,72		2 918,17	2 950,06	2 992,59	3 038,19
Non Core																		
Non Core Result	-511,07	-240,66	3 030,61	-367,67	-195,13	-202,24	-208,56	0,00		0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00
(-) Δ Goodwill	-	-8,00	-423,00	-1 738,00	0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00
(-) Δ Non-Core Deferred Taxes	-	116,89	107,41	313,53	0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00
(-) Δ Other Non-Core Invested Capital	-	-119,66	-767,00	-881,00	0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00
Non Operating Free Cash Flow	-511,07	-251,44	1 948,02	-2 673,14	-195,13	-202,24	-208,56	0,00		0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00
Total Free Cash Flow Available to Investors	2 963,18	2 388,62	5 047,66	646,95	2 329,32	828,92	791,67	1 796,73		2 789,90	2 913,27	2 594,95	3 405,72		2 918,17	2 950,06	2 992,59	3 038,19
Financial																		
Financial Result	-191,18	-220,41	-213,30	-283,61	-445,53	0,04	0,04	0,04		0,04	0,04	0,04	0,04		0,04	0,04	0,04	0,04
(+) Δ Net Debt & Other Gains	-	1 692,79	2 073,64	4 680,66	-787,26	372,37	432,34	-516,50		-2 047,71	-2 225,87	-1 965,35	-2 825,77		-2 291,36	-2 310,17	-2 338,91	-2 369,94
(+) Transactions with Shareholders	-	-3 861,00	-6 908,00	-5 044,00	-1 096,53	-1 201,34	-1 224,05	-1 280,28		-742,23	-687,44	-629,64	-579,99		-626,86	-639,93	-653,72	-668,28
Financing Cash Flow	-191,18	-2 388,62	-5 047,66	-646,95	-2 329,32	-828,92	-791,67	-1 796,73		-2 789,90	-2 913,27	-2 594,95	-3 405,72		-2 918,17	-2 950,06	-2 992,59	-3 038,19

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Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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