The Depository Trust & Clearing Corporation

Consolidated Financial Statements as of and for the Years Ended December 31, 2019 and 2018

THE DEPOSITORY TRUST & CLEARING CORPORATION

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THE DEPOSITORY TRUST & CLEARING CORPORATION
CONSOLIDATED STATEMENTS OF FINANCIAL CONDITION

(In thousands, except share data)	As of December 31, 2019	2018
ASSETS		
CURRENT ASSETS:		
Cash and cash equivalents	$ 8,395,163	$ 8,641,036
Participants' segregated cash	4,876	77,988
Short-term investments	900,000	800,000
Accounts receivable - net of allowance for doubtful accounts	177,219	177,880
Participants' and Clearing Funds	40,814,905	36,622,122
Other Participants' assets	514,104	518,115
Other current assets	177,940	133,960
Total current assets	50,984,207	46,971,101
NON-CURRENT ASSETS:		
Premises and equipment - net of accumulated depreciation	216,417	213,111
Goodwill	57,699	57,699
Intangible assets - net of accumulated amortization	325,125	319,119
Equity method investments	10,676	10,491
Operating lease right-of-use-asset	237,689	—
Other non-current assets	304,719	319,579
Total non-current assets	1,152,325	919,999
TOTAL ASSETS	$ 52,136,532	$ 47,891,100
LIABILITIES AND SHAREHOLDERS' EQUITY		
CURRENT LIABILITIES:		
Commercial paper - net of unamortized discount	$ 7,154,217	$ 7,436,141
Current portion of long-term debt	4,103	2,650
Current portion of pension and postretirement benefits	34,270	16,608
Current portion of operating lease liability	25,906	—
Accounts payable and accrued expenses	102,179	104,013
Participants' and Clearing Funds	40,814,905	36,622,122
Payable to Participants	518,980	596,103
Other current liabilities	266,160	260,677
Total current liabilities	48,920,720	45,038,314
NON-CURRENT LIABILITIES:		
Non-current portion of long-term debt	3,921	33,725
Non-current portion of pension and postretirement benefits	178,384	198,492
Non-current operating lease liability	264,848	—
Other non-current liabilities	263,681	288,334
Total non-current liabilities	710,834	520,551
Total liabilities	49,631,554	45,558,865
COMMITMENTS AND CONTINGENCIES (Note 2)		
SHAREHOLDERS' EQUITY		
Preferred stock:		
Series A, $0.50 par value - 10,000 shares authorized, issued (above par), and outstanding	300	300
Series B, $0.50 par value - 10,000 shares authorized, issued (above par), and outstanding	300	300
Series C, $0.50 par value - 1,600 shares authorized, issued (above par), and outstanding	390,516	390,516
Common stock, $100 par value - 80,000 shares authorized, 50,908 shares issued and outstanding	5,091	5,091
Additional paid-in capital	411,065	411,065
Retained earnings	1,769,638	1,571,298
Accumulated other comprehensive loss, net of tax	(221,932)	(196,335)
Non-controlling interests	150,000	150,000
Total shareholders' equity	2,504,978	2,332,235
TOTAL LIABILITIES AND SHAREHOLDERS' EQUITY	$ 52,136,532	$ 47,891,100

The Notes to Consolidated Financial Statements are an integral part of these statements.

THE DEPOSITORY TRUST & CLEARING CORPORATION
CONSOLIDATED STATEMENTS OF INCOME

(In thousands)	For the years ended, December 31, 2019	2018
REVENUES		
Settlement and asset services	$ 448,796	$ 458,973
Clearing services	587,003	604,628
Matching and data services	273,836	275,979
Repository and derivatives services	290,161	292,980
Wealth management services	103,721	112,133
Other services	40,384	44,481
Investment income (loss), net	22,290	(4,806)
Total revenues	1,766,191	1,784,368
EXPENSES		
Employee compensation and related benefits	733,025	664,068
Information technology	176,348	161,863
Professional and other services	335,180	369,477
Occupancy	48,010	48,180
Depreciation and amortization	143,338	159,528
General and administrative	54,028	43,723
Impairment of Intangible assets	21,468	8,588
Total expenses	1,511,397	1,455,427
Total operating income	254,794	328,941
NON-OPERATING INCOME (EXPENSE)		
Interest income	557,551	460,017
Refunds to Participants	(367,073)	(326,017)
Interest expense	(216,361)	(148,390)
Net income (loss) from Equity method investments	404	(10,423)
Other non-operating income, net	39,012	42,709
Total non-operating income	13,533	17,896
Income before taxes	268,327	346,837
Provision for income taxes	47,847	47,124
Net income	220,480	299,713
Net income attributable to non-controlling interests	2,640	3,900
Net income attributable to DTCC	$ 217,840	$ 295,813

The Notes to Consolidated Financial Statements are an integral part of these statements.

THE DEPOSITORY TRUST & CLEARING CORPORATION
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

(In thousands)	For the years ended December 31, 2019	2018
Net income	$ 220,480	$ 299,713
OTHER COMPREHENSIVE INCOME (LOSS) - Net of tax:		
Defined benefit pension and other plans [1]	(27,286)	33,129
Foreign currency translation	1,689	(6,434)
Other comprehensive (loss) income	(25,597)	26,695
Comprehensive income	194,883	326,408
Comprehensive income attributable to non-controlling interests	2,640	3,900
Comprehensive income attributable to DTCC	$ 192,243	$ 322,508

(1) Amounts are net of benefit for income taxes of $10,508 and provision for income taxes of $12,797 for 2019 and 2018, respectively.

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THE DEPOSITORY TRUST & CLEARING CORPORATION
CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

(In thousands)	Preferred Stock Series A	Preferred Stock Series B	Preferred Stock Series C	Common Stock	Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss), Net of Tax: Defined Benefit Pension and Other Plans	Accumulated Other Comprehensive Income (Loss), Net of Tax: Foreign Currency Translation	Non-controlling Interests	Total Shareholders' Equity
BALANCE - January 1, 2018	$ 300	$ 300	$ 390,516	$ 5,091	$ 411,065	$ 1,261,309	$ (188,925)	$ (429)	$ 148,440	$ 2,027,667
Adjustment for accounting change[(1)]	—	—	—	—	—	33,676	(33,676)	—	—	—
Net income	—	—	—	—	—	295,813	—	—	3,900	299,713
Other comprehensive income (loss)	—	—	—	—	—	—	33,129	(6,434)	—	26,695
Dividend to non-controlling interest	—	—	—	—	—	—	—	—	(2,340)	(2,340)
Dividends on preferred stock	—	—	—	—	—	(19,500)	—	—	—	(19,500)
BALANCE - December 31, 2018	300	300	390,516	5,091	411,065	1,571,298	(189,472)	(6,863)	150,000	2,332,235
Net income	—	—	—	—	—	217,840	—	—	2,640	220,480
Other comprehensive (loss) income	—	—	—	—	—	—	(27,286)	1,689	—	(25,597)
Dividend to non-controlling interest	—	—	—	—	—	—	—	—	(2,640)	(2,640)
Dividends on preferred stock	—	—	—	—	—	(19,500)	—	—	—	(19,500)
BALANCE - December 31, 2019	$ 300	$ 300	$ 390,516	$ 5,091	$ 411,065	$ 1,769,638	$ (216,758)	$ (5,174)	$ 150,000	$ 2,504,978

(1) The adjustment relates to the adoption of an accounting update during the prior year.

The Notes to Consolidated Financial Statements are an integral part of these statements.

THE DEPOSITORY TRUST & CLEARING CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS

	For the years ended December 31,	
(In thousands)	**2019**	**2018**
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net income	$ 220,480	$ 299,713
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	143,338	159,528
Loss on impairment of Intangible assets	21,468	8,588
Net (gain)/loss on disposal of Premises and equipment and Intangible assets	2,798	(1,769)
Net (income)/loss from Equity method investments	(404)	10,423
Deferred income taxes	12,170	42,260
Discount on Commercial paper outstanding	11,774	24,854
Other	25,459	(6,432)
Net change in:		
Accounts receivable	220	(7,490)
Other Participants' assets	450	5,529
Other assets	(40,957)	(31,367)
Accounts payable and accrued expenses	12,664	(13,590)
Pension and postretirement benefits	(29,732)	(64,316)
Operating lease liability	(25,006)	—
Other liabilities	19,208	(74,658)
Participants' and Clearing Funds liabilities	1,098,814	1,995,148
Payable to Participants	(77,123)	(292,053)
Net cash provided by operating activities	1,395,621	2,054,368
CASH FLOWS FROM INVESTING ACTIVITIES:		
Purchases of Short-term investments	(2,100,000)	(800,000)
Maturities of Short-term investments	2,000,000	—
Maturities of Investments in marketable securities	—	83,600
Purchases of Investments in marketable securities	—	(58,600)
Purchases of Premises and equipment	(53,859)	(36,706)
Capitalized software development costs	(108,588)	(93,215)
Investment in Equity method investments	—	(11,000)
Purchase of equity investments	(500)	(1,104)
Net cash used in investing activities	(262,947)	(917,025)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Proceeds from Commercial paper	29,534,455	41,659,738
Repayments of Commercial paper	(29,828,153)	(37,471,022)
Repayments on long-term debt and other borrowings	(42,779)	(4,237)
Preferred stock dividend payments	(19,500)	(19,500)
Payment to Non-controlling interests	(2,340)	(1,080)
Net cash provided by/(used in) financing activities	(358,317)	4,163,899
Effect of foreign exchange rate changes on Cash and cash equivalents	1,911	(1,900)
Net increase/(decrease) in Cash and cash equivalents, Participants' segregated cash, Participants' and Clearing Funds cash deposits, Cash in Other Participants' assets	776,268	5,299,342
Cash and cash equivalents, Participants' segregated cash, Participants' and Clearing Funds cash deposits, Cash in Other Participants' assets - Beginning of period	25,569,357	20,270,015
Cash and cash equivalents, Participants' segregated cash, Participants' and Clearing Funds cash deposits, Cash in Other Participants' assets - End of period	$ 26,345,625	$ 25,569,357
SUPPLEMENTAL DISCLOSURES:		
Interest paid	$ 159,543	$ 80,992
Income taxes paid - net of refunds	$ 60,813	$ 83,009
Non-cash financing activity - capital lease obligation	$ —	$ 3,640

The Notes to Consolidated Financial Statements are an integral part of these statements.

1. BUSINESS AND OWNERSHIP

The Depository Trust & Clearing Corporation (DTCC) is the parent company of various operating subsidiaries, including, but not limited to, The Depository Trust Company (DTC), National Securities Clearing Corporation (NSCC), Fixed Income Clearing Corporation (FICC), DTCC ITP LLC (ITP), DTCC Deriv/SERV LLC (Deriv/SERV), DTCC Solutions LLC (Solutions), Business Entity Data, B.V. (BED); collectively, the "Company" or "Companies."

Subsidiaries
DTC is a limited purpose trust company formed under the Banking Law of New York State and supervised by the New York State Department of Financial Services (NYSDFS); a State member bank of the Federal Reserve System (FRS), subject to examination by the Federal Reserve Bank of New York (FRBNY) under delegated authority from the Board of Governors (the FRB) of the FRS; and a clearing agency registered with and under the supervision of the U.S. Securities and Exchange Commission (SEC). DTC provides central securities depository, settlement and related services to members of the securities, banking and other financial industries.

NSCC is organized as a business corporation under New York law, and is a clearing agency registered with the SEC. NSCC provides clearing, settlement, risk management, and central counterparty (CCP) services to its members for broker-to broker trades involving equities, corporate and municipal debt, exchange-traded funds, and unit investment trusts.

FICC is a clearing agency registered with the SEC that provides CCP services to members that participate in the U.S. government and mortgage-backed securities markets, consisting principally of automated real-time trade comparison, netting, settlement, trade confirmation, clearing, risk management and electronic pool notification. FICC has two divisions: the Government Securities Division (GSD) and the Mortgage-Backed Securities Division (MBSD).

DTC, NSCC and FICC are designated as Systemically Important Financial Market Utilities (SIFMUs) by the U.S. Financial Stability Oversight Council pursuant to Title VIII of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. This designation subjects the clearing agencies to enhanced standards for operation and governance, as established by the SEC's Standards for Covered Clearing Agencies (CCAS).

The members of DTCC's clearing agencies are collectively referred to as Participants.

ITP, formerly known as Omgeo LLC, provides post-trade matching, processing and other related services, primarily to members of the financial community.

Deriv/SERV, through its subsidiaries and affiliates, enhances transparency and provides operational efficiency, advanced analytics and strategic consulting for derivatives and securities financing transactions. A system of trade repositories supports a multitude of data submissions covering real-time price reporting, transaction details and valuation data. Deriv/SERV offers the Trade Information Warehouse asset servicing for credit default swaps and Equity Cash Flow Matching for equity derivatives.

Solutions provides information-based and data processing solutions.

BED owns and operates the Global Market Entity Identifier (GMEI) Utility Legal Entity Identifier (LEI) solution in the federated Global LEI system. The GMEI Utility is designed to provide a single, universal standard identifier to any organization or firm involved in a financial transaction internationally across all asset classes.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of presentation. The accompanying consolidated financial statements are prepared in accordance with generally accepted accounting principles in the United States of America (U.S. GAAP). The accompanying consolidated financial statements include the accounts of the Company and its wholly owned subsidiaries. Intercompany accounts and transactions have been eliminated in consolidation.

Use of estimates. The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements. Management makes estimates regarding, among other things, the collectability of receivables, the outcome of litigation, the realization of deferred taxes, unrecognized tax benefits, impairment of intangible assets, fair value measurements and other matters that affect the reported amounts. Estimates are based on judgment and available information; therefore, actual results could differ materially from those estimates.

Cash and cash equivalents. All highly liquid investments purchased with an original maturity of three months or less at the date of acquisition are classified as Cash and cash equivalents. Cash equivalents consist primarily of highly liquid investments in deposits held in banks.

Participants' segregated cash. Represents cash received from Participants for the exclusive benefit of the Participants' customers in compliance with SEC rule 15c3-3 (customer protection), which requires broker-dealers to segregate a certain amount of cash and securities in specially protected accounts on behalf of their clients.

Short-term investments. Consists of cash invested in bank deposits with original maturities greater than three months and less than one year with various yields carried at amortized cost, which approximates fair value due to their short-term maturities.

Fair value measurements. The Company may be required or permitted to measure and disclose certain assets and liabilities using fair value measurements. Fair value is defined as the price that would be received to sell an asset, or paid to transfer a liability, in an orderly transaction between market participants at the measurement date. The Company uses a three-level classification hierarchy of fair value measurements that establishes the quality of inputs used to measure fair value. The fair value of financial instruments is determined using various techniques that involve some level of estimation and judgment, the degree of which is dependent on the price transparency and the complexity of the instruments.

Accounts receivable. Accounts receivable are stated at cost, net of an allowance for doubtful accounts. The Company establishes an allowance for estimated losses resulting from uncollectibility. The Company determines the need for an allowance based on a variety of factors, including the length of time receivables are past due, macroeconomic conditions, historical experience and the financial condition of customers and other debtors.

Participants' and Clearing Funds. The rules of DTC, NSCC and FICC require Participants to maintain deposits related to their respective activities based on calculated requirements. The deposits are available to collateralize Participants' obligations and certain liabilities of the Companies. Margin deposits and Participant contributions are maintained within the Participants' and Clearing Funds on the accompanying Consolidated Statements of Financial Condition due to the benefits and risks of ownership incurred by the Company. Deposits and contributions may be in the form of cash and cash equivalents and securities. These deposits and contributions may be applied to satisfy obligations of the depositing Participant, other Participants, or the Company as provided in the rules of the relevant subsidiaries of the Company.

Cash deposits and Investments in marketable securities. Deposits and contributions received in the form of cash may be invested in bank deposits, reverse repurchase agreements, money market funds and direct obligations of the U.S. Government. Reverse repurchase agreements provide for FICC's delivery of cash in exchange for securities having a market value that is at least 102% of the amount of the agreements. Securities purchased under reverse repurchase agreements are typically U.S. Treasury and agency securities. Reverse repurchase agreements are recorded at the contract amounts. All interest earned on investments is accrued and included within Interest income in the accompanying Consolidated Statements of Income. This interest is refunded to Participants, which is included in Refunds to Participants in the accompanying Consolidated Statements of Income.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Securities on deposit - at fair value. Securities may include U.S. Treasury securities, U.S. agency debt securities and U.S. agency residential mortgage-backed securities. All interest earned on these investments is accrued and included within Interest income in the accompanying Consolidated Statements of Income. This interest is refunded to Participants, which is included in Refunds to Participants in the accompanying Consolidated Statements of Income.

Securities held in custody. Securities held in custody by DTC for Participants, which are predominantly in electronic book form, but also include physical certificates, are not reported in the accompanying consolidated financial statements. Cash dividends and interest received by DTC or due on such securities and in the process of distribution or awaiting claim, are included in Other Participants' assets with a corresponding liability recorded in Payable to Participants on the accompanying Consolidated Statements of Financial Condition. Short positions occasionally exist in securities balances and are credited to the account of the Participants; such short positions are valued and collateralized daily by 130% of the short position reflected in Other Participants' assets on the accompanying Consolidated Statements of Financial Condition. DTC's obligation to return such cash collateral to Participants is also reflected in Payable to Participants.

Federal reserve stock. DTC is a member of the FRBNY and, as a member, is required to maintain a minimum level of investment in FRB stock based on the Company's capital. The FRB stock is carried at cost, classified as a restricted security and periodically evaluated for impairment based on ultimate recovery of par value. Based on this evaluation, the Company determined there is not an other-than-temporary impairment as of December 31, 2019 and 2018. The FRB stock, amounting to $6,402,000 at December 31, 2019 and 2018, is included in Other non-current assets on the accompanying Consolidated Statements of Financial Condition.

Other Participants' assets and Payable to Participants. The Company receives cash and stock dividends, interest, reorganization and redemption proceeds on securities registered in the name of its nominee, Cede and Co., and interest and redemption proceeds on bearer securities, which it distributes to Participants. These balances are included in Other Participants' assets with a corresponding liability recorded in Payable to Participants on the accompanying Consolidated Statements of Financial Condition.

Premises and equipment. Premises and equipment are stated at cost, net of accumulated depreciation. Routine maintenance, repairs and replacement costs are expensed as incurred, while improvements that extend the useful life of the assets are capitalized. When equipment is sold or otherwise disposed of, the cost and related accumulated depreciation are removed from the accounts and any resulting gain or loss is recognized in the accompanying Consolidated Statements of Income. Premises and equipment are reviewed for impairment whenever events or changes in circumstances indicate the related carrying amount may not be recoverable.

The following table summarizes how the Company depreciates Premises and equipment:

Premises and equipment	Amortization Period	Amortization Method
Leasehold improvements	Shorter of useful life or remaining term of the lease	Straight-line
Furniture and equipment	5 to 7 years	Straight-line
Building and improvements	39 years	Straight-line

Depreciation expense for leasehold improvements, furniture and equipment, and buildings and improvements is included in Depreciation and amortization in the accompanying Consolidated Statements of Income.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Goodwill and Intangible assets

Goodwill. The Company records Goodwill upon the completion of a business combination as the difference between the purchase price and the fair value of the net assets acquired. Subsequent to initial recognition, Goodwill is not amortized but is tested for impairment annually or more frequently if events occur or circumstances change that indicate an impairment may exist. The Company has the option to first assess qualitative factors to determine whether the existence of events or circumstances leads to a determination that it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If after assessing the totality of events or circumstances, the Company determines it is more likely than not that the fair value of a reporting unit is greater than its carrying amount, then performing the two-step test is not required. However, if the Company concludes otherwise, then it is required to perform the first step of the two-step impairment test that compares the estimated fair value of the reporting unit with its carrying value, including goodwill. If the estimated fair value of the reporting unit exceeds its carrying value, it is not considered to be impaired; however, if the carrying value of the reporting unit were to exceed its estimated fair value, a second step would be performed that compares the implied fair value of the reporting unit's goodwill with the carrying value of its goodwill. An impairment loss would be recognized to the extent the carrying value of goodwill exceeds the implied fair value.

Intangible assets. The Company's intangible assets include customer relationships and capitalized software.

Capitalized software. The Company capitalizes eligible costs associated with the acquisition or development of internal-use software projects that provide new or significantly improved functionality. The Company capitalizes software costs expected to result in long-term operational benefits, such as replacement systems or new applications that result in significantly increased operational efficiencies or functionality. All other costs incurred in connection with internal-use software are expensed as incurred.

The following table summarizes how the Company amortizes and when it tests Intangible assets for impairment:

Intangible Asset	Life/ Amortization Period	Amortization Method	Impairment Testing Frequency
Customer relationships	Finite/ 12 Years	Straight-line	If a triggering event occurs
Capitalized software	Finite/ 3 Years	Straight-line	If a triggering event occurs

Equity method investments. All investments that represent less than a majority, but at least a 20% ownership interest, and the Company can exert significant influence over the operations of the investment, are accounted for using the equity method. Investments are initially recognized at cost. Subsequently, the Company's proportionate share of investees' earnings are recorded in Net income (loss) from Equity method investments in the accompanying Consolidated Statements of Income in the period earned. Dividends are recorded as a reduction to the investment account.

Equity investments. All investments that represent less than a 20% ownership interest are initially recognized at cost and included in Other non-current assets on the accompanying Consolidated Statements of Financial Condition. Subsequently, these investments are measured at fair value, which represents cost less impairment, if any, plus or minus changes resulting from observable price changes in orderly transactions for the identical or similar security. Changes in the fair values of these investments are recorded in Other non-operating income, net in the accompanying Consolidated Statements of Income.

Commercial paper. NSCC issues unsecured short-term promissory notes (Commercial paper) with maturities generally less than one year. The proceeds from the issuance of the Commercial paper constitute liquid resources of NSCC that, together with other liquid resources of NSCC, will enable it to effect the settlement of its payment obligations in the event of the default of any of its Participants in accordance with NSCC's rules and procedures. Pending use by NSCC of the proceeds of the Commercial paper issuance for this purpose, the funds raised are invested in highly liquid short-term instruments in accordance with NSCC's investment policy.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Commitments and contingencies. The Company is involved in legal proceedings and litigation arising in the ordinary course of business. In the opinion of management, the outcome of such proceedings and litigation is not expected to have a material effect on the accompanying Consolidated Statements of Financial Condition, Income or Cash Flows.

Non-controlling interests. Shareholders' equity is adjusted for the income attributable to the non-controlling interest shareholders and any distributions to those shareholders.

Revenue recognition. The Company recognizes revenue to depict the transfer of promised services and related performance obligations to customers in an amount that reflects the consideration to which the Company expects to be entitled, upon satisfaction, in exchange for those services. Promised services and related performance obligations are recognized at the point in time when the control of the promised service is transferred to the customer.

To recognize revenue, the Company applies the following steps: identify the contract(s) with the customer, identify the performance obligations in the contract(s), determine the transaction price, allocate the transaction price to the performance obligations in the contract and recognize revenue when (or as) the entity satisfies a performance obligation.

Certain contracts with customers contain variable consideration, whereby the amount the Company receives is contingent on a future event occurring or not occurring, even though the amount itself may be fixed. The variable consideration primarily relates to volume based discounts or rebates for certain services, however, the volume targets or thresholds typically reset on a monthly basis therefore, the variable consideration does not have an impact on the revenue recognition.

The Company derives its revenue from transaction fees, subscription revenue and support services, and other services. Revenue from transaction fees is recognized at a point in time on the transaction date, as the customer obtains the control and benefit of the service at that point. Subscription and support revenues are recognized ratably over the performance period of the relevant contract using a time elapsed measure of progress as the customer receives the benefits of the services throughout the term of the contract. Other services, which represent fees generated from offering referential based data and business processing solutions to financial institutions globally, is recognized when services are provided based on contractual terms.

Details for each revenue stream presented in the Company's Consolidated Statements of Income follow:

S*ettlement and asset services.* Revenue derived from this revenue stream is related to transaction fees and subscription revenue. The Company provides settlement services for equity, corporate and municipal debt trades and money market instruments in the United States of America. Asset Servicing, also offered through the Company, offers a broad range of services for underwriting, custody, corporate actions, dividend, proxy and reorganization services, as well as the electronic registration and transfer of securities processing.

Clearing services. Revenue derived from this revenue stream is related to transaction fees. Services include continuous net settlement, mortgage backed securities clearing, and government securities clearing.

Matching and data services. Revenue derived from this revenue stream is related to transaction fees, subscription revenue and support services. Services include trade enrichment, trade agreement, LEIs and data analytics.

Repository and derivatives services. Revenue derived from this revenue stream is related to transaction fees, subscription revenue and support services. The Company provides solutions for derivatives trade reporting and contract servicing. Services support data submissions covering real-time price reporting, transaction details, valuation data to meet members' reporting obligations in various jurisdictions globally, an asset servicing infrastructure for credit default swaps, matching service for equity derivatives payments and tools to member firms to address the quality of their derivatives trade submissions.

Wealth management services. Revenue derived from this revenue stream is related to transaction fees. Services include centralized, automated processing and information services for mutual fund, alternative investment, and insurance and retirement products.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Other services. Revenue derived from this revenue stream is related to other services. The Company offers referential and activity-based, announcement, security reference, and liquidity data through the DTCC Data Services product. These offerings are delivered in fixed or configurable formats, sourced from the Company's transaction, reference, position and asset servicing data.

Rebates

During 2019, the Board of Directors approved and the Company paid a one-time rebate in the amount of $47 million to DTC, NSCC, and FICC customers. The rebate was based on a pro rata share of qualifying revenues at the legal entity level, using estimated 2019 profitability as the basis for the calculation. The rebate is netted in Settlement and asset services and Clearing services revenues in the accompanying Consolidated Statements of Income.

The rebate amount in the accompanying Consolidated Statements of Income for the year ended December 31, 2019 follows (in thousands):

	Amount
Settlement and asset services	$ 13,000
Clearing services	34,000
Total	$ 47,000

Accounts receivable and deferred revenue

The period in which the Company recognizes revenue may differ from the timing of payments received from customers. The Company typically bills its customers up to 30 days in arrears. The Company records a receivable when revenue is recognized prior to payment and there is an unconditional right to payment. See Note 5, Due from Participants and customers for services, net, for the Company's receivables related to revenues from contracts with customers.

Deferred revenue represents the Company's contract liabilities related to billings or payments received in advance for subscription and support services, as well as professional service fees, where the performance obligation has not yet been satisfied. Deferred revenue is included in Other current liabilities and Other non-current liabilities on the accompanying Consolidated Statements of Financial Condition, as disclosed in Note 12.

Investment income (loss), net. Investment income (loss), net represents changes in the fair values of investment assets related to the Company's deferred compensation plan (structured as a Rabbi Trust). All of the marketable securities of the Rabbi Trust are classified as trading securities and are recorded at fair value.

Non-qualified deferred compensation plan. DTCC maintains a self-directed, non-qualified deferred compensation plan structured as a “Rabbi Trust” for certain executives and other highly compensated employees. Under the plan, Participants may elect or be required to defer receipt of a portion of their annual compensation and invest it in various mutual, stable value and common collective trust funds. All such investments are held in the Rabbi Trust and the plan requires settlement in cash. The investment assets of the Rabbi Trust are recorded at fair value and included on the accompanying Consolidated Statements of Financial Condition in Other non-current assets as long-term incentive plan assets. The amount of compensation deferred under the plan is credited to each Participant’s deferral account and a deferred compensation liability is recorded in Other non-current liabilities on the accompanying Consolidated Statements of Financial Condition. The investment assets of the Rabbi Trust are classified as trading securities, and accordingly, changes in their fair values are recorded in Investment income (loss), net in the accompanying Consolidated Statements of Income with a corresponding charge recorded in Employee compensation and related benefits in the accompanying Consolidated Statements of Income. The change in fair value of these investments was income of $22,290,000 and loss of $4,806,000 for the years ended December 31, 2019 and 2018, respectively.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Long-term incentive plan. DTCC's long-term incentive plan is provided to certain designated employees of DTCC to establish retention incentives for certain key employees. The performance period is a three-year period commencing January 1 of each calendar year, unless modified, extended or terminated by the Board of Directors and the Compensation and Human Resources Committee. Only those employees specifically designated by the Compensation Committee are eligible to participate in the plan. The associated liabilities for the plan are classified in Other current liabilities and Other non-current liabilities on the accompanying Consolidated Statements of Financial Condition.

Pension and postretirement plans

Defined benefit plans. DTCC has a qualified non-contributory defined benefit pension plan (the Pension Plan), under which employees hired or rehired before May 1, 2009 are eligible to participate upon attainment of age 21 and completion of six months of service. The Pension Plan was frozen effective December 31, 2013 and is closed to new participants, all plan participants no longer accrue any benefits under the plan. The Pension Plan is qualified under Section 401(a) of the Internal Revenue Code of 1986, as amended. It is subject to the provisions of ERISA. The Pension Plan provides benefits to retired or vested terminated employees or their beneficiaries. The Pension Benefit Guarantee Corporation, a United States governmental agency, guarantees most vested normal age retirement benefits subject to certain limitations. Pension benefits under the Pension Plan are determined based on an employee's length of service and earnings. DTCC's funding policy requires the Company to make contributions to the Pension Plan that meet or exceed the minimum funding standards under the Employee Retirement Income Security Act of 1974 (ERISA) and the Internal Revenue Code.

DTCC provides health care and life insurance benefits to DTCC eligible retired employees in Retiree Medical and Life Insurance Plans. The Retiree Medical Plan is available to certain eligible retired employees and their dependents. Life insurance coverage is available to certain retired employees who have completed twenty years of full time service and their dependents.

DTCC also sponsors a Supplemental Executive Retirement Plan (SERP) and a Restoration Plan that are non-qualified, non-funded defined benefit plans, which provide additional retirement benefits to certain employees. Benefits paid to retirees are based on age at retirement, years of credited service and average compensation. The cost of non-qualified defined benefits is determined using substantially the same actuarial methods and economic assumptions as those used for the qualified pension plan. The Company maintains certain assets in trust for non-qualified retirement benefit obligations.

The annual measurement date for DTCC's defined benefit plans is December 31. Plan assets are determined based on fair value generally representing observable market prices. The projected benefit obligations are determined based on the present value of projected benefit distributions at an assumed discount rate. The discount rate utilized is based on the yield curves of high-quality corporate bonds available in the marketplace. The net periodic pension expense or income includes service costs, interest costs based on an assumed discount rate, an expected return on plan assets based on an actuarially derived market-related value and amortization of prior years' actuarial gains and losses and prior service cost (credit). Service costs, interest costs, and all other costs are included in Employee compensation and related benefits, Interest expense, and Other non-operating income, respectively, in the accompanying Consolidated Statements of Income.

Actuarial gains and losses include the impact of plan amendments, gains or losses related to changes in the amount of the projected benefit obligations or plan assets resulting from experience different from the assumed rate of return, changes in the discount rate or other assumptions. To the extent an actuarial gain or loss exceeds 10% of the greater of the projected benefit obligation or the market-related value of plan assets, the excess is recognized over the future lifetime of the defined benefit plans.

The expected long-term rate of return on plan assets is based on anticipated returns for each applicable asset class. Anticipated returns are weighted for the expected allocation for each asset class and are based on forecasts for prospective returns in the equity and fixed income markets, which should track the long-term historical returns for these markets. The Company also considers the growth outlook for the U.S. and global economies, as well as current and prospective interest rates.

The market-related value utilized to determine the expected return on plan assets is based on the fair value of plan assets adjusted for the difference between expected returns and actual performance of plan assets. The difference between actual experience and expected returns on plan assets is included as an adjustment in the market-related value over a 4-year period.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Defined contribution retirement plans. The Company sponsors two defined contribution plans for U.S. employees, The Depository Trust & Clearing Corporation Employee Savings Plan (Employee Savings Plan) and The Depository Trust & Clearing Corporation Operations Level Employee Savings Plan (Operations Level Savings Plan). The plans are administered by the Company's Employee Benefit Plans Committee, which is appointed by the Board of Directors of the Company and is composed of designated Company officers. The Employee Savings Plan is a single employer plan covering non-bargaining unit employees. The Operations Level Savings Plan is a single employer plan covering bargaining unit employees.

The Company matches 50% of the first 6% of the employee's contributions up to the Internal Revenue Service (IRS) compensation limits. Company matching contributions and employee contributions vest immediately.

In addition to the Company matching contributions, the Company offers a supplemental contribution on behalf of the employees in lieu of the contributions to the Pension Plan, which is now frozen. Employees are able to participate in this Pension Contribution Account (PCA) after six months of service. The Company makes contributions equal to a percentage of base and incentive pay based on years of service (3% for less than five years, 4% for five years but less than ten years, 5% for ten years or more). Company supplemental contributions vest over five years at the rate of 20% for each year of service or upon attaining age 55.

In addition to the Company matching and PCA contributions, the Company offers a supplemental contribution on behalf of the employees who were hired or rehired on or before May 1, 2001, also in lieu of the contributions to the Pension Plan. The Pension Transition Account (PTA) contribution ranges from 2% to 3% of eligible pay, for employees whose age plus service combination (in whole years) totaled 55 or higher, as of December 31, 2013. Vesting is over five years at a rate of 20% for each year of service or upon attaining age 55.

All investments, except loans receivable, are included in The Depository Trust & Clearing Corporation Master Savings Plan Trust and are administered by the plans' trustee, State Street Bank & Trust Company. Conduent Inc. serves as the recordkeeper for the plans. Both plans are subject to the provisions of the ERISA.

Income taxes. The Provision for income taxes is computed using the asset and liability method. The tax currently payable is based on taxable income for the year. Taxable income differs from Income before taxes as reported in the accompanying Statement of Income because it excludes items of income or expense that are taxable or deductible in other years and it further excludes items that are never taxable or deductible. The Company records a deferred income tax (benefit) provision when there are temporary differences between assets and liabilities measured for financial reporting and for income tax return purposes. These temporary differences result in taxable (deferred tax liability) or deductible (deferred tax asset) amounts in future years and are measured using the tax rates and laws that will be in effect when such differences are expected to reverse. Valuation allowances are recognized if, based on the weight of available evidence, it is more likely than not that some portion of the deferred tax asset will not be realized. Deferred tax assets and liabilities are reported net by jurisdiction in non-current assets or liabilities on the accompanying Statements of Financial Condition. It is the Company's policy to provide for uncertain tax positions and the related interest and penalties based upon management's assessment of whether a tax benefit is more likely than not to be sustained upon examination by the tax authorities.

Foreign currency. Assets and liabilities denominated in foreign currencies are translated at rates of exchange prevailing on the dates of the accompanying Consolidated Statements of Financial Condition. Revenues and expenses are translated at average rates of exchange during the year. Gains or losses on foreign currency transactions are included in the accompanying Consolidated Statements of Income. Gains or losses on translation of the financial statements of foreign subsidiaries, when the functional currency is other than the U.S. dollar, are included in the accompanying Consolidated Statements of Comprehensive Income.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Derivatives and hedging. The Company uses forward contracts to hedge net investments in certain foreign subsidiaries whose functional currencies are not the U.S. dollar. The Company formally documents all relationships between the hedging instruments and hedged items, as well as the Company's risk-management objectives and strategy for undertaking various hedging transactions. Hedge accounting is applied when a derivative is highly effective at reducing the risk associated with the hedged exposure and the risk management objective and strategy are documented. Hedge documentation identifies the derivative hedging instrument, the asset or liability and type of risk hedged, and how the effectiveness of the derivative is assessed prospectively and retrospectively. For hedging instruments that qualify for hedge accounting, changes in the fair value of the derivatives are recorded in Other comprehensive (loss) income. If it is determined that a derivative is not highly effective at hedging the designated exposure, the Company discontinues hedge accounting and changes in fair value of the hedging instrument are recorded in earnings.

Reconciliation of Cash and cash equivalents and other limited use cash. The Company includes all cash on the Consolidated Statements of Financial Condition, regardless of which line it is included, when reconciling the beginning and ending total amounts shown in the Consolidated Statements of Cash Flows, which includes Cash and cash equivalents and cash balances that are not available for general corporate purposes due to certain limitations, including - Participants' segregated cash, Participants' and Clearing Funds cash deposits and Cash in Other Participants' assets.

A reconciliation of Cash and cash equivalents, Participants' segregated cash, Clearing Fund cash deposits, Cash in Other Participants' assets, reported within the accompanying Consolidated Statements of Financial Condition that sum to the total of the same such amounts shown on the accompanying Consolidated Statements of Cash Flows as of December 31, 2019 and 2018 follows (in thousands):

	2019	2018
Cash and cash equivalents	$ 8,395,163	$ 8,641,036
Participants' segregated cash	4,876	77,988
Participants' and Clearing Funds cash deposits	17,431,482	16,332,668
Cash in Other Participants' assets	514,104	517,665
Total Cash and cash equivalents, Participants' segregated cash, Participants' and Clearing Funds cash deposits, Cash in Other Participants' assets shown on the Consolidated Statements of Cash Flows	$ 26,345,625	$ 25,569,357

3. ACCOUNTING AND REPORTING DEVELOPMENTS

Standard	Description	Impact on the financial statements or other significant matters
Financial Accounting Standards Board Standard Issued, but not yet Adopted		
ASU 2019-12 Income Taxes (Topic 740) - Simplifying the Accounting for Income Taxes Issued December 2019	• Clarifies and simplifies aspects of accounting for income taxes. • Eliminates certain exceptions related to the approach for intraperiod tax allocation, the methodology for calculating income taxes in an interim period and the recognition of deferred tax liabilities for basis differences between book and tax.	• Effective January 1, 2022. • The Company is evaluating the impact on its consolidated financial statements and related disclosures.
ASU 2019-05 Financial Instruments - Credit Losses: Targeted Transition Relief Issued May 2019	• Provides entities with an option upon adoption of ASU 2016-13 Customer's Financial Instruments - Credit Losses to irrevocably elect the fair value option on an instrument-by-instrument basis for certain financial instruments that are both within the scope of the current expected credit loss and eligible for the fair value option.	• Effective January 1, 2020. • The Company will not elect the fair value option on any instrument within the scope and therefore there is no impact on its consolidated financial statements and related disclosures.

3. ACCOUNTING AND REPORTING DEVELOPMENTS (CONTINUED)

Standard	Description	Impact on the financial statements or other significant matters
Financial Accounting Standards Board Standard Issued, but not yet Adopted (Continued)		
ASU 2018-18 Clarifying Interactions of the Revenue Recognition and Collaborative Arrangements Standards *Issued November 2018*	• Amends Collaborative Arrangement standard to clarify that certain transactions between participants in a collaborative arrangement should be accounted for under ASU 2014-09 *Revenue from contracts with customers* when the collaborative partner is considered the customer. Requires revenues from such collaborative contracts to be recognized upon transfer of control of a good or service in the amount of consideration expected to be received from the collaborative partner. • Precludes an entity from presenting collaborative arrangement consideration as revenue from contracts with customers if the collaborative partner is not considered the customer.	• Effective January 1, 2020 for public companies and early adopted by the Company. • The adoption of the standard will not have a material impact to the recognition and timing of revenues for collaborative arrangements or on the Company's consolidated financial statements and related disclosures.
ASU 2018-15 Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement (CCA) That Is a Service Contract *Issued August 2018*	• Implementation costs related to a CCA will be deferred or expensed as incurred in accordance with the existing internal-use software guidance for similar costs.	• Effective January 1, 2020 for public companies and early adopted by the Company. • The early adoption of the standard will not have a material impact on the Company's consolidated financial statements and related disclosures.
ASU 2018-14 Changes to the Disclosure Requirements for Defined Benefit Plans *Issued August 2018*	• Eliminates requirements for certain disclosures that are no longer considered cost beneficial and requires new ones that the Financial Accounting Standards Board considers pertinent.	• Effective January 1, 2021. • The Company is evaluating the impact on related disclosures in its consolidated financial statements.
ASU 2018-13 Changes to the Disclosure Requirements for Fair Value Measurement *Issued August 2018*	• Entities will no longer be required to disclose the amount of and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy (see Note 15). • Public companies will be required to disclose the range and weighted average used to develop significant unobservable inputs for recurring Level 3 fair value measurements. • Modifies certain disclosure requirements for nonpublic entities to make them less burdensome.	• Effective January 1, 2020. • The adoption of the standard will have no material impact on the related disclosures in the Company's consolidated financial statements.
ASU 2017-04 Intangibles - Goodwill and Other - Simplifying the Test for Goodwill Impairment *Issued January 2017*	• Eliminates the second step from the goodwill impairment test. If a reporting unit's carrying amount exceeds its fair value, an entity will record an impairment charge based on that difference. The impairment charge will be limited to the amount of goodwill allocated to that reporting unit.	• Effective January 1, 2020 for public companies and early adopted by the Company. • The adoption of the standard will not have a material impact on the Company's consolidated financial statements and related disclosures.

3. ACCOUNTING AND REPORTING DEVELOPMENTS (CONTINUED)

Standard	Description	Impact on the financial statements or other significant matters
Financial Accounting Standards Board Standard Issued, but not yet Adopted (Continued)		
ASU 2016-13 Measurement of Credit Losses on Financial Instruments *Issued June 2016*	• Replaces the current incurred loss approach for credit losses with an "expected loss" model for instruments measured at amortized cost. • Requires all lifetime credit losses for financial assets held at the reporting date to be estimated based on factors such as historical experience, current conditions and forecasts. • Requires entities to record allowances for available-for-sale debt securities.	• Effective January 1, 2020 for public companies and early adopted by the Company. • The Company determined the largest instrument in scope of the standard is trade receivables. Trade receivables will require an adjustment to management's provision matrix for current and forward-looking projections however, adjustments are not expected to be material. • The adoption of the standard will not have a material impact on its financial statements and related disclosures.

Standard	Description	Impact on the financial statements or other significant matters
Recently Adopted Accounting Standard		
ASU 2016-02 Leases *Issued February 2016*	• Requires a lessee to recognize leases with terms of longer than 12 months within balance sheet assets and liabilities. • Changes the recognition, measurement and presentation of expenses and cash flows arising from a lease depending on its classification as a financing or operating lease as determined by the lessee. • Lessor accounting will remain largely unchanged from current GAAP. • Leases of fewer than 12 months are exempt from the updated standard.	• Early adopted January 1, 2019. • The Company adopted the standard through a cumulative-effect adjustment without revising the prior comparative period and elected the practical expedients permitted under the transition guidance within the standard, which permits the Company not to reassess the following for any expired or existing contracts: i) whether any contracts contain leases; ii) lease classification (i.e. operating lease or finance lease); and iii) initial direct cost. • The adoption of the standard resulted in the recognition of right-of-use assets of $251 million and lease liabilities of $304 million on the Consolidated Statements of Financial Condition. The adoption did not have a material impact in the Consolidated Statements of Income. • See Note 10 for additional information.

4. PARTICIPANTS' SEGREGATED CASH, OTHER PARTICIPANTS' ASSETS AND PAYABLE TO PARTICIPANTS

Details for Participants' segregated cash, Other Participants' assets and Payable to Participants as of December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Assets:		
Participants' segregated cash	$ 4,876	$ 77,988
Other Participants' assets:		
Cash	514,104	517,665
Other	—	450
Total	$ 518,980	$ 596,103
Liabilities:		
Payable to Participants	$ 518,980	$ 596,103

Participants' segregated cash represents cash received from Participants to facilitate their compliance with SEC customer protection rules.

Payable to Participants included $126,000 and $127,000 of cash collateral received from Participants, representing 130% of short positions as of December 31, 2019 and 2018, respectively. Unclaimed balances are remitted to the appropriate authority when required, pursuant to abandoned property laws.

5. ACCOUNTS RECEIVABLE

Details for Accounts receivable as of December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Due from Participants and customers for services	$ 163,432	$ 165,554
Allowance for doubtful accounts	(614)	(1,650)
Due from Participants and customers for services, net	162,818	163,904
Other receivables	14,401	13,976
Total	$ 177,219	$ 177,880

Total write-offs in the allowance for doubtful accounts were $1,433,000 and $382,000 for the years ended December 31, 2019 and 2018, respectively.

6. PARTICIPANTS' AND CLEARING FUNDS

Details for the Participants' and Clearing Funds as of December 31, 2019 and 2018 follow (in thousands):

	2019			
	DTC	NSCC	FICC	Total
Required deposits	$ 1,150,000	$ 5,183,646	$ 24,221,483	$ 30,555,129
Excess deposits	807,140	713,606	8,739,030	10,259,776
Total	$ 1,957,140	$ 5,897,252	$ 32,960,513	$ 40,814,905

	2018			
	DTC	NSCC	FICC	Total
Required deposits	$ 1,150,000	$ 6,830,444	$ 18,053,674	$ 26,034,118
Excess deposits	684,363	1,435,091	8,468,550	10,588,004
Total	$ 1,834,363	$ 8,265,535	$ 26,522,224	$ 36,622,122

Cash deposits and Securities on deposit. Details for cash deposits and securities on deposit of the Participants' and Clearing Funds, which may be applied to satisfy obligations of the depositing Participant, other Participants, or the Company as provided in the rules of the relevant subsidiaries of the Company, as of December 31, 2019 and 2018 follow (in thousands):

	2019			
	DTC	NSCC	FICC	Total
Cash deposits	$ 1,957,140	$ 5,554,586	$ 9,919,756	$ 17,431,482
Securities on deposit - at fair value	—	342,666	23,040,757	23,383,423
Total	$ 1,957,140	$ 5,897,252	$ 32,960,513	$ 40,814,905

	2018			
	DTC	NSCC	FICC	Total
Cash deposits	$ 1,834,363	$ 7,651,033	$ 6,847,272	$ 16,332,668
Securities on deposit - at fair value	—	614,502	19,674,952	20,289,454
Total	$ 1,834,363	$ 8,265,535	$ 26,522,224	$ 36,622,122

Details for the Participants' and Clearing Funds cash deposits as of December 31, 2019 and 2018 follow (in thousands):

	2019			
	DTC	NSCC	FICC	Total
Bank deposits	$ 1,957,140	$ 3,953,586	$ 7,851,756	$ 13,762,482
Money market fund investments - at fair value	—	1,226,000	1,618,000	2,844,000
Reverse repurchase agreements	—	375,000	450,000	825,000
Total	$ 1,957,140	$ 5,554,586	$ 9,919,756	$ 17,431,482

	2018			
	DTC	NSCC	FICC	Total
Bank deposits	$ 1,834,363	$ 5,720,033	$ 5,466,272	$ 13,020,668
Money market fund investments - at fair value	—	1,556,000	931,000	2,487,000
Reverse repurchase agreements	—	375,000	450,000	825,000
Total	$ 1,834,363	$ 7,651,033	$ 6,847,272	$ 16,332,668

7. PREMISES AND EQUIPMENT

The cost, accumulated depreciation and net book value of Premises and equipment for the years ended December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Furniture and equipment	$ 343,082	$ 362,376
Leasehold improvements	164,636	201,183
Buildings and improvements	22,341	22,005
Finance leases	4,611	23,172
Land	4,221	4,221
Total Premises and equipment	538,891	612,957
Less: Accumulated depreciation	(322,474)	(399,846)
Net book value	$ 216,417	$ 213,111

Depreciation expense for premises and equipment for the years ended December 31, 2019 and 2018 was $47,799,000 and $55,661,000, respectively, and is included in Depreciation and amortization in the accompanying Consolidated Statements of Income.

During the years ended December 31, 2019 and 2018, disposals of fully depreciated premises and equipment resulted in the removal of cost and accumulated depreciation of $123,544,000 and $37,694,000, respectively. Disposals of other premises and equipment during the years ended December 31, 2019 and 2018 resulted in a loss of $2,798,000 and a gain of $1,769,000, respectively, and are included in General and administrative in the accompanying Consolidated Statements of Income.

8. GOODWILL AND INTANGIBLE ASSETS

The gross carrying value, accumulated amortization and net book value of Goodwill and Intangible assets for the years ended December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Goodwill:		
Gross carrying value	$ 57,699	$ 57,699
Intangible assets:		
Customer relationships:		
Gross carrying value	231,700	231,700
Accumulated amortization	(120,679)	(101,371)
Net book value	111,021	130,329
Capitalized software:		
Gross carrying value	840,431	926,655
Accumulated amortization	(626,327)	(737,865)
Net book value	214,104	188,790
Total Intangible assets - net of accumulated amortization	$ 325,125	$ 319,119

Amortization expense for intangible assets for the years ended December 31, 2019 and 2018 was $95,539,000 and $103,867,000, respectively, and is included in Depreciation and amortization in the accompanying Consolidated Statements of Income.

8. GOODWILL AND INTANGIBLE ASSETS (CONTINUED)

During the years ended December 31, 2019 and 2018, disposals of fully amortized capitalized software resulted in the removal of cost and accumulated amortization of $186,465,000 and $0, respectively. There were no other disposals of capitalized software for the years ended December 31, 2019 and 2018.

Goodwill impairment testing. DTCC completed its annual goodwill impairment test in the fourth quarter of 2019 and concluded that goodwill was not impaired. DTCC performed a qualitative assessment to test the goodwill for impairment and determined it was more likely than not that the fair value of each reporting unit exceeded their carrying value and therefore goodwill was deemed not impaired.

Intangible assets. The Company recognized impairment charges of $21,468,000 and $8,588,000 related to capitalized software for the years ended December 31, 2019 and 2018, respectively, that were determined to have no realizable value. The impairment charges were included in Impairment of Intangible assets in the accompanying Consolidated Statements of Income.

Details for estimated amortization expense for each of the next five years and thereafter follow (in thousands):

2020	$	97,193
2021		90,116
2022		65,498
2023		38,529
2024		19,308
Thereafter		14,481
Total future estimated amortization	$	325,125

9. EQUITY METHOD INVESTMENTS

Details for DTCC's Equity method investments as of December 31, 2019 and 2018 follow (in thousands, except ownership percentage):

		2019		2018
European Central Counterparty N.V.				
Percentage ownership		20%		20%
Carrying value	$	10,676	$	10,491
DTCC-Euroclear GlobalCollateral, LTD				
Percentage ownership		50%		50%
Carrying value	$	—	$	—

European Central Counterparty N.V. (ECCP N.V.), a joint venture with ABN AMRO Clearing Investments B.V., NASDAQ AB, CBOE Worldwide Holdings Limited and Euronext N.V., provides a pan-European clearing solution offering economies of scale and risk management expertise to European market participants. ECCP N.V. uses the risk management framework and customer service organization of European Multilateral Clearing Facility N.V. (EMCF), and conducts its operations using the technology platform and infrastructure of EMCF.

On December 9, 2019, the Company entered into a binding agreement to sell its 20% minority stake in ECCP N.V., along with the other ECCP N.V. shareholders, to CBOE Worldwide Holdings Limited. The transaction is expected to close in the first half of 2020, pending the receipt of required regulatory approval.

9. EQUITY METHOD INVESTMENTS (CONTINUED)

DTCC-Euroclear GlobalCollateral LTD (DEGCL), a joint venture with Euroclear plc, provides support to financial institutions in addressing significant regulatory, operational and industry challenges related to the management of margin calls and collateral impacting the over-the-counter (OTC) derivatives market.

Cash contributions made to DEGCL subsequent to December 2017 were for the funding of prior losses of DEGCL and are included in Net income (loss) from Equity method investments in the accompanying Consolidated Statements of Income until financial conditions improve.

There were no contributions to DEGCL during 2019. The Company's contributions to DEGCL for the year ended December 31, 2018 follow (in thousands):

	Amount
June 19, 2018	$ 5,000
December 5, 2018	6,000
Total (1)	$ 11,000

(1) DTCC maintained the same ownership percentage as the joint venture partner, Euroclear plc, who also contributed a total of $11,000,000

On March 10, 2020, Euroclear plc and the Company finalized a dissolution, business and share transfer agreement with respect to the DEGCL joint venture. See Note 24 for additional information.

10. LEASES

The Company leases corporate offices, data centers and certain equipment primarily through operating leases. The Company’s leases have remaining lease terms of 1 to 14 years, some of which may include options to extend the lease up to 10 years, and some of which may include options to terminate the lease within 1 year.

On January 1, 2019, the Company adopted ASU 2016-02, *Leases* under the modified retrospective method. See Note 3 for additional information. The Company determines if an arrangement is or contains a lease at contract inception and accounts for lease components separately from non-lease components of an arrangement. Operating leases are included in Operating lease right-of-use (ROU) asset, Current portion of operating lease liability, and Non-current operating lease liability on the Company's Consolidated Statements of Financial Condition.

ROU assets represent the Company's right to use an underlying asset for the lease term and lease liabilities represent the Company's obligation to make lease payments arising from the lease. The ROU assets are measured at the amount equal to the lease liabilities, adjusted for balances of accrued or prepaid rent and unamortized lease incentives provided by lessors.

Operating lease liabilities are recognized based on the present value of the future lease payments over the remaining lease term. The Company uses its incremental borrowing rate, factoring in the lease term, to determine the lease liability. When determining lease term, the Company considers renewal options that the Company is reasonably certain to exercise and termination options that the Company is reasonably certain not to exercise. For operating leases, expense is generally recognized on a straight-line basis over the lease term.

Details for operating lease assets and lease liabilities as of December 31, 2019 follow (in thousands):

Assets	
Operating lease right-of-use-asset	$ 237,689
Total leased assets	$ 237,689
Liabilities	
Current portion of operating lease liability	$ 25,906
Non-current operating lease liability	264,848
Total leased liabilities	$ 290,754

10. LEASES (CONTINUED)

Details for the maturity of lease liabilities as of December 31, 2019 for each of the next five years and thereafter follow (in thousands):

2020	$	35,191
2021		33,509
2022		27,664
2023		27,629
2024		27,075
Thereafter		203,531
Total lease payments		354,599
Less: Imputed interest		(63,845)
Present value of lease liability	$	290,754

In addition to the table above, as of December 31, 2019, the Company had $2,500,000 of minimum lease payments on operating leases that were signed but had not yet commenced. These operating leases will commence in the first quarter of 2020 with lease terms up to 5 years.

Details for estimated future minimum rental payments under all noncancelable leases as of December 31, 2018, based on U.S. GAAP guidance applicable during that period, follow (in thousands):

2019	$	33,981
2020		33,804
2021		33,879
2022		29,779
2023		29,716
Thereafter		232,344
Total minimum rental payments (1)	$	393,503

(1) Future minimum rental payments were not reduced by minimum sublease rentals of $53 million due in the future under noncancelable subleases.

Details for lease expense and lease payments for the year ended December 31, 2019 follow (in thousands):

Lease expense		
Occupancy	$	28,144
Information technology		8,818
Total lease expense		36,962
Sublease income		(5,794)
Net lease expense	$	31,168
Lease payments included in the measurement of lease liabilities		
Operating cash flows (1)	$	35,030
Total lease cash flows	$	35,030

(1) Included with net change in Operating lease liability in the Consolidated Statements of Cash Flows

Details for lease expense as of December 31, 2018 is based on U.S. GAAP guidance applicable during that period. Total rental expense under the leases was $29,764,000 for the year ended December 31, 2018. These amounts are included in Occupancy and Information technology in the Consolidated Statements of Income. Rental income for subleases was $1,843,000 for the year ended December 31, 2018. These amounts are included in Other non-operating income in the Consolidated Statements of Income.

10. LEASES (CONTINUED)

Details of the weighted average remaining lease term and weighted average discount rate used to determine the lease liability as of December 31, 2019 follow:

Weighted average remaining lease term (years)	11.1
Weighted average discount rate	3.37%

Leased assets obtained in exchange for operating lease obligations for the year ended December 31, 2019 were $12,967,000.

11. OTHER ASSETS

Details for Other assets as of December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Prepaids	$ 93,661	$ 81,774
Prepaid taxes	64,069	24,645
Interest receivable	19,872	27,353
Other current assets	338	188
Total other current assets	177,940	133,960
Long-term incentive plan assets	158,264	148,549
Cash surrender value on insurance policies	66,324	61,035
Deferred tax assets	32,472	44,952
Prepaids	26,082	44,978
Equity investments	12,393	11,750
Investment in Federal reserve stock	6,402	6,402
Other non-current assets	2,782	1,913
Total other non-current assets	304,719	319,579
Total	$ 482,659	$ 453,539

12. OTHER LIABILITIES

Details for Other liabilities as of December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Compensation payable	$ 147,363	$ 143,837
Long-term incentive plan liabilities	52,450	51,979
Deferred revenue	8,627	12,311
Deferred rent	—	829
Other current liabilities	57,720	51,721
Total other current liabilities	266,160	260,677
Long-term incentive plan liabilities	216,092	206,758
Unrecognized tax benefits	43,474	40,153
Deferred revenue	1,264	1,431
Deferred tax liabilities	660	970
Deferred rent	—	35,136
Other non-current liabilities	2,191	3,886
Total other non-current liabilities	263,681	288,334
Total	$ 529,841	$ 549,011

13. COMMERCIAL PAPER

Details for Commercial paper as of December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Commercial paper - net of unamortized discount of $20,623 and $43,856 as of December 31, 2019 and 2018, respectively	$ 7,154,217	$ 7,436,141
Weighted-average interest rate	1.95%	2.59%

Interest expense on Commercial paper, included in Interest expense in the accompanying Consolidated Statements of Income, was $166,453,000 and $104,714,000 for the years ended December 31, 2019 and 2018, respectively.

14. LONG-TERM DEBT

Details for Long-term debt as of December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Notes payable	$ —	$ 36,375
Information technology financing	8,024	—
Total long-term debt	8,024	36,375
Less: Current portion of long-term debt	(4,103)	(2,650)
Non-current portion of long-term debt	$ 3,921	$ 33,725

Details for principal payments due on Long-term debt for each of the next five years and thereafter follow (in thousands):

	Information Technology Financing
2020	$ 4,103
2021	3,921
2022	—
2023	—
2024	—
Thereafter	—
Total	$ 8,024

Notes payable. Details for notes payable as of December 31, 2019 and 2018 follow (in thousands):

			Outstanding Balance	
Issue Date	Maturity	Rate	2019	2018
April 26, 2012	April 26, 2032	3.83%	$ —	$ 19,575
September 28, 2012	September 28, 2032	3.93%	—	16,800
Total			$ —	$ 36,375

During 2019, the Company executed an optional prepayment of the remaining balance of its notes payable. Total interest expense on notes payable included in the accompanying Consolidated Statements of Income was $4,558,000 and $1,465,000 for the years ended December 31, 2019 and 2018, respectively. The 2019 interest expense includes a one-time make-whole payment of $3,276,000 related to the early extinguishment of debt. The weighted-average interest rate was 3.88% as of December 31, 2018.

14. LONG-TERM DEBT (CONTINUED)

Information Technology Financing. On January 1, 2019, the Company obtained three year financing of $14 million, fully drawn down, from IBM Credit LLC in connection to its software and services purchase agreement with IBM. The weighted-average interest rate of the loan was 3.90% as of December 31, 2019. Interest expense on the loan included in the accompanying Consolidated Statements of Income was $407,000 for the year ended December 31, 2019.

Lines of credit. DTCC maintains a committed line of credit for general funding purposes while certain of its subsidiaries, DTC and NSCC, also maintain committed lines of credit to support settlement.

Details for the terms of the outstanding lines of credit as of December 31, 2019 and December 31, 2018 follow:

	2019	2018
DTCC		
Committed Amount	$500 million (1)	$500 million (1)
Denomination	USD	USD
Number of Participants/Lenders	10/10	10/10
Borrowing Rate	Either base rate plus 0.25% or eurodollar plus 1.25%	Either base rate plus 0.375% or eurodollar plus 1.375%
Maturity Date	January 2022	January 2019
DTC		
Committed Amount	$1.9 billion (2)	$1.9 billion (2)
Denomination	USD	USD
Number of Participants/Lenders	32/41	33/41
Borrowing Rate	The greater of the federal funds offered rate, adjusted LIBOR, or lenders' cost of funds, on the day of borrowing, plus 1.40%	
Maturity Date	May 2020	May 2019
Uncommitted Amount	C$150 million (3)	C$150 million (3)
Denomination	CAD	CAD
Number of Participants/Lenders	1/1	1/1
Borrowing Rate	A rate per annum equal to the Canadian Prime Rate minus 0.50%	
Maturity Date	On Demand	On Demand
NSCC		
Committed Amount	$12.1 billion(2)	$12.1 billion(2)
Denomination	USD	USD
Number of Participants/Lenders	32/41	33/41
Borrowing Rate	The greater of the federal funds offered rate, adjusted LIBOR, or lenders' cost of funds, on the day of borrowing, plus 1.40%	
Maturity Date	May 2020	May 2019

(1) The annual commitment fee associated with maintaining the line of credit was 15 basis points and 17.5 basis points of the unused amount of the total line of credit, for the years ended December 31, 2019 and 2018, respectively, and is included in Professional and other services in the accompanying Consolidated Statements of Income.

(2) The annual facility fee associated with maintaining the line of credit was 10 basis points of the total line of credit, for the years ended December 31, 2019 and 2018, and is included in Professional and other services in the accompanying Consolidated Statements of Income.

(3) Used to support Canadian settlement.

There were no borrowings under the lines of credit during 2019 and 2018.

14. LONG-TERM DEBT (CONTINUED)

Details for debt covenants related to the notes payable and lines of credit as of December 31, 2019 and December 31, 2018 follow:

	2019	2018
Notes Payable		
DTCC		
Minimum Net Worth	N/A	$400 million
Maximum Priority Debt	N/A	20% of Net Worth
Lines of Credit		
DTCC		
Minimum Net Worth	$1.25 billion	$1.1 billion
Maximum Priority Debt	$200 million	$200 million
DTC		
Minimum Net Worth	$150 million	$150 million
Minimum Participants' Fund deposits	$750 million	$750 million
NSCC		
Minimum Net Worth	$125 million	$125 million
Minimum Clearing Fund deposits	$1 billion	$1 billion

For the years ended December 31, 2019 and 2018, the Company was in compliance with its debt covenants.

Credit Ratings. DTCC, DTC, FICC and NSCC are rated by Moody's Investors Service, Inc. (Moody's) and S&P Global Inc. (S&P). Details for issuer credit ratings and ratings outlooks for DTCC and its three clearing agency subsidiaries as of December 31, 2019 follow:

	Moody's (1)			S&P		
	Long-term	**Short-term**	**Outlook**	**Long-term**	**Short-term**	**Outlook**
DTCC	Aa3	N/A	Stable	AA-	A-1+	Stable
DTC	Aaa	P-1	Stable	AA+	A-1+	Stable
FICC	Aaa	P-1	Stable	AA	A-1+	Stable
NSCC	Aaa	P-1	Stable	AA+	A-1+	Stable

(1) Moody’s categorizes the long-term issuer ratings of DTC, FICC and NSCC as clearing counterparty ratings (CCR) under the agency's Clearing Houses Rating Methodology.

15. FAIR VALUE MEASUREMENTS

Valuation hierarchy
U.S. GAAP provides for a three-level valuation hierarchy based on the transparency of inputs to the valuation of an asset or liability as of the measurement date. Details for the description of the three levels follow:

- Level 1 — Inputs to the valuation methodology are unadjusted quoted market prices for identical assets or liabilities in active markets as of the valuation date.
- Level 2 — Inputs to the valuation methodology are quoted market prices for similar assets and liabilities in active markets; quoted market prices for identical or similar assets or liabilities in markets that are not active; inputs other than quoted prices that are observable for the asset or liability; and inputs that are derived principally from or corroborated by observable market data by correlation or other means.
- Level 3 — Inputs to the valuation methodology are unobservable and reflect the Company's own assumptions about the estimates market participants would use pricing the asset or liability based on the best information available in the circumstances (e.g., internally derived assumptions surrounding timing and amount of expected cash flows).

A financial asset or liability's categorization within the valuation hierarchy is based on the lowest level of input that is significant to the fair value measurement.

Financial Assets and Liabilities measured at fair value on a recurring basis. For financial assets and liabilities measured at fair value on a recurring basis, the Company applies the following valuation techniques to measure fair value:

Product/ Instrument	Valuation Methodology	Classification in the valuation hierarchy
Assets - Participants' and Clearing Funds - Securities on deposit		
U.S. Treasury Securities U. S. Agency Issued Debt Securities (Non-Callable)	Obtained from pricing services engaged by the Company, and the Company receives one price for each security. The fair values provided by the pricing services are estimated using pricing models, where the inputs to those models are based on observable market inputs.	Level 1
U. S. Agency Issued Debt Securities (Callable) U.S. Agency Residential Mortgage-Backed Securities	Quoted market price of recent trades of similar securities obtained from pricing services engaged by the Company.	Level 2
Assets - Participants' and Clearing Funds - Cash deposits		
Money market fund investments	Quoted prices in active markets for identical assets	Level 1

15. FAIR VALUE MEASUREMENTS (CONTINUED)

Product/ Instrument	Valuation Methodology	Classification in the valuation hierarchy
Non-Current Assets - Other non-current assets		
Long-term incentive plan assets - Mutual fund and Stable value fund investments	Obtained from pricing services engaged by the Company, and the Company receives one price for each security.	Level 1
	Quoted market price of recent trades of similar securities obtained from pricing services engaged by the Company.	Level 2
Liabilities - Participants' and Clearing Funds - Securities on deposit and Cash deposits - Money market fund investments		
Participants' and Clearing Funds liabilities	Derived from the corresponding Participants' and Clearing Funds assets (see above).	Level 1 and Level 2

Fair value measurements of those items measured on a recurring basis as of December 31, 2019 and 2018 follow (in thousands):

	2019			
	Level 1	Level 2	Level 3	Total
Assets - Participants' and Clearing Funds				
Securities on deposit	$ 18,469,797	$ 4,913,626	$ —	$ 23,383,423
Cash deposits - Money market fund investments	2,844,000	—	—	2,844,000
Non-current assets				
Long-term incentive plan assets - Mutual fund and Stable value fund investments	100,706	33,813	—	134,519
Total assets, excluding investments at fair value based on NAV	$ 21,414,503	$ 4,947,439	$ —	$ 26,361,942
Participants' and Clearing Funds				
Securities liabilities	$ 18,469,797	$ 4,913,626	$ —	$ 23,383,423
Money market fund investments liabilities	$ 2,844,000	$ —	$ —	$ 2,844,000
Total	$ 21,313,797	$ 4,913,626	$ —	$ 26,227,423

The Company uses Net Asset Value (NAV) to estimate the fair value of certain investments related to the long-term incentive plan. Investments in common collective trust funds are valued at NAV based upon the redemption price of the units, which is based on the current fair value of the common collective trust funds' underlying assets. Unit values are determined by the financial institution sponsoring such funds by dividing the funds' net assets at fair value by its units outstanding at the valuation dates.

15. FAIR VALUE MEASUREMENTS (CONTINUED)

Details of investments measured at fair value using NAV as of December 31, 2019 follow (in thousands):

	2019			
	NAV	Redemption Frequency	Other Redemption Restrictions	Redemption Notice Period
Common collective trusts	$ 23,745	Daily	None	None

There were no unfunded commitments related to these investments as of December 31, 2019.

Fair value measurements of those items measured on a recurring basis as of December 31, 2018 are summarized below (in thousands):

	2018			
	Level 1	Level 2	Level 3	Total
Assets - Participants' and Clearing Funds				
Securities on deposit	$ 16,659,680	$ 3,629,774	$ —	$ 20,289,454
Cash deposits - Money market fund investments	2,487,000	—	—	2,487,000
Non-current assets				
Long-term incentive plan assets - Mutual fund and Stable value fund investments	113,151	35,398	—	148,549
Total	$ 19,259,831	$ 3,665,172	$ —	$ 22,925,003
Participants' and Clearing Funds				
Securities liabilities	$ 16,659,680	$ 3,629,774	$ —	$ 20,289,454
Money market fund investments liabilities	2,487,000	—	—	2,487,000
Total	$ 19,146,680	$ 3,629,774	$ —	$ 22,776,454

Certain investments may transfer between the fair value hierarchy classifications during the year due to changes in valuation methodology and pricing sources. There were no financial assets and liabilities measured at fair value on a recurring basis classified as Level 3 for the periods ended December 31, 2019 and 2018.

Financial Assets and Liabilities measured at other than fair value

Financial assets and liabilities whose carrying value approximates fair value. The carrying values of certain assets and liabilities approximate their fair values because they are short-term in duration, have no defined maturity or have market-based interest rates. These instruments include Cash and cash equivalents, Participants' segregated cash, Short-term investments, Participants' and Clearing Funds - Cash deposits bank deposits and Reverse repurchase agreements (and corresponding liabilities), Other Participants' assets, Commercial paper, Accounts payable and accrued expenses, and Payable to Participants.

15. FAIR VALUE MEASUREMENTS (CONTINUED)

The carrying values, fair values and fair value hierarchy levels of all financial instruments measured at other than fair value on the accompanying Consolidated Statements of Financial Condition as of December 31, 2019 and 2018 follow (in thousands):

	2019				
	Carrying Amount	Total Fair Value	Level 1	Level 2	Level 3
Assets:					
Cash and cash equivalents	$ 8,395,163	$ 8,395,163	$ 8,395,163	$ —	$ —
Participants' segregated cash	4,876	4,876	4,876	—	—
Short-term investments	900,000	900,000	—	900,000	—
Participants' and Clearing Funds:					
Cash deposits - Bank deposits	13,762,482	13,762,482	13,762,482		—
Cash deposits - Reverse repurchase agreements	825,000	825,000	—	825,000	—
Other Participants' assets	514,104	514,104	514,104	—	—
Total	$ 24,401,625	$ 24,401,625	$ 22,676,625	$ 1,725,000	$ —
Liabilities:					
Commercial paper	$ 7,154,217	$ 7,154,217	$ —	$ 7,154,217	$ —
Accounts payable and accrued expenses	102,179	102,179	—	102,179	—
Participants' and Clearing Funds Cash deposits - Bank deposits and Reverse repurchase agreements	14,587,482	14,587,482	14,587,482	—	—
Payable to Participants	518,980	518,980	518,980	—	—
Long-term debt	8,024	8,565	—	8,565	—
Total	$ 22,370,882	$ 22,371,423	$ 15,106,462	$ 7,264,961	$ —

	2018				
	Carrying Amount	Total Fair Value	Level 1	Level 2	Level 3
Assets:					
Cash and cash equivalents	$ 8,641,036	$ 8,641,036	$ 8,641,036	$ —	$ —
Participants' segregated cash	77,988	77,988	77,988	—	—
Short-term investments	800,000	800,000	—	800,000	—
Participants' and Clearing Funds:					
Cash deposits - Bank deposits	13,020,668	13,020,668	13,020,668	—	—
Cash deposits - Reverse repurchase agreements	825,000	825,000	—	825,000	—
Other Participants' assets	518,115	518,115	517,665	450	—
Total	$ 23,882,807	$ 23,882,807	$ 22,257,357	$ 1,625,450	$ —
Liabilities:					
Commercial paper	$ 7,436,141	$ 7,436,141	$ —	$ 7,436,141	$ —
Accounts payable and accrued expenses	104,013	104,013	—	104,013	—
Participants' and Clearing Funds Cash deposits - Bank deposits and Reverse repurchase agreements	13,845,668	13,845,668	13,845,668	—	—
Payable to Participants	596,103	596,103	596,103	—	—
Long-term debt	36,375	36,035	—	36,035	—
Total	$ 22,018,300	$ 22,017,960	$ 14,441,771	$ 7,576,189	$ —

15. FAIR VALUE MEASUREMENTS (CONTINUED)

Financial assets measured at fair value on a non-recurring basis. Certain assets are subject to measurement at fair value on a non-recurring basis. For these assets, measurement at fair value in periods subsequent to their initial recognition is applicable if they are determined to be impaired or when an observable event occurs.

The Company recognized impairment charges on certain Intangible assets as disclosed in Note 8. The fair values of the Intangible assets were determined based on a discounted cash flow method, which reflected estimated future cash flows associated with the identified assets at the measurement date, and is within Level 3 under the fair value hierarchy on a non-recurring basis.

The rollforward of Equity investments categorized within Level 3 in the fair value hierarchy for the year ended December 31, 2019 follows (in thousands):

	Fair Value at December 31, 2018	Purchases	Sales	Unrealized Gains (Losses)	Fair Value at December 31, 2019
Equity investments	$ 11,750	$ 500	$ —	$ 143	$ 12,393

On August 29, 2019, the Company made an additional cash investment of $500,000 in Equity Investments, which increased the Company's total investment in Equity investments to $12,393,000, including a $143,000 mark-to-market investment gain included in Other non-operating income in the accompanying Consolidated Statements of Income. The fair value of the investments were determined based on the latest valuation of Equity investments from their most recent round of financing, using Level 3 inputs.

The rollforward of Equity investments categorized within Level 3 in the fair value hierarchy for the year ended December 31, 2018 follows (in thousands):

	Investment at December 31, 2017	Transfers Into Level 3 (1)	Purchases(2)	Unrealized Gain	Fair Value at December 31, 2018
Equity investments	$ —	$ 5,411	$ 1,104	$ 5,235	$ 11,750

(1) On January 1, 2018, the Company adopted the new standard related to fair value measurement of unconsolidated equity investments under the prospective transition method of adoption.

(2) On June 25, 2018, the Company made an additional cash investment of $1,104,000 in Equity investments, which increased the Company's total investment in Equity investments, to $11,750,000, including a $5,235,000 mark-to-market investment gain included in Other non-operating income in the accompanying Consolidated Statements of Income.

The Company's primary level 3 financial asset, the valuation techniques used to measure the fair value of the financial asset and the significant unobservable inputs as of December 31, 2019 follow:

Financial Instruments Owned	Fair Value (in thousands)	Valuation Technique	Unobservable Inputs	Input Range	Weighted Average
Equity Investments	$12,393	Cost less impairment plus/ minus observable inputs	Price per share(1)	$18 - $107(2)	$64(2)

(1) Price is determined using the latest valuation from the most recent round of financing of equity investments.

(2) The unobservable input range and weighted-average are driven by the individual equity investments.

15. FAIR VALUE MEASUREMENTS (CONTINUED)

The Company's primary level 3 financial asset, the valuation techniques used to measure the fair value of the financial asset and the significant unobservable inputs as of December 31, 2018 follow:

Financial Instruments Owned	Fair Value (in thousands)	Valuation Technique	Unobservable Inputs	Input Range	Weighted Average
Equity Investments	$11,750	Cost less impairment plus/ minus observable inputs	Price per share(1)	$15 - $107(2)	$71(2)

(1) Price is determined using the latest valuation from the most recent round of financing of equity investments.

(2) The unobservable input range and weighted-average are driven by the individual equity investments.

16. PENSION AND POSTRETIREMENT BENEFITS

Defined benefit pension and other postretirement benefit plans.

Benefit obligations. The reconciliation of the beginning and ending balances of the projected benefit obligations for defined benefit plans follow (in thousands):

	Pension Benefits		Other Benefits	
	2019	2018	2019	2018
Benefit obligations, beginning of year:	$ 1,014,046	$ 1,135,910	$ 64,202	$ 72,062
Service cost	3,467	5,868	573	744
Interest cost	40,201	37,289	2,348	2,188
Gross benefits paid	(66,158)	(66,178)	(2,690)	(3,498)
Expenses paid	(1,706)	(1,900)	—	—
Actuarial (gain) loss	150,268	(96,943)	2,182	(7,294)
Total benefit obligations at end of year	$ 1,140,118	$ 1,014,046	$ 66,615	$ 64,202
Total accumulated benefit obligations at end of year	$ 1,135,715	$ 1,009,611	N/A	N/A

The Accumulated Benefit Obligations are defined as the actuarial present value of postretirement benefits attributed to employee services rendered before December 31, 2019 and 2018, respectively, and based on employee service and compensation prior to the applicable date.

16. PENSION AND POSTRETIREMENT BENEFITS (CONTINUED)

Funded status. The funded status of the plans, as of December 31, 2019 and 2018, follow (in thousands):

	Pension Benefits		Other Benefits	
	2019	2018	2019	2018
Benefit obligations at end of year:				
Qualified plan	$ 1,015,573	$ 894,461	$ —	$ —
Other plans	124,545	119,585	66,615	64,202
Total benefit obligations at end of year	1,140,118	1,014,046	66,615	64,202
Fair value of qualified plan assets at end of year	998,442	863,953	—	—
Total fair value of plan assets at end of year	998,442	863,953	—	—
Unfunded status	$ (141,676)	$ (150,093)	$ (66,615)	$ (64,202)
Amounts recognized in the balance sheet consist of:				
Current liability	$ (26,566)	$ (11,996)	$ (4,275)	$ (4,613)
Non-current liability	(115,110)	(138,097)	(62,340)	(59,589)
Amount recognized, end of year	$ (141,676)	$ (150,093)	$ (66,615)	$ (64,202)

Plan assets. The summary and reconciliation of the beginning and ending balances of the fair value of the plans' assets follow (in thousands):

	Pension Benefits		Other Benefits	
	2019	2018	2019	2018
Change in plan assets:				
Fair value of plan assets, beginning of year	$ 863,953	$ 896,442	$ —	$ —
Actual return on plan assets	150,544	(25,275)	—	—
Employer contribution	51,809	60,864	2,690	3,498
Gross benefits paid	(66,158)	(66,178)	(2,690)	(3,498)
Expenses paid	(1,706)	(1,900)	—	—
Fair value of plan assets, end of year	$ 998,442	$ 863,953	$ —	$ —

16. PENSION AND POSTRETIREMENT BENEFITS (CONTINUED)

Investments are classified based on the lowest level of input that is significant to the fair value measurement. Details of the classification of plan assets in accordance with the three-tier fair valuation hierarchy and current asset allocations as of December 31, 2019 and 2018, follow (in thousands, except percentages):

	Target Allocation 2019	Percentage of Plan Assets, December 31, 2019	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)
Pension assets as of December 31, 2019:				
Short-term investment fund[(1)]	0.50%	0.54%	$ 5,374	$ —
Equity Portfolio:				
Domestic large cap growth[(1)]			19,533	—
Domestic large cap value[(1)]			19,444	—
Domestic large cap core[(1)]			39,356	—
Domestic small core*[(1)]			7,455	3,704
International core			11,753	11,753
International emerging markets			4,025	4,025
Total equity securities	9.50%	10.17%	101,566	19,482
Fixed income portfolio:				
Domestic liability driven investment[(1)]	88.00%	88.85%	887,157	—
Guaranteed insurance contracts:				
Annuity fund[(2)]	2.00%	0.44%	4,345	—
Total pension assets as of December 31, 2019			$ 998,442	$ 19,482

* The domestic small core asset class includes an investment that is valued based on NAV per unit, as provided by the trustee of the fund, and have not been classified in the fair value hierarchy.

16. PENSION AND POSTRETIREMENT BENEFITS (CONTINUED)

	Target Allocation 2018	Percentage of Plan Assets, December 31, 2018	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)
Pension assets as of December 31, 2018:				
Short-term investment fund[1]	0.50%	0.60%	$ 5,154	$ —
Equity Portfolio:				
Domestic large cap growth[1]			26,979	—
Domestic large cap value[1]			26,418	—
Domestic large cap core[1]			53,836	—
Domestic small core			10,065	10,065
International core			16,756	16,756
International emerging markets			5,733	5,733
Total equity securities	17.50%	16.18%	139,787	32,554
Fixed income portfolio:				
Domestic liability driven investment[1]	80.00%	82.43%	712,191	—
Guaranteed insurance contracts:				
Annuity fund[2]	2.00%	0.79%	6,821	—
Total pension assets as of December 31, 2018			$ 863,953	$ 32,554

(1) These investments are valued based on NAV per unit, as provided by the trustee of the fund, and have not been classified in the fair value hierarchy. The fair value amounts presented in the table are intended to permit the reconciliation of the fair value hierarchy to the amounts presented on the accompanying Consolidated Statement of Financial Condition. See Note 15 for further information about valuation techniques and inputs to measure fair value. The Company did not hold defined benefit plan assets designated as Level 2 or Level 3 as of December 31, 2019 and 2018.

(2) As permitted by U.S. GAAP, this annuity fund is accounted for at contract value, which approximates fair value. This investment is reported at contract value because it is the amount received by participants if they were to initiate permitted transactions under the terms of the pension plan. Contract value as reported represents contributions made under the contract, plus earnings, less participant withdrawals and administrative expenses. This investment is not classified in the fair value hierarchy. The fair value amounts presented in the table are intended to permit the reconciliation of the fair value hierarchy to the amounts presented on the accompanying Consolidated Statement of Financial Condition.

Net periodic benefit expense (income). Details of the components of net periodic benefit expense (income) and amortization recognized in OCI, excluding taxes, for the years ended December 31, 2019 and 2018, follow (in thousands):

	Pension Benefits		Other Benefits	
	2019	2018	2019	2018
Components of net periodic benefit expense (income):				
Expected return on plan assets	$ (37,998)	$ (39,564)	$ —	$ —
Interest cost	40,201	37,289	2,348	2,188
Service cost	3,467	5,868	573	744
Amortizations:				
Prior service cost (credit)	933	933	(5,926)	(5,926)
Actuarial loss	5,373	8,731	804	2,188
Settlement loss	1,242	444	—	—
Net periodic benefit expense (income)	$ 13,218	$ 13,701	$ (2,201)	$ (806)

16. PENSION AND POSTRETIREMENT BENEFITS (CONTINUED)

Changes in OCI. Details of the changes in plan assets and benefit obligations recognized in OCI, excluding taxes, for the years ended December 31, 2019 and 2018, follow (in thousands):

	Pension Benefits		Other Benefits	
	2019	2018	2019	2018
Other changes recognized in OCI:				
Net loss (gain) arising during the period	$ 37,723	$ (32,104)	$ 2,182	$ (7,294)
Amortizations:				
Prior service (cost) credit	(933)	(933)	5,926	5,926
Actuarial and settlement loss	(6,615)	(9,175)	(803)	(2,188)
Net other changes in OCI	$ 30,175	$ (42,212)	$ 7,305	$ (3,556)

Details of the net amount recognized in Accumulated other comprehensive income on the accompanying Consolidated Statements of Financial Condition, excluding taxes, follow (in thousands):

	Pension Benefits		Other Benefits	
	2019	2018	2019	2018
Amount not yet reflected in net periodic benefit (cost) and included in Accumulated other comprehensive loss:				
Prior service (cost) credit	$ (2,569)	$ (3,502)	$ 11,754	$ 17,680
Accumulated loss	(273,649)	(242,541)	(16,323)	(14,944)
Accumulated other comprehensive (loss) income	(276,218)	(246,043)	(4,569)	2,736
Cumulative net periodic benefit (cost) in excess of employer contributions	134,542	95,950	(62,046)	(66,938)
Net amount recognized at year-end	$ (141,676)	$ (150,093)	$ (66,615)	$ (64,202)

The estimated actuarial loss (gain) and prior service (cost) credit that will be amortized from accumulated other comprehensive loss into the accompanying Consolidated Statement of Income through net periodic benefit (cost) or expense over the next fiscal year follow (in thousands):

	Pension Benefits		Other Benefits	
	2019	2018	2019	2018
Prior service credit (cost)	$ (829)	$ (933)	$ 5,568	$ 5,926
Net loss	(10,208)	(5,270)	(1,523)	(1,270)
Total	$ (11,037)	$ (6,203)	$ 4,045	$ 4,656

16. PENSION AND POSTRETIREMENT BENEFITS (CONTINUED)

Assumptions for net periodic benefit expense (income). Details for the defined benefit plans assumptions used by actuaries to determine net periodic benefit expense (income) as of December 31, 2019 and 2018 follow:

	Pension Benefits		Other Benefits	
	2019	**2018**	**2019**	**2018**
Weighted-average assumptions used to determine net periodic benefit expense (income) for the years ended December 31:				
Discount rate	4.41%	3.73%	4.31%	3.62%
Expected long-term rate of return on plan assets	4.45%	4.75%	n/a	n/a
Rate of compensation increase	n/a	n/a	n/a	n/a
Assumed health care cost trend rates as of December 31:				
Health care cost trend rate assumed for next year			6.46%	6.89%
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)			4.46%	4.46%
Year that the rate reaches the ultimate trend rate			2038	2038

To develop the expected long-term rate of return on assets assumptions, DTCC considered the historical returns and the future expectations for returns for each asset class, as well as the target asset allocation of the pension portfolio. This resulted in the selection of the 4.45% and 4.75% long-term rate of return assumptions as of December 31, 2019 and 2018, respectively.

The discount rate reflects the rate at which defined benefit plan obligations could be effectively settled. The Company projects the benefits to be paid by each plan for each year in the future, the sum of which is the projected benefit obligations. The benefits are then discounted using the Above Mean Mercer Yield Curve spot rates for the corresponding maturity years.

The total of the present values for the benefit payment years is used to calculate the single rate that discounts the benefit cash flows to the same total present value. The single rate is the basis for the final effective discount rate.

Details for the defined benefit plans assumptions used by actuaries to determine benefit obligations as of December 31, 2019 and 2018 follow:

	Pension Benefits		Other Benefits	
	2019	**2018**	**2019**	**2018**
Weighted-average assumptions used to determine benefit obligations as of December 31:				
Discount rate	3.38%	4.41%	3.26%	4.30%
Rate of compensation increase	n/a	n/a	n/a	n/a
Assumed health care cost trend rates as of December 31:				
Health care cost trend rate assumed for next year			6.02%	6.46%
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)			4.46%	4.46%
Year that the rate reaches the ultimate trend rate			2038	2038

Assumptions for defined benefit obligations. Mortality is a key assumption used to determine the benefit obligations for the Company's defined benefit plans. The mortality assumption for all plans uses the Pri-2012 mortality tables projected generationally with scale MMP-2019. The mortality tables use a white collar adjustment for the SERP, Restoration Plan and non-union Retiree Medical and Life Insurance Plans and a blue collar adjustment for the union Retire Medical and Life Insurance Plans. The Pension Plan continues to use no collar adjustment. On a lump sum basis, mortality is based on IRS prescribed tables projected using scale MP-2019, with segmented interest rate adjustments.

16. PENSION AND POSTRETIREMENT BENEFITS (CONTINUED)

Expected cash flows. The Company contributed $40,250,000 to the Pension Plan in 2019 and does not expect to make any contributions during 2020. Settlement losses relate to early retirement of executives who elected lump-sum and periodic payments. Settlement losses totaled $1,242,000 and $444,000 for the years ended December 31, 2019 and 2018, respectively. There were no participant contributions to the plans in 2019 and 2018.

Details for the benefit payments for the pension plans and other plans for 2019 and 2018 follow (in thousands):

	2019	2018
Pension plans	$ 66,158	$ 66,177
Other plans	2,690	3,498
Total	$ 68,848	$ 69,675

Details for estimated amounts to be paid in each of the next five years and the five year period thereafter follow (in thousands):

	Pension	Employer Benefits Payments	Medicare Subsidy Receipts
2020	$ 83,570	$ 4,275	$ 11
2021	70,854	4,421	10
2022	67,207	4,557	10
2023	62,408	4,609	9
2024	69,313	4,582	8
Thereafter	325,818	21,457	32
Total	$ 679,170	$ 43,901	$ 80

Defined contribution retirement plans. Total expense for the defined contribution retirement plans included in Employee compensation and related benefits in the accompanying Consolidated Statements of Income was $43,284,000 and $37,510,000 for the years ended December 31, 2019 and 2018, respectively.

17. INCOME TAXES

DTCC and its subsidiaries file a consolidated Federal income tax return and various state tax returns. DTCC and its subsidiaries also file other state and non-U.S. jurisdiction income tax returns on a separate company basis.

Details for the components of the Company's Provision for income taxes for the years ended December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Current income tax:		
Federal	$ 3,310	$ 10,397
State and local	5,020	24,785
Foreign	16,847	23,539
Total current income tax	25,177	58,721
Deferred income tax/(benefit):		
Federal	15,687	22,993
State and local	7,157	(35,641)
Foreign	(174)	1,051
Total deferred income tax/(benefit)	22,670	(11,597)
Provision for income taxes	$ 47,847	$ 47,124

17. INCOME TAXES (CONTINUED)

The 2019 and 2018 effective tax rates differ from the 21% Federal statutory tax rate mainly due to state and local taxes, change in unrecognized tax benefits, the effects of the Tax Cuts and Jobs Act of 2017 (Tax Reform Act), settlements of tax audits, and effects from foreign tax credit (FTC) and deduction for global intangible low-taxed income (GILTI) and foreign-derived intangible income (FDII). Details for the reconciliation of the U.S. Federal statutory tax rate to the Company's effective tax rate on Income before taxes for the years ended December 31, 2019 and 2018 follow:

	2019	2018
U.S. statutory tax rate	21.0%	21.0%
State and local income taxes, net of Federal income tax benefit	3.4	4.9
Income from foreign operations	(0.6)	(0.6)
Change in unrecognized tax benefits	1.1	(9.4)
DEGCL joint venture	(3.1)	—
U.S. charges (benefits) related to FTC, GILTI, and FDII	(3.0)	—
Enactment of the Tax Reform Act	—	(3.2)
Settlements of tax audits	(0.3)	2.3
Other	(0.7)	(1.4)
Effective tax rate	17.8%	13.6%

Details for the components of deferred tax assets and liabilities as of December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Deferred tax assets:		
Accrued compensation and benefits	$ 118,383	$ 117,299
Operating lease liabilities and deferred rent	69,830	9,011
Other	27,063	29,443
Total deferred tax assets	215,276	155,753
Deferred tax liabilities:		
Lease right-of-use asset	(56,120)	—
Depreciation	(35,618)	(27,260)
Capitalized software	(52,281)	(44,826)
Investment tax basis difference	(39,445)	(39,685)
Total deferred tax liabilities	(183,464)	(111,771)
Net deferred tax assets	$ 31,812	$ 43,982

The deferred tax assets are expected to be fully realized and, accordingly, no valuation allowance was established.

Details for unrecognized tax benefits, included in Non-current liabilities, for the years ended December 31, 2019 and 2018 follow (in thousands):

	2019	2018
Beginning balance	$ 28,692	$ 53,008
Increases:		
Prior period tax positions	1,382	2,586
Current period tax positions	822	1,444
Decreases:		
Prior period tax positions	(1,002)	(22,192)
Statute of limitations	(655)	(734)
Settlements with tax authorities	(42)	(5,420)
Unrecognized tax benefit	29,197	28,692
Accrued interest	14,277	11,461
Ending balance	$ 43,474	$ 40,153

17. INCOME TAXES (CONTINUED)

The Company classifies interest and penalties related to unrecognized tax benefits, if incurred, in Provision for income taxes in its accompanying Consolidated Statements of Income. The Company recognized accrued interest of $2,816,000 for the year ended December 31, 2019. The Company recognized a decrease in accrued interest and penalties of $17,132,000 for the year ended December 31, 2018 primarily related to the settlement of state tax audits.

Unrecognized tax benefits are estimated based on judgment, assessment of relevant risks, facts and circumstances. Actual results could differ materially from those estimates. The Company believes that the liability for unrecognized tax benefits is the best estimate in relation to the potential for additional assessments. Unexpected results from one or more such tax audits could significantly adversely affect the Company's income tax provision and results of operations.

Details for the periods currently under examination and remaining subject to examination by jurisdiction as of December 31, 2019 follow:

	Tax Years	
Jurisdiction	**Under Examination**	**Subject to Examination**
U.S. Federal - Internal Revenue Service	2014	2016 - 2018
New York State	2015 - 2016	2017 - 2018
New York City	2010 - 2014	2015 - 2018
State of Florida	2013 - 2017	2018

18. SHAREHOLDERS' EQUITY

DTCC Series A Preferred stock. All 10,000 shares of DTCC Series A Preferred stock are issued and outstanding and held of record by Stock Clearing Corporation, a wholly owned subsidiary of the New York Stock Exchange LLC, the successor-in-interest to the New York Stock Exchange Inc. In the event of DTCC's voluntary or involuntary liquidation, dissolution or winding-up, the holders of Series A Non-Cumulative Perpetual Preferred stock are entitled to a liquidation preference of $30.00 per share.

DTCC Series B Preferred stock. All 10,000 shares of DTCC Series B Preferred stock are issued and outstanding and held of record by National Clearing Corporation, a wholly owned subsidiary of the Financial Industry Regulatory Authority Inc. ("FINRA"). In the event of DTCC's voluntary or involuntary liquidation, dissolution or winding-up, the holders of Series B Preferred stock are entitled to a liquidation preference of $30.00 per share.

DTCC Series C Fixed-to-Floating Rate Non-Cumulative Perpetual Preferred stock. DTCC issued 1,600 shares of Fixed-to-Floating Rate Non-Cumulative Perpetual Preferred stock, Series C, $0.50 par value per share, with a liquidation preference of $250,000 per share. When declared by DTCC's Board of Directors, dividends on the Series C Preferred stock are payable in arrears on June 15 and December 15 of each year through June 15, 2020 at a fixed rate of 4.875% per annum. From June 15, 2020 onward, dividends will accrue at a floating rate equal to three-month LIBOR plus 3.167% per annum.

DTCC may redeem the Series C Preferred Stock at its option, for cash, i) in whole or in part, from time to time, on any dividend payment date on or after June 15, 2020 at a redemption price equal to $250,000 per share, plus any declared and unpaid dividends to, but excluding the redemption date, or ii) in whole but not in part, at any time within 90 days following a Regulatory Capital Treatment Event, as defined in the Series C Preferred Stock Offering Memorandum, at a redemption price equal to $250,000 per share, plus any declared and unpaid dividends to, but excluding, the redemption date.

On April 16, 2019 and October 23, 2019, in accordance with the Amended Certificate of Incorporation of DTCC, the Board of Directors approved and declared dividends in the amount of $6,093.75 per share on 1,600 shares outstanding of its Series C Preferred Stock. The semi-annual aggregate dividend of $9,750,000 was paid on June 17, 2019 and December 16, 2019, to the holders of the Series C Preferred Stock as of record date May 31, 2019 and November 30, 2019, respectively.

On April 17, 2018 and October 17, 2018, in accordance with the Amended Certificate of Incorporation of DTCC, the Board of Directors approved and declared dividends in the amount of $6,093.75 per share on 1,600 shares outstanding of its Series C Preferred Stock. The semi-annual aggregate dividend of $9,750,000 was paid on June 15, 2018 and December 15, 2018, to the holders of the Series C Preferred Stock as of record date May 31, 2018 and November 30, 2018, respectively.

18. SHAREHOLDERS' EQUITY (CONTINUED)

DTC Series A Non-Cumulative Perpetual Preferred stock. Under a plan adopted by the Board of Directors, each Participant of DTC is required to own shares of DTC Series A preferred stock. The ownership of DTC preferred stock is reported as non-controlling interests in the consolidated financial statements. There was $150,000,000 of DTC Series A preferred stock (1,500,000 shares at par value of $100 per share) outstanding as of December 31, 2019 and 2018. Annual dividends are accrued based on the weighted-average rate of interest paid by the Company on required Participants' Fund deposits during the dividend period as disclosed in the DTC's rules. The 2019 annual dividend amount of $2,640,000 will be paid in April 2020, to the holders of DTC Series A Preferred stock during 2019. The 2018 annual dividend amount of $2,340,000 was paid in April 2019, to the holders of DTC Series A Preferred stock during 2018.

19. CAPITAL REQUIREMENTS

The capital requirement for each of the clearing agencies is equal to the sum of the general business risk capital requirement and corporate contribution, as described below. The clearing agencies must meet the capital requirements by holding liquid net assets funded by equity, as described in rule 17Ad-22(e)(15) of the CCAS and the Clearing Agency Policy on Capital Requirements.

General Business Risk Capital Requirement. The general business risk capital requirement is determined according to Rule 17Ad-22(e)(15) of the CCAS and the Clearing Agency Policy on Capital Requirements. The capital requirement is held to cover potential general business losses so that the clearing agencies can continue operations and provide services as a going concern if those losses materialize. It is determined based on the general business risk profile and estimated time to execute a recovery or orderly wind-down of critical operations for each of the clearing agencies and, at a minimum, is equal to six months of operating expenses.

Corporate Contribution. The clearing agencies maintain an amount referred to as the corporate contribution, to be applied to losses as provided in each of the respective clearing agencies rules. The amount of the corporate contribution is generally equal to 50% of each clearing agency's general business risk capital requirement.

Details of the general business risk capital requirement, corporate contribution and liquid net assets funded by equity for the clearing agencies as of December 31, 2019 and 2018 follow (in thousands):

	2019		
	DTC	NSCC	FICC
General business risk capital requirement	$ 169,398	$ 159,218	$ 113,137
Corporate contribution	84,699	79,609	56,568
Total requirement	254,097	238,827	169,705
Liquid net assets funded by equity	606,572	524,817	277,811
Excess	$ 352,475	$ 285,990	$ 108,106

	2018		
	DTC	NSCC	FICC
General business risk capital requirement	$ 169,119	$ 153,054	$ 107,845
Corporate contribution	84,559	76,527	53,922
Total requirement	253,678	229,581	161,767
Liquid net assets funded by equity	529,478	445,732	265,724
Excess	$ 275,800	$ 216,151	$ 103,957

19. CAPITAL REQUIREMENTS (CONTINUED)

Regulatory capital. DTCC's regulated subsidiaries maintain and report regulatory capital in accordance with all relevant laws, rules and guidelines. As a multinational enterprise, various DTCC subsidiaries are subject to regulatory capital regimes, as applicable. Certain DTCC subsidiaries submit regulatory capital reports to various regulators, including, but not limited to, FRBNY, the NYSDFS and the Commodity Futures Trading Commission in the United States; Ontario Securities Commission in Canada; and the Monetary Authority of Singapore in Singapore.

Capital adequacy. DTC is subject to capital guidelines issued by United States federal and state banking regulators.

DTC capital and leverage ratios filed with the FRBNY and the NYSDFS as of December 31, 2019 follow:

	Ratio	Minimum Capital Ratio[a]	Well Capitalized Ratio[a]
Tier 1 capital ratio [1]	103.94%	6.00%	8.00%
Total capital ratio [1]	103.94%	8.00%	10.00%
Tier 1 leverage ratio [2]	20.07%	4.00%	4.00%

(a) As defined by the regulations issued by the Federal Reserve, Office of the Comptroller of the Currency and the Federal Deposit Insurance Corporation.

(1) Total capital and Tier 1 capital includes common stock, retained earnings and preferred stock. DTC's tier 1 capital and total capital ratios are based on tier 1 capital and total risk-weighted assets.

(2) Tier 1 leverage ratio is based on tier 1 capital and quarterly average total assets.

20. TRANSACTIONS WITH RELATED PARTIES

DTCC has agreements with DEGCL to provide various support services and office facilities. Expense reimbursements under these agreements follow (in thousands):

	Other Services[1]		Other Receivables[2]	
	For the years ended December 31,		As of December 31,	
Related parties	2019	2018	2019	2018
DEGCL	$ 9,407	$ 14,313	$ 664	$ 982

(1) Included in Other services revenue in the accompanying Consolidated Statements of Income.

(2) Included in Accounts receivable on the accompanying Consolidated Statements of Financial Condition.

21. GUARANTEES

Certain DTCC subsidiaries (NSCC and FICC) provide central counterparty (CCP) services, including clearing, settlement and risk management services. Acting as a CCP, NSCC and FICC (through GSD and MBSD) guarantee the settlement of trades in the event one or more of their Participants' defaults. A Participant default is defined in the respective rules of NSCC, GSD and MBSD. In their guarantor role, each clearing subsidiary has equal claims to and from Participants, as applicable, on opposite sides of the netted transactions. To cover their guarantee risk, NSCC and FICC (through GSD and MBSD) use risk-based margining to collect cash and securities collateral through their Clearing Funds.

NSCC is the leading provider of clearance, netting, risk management and settlement for virtually all U.S. broker-to-broker trades involving equities, corporate and municipal debt, exchange traded funds and unit investment trusts. Through its Continuous Net Settlement (CNS) system, NSCC is interposed between Participants in securities clearance and settlement. CNS transactions are generally guaranteed at the point of trade comparison and validation for bilateral submissions or the point of trade validation for locked-in submissions. Since NSCC stands between the Participants delivering and receiving CNS trades, the failure of Participants to deliver securities to NSCC on settlement date, and the corresponding failure of NSCC to redeliver the securities, results in open positions. Open CNS positions are marked-to-market daily. Such marks are debited from or credited to the involved Participants through the settlement process.

FICC, through GSD, provides real-time trade matching, clearing, netting, risk management and settlement for trades in U.S. government debt including buy-sell transactions and repurchase agreement transactions. Securities processed by GSD include Treasury bills, bonds, notes, zero-coupon securities, government agency securities and inflation-indexed securities. The U.S. Government securities market is predominantly an over-the-counter market and most transactions are settled on trade date plus one day (T+1). Trades are guaranteed and novated upon comparison. The guarantee of GSD net settlement positions may result in a potential liability to FICC. Guaranteed positions that have not yet settled are margined and collateralized twice-daily through the Clearing Fund and marked-to-market twice-daily through the funds-only settlement process. In addition, a Participant may be subject to an additional amount referred to as the intra-day supplemental required fund deposit, which, if applicable, may be collected on an intra-day basis through the Clearing Fund.

MBSD provides real-time trade matching, clearing, netting , risk management and settlement for trades in the U.S. mortgage-backed securities market. Specifically, MBSD processes to-be-announced transactions, specified pool trades and stipulated trades. FICC's guarantee of MBSD transactions may result in potential liability to FICC. Guaranteed positions that have not yet settled are margined and collateralized daily through the Clearing Fund. The daily Clearing Fund includes a mark-to-market component that is calculated using guaranteed positions and prices as of prior end-of-day. In addition, a Participant may become subject to an intra-day mark-to-market charge which, if applicable, may be collected on an intra-day basis through the Clearing Fund.

If a Participant defaults in either NSCC or FICC, such Participant's deposits to the applicable Clearing Fund are the first source of funds and collateral that the NSCC and FICC would use to cover any losses that may result from the close-out and liquidation of the defaulting Participant's positions. To address potential tail losses, NSCC and FICC each separately maintain additional prefunded resources. These consist of (i) the CCP's Clearing Fund that, in the aggregate, currently serves as the CCP's default fund, and (ii) the CCP's corporate contribution, (see Note 19).

If, after closing out and liquidating a defaulting Participant's positions, the CCP were to suffer a loss, such loss would be satisfied as follows: (i) first, applying the defaulter's Clearing Fund deposit, including any amounts available under cross-guaranty agreements to which the CCPs are a party, described below; (ii) next, the CCPs may apply their corporate contribution (or such higher amount as approved by their Board of Directors), and (iii) by allocating any remaining loss to Participants.

For purposes of loss allocation, Participant defaults are grouped together chronologically into discrete event periods of 10 business days. If there is remaining loss or liability from one or more Participant default events that occurred within the same event period, they will be treated as follows:

NSCC will assess its non-defaulting Participants as provided for in its rules. The process, in general, allocates any remaining losses or liabilities among the Participants of NSCC who were Participants on the first day of the event period ratably in accordance with their respective average daily required deposits to the Clearing Fund over the prior 70 business days

21. GUARANTEES (CONTINUED)

FICC Participants are grouped into three different tiers for purposes of loss allocation: Tier 1, Tier 2, and Sponsored Members. The division will divide such obligation between Tier 1 Participants and Tier 2 Participants. Tier 1 Participants will be assessed ratably in accordance with their respective average daily required deposits to the Clearing Fund over the prior 70 business days. Tier 2 Participants will only be subject to such loss or liability to the extent they traded with the defaulting Participant. Sponsored Members are not obligated for loss allocation. If the loss arises in connection with Sponsored Member trades, the loss shall be allocated to Tier 1 Participant Sponsor. GSD Participants who act as interdealer brokers are limited to a loss allocation of $5 million per event period in respect of their inter-dealer broker activity.

Amounts that may be available under cross-guaranty agreements include, for NSCC, amounts available under the netting contract and limited cross-guaranty between DTC and NSCC relating to collateralization across the DTC-NSCC interface, or for FICC, amounts available under the cross-margining agreements between GSD and the Chicago Mercantile Exchange Inc., which may provide for additional funds if the defaulting member was a cross-margining Participant.

DTC, NSCC, FICC and The Options Clearing Corporation (OCC) have also entered into a multilateral netting contract and limited cross-guaranty agreement. In accordance with the cross-guaranty agreement, these clearing agencies have agreed to make payments to each other for any remaining unsatisfied obligations of a common defaulting Participant to the extent that these clearing agencies have excess resources belonging to the defaulting Participant. Under this agreement, no party ever needs to pay out of pocket and no party can receive more than its loss.

Details for open CCP positions for which a trade guarantee applied as of December 31, 2019 and 2018 follow (in billions):

	2019	2018
FICC		
GSD	$ 1,172	$ 1,160
MBSD	419	333
NSCC	143	176

There were no defaults by Participants to these obligations.

22. OFF BALANCE SHEET AND CONCENTRATION OF CREDIT RISKS

DTCC is exposed to significant credit risk to third-parties including its Participants, which extends to companies in the global financial services industry. Customers are based in the United States of America and overseas and include participating brokers, dealers, institutional investors, banks, trust issuers, mutual fund companies, insurance carriers, hedge funds and other financial intermediaries - either directly or through correspondent relationships. Credit risk represents the potential for loss due to the default or deterioration in credit quality of a Participant. The Company's exposure to credit risk is primarily derived from clearing and settlement service operations. Credit risk also comes from financial assets, which consist principally of cash and cash equivalents, investments, accounts receivable and Participants' and Clearing Funds.

Given that NSCC and FICC are CCPs, they are exposed to significant credit risk of third parties, including their customer base, which extends to companies within the global financial services industry.

Concentrations of credit risk may arise due to large connected individual exposures and significant exposures to groups of Participants whose likelihood of default is driven by common underlying factors, including economic conditions affecting financial markets, the securities industry and debt-issuing countries.

22. OFF BALANCE SHEET AND CONCENTRATION OF CREDIT RISKS (CONTINUED)

Cash and cash equivalents. The Company maintains cash and cash equivalents with various financial institutions including the FRBNY. These financial institutions are located in various geographical regions, and the Company's policy is designed to limit exposure with any one financial institution. As part of its credit and risk management processes, the Company performs periodic evaluations of the relative credit standing of the financial institutions with whom it places funds. The Company generally makes deposits with financial institutions with a credit rating of at least BBB+/Baa1 or better from recognized rating agencies and that are approved via its internal credit review process. The Company also monitors the condition of the financial institutions with whom it places funds on an ongoing basis to identify any significant change in a financial institution's condition. If such a change takes place, the amounts deposited with such financial institutions may be adjusted.

Marketable securities. In addition to investing in reverse repurchase agreements, money market funds and bank deposits, the Company also directly invests in U.S. Treasury securities and debt obligations of the U.S. government or those U.S. government agencies guaranteed by the U.S. government. Credit risk related to marketable securities involves the risk of nonperformance by the counterparty, which could result in a material loss.

Accounts receivable. Credit risk related to accounts receivable involves the risk of non-payment by the counterparty. Credit risk is diversified due to the large number of Participants comprising the Company's customer base. The Company also performs ongoing credit evaluations of the financial conditions of its customers and evaluates the delinquency status of the receivables.

Participants' Fund and Clearing Funds. In addition to risk management policies described above for cash and cash equivalents, when Participants provide cash deposits to the Participants' and Clearing Funds, the Company may invest the cash in bank deposits at the FRBNY or reverse repurchase agreements (reverse repos). Reverse repos are collateralized and the collateral must have a market value greater than or equal to 102% of the cash invested. The Company bears credit risk related to reverse repos only to the extent cash advanced to the counterparty exceeds the value of collateral received. Securities purchased under reverse repos are generally U.S. Treasury and Agency securities having minimal credit risk due to low probability of U.S. government default, coupled with the highly liquid nature of these securities. Reverse repos are typically placed with financial institutions with a credit rating of BBB+/Baa1 or better from recognized rating agencies and that are approved via the Company's credit review process. To avoid concentration of credit risk exposures, the Company sets credit limits for each counterparty.

Participants' and Clearing Funds cash deposits may also be invested in money market mutual funds under Rule 2a-7 of the Investment Company Act of 1940 with a credit rating of AAA/Aaa from recognized rating agencies. Credit risk is mitigated by investing in highly rated money market mutual funds and having cash returned daily.

Credit risk arises at DTCC should a Participant fail to fulfill its settlement obligation. The Company manages and mitigates this risk by identifying, measuring and responding to these risks in order to protect the safety and soundness of the DTCC clearing and settlement system.

Various tools are utilized to mitigate these risks including, but not limited to: setting capital adequacy standards; assessing new applicants; performing continuous monitoring of Participants financial condition; reviewing Participants daily trading activity and determining appropriate collateral requirements; maintaining the Participants' Fund and Clearing Fund; netting trades continuously; marking unsettled trades to market; and utilizing a variety of advanced quantitative analytical methodologies, such as back and stress testing.

To become a participating member at any of DTCC's clearing agency or registered clearing house subsidiaries, an applicant must meet minimum eligibility criteria that are specified in the subsidiaries' respective rules. All applicants must provide the Company with certain financial and operational information. This information is reviewed to ensure the applicant has sufficient financial resources to make anticipated contributions to the relevant subsidiary's Participants' Fund or Clearing Fund and to meet its obligations to the subsidiary. The credit quality of the Participant is evaluated at the time of application and monitored on an ongoing basis to determine if the Participant continues to be financially stable and able to meet the financial requirements of membership. As part of its review, the Company utilizes an internal credit risk rating matrix to risk-rate its Participants. The resulting rating determines the level of financial review to be performed on each Participant and may impact their Participants' Fund and Clearing Fund requirements.

22. OFF BALANCE SHEET AND CONCENTRATION OF CREDIT RISKS (CONTINUED)

Collateralization controls and net debit caps are employed by DTC to protect Participants against the risk that one or more Participants may fail to pay for their settlement obligations. DTC's collateralization controls prevent the completion of transactions that would cause a Participant's net debit balance to exceed the value of collateral in its account. The controls are designed to provide DTC with sufficient collateral to obtain funding for settlement in the event a Participant fails to pay its settlement obligation. DTC's net debit cap controls limit the net settlement debit that each Participant can incur to an amount, based upon activity level, which would be covered by DTC's liquidity resources. The net debit cap requires DTC to maintain sufficient liquidity to complete settlement should any single Participant or Participant family fail to settle.

NSCC and FICC collect Clearing Fund deposits from their Participants using a risk-based margining methodology. The risk-based methodology enables them to identify the risks posed by a Participant's unsettled portfolio and to quickly adjust and collect additional deposits as needed to cover those risks. At multiple times during the day, Clearing Fund requirements are calculated for each Participant based on their then-current unsettled and pending transactions. Security pricing is updated on an intraday basis and additional charges may be collected to cover significant price movements from those Participants with a significant exposure in the identified security. The Company monitors Participants overall trading activities throughout the trading day to determine whether exposures exist that would require special actions to increase their Clearing Fund deposits.

The Company regularly performs back and stress testing of the quality and accuracy of its risk management systems to ensure the adequacy of Clearing Fund requirements and to respond to other risk factors the tests may reveal.

DTC and NSCC maintain committed, secured lines of credit to support potential liquidity needs in the event of a Participant default.

The Company also limits its exposure to potential losses from default by Participants through multilateral netting contracts and limited cross-guaranty agreements with other clearing agencies. These arrangements are designed to provide a mechanism for the sharing of excess net resources of a common defaulting Participant held at one clearing agency to cover losses incurred at another clearing agency. NSCC, FICC and DTC have a multilateral netting contract and limited cross-guaranty agreement with each other and with OCC under which these clearing agencies have agreed to make payment to each other for any remaining unsatisfied obligations of a common defaulting Participant to the extent they have excess resources of the defaulting Participant. NSCC and OCC also have an agreement providing for payments to each other relating to the settlement of certain option exercises and assignments in the event of a mutual Participant's failure. Further, DTC and NSCC have a netting contract and limited cross-guaranty agreement, which includes certain arrangements. Securities delivered by DTC to NSCC to cover CNS system allocations are fully collateralized.

If a DTC Participant defaults, such Participant's deposits to the Participants Fund would be liquidated to satisfy an outstanding obligation and/or loss incurred by DTC. If those funds are insufficient to cover the defaulting Participant's outstanding obligations, DTC may use other Participant deposits in the Participants' Fund or apply a portion of its retained earnings to cover the loss.

23. PARENT COMPANY CONDENSED FINANCIAL STATEMENTS

Condensed financial statements for DTCC (the Parent Company Condensed Financial Statements) that follow should be read in conjunction with the accompanying consolidated financial statements of the Company and its subsidiaries and the notes thereto. The Parent Company Condensed Financial Statements as of December 31, 2019 and 2018 require management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses. Management believes that the estimates utilized in the preparation of the condensed financial statements are reasonable. Actual results could differ materially from these estimates.

The DTCC Parent Company Condensed Statements of Financial Condition follow (in thousands):

	As of December 31,	
	2019	2018
ASSETS:		
Cash and cash equivalents	$ 438,544	$ 519,894
Investments in subsidiaries	1,863,686	1,730,200
Due from subsidiaries	259,633	190,060
Premises, equipment and intangible assets	187,926	174,353
Operating lease right-of-use asset	206,769	—
Other assets	392,034	379,305
TOTAL ASSETS	$ 3,348,592	$ 2,993,812
LIABILITIES AND SHAREHOLDERS' EQUITY:		
LIABILITIES:		
Long-term debt and other borrowings	$ 8,024	$ 36,375
Pension and postretirement benefits	211,720	214,445
Operating lease liability	256,993	—
Other liabilities	516,877	560,757
Total liabilities	993,614	811,577
SHAREHOLDERS' EQUITY:		
Preferred stock	391,116	391,116
Common stock	5,091	5,091
Additional paid-in capital	411,065	411,065
Retained earnings	1,769,638	1,571,298
Accumulated other comprehensive loss, net of tax	(221,932)	(196,335)
Total shareholders' equity	2,354,978	2,182,235
TOTAL LIABILITIES AND SHAREHOLDERS' EQUITY	$ 3,348,592	$ 2,993,812

23. PARENT COMPANY CONDENSED FINANCIAL STATEMENTS (CONTINUED)

DTCC Parent Company has an agreement with its subsidiaries whereby the DTCC Parent Company pays for substantially all of the expenses for the operations of its subsidiaries. The related expenses are allocated to subsidiaries based upon their estimated use of such goods or services as determined by applicable allocation factors. Further, the agreement provides that the DTCC Parent Company performs credit and quantitative risk services, and certain other services for its subsidiaries, including among other things, administrative, internal audit, finance and legal services. The billing for these services as a percentage of total allocated expenses ranged from 104% to 108% in 2019 and 2018, excluding pass-through charges and the impact of capitalized software. The fee, representing the amount over actual cost, is included in Interest and other income in the Condensed Statements of Income below.

The DTCC Parent Company Condensed Statements of Income follow (in thousands):

	For the years ended, December 31,	
	2019	**2018**
REVENUES:		
Equity in earnings of subsidiaries	$ 165,724	$ 223,596
Interest and other income	110,000	114,596
Total revenues	275,724	338,192
OPERATING EXPENSES:		
Professional services	8,842	19,874
Other	48,249	23,969
Total operating expenses	57,091	43,843
Income before taxes	218,633	294,349
Provision (benefit) for income taxes	793	(1,464)
Net income attributable to DTCC	$ 217,840	$ 295,813

23. PARENT COMPANY CONDENSED FINANCIAL STATEMENTS (CONTINUED)

The DTCC Parent Company Condensed Statements of Cash Flows follow (in thousands):

	For the years ended, December 31, 2019	2018
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net income	$ 217,840	$ 295,813
Adjustments to reconcile net income to net cash provided by/(used in) operating activities:		
Equity in earnings of subsidiaries	(165,724)	(223,596)
Depreciation and amortization	2,608	55,302
Deferred income taxes	(10,660)	20,856
Other	18,947	—
Net change in:		
Due from subsidiaries	(69,573)	191,100
Operating lease liability	(18,518)	—
Other operating assets and liabilities	16,707	(140,684)
Net cash provided by/(used in) operating activities	(8,373)	198,791
CASH FLOWS FROM INVESTING ACTIVITIES:		
Investments in subsidiaries	(30,799)	(165,000)
Distributions from subsidiaries	69,000	93,246
Capitalized software development costs and purchases of Premises and equipment	(48,923)	(34,174)
Net cash used in investing activities	(10,722)	(105,928)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Preferred stock dividend payments	(19,500)	(19,500)
Repayments on long-term debt and other borrowings	(42,779)	(7,877)
Net cash used in financing activities	(62,279)	(27,377)
Effect of foreign exchange rate changes on Cash and cash equivalents	24	67
Net increase/(decrease) in Cash and cash equivalents	(81,350)	65,553
Cash and cash equivalents - Beginning of year	519,894	454,341
Cash and cash equivalents - End of year	$ 438,544	$ 519,894
SUPPLEMENTAL DISCLOSURES:		
Interest paid	$ 4,864	$ 1,133
Income taxes paid - net of refunds	$ 20,091	$ 20,588
Non-cash financing activity - capital lease obligation	$ —	$ 3,640

24. SUBSEQUENT EVENTS

The Company evaluated events and transactions occurring after December 31, 2019 through March 27, 2020, the date these consolidated financial statements are available to be issued, for potential recognition or disclosure. No additional events or transactions other than the ones mentioned below occurred during such period that would require recognition or disclosure in these consolidated financial statements.

On March 10, 2020, Euroclear plc and the Company finalized a dissolution, business and share transfer agreement with respect to the DEGCL joint venture. As a result, the Company transferred its investment in DEGCL to Euroclear plc in exchange for cash totaling $3,600,000 and the rights to certain products of the joint venture. In addition, all agreements between DEGCL and DTCC, which provided various support services and office facilities on a reimbursement basis, were terminated.

The recent outbreak of the novel coronavirus (“Covid-19”) in many countries continues to adversely impact global commercial activity and has contributed to significant volatility in financial markets. The World Health Organization has declared COVID-19 a "Public Health Emergency of International Concern." The global impact of the outbreak has been rapidly evolving, and as cases of the virus have continued to be identified, many countries have reacted by instituting quarantines and restrictions on travel. Such actions are creating disruption in global supply chains, and adversely impacting a number of industries. The outbreak could have a continued adverse impact on economic and market conditions and trigger a period of global economic slowdown. The rapid development and fluidity of this situation precludes any prediction as to the ultimate adverse impact of Covid-19. Nevertheless, Covid-19 could have a material impact on the Company's financial condition. In addition to the factors described above, other factors either in the U.S or internationally that may affect market, economic and geopolitical conditions, and thereby adversely affect the Company’s business include, without limitation, economic slowdown, changes in interest rates and/or a lack of availability of credit, changes in law and/or regulation, and uncertainty regarding government and regulatory policy.