A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics.

From On-sight to Online
The Digitalization Boom

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Abstract

The following equity research was conducted from September 2020 until January 2021 and assesses the intrinsic value of Siemens AG's share price as part of an investment decision. Siemens AG is an industrial company, segmented in several market as digitalization and automation, transportation and parts, and medical imaging. Each one is separately evaluated taking into account the historical performance as well as the market trends and regional dynamics. The valuation method used was a discounted cash flow. The share price target for fiscal 2021 was € 138.99, implying an expected annualized return of 12.5%, which justifies the recommendation to BUY.

Valuation, Digitalization, Automation, Siemens

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This report is part of the Siemens report (annexed) and should be read has an integral part of it.

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Forecast

To perform the valuation of Siemens AG, the firm was divided in three main segments: Siemens Ingenuity for Life, Siemens Healthineers segment and Siemens Other and the firm's financial statements and cash flows were forecasted. From 2026 until 2029 it was verified that the operational ROIC, the reinvestment rate and, thus, the company's growth rate were stable. As such, the forecasted exercise ends in 2029, where it is assumed Siemens AG to be at a mature stage in the development of its operations.

	2026F	2027F	2028F	2029F	Terminal Value
Operational ROIC	12,63%	12,19%	11,67%	11,09%	11,89%
Reinvestment Rate	20,81%	22,83%	25,14%	27,84%	24,16%
RONIC	-1,99%	-4,63%	-6,78%	-8,91%	
Growth	2,63%	2,78%	2,94%	3,09%	**2,87%**

*Table 1: **Operational ROIC, Reinvestment Rate, RONIC and Growth Forecasted***

Operating Revenues

Following the company's division explained above, revenues were predicted for the different Siemens AG's business units, according to the assumptions and research described in the prior Industry Overview section.

Digital Industries: During the fiscal year of 2020, the importance of Digital Industries was even more highlighted. Indeed, the benefits and the necessity were key to incentive the boom for the implementation of automation and digitalization features in production factories. Aligned with incentives from government policies mentioned above, it is expected that digital factories and automation in Europe will increase ~5% until the end of the forecasted period of 2029[1].During fiscal 2020, the most affected region was the United States of America, with revenues decreasing almost 20%. In this volatile region, although negatively impacted with trade wars and recession in investment, it is expected that smaller North America companies will grow at 6% while larger companies will increase at a 16% pace after the return to the normal pace of the economy[2].

	2018	2019	2020	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F
Digital Industries	**15 587**	**16 087**	**14 997**	**15 985**	**17 303**	**18 559**	**19 920**	**21 396**	**22 715**	**24 120**	**25 617**	**27 213**
Europe, C.I.S., Africa, Middle East (EMEA)	8 582	8 593	8 221	8 734	9 222	9 740	10 291	10 877	11 466	12 087	12 741	13 431
Germany	2 837	3 004	3 150	3 461	3 737	4 036	4 359	4 708	4 961	5 228	5 508	5 804
Americas	3 733	4 112	3 328	3 498	3 824	4 184	4 584	5 028	5 389	5 779	6 200	6 655
United States	2 974	3 389	2 742	2 906	3 226	3 581	3 975	4 412	4 767	5 151	5 566	6 014
Asia, Australia	3 265	3 374	3 316	3 753	4 258	4 634	5 044	5 491	5 859	6 253	6 675	7 127
China	1 662	1 711	1 866	2 201	2 598	2 857	3 143	3 457	3 729	4 022	4 338	4 679

*Table 2: **Digital Industries Revenue Breakdown***

Smart Infrastructure: Siemens Smart Infrastructure revenues were predicted based on studies forecasting revenues for the smart home market in the countries where Siemens operates[3]. The

[1] ResearchAndMarkets, Global Process Automation Industry: Growth, Trends and Forecast (2020-2025)
[2] Siemens AG, 4 Quarter 2020 Results Presentation
[3] Statista, Smart Home revenue forecast per segment from 2017 to 2025

investment in smart home lies on smart appliances, control and connectivity, home entertainment, energy management, comfort and lighting, and security.

Overall, the trend reports a recovery from the slowdown due to the COVID-19 pandemic in 2021, although to less than pre-COVID levels in Europe (~12% between 2021 and 2025) and America (~4% between 2021 and 2025). It is expected an increase in this sector in the period between 2022 and 2025 and a stable growth from 2026 onwards (~3% and ~1% for Europe and America, respectively). For Asia and, more specific China, it is predicted not only a faster recovery, but also a much higher growth at two digits for the subsequent years (~11% and ~15% for China and Asia, respectively). This is mainly driven to China and India promising development.

	2018	2019	2020	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F
Smart Infrastructure	**14 445**	**15 225**	**14 323**	**15 384**	**17 609**	**19 941**	**22 379**	**24 792**	**26 108**	**27 508**	**28 999**	**30 587**
Europe, C.I.S., Africa, Middle East (EMEA)	7 953	8 132	7 851	8 313	9 453	10 650	11 885	13 095	13 688	14 318	14 988	15 701
Germany	2 630	2 843	3 008	3 253	3 725	4 183	4 622	5 033	5 442	5 885	6 363	6 881
Americas	3 459	3 892	3 179	3 361	3 856	4 313	4 764	5 217	5 494	5 787	6 097	6 426
United States of America	2 756	3 208	2 619	2 777	3 238	3 655	4 072	4 499	4 770	5 057	5 361	5 683
Asia, Australia	3 026	3 193	3 169	3 709	4 300	4 977	5 731	6 480	6 926	7 404	7 914	8 460
China	1 540	1 619	1 782	2 049	2 325	2 642	3 033	3 421	3 631	3 854	4 090	4 342

*Table 3: **Smart Infrastructure Revenue Breakdown***

Mobility: Siemens Mobility revenues are derived mainly from contracts with public and state owed companies in transportation and logistics sector, meaning that Mobility's revenue is highly dependent on state investment. Given that, most regions are forecasted based on the train investment[4]. Moreover, during the year of 2020, Siemens closed contracts with the United Kingdom, on metro trains, with Russia, for high-speed trains, with Canada, to implement the Intermodal system, and with the US for diesel electric locomotives. However, due to the pandemic most contracts had to be postponed, and consequently, revenues decreased during 2020 fiscal year. Only United States is predicted to take longer than a year to recover to pre-COVID-19 levels (growth of ~7% until 2025, and stable at ~3.5% thereafter). In line with historical figures, South America is decreasing even further mobility investments, with a risen preference for car sharing, which consequently predicts a decrease of ~6% each year. Besides, it is expected that the most accentuated growth will occur in China until the forecasted period of 2025[5], a consequence of the previously mentioned government program "Mainland China – Made in China 2025", that will boost growth to an expected ~18.7% revenue growth[6] until 2025 and ~8% thereafter.

	2018	2019	2020	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2016
Mobility	**8 821**	**8 916**	**9 051**	**9 853**	**10 860**	**11 821**	**12 830**	**13 957**	**14 763**	**15 636**	**16 581**	**17 605**
Europe, C.I.S., Africa, Middle East (EMEA)	4 857	4 762	4 961	5 374	5 826	6 252	6 645	7 067	7 409	7 778	8 176	8 605
Germany	856	873	875	919	965	1 013	1 064	1 117	1 150	1 185	1 220	1 257
Americas	5 290	5 803	5 692	5 994	6 314	6 653	7 012	7 112	7 213	7 315	7 419	7 524
United States of America	4 458	4 916	4 909	5 204	5 516	5 847	6 197	6 289	6 381	6 475	6 571	6 667
Asia, Australia	3 726	4 097	4 021	4 311	4 622	4 955	5 313	5 632	5 898	6 177	6 469	6 775
China	1 681	1 838	1 894	2 046	2 209	2 386	2 577	2 718	2 866	3 023	3 188	3 363

*Table 4: **Mobility Revenue Breakdown***

[4] Statista train investment breakdown in regions, May 2020
[5] Oliver Wyman, Where China is leading mobility revolution, Dez 2019
[6] Statista, Mobility Services, October 2020

Siemens Healthineers: According to the "Strategy 2025", Siemens Healthineers is focusing efforts to shift to digitalization and automated workflows in laboratory diagnostics. Besides, during the current year, the company closed several long-term contracts, a guarantee for future revenues. Moreover, due to recent acquisitions, Siemens Healthineers positioned itself as a partner for consolidations and is set to be the market leader of cancer care by 2025.

Breaking down through regions, it is relevant to highlight the growth in Asia, with a forecast of a ~7.2% CAGR across the continent[7], with ~8% in China and ~6,5% in the other regions.

	2018	2019	2020	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2016
Siemens Healthineers	**13 425**	**14 517**	**14 460**	**15 289**	**16 170**	**17 104**	**18 095**	**18 802**	**19 387**	**19 993**	**20 623**	**21 277**
Europe, C.I.S., Africa, Middle East (EMEA)	4 409	4 617	4 747	4 984	5 234	5 495	5 770	6 059	6 276	6 502	6 736	6 978
Germany	1 606	1 665	1 901	2 131	2 388	2 677	2 926	3 199	3 486	3 797	4 137	4 507
Americas	2 112	2 279	2 009	2 181	2 346	2 426	2 506	2 584	2 653	2 727	2 805	2 887
United States of America	1 683	1 879	1 655	1 854	2 039	2 137	2 236	2 330	2 415	2 503	2 594	2 689
Asia, Australia	1 848	1 870	2 002	2 297	2 687	3 144	3 679	4 307	4 701	5 131	5 601	6 114
China	941	948	1 125	1 336	1 585	1 882	2 234	2 651	2 885	3 139	3 416	3 717

*Table 5: **Siemens Healthineers Revenue Breakdown***

Operating Costs

In line with the overall analysis, operating costs were also divided according to the business units integrated on the Industrial Business. The company reports on the consolidated financial statements its operating costs according to the function of the expenses, i.e., cost of sales, research and development expenses and selling, general and administrative expenses. As such, for each busines unit, three main captions were considered and broken-down: personnel costs, depreciation and impairments, and a variable portion, which is dependent on revenues. Due to the lack of information to perform this decomposition, two drivers were considered: the adjusted EBITA margin and respective target margin range defined by Siemens, and the number of employees allocated to each segment. Besides, in certain years it is also known the amount of R&D expenses allocated per unit. Combining all this information with the relative size in revenues of the business unit, allowed for a complete map of the historical figures in relation with costs.

To perform an accurate forecast, the first two drivers used were the number of employees needed per € million of order followed by the implied number of employees allocated to the Siemens Industrial Business segments and geography in the period between 2021 and 2029. Finally, it was analysed the historical cost per employee, which comprises not only wages and salaries but also social welfare contributions. The cost per employee was forecasted based on the inflation rate of the most relevant country in each region, i.e., Germany in the region of Europe, C.I.S. Africa and Middle East, United States in Americas and China in the region that comprises Asia and Australia. Having this predictions, the personnel expenses were then allocated to each cost function, based on the nature of the tasks the employees develop: manufacturing and services, as well as sales and marketing tasks were allocated to cost of sales; research and development tasks were allocated to R&D expenses; and administration and general services tasks were allocated to selling and general administrative expenses.

Regarding the prediction of depreciation and impairment expenses applied to each business

[7] Deloitte, 2020 global health care outlook

area, it was obtained using as driver a percentage of the property, plant and equipment previously forecasted.

This way, the gross profit, the adjusted EBITA, and the respective margins were obtained for each operating business unit. Amortization expenses were predicted based on a percentage of the intangible assets forecasted, and then subtracted from adjusted EBITA, to obtain each Siemens operating segment's EBIT and EBIT margin.

Table 6: ***Competitors Margin Comparison Digital Industries,*** *source: competitors financials*

	2018	2019
Gross Margin AVG	39%	39%
Siemens vs Competitors	BETTER	BETTER
EBIT MARGIN - average	17%	15%
Siemens vs Competitors	WORSE	BETTER

Digital Industries: gross margin is expected to remain constant between 40% and 39% until 2024. After 2025, it is predicted a decrease, which is forecasted to be 35% in 2029, mainly due to the increase in the personnel costs caption.

Siemens targets the adjusted EBITA margin for Digital Industries to be between 17% and 23%. According to our forecast, those targets will be achieved until 2025, when the adjusted EBITA margin is predicted to be 17.2%. In the future, Siemens must continue investing in research and development and cost reduction programs so that the company will be able to reach the targeted margins. EBIT margin was 19% in 2020 and is expected stabilize around 16% until 2024, decreasing after that period to 13.2% in 2029.

When comparing Siemens Digital Industries operating segment with its direct competitors – ABB, Cadence, Dassault Systems, Emerson, Rockwell Automation, and Schneider Electric – in the period between 2016 and 2019, it is possible to conclude that Siemens was performing 2pp worse than its competitors average in gross margin terms, after the company reorganization in 2018. However, in 2019 and 2020 (note that there is still not information regarding all the competitors in 2020), Siemens was performing better than its competitors average in terms of EBIT margin. Although the difference does not exceed 1pp, it is good news for Siemens as the company performance is in accordance to what is expected by the market.

Table 7: ***Competitors Margin Comparison Smart Infrastructure,*** *source: competitors financials*

	2018	2019
Gross Margin AVG	33%	34%
Siemens vs Competitors	WORSE	WORSE
EBIT MARGIN - average	12%	12%
Siemens vs Competitors	WORSE	WORSE

Smart Infrastructures: gross margin is expected to remain stable between 23% and 22% until 2023. Similarly, to what is verified in the Digital Industries segment, the increase in cost of sales is mainly due to the increase in personnel costs over the years.

Regarding the adjusted EBITA margin, Siemens targets it to be between 10% and 11%. This target was not achieved with the 9.1% margin in fiscal 2020. Although, it is expected a global recovery from 2021 onwards, which will boost the increase in sales, and the target margins will be achieved until 2024. Moreover, in 2021 and 2022 it is expected to even exceed the targeted margins, as adjusted EBITA margins are forecasted to be 11.4% and 11.2%, respectively, implying EBIT margins of 9%. After 2025, investments must be done in order to push up again the margins and continue achieving the targets, since it is expected only a 6.7% adjusted EBITA margin in 2029, implying an EBIT margin of 5%.

However, considering its direct competitors – ABB, Honeywell, Johnson Controls, and Schneider Electric – past years margins, Siemens Smart Infrastructure segment has always been performing worse than its peers in terms of gross margin, particularly in 2018 and 2019, with differences exceeding more than 10pp against the average of its competitors. When considering EBIT margins, the difference against the average of Smart Infrastructures' peers shrinks to 3pp and 4pp in 2018 and 2019, respectively. This means that Siemens is performing worse than what the market expects in this segment, which means that Siemens must prepare a cost reduction program and keep investing on offering innovative solutions to the market to remain competitive and profitable.

Table 8: ***Competitors Margin Comparison Mobility****, source: competitors financials*

	2018	2019
Gross Margin AVG	17%	16%
Siemens vs Competitors	BETTER	BETTER
EBIT MARGIN - average	6%	4%
Siemens vs Competitors	BETTER	BETTER

Mobility: Siemens Mobility segment is the most stable business unit. It is predicted the gross margin to remain steady between 20% and 17% until 2029, implying an adjusted EBITA margin of 10.1%, 9.9% and 9.6% in 2021, 2022, and 2023. However, the adjusted EBITA margin targeted by Siemens to be between 9.5% and 10.5% is not expected to be achieved from 2024 onwards. It is important to note that Siemens Mobility revenues are highly dependent on public contracts, which are expected to be long-term contracts until 2024. From 2025 onwards, Siemens becomes even more dependent on public investment and must win public contracts to be able to meet again the targeted margins.

Regarding the EBIT margin, it is forecasted to remain stable between 8% and 7% until 2026, declining to 5% in 2029.

With more than 100 years of experience, Siemens Mobility segment is the market leader. Indeed, when comparing Siemens Mobility with its direct competitors – Alstom, Bombardier, CRRC, and Stadler – it is verified that Siemens is outperforming its peers average by 4pp in terms of gross margin and by 5pp in EBIT margin terms, in 2019. The scenario is similar for the remaining historical years analysed, proving that Siemens Mobility is performing better than what is expected by the market, as it is market leader.

Siemens Healthineers: gross margin is predicted to range between 42% and 40% between 2021 and 2025, implying 16% adjusted EBITA margin in 2021 and 13.5% in 2025. Although, Siemens targeted the margin to be between 17% and 21% and in none of the forecasted years the target margin is achieved. Siemens Healthineers EBIT margin is predicted to be 14% in 2021, 11% in 2025 and only 7% in 2029.

Table 9: ***Competitors Margin Comparison Siemens Healthineers****, source: competitors financials*

	2018	2019
Gross Margin AVG	60%	51%
Siemens vs Competitors	WORSE	WORSE
EBIT MARGIN - average	15%	15%
Siemens vs Competitors	WORSE	BETTER

In fact, when analysing the past years and comparing to the company's direct competitors – Abbott, Becton, Dickinson and Company, Philips, Smith and Nephew, Boston Scientific Group, Medtronic, Stryker, and Thermo Fisher Scientific – Siemens Healthineers has always been underperforming its peers' averages in terms of historical gross margins. However, when analysing EBIT margins, it is verified that the segment only underperformed its peers' averages in 2018, which means that, overall, one can conclude that Siemens Healthineers is performing in accordance with which has been expected by the market. Nevertheless, the company still needs improvements, namely in its cost structure to achieve the adjusted EBITA targeted margins for next years.

Net Working Capital and Capital Expenditures

For Siemens Industrial Business segments (Siemens Ingenuity for Life and Siemens Healthineers), inventories, trade and other receivables and contract assets, and trade payables captions were forecasted based on the holding period inventory, average collection period and average payable period, respectively. For all the captions, the driver assumed to forecast 2020 and following years was the value verified in 2019. Operating cash was assumed to be 2% of the segment's revenues.

To forecast property, plant and equipment and intangible assets, it was analysed the past evolution for each of the captions and an average was computed to predict the values for the upcoming years, as Siemens does not disclose other relevant information relevant to forecast its financial statements captions.

As such, net working capital expenditures, capital expenditures and intangible assets were forecasted as shown in the following table:

(Values in millions of €)	2020	2021F	2022F	2023F	2024F	...	2029F
Net Working Capital	20 153	21 287	23 704	26 194	28 865	…	40 496
Var. NWC	-9 842	1 134	2 417	2 491	2 671	…	2 473
Other intangible assets	9 747	9 762	9 828	9 943	10 107	…	11 676
Property, plant and equipment	12 782	13 415	14 109	14 872	15 377	…	18 244
CAPEX	6 636	26 032	4 363	4 704	4 706	…	8 183

Table 10: ***Net Working Capital and CAPEX***

Intrinsic Valuation

To financially evaluate Siemens AG, at a first stage, the Discounted Cash Flow Model (DCF) was used. Moreover, to perform a more accurate and comprehensive analysis regarding each business unit, taking into consideration a more detailed view of the risks and growth rates, it was performed a sum-of-the-parts valuation (SOTP DCF), making use of the projected financial statements per segment.

Model Description

Target Debt/Enterprise Value Ratio

Table 11: ***YTM Approach***

1-Yr Default Probability (Moody's)	0,0200%
Weighted average YTM	0,40%
LGD	48,00%
Bd	0,08
Rd	**0,39%**

*Table 12:****Rating Approach***

Germany country risk premium	0%
S&P: A+ Spread	0,98%
Risk-free rate	-0,14%
Pre-tax Rd	**0,84%**

As it was observed in the recent acquisition of Varian, where Siemens Healthineers opt to fund the deal with the issuance of new debt, Siemens keeps leveraging its business with new debt in line with the investing strategy observed historically and supported by the management team. As such, the average debt to enterprise value ratio between 2016 and 2019 is a fair assumption for computing Siemens' capital structure. By doing so, the debt-to-equity ratio is kept stable at 34% for the forecasted period. The assumed debt to enterprise value ratio was the driver to predict total equity and total net financial assets for the company during the next years, as well as to predict debt levels.

Discount Rates

With the aim of computing the most accurate discount rate, certain assumptions were considered as the country risk premium of 0% for Germany[8] and the market risk premium (MRP) of 6.75%[9]. The 30-year German Bund yield was used as a proxy for the risk-free rate, as Siemens AG is a Germany based company and the German Bunds are the assets with lower default risk in Europe. As such, -0.14%[10] was the risk-free rate considered for all the discount rates computation.

[8] Bloomberg, 28/12/2020
[9] KPMG Research on Equity Market Risk Premium, 31/03/2020
[10] Bloomberg, 28/12/2020

Cost of debt: to obtain the cost of debt, two different approaches were used – the YTM approach and the rating approach. Considering the first one, the YTM approach, it was computed the average yield to maturity for Siemens AG outstanding debt, to which was subtracted the Moddy's default probability (0.02%) multiplied by the loss given default (LGD) of 48%[11]. This way, it was obtained a 0.39% cost of debt. Regarding the rating approach, Siemens AG cost of debt was obtained by adding up the -0.14% risk-free rate with the 0.98% S&P A+ spread, which corresponds to the company's credit rating, resulting on 0.84% cost of debt. Finally, it was calculated an average of the two approaches and was obtained a 0.61% cost of debt. This rate used to estimate WACC and assumed to be the interest rate at which any new debt would be issued from 2021 onwards. The implied beta of debt (βD) obtained was 0.11.

Table 13: ***Unlevered Beta of Siemens Peers****, source: analyst estimate*

SIEMENS AG	0,84
Emerson Electric	1,03
Abb	1,13
Eaton	1,02
Alstom	0,88
General Electric	0,95
Rockwell	1,02
Schneider	0,94
Average	**0,98**
Median	**0,98**

Cost of equity: Siemens AG's peer companies were selected based on the information reported by the company's management strategy, similarity of operations and market size. From Bloomberg were then extracted financial information regarding Siemens' peers, namely the levered beta and the after-tax cost of debt, which were used to obtain the peers' cost of debt and, afterwards, their beta of debt. Having such data, the unlevered beta to each of the peers was computed (unlevered beta = net debt to enterprise value * beta of debt + equity to enterprise value * levered beta), as to remove the effect of leverage and only reflect the operational risk of that specific company. Based on its peers unlevered betas median, Siemens AG unlevered beta was obtained, which was afterwards re-levered. The final cost of equity obtained was 9.52%, with an implied 1.43 beta of equity (β^E).

WACC: after computing the company's cost of debt and cost of equity, the 6.44% WACC estimated was obtained using Siemens D/EV ratio of 34%.

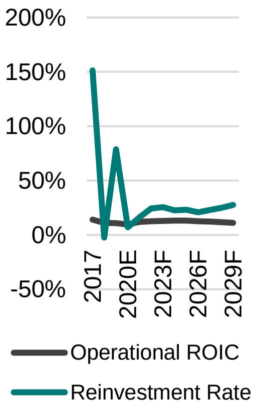
Table 14: ***WACC calculation***

Rf	-0,14%
Rd	0,61%
Ru	6,50%
Re	9,52%
D/EV	34%
E/EV	66%
1-statutory tax rate	75%
WACC	**6,444%**

DCF Valuation

After estimating WACC and predicted Siemens free cash flow (FCF) until 2029, it was concluded that the estimated growth of FCF to firm is stable from 2026 onwards. As such, the terminal value for each of the two ratios was assumed to be an average of the values between 2016 and 2029. This way, Siemens terminal growth was estimated to be 2.86%, obtained considering an operational ROIC of 11.9% and a 24.0% reinvestment rate. The implicit long-term inflation for Siemens AG by 2029 is forecasted to be 2.62%. It is reasonable to consider a long-term growth rate slightly higher than the long-term inflation rate, as Siemens is a mature firm with the capacity to remain investing in research and development and offering innovative and competitive solutions to the market. Having all the discount rates and the unlevered operating cash flows computed, the present value of the levered operating FCF was obtained. By adding up the net financial debt and the value of the non-controlling interests, it was estimated the equity value of €118.1bn in fiscal 2021, with an implied share price of €138.99, delivering an expected annualized return of 12.5%.

Figure 1: ***Evolution of ROIC and RR***



[11] Siemens AG Reports

Table 15: ***Terminal Values***, *source: analyst estimate*

Reinvestment Rate	11.91%
RONIC	24.02%
Growth	**2.86%**

Table 16: ***Digital Industries and Smart Infrastructure: Unlevered Beta of Peers***, *source: analyst estimate*

SAP	1,36
Honeywell	0,99
Schneider Elec	0,96
Emerson Electric Co	1,04
Abb Ltd	1,11
Johnson Contr	0,81
Rockwell Autor	1,02
Cadence Design Systems	1,08

Table 18: ***Mobility: Unlevered Beta of Peers***, *source: analyst estimate*

Bombardier	0,44
Talgo	0,95
Guangdong Huatie Tongda	1,41
KTK Group	1
CRRC Corp	0,81
Alstom	0,87
Thales	1,18
Stadler Rail	0,65

Table 19: ***Siemens Healthineers: Unlevered Beta of Peers***, *source: analyst estimate*

Abbott Laboratories	0,89
Elekta	1,44
Koninklijke Philips NV	0,85
Smith & Nephe	0,92
Boston Scientific Corp	0,91
Hologic Inc	0,86
Medtronic PLC	0,87
Stryker Corp	1,02
Thermo Fisher Scientific Inc	0,8

SOTP DCF Valuation

	WACC	Long Term Growth
Digital Industries and Smart Infrastructure	6.86%	**2.91%**
Mobility	5.98%	**2.91%**
Siemens Healthineers	6.22%	**2.74%**

Table 17: ***WACC and Long-Term Growth***

To better analyse the performance of each operating segment it was performed a sum-of-the-parts valuation (SOTP DCF) to assess the value of Siemens.

As such, it was estimated a WACC for Siemens Digital Industries and Smart Infrastructures segments, a WACC for Siemens Mobility segment, and a WACC for Siemens Healthineers segment, based on the direct competitors for each busines unit, chosen taking into consideration the product portfolios and the market cap. The resulting estimated WACCs were 6.86%, 5.98% and 6.22%, respectively. The terminal growth used in each segment was also estimated individually for each operating business unit, using the same rationale used to predict the terminal growth for Siemens AG. The results obtained were 2.91% for Siemens Ingenuity for Life operating segments and 2.74% for Siemens Healthineers operating segments.

To discount the investment cash flows, the 6.44% WACC estimated for Siemens AG was used, obtaining a total discounted free cash flow of €147.4bn in fiscal 2021. Likewise the proceeding in the traditional DCF valuation model, to the discounted free cash flow was added up the net financial debt and the value of the non-controlling interests, obtaining this way the equity value of €123.8 bn in 2020, implying a €145.70 share price, and delivering a 16.5% annualized expected return.

Therefore, it is concluded that Siemens AG is being traded at discount, and the recommendation would be to **BUY** Siemens AG shares.

Sensitivity Analysis

With the aim of analyse the impact of the assumptions of the DCF model on Siemens' share price, a sensitivity analysis was conducted. Indeed, a percentual chance in the growth rate of Siemens or in WACC exhibit how the projected share price would change, keeping constant all the remaining assumptions.

As previously explained, the 9.52% cost of equity was based on Siemens' peers' unlevered betas median, obtaining a 6.44% WACC. It was verified the impact on the company's share price, if instead of considering the median of the peers' unlevered betas was considered the average instead, obtaining a 9.45% cost of equity, implying a 6.40% WACC.

Moreover, as above mentioned, the cost of debt and its implied beta was computed based on an average of two approaches. As such, it was analysed the impact on share price of considering only the YTM approach, obtaining a cost of debt 0.39%, implying a 6.39% WACC, versus considering only the rating approach, with a computed 0.84% cost of debt, implying a 6.50% WACC.

For the long-term growth rate, it was assessed the impact on Siemens' share price for: a conservative scenario, having Siemens growing in perpetuity only at the long-term inflation rate of 2.63%; the assumed terminal growth rate of 2.87%; an optimistic scenario in which the 2.94% terminal growth rate is obtained as an average of the financial results of the period between 2027 and 2029; a very optimistic scenario in which it is obtained a 3.01% terminal growth rate calculated as an average considering the only the values of 2028 and 2029.

By applying the different long-term growth rates and WACCs it was obtained the sensitive analysis presented on table 20.

		WACC			
	139,0 €	6,39%	6,40%	6,44%	6,50%
Growth Rate	2,63%	133,26 €	132,64 €	130,77 €	128,35 €
	2,87%	142,06 €	141,36 €	139,26 €	136,55 €
	2,94%	144,67 €	143,95 €	141,78 €	138,99 €
	3,01%	147,81 €	147,06 €	144,80 €	141,90 €

Table 20: ***Sensitivity Analysis Output***

YTM approach	
Rd	0,39%
Beta Debt	0,08
WACC	6,39%

Rating approach	
Rd	0,84%
Beta Debt	0,15
WACC	6,50%

Peer's Median	
Re	0,095
beta equity	1,431
WACC	6,44%

Peer's Average	
Re	0,094
beta equity	1,421
WACC	6,40%

From the sensitivity analysis it is possible to conclude that negative returns are not expected, and, in the worst-case scenario, the recommendation would be to hold the stock, with an expected annualized return of 6.0%. Overall, our recommendation would be to buy Siemens AG stock, as it delivers a return higher than 10% in 75% of the cases considered.

Relative Valuation

In order to complement Siemens valuation through the DCF models, a multiple valuation was performed. Siemens' peers were selected, not only by their financials, product portfolio and region of operations, but also because these companies are highlighted by Siemens reports as the company's direct competitors. The multiples valuation was obtained using the Enterprise Value to EBITDA (EV/EBITDA) ratio. Since analysing the ratios for comparable companies per operating segment provides a more accurate approach to value Siemens AG, the multiples valuation was based on a sum-of-the-parts (SOTP) model. Siemens peers' financial information needed to compute the ratios were obtained from Bloomberg, namely enterprise value, revenues, EBITDA, EBIT, and EPS. The multiples were obtained for each operating segment and elaborated a summary interval with the 1st quartile, the average, the median, and the 3rd quartile for each ratio. Based on the fiscal 2021 forecasted financials for each segment, was computed the enterprise value per operating business unit. By adding up the enterprise value of all the operating areas, the enterprise value range for Siemens AG was obtained, to which was subtracted the total company's bridge to compute the market value of equity. Siemens share price was then calculated by dividing the number of shares outstanding (850 million) by the market value of equity range obtained.

	EV/EBITDA	EV/EBIT	EV/Revenues	P/E
SIEGn.DE	15,7x	27,0x	2,1x	20,0x
ABB	13,5x	33,0x	2,1x	35,3x
ALSO.PA	20,2x	30,2x	1,8x	24,9x
ROK	20,0x	23,3x	4,4x	28,3x
SCHN.PA	16,2x	23,6x	2,9x	29,0x
EMR	12,4x	19,2x	2,8x	22,7x
ETN	14,8x	24,0x	2,7x	28,3x
Average	**16,1x**	**25,8x**	**2,7x**	**26,9x**

*Table 21: **Siemens Peers Multiples***

Focusing on the EV/EBITDA ratio and considering the median price, 140.32€, it can be concluded that Siemens' stock is being traded at discount, as the DCF methodologies had suggested.

In a consolidated multiple analysis to Siemens, compared to its peers, Siemens presents a lower multiple than the average of its competitors. This can be seen as an evidence that there is an opportunity to increase Siemens' multiples. After the spin-off, there was established a different operating strategy in what regards the focusing of the company on its industrial software activities. As such, there is the fair expectation that Siemens' stock will get re-graded with an increase of its multiples, which are predicted to be similar to those of its direct competitors – Schneider Electric or Rockwell Automation, for instance.

EV/EBITDA			
	Digital Industries and Smart Infrastructures	**Mobility**	**Siemens Healthineers**
1st Quartile	13,0x	14,3x	13,2x
Average	19,4x	48,2x	17,7x
Median	16,2x	18,5x	17,6x
3rd Quartile	19,0x	52,3x	22,2x

EV Range			
	Digital Industries and Smart Infrastructures	**Mobility**	**Siemens Healthineers**
1st Quartile	59 916 €	13 613 €	31 278 €
Average	89 546 €	45 794 €	41 870 €
Median	74 899 €	17 554 €	41 752 €
3rd Quartile	87 874 €	49 735 €	52 758 €

Siemens AG			
	EV	**Market Cap**	**Share Price**
1st Quartile	104 807	89 398	105,58 €
Average	177 210	161 800	190,53 €
Median	134 205	118 795	140,32 €
3rd Quartile	190 367	174 958	206,23 €

*Table 22**: EV/EBITDA multiple and EV range***

Final Recommendation

As a result of the analysis and valuation methodologies (DCF, SOTP DCF, and EV/EBITDA) the outcomes presented on the table 23 were obtained:

	Share price	Annualized Expected Return	Recommendation
DCF	138.99 €	12.5%	BUY
DCF SOTP	145.70 €	16.5%	BUY
EV/EBITDA	140.32 €	13.3%	BUY

Table 23: ***Valuation Models Output***

As of 28th December 2020, Siemens AG was trading at €118.82. Based on the annualized expected return, which is above 10% in the three valuation methodologies analysed, the final recommendation would be to **BUY** Siemens AG's shares, as it is an investment with a strong fundamental value expected to appreciate.

Investment Risks

Considering the business model of Siemens and its operations, one can identify a series of risks that relate to all business units, and that can negatively impact the company's operations, financial performance, and reputation.

COVID-19 pandemic: the outcome of forecasts and assumptions are dependent on the belief that with the emerging vaccine, the global economy will not suffer from a long-lasting recession. Indeed, looking at past values, Siemens was able to burden the economic cost of a lockdown, however, a new wave of restrict measures could mean a sharp decrease in revenues, forcing for new measures. Looking at the price of the stock, in case of a new epidemical crisis it is not expected that the market will suffer as much as it did in March 2020, with decreases of ~17%, since it was taken by surprise[12], but to be similar to the movement of the stock in October, resulting in negative expected returns around ~6%. Moreover, Siemens AG stock beta is 1.17[13], which is a negative feature given this uncertain horizon that is projected for 2021, as the company is expected to be more volatile than the overall market. Certainly, there is an investment risk of a long-lasting global recession that, even in a robust company as Siemens, might affect deeply its financials.

Trade-war: With the increase of revenues in China, Siemens is becoming more exposed to global conflicts as the trade war between US and China. By now, China represents 13% of the overall revenue, which is expected to increase even further, ~15% until 2029, due to the economic reform Mainland China, that will be in progress until 2025. However, new trade barriers can weaken the economic progress, which can reverse the trend of growth and consequently risk a global recession[14]. Although, there are no apparent barriers to entry in this economy (supported by the Siemens office in Hong Kong since the early 1900's), the volatility in revenues is higher in companies that are export-oriented, as Siemens is, versus the ones that are service-oriented.

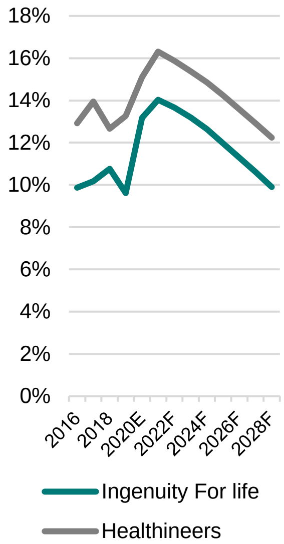
[12] HIS Markit, Top 10 economic predictions of 2021
[13] Reuters, 29/12/2020, Siemens vs MSCI World Index
[14] Bloomberg News, 09/09/2019, Siemens AG in China

This way, it is necessary to keep paying attention to the developments of trade war, particularly due to the current uncertain environment regarding the trade measures that will be taken by the new President of the United States[15].

Disruptive technologies: Siemens operates in unprecedented times of change and speed of evolution. That is one of the reasons why it is so important to focus the company's business to be side by side with the latest technological developments. This business is highly impacted by the introduction of innovative and disruptive technologies, which can cause meaningful transformations to the market. The negative evolution of Siemens Ingenuity for Life and Siemens Healthineers EBIT margin throughout the years highlights that it is crucial for Siemens to keep track on the innovations regarding digitalization, artificial intelligence, autonomous machines, and the internet of things. Otherwise, Siemens' margin will remain decreasing over the years, with the company becoming less profitable and competitive.

Siemens should take the opportunities brought by the technological revolution to continue its investment and efforts in research and development so that it will still be able to maintain its technological leadership. Also, it is imperative for Siemens to be able to anticipate shifts in the markets where the company operates and adapt accordingly to consumer demands, namely through an adequate and optimized cost base.

Figure 2: ***EBIT Siemens Ingenuity for Life and Siemens Healthineers****, source: company data*



However, it is relevant to note that not always high investments in R&D, which imply considerable financial costs, result in successful innovations. It may succeed that the technologies developed do not operate or are accepted by the market as expected. Moreover, there is the eminent risk of Siemens' product portfolio become obsolete, namely by the introduction of new products and business models by the company's competitors, or the arise of new competitors. As such, Siemens should mitigate these risks using disruptive technologies to create value through innovation, which face the climate change, urbanization, and globalization trends.

Competitive environment and shortage of skilled personnel: worldwide the technological industry is highly competitive in terms of product and service quality, timing of introduction, and pricing, which affects customer retention rates. Furthermore, there is a shortage of highly qualified personnel, namely specialists on digital areas and engineers. Thus, Siemens' success not only depends on the company's market positioning across its customers and competitors, but also extremely depends on Siemens' capacity to attract and retain talent.

[15] War on trade, Research Gate, June 2020