

The Henry Fund

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SYNOPSYS, INC. (SNPS)

Information Technology – Application Software

November 15, 2023

Investment Thesis

We recommend a BUY rating on Synopsys with a target price range of \$580-\$595, representing an 8-11% upside from its current price of \$538.32. Synopsys is the market leader in the electronic design automation (EDA) industry, which is fundamental towards the design and manufacture of semiconductor chips. As chip complexity continues to increase and demand for AI chips continues to grow, we expect Synopsys to deliver strong long-term growth.

Drivers of Thesis

- Synopsys is well-positioned in the EDA industry, being the current market leader, with ~5% market share lead over Cadence Design Systems, its closest competitor. The firm has a time-based, recurring revenue model, offering resilience through uncertain economic conditions.
- EDA tools are essential towards designing semiconductor chips in many end markets, especially given the increasing complexity of these chips.
- Growth in technologies such as AI, machine learning, IoT, 5G, and automotive are expected to spur demand for Synopsys's solutions.

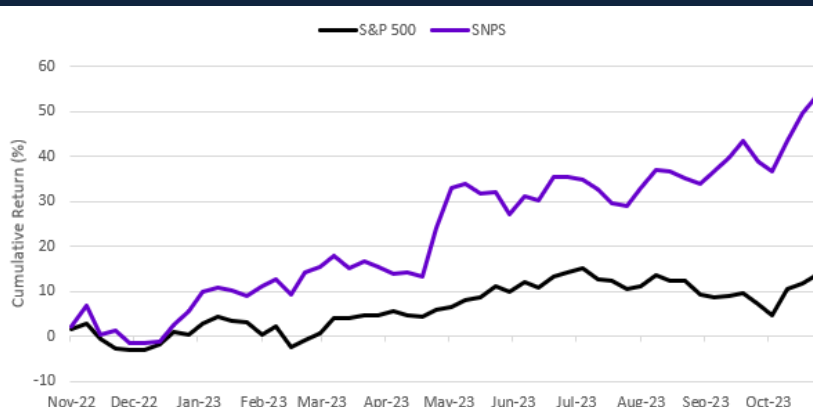
Risks to Thesis

- The growth of SNPS, as well as the EDA industry depends primarily on the semiconductor and electronics industries. If this growth fails to materialize, over 90% of SNPS's business could be adversely impacted.
- SNPS may be susceptible to regulatory risks via export restrictions to certain end markets, namely China. While current restrictions do not pose a material threat, these have a fair likelihood to increase in the future.
- The EDA industry is highly competitive and dominated by three major players. As a result, innovation and competitive product offerings are key to maintaining Synopsys's market share.

Earnings Estimates

Year	2020	2021	2022	2023E	2024E	2025E
EPS	\$4.40	\$4.96	\$6.44	\$7.87	\$8.60	\$10.25
HF est.				\$7.90	\$9.71	\$11.90
growth	23.9%	12.7%	29.8%	16.7%	29.1%	22.6%

12 Month Performance



Stock Rating

BUY

Target Price

\$580-595

Henry Fund DCF	\$582
Henry Fund DDM	N/A
Relative Multiple	\$522

Price Data

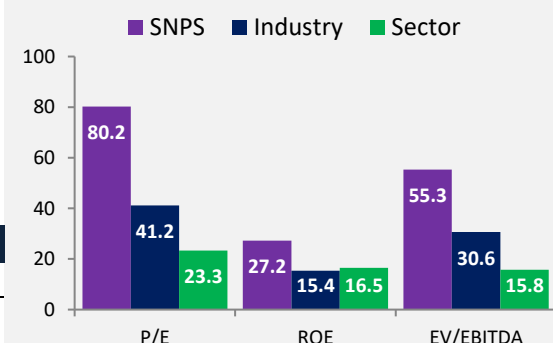
Current Price	\$538
52wk Range	\$312.25 – 538.32
Consensus 1yr Target	\$517

Key Statistics

Market Cap (B)	\$81.3
Shares Outstanding (M)	\$152.1
Institutional Ownership	88.5%
Beta	1.08
Dividend Yield	0.0%
Est. 5yr Growth	26.0%
Price/Earnings (LTM)	80.2
Price/Earnings (FY1)	42.3

Profitability

Operating Margin	22.9%
Profit Margin	19.4%
Return on Assets (2022)	10.8%
Return on Equity (2022)	27.2%



Company Description

Synopsys, Inc. (SNPS) is a leading provider of electronic design automation (EDA) software, intellectual property, and software integrity products, which are essential for designing semiconductor chips. SNPS is the current market leader in the EDA industry, which is dominated by SNPS, Cadence Design Systems, and Siemens EDA. Given the increasing complexity of semiconductor chips, SNPS is expected to significantly benefit as a provider of EDA tools with AI integration. SNPS was founded in 1986 and is headquartered in Sunnyvale, CA.

Important disclosures appear on the last page of this report.

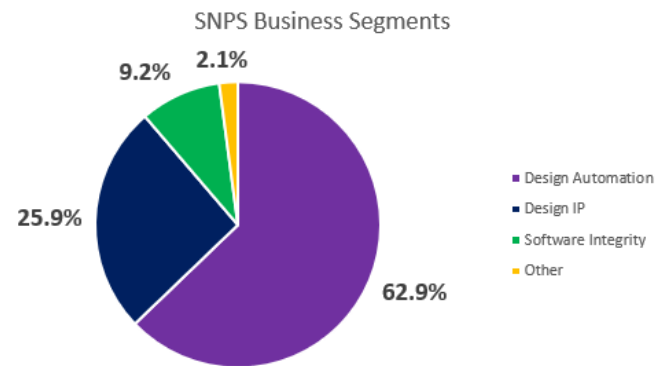
COMPANY DESCRIPTION

Synopsys, Inc. (SNPS) is a leading provider of electronic design automation (EDA) software, intellectual property, and software integrity products. As will be highlighted below, SNPS's products are essential towards the design and manufacture of semiconductor chips, a role which is significant given the prevalence of AI chips and ever-increasing complexity of semiconductor chips.

SNPS classifies its business model as being a time-based, recurring revenue model, with a non-cancellable backlog of \$7.1 billion. SNPS typically sells EDA products and services through Technology Subscription License (TSL) agreements, which generally last 3 years and include the use of all licensed products and maintenance³. This helps add significant stability in revenue even despite challenging economic conditions, which is favorable during uncertain economic periods.

These time-based products make up ~60% of SNPS in total revenue, which has fallen from 74% since 2018, given the increased demand for chip design IP, with revenues generally recognized upfront. We do not view this change as a significant threat for SNPS, given the robust nature of EDA industry (as it is required to design semiconductors) and the high expected growth arising from Design IP.

Effective Q1 FY 2023, SNPS changed its previous two reportable segments to the following three: Design Automation, Design IP, and Software Integrity. We forecast our revenues based on these new segments, given that we have revenue data backdated to 2021, to incorporate management estimates/outlook more accurately, as well as having consensus estimates to benchmark against. As a result, we note that products and services highlighted under certain segments in this report may be subject to change with SNPS's FY 2023 annual report, expected November 30, 2023.



Source: SNPS

Electronic Design Automation (EDA) Overview

To understand SNPS's prospects as a firm and its products, it is important to understand EDA, the market in which SNPS operates. EDA refers to the collection of software, hardware, and services which are essential for the design and manufacture of semiconductor chips. While EDA is not involved directly with manufacturing chips, it does have three important applications, per Synopsys:

1. **Technology computer-aided design (TCAD):** Used to design and validate semiconductor manufacturing processes to ensure it delivers the required performance and density³.
2. **Design for Manufacturability (DFM):** Used to verify that a design will meet all requirements of a manufacturing process. This is done to ensure that the chip will function and not operate at a reduced capacity³.
3. **Silicon Lifecycle Management (SLM):** Performance of a chip is monitored after it is manufactured, to ensure that it continues to perform as expected and that tampering has not occurred³.

In addition, semiconductor intellectual property (IP) is closely associated with EDA, which allows highly complex chips to be designed in far less, as existing design work can be reused³.

Three types of EDA tools exist, outlined below:

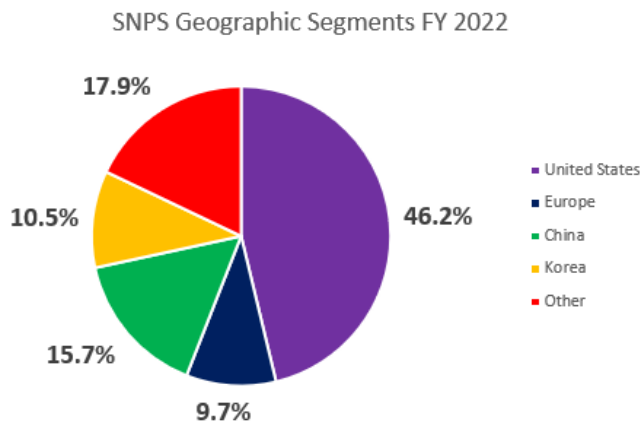
1. **Simulation:** Can predict circuit behavior pre-implementation from proposed circuit descriptions³.
2. **Design:** Assemble circuit elements to implement proposed circuit functions from a given description³.

3. **Verification:** Confirms if the resulting design is connected correctly and will deliver the required performance³.

Semiconductors are very complex, oftentimes containing billions of transistors on a very small chip, which must work flawlessly³. For instance, the Nvidia H100 GPU contains 80 billion transistors on a single chip⁸. If there is an error in a manufactured chip, the entire chip needs to be re-designed and re-manufactured, incurring very high costs, and potential project failure. Without EDA tools, achieving this and successfully managing semiconductor complexity is impossible³.

Geographic Business Segments

SNPS reports across five geographical segments: United States, Europe, China, Korea, and Other. As of FY 2022, the majority of revenue came from the United States, making up almost half of revenues, with the second-largest country revenue coming from China, at around 15%. Over the past few years, revenues from China have been making up an increasing percentage of SNPS's revenue, though this exposure remains lower than other semiconductor firms, such as Nvidia, which has a total 47% revenue exposure to China and Taiwan.



Source: SNPS

Design Automation

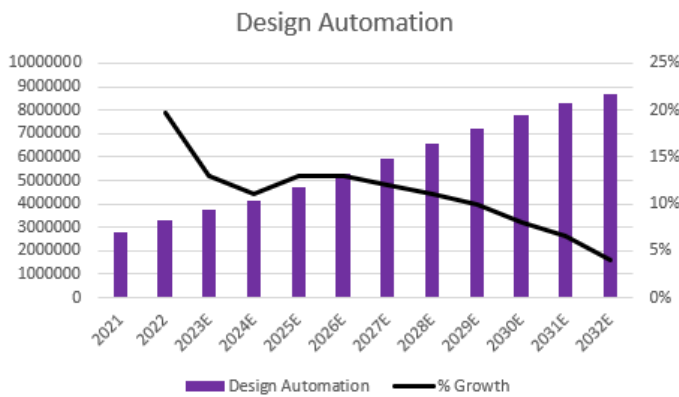
Broadly, the Design Automation segment includes software and hardware used to validate the electronic systems that incorporate chips and the software that runs on them³. This segment also includes technical services and support to help customers develop advanced chips and electronic systems³.

SNPS is the market leader in EDA, with chip designers being able to use SNPS's EDA products to automate the chip design process, reduce errors, verify the chip design behaves as intended, and enable more powerful and robust designs¹. According to SNPS CEO Aart de Geus, every one of SNPS's EDA tools has AI and machine learning (ML) capabilities⁹, allowing for more efficient design of complex chips while meeting all performance and power requirements. In addition, all leading semiconductor companies in the world use Synopsys technology³, including TSMC, Intel, and Samsung.

Specific offerings include, but are not limited to:

- **DSO.ai (Design Space Automation):** Uses AI/ML for optimizing chip design. By using AI/ML algorithms, DSO.ai can identify and generate more improvements than human engineers would be able to do³
- **Synopsis.ai:** The industry's first full-stack, AI driven EDA-suite, used for the verification, testing, and manufacturing of digital and analog chips³.
- **Verification Hardware:** The ZeBu Server 5 offers the highest performance for large workloads, 99.9%+ projected uptime, and the best data center scalability through power and footprint³.

Design Automation is SNPS's largest segment by revenue, comprising ~65% of total revenues. In our view, we expect strong growth in this segment, incorporating double digit growth in our model through 2030, in-line with SNPS's long-term targets. The ultimate growth driver for this segment is increasing chip and system complexity, which will be further explained under our Industry Trends section. In addition, we view AI as being a key driver in this segment, as it drives the need for much faster, lower power consumption, and much higher capacity for chips, per SNPS CEO Aart de Geus. Within this area, SNPS is a market leader.



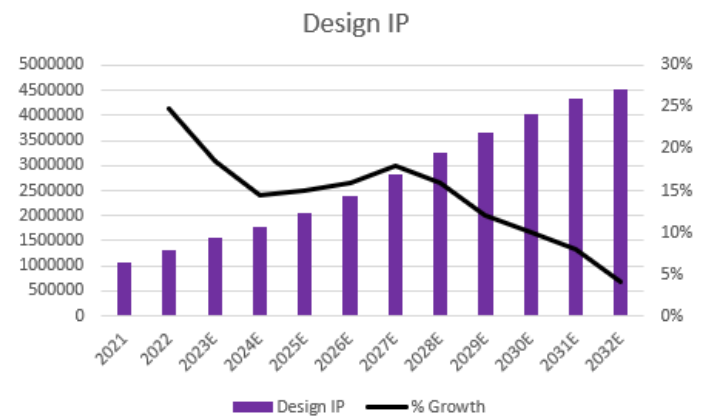
Source: SNPS, HF Estimates

Design IP

Design IP is SNPS's second-largest segment by revenue, totaling ~25%, consisting of pre-designed circuits used by engineers as components of larger chip designs, rather than having to design it themselves. This helps to reduce chip design costs, lowers risks, and lowers the chips' time to market. Specific products include foundation IP, analog, interfaces, processors, and subsystems³.

This segment serves primarily companies in the semiconductor and electronics industries, in growing markets such as Internet-of-Things (IoT), automotive, security, and cloud computing, all of which are expected to see high growth over our forecast horizon.

Currently, SNPS has the second-largest market share in Design IP, a \$6.7 billion market which has grown by a CAGR of 11.8%. SNPS is behind ARM and ahead of competitor Cadence Design Systems in terms of market share, with values of 19.7%, 41.1%, and 5.4%, respectively¹⁰. We expect growth for this segment to continue in-line with SNPS's mid-teens guidance through 2030, as it is benefitted through customers' move to outsourcing increasingly complex IP³. In addition, this segment is set to strongly benefit from tailwinds in technologies such as AI/ML, IoT, 5G, automotive, and more, which IP blocks cater to and are driving demand. We expect each of these technologies is expected to see significant growth over our forecast horizon.



Source: SNPS, HF Estimates

Software Integrity

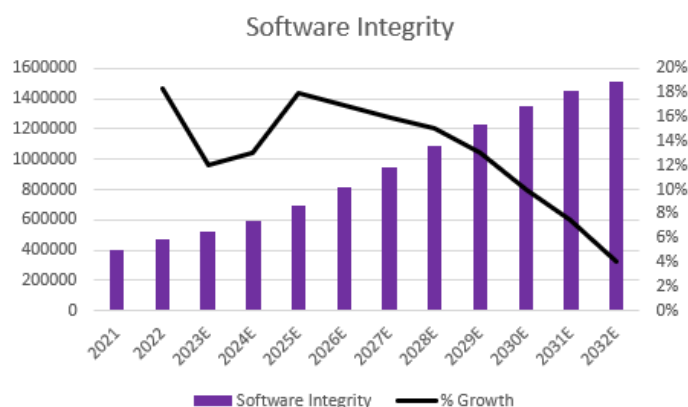
The Software Integrity segment includes solutions that enable organizations to manage application security, quality, and compliance risks at the speed demanded by their business. Within this segment, SNPS services companies in a wide range of industries, from semiconductors and systems to financial services, medical, industrial, and automotive industries³, with a served available market (SAM) of ~\$2.5-3.0 billion.

Currently, SNPS maintains the broadest portfolio of solutions in the market, with over \$500 million in trailing twelve-month revenue, in part driven by increased recognition of the cost of software failure³.

Specific offerings in this segment (non-exhaustive) include:

- Solutions for widely used interfaces such as USB, PCI Express, DDR, Ethernet, HDMI, etc.
- Processor solutions for Intel ARC processors, neural network processors, and more.
- Security IP solutions

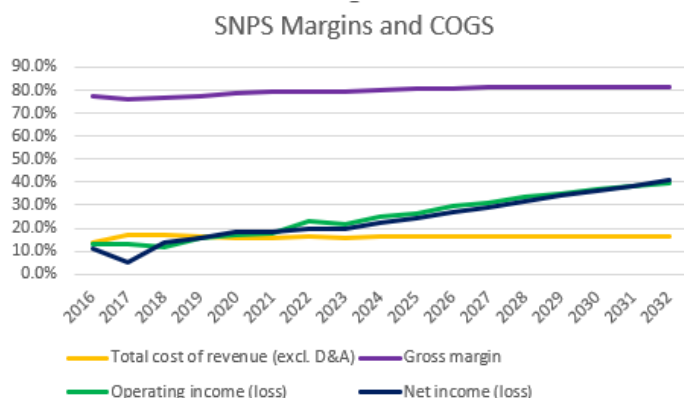
SNPS expects this segment to grow by 15-20% over the long term, driven by growth of software, increasing cloud transformation, cybersecurity risks to businesses, rise of open-source software, and complexities of the software supply chain. We expect these trends to hold over our forecast horizon, and thus forecast revenue for this segment in-line with SNPS estimates (albeit more conservatively as we approach our CV year).



Source: SNPS, HF Estimates

Cost Structure Analysis

The figure below SNPS's gross margin, operating margin, cost of revenue, and net margins over the historical period and our forecast horizon:



Source: SNPS

We forecast SNPS's margins to improve over time as the company continues to scale and continue to incorporate AI to optimize and automate their existing workflows. We take into account historical averages of the changes in operating expenses as a percent of total revenue, and expect this to decrease over our forecast horizon.

Debt Maturity Analysis

SNPS is currently very favorable in terms of debt, with no short-term debt as of FY 2022, and a historically low long-term debt balance of ~\$20 million. This is markedly lower than Cadence Design Systems, which has a long-term debt balance of \$648 million. With over \$1.4 billion in cash and cash equivalents in FY 2022, we do not anticipate SNPS having trouble repaying their debt. Currently, as no credit

ratings were available for SNPS and some members of its peer groups, we do not factor this into our analysis.

In terms of liquidity ratios, SNPS has a quick ratio of 1.01 and a current ratio of 1.06, with over \$1.4 billion in cash and cash equivalents in FY 2022. As a result of all these factors, we do not anticipate SNPS having issues repaying their debt.

ESG Analysis

We find SNPS to be very well-positioned among its peers, having an ESG risk rating of 14.42, the lowest among its peer group. In the table below, a lower ESG risk rating is considered better.

Company	ESG Risk Rating	
Synopsys (SNPS)	14.42	Low
Cadence Design Systems (CDNS)	28.96	Medium
Siemens (SIE)	28.38	Medium
Ansys (ANSS)	15.89	Low
Autodesk (ADSK)	16.76	Low
PTC (PTC)	19.09	Low

Source: Morningstar Sustainalytics

In addition, SNPS ranks highly in terms of its ESG scores relative to its industry group and the global universe of companies covered by Morningstar:

ESG Risk Rating		COMPREHENSIVE	Ranking	
14.4		Low Risk	Industry Group (1st = lowest risk)	
			Software & Services	44 out of 1101
			Universe	
			Global Universe	1413 out of 15717

Source: Morningstar Sustainalytics

This is driven by SNPS's relative strong ESG initiatives, which includes their Smart Future ESG Strategy, providing a framework for SNPS to manage business-relevant ESG matters and make meaningful progress towards ESG initiatives across six categories: people, cyber security, supply chain, social impact, industry sustainability, and the environment.

A non-exhaustive list of SNPS's ESG progress from the previous fiscal year include³:

- 25% power reduction for customer systems-on-chip (SoCs) through SNPS's low power EDA solutions.

- Achieved CarbonNeutral company certification for fourth consecutive year.
- Mitigated approximately 50% of their North America energy demand.
- ~30% representation of women on Board of Directors.

RECENT DEVELOPMENTS

Q3 FY 2023 Earnings Announcement

SNPS announced their third quarter earnings for FY 2023 on August 6, 2023. They reported a GAAP EPS of \$2.17, non-GAAP EPS of \$2.74. and revenue of \$1.487 billion, beating consensus estimates for non-GAAP EPS and revenue by 5.25% and 0.30%. respectively. This was primarily driven by continued semiconductor design starts and R&D investments despite economic challenges, paired with growth in each of their revenue segments. The company also increased its revenue forecast for FY 2023 to be between \$5.81-5.84 billion, up from \$5.79-5.83 billion. This is despite what is expected to be a down year for the chip market, with industry sales likely to be off in the low double-digits⁶.

AI Monetization

SNPS highlighted three distinct value streams for their monetization of AI:

1. **Participation in design and very strong growth in demand for AI chips:** With more companies designing AI chips, solutions are needed for their specific applications, with SNPS being the leading EDA provider to AI chip designers². SNPS cites estimates that the current \$20-30 billion market for AI chips will exceed \$100 billion by 2030 (CAGR of ~22%).
2. **Embedding their AI solutions across Synopsys.ai:** Used by customers for the automation of entire design sub flows, reduced time to market, and to increase performance of chips. Due to the significance of this offering, we highlight this in a dedicated section.
3. **AI-driven efficiency transformation:** We expect future cost savings and continued economies of scale as SNPS optimizes and automates their internal workflows. Generative AI in particular is a significant tailwind here, with an expected CAGR of 42% over the next 10 years⁵

Leadership Change

In addition, it was announced that Sassine Ghazi, the current president and COO, will succeed the current CEO and co-founder of SNPS Aart de Geus effective January 2024. We view this as favorable, given Ghazi's 25-year history with the company, as well as being the one to lead AI-driven chip design at SNPS, which we expect will be core to their revenue stream as the firm continues to capitalize on AI growth.

Outlook

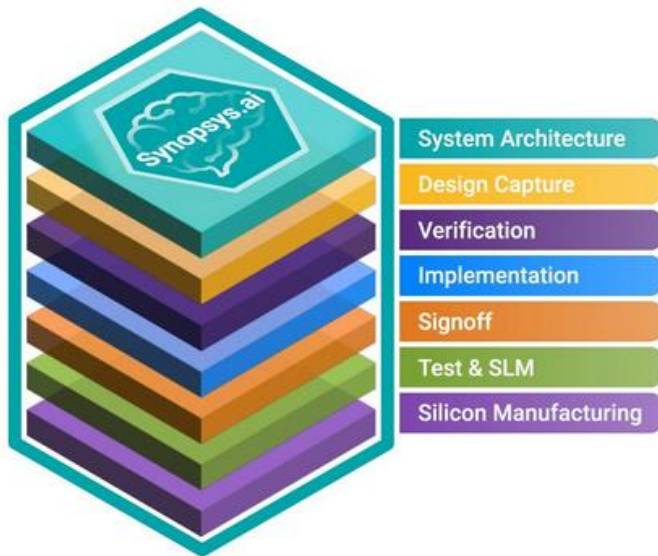
Lastly, SNPS highlighted their long-term objectives, which we factor in as a baseline for our forecasts, given SNPS strong history with meeting earnings expectations and our confidence in their business/competitive positioning. Their per-segment growth guidance is as follows:

- **Design Automation:** double digits.
- **Design IP:** mid-teens
- **Software Integrity:** 15-20%
- **Overall revenue:** double-digit growth

As for their cash flow, SNPS intends to use it for organic investments, M&A, and stock buybacks.

Synopsys.ai

As mentioned previously, Synopsys.ai is the industry's first full-stack, AI driven EDA-suite, used for the verification, testing, and manufacturing of digital and analog chips. As shown in the figure below, this incorporates a variety of solutions by SNPS:



Source: Synopsys

Strong Adoption

In February, SNPS reported that customers have reached 100 commercial tape-outs (the stage where a design is sent to be manufactured, a critical step in chip development) using their AI and is up to 270 as of their most recent earnings call. In addition, nine out of the top 10 semiconductor vendors are using Synopsys.ai in production, with the tenth already in test phases². These indicate both strong adoption both among large and small players and the efficacy of Synopsys.ai, given that it is being issued at that stage in development.

Expected Design Engineering Gap

One of the main challenges facing the semiconductor industry is a talent shortage, with 50% more workers needed by 2030, driven by increasing drive for chip self-sufficiency in the United States, European Union, and China¹¹. Therefore, the use of AI to bridge this talent gap will be essential, with SNPS citing 10 times faster turn around time and double-digit improvements in verification coverage among customers².

Outlook

SNPS has stated that Synopsys.ai revenue is just starting to ramp up, with customers now increasingly adding Synopsys.ai subscriptions. In addition, the firm saw multiple full-flow switches to Synopsys.ai from competitors, driven by 10 times productivity differentiation compared to competitors².

Copilot

On November 15, 2023, SNPS announced Synopsys.ai Copilot, resulting from a strategic collaboration with Microsoft to integrate Azure OpenAI service for use in semiconductor design. This will allow engineers to make natural language requests/queries for chip design, helping to increase productivity and address the issue of a workforce shortage^{6,3}. As of this report, Synopsys.ai Copilot is available for early access customers.

We are very optimistic regarding the long-term growth prospects of Synopsys.ai, as well as the potential for the tool to have significant impacts on growth for SNPS. In our forecasts, this is reflected through generally above-consensus growth expectations in SNPS's Design Automation segment. As the demand for AI chips continues to rise, we expect this to be a significant tailwind for SNPS.

COVID-19 Impact

To date, the COVID-19 pandemic has caused minor disruptions to SNPS, such as logistical challenges from a disrupted supply chain and slowdown in customer commitments in the Software Integrity segment, resulting in a 0.9% growth year-over-year, far lower than the historical average³. In 2020, SNPS experienced additional resilience through ~64% of its revenues coming from time-based products.

Overall, the EDA industry generally benefited from the pandemic, as demand for software, chips, and other electronics products increased, resulting in profits surging¹². This was able to offset the negative impact from supply chain disruptions which occurred over the course of the pandemic. Given SNPS's robust end markets and stable nature of its revenues, we do not anticipate the pandemic to have a significant continued impact on the firm.

Russia-Ukraine War

SNPS has ceased all business operations in Russia beginning in Q2 FY 2022 and does not currently have employees or operate in Ukraine. This has not had a material impact on SNPS's business, and as long as the United States has sanctions in place on Russia and Belarus, SNPS does not plan to resume operations there³.

Recent Acquisitions

PikeTec

On August 23, 2023, SNPS acquired PikeTec GmbH, a German leader in solutions for the testing and verification of automotive software for control unit systems, which is important given the increasing complexity of software-defined vehicle (SDV)³. SDVs, or vehicles whose features and functions are primarily enabled through software (APTIV), have been emerging, expected to create more than \$650 billion in value for the automotive industry, and make up 15-20% of industry value by 2030 (BCG).

We expect this acquisition to be beneficial for SNPS, given the significant tailwinds for growth in SDVs and the digital twins market, as well as PikeTec's ability to enhance SNPS's current offerings in the automotive space. Currently, the terms of the deal have not been disclosed, but according to SNPS are not material to the firm's financials.

Partnerships

Given SNPS significant role in the semiconductor industry, we highlight some key partnership developments that have occurred recently. We expect these partnerships to continue to occur in the future as SNPS continues to integrate AI and expand their offerings. We note that this list is non-exhaustive and is intended to highlight SNPS's partnered initiatives in the industry.

Nvidia: Nvidia partnered with SNPS to run Synopsys Optical Proximity Correction (OPC) software on Nvidia's computational lithography (cuLitho) platform, accelerating performance from weeks to days¹³. In addition, as a supporter of Synopsys.ai (alongside TSMC, IBM, and MediaTek), Nvidia is working with SNPS to accelerate and improve production across the industry³.

ARM: In May 2023, SNPS expanded their agreement with ARM to join ARM Total Design, providing IP and design services using Synopsys.ai, building on 30 years of collaboration between the two firms³. We view this as beneficial towards SNPS, given the increased adoption of Synopsys.ai among partners, benefiting the potential for strong long-term growth prospects.

TSMC: In April 2023, SNPS announced a collaboration with Taiwan Semiconductor (TSMC) to deliver digital and custom design EDA flows on TSMC's most advanced N2

process, referring to the new generation of chips with increased performance and chip density³. We view this as a beneficial for SNPS, given that their technologies are actively being used to design the world's most advanced semiconductors.

Microsoft: In a strategic collaboration with SNPS to integrate Azure OpenAI service for use in Synopsys.ai offering.

INDUSTRY TRENDS

China Export Restrictions

On October 7, 2022, the United States introduced new restrictions on Chinese entities to obtain advanced computing chips, develop and maintain supercomputers, and manufacture advanced semiconductors. In addition, on October 14, 2022, the US imposed restrictions on exports including EDA software specifically for the development of ICs with Gate-All-Around Effect Transistor structures³.

Currently, SNPS does not anticipate these regulations in their current form to have a material impact on their business, though notes how this will be a key area to monitor.

Ultimately, while we view the potential increase export restrictions as a threat to SNPS, we believe the firm will be able to successfully face these challenges. This is driven by the firm's robust end markets, continued strong demand for chips, and that China comprises a relatively low percentage of SNPS's total revenue, or 15%.

Moore's Law & Increasing Chip Complexity

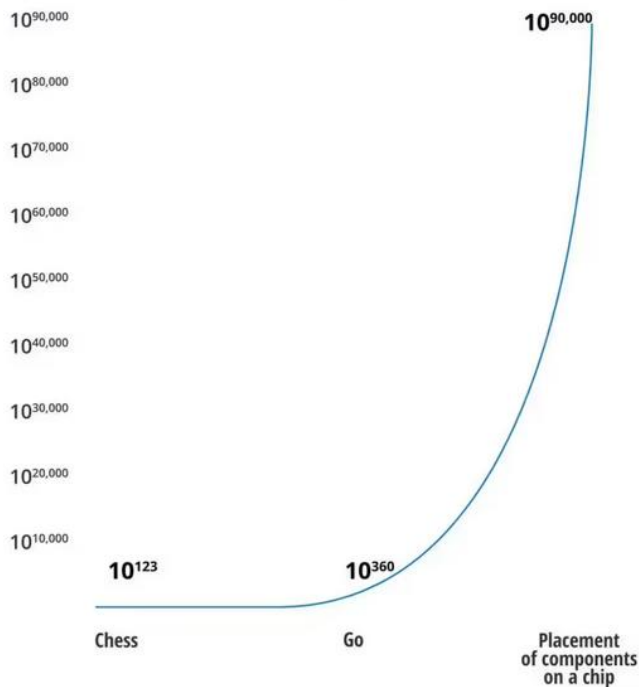
Moore's Law, created by Intel co-founder Gordon Moore in 1965, states that the number of transistors on a microprocessor chip roughly doubles every two years, with the cost being halved over the same period. For the semiconductor industry, this has significant implications as Moore's Law has been used for long-term planning and research and development targets. Therefore, an end to Moore's Law would have negative implications on future growth for companies reliant upon it, such as Intel.

While Moore's Law has held historically, the chips now are at the single-digit nanometer level. Chip designers pack billions of transistors onto a single chip to satisfy the needs of different computationally intensive applications,

namely AI, high-performance computing, and networking³. A proposed way around these bottlenecks include angstrom-level scaling (referring the one ten-billionth of a meter), which would allow more transistors to be fit on a chip to deliver greater performance at lower power³, as nanometer-scale chips may no longer suffice in the future.

We expect this increasingly complexity and challenges faced with Moore's Law to benefit the EDA software industry. As the complexity of chips increases with more transistors and other circuit components, especially on the proposed angstrom-scale, EDA solutions are needed to design these chips effectively and efficiently. In particular, the integration of AI algorithms as allowed chip design to continue to improve efficiency¹².

The relative complexity of chips can be visualized in the figure below. Compared to all the possible configurations of games such as Chess or Go, chip designs have exponentially more, speaking to the need for AI in chip design.



Source: Adapted from Synopsys, "What is Design Space Optimization?," July 21, 2020.

Source: Deloitte Insights

CHIPS and Science Act

In November 2022, the Biden administration passed the CHIPS and Science Act, allocating more than \$80 billion to domestic semiconductor production¹². This is expected to

benefit EDA solutions providers which allow for these semiconductors to be designed. In addition, advancements in semiconductors require advancements in EDA, with EDA tools being integrated across the entire chipmaking process³. As a result, we expect SNPS to benefit from this.

MARKETS AND COMPETITION

The EDA software industry has expanded significantly in the past five years at a CAGR of 9.5%, driven by increased enterprise spending, changes in semiconductor technology, shifts in electronics demand, and increasing chip complexity¹². While the threat of new entrants is not an immediate threat, this will be important to monitor in the future. With China's stated intention to become a global leader in all segments of the semiconductor industry by 2030, this has the potential to lead to increased competition and further restrictions.

Currently SNPS, alongside Cadence Design Systems (CDNS) and Siemens AG effectively dominate the EDA industry, as they are the only three developers in the world with software across the entire chip engineering¹². While SNPS is the market leader of these three, with 15.2% market share (compared to 9.7% for CDNS and 3% for Siemens), particular emphasis should be placed on these two firms, as these are Synopsys's closest competitors. For the rest of our peer group, we opted to include other companies operating in the EDA and computer-aided design (CAD) software space. These include Ansys (ANSS) and Autodesk (ADSK).

It should be noted that Siemens is a German company not listed on a US exchange. As a result, we opt to use the company's American Depository Receipt (ADR) listing in the US, under the ticker SIEGY.

Metric Comparisons

While Siemens has a higher market capitalization than SNPS, it is a multinational technology conglomerate, with their EDA business operating within their Digital Industries segment, comprising 27% of their total revenues⁴. As shown in the table below, SNPS as net and operating margins in-line with its peer group, only behind CDNS and ANSS.

restrictions, these will be a key point to monitor moving forward.

Ultimately, while we view both companies as high-quality firms in the EDA space, we are more optimistic regarding the long-term growth prospects of SNPS.

Siemens AG (SIE)

Siemens AG is a German multinational technology conglomerate, which engages in the areas of automation and digitalization in the process and manufacturing industries, intelligent infrastructure for buildings and distributed energy systems, rail transport solutions, health technology, and digital healthcare services¹⁵. The firm was founded in 1847 and is headquartered in Munich, Germany.

The area in which Siemens AG competes with SNPS is through their Siemens EDA business, formerly known as Mentor Graphics prior to their acquisition in 2017. Of three major players, Siemens EDA boasts the smallest market share, and offers solutions tailoring to:

- IC design, verification, and manufacturing
- IC packaging design & verification
- Electronic systems design and manufacturing

Ansys, Inc. (ANSS)

Ansys (ANSS) is engages in the development and marketing of engineering simulation software and services⁴, used to simulate structural, fluids, semiconductor power, embedded software, optical, and electromagnetic properties¹⁶. The firm was founded in 1970 and is headquartered in Canonsburg, PA.

While ANSS is not one of SNPS's main competitors, they do offer EDA solutions, albeit in a different nature when compared to SNPS. While SNPS's solutions are more focused towards chip design, ANSS provides solutions for simulation of the system, evaluating aspects such as power distribution, thermals, etc. As a result, we do not anticipate ANSS to be a competitive threat to SNPS, given the difference in their business models.

Autodesk, Inc. (ADSK)

Autodesk, Inc. (ADSK) is an application software company enabling the design, modeling, and rendering needs of various industries, including architecture, engineering,

Company	Market Cap (B)	P/E (LTM)	Div. Yield
SNPS	80.5	79.4	0%
CDNS	72.3	75.7	0%
SIEGY	127.5	13.9	0%
ANSS	25.9	29.2	0%
ADSK	46.2	20.1	0%

Source: FactSet

Company	Oper. Margin	Net Margin	ROA (%)	ROE (%)
SNPS	23.5%	19.4%	10.8%	18.2%
CDNS	30.1%	23.8%	17.8%	31.0%
SIEGY	10.3%	5.2%	2.6%	8.2%
ANSS	29.2%	25.4%	8.0%	11.2%
ADSK	20.1%	16.6%	9.1%	82.5%

Source: FactSet

Cadence Design Systems, Inc. (CDNS)

Cadence Design Systems (CDNS) engages in the design and development of integrated circuits and electronic devices. Product offerings include EDA, software, emulation hardware, and design IP⁴, similar to SNPS. The firm was founded in 1988 and is headquartered in San Jose, CA.

We consider CDNS to be SNPS's primary competitor and is the second-largest player in the EDA industry by market share. CDNS competes against SNPS across EDA solutions for chip design. Similar to SNPS, CDNS has a recurring revenue model, with time-based license agreements allowing customers to access all the licensed products, lasting 2-3 years¹⁴. This helps to add robustness to its business model and to reduce its exposure to the software life cycle sales pattern which is driven by new product releases¹². Relative to SNPS, CDNS has a higher percentage of recurring revenue at 85% of total revenue, compared to SNPS at 76%.

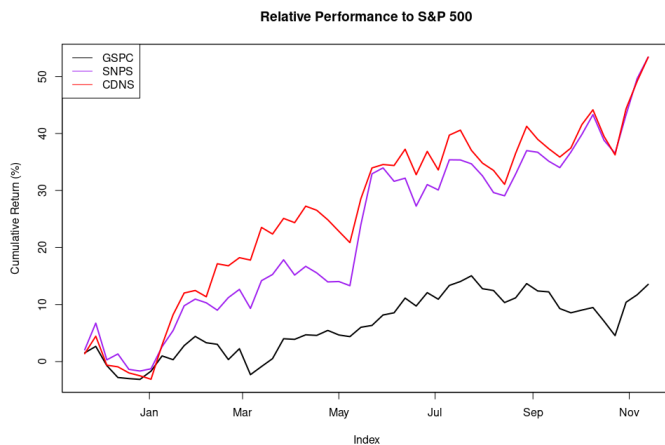
As far as exposure to China, both CDNS and SNPS have 15% of revenue coming from China, with both facing similar risks to related to uncertainty with future export restrictions. CDNS has been through restrictions surrounding advanced node IC production in China, though anticipates these restrictions to have a limited impact on the business. Ultimately, while neither SNPS or CDNS currently are not significantly impacted by export

construction, and media and entertainment. ADK's main products include products such as AutoCAD, Fusion 360, Inventor, and Maya. The firm was founded in 1982 and is headquartered in San Francisco, CA.

While ADK is considered to be in SNPS's peer group, we do not view ADK as a competitive threat to SNPS given the difference in their product offerings. While both firms offer design software for applications in the technology industry, ADK does not focus on chip design, focusing rather on the broader spectrum of industries highlighted above.

Relative Performance

Over a one-year period (11/15/2022 – 11/15/2023), SNPS and CDNS have both outperformed the market significantly. As shown in the figure below, due to the similarities of their businesses, thereby similar exposures, SNPS and CDNS's stock prices appear to move in conjunction with each other, with each having about the same relative performance over a one-year period. Ultimately, this speaks to the strength of the offerings of both companies, and how the EDA industry has benefited over this period.

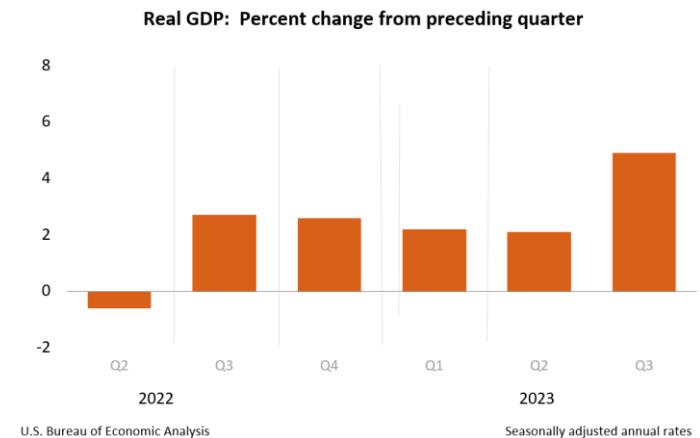


ECONOMIC OUTLOOK

Real GDP Outlook

In Q2 and Q3 of 2023, real GDP growth was stronger than expected, with real GDP growth of 2.1% and 4.9%, respectively. Looking forward, the Conference Board forecasts real GDP to growth to be 2.4% and fall to 0.8% in

2023 and 2024, respectively. The Henry Fund consensus is that real GDP growth will be 1.9% in the next six months.



Source: Bureau of Economic Analysis

A slowing GDP could have negative effects for SNPS, should R&D spend slow, demand decrease for electronics, or if semiconductor companies otherwise reduce their spending on designing and manufacturing chips. As mentioned previously, we believe SNPS is more resilient towards economic downturns, given their recurring revenue model and significant non-cancellable backlog, providing stability to revenue streams.

Fed Funds Rate & Inflation

The Fed Funds rate has ripple effects throughout the economy, impacting longer-term interest rates, such as mortgages, loans, and savings, which significantly impact consumer wealth and confidence. As for inflation, the US CPI has remained unchanged from July to October 2023.



Source: U.S. Bureau of Labor Statistics

As for Fed Fund rate hikes, consensus estimates are pointing towards an end to further rate hikes, with rate cuts expected in 2024. We expect interest rates to remain

higher for longer as the inflation rate approaches the Fed's 2% target.

A regime of higher or rising interest rates would have an anticipated adverse impact on SNPS, due to increased borrowing costs, reduced enterprise spending, and a greater risk for SNPS's end markets to reduce spending.

VALUATION

Revenue Growth

Our growth assumptions are based on SNPS management estimates, paired with the high growth prospects associated with the industries SNPS benefits from. For our revenues, we opt to forecast these based on SNPS's new revenue segments as of FY 2023: Design Automation, Design IP, and Software Integrity. This allows us to benchmark against consensus forecasts, evaluate SNPS's revenue based on its expected reportable segments in the future, and use historical data for these segments through Bloomberg.

For our forecasts, we rely heavily on SNPS's multi-year forecast estimates for each of their segments, given their strong history of meeting earnings targets. Over our forecast horizon, growth rates generally decline to our CV assumption, though remain elevated as we do not believe SNPS will achieve maturity in 10 years. While we provide a quarterly forecast, it should be noted that SNPS experiences no strong pronounced seasonality, other than slightly lower Q1 and slightly higher Q4 revenues compared to the rest of the year. Over our forecast horizon, we forecast a CAGR of 11.2%.

Earnings Estimates

Compared to consensus estimates, we forecast higher earnings, driven by strong tailwinds SNPS is expected to benefit from (ex. AI growth, resulting in increased demand for AI chips, machine learning, increasing chip complexity), SNPS's strong product offerings, and confidence in SNPS's ability to meet their growth targets. It should be noted that we projected GAAP EPS, not non-GAAP EPS as is oftentimes reported.

Operating Expenses

SNPS's operating expenses as a percentage of sales have been generally decreasing over time, which we factor into

our model by applying a negative growth rate to each of SNPS's operating expenses over our forecast horizon. This is done to not only reflect historical trends, but to capture SNPS's increasing economies of scale and internal workflow process and optimization through AI.

Share Repurchases

In their most recent earnings call, SNPS has stated their intention to use their cash flow in part for stock buybacks. As SNPS did not give specific guidance regarding this to our knowledge, we forecast this as a 3-year historical average of share repurchases done by SNPS, to reflect more recent practices.

WACC Assumptions

We calculated a weighted average cost of capital (WACC) of 9.80% for SNPS, slightly lower than consensus estimates. For this calculation, we used the following assumptions:

Risk-free Rate: We used 4.45%, the 10-year Treasury bond yield as of November 15, 2023.

Beta: We used 1.08, equal to the 5-year monthly beta estimate from Bloomberg.

Equity Risk Premium: We used the Henry Fund consensus estimate of 5.00%.

Pre-tax Cost of Debt: We used 5.89% based on FactSet estimates, as no comparable bonds were available on Bloomberg.

Tax Rate: We used 12.30% for our forecast horizon, equal to SNPS's effective tax rate of FY 2022, which in our view more closely reflects the tax rate SNPS is expected to pay over our forecast horizon.

DCF / Economic Profit (EP)

Our discounted cash flow (DCF) and economic profit (EP) models both yielded an implied price today of \$584.59, representing an upside of ~8% from the current price. We opt to use this as our primary model driving our recommendation, as the model considers more company-specific factors and allows us to incorporate growth assumptions per business segment. Our assumption for

our CV growth of NOPLAT is 6.9%, slightly lower than our final year NOPLAT growth rate.

Relative Valuation (P/E and PEG)

For our relative valuation models, we considered SNPS's main competitors in the EDA industry as well as other members of its peer group. These include Ansys, Autodesk, and Cadence Design Systems.

Our relative P/E valuation models yielded an implied price today of \$247.93 and \$283.12 based on forecasted 2023 and 2024 EPS figures, implying that it is overvalued relative to its peers. Our relative PEG valuation models yielded and implied price today of \$387.03 and \$442.76 based on forecasted 2023 and 2024 EPS figures, respectively. However, given SNPS's dominance in the EDA industry alongside Cadence Design Systems and differences in business models among peers, we do not believe these prices accurately reflect SNPS's intrinsic price.

Dividend Discount Model (DDM)

As SNPS does not currently pay a dividend nor do we expect them to over our forecast horizon, we opted to not value SNPS on this basis.

KEYS TO MONITOR

For SNPS, keys to monitor will be their continued product offerings, such as Synopsys.ai and DSO.ai, growth of the semiconductor industry and changes in chip design, potential additional trade restrictions to China, and competitive positioning in the EDA industry, including partnerships.

In order to differentiate itself from its competition, how SNPS continues to integrate AI into their offerings will be paramount for the firm moving forward, especially given its position as a leading EDA provider for AI chip designers. We see this trending positively over our forecast horizon, given SNPS's strong set of offerings/solutions along with strong adoption of Synopsys.ai and other offerings. However, given strong competition from firms such as CDNS, offerings from both companies will be important to monitor.

A significant portion of SNPS's revenue is dependent on growth in the semiconductor industry, which has historically been cyclical. However, SNPS can mitigate this through its recurring business model, with a non-

cancellable backlog of \$7.1 billion, helping to add stability to SNPS's revenue streams.

Lastly, while not having a material impact on SNPS at the moment, any future export restrictions will be important to monitor, given the potential to disrupt this end-market for SNPS. Currently, SNPS only has a 15% revenue exposure to China, though this may increase should restrictions ease.

Summary

We recommend a BUY rating for SNPS, with a target price range of \$580-595, representing a current upside of up to 11%. Given SNPS's essential role in the design and manufacture of semiconductors, strong product offerings, market leadership, and tailwinds such as increasing chip complexity and AI driving demand for SNPS's solutions. As a result, we believe SNPS has the potential to deliver strong long-term growth.

REFERENCES

1. SNPS FY 2022 10-K
2. SNPS Q3 FY 2023 10-Q / Earnings Announcement
3. Synopsys
4. FactSet
5. Bloomberg
6. Barron's
7. FactSet
8. Drex Electronics
9. Semiconductor Engineering
10. Electronics Weekly
11. Deloitte
12. IBISWorld
13. Nvidia
14. Cadence Design Systems
15. Siemens
16. Morningstar

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Synopsys (SNPS)
Sensitivity Tables

Risk-free rate	Beta						
	582.27	1.02	1.04	1.06	1.08	1.10	1.12
	3.85%	847.19	806.28	769.04	735.00	703.77	675.00
	4.05%	769.04	735.00	703.76	675.00	648.42	623.79
	4.25%	703.76	674.99	648.41	623.79	600.90	579.58
	4.45%	648.41	623.78	600.90	579.58	559.67	541.04
	4.65%	600.89	579.57	559.66	541.03	523.55	507.13
	4.85%	559.66	541.02	523.55	507.12	491.66	477.07
	5.05%	523.54	507.12	491.65	477.07	463.29	450.25

Equity Risk Premium	Pre-tax cost of debt						
	582.27	5.59%	5.69%	5.79%	5.89%	5.99%	6.09%
	4.25%	814.60	814.75	814.89	815.03	815.17	815.32
	4.50%	719.37	719.52	719.67	719.82	719.97	720.12
	4.75%	643.57	643.72	643.88	644.03	644.18	644.33
	5.00%	581.81	581.97	582.12	582.27	582.42	582.57
	5.25%	530.54	530.69	530.83	530.98	531.13	531.28
	5.50%	487.29	487.43	487.58	487.72	487.87	488.01
	5.75%	450.33	450.46	450.60	450.74	450.88	451.02

CV Growth of NOPAT	ROI assumption						
	582.27	4.24%	4.44%	4.64%	4.84%	5.04%	5.24%
	5.40%	423.52	421.99	420.44	418.88	417.30	415.70
	5.90%	464.52	462.82	461.11	459.37	457.62	455.84
	6.40%	517.60	515.68	513.74	511.78	509.79	507.79
	6.90%	588.98	586.77	584.53	582.27	579.98	577.67
	7.40%	690.14	687.51	684.85	682.16	679.44	676.69
	7.90%	844.60	841.33	838.02	834.68	831.30	827.88
	8.40%	1,109.57	1,105.20	1,100.78	1,096.31	1,091.80	1,087.24

FY 2026+ Inflation Est.	Normal Cash Est. % Sales							
	582.27	20.2%	20.7%	21.2%	21.7%	22.2%	22.7%	23.2%
	1.4%	585.01	584.09	583.18	582.27	581.35	580.44	579.53
	1.6%	585.01	584.09	583.18	582.27	581.35	580.44	579.53
	1.8%	585.01	584.09	583.18	582.27	581.35	580.44	579.53
	2.0%	585.01	584.09	583.18	582.27	581.35	580.44	579.53
	2.2%	585.01	584.09	583.18	582.27	581.35	580.44	579.53
	2.4%	585.01	584.09	583.18	582.27	581.35	580.44	579.53
	2.6%	585.01	584.09	583.18	582.27	581.35	580.44	579.53

F. Marg. Tax Rate	Forecasted Effective Tax Rate							
	582.27	6.30%	8.30%	10.30%	12.30%	14.30%	16.30%	18.30%
	17.10%	629.97	613.71	597.61	581.67	565.87	550.22	534.73
	19.10%	630.19	613.93	597.82	581.87	566.06	550.41	534.91
	21.10%	630.40	614.14	598.03	582.07	566.26	550.60	535.10
	23.10%	630.62	614.35	598.23	582.27	566.45	550.79	535.28
	25.10%	630.84	614.56	598.44	582.47	566.65	550.98	535.47
	27.10%	631.06	614.77	598.65	582.67	566.85	551.17	535.65
	29.10%	631.28	614.99	598.85	582.87	567.04	551.36	535.84

Synopsys (SNPS)

Revenue Decomposition

Fiscal Years Ending Oct. 31	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
By Segment (New Classification)													
Design Automation	-	2757951	3303002	3732393	4142956	4681540	5290140	5924957	6576702	7234373	7813122	8320975	8653814
% Growth	-		19.8%	13.0%	11.0%	13.0%	13.0%	12.0%	11.0%	10.0%	8.0%	6.5%	4.0%
% Total Revenue	-	65.6%	65.0%	64.2%	63.5%	63.0%	62.3%	61.2%	60.2%	59.7%	59.3%	58.9%	58.9%
Design IP	-	1055252	1316119	1559601	1785744	2053605	2382182	2810975	3260731	3652019	4017220	4338598	4512142
% Growth	-		24.7%	18.5%	14.5%	15.0%	16.0%	18.0%	16.0%	12.0%	10.0%	8.0%	4.0%
% Total Revenue	-	25.1%	25.9%	26.8%	27.4%	27.6%	28.1%	29.0%	29.8%	30.1%	30.5%	30.7%	30.7%
Software Integrity	-	395194	467502	523602	591670	698171	816860	947558	1089691	1231351	1354486	1456073	1514316
% Growth	-		18.3%	12.0%	13.0%	18.0%	17.0%	16.0%	15.0%	13.0%	10.0%	7.5%	4.0%
% Total Revenue	-	9.4%	9.2%	9.0%	9.1%	9.4%	9.6%	9.8%	10.0%	10.2%	10.3%	10.3%	10.3%
Total Revenue	-	4204193	5081542	5815596	6520370	7433316	8489182	9683490	10927125	12117742	13184829	14115646	14680272
% Growth	-	14.1%	20.9%	14.4%	12.1%	14.0%	14.2%	14.1%	12.8%	10.9%	8.8%	7.1%	4.0%
By Product Groups:													
EDA	2115351	2333327	2581423										
% Growth		7.8%	10.3%										
% Total Revenue		57.4%	55.5%										
IP & System Integration	1201402	1463059	1997046										
% Growth		13.8%	21.8%										
% Total Revenue		32.6%	34.8%										
Software Integrity Products and Services	339046	395194	492910										
% Growth		0.9%	16.6%										
% Total Revenue		9.2%	9.4%										
Other	11056	12613	35571										
% Growth		64.5%	14.1%										
% Total Revenue		0.3%	0.3%										
Total Revenue	3685281	4204193	5081542										
% Growth		9.7%	14.1%										
By Geographic Segment:													
United States	1774348	1951964	2349766										
% Growth		5.9%	10.0%										
% Total Revenue		48.1%	46.4%										
Europe	385287	440825	493430										
% Growth		10.4%	14.4%										
% Total Revenue		10.5%	10.5%										
China	420829	562711	795405										
% Growth		30.8%	33.7%										
% Total Revenue		11.4%	13.4%										
Korea	389008	427471	531542										
% Growth		10.1%	9.9%										
% Total Revenue		10.6%	10.2%										
Other	715809	821222	911399										
% Growth		8.4%	14.7%										
% Total Revenue		19.4%	19.5%										
Total Revenue	3685281	4204193	5081542										
% Growth		9.7%	14.1%										

Synopsys (SNPS)
Income Statement

<i>Fiscal Years Ending Oct. 31</i>	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Total revenue	3685281	4204193	5081542	5815596	6520370	7433316	8489182	9683490	10927125	12117742	13184829	14115646	14737834
Total cost of revenue (excl. D&A)	584704	658101	835292	929664	1044931	1200459	1362827	1556751	1758529	1947858	2120297	2270220	2369783
Amortization of intangible assets	52452	48461	66936	99311	88021	71113	58688	38487	30826	0	0	0	0
Depreciation	157534	155215	161469	165833	169570	179374	195333	216825	243396	273817	306215	338622	369615
Gross margin	2890591	3342416	4017845	4620788	5217848	5982371	6872335	7871426	8894373	9896068	10758318	11506804	11998436
Research & development	1279022	1504823	1680379	1952299	2118220	2393708	2608479	2894543	3146339	3377887	3549088	3673868	3706391
Sales & marketing expenses	632010	712491	779777	901439	965400	1081326	1164928	1279770	1376134	1462133	1520007	1557017	1554293
General & administrative expenses	284530	322988	353840	418406	458076	506498	565438	628616	690882	747309	792508	826962	841751
Restructuring charges	36059	33405	12057	78384	39976	40956	42843	50540	43579	44479	45360	45989	44852
Operating income (loss)	620141	734790	1162038	1270260	1636175	1959883	2490647	3017958	3637439	4264258	4851355	5402968	5851149
Other income (expense), net	18018	70724	-46524	26808	28184	72155	127485	199731	300549	429850	588732	780586	1003506
Income before income taxes	638159	805514	1115514	1297068	1664359	2032038	2618132	3217689	3937989	4694108	5440087	6183555	6854655
Provision (benefit) for income taxes	-25288	49155	137078	159539	204716	249941	322030	395776	484373	577375	669131	760577	843123
Net income (loss) attributed to non-controlling interest and redeemable non-controlling interest	900	1157	6158	3757	4821	5886	7584	9321	11407	13598	15759	17912	19856
Net income (loss) attributed to Synopsys	664347	757516	984594	1141286	1464465	1787984	2303686	2831234	3465023	4130331	4786715	5440890	6031388
Weighted average shares outstanding - basic	151135	152698	153002	151795	150886	150221	149395	148460	147609	146833	146128	145485	144901
Year end shares outstanding	152618	153062	152375	151,215	150,557	149,885	148,906	148,014	147,203	146,464	145,792	145,179	144,622
Net income (loss) per share - basic	4.4	4.96	6.44	7.52	9.71	11.90	15.42	19.07	23.47	28.13	32.76	37.40	41.62

Synopsys (SNPS)
Income Statement

<i>Fiscal Years Ending Oct. 31</i>	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4
Total revenue	1270255	1279229	1247766	1284292	1361340	1394863	1487288	1572105	1567225	1601624	1633841	1717095	1786968	1601624	1633841	1717095
Total cost of revenue	256984	252811	271181	282721	284354	298014	307482	304958	250783	261233	261233	271682	288110	300115	300115	312119
Less: Amortization of intangible assets & Depreciation	13360	14455	19330	19791	18640	17872	18374	44425	64398	64398	64398	64398	62622	62622	62622	62622
Gross margin	1013271	1026418	976585	1001571	1076986	1096849	1179806	1267147	1252044	1275993	1308210	1381015	1436236	1238887	1271104	1342354
Research & development	383971	389964	444826	461618	465329	485597	507402	493971	510491	518964	521082	567683	576884	586459	588852	641514
Sales & marketing expenses	180510	191573	199246	208448	210785	222115	227134	241405	230731	232661	241350	260658	258437	260599	270331	291958
General & administrative expenses	81008	73957	91461	107414	97364	91083	109714	120245	102374	103008	122583	130110	113196	113897	135541	143863
Restructuring charges	-11746	-311	0	0	40859	4140	33385	0	0	0	0	0	0	0	0	0
Operating income (loss)	347036	363701	233928	217373	255932	287332	295474	431522	408447	421359	423195	422564	487719	277932	276380	265019
Other income (expense), net	-19793	-23913	2426	-5244	23292	4253	25808	-26545	7046	7046	7046	7046	18039	18039	18039	18039
Income before income taxes	327243	339788	236354	212129	279224	291585	321282	404977	415493	428405	430241	429610	505758	295971	294418	283057
Provision (benefit) for income taxes	-13902	-45896	-16708	-60572	-10597	-21637	11773	180000	51179	51179	51179	51179	62485	62485	62485	62485
Net income (loss) attributed to non-controlling interest and redeemable non-controlling interest	346	889	2980	1943	2909	2962	3197	-5311	1205	1205	1205	1205	1472	1472	1472	1472
Net income (loss) attributed to Synopsys	313687	294781	222626	153500	271536	272910	336252	260588	365520	378432	380267	379636	444745	234957	233405	222044
Weighted average shares outstanding - basic	151135	151135	151135	151135	152698	152698	152698	152698	153002	153002	153002	153002	151,795	151,795	151,795	151,795
Year end shares outstanding	152618	152618	152618	152618	153062	153062	153062	153062	152375	152375	152375	152375	151,215	151,215	151,215	151,215
Net income (loss) per share - basic	2.05	1.93	1.46	1.00	1.78	1.79	2.21	1.71	2.39	2.47	2.49	2.48	2.93	1.55	1.54	1.46

Synopsis (SNPS)

Balance Sheet

Fiscal Years Ending Oct. 31	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Cash & cash equivalents	1,235,653	1,432,840	1,417,608	1,719,886	2,756,360	4,079,786	5,800,286	8,124,586	11,053,180	14,585,439	18,768,526	23,566,733	28,863,756
Short-term investments	0	147,949	147,913	155,066	162,565	170,427	178,669	187,309	196,367	205,864	215,819	226,256	237,198
Accounts receivable, net	780,709	568,501	796,091	976,498	999,347	1,183,976	1,359,557	1,525,784	1,737,402	1,925,575	2,089,663	2,241,538	2,330,217
Inventories	192,333	229,023	211,927	287,619	316,535	346,163	409,097	462,565	519,140	579,503	628,918	672,997	700,739
Prepaid & other current assets	308,167	397,617	439,130	512,963	585,089	655,009	752,864	860,332	967,590	1,074,762	1,169,441	1,251,298	1,301,824
Total current assets	2,549,217	2,808,341	3,012,669	3,652,033	4,819,896	6,435,360	8,500,473	11,160,576	14,473,679	18,371,142	22,872,367	27,958,822	33,433,734
Property & equipment, gross	1,253,348	1,276,745	1,349,655	1,526,380	1,724,522	1,950,406	2,208,377	2,502,640	2,834,694	3,202,930	3,603,592	4,032,540	4,478,646
Less accumulated depreciation & amortization	769,530	804,347	866,355	1,032,188	1,201,758	1,381,132	1,576,464	1,793,290	2,036,686	2,310,503	2,616,718	2,955,340	3,324,955
Property & equipment, net	483,818	472,398	483,300	494,192	522,764	569,275	631,912	709,350	798,008	892,427	986,874	1,077,200	1,153,691
Operating lease right-of-use assets, net	465,818	493,251	559,090	571,690	604,743	658,547	731,007	820,588	923,150	1,032,375	1,141,634	1,246,124	1,334,610
Goodwill	3,365,114	3,575,785	3,842,234	3,842,234	3,842,234	3,842,234	3,842,234	3,842,234	3,842,234	3,842,234	3,842,234	3,842,234	3,842,234
Intangible assets, net	254,322	279,132	386,446	287,135	199,114	128,001	69,313	30,826	0	0	0	0	0
Deferred income taxes	497,546	612,655	670,653	718,642	770,066	825,169	884,215	947,486	1,015,284	1,087,934	1,165,782	1,249,201	1,338,589
Other long-term assets	405,951	510,698	463,695	625,911	696,268	757,358	895,034	1,013,870	1,136,494	1,268,889	1,377,467	1,473,644	1,534,503
Total assets	8,030,062	8,752,260	9,418,087	10,191,838	11,455,084	13,215,943	15,554,188	18,524,930	22,188,850	26,495,000	31,386,358	36,847,225	42,637,361
Accounts payable & accrued liabilities	623,664	694,748	809,403	957,180	1,063,087	1,206,457	1,386,378	1,577,299	1,779,302	1,975,313	2,147,935	2,299,689	2,392,088
Operating lease liabilities	73,173	79,678	54,274	55,497	58,706	63,929	70,963	79,659	89,615	100,218	110,825	120,968	129,558
Deferred revenue	1,388,263	1,517,623	1,910,822	2,158,972	2,408,731	2,766,895	3,149,157	3,591,304	4,057,820	4,496,421	4,892,814	5,239,295	5,447,969
Short-term debt	27,084	74,992	0	45,597	48,776	56,067	64,698	73,092	82,726	91,853	99,760	106,888	111,172
Total current liabilities	2,139,922	2,413,484	2,774,499	3,217,246	3,579,299	4,093,348	4,671,196	5,321,354	6,009,463	6,663,805	7,251,334	7,766,840	8,080,787
Long-term operating lease liabilities	462,411	487,003	581,273	594,373	628,737	684,676	760,011	853,147	959,778	1,073,336	1,186,930	1,295,567	1,387,563
Long-term deferred revenue	104,850	136,303	154,472	176,931	202,659	227,715	260,728	298,343	335,669	372,585	405,545	433,936	451,404
Long-term debt	100,823	25,094	20,824	58,149	59,682	62,685	66,946	71,406	76,484	81,828	86,710	91,270	94,642
Other long-term liabilities	284,511	363,540	327,829	335,217	354,598	386,147	428,635	481,162	541,300	605,345	669,410	730,680	782,564
Total liabilities	3,117,695	3,453,317	3,897,561	4,381,916	4,824,975	5,454,571	6,187,516	7,025,411	7,922,694	8,796,899	9,599,929	10,318,293	10,796,960
Common stock & Capital in excess of par value	1,654,694	1,577,894	1,488,650	1,542,760	1,596,870	1,638,535	1,638,535	1,638,535	1,638,535	1,638,535	1,638,535	1,638,535	1,638,535
Retained earnings (accumulated deficit)	3,795,397	4,549,713	5,534,307	5,765,836	6,527,093	7,610,804	9,208,519	11,332,046	14,087,276	17,505,622	21,578,192	26,302,783	31,594,467
Treasury stock, at cost	-488,613	-782,866	-1,272,955	-1,272,955	-1,272,955	-1,272,955	-1,272,955	-1,272,955	-1,272,955	-1,272,955	-1,272,955	-1,272,955	-1,272,955
Accumulated other comprehensive income (loss)	-54,074	-49,604	-234,277	-234,277	-234,277	-234,277	-234,277	-234,277	-234,277	-234,277	-234,277	-234,277	-234,277
Non-controlling interest	4,963	3,806	4,801	8,558	13,380	19,266	26,850	36,171	47,578	61,176	76,935	94,847	114,632
Total stockholders' equity	4,912,367	5,298,943	5,520,526	5,809,922	6,630,110	7,761,372	9,366,672	11,499,519	14,266,156	17,698,101	21,786,429	26,528,932	31,840,402
Total liabilities and stockholders' equity	8,030,062	8,752,260	9,418,087	10,191,838	11,455,084	13,215,943	15,554,188	18,524,930	22,188,850	26,495,000	31,386,358	36,847,225	42,637,361

Synopsis (SNPS)
Historical Cash Flow Statement

Fiscal Years Ending Oct. 31	2016	2017	2018	2019	2020	2021	2022
Net income	266826	136563	432518	532367	664347	757516	978436
Amortization & depreciation	207032	189442	209207	201676	209986	203676	228405
Reduction of operating lease right-of-use assets	-	-	-	-	82895	86645	89541
Amortization of capitalized costs to obtain revenue contracts	-	-	-	62750	61185	64698	73026
Stock-based compensation	97583	108294	140032	155001	248584	345272	459029
Allowance for credit losses	-	-	-	-	-	18515	-3477
Other non-cash	-	-	-	-	5419	14702	10188
Accounts receivable	-43269	2296	-95785	-8575	-236806	201706	-251390
Inventories	-	-	-66509	-19243	-55024	-48046	1320
Prepaid & other current assets	-37641	-28955	-12835	-49779	-11298	-102174	-89983
Other long-term assets	-3770	-40236	-25892	-124895	-83367	-153037	-15283
Accounts payable & accrued liabilities	18977	137631	49043	-19280	113773	125133	-34066
Operating lease liabilities	-	-	-	-	-78578	-82581	-85828
Income taxes	7098	19665	-103841	19777	14120	28855	1644
Deferred revenue	86904	-16644	105329	125717	148722	160325	414251
Net cash flows from operating activities	586635	634565	424232	800513	991313	1492622	1738900
Proceeds from sales & maturities of short-term investments	156350	295633	12449	-	-	12850	93696
Purchases of short-term investments	-168712	-155098	-	-	-	-161732	-97245
Proceeds from sales of long-term investments	1785	839	494	6361	2151	-	582
Purchases of long-term investments	-1002	-	-3561	-3245	-2762	-7591	-7000
Purchases of property & equipment	-66909	-70328	-98976	-198129	-154717	-93764	-136589
Acquisitions, net of cash acquired	-	-	-	-	-	-296017	-422374
Capitalization of software development costs	-4131	-3226	-2950	-4259	-4045	-1976	-2493
Other investing activities	-	2100	-	-	-	-800	-1200
Net cash flows from investing activities	-142675	-189282	-743525	-235877	-360418	-549030	-572623
Proceeds from credit facilities	185000	320000	620635	192897	276489	-	-
Repayment of debt	-185000	-380625	-295313	-524063	-288879	-28061	-76838
Issuances of common stock	125283	126337	123829	156364	197403	210719	237956
Payments for taxes related to net share settlement of equity awards	-26562	-36730	-45772	-57143	-82225	-138950	-174005
Purchase of equity forward contract	-	-20000	-	-	-	-35000	-
Purchases of treasury stock	-400000	-380000	-400000	-329185	-242078	-753081	-1100000
Other financing activities	-5658	-2102	1759	-762	-1316	-4375	-3413
Net cash flows from financing activities	-306937	-373120	5138	-561892	-140606	-748748	-1116300
Effect of exchange rate changes on cash, cash equivalents & restricted cash	3409	-427	-11086	2782	17154	2369	-65296
Net change in cash, cash equivalents & restricted cash	140432	71736	-325241	5526	507443	197213	-15319
Cash, cash equivalents & restricted cash, beginning of year	836188	976620	1048356	725001	730527	1237970	1435183
Cash, cash equivalents & restricted cash, end of year	976620	1048356	723115	730527	1237970	1435183	1419864

Synopsis (SNPS)

Forecasted Cash Flow Statement

Fiscal Years Ending Oct. 31	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Cash Flow at Beginning of Period	1,417,608	1719886	2756360	4079786	5800286	8124586	11053180	14585439	18768526	23566733
Net Income	1141286	1464465	1787984	2303686	2831234	3465023	4130331	4786715	5440890	6009856
Adjustments to reconcile net income to cash from operating activities:										
Depreciation, amortization, and other	265144	257591	250487	254021	255312	274222	273817	306215	338622	369615
Changes in Operating Activities:										
Accounts receivable, net	-180407	-22848	-184629	-175582	-166227	-211617	-188173	-164088	-151875	-88679
Inventories	-75692	-28916	-29628	-62934	-53467	-56576	-60363	-49415	-44079	-27742
Prepaid & other current assets	-73833	-72127	-69919	-97855	-107468	-107259	-107171	-94679	-81857	-50526
Operating lease right-of-use assets, net	-12600	-33052	-53804	-72460	-89581	-102562	-109225	-109259	-104491	-88486
Deferred income taxes	-47989	-51423	-55103	-59046	-63271	-67798	-72650	-77848	-83419	-89388
Other long-term assets	-162216	-70357	-61089	-137676	-118836	-122624	-132395	-108578	-96176	-60860
Accounts payable & accrued liabilities	147777	105907	143371	179920	190921	202003	196011	172622	151753	92400
Operating lease liabilities	1223	3209	5223	7034	8696	9956	10603	10606	10143	8590
Deferred revenue	248150	249758	358164	382262	442147	466516	438601	396393	346482	208674
Long-term operating lease liabilities	13100	34364	55939	75335	93136	106631	113558	113594	108637	91997
Long-term deferred revenue	22459	25729	25056	33013	37615	37327	36916	32960	28391	17468
Other long-term liabilities	7388	19381	31549	42488	52527	60138	64045	64065	61269	51885
Net cash from operating activities:	1293789	1881679	2203599	2672207	3312736	3953382	4593906	5279302	5924289	6444803
Changes in Investing Activities:										
Short-term investments	-7153	-7499	-7862	-8242	-8640	-9058	-9496	-9956	-10437	-10942
Property & equipment, gross	-176725	-198142	-225884	-257970	-294263	-332055	-368235	-400662	-428948	-446106
Net cash from investing activities	-183878	-205641	-233746	-266212	-302903	-341113	-377732	-410618	-439385	-457048
Changes in Financing Activities:										
Short-term debt	45597	3179	7291	8631	8394	9633	9127	7907	7128	4284
Long-term debt	37325	1533	3003	4261	4459	5078	5344	4882	4560	3371
Common stock & Capital in excess of par value	54110	54110	41665	0	0	0	0	0	0	0
Treasury stock, at cost	0	0	0	0	0	0	0	0	0	0
Accumulated other comprehensive income (loss)	0	0	0	0	0	0	0	0	0	0
Redeemable non-controlling interest	-38,664	0	0	0	0	0	0	0	0	0
Share Repurchases	-906000	-698386	-698386	-698386	-698386	-698386	-698386	-698386	-698386	-698386
Net cash from financing activities	-807633	-639564	-646427	-685494	-685533	-683675	-683915	-685597	-686698	-690732
Cash and cash equivalents, end of period	1719886	2756360	4079786	5800286	8124586	11053180	14585439	18768526	23566733	28863756

Synopsys (SNPS)
Common Size Income Statement

Fiscal Years Ending Oct. 31	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4
Total revenue	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total cost of revenue (excl. D&A)	21.7%	22.0%	20.9%	21.4%	20.7%	19.4%	16.0%	16.3%	16.0%	15.8%	16.1%	18.7%	18.4%	18.2%
Amortization of intangible assets	1.5%	1.5%	1.4%	1.3%	1.2%	2.8%	4.1%	4.0%	3.9%	3.8%	3.5%	3.9%	3.8%	3.6%
Depreciation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Gross margin	78.3%	78.0%	79.1%	78.6%	79.3%	80.6%	79.9%	79.7%	80.1%	80.4%	80.4%	77.4%	77.8%	78.2%
Research & development	35.6%	35.9%	34.2%	34.8%	34.1%	31.4%	32.6%	32.4%	31.9%	33.1%	32.3%	36.6%	36.0%	37.4%
Sales & marketing expenses	16.0%	16.2%	15.5%	15.9%	15.3%	15.4%	14.7%	14.5%	14.8%	15.2%	14.5%	16.3%	16.5%	17.0%
General & administrative expenses	7.3%	8.4%	7.2%	6.5%	7.4%	7.6%	6.5%	6.4%	7.5%	7.6%	6.3%	7.1%	8.3%	8.4%
Restructuring charges	0.0%	0.0%	3.0%	0.3%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Operating income (loss)	18.7%	16.9%	18.8%	20.6%	19.9%	27.4%	26.1%	26.3%	25.9%	24.6%	27.3%	17.4%	16.9%	15.4%
Other income (expense), net	0.2%	-0.4%	1.7%	0.3%	1.7%	-1.7%	0.4%	0.4%	0.4%	0.4%	1.0%	1.1%	1.1%	1.1%
Income before income taxes	18.9%	16.5%	20.5%	20.9%	21.6%	25.8%	26.5%	26.7%	26.3%	25.0%	28.3%	18.5%	18.0%	16.5%
Provision (benefit) for income taxes	-1.3%	-4.7%	-0.8%	-1.6%	0.8%	11.4%	3.3%	3.2%	3.1%	3.0%	3.5%	3.9%	3.8%	3.6%
Net income (loss) attributed to non-controlling interest and redeemable non-controlling interest	0.2%	0.2%	0.2%	0.2%	0.2%	-0.3%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Net income (loss)	17.8%	12.0%	19.9%	19.6%	22.6%	16.6%	23.3%	23.6%	23.3%	22.1%	24.9%	14.7%	14.3%	12.9%

Synopsis (SNPS)

Common Size Income Statement

Fiscal Years Ending Oct. 31	2016	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Total revenue	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total cost of revenue (excl. D&A)	13.9%	15.9%	15.7%	16.4%	16.0%	16.0%	16.1%	16.1%	16.1%	16.1%	16.1%	16.1%	16.1%	16.1%
Amortization of intangible assets	4.2%	1.4%	1.2%	1.3%	1.7%	1.3%	1.0%	0.7%	0.4%	0.3%	0.0%	0.0%	0.0%	0.0%
Depreciation	4.3%	4.3%	3.7%	3.2%	2.9%	2.6%	2.4%	2.3%	2.2%	2.2%	2.3%	2.3%	2.4%	2.5%
Gross margin	77.6%	78.4%	79.5%	79.1%	79.5%	80.0%	80.5%	81.0%	81.3%	81.4%	81.7%	81.6%	81.5%	81.4%
Research & development	35.4%	34.7%	35.8%	33.1%	33.6%	32.5%	32.2%	30.7%	29.9%	28.8%	27.9%	26.9%	26.0%	25.1%
Sales & marketing expenses	20.7%	17.1%	16.9%	15.3%	15.5%	14.8%	14.5%	13.7%	13.2%	12.6%	12.1%	11.5%	11.0%	10.5%
General & administrative expenses	6.9%	7.7%	7.7%	7.0%	7.2%	7.0%	6.8%	6.7%	6.5%	6.3%	6.2%	6.0%	5.9%	5.7%
Restructuring charges	0.4%	1.0%	0.8%	0.2%	1.3%	0.6%	0.6%	0.5%	0.5%	0.4%	0.4%	0.3%	0.3%	0.3%
Operating income (loss)	13.1%	16.8%	17.5%	22.9%	21.8%	25.1%	26.4%	29.3%	31.2%	33.3%	35.2%	36.8%	38.3%	39.7%
Other income (expense), net	0.5%	0.5%	1.7%	-0.9%	0.5%	0.4%	1.0%	1.5%	2.1%	2.8%	3.5%	4.5%	5.5%	6.8%
Income before income taxes	13.6%	17.3%	19.2%	22.0%	22.3%	25.5%	27.3%	30.8%	33.2%	36.0%	38.7%	41.3%	43.8%	46.5%
Provision (benefit) for income taxes	2.6%	-0.7%	1.2%	2.7%	2.7%	3.1%	3.4%	3.8%	4.1%	4.4%	4.8%	5.1%	5.4%	5.7%
Net income (loss) attributed to non-controlling interest and redeemable non-controlling interest	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Net income (loss)	11.0%	18.0%	18.0%	19.4%	19.6%	22.5%	24.1%	27.1%	29.2%	31.7%	34.1%	36.3%	38.5%	40.9%

Synopsis (SNPS)
Common Size Balance Sheet

Fiscal Years Ending Oct. 31	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Cash & cash equivalents	33.5%	34.1%	27.9%	29.6%	42.3%	54.9%	68.3%	83.9%	101.2%	120.4%	142.3%	167.0%	196.6%
Short-term investments	0.0%	3.5%	2.9%	2.7%	2.5%	2.3%	2.1%	1.9%	1.8%	1.7%	1.6%	1.6%	1.6%
Accounts receivable, net	21.2%	13.5%	15.7%	16.8%	15.3%	15.9%	16.0%	15.8%	15.9%	15.9%	15.8%	15.9%	15.9%
Inventories	5.2%	5.4%	4.2%	4.9%	4.9%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Prepaid & other current assets	8.4%	9.5%	8.6%	8.8%	9.0%	8.8%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%
Total current assets	69.2%	66.8%	59.3%	62.8%	73.9%	86.6%	100.1%	115.3%	132.5%	151.6%	173.5%	198.1%	227.7%
Property & equipment, gross	34.0%	30.4%	26.6%	26.2%	26.4%	26.2%	26.0%	25.8%	25.9%	26.4%	27.3%	28.6%	30.5%
Less accumulated depreciation & amortization	20.9%	19.1%	17.0%	17.7%	18.4%	18.6%	18.6%	18.5%	18.6%	19.1%	19.8%	20.9%	22.6%
Property & equipment, net	13.1%	11.2%	9.5%	8.5%	8.0%	7.7%	7.4%	7.3%	7.3%	7.4%	7.5%	7.6%	7.9%
Operating lease right-of-use assets, net	12.6%	11.7%	11.0%	9.8%	9.3%	8.9%	8.6%	8.5%	8.4%	8.5%	8.7%	8.8%	9.1%
Goodwill	91.3%	85.1%	75.6%	66.1%	58.9%	51.7%	45.3%	39.7%	35.2%	31.7%	29.1%	27.2%	26.2%
Intangible assets, net	6.9%	6.6%	7.6%	4.9%	3.1%	1.7%	0.8%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
Deferred income taxes	13.5%	14.6%	13.2%	12.4%	11.8%	11.1%	10.4%	9.8%	9.3%	9.0%	8.8%	8.8%	9.1%
Other long-term assets	11.0%	12.1%	9.1%	10.8%	10.7%	10.2%	10.5%	10.5%	10.4%	10.5%	10.4%	10.4%	10.5%
Total assets	217.9%	208.2%	185.3%	175.3%	175.7%	177.8%	183.2%	191.3%	203.1%	218.6%	238.0%	261.0%	290.4%
Accounts payable & accrued liabilities	16.9%	16.5%	15.9%	16.5%	16.3%	16.2%	16.3%	16.3%	16.3%	16.3%	16.3%	16.3%	16.3%
Operating lease liabilities	2.0%	1.9%	1.1%	1.0%	0.9%	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%
Deferred revenue	37.7%	36.1%	37.6%	37.1%	36.9%	37.2%	37.1%	37.1%	37.1%	37.1%	37.1%	37.1%	37.1%
Short-term debt	0.7%	1.8%	0.0%	0.8%	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Total current liabilities	58.1%	57.4%	54.6%	55.3%	54.9%	55.1%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%
Long-term operating lease liabilities	12.5%	11.6%	11.4%	10.2%	9.6%	9.2%	9.0%	8.8%	8.8%	8.9%	9.0%	9.2%	9.5%
Long-term deferred revenue	2.8%	3.2%	3.0%	3.0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Long-term debt	2.7%	0.6%	0.4%	1.0%	0.9%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%
Other long-term liabilities	7.7%	8.6%	6.5%	5.8%	5.4%	5.2%	5.0%	5.0%	5.0%	5.0%	5.1%	5.2%	5.3%
Total liabilities	84.6%	82.1%	76.7%	75.3%	74.0%	73.4%	72.9%	72.6%	72.5%	72.6%	72.8%	73.1%	73.5%
Common stock	44.9%	37.5%	29.3%	26.5%	24.5%	22.0%	19.3%	16.9%	15.0%	13.5%	12.4%	11.6%	11.2%
Retained earnings (accumulated deficit)	103.0%	108.2%	108.9%	99.1%	100.1%	102.4%	108.5%	117.0%	128.9%	144.5%	163.7%	186.3%	215.2%
Treasury stock, at cost	-13.3%	-18.6%	-25.1%	-21.9%	-19.5%	-17.1%	-15.0%	-13.1%	-11.6%	-10.5%	-9.7%	-9.0%	-8.7%
Accumulated other comprehensive income (loss)	-1.5%	-1.2%	-4.6%	-4.0%	-3.6%	-3.2%	-2.8%	-2.4%	-2.1%	-1.9%	-1.8%	-1.7%	-1.6%
Non-controlling interest	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Total stockholders' equity	133.3%	126.0%	108.6%	99.9%	101.7%	104.4%	110.3%	118.8%	130.6%	146.1%	165.2%	187.9%	216.9%
Total liabilities and stockholders' equity	217.9%	208.2%	185.3%	175.3%	175.7%	177.8%	183.2%	191.3%	203.1%	218.6%	238.0%	261.0%	290.4%

Synopsys (SNPS)
Value Driver Estimation

Fiscal Years Ending Oct. 31	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
NOPLAT:													
Total Revenue	3,685,281	4,204,193	5,081,542	5,815,596	6,520,370	7,433,316	8,489,182	9,683,490	10,927,125	12,117,742	13,184,829	14,115,646	14,680,272
Less: Total cost of revenue (excl. D&A)	584,704	658,101	835,292	929,664	1,044,931	1,200,459	1,362,827	1,556,751	1,758,529	1,947,858	2,120,297	2,270,220	2,360,527
Less: Depreciation expense	157,534	155,215	161,469	165,833	169,570	179,374	195,333	216,825	243,396	273,817	306,215	338,622	369,615
Less: Amortization expense	52,452	48,461	66,936	99,311	88,021	71,113	58,688	38,487	30,826	0	0	0	0
Less: Research and Development	1,279,022	1,504,823	1,680,379	1,952,299	2,118,220	2,393,708	2,608,479	2,894,543	3,146,339	3,377,887	3,549,088	3,673,868	3,691,915
Less: Sales and marketing	632,010	712,491	779,777	901,439	965,400	1,081,326	1,164,928	1,279,770	1,376,134	1,462,133	1,520,007	1,557,017	1,548,223
Less: General and administrative	284,530	322,988	353,840	418,406	458,076	506,498	565,438	628,616	690,882	747,309	792,508	826,962	838,463
Less: Amortization of intangible assets	38,829	33,919	29,754	44,588	33,130	22,974	14,769	7,997	3,557	0	0	0	0
Less: Restructuring charges	36,059	33,405	12,057	78,384	39,976	40,956	42,843	50,540	43,579	44,479	45,360	45,989	44,852
Plus: Implied interest on operating leases	27,437	29,052	32,930	33,673	35,619	38,788	43,056	48,333	54,374	60,807	67,242	73,397	78,609
EBITA	647,578	763,842	1,194,968	1,259,344	1,638,665	1,975,697	2,518,934	3,058,293	3,688,256	4,325,065	4,918,597	5,476,365	5,905,285
Implied Marginal Tax Rate	15.81%	21.64%	23.10%	23.10%	23.10%	23.10%	23.10%	23.10%	23.10%	23.10%	23.10%	23.10%	23.10%
Adjusted Taxes:													
Provision for income taxes	-25,288	49,155	137,078	159,539	204,716	249,941	322,030	395,776	484,373	577,375	669,131	760,577	840,112
Plus: Tax shield on other income (expense), net	2,849	15,305	-10,747	6,192	6,510	16,667	29,448	46,136	69,424	99,291	135,991	180,308	231,800
Plus: Tax shield on implied interest on operating leases	4,338	6,287	7,607	7,778	8,228	8,960	9,946	11,164	12,560	14,046	15,532	16,954	18,158
Total Adjusted Taxes	-18,101	70,747	133,938	173,510	219,454	275,568	361,424	453,076	566,356	690,712	820,654	957,839	1,090,070
Deferred Tax Assets	636995	760490	863590	925385	991602	1062557	1138590	1220063	1307366	1400916	1501161	1608578	1723682
Deferred Tax Liabilities	141846	153749	206392	243792	287968	340150	401787	474593	560593	662175	782166	923899	1091315
Change in Deferred Taxes	-106,508	-111,592	-50,457	-24,396	-22,040	-18,774	-14,395	-8,667	-1,304	8,033	19,746	34,316	52,313
NOPLAT	559171	581504	1010573	1061438	1397170	1681356	2143115	2596550	3120596	3642386	4117689	4552842	4867528
Invested Capital (IC):													
Plus: Normal Cash	798,967	911,467	1,101,676	1,260,819	1,413,613	1,611,540	1,840,451	2,099,376	2,368,996	2,627,121	2,858,465	3,060,266	3,182,677
Plus: Accounts receivable, net	780,709	568,501	796,091	976,498	999,347	1,183,976	1,359,557	1,525,784	1,737,402	1,925,575	2,089,663	2,241,538	2,330,217
Plus: Inventories	192,333	229,023	211,927	287,619	316,535	346,163	409,097	462,565	519,140	579,503	628,918	672,997	700,739
Plus: Prepaid & other current assets	308,167	397,617	439,130	512,963	585,089	655,009	752,864	860,332	967,590	1,074,762	1,169,441	1,251,298	1,301,824
Plus: Operating lease assets	465,818	493,251	559,090	571,690	604,743	658,547	731,007	820,588	923,150	1,032,375	1,141,634	1,246,124	1,334,610
Operating Current Assets (CA)	2,545,994	2,599,859	3,107,914	3,609,590	3,919,327	4,455,234	5,092,976	5,768,645	6,516,278	7,239,336	7,888,121	8,472,224	8,850,067
Less: Accounts payable & accrued liabilities	623,664	694,748	809,403	957,180	1,063,087	1,206,457	1,386,378	1,577,299	1,779,302	1,975,313	2,147,935	2,299,689	2,392,088
Less: Deferred revenue	1,388,263	1,517,623	1,910,822	2,158,972	2,408,731	2,766,895	3,149,157	3,591,304	4,057,820	4,496,421	4,892,814	5,239,295	5,447,969
Non-Interest-Bearing Current Liabilities (CL)	2,011,927	2,212,371	2,720,225	3,116,152	3,471,817	3,973,352	4,535,535	5,168,602	5,837,122	6,471,734	7,040,749	7,538,984	7,840,057
Net Operating Working Capital	534,067	387,488	387,689	493,437	447,510	481,882	557,442	600,043	679,157	767,602	847,372	933,240	1,010,009
Plus: Property, Plant, and Equipment, net	483,818	472,398	483,300	494,192	522,764	569,275	631,912	709,350	798,008	892,427	986,874	1,077,200	1,153,691
Plus: PV of Operating Leases	465,818	493,251	559,090	571,690	604,743	658,547	731,007	820,588	923,150	1,032,375	1,141,634	1,246,124	1,334,610
Plus: Goodwill	254,322	279,132	386,446	287,135	199,114	128,001	69,313	30,826	0	0	0	0	0
Plus: Intangible assets, net (non-goodwill)	405,951	510,698	463,695	625,911	696,268	757,358	895,034	1,013,870	1,136,494	1,268,889	1,377,467	1,473,644	1,534,503
Plus: Net Other Operating Assets (net of D/A)	1,126,091	1,283,081	1,409,231	1,484,737	1,500,125	1,543,906	1,695,354	1,865,285	2,059,644	2,301,264	2,519,101	2,719,768	2,869,114
Less: Long-term deferred revenue	104,850	136,303	154,472	176,931	202,659	227,715	260,728	298,343	335,669	372,585	405,545	433,936	451,404
Less: Other Operating Liabilities	104,850	136,303	154,472	176,931	202,659	227,715	260,728	298,343	335,669	372,585	405,545	433,936	451,404
Invested Capital (IC)	2039126	2006664	2125748	2295436	2267739	2367348	2623980	2876335	3201140	3588707	3947802	4296272	4581410
Free Cash Flow (FCF):													
NOPLAT	559171	581504	1010573	1061438	1397170	1681356	2143115	2596550	3120596	3642386	4117689	4552842	4867528
Change in IC	117188	-32462	119084	169688	-27697	99608	256633	252355	324805	387567	359095	348470	285138
FCF	441983	613966	891490	891751	1424867	1581748	1886483	2344196	2795791	3254819	3758594	4204372	4582389
Return on Invested Capital (ROIC):													
NOPLAT	559171	581504	1010573	1061438	1397170	1681356	2143115	2596550	3120596	3642386	4117689	4552842	4867528
Beginning IC	1921939	2039126	2006664	2125748	2295436	2267739	2367348	2623980	2876335	3201140	3588707	3947802	4296272
ROIC	29.09%	28.52%	50.36%	49.93%	60.87%	74.14%	90.53%	98.95%	108.49%	113.78%	114.74%	115.33%	113.30%
Economic Profit (EP):													
Beginning IC	1921939	2039126	2006664	2125748	2295436	2267739	2367348	2623980	2876335	3201140	3588707	3947802	4296272
x (ROIC - WACC)	19.30%	18.72%	40.56%	40.13%	51.07%	64.34%	80.73%	89.16%	98.69%	103.99%	104.94%	105.53%	103.50%
EP	370862	381713	813964	853161	1172267	1459167	1911166	2339457	2838777	3328743	3766073	4166043	4446586

Synopsis (SNPS)

Weighted Average Cost of Capital (WACC) Estimation

Cost of Equity:

Risk-Free Rate	4.45%
Beta	1.08
Equity Risk Premium	5.00%
Cost of Equity	9.84%

ASSUMPTIONS:

10-YR US Treasury Rate (11/3/2023)
 5YR monthly beta from Bloomberg
 Henry Fund consensus estimate

Cost of Debt:

Risk-Free Rate	4.45%
Implied Default Premium	1.45%
Pre-Tax Cost of Debt	5.89%
Marginal Tax Rate	23%
After-Tax Cost of Debt	4.53%

10-YR US Treasury Rate (11/3/2023)

FactSet outstanding corporate debt assumption

Market Value of Common Equity:

Total Shares Outstanding	152375
Current Stock Price	\$538.32
MV of Equity	82,026,510

MV Weights

99.21%

Market Value of Debt:

Short-Term Debt	0
Current Portion of LTD	0
Long-Term Debt	20824
PV of Operating Leases	635,547
MV of Total Debt	656,371

0.79%

Market Value of the Firm

82,682,881

100.00%

Estimated WACC

9.80%

Synopsis (SNPS)

Discounted Cash Flow (DCF) and Economic Profit (EP) Valuation Models

Key Inputs:

CV Growth of NOPLAT	6.90%
CV Year ROIC	113.30%
WACC	9.80%
Cost of Equity	9.84%

Fiscal Years Ending Oct. 31	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
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DCF Model:

Free Cash Flow (FCF)	891751	1424867	1581748	1886483	2344196	2795791	3254819	3758594	4204372	4582389
Continuing Value (CV)										157740955
PV of FCF	812175	1181916	1194967	1298009	1469010	1595665	1691882	1779406	1812829	68014294
Value of Operating Assets:	80850154									
Non-Operating Adjustments										
Plus: Excess Cash	315932									
Plus: ST Investments	147913									
Plus: Other long-term assets	463695									
Less: Operating Lease Liab.	-54274									
Less: LT Debt	-20824									
Less: PV Operating Leases	-635547									
Less: PV of ESOP	-647507									
Value of Equity	80419542									
Shares Outstanding	152375									
Intrinsic Value of Last FYE	\$ 527.77									
Implied Price as of Today	\$ 582.27									

EP Model:

Economic Profit (EP)	853161	1172267	1459167	1911166	2339457	2838777	3328743	3766073	4166043	4446586
Continuing Value (CV)										153444683
PV of EP	777029	972386	1102360	1314992	1466041	1620199	1730309	1782946	1796302	66161840
Total PV of EP	78724406									
Invested Capital (last FYE)	2125748									
Value of Operating Assets:	80850154									
Non-Operating Adjustments										
Plus: Excess Cash	315932									
Plus: ST Investments	147913									
Plus: Other long-term assets	463695									
Less: Operating Lease Liab.	-54274									
Less: LT Debt	-20824									
Less: PV Operating Leases	-635547									
Less: PV of ESOP	-647507									
Value of Equity	80419542									
Shares Outstanding	152375									
Intrinsic Value of Last FYE	\$ 527.77									
Implied Price as of Today	\$ 582.27									

Synopsys (SNPS)

Relative Valuation Models

Ticker	Company	Price	EPS 2023E	EPS 2024E	P/E 23	P/E 24	Est. 5yr EPS gr.	PEG 23	PEG 24
CDNS	Cadence Design Systems	\$272.62	\$5.11	\$5.86	53.35	46.52	19.5	2.74	2.39
CDNS	Cadence Design Systems	\$80.93	\$5.51	\$6.10	14.69	13.27	32.1	0.46	0.41
ANSS	Ansys Inc.	\$297.94	\$8.57	\$9.55	34.77	31.20	10.4	3.34	3.00
ADSK	Autodesk Inc.	\$217.36	\$7.47	\$8.46	29.10	25.69	14.9	1.95	1.72
Average					32.98	29.17		2.12	1.88

SNPS	Synopsys (SNPS)	\$538.32	\$7.52	\$9.71	71.6	55.5	24.25	3.0	2.3
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Implied Relative Value:

P/E (EPS23)	\$ 247.93
P/E (EPS24)	\$ 283.12
PEG (EPS23)	\$ 387.03
PEG (EPS24)	\$ 442.76

Synopsis (SNPS)

Key Management Ratios

Fiscal Years Ending Oct. 31	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Liquidity Ratios:													
Current Ratio (CA/CL)	1.19	1.16	1.09	1.14	1.35	1.57	1.82	2.10	2.41	2.76	3.15	3.60	4.13
Quick Ratio (CA - Inv) / CL	1.10	1.07	1.01	1.05	1.26	1.49	1.73	2.01	2.32	2.67	3.07	3.51	4.04
Cash Ratio (Cash + Mkt. Sec.) / CL	0.58	0.65	0.56	0.58	0.82	1.04	1.28	1.56	1.87	2.22	2.62	3.06	3.59
Asset-Management Ratios:													
Asset Turnover (Net Sales / Avg. Total Assets)	0.51	0.50	0.56	0.59	0.60	0.60	0.59	0.57	0.54	0.50	0.46	0.41	0.37
Inventory Turnover (COGS / Avg. Inv)	0.08	0.08	0.09	0.09	0.10	0.10	0.09	0.09	0.09	0.08	0.07	0.07	0.06
Accounts Receivable Turnover (Sales / Avg. AR)	5.52	6.23	7.45	6.56	6.60	6.81	6.68	6.71	6.70	6.62	6.57	6.52	6.43
Financial Leverage Ratios:													
Debt-to-Equity Ratio (ST debt + LT debt / TSE)	0.03	0.02	0.00	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Debt-to-Asset Ratio (ST debt + LT debt / Assets)	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Profitability Ratios:													
Return on Equity (NI/Beg TSE)	16.2%	15.4%	18.6%	20.7%	25.2%	27.0%	29.7%	30.2%	30.1%	29.0%	27.0%	25.0%	22.7%
Return on Assets (NI / Total Assets)	8.3%	8.7%	10.5%	11.2%	12.8%	13.5%	14.8%	15.3%	15.6%	15.6%	15.3%	14.8%	14.1%
Operating Profit Margin (Opr. Profit / Sales)	16.8%	17.5%	22.9%	21.8%	25.1%	26.4%	29.3%	31.2%	33.3%	35.2%	36.8%	38.3%	39.7%
Net Profit Margin (Net Income / Sales)	18.0%	18.0%	19.4%	19.6%	22.5%	24.1%	27.1%	29.2%	31.7%	34.1%	36.3%	38.5%	40.9%

Synopsis (SNPS)

Present Value of Operating Lease Obligations

Fiscal Years Ending Oct. 31	2016	2017	2018	2019	2020
Year 1	52373	56879	61819	79286	84534
Year 2	50938	51350	58220	79286	79886
Year 3	46506	39594	58564	69477	64073
Year 4	35835	31797	49805	53909	59751
Year 5	28801	27438	43357	48730	53280
Thereafter	171040	147271	318135	291494	259969
Total Minimum Payments	385493	354329	589900	622182	601493
Less: Cumulative Interest	95465	83023	168485	158441	143352
PV of Minimum Payments	290028	271306	421415	463741	458141

Implied Interest in Year 1 Payment		17083	15980	24821	27314
Pre-Tax Cost of Debt	5.89%	5.89%	5.89%	5.89%	5.89%
Years Implied by Year 6 Payment	5.9	5.4	7.3	6.0	4.9
Expected Obligation in Year 6 & Beyond	28801	27438	43357	48730	53280

Present Value of Lease Payments

PV of Year 1	49459.8	53715.2	58380.4	74875.8	79831.9
PV of Year 2	45428.9	45796.3	51923.3	70710.9	71246.0
PV of Year 3	39169.1	33347.6	49324.9	58516.2	53964.8
PV of Year 4	28502.8	25291.0	39614.4	42878.7	47525.4
PV of Year 5	21633.8	20610.0	32567.5	36603.4	40021.1
PV of 6 & beyond	105833.1	92546.2	189604.6	180155.7	165551.4
Capitalized PV of Payments	290027.6	271306.3	421415.1	463740.8	458140.6

Synopsis (SNPS)

Effects of ESOP Exercise and Share Repurchases on Common Stock Account and Number of Shares Outstanding

Number of Options Outstanding (shares): 1,449
Average Time to Maturity (years): 2.77
Expected Annual Number of Options Exercised: 523

Current Average Strike Price: \$ 103.44
Cost of Equity: 9.84%
Current Stock Price: \$538.32

Fiscal Years Ending Oct. 31	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Increase in Shares Outstanding:	523	523	403							
Average Strike Price:	\$ 103.44	\$ 103.44	\$ 103.44	\$ 103.44	\$ 103.44	\$ 103.44	\$ 103.44	\$ 103.44	\$ 103.44	\$ 103.44
Increase in Common Stock Account:	54,110	54,110	41,665	-	-	-	-	-	-	-
Share Repurchases (\$)	906,000	698,386	698,386	698,386	698,386	698,386	698,386	698,386	698,386	698,386
Expected Price of Repurchased Shares:	\$ 538.32	\$ 591.29	\$ 649.47	\$ 713.38	\$ 783.58	\$ 860.68	\$ 945.37	\$ 1,038.40	\$ 1,140.58	\$ 1,252.81
Number of Shares Repurchased:	1,683	1,181	1,075	979	891	811	739	673	612	557
Shares Outstanding (beginning of the year)	152,375	151,215	150,557	149,885	148,906	148,014	147,203	146,464	145,792	145,179
Plus: Shares Issued Through ESOP	523	523	403	0	0	0	0	0	0	0
Less: Shares Repurchased in Treasury	1,683	1,181	1,075	979	891	811	739	673	612	557
Shares Outstanding (end of the year)	151,215	150,557	149,885	148,906	148,014	147,203	146,464	145,792	145,179	144,622

Synopsys (SNPS)

Valuation of Options Granted under ESOP

Current Stock Price	\$538.32
Risk Free Rate	4.45%
Current Dividend Yield	0.00%
Annualized St. Dev. of Stock Returns	27.63%

(in thousands)

Range of Outstanding Options	Number of Shares	Average Exercise Price	Average Remaining Life (yrs)	B-S Option Price	Value of Options Granted
Range	1,449	103.44	2.77	\$ 446.86	\$ 647,507
Total	1,449	\$ 103.44	2.77	\$ 446.86	\$ 647,507