

INDUSTRY BETAS LEVERED AND UNLEVERED

- 64 INDUSTRIES
- 147 SUB INDUSTRIES
- 10 GEOGRAPHICAL AREAS

Preview - Quarterly Research on Industry Betas

This quarterly research on industry and sub-industry betas
has been prepared by

salvidio & partners

VALUATION OF BUSINESSES AND INTANGIBLES
CHARTERED ACCOUNTANTS AND AUDITORS

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I – DESCRIPTION OF METHOD USED

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1. About industry and sub-industry betas reported in this publication

Tables in Sections III and IV of this research list, *levered* and *unlevered industry* and *sub-industry* betas¹, are estimated on the basis of individual betas of shares issued by thousands of companies quoted on stock exchanges worldwide². Industry betas have been calculated as arithmetic averages of individual betas. They have been aggregated by industry or by sub-industry, as well as by different geographical areas³.

Industry betas can be useful when estimating the cost of capital because they tend to be less sensitive to errors that may affect the calculation of individual betas:

- as a consequence of special market situations or of other extraordinary events involving underlying companies, the results of individual beta calculation may be sometimes over- or underestimated;
- since industry betas are determined as averages of individual stock betas, over- and underestimations tend to compensate each other.

An average (industry or sub-industry) beta can, therefore, be generally considered to be more meaningful for the purpose of cost of capital calculation than its underlying single stock betas, considered individually.

2. Selection of individual betas

In order to estimate industry betas, we have averaged individual betas of listed companies:

- having a minimum market capitalization of 50 million Euros in the last five years;

¹ For a more plain reading on this note, we will, hereinafter recall both industry and sub-industry betas collectively as “industry betas”, unless a distinct reference to sub-industry betas is required for a better understanding of methodology and content of this research.

² Our estimates are based on industry, stock market and financial data provided by Standard & Poor’s Capital IQ

³ We have calculated an average “global” value of each industry and each sub-industry of the individual betas. In addition, the tables in Sections III and IV feature also specific “regional” average values for the following areas: a) International edition of this booklet: *European Union and Western Europe, Russia and Eastern Europe, Southern and Eastern Mediterranean Countries, States of the Persian Gulf, Sub-Saharan Africa, Central and South Asia, East Asia, Pacific States, South America, North America*; b) USA edition of this booklet: *United States of America, Canada, Central and South America, European Union and other Western European countries, Russia and other Eastern European countries, Southern and Eastern Mediterranean and Gulf countries, Sub-Saharan Africa Central and South Asia, East Asia. Oceania and Pacific.*

- whose shares daily traded value was never less than one hundredth of their average market capitalization in the last five years.

In our opinion, the requirements above constitute a reasonable compromise between:

- the need to collect a vast number of individual betas to be able to calculate as many industry and sub-industry betas as possible;
- the necessity to avoid companies that are too small and/or whose shares may be thinly traded, since their individual betas may be not meaningful.

3. Estimating individual *levered* betas

For each company selected we have estimated a set of two *levered* betas:

- *calculation technique*: regression of return of company shares to market return, applied over two distinctive periods of five and of two years considering, respectively, monthly and weekly returns;
- *market return*: we have assumed as a proxy the return of the local stock market index of reference for the underlying company.

Individual *levered* betas calculated over a regression period of five years appear, generally, to be less dispersed around the market beta than those of a regression period of two years. The latter, due to the shorter regression period, may show results that are more affected by the volatility of the underlying shares return against the index return, but also better reflect the underlying company's recent operating financial risk profiles.

4. Estimating individual *unlevered* betas

Based on their *levered* betas, we have calculated *unlevered* betas of all companies different than those belonging to financial industries (banks and insurances).

We have estimated *unlevered* betas using two different techniques, depending on whether the underlying company's gross debt less "cash⁴ and equivalents" is greater than (net debt) or lower than (net liquidity) zero.

⁴ Amount of liquidity has been adjusted to properly reflect s.c. "working cash". See T. Coller, M. Goedhart, D. Wessels *Valuation*, Wiley, 2010, pag. 143

4.1. Unlevered Beta – Net debt

In the case of existing net debt (gross debt being higher than cash and equivalents), we have used a simplified version⁵ of Hamada's formula to extract *unlevered* beta from one stock's *levered* five years and two years regression betas:

$$\beta_{unlevered} = \frac{\beta_{levered}}{1 + (1 - t) \times \frac{D}{E}}$$

where:

- “D”: gross debt (adjusted for pension liabilities and similar provisions) less cash and equivalents;
- “E”: market capitalization adjusted for minority interests;
- “t”: effective tax rate.

“D”, “E” and “t” used in the above formula are, respectively, 5 year or 2 year average values, depending on regression period of *levered* betas.

4.2. Unlevered Beta – Net liquidity

In case of existing net liquidity (gross debt lower than cash and equivalents), a company's market capitalization “E” can be assumed to be the sum of two components, the first consisting in the market value of its business “ E_b ” and the second being its net liquidity “ E_{liq} ”:

$$E = E_b + E_{liq}$$

The equation above can also be rewritten as follows:

$$E = (E - E_{liq}) + E_{liq}$$

The company's *levered* beta should be equal to the weighted average of the beta of its net liquidity and beta of its business. The latter should therefore correspond to the “true” *unlevered* beta:

⁵ The implied assumption is that the debt beta may not be meaningful. To be consistent with this assumption, we have discarded the betas of companies with an excessive level of indebtedness (see below)

$$\beta_{levered} = \beta_{Eb} \frac{(E - E_{liq})}{E} + \beta_{E_{liq}} \frac{E_{liq}}{E}$$

Assuming that net liquidity's beta is equal to zero, β_{Eb} can be calculated as follows⁶:

$$\beta_{Eb} = \frac{\beta_{levered}}{\frac{(E - E_{liq})}{E}}$$

In the end, for D equal to E_{liq} , the formula can be rewritten as:

$$\beta_{unlevered} = \frac{\beta_{levered}}{\frac{(E - D)}{E}}$$

5. From individual betas to industry betas

5.1. Filtering out outliers and meaningless values

Before calculating industry *levered* and *unlevered* betas as averages of individual *levered* and *unlevered* betas respectively, we have screened out outliers and/or otherwise, at least in our opinion, meaningless or possibly distorted individual beta values:

- we have filtered out individual betas when the five years average debt to equity ratio ($\frac{D}{E}$) of the underlying company exceeds a threshold of 1.5⁷. We believe that if the value of debt is too high with respect to that of equity, then one cannot assume that the debt beta is irrelevant⁸. As a consequence, it is not possible to use the simplified Hamada-formula to extract unlevered betas from levered ones;
- we also have filtered out individual betas in case the five-year average effective tax rate of the underlying company is negative or exceeds 70%. If the effective tax rate is negative, the company may be benefiting from some peculiar tax exemptions or from a huge tax loss carry-forward. On the other side, an effective taxation in excess of 70% is also quite unusual and may be related to other exceptional events in a company's life. In both cases, we feel that it is better not to include companies with such taxation profiles in our industry beta calculation,

⁶ M. Massari, G. Gianfrate, L. Zanetti *Corporate Valuation*, Wiley, 2016, pag. 216-218

⁷ I.e. when value of D is 1.5 times the value of E or higher. Where: a) "D" is calculated as gross debt (adjusted for pension liabilities and similar provisions) less cash and equivalents, b) "E" as the market capitalization adjusted for minority interests

⁸ Please see footnote 5 above.

since the result may be distorted by situations that are not common among businesses;

- finally, we have filtered out individual betas that are lower than 0.25 or higher than 2.5. We have set these thresholds on the basis of our behaviour as valuers: when we select comparable companies to estimate which beta value to apply in estimating the cost of capital to be used in the valuation of an unquoted business, we tend to eliminate betas that are either too low or too high. Values below 0.25 or higher than 2.5 we would always discard, because we feel they may be the consequence of events or errors that distort underlying company or stock trading data.

5.2. More about the unlevering of individual betas

The *unlevering* techniques illustrated in paragraph 4 imply that the risk of the operating activity of a company is not influenced by net liquidity and that, therefore, one can calculate the *unlevered* beta as shown before. In our opinion, however, this assumption may not correspond to reality, since decisions taken by management, all other circumstances being equal, may be different in case the company's gross debt is being higher or lower than cash and equivalents. We therefore have computed industry and sub-industry betas (both for five and for two year individual betas regression periods) from two different perspectives, as outlined below.

5.2.1. Industry betas "net liquidity included"

We have calculated industry and sub-industry betas, both *levered* and *unlevered*, by averaging individual *levered* and *unlevered* betas, considering companies having net liquidity.

5.2.2. Industry betas "net liquidity excluded"

We have calculated industry and sub-industry betas, both *levered* and *unlevered*, by averaging individual *levered* and *unlevered* betas, screening out companies having net liquidity.

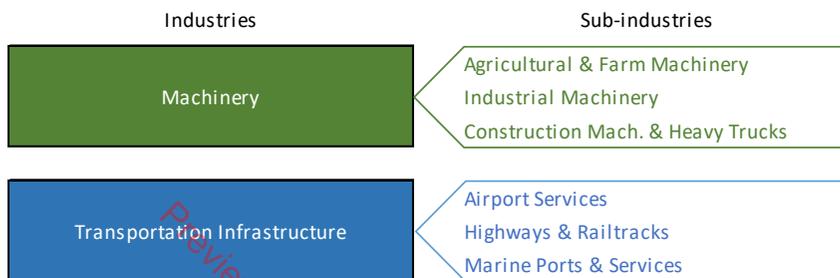
6. Definitions and data tables

6.1. Differences between editions of this research

The first edition of our quarterly beta book started in the spring of 2017 and featured one-hundred and thirty-four sub-industries. Issues of the first edition covered all quarters of 2017 and the first three quarters of 2018.

The second edition has started with a 4th Quarter 2018 issue. Research has been extended:

- we have added ten more sub-industries. The total number of sub-industries now covered are one-hundred and forty-four;
- “on top” of the sub-industries we have added the average beta calculation for sixty-five industries. One industry includes one or more sub-industries, as suggested by the following visual sample scheme:



While sub-industry betas, being more “granular”, allow us to make a more targeted selection when estimating the cost of capital for valuing unquoted businesses, they may sometimes be based on too limited a set of underlying individual company betas. In such cases, industry betas, although less granular and therefore also less specific-to-target, may offer a better alternative to sub-industry ones.

6.2. Content of Sections II, III and IV

In estimating individual company betas and for their subsequent aggregation by industry and by sub-industry, as well as by geographical zone, we rely mainly on individual company financials and on market and industry classification data provided by Standard & Poor’s⁹ Capital IQ® database.

Such classification data is quite similar to sub-industry structure and definitions of the Global Industry Classification Standard (GICS®)¹⁰ which are disclosed online by MSCI and by Standard & Poor’s. We therefore “associate” the

⁹ Standard & Poor’s Capital IQ is a financial data online distribution database and platform that is owned by S&P Global Inc.. S&P Global Inc. is an American publicly traded corporation headquartered in Manhattan, New York City. Its primary areas of business are financial information and analytics.

¹⁰The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of Standard & Poor’s Financial Services LLC (S&P) and MSCI. “GICS” is the trademark of Standard & Poor’s Financial Services LLC (S&P) and MSCI. “Global Industry Classification Standard (GICS)” and “GICS Direct” are service marks of Standard & Poor’s Financial Services LLC (S&P) and MSCI. GICS Direct is a joint product of Standard & Poor’s Financial Services LLC (S&P) and MSCI, which provides the current, company-level GICS classification codes for over 40,000 companies.

publicly available GICS^{®11} industry and sub-industry definitions to the average industry and sub-industry betas estimated on the basis of data obtained from Standard & Poor's Capital IQ[®] database.

In order to avoid dissemination of underlying data, our research features our calculation results only (average betas). We do not disclose individual company financial and stock prices data. We will, however, disclose, upon request and subject to certain limits and conditions, the names of companies that are constituents of our industry and sub-industry average beta values¹².

Section II (see below) lists industry and sub-industry definitions and indicates the reference number of tables that report average beta values.

Tables with sixty-five industry betas are displayed in Section III, while those with one-hundred and forty-four sub-industry betas are in Section IV.

The following is a brief explanation of the content of the tables.

6.3. Summary table

The first table in Section III and in Section IV, shows a summary of *levered* and *unlevered* industry betas or sub-industry betas respectively.

The first table reports their lowest, their highest and their average values, rounded to the second decimal place.

Industry betas are grouped by length of regression time period (2Y or 5Y), and sorted also by said inclusion or exclusion of net liquidity companies.

¹¹ We refer to the current GICS[®] structure and definitions that their sole legitimate owners, MSCI and S&P, periodically disclose through their websites. Such classification and definitions are disclosed in English together with official translations in many other languages. While classification structure and definitions are disclosed, access to GICS[®] classification codes for individual companies is offered by MSCI and by S&P or by distributors they authorize on a subscription basis.

¹² Restricted disclosure of company names aims to prevent the possibility to rely on our quarterly publications to attempt to build up a company classification database that is regularly updated. Even if it would still never reach the extent and completeness of the GICS[®] database, we believe such an attempt would be unfair vis-à-vis GISC[®] rightful owners and their authorized distributors. By preventing full and unrestricted disclosure of company names, we therefore avoid any possibility to exploit our publications in what we think may be unfair use. Business valuers and other financial experts interested in industry and sub-industry constituent company names may submit a request at www.salvidio.com/support and follow instructions to obtain information. Access to company names is limited per registered user and by quarterly issue to not more than twenty industries and/or sub-industries. Massive data downloads are not allowed and we retain the right to suspend at anytime the disclosure of company names in case of unusual high access requests coming from the same "unique visitors", same individual and/or firm, etc. or in case GICS[®] rightful owners asks to do so.

6.4. Industry and sub-industry betas tables

Single industry beta and sub-industry beta tables show *levered* and *unlevered* betas rounded to the second decimal place. They are aggregated:

- *by column*: on the basis of the length of regression period (5Y or 2Y) and by inclusion or exclusion of net liquidity companies;
- *by row*: on geographical basis (ten different regional values and one global value).

Tables also show the number of individual betas underlying their average (industry and sub-industry) values, as shown by the following example, taken from the US edition of this research covering the fourth quarter of 2018

		D		E		F			
B	Oil & Gas Drilling	β_L	n.	β_U	n.	β_L	β_U	n.	
A	31/12/2018	5Y net liq. incl.				5Y net liq. excl.			
	European Union and other Western European countries	1,48	3	1,26	3	1,27	2	0,93	2
	Russia and other Eastern European countries	1,57	1	1,13	1	1,57	1	1,13	1
	Southern and Eastern Mediterranean countries	-	-	-	-	-	-	-	-
	Gulf countries	1,69	3	0,86	3	1,69	3	0,86	3
	Sub-Saharan Africa	-	-	-	-	-	-	-	-
	Central and South Asia	-	-	-	-	-	-	-	-
	East Asia	-	-	-	-	-	-	-	-
	Pacific countries	-	-	-	-	-	-	-	-
C	Latin America	1,16	2	1,06	2	1,16	2	1,06	2
	North America	-	-	-	-	-	-	-	-
	Global	1,49	9	1,07	9	1,44	8	0,96	8

How to read the industry and sub industry beta tables¹³:

- A = reference date of the industry or sub-industry beta calculation;
- B = industry or sub-industry;
- C = rows of industry or sub-industry beta values aggregated by geographical area;
- D = columns displaying values of levered (β_L) and unlevered (β_U) industry or sub-industry betas;

¹³ The sample picture is taken from the international edition in English language of our industry and sub-industry beta research, issue covering the 4th Quarter of 2018. The table features the Oil & Gas Drilling sub-industry only. However, the content-structure of all other industry and sub-industry tables of all editions is the same.

- E = regression period, 5Y or 2Y: betas are aggregated in different columns depending on whether companies with net liquidity were or were not included in the industry and sub-industry betas calculation;
- F = columns displaying the number of individual betas underlying the values of industry and sub-industry betas;
- G = sample values of levered and unlevered industry and sub-industry betas;
- H = sample quantity of individual betas underlying corresponding industry and sub-industry betas values

When the number of individual betas for a specific geographical area is too small, it may be better to refer to the global value of industry beta or sub-industry beta. As an alternative, one could adjust average values resulting from a too limited underlying set of individual betas using the Blume's technique¹⁴.

6.5. Beta distribution by geographical zone

The last table in Section III and in Section IV, shows how individual company betas are distributed among the different geographical zones.

Disclaimer

We have estimated industry and sub-industry betas by relying upon third party industry, stock market, financial and classification data of thousands of listed companies. We have not verified such data.

All information contained in this publication is presented without any claim of accuracy, completeness and absence of errors. Computational mistakes can occur frequently when, like in this case, complex calculations are made by using a huge amount of information data.

We may, in future, modify at our discretion the criteria for calculating industry and sub-industry betas as well as change any content of this publication.

All information contained in this publication is provided *as is*. It is to be used at the user's own risk only.

¹⁴ Beta adjusted = Beta x 2/3 + 1/3

We do not undertake any responsibility in case of negative consequences that may result to anybody, directly or indirectly, from using industry and sub-industry betas and/or any other information contained in this publication.

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II –INDUSTRIES AND SUB-INDUSTRIES DEFINITIONS

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Industry	Tab.	Sub-industry	Tab.	Sub-industry definitions
General summary	A.1		B.1	
<u>Fossil fuel industry</u>				
Energy Equipment & Services	A.2	Oil & Gas Drilling	B.2	Drilling contractors or owners of drilling rigs that contract their services for drilling wells.
Energy Equipment & Services	A.2	Oil & Gas Equipment & Services	B.2	Manufacturers of equipment, including drilling rigs and equipment, and providers of supplies and services to companies involved in the drilling, evaluation and completion of oil and gas wells.
Oil, Gas & Consumable Fuels	A.3	Integrated Oil & Gas	B.3	Integrated oil companies engaged in the exploration & production of oil and gas, as well as at least one other significant activity in either refining, marketing and transportation, or chemicals.
Oil, Gas & Consumable Fuels	A.3	Oil & Gas Exploration & Production	B.3	Companies engaged in the exploration and production of oil and gas not classified elsewhere.
Oil, Gas & Consumable Fuels	A.4	Oil & Gas Refining & Marketing	B.4	Companies engaged in the refining and marketing of oil, gas and/or refined products not classified in the Integrated Oil & Gas or Independent Power Producers & Energy Traders Sub-Industries.
Oil, Gas & Consumable Fuels	A.4	Oil & Gas Storage & Transportation	B.4	Companies engaged in the storage and/or transportation of oil, gas and/or refined products. Includes diversified midstream natural gas companies, oil and refined product pipelines, coal slurry pipelines and oil & gas shipping companies.
Oil, Gas & Consumable Fuels	A.5	Coal & Consumable Fuels	B.5	Companies primarily involved in the production and mining of coal, related products and other consumable fuels related to the generation of energy. Excludes companies primarily producing gases classified in the Industrial Gases Sub-Industry and companies primarily mining for metallurgical (coking) coal used for steel production.

Basic materials

Chemicals	A.5	Commodity Chemicals	B.5	Companies that primarily produce industrial chemicals and basic chemicals. Including but not limited to plastics, synthetic fibers, films, commodity-based paints & pigments, explosives and petrochemicals. Excludes chemical companies classified in the Diversified Chemicals, Fertilizers & Agricultural Chemicals, Industrial Gases, or Specialty Chemicals Sub-Industries.
Chemicals	A.6	Diversified Chemicals	B.6	Manufacturers of a diversified range of chemical products not classified in the Industrial Gases, Commodity Chemicals, Specialty Chemicals or Fertilizers & Agricultural Chemicals Sub-Industries.
Chemicals	A.6	Fertilizers & Agricultural Chemicals	B.6	Producers of fertilizers, pesticides, potash or other agriculture-related chemicals not classified elsewhere.
Chemicals	A.7	Industrial Gases	B.7	Manufacturers of industrial gases.
Chemicals	A.7	Specialty Chemicals	B.7	Companies that primarily produce high value-added chemicals used in the manufacture of a wide variety of products, including but not limited to fine chemicals, additives, advanced polymers, adhesives, sealants and specialty paints, pigments and coatings.
Construction Materials	A.8	Construction Materials	B.8	Manufacturers of construction materials including sand, clay, gypsum, lime, aggregates, cement, concrete and bricks. Other finished or semi-finished building materials are classified in the Building Products Sub-Industry.
Containers & Packaging	A.8	Metal, Glass & Plastic Containers	B.8	Manufacturers of metal, glass or plastic containers. Includes corks and caps.
Containers & Packaging	A.9	Paper & Plastic Packaging Products & Materials	B.9	Manufacturers of paper and cardboard containers and packaging.
Metals & Mining	A.9	Aluminum	B.9	Producers of aluminum and related products, including companies that mine or process bauxite and companies that recycle aluminum to produce finished or semi-finished products. Excludes companies that primarily produce aluminum building materials classified in the Building Products Sub-Industry.

Metals & Mining	A.10	Diversified Metals & Mining	B.10	Companies engaged in the diversified production or extraction of metals and minerals not classified elsewhere. Including, but not limited to, nonferrous metal mining (except bauxite), salt and borate mining, phosphate rock mining, and diversified mining operations. Excludes iron ore mining, classified in the Steel Sub-Industry, bauxite mining, classified in the Aluminum Sub-Industry, and coal mining, classified in either the Steel or Coal & Consumable Fuels Sub-Industries.
Metals & Mining	A.10	Copper	B.10	Companies involved primarily in copper ore mining.
Metals & Mining	A.11	Gold	B.11	Producers of gold and related products, including companies that mine or process gold and the South African finance houses which primarily invest in, but do not operate, gold mines.
Metals & Mining	A.11	Precious Metals & Minerals	B.11	Companies mining precious metals and minerals not classified in the Gold Sub-Industry. Includes companies primarily mining platinum.
Metals & Mining	A.12	Silver	B.12	Companies primarily mining silver. Excludes companies classified in the Gold or Precious Metals & Minerals Sub-Industries.
Metals & Mining	A.12	Steel	B.12	Producers of iron and steel and related products, including metallurgical (coking) coal mining used for steel production.
Paper & Forest Products	A.13	Forest Products	B.13	Manufacturers of timber and related wood products. Includes lumber for the building industry.
Paper & Forest Products	A.13	Paper Products	B.13	Manufacturers of all grades of paper. Excludes companies specializing in paper packaging classified in the Paper & Plastic Packaging Products & Materials Sub-Industry.
<u>Heavy Industries</u>				
Aerospace & Defense	A.14	Aerospace & Defense	B.14	Manufacturers of civil or military aerospace and defense equipment, parts or products. Includes defense electronics and space equipment.
Building Products	A.14	Building Products	B.14	Manufacturers of building components and home improvement products and equipment. Excludes lumber and plywood classified under Forest Products and cement and other materials classified in the Construction Materials Sub-Industry.

Construction & Engineering	A.15	Construction & Engineering	B.15	Companies engaged in primarily non-residential construction. Includes civil engineering companies and large-scale contractors. Excludes companies classified in the Homebuilding Sub-Industry.
Electrical Equipment	A.15	Electrical Components & Equipment	B.15	Companies that produce electric cables and wires, electrical components or equipment not classified in the Heavy Electrical Equipment Sub-Industry.
Electrical Equipment	A.16	Heavy Electrical Equipment	B.16	Manufacturers of power-generating equipment and other heavy electrical equipment, including power turbines, heavy electrical machinery intended for fixed-use and large electrical systems. Excludes cables and wires, classified in the Electrical Components & Equipment Sub-Industry.
Machinery	A.16	Construction Machinery & Heavy Transportation Equipment	B.16	Manufacturers of heavy duty trucks, rolling machinery, earth-moving and construction equipment, and manufacturers of related parts. Includes non-military shipbuilding.
Machinery	A.17	Agricultural & Farm Machinery	B.17	Companies manufacturing agricultural machinery, farm machinery, and their related parts. Includes machinery used for the production of crops and agricultural livestock, agricultural tractors, planting and fertilizing machinery, fertilizer and chemical application equipment, and grain dryers and blowers.
Machinery	A.17	Industrial Machinery & Supplies & Components	B.17	Manufacturers of industrial machinery and industrial components. Includes companies that manufacture presses, machine tools, compressors, pollution control equipment, elevators, escalators, insulators, pumps, roller bearings and other metal fabrications.
Trading Companies & Distributors	A.18	Trading Companies & Distributors	B.18	Trading companies and other distributors of industrial equipment and products.
Commercial and professional services				
Commercial Services & Supplies	A.18	Commercial Printing	B.18	Companies providing commercial printing services. Includes printers primarily serving the media industry.
Commercial Services & Supplies	A.19	Environmental & Facilities Services	B.19	Companies providing environmental and facilities maintenance services. Includes waste management, facilities management and pollution control services. Excludes large-scale water treatment systems classified in the Water Utilities Sub-Industry.

Commercial Services & Supplies	A.19	Office Services & Supplies	B.19	Providers of office services and manufacturers of office supplies and equipment not classified elsewhere.
Commercial Services & Supplies	A.20	Diversified Support Services	B.20	Companies primarily providing labor oriented support services to businesses and governments. Includes commercial cleaning services, dining & catering services, equipment repair services, industrial maintenance services, industrial auctioneers, storage & warehousing, transaction services, uniform rental services, and other business support services.
Commercial Services & Supplies	A.20	Security & Alarm Services	B.20	Companies providing security and protection services to business and governments. Includes companies providing services such as correctional facilities, security & alarm services, armored transportation & guarding. Excludes companies providing security software classified under the Systems Software Sub-Industry and home security services classified under the Specialized Consumer Services Sub-Industry. Also excludes companies manufacturing security system equipment classified under the Electronic Equipment & Instruments Sub-Industry.
Professional Services	A.21	Human Resource & Employment Services	B.21	Companies providing business support services relating to human capital management. This Sub-Industry includes employment agencies, employee training, payroll processing, benefit & retirement support services, corporate & job seeker recruitment services, and online job portals generating revenue from fees or commissions for offering recruitment services to companies or job seekers.
Professional Services	A.21	Research & Consulting Services	B.21	Companies primarily providing research and consulting services to businesses and governments not classified elsewhere. Includes companies involved in management consulting services, architectural design, business information or scientific research, marketing, and testing & certification services. Excludes companies providing information technology consulting services classified in the IT Consulting & Other Services Sub-Industry.

Professional Services	0	Data Processing & Outsourced Services		Providers of commercial data processing and/or business process outsourcing services. This Sub-Industry includes companies providing services for customer experience management, back-office automation, call center management, and investor communications.
Transportation and infrastructure				
Air Freight & Logistics	A.22	Air Freight & Logistics	B.22	Companies providing air freight transportation, courier and logistics services, including package and mail delivery and customs agents. Excludes those companies classified in the Passenger Airlines, Marine Transportation, Cargo Ground Transportation and Passenger Ground Transportation Sub-Industries.
Passenger Airlines	A.22	Passenger Airlines	B.22	Companies providing primarily passenger air transportation.
Marine Transportation	A.23	Marine Transportation	B.23	Companies providing goods or passenger maritime transportation. Excludes cruise-ships classified in the Hotels, Resorts & Cruise Lines Sub-Industry.
Ground Transportation	A.23	Rail Transportation	B.23	Companies providing primarily goods and passenger rail transportation.
Ground Transportation	A.24	Cargo Ground Transportation	B.24	Companies providing ground transportation services for goods and freight.
Ground Transportation	A.24	Passenger Ground Transportation	B.24	Companies providing passenger ground transportation and related services, including bus, taxi, vehicle rental, ride sharing and on-demand ride sharing platforms, and other passenger logistics.
Transportation Infrastructure	A.25	Airport Services	B.25	Operators of airports and companies providing related services.
Transportation Infrastructure	A.25	Highways & Railtracks	B.25	Owners and operators of roads, tunnels and railtracks.
Transportation Infrastructure	A.26	Marine Ports & Services	B.26	Owners and operators of marine ports and related services.
Automotive and components				
Automobile Components	A.28	Automotive Parts & Equipment	B.28	Manufacturers of parts and accessories for automobiles and motorcycles. Excludes companies classified in the Tires & Rubber Sub-Industry.
Automobile Components	A.28	Tires & Rubber	B.28	Manufacturers of tires and rubber.

Automobiles	A.29	Automobile Manufacturers	B.29	Companies that produce mainly passenger automobiles and light trucks. Excludes companies producing mainly motorcycles and three-wheelers classified in the Motorcycle Manufacturers Sub-Industry and heavy duty trucks classified in the Construction Machinery & Heavy Transportation Equipment Sub-Industry.
Automobiles	A.29	Motorcycle Manufacturers	B.29	Companies that produce motorcycles, scooters or three-wheelers. Excludes bicycles classified in the Leisure Products Sub-Industry.
<u>Durables, apparel, accessories</u>				
Household Durables	A.30	Consumer Electronics	B.30	Manufacturers of consumer electronics products including TVs, home audio equipment, game consoles, digital cameras, and related products. Excludes personal home computer manufacturers classified in the Technology Hardware, Storage & Peripherals Sub-Industry, and electric household appliances classified in the Household Appliances Sub-Industry.
Household Durables	A.30	Home Furnishings	B.30	Manufacturers of soft home furnishings or furniture, including upholstery, carpets and wall-coverings.
Household Durables	A.32	Homebuilding	B.32	Residential construction companies. Includes manufacturers of prefabricated houses and semi-fixed manufactured homes.
Household Durables	A.32	Household Appliances	B.32	Manufacturers of electric household appliances and related products. Includes manufacturers of power and hand tools, including garden improvement tools. Excludes TVs and other audio and video products classified in the Consumer Electronics Sub-Industry and personal computers classified in the Technology Hardware, Storage & Peripherals Sub-Industry.
Household Durables	A.33	Housewares & Specialties	B.33	Manufacturers of durable household products, including cutlery, cookware, glassware, crystal, silverware, utensils, kitchenware and consumer specialties not classified elsewhere.
Leisure Products	A.33	Leisure Products	B.33	Manufacturers of leisure products and equipment including sports equipment, bicycles and toys.

Textiles, Apparel & Luxury Goods	A.34	Apparel, Accessories & Luxury Goods	B.34	Manufacturers of apparel, accessories & luxury goods. Includes companies primarily producing designer handbags, wallets, luggage, jewelry and watches. Excludes shoes classified in the Footwear Sub-Industry.
Textiles, Apparel & Luxury Goods	A.34	Footwear	B.34	Manufacturers of footwear. Includes sport and leather shoes.
Textiles, Apparel & Luxury Goods	A.35	Textiles	B.35	Manufacturers of textile and related products not classified in the Apparel, Accessories & Luxury Goods, Footwear or Home Furnishings Sub-Industries.
Consumer services				
Hotels, Restaurants & Leisure	A.35	Casinos & Gaming	B.35	Owners and operators of casinos and gaming facilities. Includes companies providing lottery and betting services.
Hotels, Restaurants & Leisure	A.36	Hotels, Resorts & Cruise Lines	B.36	Owners and operators of hotels, resorts and cruise-ships. Includes travel agencies, tour operators and related services not classified elsewhere . Excludes casino-hotels classified in the Casinos & Gaming Sub-Industry.
Hotels, Restaurants & Leisure	A.36	Leisure Facilities	B.36	Owners and operators of leisure facilities, including sport and fitness centers, stadiums, golf courses and amusement parks not classified in the Movies & Entertainment Sub-Industry.
Hotels, Restaurants & Leisure	A.37	Restaurants	B.37	Owners and operators of restaurants, bars, pubs, fast-food or take-out facilities. Includes companies that provide food catering services.
Diversified Consumer Services	A.37	Education Services	B.37	Companies providing educational services, either on-line or through conventional teaching methods. Includes, private universities, correspondence teaching, providers of educational seminars, educational materials and technical education. Excludes companies providing employee education programs classified in the Human Resources & Employment Services Sub-Industry.
Diversified Consumer Services	A.38	Specialized Consumer Services	B.38	Companies providing consumer services not classified elsewhere. Includes residential services, home security, legal services, personal services, renovation & interior design services, consumer auctions and wedding & funeral services.

Wholesalers and retail distribution business				
Distributors	A.38	Distributors	B.38	Distributors and wholesalers of general merchandise not classified elsewhere. Includes vehicle distributors.
Broadline Retail	A.39	Broadline Retail	B.39	Retailers offering a wide range of consumer discretionary merchandise. This Sub-Industry includes general and discount merchandise retailers, department stores and on-line retailers and marketplaces selling mostly consumer discretionary merchandise.
Specialty Retail	A.39	Apparel Retail	B.39	Retailers specialized mainly in apparel and accessories.
Specialty Retail	A.40	Computer & Electronics Retail	B.40	Owners and operators of consumer electronics, computers, video and related products retail stores.
Specialty Retail	A.40	Home Improvement Retail	B.40	Owners and operators of home and garden improvement retail stores. Includes stores offering building materials and supplies.
Specialty Retail	A.41	Other Specialty Retail	B.41	Owners and operators of specialty retail stores not classified elsewhere. Includes jewelry stores, toy stores, office supply stores, health & vision care stores, and book & entertainment stores.
Specialty Retail	A.41	Automotive Retail	B.41	Owners and operators of stores specializing in automotive retail. Includes auto dealers, gas stations, and retailers of auto accessories, motorcycles & parts, automotive glass, and automotive equipment & parts.
Specialty Retail	B42	Homefurnishing Retail	B42	Owners and operators of furniture and home furnishings retail stores. Includes residential furniture, homefurnishings, housewares, and interior design. Excludes home and garden improvement stores, classified in the Home Improvement Retail Sub-Industry.
Primary goods and services for consumers				
Consumer Staples Distribution & Retail	A.43	Drug Retail	B.43	Owners and operators of primarily drug retail stores and pharmacies.
Consumer Staples Distribution & Retail	A.43	Food Distributors	B.43	Distributors of food products to other companies and not directly to the consumer.
Consumer Staples Distribution & Retail	A.44	Food Retail	B.44	Owners and operators of primarily food retail stores.

Consumer Staples Distribution & Retail	A.44	Consumer Staples Merchandise Retail	B.44	Retailers offering a wide range of consumer staples merchandise such as food, household, and personal care products. This Sub-Industry includes hypermarkets, super centers and other consumer staples retailers such as discount retail spaces and on-line marketplaces selling mostly consumer staples goods.
Beverages	A.45	Brewers	B.45	Producers of beer and malt liquors. Includes breweries not classified in the Restaurants Sub-Industry.
Beverages	A.45	Distillers & Vintners	B.45	Distillers, vintners and producers of alcoholic beverages not classified in the Brewers Sub-Industry.
Beverages	A.46	Soft Drinks & Non-alcoholic Beverages	B.46	Producers of non-alcoholic beverages including mineral waters. Excludes producers of milk classified in the Packaged Foods & Meats Sub-Industry.
Food Products	A.46	Agricultural Products & Services	B.46	Producers of agricultural products. Includes crop growers, owners of plantations and companies that produce and process foods but do not package and market them. Excludes companies classified in the Forest Products Sub-Industry and those that package and market the food products classified in the Packaged Foods & Meats Sub-Industry.
Food Products	A.47	Packaged Foods & Meats	B.47	Producers of packaged foods including dairy products, fruit juices, meats, poultry, fish and pet foods.
Tobacco	A.47	Tobacco	B.47	Manufacturers of cigarettes and other tobacco products.
Household Products	A.48	Household Products	B.48	Producers of non-durable household products, including detergents, soaps, diapers and other tissue and household paper products not classified in the Paper Products Sub-Industry.
Personal Care Products	A.48	Personal Care Products	B.48	Manufacturers of personal and beauty care products, including cosmetics and perfumes.
Healthcare products and services				
Health Care Equipment & Supplies	A.49	Health Care Equipment	B.49	Manufacturers of health care equipment and devices. Includes medical instruments, drug delivery systems, cardiovascular & orthopedic devices, and diagnostic equipment.

Health Care Equipment & Supplies	A.49	Health Care Supplies	B.49	Manufacturers of health care supplies and medical products not classified elsewhere. Includes eye care products, hospital supplies, and safety needle & syringe devices.
Health Care Providers & Services	A.50	Health Care Distributors	B.50	Distributors and wholesalers of health care products not classified elsewhere.
Health Care Providers & Services	A.50	Health Care Services	B.50	Providers of patient health care services not classified elsewhere. Includes dialysis centers, lab testing services, and pharmacy management services. Also includes companies providing business support services to health care providers, such as clerical support services, collection agency services, staffing services and outsourced sales & marketing services.
Health Care Providers & Services	A.51	Health Care Facilities	B.51	Owners and operators of health care facilities, including hospitals, nursing homes, rehabilitation centers and animal hospitals.
Health Care Providers & Services	A.51	Managed Health Care	B.51	Owners and operators of Health Maintenance Organizations (HMOs) and other managed plans.
Health Care Technology	A.52	Health Care Technology	B.52	Companies providing information technology services primarily to health care providers. Includes companies providing application, systems and/or data processing software, internet-based tools, and IT consulting services to doctors, hospitals or businesses operating primarily in the Health Care Sector.
Biotechnology	A.52	Biotechnology	B.52	Companies primarily engaged in the research, development, manufacturing and/or marketing of products based on genetic analysis and genetic engineering. Includes companies specializing in protein-based therapeutics to treat human diseases. Excludes companies manufacturing products using biotechnology but without a health care application.
Pharmaceuticals	A.53	Pharmaceuticals	B.53	Companies engaged in the research, development or production of pharmaceuticals. Includes veterinary drugs.

Life Sciences Tools & Services	A.53	Life Sciences Tools & Services	B.53	Companies enabling the drug discovery, development and production continuum by providing analytical tools, instruments, consumables & supplies, clinical trial services and contract research services. Includes firms primarily servicing the pharmaceutical and biotechnology industries.
<u>Finance, banks, insurances</u>				
Banks	A.54	Diversified Banks	B.54	Large, geographically diverse banks with a national footprint whose revenues are derived primarily from conventional banking operations, have significant business activity in retail banking and small and medium corporate lending, and provide a diverse range of financial services. Excludes banks classified in the Regional Banks and Commercial & Residential Mortgage Finance Sub-Industries. Also excludes investment banks classified in the Investment Banking & Brokerage Sub-Industry.
Banks	A.55	Regional Banks	B.55	Commercial banks, savings banks and thrifts whose business are derived primarily from conventional banking operations such as retail banking, corporate lending and originating various residential and commercial mortgage loans funded mainly through deposits. Regional banks tend to operate in limited geographic regions. Excludes companies classified in the Diversified Banks and Commercial & Residential Mortgage Finance Sub-Industries. Also excludes investment banks classified in the Investment Banking & Brokerage Sub-Industry.
Financial Services	A.56	Diversified Financial Services	B.56	Providers of a diverse range of financial services and/or with some interest in a wide range of financial services including banking, insurance and capital markets, but with no dominant business line. Excludes companies classified in the Regional Banks and Diversified Banks Sub-Industries.
Financial Services	A.57	Specialized Finance	B.57	Providers of specialized financial services not classified elsewhere. Companies in this Sub-Industry derive a majority of revenue from one specialized line of business. Includes, but not limited to, commercial financing companies, central banks, leasing institutions, factoring services, and specialty boutiques. Excludes companies classified in the Financial Exchanges & Data Sub-Industry.

Financial Services	A.57	Commercial & Residential Mortgage Finance	B.57	Financial companies providing commercial and residential mortgage financing and related mortgage services. This Sub-Industry includes non-deposit funded mortgage lending institutions, building societies, companies providing real estate financing products, loan servicing, mortgage broker services, and mortgage insurance.
Financial Services	A.58	Transaction & Payment Processing Services	B.58	Providers of transaction & payment processing services and related payment services including digital/mobile payment processors, payment service providers & gateways, and digital wallet providers.
Consumer Finance	A.58	Consumer Finance	B.58	Providers of consumer finance services, including personal credit, credit cards, lease financing, travel-related money services and pawn shops. Excludes mortgage lenders classified in the Commercial & Residential Mortgage Finance Sub-Industry.
Capital Markets	A.59	Asset Management & Custody Banks	B.59	Financial institutions primarily engaged in investment management and/or related custody and securities fee-based services. Includes companies operating mutual funds, closed-end funds and unit investment trusts. Excludes banks and other financial institutions primarily involved in commercial lending, investment banking, brokerage and other specialized financial activities.
Capital Markets	A.59	Investment Banking & Brokerage	B.59	Financial institutions primarily engaged in investment banking & brokerage services, including equity and debt underwriting, mergers and acquisitions, securities lending and advisory services. Excludes banks and other financial institutions primarily involved in commercial lending, asset management and specialized financial activities.
Capital Markets	A.60	Diversified Capital Markets	B.60	Financial institutions primarily engaged in diversified capital markets activities, including a significant presence in at least two of the following area: large/major corporate lending, investment banking, brokerage and asset management. Excludes less diversified companies classified in the Asset Management & Custody Banks or Investment Banking & Brokerage Sub-Industries. Also excludes companies classified in the Banks or Insurance industry groups or the Consumer Finance Sub-Industry.

Capital Markets	A.60	Financial Exchanges & Data	B.60	Financial exchanges for securities, commodities, derivatives and other financial instruments, and providers of financial decision support tools and products including ratings agencies.
Insurance	A.61	Insurance Brokers	B.61	Insurance and reinsurance brokerage firms.
Insurance	A.61	Life & Health Insurance	B.61	Companies providing primarily life, disability, indemnity or supplemental health insurance. Excludes managed care companies classified in the Managed Health Care Sub-Industry.
Insurance	A.62	Multi-line Insurance	B.62	Insurance companies with diversified interests in life, health and property and casualty insurance.
Insurance	A.62	Property & Casualty Insurance	B.62	Companies providing primarily property and casualty insurance.
Insurance	A.63	Reinsurance	B.63	Companies providing primarily reinsurance.
Information and communication technology products and services				
IT Services	A.64	IT Consulting & Other Services	B.64	Providers of information technology and systems integration services not classified in the Data Processing & Outsourced Services or Internet Software & Services Sub-Industries. Includes information technology consulting and information management services.
IT Services	A.64	Internet Services & Infrastructure	B.64	Companies providing services and infrastructure for the internet industry including data centers and cloud networking and storage infrastructure. Also includes companies providing web hosting services. Excludes companies classified in the Software Industry.
Software	A.65	Application Software	B.65	Companies engaged in developing and producing software designed for specialized applications for the business or consumer market. Includes enterprise and technical software, as well as cloud-based software. Excludes companies classified in the Interactive Home Entertainment Sub-Industry. Also excludes companies producing systems or database management software classified in the Systems Software Sub-Industry.
Software	A.65	Systems Software	B.65	Companies engaged in developing and producing systems and database management software.

Communications Equipment	A.66	Communications Equipment	B.66	Manufacturers of communication equipment and products, including LANs, WANs, routers, telephones, switchboards and exchanges. Excludes cellular phone manufacturers classified in the Technology Hardware, Storage & Peripherals Sub-Industry.
Technology Hardware, Storage & Peripherals	A.66	Technology Hardware, Storage & Peripherals	B.66	Manufacturers of cellular phones, personal computers, servers, electronic computer components and peripherals. Includes data storage components, motherboards, audio and video cards, monitors, keyboards, printers, and other peripherals. Excludes semiconductors classified in the Semiconductors Sub-Industry.
Electronic Equipment, Instruments & Components	A.67	Electronic Equipment & Instruments	B.67	Manufacturers of electronic equipment and instruments including analytical, electronic test and measurement instruments, scanner/barcode products, lasers, display screens, point-of-sales machines, and security system equipment.
Electronic Equipment, Instruments & Components	A.67	Electronic Components	B.67	Manufacturers of electronic components. Includes electronic components, connection devices, electron tubes, electronic capacitors and resistors, electronic coil, printed circuit board, transformer and other inductors, signal processing technology/components.
Electronic Equipment, Instruments & Components	A.68	Electronic Manufacturing Services	B.68	Producers of electronic equipment mainly for the OEM (Original Equipment Manufacturers) markets.
Electronic Equipment, Instruments & Components	A.68	Technology Distributors	B.68	Distributors of technology hardware and equipment. Includes distributors of communications equipment, computers & peripherals, semiconductors, and electronic equipment and components.
Semiconductors & Semiconductor Equipment	A.69	Semiconductor Materials & Equipment	B.69	Manufacturers of semiconductor equipment, including manufacturers of the raw material and equipment used in the solar power industry.
Semiconductors & Semiconductor Equipment	A.69	Semiconductors	B.69	Manufacturers of semiconductors and related products, including manufacturers of solar modules and cells.
Telecommunication services				
Diversified Telecommunication Services	A.70	Alternative Carriers	B.70	Providers of communications and high-density data transmission services primarily through a high bandwidth/fiber-optic cable network.

Diversified Telecommunication Services	A.70	Integrated Telecommunication Services	B.70	Operators of primarily fixed-line telecommunications networks and companies providing both wireless and fixed-line telecommunications services not classified elsewhere. Also includes internet service providers offering internet access to end users.
Wireless Telecommunication Services	A.71	Wireless Telecommunication Services	B.71	Providers of primarily cellular or wireless telecommunication services.
Media and Entertainment				
Media	A.71	Advertising	B.71	Companies providing advertising, marketing or public relations services.
Media	A.72	Broadcasting	B.72	Owners and operators of television or radio broadcasting systems, including programming. Includes radio and television broadcasting, radio networks, and radio stations.
Media	A.72	Cable & Satellite	B.72	Providers of cable or satellite television services. Includes cable networks and program distribution.
Media	A.73	Publishing	B.73	Publishers of newspapers, magazines and books in print or electronic formats.
Entertainment	A.73	Movies & Entertainment	B.73	Companies that engage in producing and selling entertainment products and services, including companies engaged in the production, distribution and screening of movies and television shows, producers and distributors of music, entertainment theaters and sports teams. Also includes companies offering and/or producing entertainment content streamed online.
Entertainment	A.74	Interactive Home Entertainment	B.74	Producers of interactive gaming products, including mobile gaming applications. Also includes educational software used primarily in the home. Excludes online gambling companies classified in the Casinos & Gaming Sub-Industry.
Interactive Media & Services	A.74	Interactive Media & Services	B.74	Companies engaging in content and information creation or distribution through proprietary platforms, where revenues are derived primarily through pay-per-click advertisements. Includes search engines, social media and networking platforms, online classifieds, and online review companies.

Water, gas and electricity

Electric Utilities	A.75	Electric Utilities	B.75	Companies that produce or distribute electricity. Includes both nuclear and non-nuclear facilities.
Gas Utilities	A.75	Gas Utilities	B.75	Companies whose main charter is to distribute and transmit natural and manufactured gas. Excludes companies primarily involved in gas exploration or production classified in the Oil & Gas Exploration & Production Sub-Industry. Also excludes companies engaged in the storage and/or transportation of oil, gas, and/or refined products classified in the Oil & Gas Storage & Transportation Sub-Industry.
Multi-Utilities	A.76	Multi-Utilities	B.76	Utility companies with significantly diversified activities in addition to core Electric Utility, Gas Utility and/or Water Utility operations.
Water Utilities	A.76	Water Utilities	B.76	Companies that purchase and redistribute water to the end-consumer. Includes large-scale water treatment systems.
Independent Power and Renewable Electricity Producers	A.77	Independent Power Producers & Energy Traders	B.77	Companies that operate as Independent Power Producers (IPPs), Gas & Power Marketing & Trading Specialists and/or Integrated Energy Merchants. Excludes producers of electricity using renewable sources, such as solar power, hydropower, and wind power. Also excludes electric transmission companies and utility distribution companies classified in the Electric Utilities Sub-Industry.
Independent Power and Renewable Electricity Producers	A.77	Renewable Electricity	B.77	Companies that engage in the generation and distribution of electricity using renewable sources, including, but not limited to, companies that produce electricity using biomass, geothermal energy, solar energy, hydropower, and wind power. Excludes companies manufacturing capital equipment used to generate electricity using renewable sources, such as manufacturers of solar power systems, installers of photovoltaic cells, and companies involved in the provision of technology, components, and services mainly to this market.

Real estate services

Real Estate Management & Development	A.78	Diversified Real Estate Activities	B.78	Companies engaged in a diverse spectrum of real estate activities including real estate development & sales, real estate management, or real estate services, but with no dominant business line.
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Real Estate Management & Development	A.78	Real Estate Operating Companies	B.78	Companies engaged in operating real estate properties for the purpose of leasing & management.
Real Estate Management & Development	A.79	Real Estate Development	B.79	Companies that develop real estate and sell the properties after development. Excludes companies classified in the Homebuilding Sub-Industry.
Real Estate Management & Development	A.79	Real Estate Services	B.79	Real estate service providers such as real estate agents, brokers & real estate appraisers.
<u>Summary of individual betas by geographical zone</u>				
	A.80		B.80	

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III – INDUSTRY BETAS

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IV – SUB-INDUSTRY BETAS

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