

LSI CORP
Form 10-K
February 26, 2010

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**UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549**

Form 10-K

(Mark One)

**ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES
EXCHANGE ACT OF 1934**

For the Fiscal Year Ended December 31, 2009

OR

**TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES
EXCHANGE ACT OF 1934**

For the transition period from to .

Commission File No. 1-10317

LSI CORPORATION

(Exact name of registrant as specified in its charter)

DELAWARE

*(State or other jurisdiction of
incorporation or organization)*

94-2712976

*(IRS Employer
Identification No.)*

1621 Barber Lane

Milpitas, California 95035

(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code:

(408) 433-8000

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class

Name of Each Exchange on Which Registered

Common Stock, \$0.01 par value

New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act:

NONE

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. See definition of large accelerated filer, accelerated filer and smaller reporting company in Rule 12b-2 of the Exchange Act (check one):

Large Accelerated Filer Accelerated Filer Non-accelerated Filer Smaller reporting company
(Do not check if a smaller reporting company)

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

The aggregate market value of the voting and non-voting common stock held by non-affiliates of the registrant as of July 5, 2009 was approximately \$3.1 billion, based on the reported last sale price on the New York Stock Exchange of such equity on the last business day of the fiscal quarter ending on such date.

As of February 22, 2010, 656,539,243 shares of common stock were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Certain information required by Part III of this report is incorporated by reference from the registrant's proxy statement to be filed pursuant to Regulation 14A with respect to the registrant's 2010 annual meeting of stockholders.

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FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. The words estimate, plan, intend, expect, anticipate, believe and similar words are intended to identify forward-looking statements. Although we believe our expectations are based on reasonable assumptions, our actual results could differ materially from those projected in the forward-looking statements. We have described in Part I, Item 1A- Risk Factors a number of factors that could cause our actual results to differ materially from our projections or estimates. Except where otherwise indicated, the statements made in this report are made as of the date we filed this report with the Securities and Exchange Commission and should not be relied upon as of any subsequent date. We expressly disclaim any obligation to update the information in this report, except as may otherwise be required by law.

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PART I

Item 1. *Business*

General

We design, develop and market complex, high-performance storage and networking semiconductors and storage systems. We provide silicon-to-system solutions that are used at the core of products that create, store, consume and transport digital information. We offer a broad portfolio of capabilities including custom and standard product integrated circuits used in hard disk drives, solid state drives, high-speed communications systems, computer servers, storage systems and personal computers. We also offer external storage systems, storage systems software, redundant array of independent disks, or RAID, adapters for computer servers, and RAID software applications.

Integrated circuits, also called semiconductors or chips, are made using semiconductor wafers imprinted with a network of electronic components. They are designed to perform various functions such as processing electronic signals, controlling electronic system functions and processing and storing data.

Since the beginning of 2007, we have changed the focus of our business to providing integrated circuits for storage and networking applications and providing storage systems and related boards and software. Some of the significant steps we have taken include:

merging with Agere Systems to strengthen our position in storage and networking semiconductors;

selling our consumer and mobile handset chipset businesses, where we felt the company did not have the scale to be a strong competitor;

engaging in several strategic acquisitions, such as the acquisition in 2007 of Tarari, Inc., a provider of content processors, the acquisition in 2008 of the assets of Infineon's hard disk drive semiconductor business, and the acquisition in 2009 of the 3ware[®] RAID server adapter assets and of ONStor, Inc., a provider of network attached storage solutions; and

selling our manufacturing operations so that we could avoid the associated capital costs and focus our efforts on product development.

We also changed the focus of our storage systems business to providing products for leading original equipment manufacturer, or OEM, storage companies, rather than selling to direct-end customers, and refocused our semiconductor business on a smaller number of designs with leading customers.

Segment Information

We operate in two segments – the Semiconductor segment and the Storage Systems segment.

Our Semiconductor segment designs, develops and markets highly complex integrated circuits for storage and networking applications. These solutions include both custom solutions and standard products. We design custom solutions for a specific application defined by the customer. We develop standard products for market applications that we define and sell them to multiple customers. We sell our integrated circuits for storage applications principally to makers of hard disk drives, solid state drives and computer servers. We sell our integrated circuits for networking

applications principally to makers of devices used in computer and telecommunications networks and, to a lesser extent, to makers of personal computers. We also generate revenue by licensing other entities to use our intellectual property.

Our Storage Systems segment designs and sells enterprise storage systems and storage software applications that enable storage area networks. We also offer RAID adapters for computer servers and associated software for attaching storage devices to computer servers. We sell our storage systems and storage solutions primarily to OEMs who resell these products to end customers under their own brand name.

In 2009, the Semiconductor segment accounted for approximately 64.1% of our revenue and the Storage Systems segment accounted for approximately 35.9% of our revenue. You can find additional financial information

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about our segments and geographic financial information in Note 9 to our financial statements in Item 8. See Item 1A Risk Factors for information about risks we face as a result of our operations outside the United States.

Company Information

Shortly after the Agere acquisition, we changed our name to LSI Corporation from LSI Logic Corporation. LSI Logic Corporation was incorporated in California on November 6, 1980, and was reincorporated in Delaware on June 11, 1987.

We maintain an Internet website at www.lsi.com. We make available free of charge on our website our annual reports on Form 10-K, our quarterly reports on Form 10-Q, our current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) of the Securities Exchange Act of 1934 as soon as reasonably practicable after we electronically file such material with, or furnish it to, the U.S. Securities and Exchange Commission. You can read any materials that we file with the Commission at the Commission's Public Reference Room at 100 F Street, N.E., Room 1580, Washington, D.C. 20549. You can obtain information on the operation of the Public Reference Room by calling the Commission at (800) 732-0330. Information on our website is not incorporated by reference into this report.

Products

SEMICONDUCTOR SEGMENT

Storage Products

Hard Disk, Solid State and Tape Drive Electronics. We sell integrated circuits for hard disk, solid state and tape drive solutions, which are used to store and retrieve data in personal computers, corporate network servers, archive/back-up devices and consumer electronics products such as digital video recorders, game consoles and digital media players. A hard disk drive contains physical media, one or more platters that store data, a motor that spins the media, drive heads that read data from and write data to the media and electronics that process the data and control the disk drive. A solid state drive stores data in flash memory instead of on a hard disk, providing high speed access to stored data. Tape drives store data on magnetic tape and provide a high-capacity, cost-effective tiered data storage back-up solution.

Our TrueStore® family of storage electronics products includes systems-on-a-chip, read channels, pre-amplifiers, serial physical interfaces and hard disk controllers as well as custom firmware. These are the critical chips required to read, write and protect data. We offer products that can be used in a variety of storage applications, including hard drives and solid state drives intended for notebook computers, desktop computers and enterprise computers, and in tape drives.

A storage system-on-a-chip, or SoC, is an integrated circuit that combines the functionality of a read channel, serial interface, memory and a hard disk controller in a small, high-performance, low-power and cost-effective package. Read channels convert analog signals that are generated by reading the stored data on the physical media into digital signals. Analog refers to a transmission technique employing a continuous signal that varies in amplitude, frequency or phase of the transmission. Digital refers to a method of transmitting, storing and processing data that uses distinct electronic or optical pulses to represent the binary digits 0 and 1. We also sell pre-amplifiers, or preamps, which are used to amplify the initial signal to and from the drive disk heads so the signal can be processed by the read channel. We provide similar technology for tape drives. Our hard disk controllers are used to control signal processing and communications functions within the disk drive.

Storage Interface Products. We also offer solutions that make possible data transmission between a host computer and storage peripheral devices such as magnetic, solid state and optical disk drives and disk and tape-based storage systems. These products include:

Storage Standard Products. Our product line includes SAS, SATA and RAID-On-Chip, or RoC, integrated circuits combined with our Fusion-MPT™ firmware and drivers to form intelligent storage interface solutions primarily for server and storage system motherboard applications. Additionally, our product line

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includes SCSI, SAS and SATA bus expander integrated circuits, Fibre Channel integrated circuits, SAS switches, and disk drive bridging or interposer circuits used primarily in storage systems. We sell our integrated circuit solutions both in an integrated circuit plus software form or as a complete solution including the host bus adapter board itself.

Storage Custom Solutions. We also offer custom solutions to customers who develop Fibre Channel and Fibre Channel over Ethernet storage area network, or SAN, switches and host bus adapters, storage systems, hard disk drives and tape peripherals. By leveraging our extensive experience in providing solutions for these applications, we have developed a full portfolio of high-speed interface intellectual property that is combined with our customers' intellectual property to form custom solutions that provide a connection to the network, the SAN, memory systems and host buses. Using these pre-verified interfaces, our customers can reduce development risk and achieve quicker time to market. Our intellectual property offerings include high performance SerDes cores supporting Fibre Channel, SAS, SATA, 10-Gigabit Ethernet, Gigabit Ethernet, Infiniband, SAS, Serial RapidIO and PCI-Express industry standards and a family of high-performance Fibre Channel, Ethernet, RapidIO, PCI-E, SAS and SATA protocol controllers.

Networking Products

We offer comprehensive solutions that allow networking service providers to deliver a variety of highly reliable communications services over Internet Protocol, or IP, networks. IP networks are packet based. In an IP network, packets of data that are part of the same telephone conversation or video program can be routed over different paths. Traditional telephone networks are circuit-based where all data packets follow the same dedicated path or circuit. Historically, the dedicated paths in circuit-based networks have provided greater reliability than packet-based networks, although at the cost of flexibility.

Our networking solutions are designed to enable IP networks to provide reliability similar to that of circuit-based networks and incorporate quality of service features that allow more critical data to receive priority over less critical data. For example, packets containing data about a television picture, where a delayed packet can mean a noticeable flaw in the picture, can be delivered before packets containing web-page data being downloaded to a personal computer, where a slight delay is less likely to be noticed.

Our networking portfolio includes solutions for carrier-managed gateways that would be used in small office, home office and small-to-medium business applications. The portfolio also includes solutions for multi-service wired and wireless access systems found in carrier networks. Multi-service systems can handle traffic such as data and video in addition to voice. Our networking solutions include chips such as our network processors, digital signal processors, content-inspection processors, traffic shaping devices and physical layer devices as well as software, evaluation systems and reference designs. Our development efforts are focused on multicore processor SoCs to deliver solutions for wireline and wireless access, media gateway, service provider and enterprise networks.

We offer both custom and standard networking product solutions.

Custom Networking Products

We sell integrated circuits that are custom developed for our customers. These integrated circuits incorporate our intellectual property or combine our intellectual property with the intellectual property of our customers or other third parties to create a customized solution for these customers. For some customers, we design and manufacture the integrated circuit while the key intellectual property belongs solely to our customers.

Network Processors and Communication Processors

Network processors are typically used in switching and routing systems to classify, prioritize and forward packets as they move through a carrier's network. Communication processors handle the setup and operation of the network itself. We offer network processors and communication processors with the ability to handle a range of data throughputs, from 200 megabits per second up to 6 gigabits per second. Megabits and gigabits are units of measurement for data. A megabit is equal to approximately one million bits and a gigabit is equal to approximately 1,000 megabits. For example, our APP2200 communication processor family provides a lower cost solution

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intended for systems located between the customer's premises and the carrier's local central office, where data throughput demands are lower, but the need to prioritize the packets is still critical for all services to be delivered successfully. Our APP650 network processor is a higher throughput solution designed for use in systems that are closer to the core of a carrier's IP network, where data throughput demands are higher.

Digital Signal Processors

Digital signal processors, or DSPs, perform advanced algorithms on analog signals that have been transformed into digitally-encoded bitstreams. Our DSPs perform audio, video and speech signal processing, compression, transcoding and transrating and can be used in applications including Voice-over-IP, or VoIP, business and enterprise gateways, video delivery, media gateways and wired and wireless access network equipment.

Content Inspection Processors

We offer a family of content inspection processors, which are available as integrated circuits, boards and software acceleration components designed for network equipment, appliance and server vendors. Our Tarari® content inspection processors perform deep packet inspection at wire speeds, ranging from 100 megabits per second to over 10 gigabits per second. These products offload and accelerate applications such as anti-virus, anti-spam, intrusion prevention/detection systems, compliance, content-based routing and XML processing.

Multi-Service Processors

In addition to the networking products described above, we offer integrated circuits and supporting software designed for equipment used in access, metropolitan, and wide-area backbone telecommunications and packet networks. Our products can be used in equipment in both wired and wireless networks.

Broadband Aggregation Devices. Broadband is a general term that refers to high-speed data transmission. Our broadband access integrated circuits, or mappers, support data transport between central offices and enterprise sites by aggregation and termination. Aggregation refers to the combining of many low-speed, or tributary, data signals from enterprises into higher speed, or trunk, data signals for transmission to a central office. Termination refers to the separation of trunk data signals into lower-speed, tributary data signals.

Our products support data transport for T-carrier data transport in North America. T-carrier is a digital transmission service from a common carrier. We support similar services worldwide. These services are referred to as J-carrier in Japan and E-carrier in Europe. T-carrier services such as T1 and T3 lines are used to create point-to-point networks for use by enterprises. T1 and T3 lines refer to different levels of T-carrier service that transmit data at 1.544 megabits per second and 44.736 megabits per second, respectively.

SONET/SDH Network Devices. Synchronous optical networks, which are typically referred to as SONET, and synchronous digital hierarchy standard networks, or SDH, carry data, voice and video traffic through a network by combining lines carrying traffic at slower speeds with lines carrying traffic at higher speeds. This process is known as multiplexing, and involves directing traffic from the individual lines into designated time slots in the higher speed lines, and directing those lines into still higher speed lines. The SONET/SDH equipment that handles the directing of traffic into slower speed and faster speed lines is the add-drop multiplexer. Add-drop multiplexers also handle the addition and removal of traffic from a SONET/SDH communication transmission. We offer single-chip integrated circuit solutions called framers, for add-drop multiplexing of data and voice traffic. In addition, our framers are used in high-speed routers within optical networks. A router is an interface, or link, between two networks.

Personal Connectivity Solutions

We sell high speed input/output products primarily to manufacturers of computers, peripheral equipment and communications equipment. Input/output refers to the transfer of data within and between computers; peripheral equipment, such as printers, scanners and digital cameras; and data networks. Our products support established connectivity and transmission standards known as Gigabit Ethernet, IEEE-1394, and Universal Serial Bus or USB.

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In addition, we sell integrated circuits and associated software for modem products, primarily to manufacturers of personal computers, notebook computers, point-of-sale terminals, facsimile machines, multi-function printers, cable and satellite set-top boxes and other electronic equipment.

We believe that our systems-level knowledge and integrated circuit design methodologies allow us to turn our customers' design concepts into systems solutions quickly and effectively. Our intellectual property gives our customers the flexibility to customize their products to meet their individual cost and performance objectives.

STORAGE SYSTEMS SEGMENT

We offer a wide range of products for the storage markets in three main areas: external storage systems hardware and associated software, internal storage products and software, and value added storage software. All of these products are sold primarily through our OEM customers. The modularity of our products provides these OEMs with the flexibility to integrate our sub-assemblies with third-party components, such as disk drives or software, to form their own storage system products. Our modular product approach allows OEMs to create highly customized storage systems that can then be integrated with value-added software and services and delivered as complete, differentiated data storage solutions to their target markets.

External Storage Systems We offer a broad line of open, modular storage products comprised of complete systems and sub-assemblies configured from modular components, such as our storage controller modules, disk drive enclosure modules, related management software and advanced data protection software for creating local and remote copies of critical data. These storage systems provide connectivity to single or multiple servers connected in a storage area network, or SAN, providing block data services. The acquisition of ONStor in July 2009 has expanded our offerings to include network attached storage gateway products which provide file data services. These gateways can be combined with LSI storage systems or others to provide complete network attached storage systems or to add network attached storage capabilities to existing systems.

Our external storage systems product family includes entry level and mid-range storage systems, including the Engenio 4900 introduced in 2009 which is an upgradeable mid-range system, allowing flexibility for enhanced performance, reliability and scalability. We offer a suite of software to enable system administrators to easily manage and better utilize their storage systems' operations. We also offer advanced copy services such as snapshot, volume copy and remote volume mirroring, to provide increased levels of data protection. We design and develop storage management software that operates within all major open operating systems, including Windows, UNIX and UNIX variants and Linux environments, and server virtualization offerings including VMware and Hyper-V.

Internal Storage Products. We offer a variety of direct-attach RAID solutions as part of our MegaRAID® product family. RAID products store data using multiple drives and various data replication strategies to minimize the impact of the failure of any one drive. Our MegaRAID products include single-chip RAID-on-motherboard solutions, a broad family of PCI-X and PCI Express RAID controller boards featuring SATA and SAS interfaces, and software-based RAID products for entry level RAID data protection. All of these solutions utilize MegaRAID's fully featured RAID software and management utilities for robust storage configuration and deployment. In addition to the OEM channel, we offer MegaRAID branded products through a network of distributors and resellers. In 2009, we acquired the 3ware RAID server adapter business to add additional products and channel capabilities to our storage product offerings.

Value Added Storage Software. Through our StoreAge™ SVM suite of hardware and software products, we offer storage virtualization and advanced copy services that can be delivered as host software, reside in a network element, or be embedded in storage systems. These advanced capabilities enable our OEM customers to create unique and customized solutions to simplify and improve storage operations, deliver enhanced recovery solutions, and better manage storage connected to virtual servers.

We test and certify our products, both independently and jointly with our customers, with those of other hardware, networking and storage software vendors to ensure a high level of interoperability and performance. Our products are targeted at a wide variety of data storage applications, including Internet-based applications such as cloud computing, online transaction processing and e-commerce, data warehousing, file serving, video editing and post-production and high-performance computing.

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Marketing and Distribution

Semiconductor Marketing and Distribution

The semiconductor industry is highly competitive and is characterized by rapidly changing technology, short product cycles and emerging standards. Our marketing strategy requires that we forecast trends in the evolution of products and technology. We must then act upon this knowledge in a timely manner to develop competitively priced products offering superior features, performance or levels of integration. As part of this strategy, we are actively involved in the formulation and adoption of critical industry standards that influence the design specifications of our products.

Our semiconductor products and design services are sold primarily through our network of direct sales, marketing and field engineering offices located in North America, Europe, Japan and elsewhere in Asia. We also work with independent industrial and commercial distributors and manufacturers' representatives or other channel partners in North America, Europe, Japan and elsewhere in Asia. Some of our distributors possess engineering capabilities, and design and purchase both custom solutions and standard products from us for resale to their customers. Other distributors focus solely on the sale of standard products.

Storage Systems Marketing and Distribution

We sell our storage systems products, value-added storage software, and MegaRAID products to our OEM customers who sell them worldwide under their own brand identities using their sales and distribution channels. We also distribute our MegaRAID products, 3ware RAID server adapters, and ONStor network attached storage gateways through a network of resellers and distributors, who resell the products to end users with additional hardware, software and services, or on a standalone basis for use with existing equipment.

The products we sell to our OEM customers may be integrated by the OEM with value-added services, hardware and software and delivered as differentiated complete storage solutions to enterprises. We work closely with our OEM customers and tailor these relationships to meet the diverse needs and requirements of end customers worldwide. We also provide our OEM customers with training services to enhance their abilities to sell and support our products. After receiving our training services, most of our OEM customers independently market, sell and support our products, requiring limited ongoing product support from us. We assist some of our OEM customers further by providing additional resources such as tailored, account-specific education, training, technical support and sales and marketing assistance, allowing these customers to leverage our storage products and industry expertise. By selling products through our OEM customers and leveraging their brand marketing and worldwide sales channels, we are able to address more markets, reach a greater number of enterprises, and achieve better leverage of our sales and marketing expenditures.

Our marketing efforts support our OEM customers, as well as our distributors and reseller channels, with programs targeted at developing differentiated go-to-market strategies and increasing sales effectiveness. Depending on the nature of our channel customer engagement, our marketing teams offer various levels of assistance in assessing and analyzing the competitive landscape, defining product strategy and roadmaps, developing product positioning and pricing, creating product launch support materials and closing the sales process. These marketing teams carefully coordinate joint product development and marketing efforts with our customers to ensure that we address and effectively target enterprise requirements. We maintain sales and marketing organizations in the United States and internationally in China, France, Germany, Italy, Japan, Singapore, Sweden and the United Kingdom.

Customers

In 2009, International Business Machines Corporation accounted for approximately 19.3% and Seagate Technology accounted for approximately 15.5% of our total revenues. No other customer accounted for more than 10% of our total revenues in 2009. We currently have a highly concentrated customer base as a result of our strategy to focus our marketing and sales efforts on select, large-volume customers. Our top 10 end customers in 2009, based on revenue, accounted for approximately 65.8% of our revenue. The loss of any of our significant customers, any substantial decline in sales to these customers, or any significant change in the timing or volume of purchases by

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these customers could result in substantially lower revenues and could materially harm our business, financial condition or results of operations.

Manufacturing

Semiconductor Manufacturing

The semiconductor manufacturing process begins with wafer fabrication, where a design is transferred to silicon wafers through a series of processes, including photolithography, ion implantation, deposition of numerous films and the etching of these various films and layers. Each circuit on the wafer is tested in the wafer sort operation. The good circuits are identified and the wafer is then separated into individual die. Each good die is then assembled into a package that encapsulates the integrated circuit for protection and allows for electrical connection to a printed circuit board. The final step in the manufacturing process is final test, where the finished devices undergo stringent and comprehensive testing.

Wafer fabrication is very complex and costly, and the industry trend has been towards outsourcing all or a portion of this operation to silicon foundries located throughout the world. Our wafer fabrication is performed by third-party foundries, including Taiwan Semiconductor Manufacturing Corporation, our primary foundry partner, and other foundries such as IBM and Silicon Manufacturing Partners, a joint venture owned by GLOBALFOUNDRIES and LSI.

We also use third-party suppliers, including STATS ChipPAC and Amkor Technology, to perform final assembly and test operations for us.

We believe that using third-party manufacturing services allows us to focus on product development and increases our operational flexibility, by improving our ability to adjust manufacturing capacity in response to customer demand and to introduce new products rapidly. It also reduces our capital requirements as we do not need to spend large amounts to build and upgrade manufacturing facilities, particularly in the area of wafer fabrication, where facilities must be upgraded periodically and each upgrade tends to cost significantly more than the preceding upgrade.

Storage Systems Manufacturing

We use third-party suppliers for standard components, such as disk drives and standard computer processors, which are designed and incorporated into our products. Additionally, we outsource the manufacturing of our product components, such as printed circuit boards, chassis assemblies and enclosures, in order to take advantage of scale, quality and cost benefits afforded by using third-party manufacturing services. We also use third-party suppliers to assemble and test our storage systems products.

The assembly of our storage system products involves integrating components and manufactured sub-assemblies into final products, which are configured and tested before being delivered to our customers. The highly modularized nature of our storage system products allows for flexible assembly and delivery models, which include build-to-order, configure-to-order, direct shipment, bulk shipment and local fulfillment services. We have implemented these models in an effort to reduce lead times for delivery of our products and to enable channel customers to select from among multiple manufacturing and delivery alternatives, the methods that best complement their operations.

Our RAID server adapter products incorporate a variety of standard industry components and LSI-designed components, mounted on printed circuit board assemblies. The manufacturing, assembly and test operations for LSI's RAID server adapters are all fully outsourced to third-party suppliers to take advantage of the scale, quality and cost benefits afforded by third-party manufacturing services. Our RAID server adapter and interposer boards are produced

in configurations ranging from bulk packaging of high volume units sold to the major server and workstation OEMs, to low volume products for indirect channels featuring retail packaging with software media, documentation and interconnect cables. LSI's RAID server adapters are shipped from our third-party suppliers to our worldwide inventory hubs, directly to OEM factories, or to distributors who supply them to a variety of indirect channels in the market.

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Backlog

Semiconductor Backlog

In the Semiconductor segment, we generally do not have long-term volume purchase contracts with our customers. Instead, customers place purchase orders that are subject to acceptance by us. The timing of the design activities for which we receive payment and the placement of orders included in our backlog at any particular time is generally within the control of the customer. For example, there could be a significant time lag between our commencement of design work and the receipt of a purchase order from a customer for the units of a developed product. Also, customers may from time to time revise delivery quantities or delivery schedules to reflect their changing needs. For these reasons, we do not believe that our backlog as of any particular date is a meaningful indicator of future annual sales.

Storage Systems Backlog

Due to the nature of our business, we generally have relatively low levels of backlog in the Storage Systems segment and our quarterly revenues depend largely on orders booked and shipped within the same quarter. Consequently, we believe that backlog is not a good indicator of future sales. Because lead times for delivery of our storage systems products are relatively short, we must build products in advance of orders. This subjects us to certain risks, most notably the possibility that expected sales will not materialize, leading to excess inventory, which we may be unable to sell to our customers.

Competition

Semiconductor Competitors

The semiconductor industry is intensely competitive and characterized by continuing technological change, rapid product obsolescence, evolving industry standards and price erosion. Many of our competitors are larger, diversified companies with substantially greater financial resources than us. Some of our competitors are also customers of ours who have internal semiconductor design and manufacturing capacity. We also compete with smaller and emerging companies whose strategy is to sell products into specialized markets or to provide only a portion of the range of products and services that we offer.

Our principal competitors in the Semiconductor segment include Avago Technologies Limited, Broadcom Corporation, Cavium Networks, Inc., Freescale, Inc., International Business Machines Corporation, Marvell Technology Group, Ltd., NetLogic Microsystems, Inc., NXP Semiconductors, PMC-Sierra, Inc., STMicroelectronics N.V. and Texas Instruments, Inc.

The principal competitive factors in the semiconductor industry include:

design capabilities;

differentiating product features;

product performance characteristics;

time to market;

price;

breadth of product line;

customer support;

logistics and planning systems; and

utilization of emerging industry standards.

While we believe we are competitive on the basis of all the factors listed above, we believe some of our competitors compete more favorably on the basis of price and on delivering products to market more quickly. However, we feel we are particularly strong in offering integrated solutions, broad product lines, product

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performance, customer support and logistics and planning systems. In addition, existing suppliers tend to have an advantage when competing for designs, which can make it difficult for us to win designs at new customers, even if we compete favorably on the factors identified above.

The markets into which we sell our semiconductor products are subject to intense price competition. We expect to continue to experience declines in the selling prices of our semiconductor products over the life cycle of each product. In order to offset or partially offset declines in the selling prices of our products, we continually strive to reduce the costs of products through product design changes, manufacturing process changes, yield improvements and procurement of wafers from outsourced manufacturing partners.

Storage Systems Competitors

The market for our storage systems products is highly competitive, rapidly evolving and subject to changing technology, customer needs and new product introductions. We compete with products from storage system and component providers such as Adaptec, Inc., Dot Hill Systems Corporation, Infortrend Technology Inc., Promise Technology Inc., and Xyratex Group Limited. We also face competition from internal divisions of several of our OEM customers, such as IBM and Dell, who must choose whether to develop products internally or obtain them from companies such as LSI. We also compete indirectly with large, well-capitalized storage systems companies such as EMC Corporation, Hitachi Data Systems and Network Appliance, Inc., and with newer competitors such as 3Par Inc., Compellent Technologies Inc. and ISILON Systems Inc., who sell to the same end-customers as our OEM customers.

The principal competitive factors for storage system products include:

- features and functionality;
- product performance and price;
- reliability, scalability and data availability;
- interoperability with other server, storage networking and storage system platforms;
- interoperability with industry applications, including database, email and internet content delivery systems;
- support for emerging industry and customer standards;
- levels of training, marketing and customer support;
- level of easily customizable features;
- quality and availability of supporting software;
- quality of system integration; and
- technical services and support.

Our ability to remain competitive will depend largely upon our ongoing performance in the areas of product development and customer support. To be successful in the future, we believe that we must respond promptly and effectively to the challenges of technological change and our competitors' innovations by continually innovating and enhancing our product offerings. We must also continue to aggressively recruit and retain employees highly qualified

and technically experienced in hardware and software development in order to achieve and maintain industry leadership in product development and support.

Patents, Trademarks and Licenses

We own or have rights to a number of patents, trademarks, copyrights, trade secrets and other intellectual property directly related to and important to our business. As of December 31, 2009, we had approximately 11,075

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U.S. patents and patent applications and a number of related foreign patents and patent applications. These patents include patents related to the following technologies:

Integrated circuit and optoelectronic manufacturing processes;

A number of technologies related to storage systems;

Consumer electronics products such as digital cameras, digital audio players, DVD players, digital televisions and personal computers;

Modems, digital signal processors, wireless communications, network processors and communication protocols; and

Optoelectronic products including lasers, optical modulators, optical receivers and optical amplifiers.

We have patents of all ages ranging from pending applications, which, if awarded, will have a duration of 20 years from their filing dates, through patents soon to expire.

We indemnify our customers for some of the costs and damages of patent infringement in circumstances where our product is the primary factor creating the customer's infringement exposure. We generally exclude coverage where infringement arises out of the combination of our products with products of others.

We protect our products and processes by asserting our intellectual property rights where appropriate and prudent. We also obtain licenses to patents, copyrights and other intellectual property rights used in connection with our business when practicable and appropriate.

Companies in the technology industry are often subject to claims of intellectual property infringement. You can find information about the impact of these types of claims in Item 1A Risk Factors. You can also find information about several legal proceedings against us that involve intellectual property claims in Note 14 to our financial statements in Item 8.

Research and Development

Our industry experiences rapid change and we must continually develop new products to remain competitive. Our research and development expenditures were \$608 million, \$673 million and \$655 million for fiscal 2009, 2008 and 2007, respectively. We anticipate that we will continue to make significant research and development expenditures to maintain our competitive position with a continuing flow of innovative products and technology.

Working Capital

Information about our working capital practices is included in Item 7 Management's Discussion and Analysis of Financial Condition and Results of Operation under the heading Financial Condition, Capital Resources and Liquidity and is incorporated herein by reference.

Environmental Regulation

Federal, state and local regulations, in addition to those of other nations, impose various environmental controls on certain chemicals and restricted substances used in the manufacture of semiconductor and storage products. To comply with these regulations, we have implemented environmental, health and safety management system processes.

For example, we offer products that comply with the requirements of the European Union Restriction of Hazardous Substances Directive 2002/95/EC (RoHS Directive) that was implemented on July 1, 2006 and other international environmental regulations impacting electronic equipment and components. We also work internally and with our suppliers and customers to develop a pro-active approach to emerging concerns such as those associated with climate change.

While to date we have not experienced any material adverse impact on our business from environmental regulations, such regulations might be adopted or amended so as to impose expensive obligations on us in the future.

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In addition, violations of environmental regulations including alleged historic chemical releases into the environment or use of restricted substances could result in:

the need for additional capital or other material improvements to comply with such regulations;

liability to our employees and/or third parties; and/or

business interruptions as a consequence of environmental permit suspensions or revocations, the granting of injunctions requested by governmental agencies or private parties, or the unintentional presence of restricted substances in our products.

Employees

As of December 31, 2009, we had 5,397 full-time employees.

Our future success depends upon the continued service of our key technical and management personnel and upon our ability to continue to attract and retain qualified employees, particularly those highly skilled design, process and test engineers involved in the development of new products and processes. We currently have favorable employee relations, but the competition for technical personnel is intense, and the loss of key employees or the inability to hire such employees when needed could have a material adverse impact on our business and financial condition.

Seasonality

Our business is largely focused on the information technology industry. Due to seasonality in this industry, we typically expect to see stronger revenues in the second half of the year.

Item 1A. Risk Factors

Set forth below are risks and uncertainties that, if they were to occur, could materially adversely affect our business or could cause our actual results to differ materially from the results contemplated by the forward-looking statements in this report and other public statements we make.

We depend on a small number of customers. The loss of, or a significant reduction in revenue from, any of these customers would harm our results of operations.

A limited number of customers account for a substantial portion of our revenues. In 2009, IBM and Seagate, our two largest customers, represented approximately 19.3% and 15.5%, respectively, of our total revenues, and our 10 largest customers accounted for approximately 65.8% of our revenue. If any of our key customers reduced significantly or canceled its orders, our business and operating results could be significantly harmed. Because many of our semiconductor products are designed for specific customers and have long product design and development cycles, it may be difficult for us to replace key customers that reduce or cancel their existing orders for these products.

In addition, if we fail to win new product designs from our major customers, our business and results of operations may be harmed. Further, if our major customers make significant changes in scheduled deliveries, decide to pursue the internal development of the products we sell to them or are acquired, our business and results of operations may be harmed. For example, business combinations such as Oracle's recent acquisition of Sun Microsystems, a customer of our Storage Systems business, could result in changes in the competitive environment we face. These combinations could have a positive or negative impact on our business.

If we fail to keep pace with technological advances, or if we pursue technologies that do not become commercially accepted, customers may not buy our products and our results of operations may be harmed.

Many of the industry segments in which we operate are characterized by rapid technological change, changes in customer requirements, frequent new product introductions and enhancements, short product cycles and evolving industry standards. We believe that our future success will depend, in part, on our ability to improve on existing technologies and to develop and implement new ones, as well as on our ability to adopt and implement emerging

Potential Royal Bank of Canada and UBS Impact on Price: Trading or other transactions by Royal Bank of Canada, UBS and our respective affiliates in the equity securities composing an Underlying Index or in futures, options, exchange-traded funds or other derivative products on those equity securities may adversely affect the market value of those equity securities, the level of that Underlying Index, and, therefore, the market value of the Securities.

The Probability That the Value of the Basket Will Fall Below the Downside Threshold on the Final Valuation Date Will Depend on the Volatility of the Underlying Indices: "Volatility" refers to the frequency and magnitude of changes in the levels of the Underlying Indices. Greater expected volatility with respect to the Underlying Indices reflects a higher expectation as of the Trade Date that the level

Basket could close below the Downside Threshold on the Final Valuation Date, resulting in the loss of some or all of your investment. However, an Underlying Index's volatility can change significantly over the term of the Securities. The level of the Basket could fall sharply, which could result in a significant loss of principal.

The Terms of the Securities at Issuance and Their Market Value Prior to Maturity Will Be Influenced by Many Unpredictable Factors: Many economic and market factors will influence the terms of the Securities at issuance and their value prior to maturity. These factors are similar in some ways to those that could affect the value of a combination of instruments that might be used to replicate the payments on the Securities, including a combination of a bond with one or more options or other derivative instruments. For the market value of the Securities, we expect that, generally, the levels of the Underlying Indices on any day will affect the value of the Securities more than any other single factor. However, you should not expect the value of the Securities in the secondary market to vary in proportion to changes in the levels of the Underlying Indices. The value of the Securities will be affected by a number of other factors that may either offset or magnify each other, including:

the actual or expected volatility of each Underlying Index;

the time remaining to maturity of the Securities;

the dividend rates on the equity securities included in the Underlying Indices;

interest and yield rates in the market generally, as well as in each of the markets of the equity securities included in the Underlying Indices;

a variety of economic, financial, political, regulatory or judicial events; and

our creditworthiness, including actual or anticipated downgrades in our credit ratings.

Some or all of these factors will influence the terms of the Securities at issuance as well as the price you will receive if you choose to sell the Securities prior to maturity. The impact of any of the factors set forth above may enhance or offset some or all of any change resulting from another factor or factors. You may have to sell the Securities at a substantial discount from the principal amount if, for example, the level of the Underlying is at, below or not sufficiently above, the Initial Basket Level.

Hypothetical Examples and Return Table at Maturity

Hypothetical terms only. Actual terms may vary. See the cover page for actual offering terms. The following table and hypothetical examples below illustrate the payment at maturity per \$10.00 Security for a hypothetical range of Underlying Returns from -100.00% to +100.00% and are based on the Initial Underlying Level of 100.00, the Downside Threshold of 75.00, the Upside Gearing of 5.00 and a hypothetical Maximum Gain of 42.75% (the low end of the range set forth above). The actual Maximum Gain for the Securities will be set on the Trade Date. The hypothetical Payment at Maturity examples set forth below are for illustrative purposes only and may not be the actual returns applicable to a purchaser of the Securities. The actual payment at maturity will be determined based on the Final Basket Level on the Final Valuation Date. You should consider carefully whether the Securities are suitable to your investment goals. The numbers appearing in the table below have been rounded for ease of analysis.

Example 1 – On the Final Valuation Date, the Underlying closes 2% above the Initial Underlying Level. Because the Underlying Return is positive, we will pay you an amount based upon the lesser of the Underlying Return times the Upside Gearing and the hypothetical Maximum Gain. Since the Underlying Return of 2% times the Upside Gearing is less than the hypothetical Maximum Gain, the payment at maturity per \$10 principal amount Security will be calculated as follows:

$$\$10 + (\$10 \times 2\% \times 5.00) = \$10 + \$1.00 = \$11.00$$

Example 2 – On the Final Valuation Date, the Underlying closes 10% above the Initial Underlying Level. Because the Underlying Return is positive, we will pay you an amount based upon the lesser of the Underlying Return times the Upside Gearing and the hypothetical Maximum Gain. Since the Underlying Return of 10% times the Upside Gearing is greater than the hypothetical Maximum Gain, the payment at maturity per \$10 principal amount Security will be calculated as follows:

$$\$10 + (\$10 \times 42.75\%) = \$10 + \$4.275 = \$14.275$$

Example 3 – On the Final Valuation Date, the Underlying closes 10% below the Initial Underlying Level. Because the Underlying Return is negative, but the Final Basket Level is greater than the Downside Threshold, we will pay you at maturity the principal amount of \$10 principal amount Security.

Example 4 – On the Final Valuation Date, the Underlying closes 40% below the Initial Underlying Level. Because the Underlying Return is -40%, and the Final Basket Level is lower than the Downside Threshold, we will pay you at maturity a cash payment of \$6.00 per \$10 principal amount Security (a 40% loss on the principal amount), calculated as follows:

$$\$10 + (\$10 \times -40\%) = \$10 - \$4.00 = \$6.00$$

Hypothetical Final Basket Level (\$)	Hypothetical Underlying Return ¹	Hypothetical Payment at Maturity (\$)	Hypothetical Total Return on Securities ²
\$200.00	100.00%	\$14.275	42.75%
\$175.00	75.00%	\$14.275	42.75%
\$150.00	50.00%	\$14.275	42.75%
\$140.00	40.00%	\$14.275	42.75%
\$130.00	30.00%	\$14.275	42.75%
\$120.00	20.00%	\$14.275	42.75%
\$110.00	10.00%	\$14.275	42.75%
\$108.55	8.55%	\$14.275	42.75%
\$108.00	8.00%	\$14.000	40.00%
\$104.00	4.00%	\$12.000	20.00%
\$102.00	2.00%	\$11.000	10.00%
\$100.00	0.00%	\$10.000	0.00%
\$90.00	-10.00%	\$10.000	0.00%
\$80.00	-20.00%	\$10.000	0.00%
\$75.00	-25.00%	\$10.000	0.00%
\$70.00	-30.00%	\$7.000	-30.00%
\$65.00	-35.00%	\$6.500	-35.00%

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\$60.00	-40.00%	\$6.000	-40.00%
\$50.00	-50.00%	\$5.000	-50.00%
\$25.00	-75.00%	\$2.500	-75.00%
\$0.00	-100.00%	\$0.000	-100.00%

(1) The Underlying Return excludes any cash dividend payments.

(2) The “total return” is the number, expressed as a percentage that results from comparing the payment at maturity per \$10 principal amount Security to the purchase price of \$10 per Security.

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What Are the Tax Consequences of the Securities?

U.S. Federal Income Tax Consequences

Set forth below, together with the discussion of U.S. federal income tax in the accompanying product prospectus supplement, prospectus supplement, and prospectus, is a summary of the material U.S. federal income tax consequences relating to an investment in the Securities. The following summary supplements, and to the extent inconsistent supersedes, the discussion under the section entitled “Supplemental Discussion of U.S. Federal Income Tax Consequences” in the accompanying product prospectus supplement, the section entitled “Certain Income Tax Consequences” in the accompanying prospectus supplement, and the section entitled “Tax Consequences” in the accompanying prospectus, which you should carefully review prior to investing in the Securities.

In the opinion of our counsel, Morrison & Foerster LLP, it would generally be reasonable to treat the Securities as pre-paid cash-settled derivative contracts in respect of the Underlying Basket for U.S. federal income tax purposes, and the terms of the Securities require a holder and us (in the absence of a change in law or an administrative or judicial ruling to the contrary) to treat the Securities for all tax purposes in accordance with such characterization. If the Securities are so treated, a U.S. holder should generally recognize capital gain or loss upon the sale or maturity of the Securities in an amount equal to the difference between the amount a holder receives at such time and the holder’s tax basis in the Securities. Capital gain recognized by an individual U.S. holder is generally taxed at preferential rates where the property is held for more than one year and is generally taxed at ordinary income rates where the property is held for one year or less. The deductibility of capital losses is subject to limitations.

Alternative tax treatments are also possible and the Internal Revenue Service (the “IRS”) might assert that a treatment other than that described above is more appropriate. In addition, the IRS has released a notice that may affect the taxation of holders of the Securities. According to the notice, the IRS and the U.S. Treasury Department are actively considering whether the holder of an instrument such as the Securities should be required to accrue ordinary income on a current basis. It is not possible to determine what guidance they will ultimately issue, if any. It is possible, however, that under such guidance, holders of the Securities will ultimately be required to accrue income currently and this could be applied on a retroactive basis. The IRS and the U.S. Treasury Department are also considering other relevant issues, including whether additional gain or loss from such instruments should be treated as ordinary or capital and whether the special “constructive ownership rules” of Section 1260 of the Code might be applied to such instruments. Holders are urged to consult their tax advisors concerning the significance, and the potential impact, of the above considerations.

Under Section 871(m) of the Code, a “dividend equivalent” payment is treated as a dividend from sources within the United States. Such payments generally would be subject to a 30% U.S. withholding tax if paid to a non-U.S. holder. Under U.S. Treasury Department regulations, payments (including deemed payments) with respect to equity-linked instruments (“ELIs”) that are “specified ELIs” may be treated as dividend equivalents if such specified ELIs reference an interest in an “underlying security,” which is generally any interest in an entity taxable as a corporation for U.S. federal income tax purposes if a payment with respect to such interest could give rise to a U.S. source dividend. However, the IRS has issued guidance that states that the U.S. Treasury Department and the IRS intend to amend the effective dates of the U.S. Treasury Department regulations to provide that withholding on dividend equivalent payments will not apply to specified ELIs that are not delta-one instruments and that are issued before January 1, 2021. Based on our determination that the Securities are not delta-one instruments, non-U.S. holders should not be subject to withholding on dividend equivalent payments, if any, under the Securities. However, it is possible that the Securities could be treated as deemed reissued for U.S. federal income tax purposes upon the occurrence of certain events affecting an Underlying Index or the Securities (for example, upon an Underlying Index rebalancing), and following such occurrence the Securities could be treated as subject to withholding on dividend equivalent payments. Non-U.S. holders that enter, or have entered, into other transactions in respect of the Underlying or the Securities should consult their tax advisors as to the application of the dividend equivalent withholding tax in the context of the Securities and their other transactions. If any payments are treated as dividend equivalents subject to withholding, we (or the applicable withholding agent) would be entitled to withhold taxes without being required to pay any additional amounts with respect to amounts so withheld.

Individual holders that own “specified foreign financial assets” may be required to include certain information with respect to such assets with their U.S. federal income tax return. You are urged to consult your own tax advisor

regarding such requirements with respect to the Securities.

The accompanying product prospectus supplement notes that FATCA withholding on payments of gross proceeds from a sale or redemption of Securities will only apply to payments made after December 31, 2018. That discussion is modified to reflect regulations proposed by the U.S. Treasury Department in December 2018 indicating an intent to eliminate the requirement under FATCA of withholding on gross proceeds of the disposition of financial instruments. The U.S. Treasury Department has indicated that taxpayers may rely on these proposed regulations pending their finalization. Prospective investors are urged to consult with their own tax advisors regarding the possible implications of FATCA on their investment in the Securities.

Please see the discussion under the section entitled “Supplemental Discussion of U.S. Federal Income Tax Consequences” in the accompanying product prospectus supplement for a further discussion of the U.S. federal income tax consequences of an investment in the Securities.

Canadian Federal Income Tax Consequences

For a discussion of the material Canadian federal income tax consequences relating to an investment in the Securities, please see the section entitled "Tax Consequences—Canadian Taxation" in the accompanying prospectus, which you should carefully review prior to investing in the Securities.

Information About the Underlying Indices

We have derived all information contained in this document regarding each Underlying Index, including, without limitation, its make-up, method of calculation, and changes in its components, from publicly available sources. The information reflects the policies of, and is subject to change by, its index sponsor. Each index sponsor, which owns the copyright and all other rights to the applicable Underlying Index, has no obligation to continue to publish, and may discontinue publication of the relevant Underlying Index. None of us, UBS or RBCCM accepts any responsibility for the calculation, maintenance or publication of any Underlying Index or any successor index.

The EURO STOXX 50[®] Index

The SX5E was created by STOXX, which is currently owned by Deutsche Börse AG. Publication of the SX5E began in February 1998, based on an initial SX5E level of 1,000 at December 31, 1991.

Composition and Maintenance

The SX5E is composed of 50 component stocks of market sector leaders from within the 19 EURO STOXX[®] Supersector indices, which represent the Eurozone portion of the STOXX Europe 600[®] Supersector indices. The composition of the SX5E is reviewed annually, based on the closing stock data on the last trading day in August. The component stocks are announced on the first trading day in September. Changes to the component stocks are implemented on the third Friday in September and are effective the following trading day. Changes in the composition of the SX5E are made to ensure that the SX5E includes the 50 market sector leaders from within the SX5E.

The free float factors for each component stock used to calculate the SX5E, as described below, are reviewed, calculated, and implemented on a quarterly basis and are fixed until the next quarterly review.

The SX5E is also reviewed on an ongoing basis. Corporate actions (including initial public offerings, mergers and takeovers, spin-offs, delistings, and bankruptcy) that affect the SX5E composition are immediately reviewed. Any changes are announced, implemented, and effective in line with the type of corporate action and the magnitude of the effect.

Calculation of the SX5E

The SX5E is calculated with the “Laspeyres formula,” which measures the aggregate price changes in the component stocks against a fixed base quantity weight. The formula for calculating the SX5E value can be expressed as follows:

$$\text{Index} = \frac{\text{Free float market capitalization of the index}}{\text{Adjusted base date market capitalization of the index}} \times 1,000$$

The “free float market capitalization of the SX5E” is equal to the sum of the products of the closing price, market capitalization, and free float factor for each component stock as of the time the SX5E is being calculated.

The SX5E is also subject to a divisor, which is adjusted to maintain the continuity of the SX5E values across changes due to corporate actions, such as the deletion and addition of stocks, the substitution of stocks, stock dividends, and stock splits.

License Agreement

We have entered into a non-exclusive license agreement with STOXX providing for the license to us and certain of our affiliated or subsidiary companies, in exchange for a fee, of the right to use indices owned and published by STOXX (including the SX5E) in connection with certain securities, including the Securities offered hereby.

The license agreement between us and STOXX requires that the following language be stated in this document:

STOXX has no relationship to us, other than the licensing of the SX5E and the related trademarks for use in connection with the Securities. STOXX does not:

- sponsor, endorse, sell, or promote the Securities;
- recommend that any person invest in the Securities offered hereby or any other securities;
- have any responsibility or liability for or make any decisions about the timing, amount, or pricing of the Securities;
- have any responsibility or liability for the administration, management, or marketing of the Securities; or
- consider the needs of the Securities or the holders of the Securities in determining, composing, or calculating the SX5E, or have any obligation to do so.

STOXX will not have any liability in connection with the Securities. Specifically:

- STOXX does not make any warranty, express or implied, and disclaims any and all warranty concerning:

•

the results to be obtained by the Securities, the holders of the Securities or any other person in connection with the use of the SX5E and the data included in the SX5E;

the accuracy or completeness of the SX5E and its data;

the merchantability and the fitness for a particular purpose or use of the SX5E and its data;

STOXX will have no liability for any errors, omissions, or interruptions in the SX5E or its data; and

Under no circumstances will STOXX be liable for any lost profits or indirect, punitive, special, or consequential damages or losses, even if STOXX knows that they might occur.

The licensing agreement between us and STOXX is solely for their benefit and our benefit, and not for the benefit of the holders of the Securities or any other third parties.

Historical Information

The following graph sets forth the closing levels of the SX5E from April 30, 2009 through April 30, 2019, as reported by Bloomberg Financial Markets. The historical performance of the SX5E should not be taken as an indication of future performance. We cannot give you assurance that the performance of the SX5E will result in the return of any of your initial investment.

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The FTSE® 100 Index

The FTSE® 100 Index (Bloomberg ticker “UKX Index”) is a market capitalization-weighted index of the 100 most highly capitalized U.K.-listed blue chip companies traded on the London Stock Exchange. The FTSE® 100 Index was developed with a base level of 1,000 as of December 30, 1983. It is calculated, published and disseminated by FTSE International Limited (“FTSE”), a company owned by the London Stock Exchange Plc (the “Exchange”). Additional information on the FTSE® 100 Index is available from the following website: www.ftse.com/uk. We are not incorporating by reference the website or any material it includes in this document. FTSE is under no obligation to continue to publish the FTSE® 100 Index and may discontinue publication of the FTSE® 100 Index at any time. The FTSE® 100 is a market capitalization-weighted index of the 100 most highly capitalized U.K.-listed blue chip companies traded on the London Stock Exchange. FTSE divides the 100 companies included in the FTSE® 100 Index into 19 sectors: Oil & Gas, Chemicals, Basic Resources, Construction & Materials, Industrial Goods & Services, Automobiles & Parts, Food & Beverage, Personal & Household Goods, Health Care, Retail, Media, Travel & Leisure, Telecommunications, Utilities, Banks, Insurance, Real Estate, Financial Services and Technology.

Index Composition and Selection Criteria

The FTSE® 100 Index consists of the 100 largest U.K.-listed blue chip companies, based on full market capitalization, that pass screening tests for price and liquidity. The FTSE® 100 Index is reviewed on a quarterly basis in March, June, September and December based on data from the close of business on the Tuesday before the first Friday of the review month. The FTSE Europe, Middle East & Africa Regional Advisory Committee (the “Committee”), meets quarterly to approve the constituents of the index. These meetings are held on the Wednesday before the first Friday in March, June, September and December. Any constituent changes are implemented after the close of business on the third Friday of the review month (i.e., effective Monday), following the expiration of the London International Financial Futures and Options Exchange futures and options contracts.

Eligibility Standards

Only “premium listed” equity shares, as defined by the Financial Conduct Authority in its Listing Rules Sourcebook, are eligible for inclusion in the FTSE® 100 Index. Eligible stocks must pass price and liquidity screens before being included in the index. Additionally, a stock must have a free float (as described below) of greater than 5%.

Price Screen — With regard to the price screen, the Committee must be satisfied that an accurate and reliable price exists for purposes of determining the market value of a company. To be eligible for inclusion in the FTSE® 100 Index, a stock must have a full listing on the London Stock Exchange with a Sterling-denominated price on SETS (SETS is the London Stock Exchange’s trading service for UK blue chip securities).

Liquidity Screen — With regard to liquidity, each eligible stock is tested for liquidity annually in June by calculating its median daily trading per month. When calculating the median of daily trades per month of any security, a minimum of five trading days in each month must exist, otherwise the month is excluded from the test. Liquidity is tested from the first business day in May of the previous year to the last business day of April. The median trade is calculated by ranking each daily trade total and selecting the middle-ranking day. Any period of suspension is not included in the test. The liquidity test is applied on a pro-rata basis where the testing period is less than 12 months. A stock not presently included in the FTSE® 100 Index that does not turnover at least 0.025% of its shares in issue (after application of any investability weightings) based on its median daily trade per month in at least ten of the 12 months prior to the annual index review in June will not be eligible for inclusion until the next annual review. An existing constituent failing to trade at least 0.015% of its shares in issue (after the application of any investability weightings) based on its median daily trade per month for at least eight of the 12 months prior to the annual index review will be removed from the FTSE® 100 Index and will not be eligible for inclusion until the next annual review. New issues will become eligible for inclusion in the index at the quarterly review following their issuance provided that they have a minimum trading record of at least 20 trading days prior to the review date and that they have turned over at least 0.025% of their shares in issue (after the application of any investability weightings) based on their median daily trade per month since listing.

Market Capitalization Ranking — Eligible stocks that pass the price and liquidity screens are ranked by the Committee according to their market capitalization before the application of any adjustments based on the extent to which the shares are publicly traded. Only the quoted equity capital of a constituent company will be included in the calculation of its market capitalization. Where a company has two or more classes of equity, secondary lines will be included in

the calculation of the market capitalization of the company only if those lines are significant and liquid. The Committee will add a stock to the FTSE® 100 Index at the quarterly review if it has risen to 90th place or above on the full market capitalization rankings and will delete a stock at the quarterly review if it has fallen to 111th place or below on these rankings. Market capitalization rankings are calculated using data as of the close of business on the day before the review.

100 Constituent Limitation — The FTSE® 100 Index always contains 100 constituents. If a greater number of companies qualify to be inserted in the index than qualify to be removed, the lowest ranking constituents of the index will be removed so that the total number of stocks remains at 100 following inclusion of those that qualify to be inserted. Likewise, if a greater number of companies qualify to be removed than to be inserted at the quarterly review, securities of the highest ranking companies that are then not included in the FTSE® 100 Index will be inserted to match the number of companies being removed, in order to maintain the total at 100.

Index Calculation

The FTSE® 100 Index is a market capitalization weighted index. This means that the price movement of a larger company (that is, one representing larger percentage of the index) will have a greater effect on the level of the index than will the price movement of a smaller company (that is, one representing a smaller percentage of the index). The value of the FTSE® 100 Index is represented by a fraction, (a) the numerator of which is the sum of the product of (i) the price of each component stock, (ii) the number of shares issued for each such component and (iii) a free float factor for each such component (described more fully below), and (b) the denominator of which is a divisor. The divisor represents the total issued share capital of the index on the base date; the divisor may be adjusted as necessary to allow for changes in issued share capital of individual securities without distorting the index.

As noted above, a free float factor is applied to each index component. By employing this approach, FTSE uses the investable market capitalization, not the total market capitalization, of each constituent to determine the value of the FTSE® 100 Index. Investable market capitalization depends on free float. The following are excluded from free float: shares directly owned by state, regional, municipal and local governments (excluding shares held by independently managed pension schemes for governments); shares held by sovereign wealth funds where each holding is 10% or greater of the total number of shares in issue (if the holding subsequently decreases below 10%, the shares will be excluded from free float until the holding falls below 7%); shares held by directors, senior executives and managers of the company, and by their family and direct relations, and by companies with which they are affiliated; shares held within employee share plans; shares held by public companies or by non-listed subsidiaries of public

companies; shares held by founders, promoters, former directors, founding venture capital and private equity firms, private companies and individuals (including employees) where the holding is 10% or greater of the total number of shares in issue (if the holding subsequently decreases below 10%, the shares will be excluded from free float until the holding falls below 7%); all shares where the holder is subject to a lock-in clause (for the duration of that clause, after which free float changes resulting from the expiration of a lock-in clause will be implemented at the next quarterly review subsequent to there being a minimum of 20 business days between the expiration date of such lock-in clause and the index review date); shares held for publicly announced strategic reasons, including shares held by several holders acting in concert; and shares that are subject to ongoing contractual agreements (such as swaps) where they would ordinarily be treated as restricted.

The FTSE® 100 Index is recalculated whenever errors or distortions occur that are deemed to be significant. Users of the FTSE® 100 Index are notified through appropriate media.

Index Maintenance

The FTSE® 100 Index is reviewed quarterly for changes in free float. A stock's free float is also reviewed and adjusted if necessary following certain corporate events. Following a takeover or merger involving one or more index constituents, the free float restrictions will be based on restricted holdings in the successor company and will be implemented when the offer has completed (or lapsed) unless it directly reflects a corporate action independent of and not conditional on the takeover or merger completing or lapsing. If the corporate event includes another corporate action that affects the index, a change in free float is implemented at the same time as the corporate action. If there is no corporate action, the change in free float will be applied at the next quarterly review. Following the application of an initial free float restriction, a stock's free float will only be changed if its rounded free float moves more than three percentage points above or below the existing rounded free float. Companies with a free float of above 99% and of 15% or below will not be subject to the three percentage points threshold.

At each quarterly review, the Committee publishes a Reserve List containing the six highest ranking non-constituents of the FTSE® 100 Index. The Reserve List will be used in the event that one or more constituents are deleted from the index during the period up to the next quarterly review. If a merger or takeover results in one index constituent being absorbed by another constituent, the resulting company will remain a constituent and a vacancy will be created. This vacancy will be filled by selecting the highest ranking security in the Reserve List as at the close of the FTSE® 100 Index calculation two days prior to the deletion and related index adjustment. If an index constituent is taken over by a non-constituent company, the original constituent will be removed and replaced by the highest ranking non-constituent on the Reserve List. Any eligible company resulting from the takeover will be eligible to become the replacement company if it is ranked higher than any other company on the Reserve List. If a constituent company is split to form two or more companies, then the resulting companies will be eligible for inclusion as FTSE® 100 Index constituents, based on their respective full market capitalizations (before the application of any investability weightings), provided that they qualify in all other respects. Any eligible company resulting from a split that has no available market price after 20 business days will be removed. If a split results in the inclusion of an ineligible non-equity security, such security will remain in the FTSE® 100 Index for two trading days and then be removed. If a constituent is delisted or ceases to have a firm quotation, it will be removed from the list of constituents and be replaced by the highest ranking eligible company from the Reserve List as at the close of the index calculation two days prior to the deletion.

Capitalization Adjustments

A premium listed secondary line of a company will be considered for index inclusion if its total market capitalization before the application of any adjustments based on the extent to which the shares are publicly traded, is greater than 25% of the total market capitalization of the company's principal line and the secondary line is eligible, in its own right. Should the total market capitalization of a secondary line fall below 20% of the total market capitalization of the company's principal line at an annual review, the secondary line will be deleted from the FTSE® 100 Index unless its total market capitalization remains above the qualification level for continued inclusion as a constituent of the FTSE® 100 Index at that review. Where a company has partly paid shares, these shares, together with the outstanding call(s), are both included in the FTSE® 100 Index. Warrants to purchase ordinary shares and convertible securities are not included in the FTSE® 100 Index until they are exercised or converted.

Share Weighting Changes — For the purposes of computing the FTSE® 100 Index, the number of shares in issue for each constituent security is expressed to the nearest share and, to prevent a large number of insignificant weighting

changes, the number of shares in issue for each constituent security is amended only when the total shares in issue held within the index system changes by more than 1% on a cumulative basis. Changes will be made quarterly after the close of business on the third Friday of March, June, September and December. The data for these changes will be taken from the close of business on the third Wednesday of the month prior to the review month.

If a corporate action is applied to a constituent which involves a change in the number of shares in issue, the change in shares will be applied simultaneously with the corporate action. If accumulated changes in the number of shares in issue add up to 10% or more or when an accumulated share change represents \$2 billion of a company's total market capitalization, they are implemented between quarters. If an adjustment is made, it will be applied for the first time at the next review in March of the following year. All adjustments are made before the start of the index calculation on the day concerned, unless market conditions prevent this.

Shares in Issue Increase — When a company increases the number of shares it has in issue, the market capitalization of that company increases and the total market capitalization will rise accordingly. The index divisor is adjusted to maintain a constant index value.

Weighting Amendments — The market capitalization of a company is adjusted to take account of various corporate actions. To prevent the value of the FTSE® 100 Index from changing due to such an event, all corporate actions which affect the market capitalization of the FTSE® 100 Index require an offsetting divisor adjustment. By adjusting the divisor, the value of the FTSE® 100 Index remains constant before and after the event. Below is a summary of the more frequent corporate actions and their resulting adjustment.

Type of Corporate Action	Adjustment	Adjustment to Divisor
Issue of new shares	Share weighting increased	Yes
Share repurchase	Share weighting decreased	Yes
Bonus issued or stock split	Share weighting multiplied by four. Share price divided by four	No

Rights Issues — A rights issue is where a company raises new capital by offering shareholders additional shares at a set ratio with a discount to the market price. The rights become attached to the shares on a set date—the ex-date. On this date, the price of the company's underlying shares will fall by the value of the rights. The effect of the rights issue is to increase the market capitalization of the company by the value of the additional shares created by the rights issue less the value of the fall in the share price. The share weighting of the company and index divisor are also adjusted to prevent the index falling in line with the reduction in the share price on the ex-date.

In the event that the market price is equal to or below the rights offer price at the close of business immediately before trading ex-dividend, no adjustments will be made. In this circumstance, any resulting new shares will only be added to the index weighting once the take-up proportion is known and together with any associated change to the company's free float. If the rights issue is highly dilutive and the ratio is greater than ten to one, FTSE will include the new shares on a separate temporary line to reflect the market value of the right (together with a temporary line fixed at the value of the outstanding rights subscription price) until the end of the subscription period, at which point the temporary lines will be deleted and the new shares will be merged into the existing share line. In the event the rights issue involves non-equity and the value of the right cannot be determined, there will be no adjustment to the parent stock on the ex-date. The rights line will be included in the index at a value of zero on the ex-date (with no inclusion of the cash call value). If the rights line trades, it will be deleted at the market price after two days. If it does not trade, it will be deleted at a value of zero.

Market Disruption

If there is a system problem or situation in the market that is judged by FTSE to affect the quality of the constituent prices at any time when an index is being calculated, the index will be declared indicative (e.g. normally where a "fast market" exists in the equity market). The message "IND" will be displayed against the index value calculated by FTSE. The Committee must be satisfied that an accurate and reliable price for the purposes of determining the market value of a company exists. The Committee may exclude a security from the FTSE[®] 100 Index should it consider that an "accurate and reliable" price is not available.

If any event leads to an error in the index value of the FTSE[®] 100 Index that is greater than three basis points at the local country index level, then the FTSE[®] 100 Index will generally be recalculated, subject to discovery, within one month of the event. Where an alternative approach is available, FTSE may, at its sole discretion, choose not to recalculate.

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Historical Information

The following graph sets forth the closing levels of the UKX from April 30, 2009 through April 30, 2019, as reported by Bloomberg Financial Markets. The historical performance of the UKX should not be taken as an indication of future performance. We cannot give you assurance that the performance of the UKX will result in the return of any of your initial investment.

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The Nikkei 225 Index

The NKY was developed by Nikkei Inc. and is calculated, maintained and published by Nikkei Digital Media, Inc. a wholly owned subsidiary of Nikkei Inc. The Nikkei 225 is reported by Bloomberg L.P. under the symbol “NKY.” The NKY is a stock index that measures the composite price performance of selected Japanese stocks. The formal name of the NKY is the Nikkei Stock Average. The NKY is based on 225 underlying stocks (the “Nikkei Underlying Stocks”) trading on the Tokyo Stock Exchange (“TSE”) representing a broad cross-section of Japanese industries. All 225 Nikkei Underlying Stocks are stocks listed in the First Section of the TSE. Stocks listed in the First Section of the TSE are among the most actively traded stocks on the TSE. Nikkei Inc. rules require that the 75 most liquid issues (one-third of the component count of the NKY) be included in the NKY. Nikkei Inc. was first calculated and published the NKY in 1970; prior to 1970, the TSE calculated the NKY.

The 225 companies included in the NKY are divided into six sector categories: Technology, Financials, Consumer Goods, Materials, Capital Goods/Others and Transportation and Utilities. These six sector categories are further divided into 36 industrial classifications as follows:

• Technology — Pharmaceuticals, Electrical Machinery, Automobiles, Precision Machinery, Telecommunications;

• Financials — Banks, Miscellaneous Finance, Securities, Insurance;

• Consumer Goods — Marine Products, Food, Retail, Services;

• Materials — Mining, Textiles, Paper and Pulp, Chemicals, Oil, Rubber, Ceramics, Steel, Nonferrous Metals, Trading House;

• Capital Goods/Others — Constructions, Machinery, Shipbuilding, Transportation Equipment, Miscellaneous Manufacturing, Real Estate; and

• Transportation and Utilities — Railroads and Buses, Trucking, Shipping, Airlines, Warehousing, Electric Power, Gas. Calculation of the NKY

The NKY is a modified, price-weighted index (i.e., a Nikkei Underlying Stock’s weight in the NKY is based on its price per share rather than the total market capitalization of the issuer) which is calculated by (i) multiplying the per share price of each Nikkei Underlying Stock by the corresponding weighting factor for such Nikkei Underlying Stock (a “Weight Factor”), (ii) calculating the sum of all these products and (iii) dividing such sum by a divisor (the “Divisor”). The Divisor was initially set at 225 for the date of May 16, 1949 (the date on which the TSE was reopened after World War II) using historical numbers from that date. The Divisor is subject to periodic adjustments as set forth below. Each Weight Factor is computed by dividing ¥50 by the presumed par value of the relevant Nikkei Underlying Stock, so that the share price of each Nikkei Underlying Stock when multiplied by its Weight Factor corresponds to a share price based on a uniform par value of ¥50. The stock prices used in the calculation of the NKY are those reported by a primary market for the Nikkei Underlying Stocks (currently the TSE). The level of the NKY is calculated once every 15 seconds during TSE trading hours.

In order to maintain continuity in the NKY in the event of certain changes due to non-market factors affecting the Nikkei Underlying Stocks, such as the addition or deletion of stocks, substitution of stocks, stock splits or distributions of assets to stockholders, the Divisor used in calculating the NKY is adjusted in a manner designed to prevent any instantaneous change or discontinuity in the level of the NKY. Thereafter, the Divisor remains at the new value until a further adjustment is necessary as the result of another change. As a result of such change affecting any Nikkei Underlying Stock, the Divisor is adjusted in such a way that the sum of all share prices immediately after such change multiplied by the applicable Weight Factor and divided by the new Divisor (i.e., the level of the NKY immediately after such change) will equal the level of the NKY immediately prior to the change.

Standards for Listing and Maintenance

A Nikkei Underlying Stock may be deleted or added by Nikkei Inc. Any stock becoming ineligible for listing in the First Section of the TSE due to any of the following reasons will be deleted from the Nikkei Underlying Stocks: (i) bankruptcy of the issuer, (ii) merger of the issuer with, or acquisition of the issuer by, another company, (iii) delisting of such stock, (iv) transfer of such stock to the “Seiri-Post” because of excess debt of the issuer or because of any other reason or (v) transfer of such stock to the Second Section. In addition, a component stock transferred to the “Kanri-Post” (Posts for stocks under supervision) becomes a candidate for deletion. Nikkei Underlying Stocks with relatively low liquidity, based on trading value and rate of price fluctuation over the past five years, may be deleted by Nikkei Inc. Upon deletion of a stock from the Nikkei Underlying Stocks, Nikkei Inc. will select a replacement for such deleted

Nikkei Underlying Stock in accordance with certain criteria. In an exceptional case, a newly listed stock in the First Section of the TSE that is recognized by Nikkei Inc. to be representative of a market may be added to the Nikkei Underlying Stocks. In such a case, a newly listed stock in the First Section of the TSE that is recognized by Nikkei Inc. to be representative of a market may be added to the Nikkei Underlying Stocks. In such a case, an existing Nikkei Underlying Stock with low trading volume and deemed not to be representative of a market will be deleted by Nikkei Inc.

A list of the issuers of the Nikkei Underlying Stocks constituting the NKY is available from the Nikkei Economic Electronic Databank System and from the Stock Market Indices Data Book published by Nikkei Inc. Nikkei Inc. may delete, add or substitute any stock underlying the NKY.

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Historical Information

The following graph sets forth the closing levels of the NKY from April 30, 2009 through April 30, 2019, as reported by Bloomberg Financial Markets. The historical performance of the NKY should not be taken as an indication of future performance. We cannot give you assurance that the performance of the NKY will result in the return of any of your initial investment.

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Swiss Market Index

The Swiss Market Index (Bloomberg ticker “SMI Index”):

was first launched with a base level of 1,500 as of June 30, 1988; and

is sponsored, calculated, published and disseminated by SIX Group Ltd., certain of its subsidiaries, and the Management Committee of the SIX Swiss Exchange (the “SIX Exchange”).

The Swiss Market Index is a price return float-adjusted market capitalization-weighted index of the 20 largest stocks traded on the Swiss Stock Exchange. The Management Committee of SIX Swiss Exchange is supported by an Index Commission (advisory board) in all index-related matters, notably in connection with changes to the index rules and adjustments, additions and exclusions outside of the established review and acceptance period. The Index Commission meets at least twice annually.

Swiss Market Index Composition and Selection Criteria

The Swiss Market Index is comprised of the 20 highest ranked stocks traded on the Swiss Stock Exchange that have a free float of 20% or more and that are not investment companies. The equity universe is largely Swiss domestic companies; however, in some cases, foreign issuers with a primary listing on the Swiss Stock Exchange or investment companies that do not hold any shares of any other eligible company and that have a primary listing on the Swiss Stock Exchange may be included.

The ranking of each security is determined by a combination of the following criteria:

average free-float market capitalization over the last 12 months (compared to the capitalization of the Swiss

Performance Index, which serves as a benchmark for the overall Swiss equity market and as the index universe for the Swiss Market Index), and

cumulative on order book turnover over the last 12 months (compared to the total turnover of the Swiss Performance Index).

The Swiss Market Index is reconstituted annually after prior notice of at least two months on the third Friday in September after the close of trading. For companies that were listed during the last 12 months, the cumulated on order book turnover generally excludes the first five trading days in the calculation. The ordinary index reconstitution is based on data from the previous July 1 through June 30. Provisional interim selection (ranking) lists based on the average free-float market capitalization and cumulative on order book turnover over the last 12 months are also published at the cut off dates of March 31, September 30 and December 31.

The 18 securities with the highest rank are selected for inclusion in the Swiss Market Index. In order to reduce turnover, a buffer is applied for securities ranked 19 to 22. Out of the securities ranked 19 to 22 current components are selected with priority over the other securities. New components out of the buffer are selected until 20 components have been reached.

If a company has primary listings on several exchanges and less than 50% of that company’s total turnover is generated on the SIX Swiss Exchange, it will not be included in the Swiss Market Index unless it satisfies an additional liquidity criteria. For this purpose, all the components of the Swiss Performance Index are ranked based on their cumulated on order book turnover over the past 12 months relative to the total turnover of the Swiss Performance Index. Such a security must rank at least 18 or better in terms of the cumulated on order book turnover over the past 12 months, and if it ranks 23 or lower, it will be automatically excluded from the Swiss Market Index (i.e., without considering its free float).

Maintenance of the Swiss Market Index

Constituent Changes. In the case of major market changes as a result of capital events such as mergers or new listings, the Management Committee of SIX Swiss Exchange can decide at the request of the Index Commission that a security should be admitted to the Swiss Market Index outside the annual review period as long as it clearly fulfills the criteria for inclusion. For the same reasons, a security can also be excluded if the requirements for admission to the Swiss Market Index are no longer fulfilled. As a general rule, extraordinary acceptances into the Swiss Market Index take place after a three-month period on a quarterly basis after the close of trading on the third Friday of March, June, September and December (for example, a security listed on or before the fifth trading day prior to the end of November cannot be included until the following March). If a delisting has been confirmed, it will be removed from the index at the next upcoming ordinary quarterly adjustment date (March, June, September and December), with a notice period of at least five days. However, if the delisting would be effective before the ordinary index review, the

security is excluded from the index on the effective date of the delisting. If a delisted company is removed before the ordinary index review, it will be replaced by the highest ranked candidate on the selection list which is not yet part of the index in order to maintain 20 components.

Number of Shares and Free Float. The securities included in the Swiss Market Index are weighted according to their free float. This means that shares deemed to be in firm hands are subtracted from the total market capitalization of that company. The free float is calculated on the basis of outstanding shares. Issued and outstanding equity capital is, as a rule, the total amount of equity capital that has been fully subscribed and wholly or partially paid in and documented in the Commercial Register. Not counting as issued and outstanding equity capital are the approved capital and the conditional capital of a company. The free float is calculated on the basis of listed shares only. If a company offers several different categories of listed participation rights, each is treated separately for purposes of index calculation. Shares held deemed to be in firm hands are shareholdings that have been acquired by one person or a group of persons in companies domiciled in Switzerland and which, upon exceeding 5%, have been reported to the SIX Exchange. Shares of persons and groups of persons who are subject to a shareholder agreement which is binding for more than 5% of the listed shares or who, according to publicly known facts, have a long-term interest in a company, are also deemed to be in firm hands.

For the calculation of the number of shares in firm hands, the SIX Exchange may also use other sources than the reports submitted to it. In particular, the SIX Exchange may use data gained from issuer surveys that it conducts itself. In general, shares held by custodian nominees, trustee companies, investment funds, pension funds and investment companies are deemed free-floating regardless whether a report has been made to the SIX Exchange. The SIX Exchange classifies at its own discretion persons and groups of persons who, because of their area of activity or the absence of important information, cannot be clearly assigned.

The free-float rule applies only to bearer shares and registered shares. Capital issued in the form of participation certificates (“Partizipationsscheine”) and bonus certificates (“Genussscheine”) is taken into full account in calculating the Swiss Market Index because it does not confer voting rights.

The number of securities in the Swiss Market Index and the free-float factors are adjusted after the close of trading on four adjustment dates per year, the third Friday of March, June, September and December. Such changes are pre-announced at least one month before the adjustment date, although the index sponsor reserves the right to take account of recent changes before the adjustment date in the actual adjustment, so the definite new securities are announced five trading days before the adjustment date.

In order to avoid frequent slight changes to the weighting and to maintain the stability of the Swiss Market Index, any extraordinary change of the total number of outstanding securities or the free float will only result in an extraordinary adjustment if it exceeds 10% and 5% respectively and is in conjunction with a corporate action.

After a takeover, the index sponsor may, in exceptional cases, adjust the free float of a company upon publication of the end results after a five-day notification period or may exclude the security from the relevant index family. When an insolvency has been announced, an extraordinary adjustment will be made and the affected security will be removed from the Swiss Market Index after five trading days' notice.

The index sponsor reserves the right to make an extraordinary adjustment, in exceptional cases, without observing the notification period.

Capped Weightings and Intra-Quarter Breaches. The weight of any index constituent that exceeds a weight of 18% within the Swiss Market Index is reduced to that value at each ordinary quarterly adjustment date by applying a capping factor to the calculation of such constituent's free float market capitalization. A constituent's number of shares and free float figure are used to determine its capping factor. The excess weight (the difference of the original weight minus the capped weight) is distributed proportionally across the other index constituents. The constituents are also capped to 18% as soon as two index constituents exceed a weight of 20% (an "intra-quarter breach"). If an intra-quarter breach is observed after the close of the markets, the new capping factors are implemented after the close of the following trading day. The weights of the largest components are therefore set again to 18% effective after the close of the following trading day. If an issuer is represented in the Swiss Market Index by more than one security, the free float market capitalization of those securities is cumulated for the calculation of the capping factors.

Calculation of the Swiss Market Index

The index sponsor calculates the Swiss Market Index using the "Laspeyres formula," with a weighted arithmetic mean of a defined number of securities issues. The formula for calculating the index value can be expressed as follows:

$$\text{Swiss Market Index (SMI®)} = \frac{\text{Free Float Market Capitalization of the Swiss Market Index}}{\text{Divisor}}$$

The "free float market capitalization of the SMI®" is equal to the sum of the product of the last-paid price, the number of shares, the free-float factor, the capping factor and, if a foreign stock is included, the current CHF exchange rate as of the time the index value is being calculated. The index value is calculated in real time and is updated whenever a trade is made in a component stock. Where any Swiss Market Index component stock price is unavailable on any trading day, the index sponsor will use the last reported price for such component stock. Only prices from the SIX Exchange's electronic order book are used in calculating the Swiss Market Index.

Divisor Value and Adjustments

The divisor is a technical number used to calculate the index and is adjusted to reflect changes in market capitalization due to corporate events.

Below are common corporate events and their impact on the divisor of the index.

Event	Divisor Change?
Regular cash dividend	No
Share split	No
Rights issue	If the rights issue is used to raise capital, the divisor increases. If the rights issue is used to return capital, the divisor decreases.

Merger & Acquisition Activities

Mergers and acquisitions are corporate actions that go along with a change to the ownership structure of one or more companies. This can result in the disappearance of the involved companies and in the creation of a new company (merger) or in the integration of one company into the other (acquisition). Therefore, the corporate action may lead to a new listing or to a delisting which results in an adjustment of the index composition. In both cases, a change in the number of shares or the free float factor are to be considered, which result in a change of the component's weight.

The index sponsor reserves the right to respond to any other corporate events with divisor adjustments or, in extraordinary circumstances, to depart from the provisions set forth above.

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Historical Information

The following graph sets forth the closing levels of the SMI from April 30, 2009 through April 30, 2019, as reported by Bloomberg Financial Markets. The historical performance of the SMI should not be taken as an indication of future performance. We cannot give you assurance that the performance of the SMI will result in the return of any of your initial investment.

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The S&P®/ASX 200 Index

The S&P®/ASX 200 Index (Bloomberg ticker “AS51 Index”):

was first launched in 1979 by the Australian Securities Exchange and was acquired and re-launched by its current index sponsor on April 3, 2000; and

is sponsored, calculated, published and disseminated by S&P Dow Jones Indices LLC, a part of McGraw Hill Financial (“S&P”).

The S&P®/ASX 200 Index includes 200 companies and covers approximately 80% of the Australian equity market by market capitalization. As discussed below, the S&P®/ASX 200 Index is not limited solely to companies having their primary operations or headquarters in Australia or to companies having their primary listing on the Australian Securities Exchange (the “ASX”). All ordinary and preferred shares (if such preferred shares are not of a fixed income nature) listed on the ASX, including secondary listings, are eligible for the S&P®/ASX 200 Index. Hybrid stocks, bonds, warrants, preferred stock that provides a guaranteed fixed return and listed investment companies are not eligible for inclusion.

The S&P®/ASX 200 Index is intended to provide exposure to the largest 200 eligible securities that are listed on the ASX by float-adjusted market capitalization. Constituent companies for the S&P®/ASX 200 Index are chosen based on market capitalization, public float and liquidity. All index-eligible securities that have their primary or secondary listing on the ASX are included in the initial selection of stocks from which the 200 index stocks may be selected.

The float-adjusted market capitalization of companies is determined based on the daily average market capitalization over the last six months. The security’s price history over the last six months, the latest available shares on issue and the investable weight factor (the “IWF”), are the factors relevant to the calculation of daily average market capitalization. The IWF is a variable that is primarily used to determine the available float of a security for ASX listed securities.

Information regarding the S&P®/ASX 200 Index (including information regarding the top ten components of this Underlying Index, the industries represented by the securities included in this Underlying Index and their respective weights and the countries represented by the securities included in this Underlying Index and their respective weights) may be found on S&P’s website. That information is updated from time to time on that website. Please note that information included in that website is not included or incorporated by reference in this document.

Number of Shares

When considering the index eligibility of securities for inclusion or promotion into S&P/ASX indices, the number of index securities under consideration is based upon the latest available ASX quoted securities. For domestic securities (companies incorporated in Australia and traded on the ASX, companies incorporated overseas but exclusively listed on the ASX and companies incorporated overseas and traded on other markets but most of its trading activity is on the ASX), this figure is purely based upon the latest available data from the ASX.

Foreign-domiciled securities may quote the total number of securities on the ASX that is representative of their global equity capital; whereas other foreign-domiciled securities may quote securities on the ASX on a partial basis that represents their Australian equity capital. In order to overcome this inconsistency, S&P will quote the number of index securities that are represented by CHESS Depositary Interests (“CDIs”) for a foreign entity. When CDIs are not issued, S&P will use the total securities held on the Australian register (CHESS and, where supplied, the issuer sponsored register). This quoted number for a foreign entity is representative of the Australian equity capital, thereby allowing the S&P®/ASX 200 Index to be increasingly reflective of the Australian market.

The number of CDIs or shares of a foreign entity quoted on the ASX can experience more volatility than is typically the case for ordinary shares on issue. Therefore, an average number on issue will be applied over a six-month period. Where CDI information is not supplied to the ASX by the company or the company’s share register, estimates for Australian equity capital will be drawn from CHESS data and, ultimately, registry-sourced data.

IWF

The IWF represents the float-adjusted portion of a stock’s equity capital. Therefore any strategic holdings that are classified as either corporate, private or government holdings reduce the IWF which, in turn, results in a reduction in the float-adjusted market capital.

The IWF ranges between 0 and 1, is calculated as $1 - \text{Sum of the \% held by strategic shareholders who possess 5\% or more of issued shares}$, and is an adjustment factor that accounts for the publicly available shares of a company. A

company must have a minimum IWF of 0.3 to be eligible for index inclusion.

S&P Dow Jones Indices identifies the following shareholders whose holdings are considered to be control blocks and are subject to float adjustment:

1. Government and government agencies;
2. Controlling and strategic shareholders/partners;
3. Any other entities or individuals which hold more than 5%, excluding insurance companies, securities companies and investment funds; and
4. Other restricted portions such as treasury stocks.

Liquidity Test

Only stocks that are regularly traded are eligible for inclusion. Eligible stocks are considered for index inclusion based on their stock median liquidity (median daily value traded divided by its average float-adjusted market capitalization for the last six months relative to the market capitalization weighted average of the stock median liquidities of the 500 constituents of the All Ordinaries index, another member of the S&P®/ASX index family).

Index Maintenance

S&P rebalances constituents quarterly to ensure adequate market capitalization and liquidity using the previous six months' data to determine index eligibility. Quarterly review changes take effect the third Friday of March, June, September and December. Eligible stocks are considered for index inclusion based on their float-adjusted market capitalization rank relative to the stated quota of 200 securities. For example, a stock that is currently in the S&P®/ASX 300 and is ranked at 175, based on float-adjusted market capitalization, within the universe of eligible securities may be considered for inclusion into the S&P®/ASX 200 Index, provided that liquidity hurdles are met. In order to limit the level of index turnover, eligible securities will only be considered for index inclusion once another stock is excluded due to a sufficiently low rank and/or liquidity, based on the float-adjusted market capitalization. Potential index inclusions and exclusions need to satisfy buffer requirements in terms of the rank of the stock relative to a given index. The buffers are established to limit the level of index turnover that may take place at each quarterly rebalancing.

Between rebalancing dates, an index addition is generally made only if a vacancy is created by an index deletion. Index additions are made according to float-adjusted market capitalization and liquidity. An initial public offering is added to the S&P®/ASX 200 Index only when an appropriate vacancy occurs and is subject to proven liquidity for at least two months. An exception may be made for extraordinary large offerings where sizeable trading volumes justify index inclusion.

Deletions can occur between index rebalancing dates due to acquisitions, mergers and spin-offs or due to suspension or bankruptcies. The decision to remove a stock from the S&P®/ASX 200 Index will be made once there is sufficient evidence that the transaction will be completed. Stocks that are removed due to mergers and acquisitions are removed from the S&P®/ASX 200 Index at the cash offer price for cash-only offers. Otherwise, the best available price in the market is used.

Share numbers for all index constituents are updated quarterly and are rounded to the nearest thousand. The update to the number of issued shares will be considered if the change is at least 5% of the float adjusted shares or \$100 million in value.

Share updates for foreign-domiciled securities will take place annually at the March rebalancing. The update to the number of index shares will only take place when the six-month average of CDIs or the Total Securities held in the Australian branch of issuer sponsored register (where supplied) and in CHESS, as of the March rebalancing, differs from the current index shares by either 5% or a market-cap dollar amount greater than A\$ 100 million. Where CDI information is not supplied to the ASX by the company or the company's share register, estimates for Australian equity capital will be drawn from CHESS data and, ultimately, registry-sourced data.

Intra-quarter share changes are implemented at the effective date or as soon as reliable information is available; however, they will only take place in the following circumstances:

changes in a company's float-adjusted shares of 5% or more due to market-wide shares issuance; rights issues, bonus issues and other major corporate actions; and share issues resulting from index companies merging and major off-market buy-backs.

Share changes due to mergers or acquisitions are implemented when the transaction occurs, even if both of the companies are not in the same index and regardless of the size of the change.

IWFs are reviewed annually as part of the September quarterly review. However, any event that alters the float of a security in excess of 5% will be implemented as soon as practicable by an adjustment to the IWF.

The function of the IWF is also to manage the index weight of foreign-domiciled securities that quote shares on the basis of CDIs. Due to the volatility that is displayed by CDIs, unusually large changes in the number of CDIs on issue could result. Where this is the case, the IWF may be used to limit the effect of unusually large changes in the average number of CDIs (and, thereby, limit the potential to manipulate this figure). Where the Australian Index Committee sees fit to apply the IWF in this manner, the rationale for the decision will be announced to the market. This will be reviewed annually at the March-quarter index rebalancing date.

Index Calculation

The S&P®/ASX 200 Index is calculated using a base-weighted aggregate methodology. The value of the S&P®/ASX 200 Index on any day for which an index value is published is determined by a fraction, the numerator of which is the aggregate of the price of each stock in the S&P®/ASX 200 Index times the number of shares of such stock included in the S&P®/ASX 200 Index times that stock's IWF, and the denominator of which is the divisor, which is described

more fully below.

In order to prevent the value of the S&P®/ASX 200 Index from changing due to corporate actions, all corporate actions may require S&P to make an index or divisor adjustment. This helps maintain the value of the index and ensures that the movement of the S&P®/ASX 200 Index does not reflect the corporate actions of the individual companies that comprise the S&P®/ASX 200 Index.

The table below summarizes the types of index adjustments and indicates whether the corporate action will require a divisor adjustment:

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Type of Corporate Action	Index Treatment	Divisor Adjustment Required
Cash dividend	None	No
Special Cash Dividend	Price adjustment needed	Yes
Stock dividend and/or split	Shares are multiplied by and price is divided by the split factor	No
Stock dividend from class A shares into existing class B shares, both of which are included in the S&P®/ASX 200 Index	Adjustment for price of A; adjustment for shares in B	Yes
Stock dividend of different class, same company and is not included in the S&P®/ASX 200 Index	Price adjustment	Yes
Reverse split	Adjustment for price and shares	No
Rights offering	Adjustment for price and shares	Yes
Rights offering for a new line	Adjustment for price	Yes
New share issuance	Adjustment for shares	Yes
Reduction of capital	Share adjustment	Yes
New addition to index	Share adjustment	Yes
Deletion from index	Share adjustment	Yes
Merger (acquisition by index company for stock)	Share increase	Yes

In situations where an exchange is forced to close early due to unforeseen events, such as computer or electric power failures, weather conditions or other events, S&P will calculate the closing price of the indices based on (1) the closing prices published by the exchange or (2) if no closing price is available, the last regular trade reported for each security before the exchange closed. If the exchange fails to open due to unforeseen circumstances, S&P treats this closure as a standard market holiday. The S&P®/ASX 200 Index will use the prior day's closing prices and shifts any corporate actions to the following business day. If all exchanges fail to open or in other extreme circumstances, S&P may determine not to publish the S&P®/ASX 200 Index for that day.

S&P reserves the right to recalculate the S&P®/ASX 200 Index under certain limited circumstances. S&P may choose to recalculate and republish the S&P®/ASX 200 Index if it is found to be incorrect or inconsistent within two trading days of the publication of the level of the S&P®/ASX 200 Index for one of the following reasons:

1. incorrect or revised closing price;
2. missed corporate event;
3. late announcement of a corporate event; or
4. incorrect application of corporate action or index methodology.

Any other restatement or recalculation of the S&P®/ASX 200 Index is only done under extraordinary circumstances to reduce or avoid possible market impact or disruption, as solely determined by the Index Committee.

License Agreement

The S&P®/ASX 200 Index is published and maintained by the S&P Australian Index Committee (the "ASX Committee"), a team of representatives from both Standard & Poor's and the Australian Stock Exchange. The S&P®/ASX 200 Index is composed of the S&P®/ASX 100 stocks plus an additional 100 stocks selected by the ASX Committee. The S&P®/ASX 200 Index essentially covers large-cap and mid-cap stocks evaluated for liquidity and

size. Additional information concerning the S&P®/ASX 200 Index may be obtained from the Australian Stock Exchange website at www.asx.com.au. We are not incorporating by reference the website or any material it includes in this document.

Historical Information

The following graph sets forth the closing levels of the AS51 from April 30, 2009 through April 30, 2019, as reported by Bloomberg Financial Markets. The historical performance of the AS51 should not be taken as an indication of future performance. We cannot give you assurance that the performance of the AS51 will result in the return of any of your initial investment.

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The Hang Seng® Index

The HSI is reported by Bloomberg L.P. under the ticker symbol “HSI.”

The HSI is calculated, maintained and published by HSIL, a wholly owned subsidiary of Hang Seng Bank, in concert with the HSI Advisory Committee and was first developed, calculated and published on November 24, 1969. The HSI is a free float-adjusted market capitalization weighted stock market index that is designed to reflect the performance of the Hong Kong stock market.

Only companies with a primary listing on the main board of the Stock Exchange of Hong Kong (“SEHK”) are eligible as constituents of the HSI. Mainland China enterprises that have an H-share listing in Hong Kong will not be eligible for inclusion in the HSI unless the company has no unlisted share capital. In addition, to be eligible for selection, a company: (1) must be among those that constitute the top 90% of the total market value of all primary listed shares on the SEHK (the market value of a company refers to the average of its month-end market capitalizations for the past 12 months); (2) must be among those that constitute the top 90% of the total turnover of all primary listed shares on the SEHK in a sufficient number of measurement sub-periods (turnover is assessed over the last eight quarterly sub-periods: if a company was in the top 90% in any of the most recent four sub-periods, it receives two points; if it was in the top 90% in any of the latter four sub-periods, it receives one point. A company must attain a “score” of eight points to meet the turnover requirement); and (3) should normally have a listing history of 24 months (there are exceptions for companies that have shorter listing histories but large market values and/or high turnover scores). From the many eligible candidates, final selections are based on the following: (1) the market value and turnover rankings of the companies; (2) the representation of the sub sectors within the HSI directly reflecting that of the market; and (3) the financial performance of the companies.

Calculation of the HSI

The calculation methodology of the HSI is a free float-adjusted market capitalization weighting with a 10% cap on individual stocks. Under this calculation methodology, shares held by any entities (excluding custodians, trustees, mutual funds and investment companies) which control more than 5% of shares are excluded for index calculation:

- Strategic holdings (governments and affiliated entities or any other entities which hold substantial shares in the company would be considered as non-freefloat unless otherwise proved);
- Directors’ and management holdings (directors, members of the board committee, principal officers or founding members);
- Corporate cross holdings (publicly traded companies or private firms / institutions); and
- Lock-up shares (shareholdings with a publicly disclosed lock-up arrangement).

A free float-adjusted factor representing the proportion of shares that is free floated as a percentage of the issued shares, is rounded up to the nearest multiple of 5% for the calculation of the HSI and is updated quarterly.

A cap of 10% on individual stock weightings is applied. A cap factor is calculated quarterly to coincide with the regular update of the free float-adjusted factor. Additional re-capping is performed upon constituent changes.

The formula for the index calculation is shown below:

$$\begin{aligned} \text{Current Index} &= \frac{\text{Current Aggregate Free Float-adjusted Market Capitalization of Constituents}}{\text{Yesterday's Aggregate Free Float-adjusted Market Capitalization of Constituents}} \times \text{Yesterday's Closing Index} \\ &= \frac{\sum (P_t \times IS \times FAF \times CF)}{\sum (P_{t-1} \times IS \times FAF \times CF)} \times \text{Yesterday's Closing Index} \end{aligned}$$

where:

P_t: current price at day t;

P_{t-1}: closing price at day t-1;

IS: number of issued shares (in the case of H-share constituents, only the H-share portion is taken into calculation);

FAF: free float-adjusted factor, which is between 0 and 1; and

CF: cap factor, which is between 0 and 1.

License Agreement

The Hang Seng® Index (the “Index”) is published and compiled by Hang Seng Indexes Company Limited pursuant to a license from Hang Seng Data Services Limited. The mark(s) and name(s) of the Hang Seng® Index are proprietary to Hang Seng Data Services Limited. Hang Seng Indexes Company Limited and Hang Seng Data Services Limited have agreed to the use of, and reference to, the Index by Royal Bank of Canada, BUT NEITHER HANG SENG INDEXES COMPANY LIMITED NOR HANG SENG DATA SERVICES LIMITED WARRANTS OR REPRESENTS OR GUARANTEES TO ANY BROKER OR HOLDER OF THE SECURITIES OR ANY OTHER PERSON (i) THE ACCURACY OR COMPLETENESS OF THE INDEX AND ITS COMPUTATION OR ANY INFORMATION RELATED THERETO; OR (ii) THE FITNESS OR SUITABILITY FOR ANY PURPOSE OF THE INDEX OR ANY COMPONENT OR DATA COMPRISED IN IT; OR (iii) THE RESULTS WHICH MAY BE OBTAINED BY ANY PERSON FROM THE USE OF THE INDEX OR ANY COMPONENT OR DATA COMPRISED IN IT FOR ANY PURPOSE, AND NO WARRANTY OR REPRESENTATION OR GUARANTEE OF ANY KIND WHATSOEVER RELATING TO THE INDEX IS GIVEN OR MAY BE IMPLIED. The process and basis of computation and compilation of the Index and any of the related formula or formulae, constituent stocks and factors may at any time be changed or altered by Hang Seng Indexes Company Limited without notice. TO THE EXTENT PERMITTED BY APPLICABLE LAW, NO RESPONSIBILITY OR LIABILITY IS ACCEPTED BY HANG SENG INDEXES COMPANY LIMITED OR HANG SENG DATA SERVICES LIMITED (i) IN RESPECT OF THE USE OF AND/OR REFERENCE TO THE INDEX BY ROYAL BANK OF CANADA IN CONNECTION WITH THE SECURITIES; OR (ii) FOR ANY INACCURACIES, OMISSIONS, MISTAKES OR ERRORS OF HANG SENG INDEXES COMPANY LIMITED IN THE COMPUTATION OF THE INDEX; OR (iii) FOR ANY INACCURACIES, OMISSIONS, MISTAKES, ERRORS OR INCOMPLETENESS OF ANY INFORMATION USED IN CONNECTION WITH THE COMPUTATION OF THE INDEX WHICH IS SUPPLIED BY ANY OTHER PERSON; OR (iv) FOR ANY ECONOMIC OR OTHER LOSS WHICH MAY BE DIRECTLY OR INDIRECTLY SUSTAINED BY ANY BROKER OR HOLDER OF THE SECURITIES OR ANY OTHER PERSON DEALING WITH THE SECURITIES AS A RESULT OF ANY OF THE AFORESAID, AND NO CLAIMS, ACTIONS OR LEGAL PROCEEDINGS MAY BE BROUGHT AGAINST HANG SENG INDEXES COMPANY LIMITED AND/OR HANG SENG DATA SERVICES LIMITED in connection with the Securities in any manner whatsoever by any broker, holder or other person dealing with the Securities. Any broker, holder or other person dealing with the Securities does so therefore in full knowledge of this disclaimer and can place no reliance whatsoever on Hang Seng Indexes Company Limited and Hang Seng Data Services Limited. For the avoidance of doubt, this disclaimer does not create any contractual or quasi-contractual relationship between any broker, holder or other person and Hang Seng Indexes Company Limited and/or Hang Seng Data Services Limited and must not be construed to have created such relationship.

Historical Information

The following graph sets forth the closing levels of the HSI from April 30, 2009 through April 30, 2019, as reported by Bloomberg Financial Markets. The historical performance of the HSI should not be taken as an indication of future performance. We cannot give you assurance that the performance of the HSI will result in the return of any of your initial investment.

Supplemental Plan of Distribution (Conflicts of Interest)

We have agreed to indemnify UBS and RBCCM against liabilities under the Securities Act of 1933, as amended, or to contribute payments that UBS and RBCCM may be required to make relating to these liabilities as described in the prospectus supplement and the prospectus. We will agree that UBS may sell all or a part of the Securities that it will purchase from us to investors at the price to public listed on the cover hereof, or its affiliates at the price indicated on the cover of the pricing supplement, the document that will be filed under Rule 424(b)(2) containing the final pricing terms of the Securities.

UBS may allow a concession not in excess of the underwriting discount set forth on the cover of the pricing supplement to its affiliates for distribution of the Securities.

Subject to regulatory constraints and market conditions, RBCCM intends to offer to purchase the Securities in the secondary market, but it is not required to do so.

We or our affiliates may enter into swap agreements or related hedge transactions with one of our other affiliates or unaffiliated counterparties in connection with the sale of the Securities and RBCCM and/or an affiliate may earn additional income as a result of payments pursuant to the swap or related hedge transactions. See “Use of Proceeds and Hedging” in the accompanying product prospectus supplement UBS-IND-1.

We expect to deliver the Securities on a date that is greater than two business days following the trade date. Under Rule 15c6-1 of the Exchange Act, trades in the secondary market generally are required to settle in two business days, unless the parties to any such trade expressly agree otherwise. Accordingly, purchasers who wish to trade the Securities more than two business days prior to the original issue date will be required to specify alternative settlement arrangements to prevent a failed settlement.

The value of the Securities shown on your account statement may be based on RBCCM’s estimate of the value of the Securities if RBCCM or another of our affiliates were to make a market in the Securities (which it is not obligated to do). That estimate will be based upon the price that RBCCM may pay for the Securities in light of then prevailing market conditions, our creditworthiness and transaction costs. If so specified in the pricing supplement related to the Securities, for a period of approximately 10 months after the issue date, the value of the Securities that may be shown on your account statement may be higher than RBCCM’s estimated value of the Securities at that time. This is because the estimated value of the Securities will not include the underwriting discount and our hedging costs and profits; however, the value of the Securities shown on your account statement during that period may be a higher amount, potentially reflecting the addition of the underwriting discount and our estimated costs and profits from hedging the Securities. Any such excess is expected to decrease over time until the end of this period. After this period, if RBCCM repurchases your Securities, it expects to do so at prices that reflect their estimated value. This period may be reduced at RBCCM’s discretion based on a variety of factors, including but not limited to, the amount of the Securities that we repurchase and our negotiated arrangements from time to time with UBS.

For additional information as to the relationship between us and RBCCM, please see the section “Plan of Distribution—Conflicts of Interest” in the prospectus dated September 7, 2018.

Structuring the Securities

The Securities are our debt securities, the return on which is linked to the performance of the Underlying Basket. As is the case for all of our debt securities, including our structured notes, the economic terms of the Securities reflect our actual or perceived creditworthiness at the time of pricing. In addition, because structured notes result in increased operational, funding and liability management costs to us, we typically borrow the funds under these Securities at a rate that is more favorable to us than the rate that we might pay for a conventional fixed or floating rate debt security of comparable maturity. Using this relatively lower implied borrowing rate rather than a secondary market rate is a factor that is likely to result in a higher initial estimated value of the Securities at the time their terms are set than if a secondary market rate was used. Unlike the estimated value included on the cover of this document or in the final pricing supplement relating to the Securities, any value of the Securities determined for purposes of a secondary market transaction may be based on a different borrowing rate, which may result in a lower value for the Securities than if our initial internal borrowing rate were used.

In order to satisfy our payment obligations under the Securities, we may choose to enter into certain hedging arrangements (which may include call options, put options or other derivatives) on the issue date with RBCCM or one of our other subsidiaries. The terms of these hedging arrangements take into account a number of factors, including

our creditworthiness, interest rate movements, the volatility of each Underlying Index, and the tenor of the Securities. The economic terms of the Securities and their initial estimated value depend in part on the terms of these hedging arrangements.

The lower implied borrowing rate is a factor that reduces the economic terms of the Securities to you. The initial offering price of the Securities also reflects the underwriting discount and our estimated hedging costs. These factors result in the initial estimated value for the Securities on the Trade Date being less than their public offering price. See “Key Risks—The Initial Estimated Value of the Securities Will Be Less than the Price to the Public” above.

Terms Incorporated in Master Note

The terms appearing above under the caption “Indicative Terms of the Securities” and the provisions in the accompanying product prospectus supplement UBS-IND-1 dated September 7, 2018 under the caption “General Terms of the Securities,” are incorporated into the master note issued to DTC, the registered holder of the Securities.