

# Investment Analysis Based on Intrinsic Value in the Information Technology and Pharmaceutical Sectors for Advancements in Digital Healthcare.

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## Abstract

In the annals of financial literature, the 1930s bore witness to a foundational shift with the publication of “Security Analysis” by Benjamin Graham and David Dodd, scholars at Columbia Business School. As articulated therein, value investing advocates for an analytical focus on equities priced beneath their calculated intrinsic or book values. Fundamentally, discerning investors target equities that, upon rigorous analysis, appear to be undervalued by prevailing market standards. Equities, in an economic construct, signify an entity’s ownership and proffer a claim on a specified tranche of its fiscal assets and revenues. To ascertain an equity’s intrinsic worth, investors meticulously examine a company’s foundational metrics, encompassing earnings, dividends, projected cash inflows, and overall fiscal robustness. The tenets of value investing transcend industry boundaries and are universally applicable. Whether in technology, healthcare, consumer goods, or industrial sectors, the principles remain valid, provided investors possess the insight to identify and leverage market inefficiencies. This paper aims to scrutinize prominent entities within the information technology and pharmaceutical arenas, interpreting their financial dynamics through the value investing paradigm.

**Keywords:** 1930s. Benjamin Graham, David Dodd, Intrinsic Value

## 1. Introduction

In the annals of financial literature, the 1930s bore witness to a foundational shift with the publication of “Security Analysis” by Benjamin Graham and David Dodd, scholars at Columbia Business School. As articulated therein, value investing advocates for an analytical focus on equities priced beneath their calculated intrinsic or book values. Fundamentally, discerning investors target equities that, upon rigorous analysis, appear to be undervalued by prevailing market standards. Equities, in an economic construct, signify an entity’s ownership and proffer a claim on a specified tranche of its fiscal assets and revenues. To ascertain an equity’s intrinsic worth, investors meticulously examine a company’s foundational metrics, encompassing earnings, dividends, projected cash inflows, and overall fiscal robustness. The tenets of value investing transcend industry boundaries and are universally applicable. Whether in technology, healthcare, consumer goods, or industrial sectors, the principles remain valid, provided investors possess the insight to identify and leverage market inefficiencies. This paper aims to scrutinize prominent entities within the information technology and pharmaceutical arenas, interpreting their financial dynamics through the value investing paradigm.

## 2. Financial indicators

Utilizing platforms such as Yahoo Finance and the Financial Times, individuals can readily access stock data and the overarching financial status of listed enterprises, allowing for subsequent computation of the company’s salient financial indicators. These indicators are quintessential instruments in the rigorous evaluation and analytical discernment of a firm’s fiscal robustness, operational prowess, and prospective profitability trajectory. Enumerated below are the predominant methodologies employed in such evaluative undertakings:

- Annualized Return: This metric elucidates an asset or investment’s aggregate return over an annum. Positioned as a canonical instrument, the Annualised Return facilitates investors in juxtaposing the performance vectors of diverse assets or investment paradigms.
- CAGR (Compound Annual Growth Rate): The CAGR metric provides a lucid depiction of the geometric progression ratio, ensuring a perpetually consistent rate of return across a specified temporal expanse. By judiciously factoring in the nuances of compounding, CAGR bequeaths a homogenous annual growth trajectory impervious to pronounced annual flux. Divergent from the annualized return, CAGR’s inherent consideration of compounding phenomena engenders a veritable, mean

annual expansion, proffering investors an augmented perspicuity into the perennial performance of elongated investments.

- **EBIT Margin (EBIT/Total Revenue):** This indicator demarcates the quantum of revenue a corporate entity amasses from its core commercial ventures, antecedent to any extractions about both oscillatory and fixed operational expenditures. A heightened ratio is frequently emblematic of efficacious fiscal stewardship or burgeoning revenues, ergo, serving as a forerunner of a firm’s operational finesse and fiscal viability.

- **Earnings Per Share (EPS):** Epitomizing the profit apportioned to each extant share of a corporate entity’s equity, EPS emerges as a cardinal metric elucidating a firm’s profitability matrix. The investment community recurrently harnesses EPS to discern an equity instrument’s inherent value and predict its potential growth trajectory.

- **Correlation between Annualised Returns and EBIT/Total Revenue:** Through meticulous examination of this correlation, the financial cognoscenti—encompassing both investors and analysts—can glean profound insights into the symbiotic relationship interlinking a firm’s profit margins with its equity market manifestations, thereby underpinning sagacious investment deliberations.

Conclusively, the metrics above proffer indispensable insights into a firm’s financial fortitude, revenue generation mechanisms, and equity market comportment, thereby directing investors along the pathway of enlightened decision-making. Nonetheless, it remains paramount to acknowledge that equity analysis transcends the confines of sheer financial metrics. An exhaustive analytical excursion invariably demands an integrative approach, assimilating macroeconomic oscillations, industry-specific dissections, and the increasingly pivotal environmental, social, and governance (ESG) determinants.

### 3. IT Industry

The Information Technology (IT) sector encompasses various sub-domains, including computer hardware, software, electronics, telecommunication infrastructure, e-commerce, and computer-centric services. Prompted by the pervasive wave of global digitization, this industry has grown exponentially in recent decades, thus emerging as a linchpin in the global economic framework. Apple and Microsoft are quintessential exemplars of technological innovation and market leadership within this expansive industry.

Incepted in 1976 by Steve Jobs and his associates, Apple has consistently been at the vanguard of design and

technological innovation, evidenced by its seminal products such as the iPhone and MacBook. Beyond its tangible offerings, Apple’s proprietary software ecosystems, notably iOS, have redefined user interfaces, rendering its global clientele a distinct and unparalleled experience.

Conversely, Microsoft, established in 1975 by Bill Gates and Paul Allen, has secured its dominance in the personal computing, primarily attributed to its Windows operating system and the ubiquitous Office software suite. Beyond this, the company has ventured into and excelled within cloud computing and enterprise solutions, cementing its position as a beacon of technological advancement.

#### 3.1 General Observation

Annual Return End of Year Price/ Beginning of Year Price X100%	MSFT	AAPL
2019	1.584128501	1.895861528
2020	1.400806143	1.79165549
2021	1.511346823	1.329913134
2022	0.715133451	0.730641576
CAGR	MSFT	AAPL
	$[(239820007/99.550003)^{1/4}-1]$	$[(129.929993/38.72251/4)-1]$
	0.245836451	0.353432206
EBIT	MSFT	AAPL
2019	42,933,000,000	63,930,000,000
2020	52,826,000,000	66,288,000,000
2021	69,903,000,000	108,949,000,000
2022	83,282,000,000	119,437,000,000
Total Revenue	MSFT	AAPL
2019	198,270,000,000	260,174,000,000
2020	168,088,000,000	274,515,000,000
2021	143,015,000,000	365,817,000,000
2022	125,843,000,000	394,328,000,000
EBIT Margin	MSFT	AAPL

Annual Return End of Year Price/ Beginning of Year Price X100%	MSFT	AAPL
2019	0.216538054	0.245720172
2020	0.314275856	0.241473144
2021	0.488780897	0.297823775
2022	0.661792869	0.302887444
EPS	MSFT	AAPL
2019	5.08	2.97
2020	5.76	3.28
2021	8.05	5.61
2022	9.65	6.11
Correlation between Annual Return and EBIT/Total Revenue	MSFT	AAPL
	-0.830788481	-0.905787282

Upon meticulous analysis of the extant data, it is evident that Microsoft registered a decrement in revenues spanning 2019 to 2021. Intriguingly, concomitant increases were observed in its EBIT and earnings per share, signifying a marked operational efficiency and profitability enhancement. It warrants mention that 2022 heralded negative annual returns; however, the company's compound annual growth rate perseveres in its robustness. The difficulties of the COVID-19 pandemic, while proffering avenues of opportunity in the realms of online services and cloud computing for Microsoft, simultaneously imposed economic encumbrances largely attributable to the prevailing global recession. Notwithstanding these challenges, Microsoft's adaptability and resilience during this tumultuous period have been laudable.

In juxtaposition, Apple (AAPL) manifested an ascendant trajectory in total revenue and EBIT from 2019 to 2022. This ascent, notably achieved amidst the multifaceted macroeconomic impediments introduced by the COVID-19 pandemic, is indeed commendable. The company's four-year CAGR, as evinced by the data, underscores a latent dynamism and growth potential.

This observation gains salience when one considers the tapering, even negative trajectory, of its annual returns by 2022. Such patterns elucidate Apple's inherent resilience, a product of its diversified portfolio, nuanced online service offerings, and adeptness in supply chain management. Even when besieged by the diverse challenges of the pandemic, Apple's unwavering business resilience and growth trajectory remain palpable.

### 3.2 Comprehensive Comparison

- **Profitability:** Assessing the trajectory through the lens of EPS, Apple manifests a marginally more rapid growth curve than Microsoft despite commencing from a lower baseline value. This could be inferred as Apple's strategic venture into launching high-margin products or augmenting its sales dynamics over the pertinent period.

- **Operational Efficiency:** Upon close examination of the EBIT margin, Microsoft has exhibited a commendable ascent, progressing from 21.65% in 2019 to 66.18% by 2022. Such a surge underscores Microsoft's proficiency in fiscal prudence and augmentation of operational efficacy. Intriguingly, Microsoft's growth rate surpasses that of Apple, signaling Microsoft's discerned strategies in cost modulation, market differentiation, and astute product valuation.

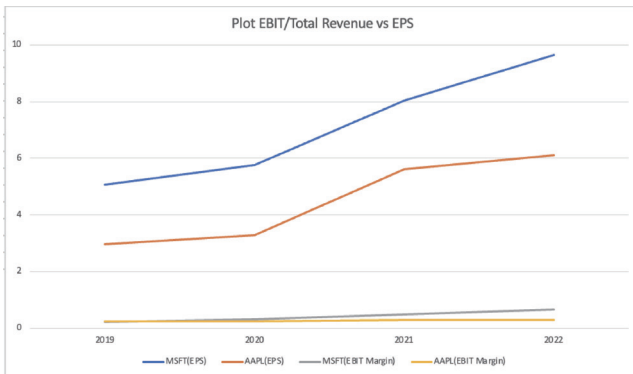
- **Market Context:** A comparative analysis between Microsoft and Apple reveals their unique market stances. Microsoft's operational ethos is predominantly delineated by its ventures into cloud computing, comprehensive office software suites, and enterprise-centric solutions. Apple, in juxtaposition, orients its modus operandi around its flagship hardware products, further bolstered by a meticulously curated ecosystem.

- **Differences in Strategy:** Microsoft's strategic capital allocation towards cloud infrastructure, epitomized by Azure, and its emphasis on subscription-based models such as Office 365 ostensibly delineate the impressive augmentation in its EBIT margins. In contrast, Apple's revenue genesis seems intrinsically linked to its venerated hardware suite, including iPhones, iPads, and the Macintosh lineage.

- **COVID-19 Impact:** The pandemic-induced shift towards telecommuting and virtual education paradigms ostensibly fortified the demand trajectory for Apple's devices like Macs and iPads. Simultaneously, with an increasing inclination towards digital realms due to stay-at-home mandates, Apple's suite of online services likely witnessed augmented consumption. However, the pandemic heralded pronounced logistical challenges for Apple, notably potential disruptions in the supply chain, which could hinder product fabrication and market availability. Global retail limitations could further dampen

direct in-store purchase dynamics. From Microsoft’s perspective, the pandemic potentially catalyzed the demand for its collaborative digital tools, exemplified by offerings like Teams and Office 365, complemented further by its cloud provisioning via Azure. However, the firm remains susceptible to potential challenges, such as hardware procurement hurdles, particularly in designated regions, and an overarching global economic downtrend may prompt enterprise sectors to recalibrate IT outlays.

### 3.3 EBIT/Total Revenue vs. EPS Plot



The graphical representations elucidate both enterprises’ comparative performance and evolutionary trajectories in profitability and operational efficiency. Between 2019 and 2022, Microsoft’s (MSFT) growth in Earnings Before Interest and Taxes (EBIT) distinctly eclipses that of Apple (AAPL). Analogously, MSFT’s Earnings Per Share (EPS) growth trajectory surpasses AAPL’s.

Throughout this quadrennial period, the ascending trend in the EPS of both corporations underscores their augmented capabilities in shareholder value creation. A pronounced uptick in EBIT margins signifies the refinement and escalation in core business profitability. Specifically, the amplification of MSFT’s EBIT margin during this temporal frame highlights a salient improvement in its infrastructural efficiency.

### 3.4 Industry Prospects

In the broader milieu of global economic dynamics, particularly in the wake of the COVID-19 pandemic, the growth trajectories of Microsoft and Apple are markedly distinguished. In confronting the difficulties precipitated by the pandemic, both enterprises have adapted to the pronounced shift towards remote working and e-learning, subsequently achieving business proliferation and notable profitability enhancement.

In this turbulent era, the domains of digitalization and technological innovation have unwaveringly showcased

resilience and substantial growth on a global scale. Microsoft and Apple, with their strategic sagacity, Microsoft and Apple have deftly maneuvered within this evolving landscape, fortifying their financial positions through pioneering innovation, strategic recalibration, and judicious operational efficiency. As the spheres of 5G, cloud computing, and artificial intelligence forge ahead, it is anticipated that both corporations will further reinforce their preeminent stances within the market.

## 4. Pharmaceutical Industry

The pharmaceutical sector is indispensable in the global health paradigm, spearheading medicinal agents’ research, development, production, and dissemination tailored to various medical conditions. Its delivery of essential therapeutic interventions underscores this industry’s pivotal contributions to global health. Though marked by hefty R&D investments and elongated developmental timelines, the sector’s potential yields from successful drug introductions are unparalleled.

Pfizer and Merck & Co. are emblematic of excellence within this international pharmaceutical milieu. Their prolific track records in drug innovations and clinical investigations underscore their formidable R&D proficiencies and penchant for groundbreaking innovations.

Established in 1849, Pfizer, an American multinational pharmaceutical behemoth, has meticulously carved its niche as a linchpin in the pharmaceutical arena, a trajectory catalyzed by its sustained commitment to innovation and rigorous research. Pfizer’s therapeutic arsenal spans many domains, from cardiovascular pathologies to infectious disorders. Its pivotal role in global pharmaceutical stewardship was further underscored by its instrumental role in developing a COVID-19 vaccine, an achievement of paramount importance amidst a dire global health crisis.

Conversely, Merck & Co., another venerated American pharmaceutical entity founded in 1891, is renowned for its profound research endeavors and diverse catalog of pharmaceutical interventions. With products addressing a multitude of therapeutic domains, from cardiovascular afflictions to respiratory and immunological disorders, Merck continually embarks on pioneering therapeutic quests. This relentless pursuit is not circumscribed to ubiquitous pathologies; Merck’s R&D also delves into rare conditions, thus illuminating therapeutic horizons for patients globally.

### 4.1 General Observation

Annual Return End of Year Price/Beginning of Year Price X100%	PFE	MRK
2019	0.908627098	1207995656
2020	0987219808	0.899395315
2021	1601573111	0.979496533
2022	0.87589747	1443811623
CAGR	PFE	MRK
	$((51.240002/40.910816)^{1/4}-1)$	$[(110.949997/1.8416C6)^{1/4}-1]$
	0057895449	0.114776527
EBIT	PFE	MRK
2019	12,331,000.000	7,300.000.000
2020	7.812.000.000	4.973.000.000
2021	23,652,000,000	12,538,000,000
2022	36.551.000.000	17.945.000.000
Total Revenue	PFE	MRK
2019	41.172.000.000	39,121,000,000
2020	41.651.000.000	41.518,000.000
2021	81.288.000.000	48.704.000.000
2022	100,330,000,000	59,283,000,000
EBIT Margin	PFE	MRK
2019	0.29949966	0.186600547
2020	0.187558522	0.119779373
2021	0290965456	0257432654
2022	0364307784	0.302700606
EPS	PFE	MRK
2019	1.85	221
2020	1.18	1.78
2021	3.93	4.86
2022	547	571
Correlation between Annual Return and EBIT/Total Revenue	PFE	MRK
	-0087339208	0.692877476

In a meticulous analysis of Pfizer’s (PFE) fiscal trajectory

from 2019 through 2022, one observes conspicuous growth in revenue, EBIT, and EPS metrics, with the zenith observed between 2021 and 2022. This robust growth can be primarily ascribed to the research, production, and subsequent sales of the COVID-19 vaccine. Remarkably, the 2021 fiscal year witnessed an annual return amassing 160.16%, juxtaposed against a four-year compound annual growth rate (CAGR) of a modest 5.79%. 2020 presented a slight diminution in the EBIT margin, a conceivable result of the substantial capital funneled into the nascent stages of vaccine development. However, the fiscal recovery in the ensuing years was expeditious. The overarching narrative suggests an optimistic influence of the COVID-19 pandemic on Pfizer’s fiscal health.

Conversely, Merck (MRK) charted a more capricious financial course between 2019 and 2022. Annual returns, having ascended to a commendable 120.80% in 2019, witnessed an ebb in 2020, only to rebound assertively to 144.88% by 2022. Over this span, the firm registered a CAGR of 11.48%. The fiscal performances in 2021 and 2022 are particularly salient, manifesting marked enhancements in EBIT, overarching revenue, and EPS—indicative of sustained profitability and revenue augmentation. Considering Merck’s strategic forays into antiviral therapeutics and related pharmaceutical innovations in the context of COVID-19, the pandemic’s auspicious fiscal ramifications during this period stand out conspicuously.

### 4.2 Comprehensive Comparison

**Profitability:** An analysis of Merck’s (MRK) EPS reveals substantial growth, manifesting an approximately 2.6-fold increase from 2.21 in 2019 to 5.71 in 2022. In juxtaposition, Pfizer’s (PFE) EPS is almost tripling, evolving from 1.85 in 2019 to 5.47 in 2022. Even with a lower inception EPS, Pfizer delineates a slightly accelerated growth trajectory compared to Merck. This observation insinuates that Pfizer’s capital allocation and revenue accrual from its COVID-19 vaccine likely outstrip Merck’s analogous ventures. Such data underpins the strategic advantages attendant with a vaccine’s expeditious development and deployment, culminating in enhanced market capitalization and dominion for Pfizer.

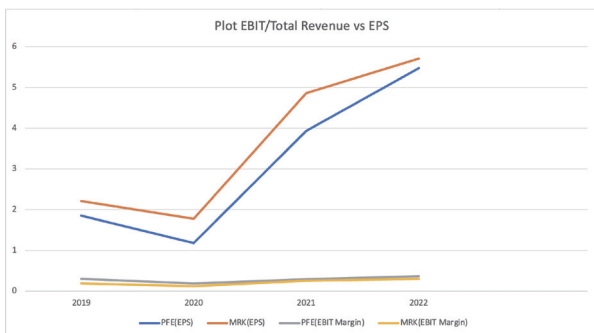
- **Market Context:** Merck’s engagements span various medical disciplines, yet a transformative breakthrough about the COVID-19 vaccine remains elusive. Contrarily, while Pfizer boasts a multifaceted medical portfolio, its COVID-19 vaccine indisputably emerges as the linchpin of its growth paradigm.

- **Data Relevance:** A meticulous examination reveals a robust positive correlation between Merck’s annual yield and EBIT margin. This relationship postulates that



an augmentation in Merck’s EBIT margin invariably parallels an enhancement in its annual yield. Such a nexus epitomizes the symbiosis between Merck’s operational acumen and equity market performance. Conversely, Pfizer’s annual yield and EBIT margin maintain an ambiguous correlation. This ambivalence suggests that Pfizer’s equity market trajectory might be predicated on a more intricate tapestry of factors, potentially encompassing macroeconomic variables, nuanced microeconomic fluctuations, or distinct organizational milestones.

**4.3 EBIT/Total Revenue vs. EPS Plot**



Upon analyzing the chart juxtaposing EBIT Margin with Earnings Per Share, it becomes discernible that both corporate entities exhibit an ascending trend in EPS and EBIT Margin from 2019 to 2022.

In the fiscal year 2019, Pfizer’s EBIT margin was markedly superior to Merck’s. Yet, a transition is noted in 2020, where both enterprises register diminished EBIT margins, Pfizer’s decline being particularly salient. This contraction can plausibly be ascribed to the global economic alterations induced by the advent of COVID-19. Interestingly, the subsequent years, 2021 and 2022, herald a revival in their financial metrics. Such an upswing during these years can reflect the companies’ agile strategic recalibrations, particularly in vaccine research, development, and distribution, concurrent with the pandemic’s evolution.

**4.4 Industry Prospects**

The advent of COVID-19, commencing in 2019, has imparted a transformative impact on the global pharmaceutical paradigm. With the urgency of vaccination and therapeutic intervention escalating worldwide, the sector’s research and development, alongside production proficiencies, became paramount, thus delineating novel market opportunities. Esteemed entities like Pfizer and Merck have epitomized industry responsiveness by advancing in outbreak mitigation, vaccine formulation, and therapeutic drug creation. Furthermore, as many nations verges on culminating their vaccination endeavors, the pharmaceutical arena might be poised to recalibrate its

focus, addressing post-pandemic therapeutic modalities, emergent pharmacological necessities, and protracted health quandaries.

In an overarching analysis, the COVID-19 epoch has undeniably ushered transformative dynamics within the pharmaceutical milieu. The operational contours of Merck and Pfizer offer a perceptive insight into the industry’s resilient adaptability, innovation, and prosperity amidst an unparalleled health exigency. These conglomerates exhibited laudable acumen across research, market responsiveness, and fiscal gains.

**5. Digital Healthcare**

Digital healthcare, an evolving domain, melds information technology (IT) with pharmaceutical expertise to enhance patient outcomes and streamline healthcare processes. By leveraging digital technologies, this discipline aims to elevate the quality, efficiency, and accessibility of health and wellness provisions. Digital healthcare bolsters operational efficiency, enabling swift information exchange among providers and augments patient engagement, facilitating proactive health management. This paradigm broadens healthcare access for remotely situated patients, allows medical professionals to offer tailored treatments, and propels advancements in medical research. This framework is anticipated to curtail long-term healthcare expenditures due to the minimization of redundant tests and errors. Moreover, its indispensable utility in disease monitoring, diagnostic testing, and vaccine dissemination became starkly evident during global health emergencies like the COVID-19 pandemic. As global demographics tilt towards an aging population, the tools and technologies underpinning digital healthcare will be crucial in addressing burgeoning medical needs and assuring the delivery of premium healthcare services. The convergence of IT and pharmaceuticals is gaining momentum due to the escalating dependency of contemporary medicine on data-driven decisions. The present-day healthcare sector grapples with the challenges of surging data volumes and rapid technological evolutions. Predominantly, the explosion of medical datasets, encompassing genomics, bioinformatics, and electronic health records, has been overwhelming. IT solutions, especially big data analytics and artificial intelligence, have become pivotal in deciphering and navigating this data deluge. Furthermore, there’s an emergent demand for instantaneous, tailored, and precision-driven medical interventions. Integrating IT and pharmaceutical insights facilitates nuanced drug discovery, customized therapeutic pathways, and optimized patient care protocols. The ascendance of digital health

ecosystems, telemedicine, and wearable tech innovations accentuates this nexus between the two disciplines. Such an amalgamation promises enhanced patient outcomes and unveils myriad avenues for pioneering innovations within the healthcare realm.

## 6. Conclusion

As people stand on the cusp of an era dominated by digital health innovations, there's a notable surge in the assortment and capabilities of these solutions. However, juxtaposed against these progressive strides is a conspicuous deficit in trust and confidence across stakeholders — from patients and medical professionals to fiscal entities, industry magnates, and regulatory bodies. To introduce transparency into the nebulous realms of the digital health marketplace, there emerges an imperative for 'value investing,' a paradigm that advocates for objective, transparent, and criteria-centric assessments of digital health entities.

The quintessential ethos of value investing pivots on the commitment to infuse capital predicated on an enterprise's inherent worth, eschewing the mercurial whims of market sentiment or the capriciousness of transient trends. At the nexus of IT and the pharmaceutical landscape, this investment doctrine champions a perspicacious, long-range orientation, fostering a robust fiscal foundation that galvanizes research, development, and innovation of tangible consequence. By anchoring their strategies to intrinsic value, investors, alongside corporate entities, can strategize resource allocation with prudence, circumnavigate the pitfalls of market inflation, and discern undervalued prospects within the tumultuous terrains

of volatile markets. This value-oriented compass, thus, bestows stakeholders with a nuanced methodological framework to navigate the multifaceted labyrinth of the digital health domain.

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