2018 Retirement Funds

ANNUAL REPORT

SWIB STATE OF WISCONSIN INVESTMENT BOARD

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INTRODUCTION

Message from the

Executive Director/Chief Investment Officer

"U.S. Indexes Close With Worst Yearly Losses Since 2008," read the January 1, 2019 headline in the *Wall Street Journal.* Despite the turbulent market and negative performance in 2018, the State of Wisconsin Investment Board's (SWIB) disciplined and diversified asset allocation and investment strategy provided moderate protection to the Wisconsin Retirement System (WRS) from a full equities market decline. Thanks to past performance and the WRS's smoothing mechanism, Core Fund annuity payments remained unchanged, and the WRS remains stable and strong.

The WRS is one of the only fully funded public pensions in the United States. It is the eighth largest public pension fund in the U.S. and 25th largest public or private pension fund in the world. Over 632,000 retirees and active members and over 1,500 public employers participate in the WRS. As of December 31, 2018, SWIB managed WRS trust fund assets of $100.6 billion.

SWIB implements a prudent and innovative long-term investment strategy to manage the WRS trust funds. SWIB's portfolio of investments is highly diversified, carefully monitored, and designed to strike an appropriate balance between risk and return. On a long-term basis, the Core Fund, the larger of the two WRS trust funds with $93.5 billion in assets, ended 2018 with a 10-year gross return of 8.8 percent, and the Variable Fund, an optional stock only fund with $7.1 billion in assets, had a gross return of 11.6 percent for the 10-year period, both of which well exceeds the actuarial assumed rate of return of 7.0 percent that is required to keep the plan fully funded. The assumed rate was lowered in December 2018 to 7.0 percent from 7.2 percent. Investment returns account for about 75 percent of the income needed to fund the WRS.

A major reason for the WRS's long-term success is because of SWIB's ability to manage over half of the trust fund assets internally. Over the past several years, SWIB has invested in adding new staff, technology, and functionality to support increased in-house investment management across multiple investment strategies. While SWIB does utilize outside managers where it makes sense to do so and market opportunities arise, SWIB's highly qualified professionals manage WRS funds internally for significantly less than what it would cost to use external managers. SWIB's independent cost benchmarking consultant's analysis shows SWIB saved about $90 million in 2017, the latest data available, and $1.3 billion over the last ten years, compared to the median costs of what similar public pension funds would pay for managing the same amount of assets. These savings are driven by SWIB having fewer high cost assets and more internal management.

The investing world continues to recognize SWIB as a destination for top talent. In 2018, for the second time in as many years, SWIB has been chosen by its peers as an *Institutional Investor* Allocators' Choice Award winner. In addition, in 2018, *Trusted Insight* named SWIB staff members to its Top 30 Institutional Investors in the Midwest and Top 30 Private Equity and Venture Capital Investors. While these are examples of individual recognition, they are indicative of the excellent quality of SWIB's staff as a whole.

We believe it is an honor to work on behalf of the public employees, retirees, and employers who depend on us to manage the funds entrusted to us.

David Villa
Executive Director/Chief Investment Officer

Agency Overview

The State of Wisconsin Investment Board (SWIB) is an independent agency of the State responsible for investing the assets of the Wisconsin Retirement System (WRS), the State Investment Fund (SIF), and several other smaller trust funds.

SWIB was created under section 15.76 of the state statutes and its duties to invest these funds are provided in Chapter 25 of the statutes. SWIB is a fiduciary and is governed by the "prudent investor" standard, which requires it to use the diligence, skill, and care that a prudent person acting in a similar capacity and with the same resources would use in managing a large public pension fund. The law also requires SWIB to make investment decisions and conduct its operations solely to fulfill the purpose of the funds under management.

Strong Governance

SWIB is governed by a nine-person, independent Board of Trustees. Trustees appoint the executive director and set the overall policies for SWIB. The executive director/chief investment officer (ED/CIO) oversees the staff, develops and recommends agency and investment policies for Board adoption, and ensures adherence to state law and policies. The ED/CIO serves as chair of the Investment Committee. The Investment Committee provides oversight of SWIB's investments and reports to and makes recommendations to the Trustees.

The creation of a five-member executive leadership Management Council by SWIB's Board of Trustees occurred in October 2018, at the same time the ED and CIO roles were combined. The Management Council consists of: the ED/CIO, deputy executive director/chief administrative officer, chief technology & operations officer, agency business director, and a representative from investment management. (The investment management appointee serves on a six-month rotating basis.) The new structure provides leadership the opportunity to collaborate, to discuss innovative ideas and how to best implement them, and to drive strategy.

Experienced Staff

SWIB's investments are managed by its own professional staff and by outside management firms. SWIB's staff consists of 203 authorized positions (as of 12/31/18) and includes portfolio managers, analysts, and traders who are responsible for daily investment decisions made within the parameters of the investment policy, as well as highly-trained professionals with legal, technical, accounting, and operational expertise. SWIB adheres to Chartered Financial Analyst (CFA) ethical standards. About 65 percent of SWIB staff hold advanced degrees or professional certifications.

Internal Management

Having a strong internal management program provides a significant financial benefit to the WRS. SWIB's Board of Trustees has committed to internal active management, growing the number of internal staff positions over the years and enabling SWIB to increase the share of WRS assets managed internally from 21 percent in 2007 to 57 percent in 2018. Managing a significant portion of assets internally helps keep SWIB's costs lower than its peers, according to CEM Benchmarking, an independent provider of objective cost benchmarking for public pension plans.

In addition to cost savings, SWIB's active management has created billions in value added compared to a simple passively constructed portfolio. The Core Fund has outperformed a passive 60 percent equities/40 percent fixed income global reference portfolio by 38 percent between December 1998 and December 2018, equivalent to approximately $43.8 billion of excess value added, of which $13.4 billion is value added due to active management. (Values are based on Core Fund market value as of December 1998 assuming no contributions or withdrawals.)

Growing a Strong Future

SWIB has been, and continues to be, a long-term investor. Historically, markets tend to be cyclical with periods of strong performance and periods of decline. Because SWIB is a long-term investor, it can be more patient than many other investors. However, it must also be responsible and committed to a thoughtful investment strategy that can weather both positive and negative market environments. As monetary policy normalizes across the globe, lower returns are anticipated. For that reason, SWIB's investment strategy is designed to provide moderate downside protection from another dramatic market downturn, while still earning reasonable returns in other market conditions. The strategy is intended to reduce the Core Fund's reliance on the public equity markets to achieve consistent performance across different economic environments.

To meet the market challenges SWIB anticipates coming in the next five to seven years, SWIB will rely on more robust and complex investment strategies. To continue to manage risk and optimize costs, SWIB will strengthen its already award-winning staff to deal with the complexity of managing assets in a more challenging environment. SWIB will continue to build out the infrastructure and technology needed to support the investments SWIB makes on behalf of the over 632,000 WRS participants. Actively managing the trust funds in a diversified portfolio is vital to the long-term success of SWIB and the WRS.

SWIB's long-term goal is to provide prudent and cost-effective management of the funds held in trust. This is achieved through strong governance, people, processes, and innovative investment strategies.

MISSION

To be a trusted and skilled global investment organization contributing to a strong financial future for the beneficiaries of the funds entrusted to us.

VISION

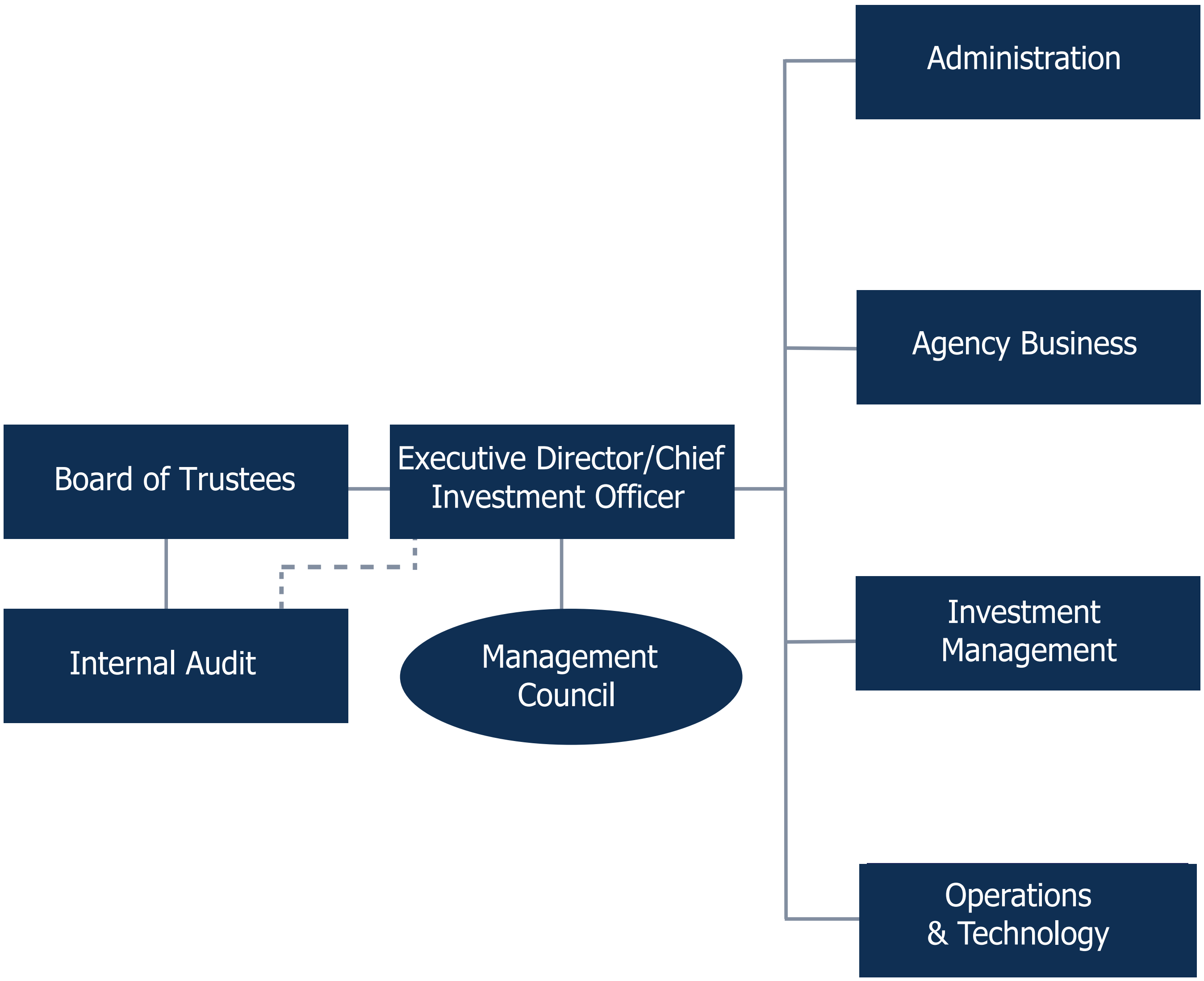
SWIB will be an innovative, agile, integrated organization that optimizes investment returns while managing risk and cost over the long term.

FUTURE DIRECTION

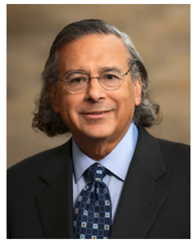
Throughout our history, we have been committed to contributing to a strong financial future for the beneficiaries of the funds entrusted to us. We understand that carrying that commitment into the future demands more than maintaining the status quo.

As a global investment management organization, our mission requires that we keep pace with ever-changing financial markets while remaining true to our values and operating principles. Accordingly, we continually seek to effectively manage risk, optimize costs and achieve the target returns for our funds over the long term.

Agency Management



MANAGEMENT COUNCIL



David Villa
Executive Director/
Chief Investment Officer

Rochelle Klaskin
Deputy Executive Director/
Chief Administrative Officer

Mike Jacobs
Agency Business Director

Julia Valentine
Chief Technology &
Operations Officer
(Assumed role in April 2019)

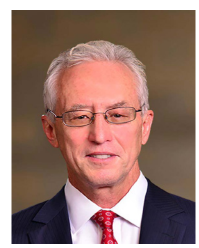
Investment Management Leadership Team*

Edwin Denson
Managing Director
Asset & Risk
Allocation

Brian Hellmer
Managing Director
Public Equities

Todd Ludgate
Managing Director
Fixed Income

Nick Stanton
Head of Multi-Asset
Strategy



Chuck Carpenter
Managing Director,
Private Markets &
Funds Alpha
(Retired in April 2019)

*One person from the investment management leadership team appointed for a rotating six-month term.

Investment Services Leaders

Sara Chandler
Chief Legal Counsel

Mike Bress
Chief Financial Officer

Brandon Brickner
Internal Audit Director

Board of Trustees

The Board of Trustees is responsible for setting long-term investment policies, asset allocation, benchmarks, and fund level risk and monitoring investment performance. The Board is comprised of the following, per section 15.76 of the state statutes (see **www.swib.state.wi.us** for current Board):

- Six public members appointed by the Governor and confirmed by the state Senate including four with at least 10 years investment experience, and one with at least 10 years financial experience and who works for a local government in the Local Government Investment Pool
- Educator participant in the Wisconsin Retirement System (WRS) appointed by the Teachers Retirement Board
- Non-educator participant in the WRS appointed by the Wisconsin Retirement Board
- Secretary of the Department of Administration or designee

David Stein

Norman Cummings

Mark Doll

Barbara Nick

Tim Sheehy

Paul Stewart

Sandra Claflin-Chalton

Robert Conlin

Ellen Nowak

Public Members*

1. David Stein, Board Chair, Executive Vice President and Head of Retail Banking, Associated Banc-Corp, Madison
2. Norman Cummings, Board Vice Chair, Director of Administration, Waukesha County
3. Mark Doll, Retired Executive Vice President and Chief Investment Officer, Northwestern Mutual Life Insurance Co., Milwaukee
4. Barbara Nick, President and Chief Executive Officer, Dairyland Power Cooperative, La Crosse
5. Tim Sheehy, President, Metropolitan Milwaukee Association of Commerce, Milwaukee
6. Paul Stewart, Co-Founder, PS Capital Partners, Milwaukee (resigned December 12, 2018)

WRS Participant Members*

1. Sandra Claflin-Chalton, Educator, Retired Teacher, Menomonie
2. Robert Conlin, Board Secretary, Non-educator, Department Secretary, Employee Trust Funds

Department of Administration

1. Ellen Nowak, Department Secretary (assumed role March 5, 2018, replacing Scott Neitzel)

* Appointed Board members serve six-year terms.

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FINANCIAL SECTION

STATE OF WISCONSIN | Legislative Audit Bureau
22 East Mifflin St., Suite 500 ▪ Madison, WI 53703 ▪ (608) 266-2818 ▪ Hotline: 1-877-FRAUD-17 ▪ www.legis.wisconsin.gov/lab

Joe Chrisman
State Auditor

Independent Auditor's Report on the Financial Statements and Other Reporting Required by *Government Auditing Standards*

Senator Robert Cowles and
Representative Samantha Kerkman, Co-chairpersons
Joint Legislative Audit Committee

Mr. David Villa, Executive Director/Chief Investment Officer and
Members of the Audit and Finance Committee of the Board of Trustees
State of Wisconsin Investment Board

Report on the Financial Statements

We have audited the accompanying Statement of Net Investment Position and the Statement of Changes in Net Investment Position, and the related notes to the financial statements of the Core Retirement Investment Trust Fund and the Variable Retirement Investment Trust Fund (Retirement Funds) of the State of Wisconsin as of and for the year ended December 31, 2018.

Management's Responsibility for the Financial Statements

Management of the State of Wisconsin Investment Board (SWIB) is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America. This includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, which is issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinions on these financial statements.

Opinions

In our opinion, the financial statements referred to in the first paragraph present fairly, in all material respects, the financial position of the Retirement Funds as of December 31, 2018, and the respective changes in financial position thereof for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Emphases of Matter

As discussed in Note 1 to the financial statements, the financial statements referred to in the first paragraph present only the investment activity of the Retirement Funds attributable to SWIB and do not purport to, and do not, present fairly the financial position of SWIB or the State of Wisconsin as of December 31, 2018, or the changes in financial position for the year then ended, in accordance with accounting principles generally accepted in the United States of America.

As discussed in Note 2C to the financial statements, the financial statements include investments that do not have readily ascertainable market prices and are valued based on a variety of third-party pricing methods. However, because of the inherent uncertainty of valuation, those estimated values may differ from the values that would have been used had a ready market for the investments existed.

Our opinions are not modified with respect to these matters.

Other Matters

Required Supplementary Information—Accounting principles generally accepted in the United States of America require that the management discussion and analysis, which precedes the financial statements, be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board, which considers it to be essential for placing the financial statements in an appropriate operational, economic, or historical context. In accordance with auditing standards generally accepted in the United States of America, we have applied certain limited procedures to the required supplementary information that included inquiries of management about the methods of preparing the information. We further compared the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to do so.

Accompanying Information—Our audit was conducted for the purpose of forming opinions on the financial statements of the Retirement Funds. The introduction section on pages 3 through 10 of the annual report is presented for purposes of additional analysis and is not a required part of the financial statements. Such information has not been subjected to the auditing procedures applied in the audit of the financial statements and, accordingly, we do not express an opinion or provide any assurance on it.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued a report dated August 27, 2019, on our consideration of SWIB's internal control over financial reporting; our tests of its compliance with certain provisions of laws, regulations, and contracts; and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of SWIB's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* and should be used when considering SWIB's internal control over financial reporting and compliance.

LEGISLATIVE AUDIT BUREAU

Joe Chrisman
State Auditor

August 27, 2019

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Retirement Funds

Management Discussion & Analysis

The Retirement Funds' discussion and analysis of the financial activities for the calendar year ended December 31, 2018, is presented by management as an introduction to the financial statements. It is meant to assist the reader in understanding the financial statements by providing an overall review of the financial activities during the year as well as to provide a comparison of the prior year's activity and results.

Overview of Basic Financial Statements

The State of Wisconsin Investment Board (SWIB) is responsible for managing the assets of the Wisconsin Retirement System (WRS). The Core Retirement Investment Trust Fund (Core Fund) and Variable Retirement Investment Trust Fund (Variable Fund), collectively Retirement Funds, represent the assets of the WRS. Following this section are the financial statements and footnotes which reflect only the investment activity of the Retirement Funds. Retirement reserves, contribution revenue, and benefit expense are specifically excluded from presentation in these statements, although contribution revenue and benefit expenses are reflected in "Net Disbursements" in the Statement of Changes in Net Investment Position. The Wisconsin Department of Employee Trust Funds (ETF) prepares a Comprehensive Annual Financial Report, and it can be found on their website: **www.etf.wi.gov.**

The **Statement of Net Investment Position** provides information on the financial position of the Retirement Funds at December 31, 2018. It reflects the investment assets available for payment of future benefits and any liabilities related to the investments.

The **Statement of Changes in Net Investment Position** presents the results of the investing activities for the twelve months ending December 31, 2018.

The **Notes to Financial Statements** provide additional information that is essential to a full understanding of the data presented in the financial statements. The notes provide more detail about accounting policies, significant account balances and activities, material risks, obligations, contingencies, and subsequent events, if any.

The financial statements and related notes are prepared in accordance with Governmental Accounting Standards Board (GASB) Pronouncements.

Retirement Funds

Approximately 632,000 people participate in the WRS, including current and former employees of Wisconsin's state agencies, most local governments, and school districts in Wisconsin. Contributions made to the WRS by these employees, and their employers, are invested by SWIB to finance retirement and other benefits. The Retirement Funds had a combined Net Investment Position of $100.6 billion as of December 31, 2018.

Core Retirement Investment Trust Fund

The larger of the two trust funds comprising the WRS is the Core Fund with a Net Investment Position of $93.5 billion at December 31, 2018. All WRS members have at least half, if not all, of their pension contributions invested in the Core Fund. It is a diversified, balanced fund invested for the

Time-Weighted Annualized Returns
As of December 31, 2018
(Gross of external management fees and costs)

	1-Year Return %	5-Year Return %	10-Year Return %	20-Year Return %
Core Fund	-3.3	5.2	8.8	6.2
Benchmark	-3.5	4.9	8.2	5.8
Variable Fund	-7.9	5.9	11.6	5.9
Benchmark	-7.8	5.9	11.3	5.4

long-term needs of the WRS. Diversification helps to stabilize the effects of market changes. The investment objective of this trust fund is to meet or exceed an average 7.2% annual nominal return over the long-term, which is set by ETF with input from outside consultants using a number of factors including market returns, estimated wage growth and other actuarial assumptions. The long-term required rate of return was decreased by ETF to 7.0% in December 2018 and will be effective for the 2018 WRS valuation to determine contribution rates for 2020.

The financial statements reflect the investment activity of the Core Fund as well as changes in cash balances due to net disbursements related to ETF. Net disbursements include, but are not limited to, benefit payments, contribution receipts, transfers to/from the Variable Fund, and administrative expenses.

Condensed Core Fund financial information for the calendar years ending December 31, 2018 and December 31, 2017 is included in the table entitled **Core Fund Condensed Financial Information**.

Cash and Cash Equivalents increased by $403.0 million, or 12%, when comparing calendar year-end 2018 to 2017. The majority of the increase in cash and cash equivalents is attributed to SWIB

Core Fund Condensed Financial Information
(In thousands)

	2018	2017	% Change
Cash and Cash Equivalents	$ 3,820,858	$ 3,417,883	12
Receivables	3,842,022	1,558,973	146
Invested Securities Lending Collateral	445,786	1,522,476	(71)
Prepaid Expenses	9,774	25,547	(62)
Investments	101,449,272	104,574,185	(3)
Total Investment Assets	109,567,712	111,099,064	(1)
Payables and Other Liabilities	3,799,521	468,710	711
Securities Lending Collateral Liability	445,786	1,522,476	(71)
Short Sales	3,002,001	2,722,194	10
Obligations Under Reverse Repurchase Agreements	8,834,034	6,114,256	44
Total Investment Liabilities	16,081,342	10,827,636	49
Net Investment Position Held in Trust	$ 93,486,370	$ 100,271,428	(7)
Investment Income (Loss)	$ (2,890,277)	$ 14,328,623	(120)
Investment Expense	(694,988)	(486,173)	43 *
Net Investment Income	(3,585,265)	13,842,450	(126)
Net Disbursements - Department of Employee Trust Funds	(3,199,793)	(2,990,625)	7
Net Increase (Decrease) in Net Investment Position Held in Trust	$ (6,785,058)	$ 10,851,825	(163)

*Approximately 78% of the increase in Investment Expense is attributed to an accounting change. See Note 2E in the Notes to Financial Statements section.

holding a short-term, foreign discount bill at calendar-year end used within an active investment strategy. Short-term investments with maturities generally less than three months are included in Cash and Cash Equivalents. Also, SWIB utilized derivatives to implement strategic investment positions. Derivatives used for these strategies require defined levels of cash to conservatively provide for adequate levels of margin, near-term benefit payments, and to adjust risk to desired levels.

The increase in cash and cash equivalents was partially offset by a reduction in SWIB's exposure to the commodities markets, which was eliminated from the policy portfolio asset allocation and had been obtained using futures contracts. As in other instances, derivatives used for this strategy required certain levels of cash on-hand to moderate exposures. In addition, SWIB continued to reduce synthetic positions and increase the use of physical securities when possible during 2018.

The balance in **Receivables** increased by $2.3 billion, or 146%, when comparing calendar year-end 2018 to 2017. Most of this increase is due to SWIB's increased use of To Be Announced (TBA) securities in 2018. TBA securities are derivative contracts that consist of mortgage-backed securities (MBS) issued by the Government National Mortgage Association, a government entity, and by government-sponsored enterprises, such as the Federal National Mortgage Association or the Federal Home Loan Mortgage Corp. The term TBA is derived from the fact that the actual MBS that will be delivered to fulfill a TBA trade is not designated at the time the trade is made. Instead, the specific pool of mortgages making up the MBS is announced 48 hours prior to the established trade settlement date. Eligibility rules and standards for MBS pools deliverable into TBA contracts ensure that delivered MBS pools are fungible. TBA securities sold create a receivable on the Statement of Net Investment Position because payment for TBA securities is not made until the settlement date.

Routine rebalancing activities, where investment positions were sold but pending settlement, also contributed to the change in Receivables at December 31, 2018.

Invested Securities Lending Collateral and **Securities Lending Collateral Liability** decreased by $1.1 billion as of December 31, 2018, compared to December 31, 2017. Cash received as collateral for securities borrowed can be utilized by SWIB's internally managed portfolios to back short positions. Starting in 2018, investment policies permit the use of treasury securities as collateral to back short positions. The use of treasury securities as collateral is a more efficient option to increase SWIB's internal shorting capacity. As a result, the amount of cash used as collateral for short positions decreased in 2018.

Investments decreased by 3% over the prior year. Investment returns play a large role in this change and a more detailed discussion on performance is included in the Investment Income discussion which follows.

Payables & Other Liabilities increased by $3.3 billion as of December 31, 2018, versus the prior year-end balance. The majority of this increase is due to purchased TBA contracts held at December 31, 2018. SWIB began trading these derivative instruments in 2017 and increased the use of TBA securities in 2018. Purchased TBA securities create a payable on the Statement of Net Investment Position because payment for TBA securities is not made until the settlement date.

Short Sales increased by $279.8 million, or 10%, when comparing calendar year 2018 to the prior year end. A short sale transaction is created when a security not owned by the portfolio is sold in anticipation of purchasing the security at a lower price in the future. The increase in short sales can be largely attributed to a new, internal equity structure that magnifies active risk positions including the use of shorting to take advantage of securities that are deemed to be overvalued. The new structure is expected to provide a more balanced impact from active positions and provide the ability to better manage risk.

The increase in short sales was partially offset by decreased allocations to other internal active strategies that utilize shorting.

Obligations Under Reverse Repurchase Agreements increased by $2.7 billion, or 44%, when comparing calendar year-end 2018 to 2017. Reverse repurchase agreements involve the sale of assets with the simultaneous agreement to repurchase those assets for a pre-determined price, plus interest, at a future date. During 2018, SWIB increased its capacity to participate in reverse repurchase agreements, providing a low-cost way to obtain financing. The proceeds from these agreements are invested in Treasury Inflation-Protected Securities (TIPS).

Calendar year 2018 **Investment Income** was negative $2.9 billion compared to $14.3 billion for calendar year 2017, a decrease of $17.2 billion. The decrease in income in 2018 is attributable to a total Core Fund investment return of -3.3% as compared to 16.2% for the previous calendar year. Asset class returns for calendar year 2018 and 2017 are presented in the table entitled **Core Fund Time Weighted Annualized Asset Class Returns.**

Investment Expense includes most transaction-related expenses, external management fees, and administrative-related expenses. Transaction-related expenses are incurred as part of executing a trade or investment strategy and include interest and dividend expenses and securities lending fees. Unlike other expenses, transaction-related expenses often represent payments to counterparties, rather than vendors, and are not invoiced to SWIB. SWIB does not include transaction-related expenses in its Total Cost of Management Plan because these expenses are already accounted for in gross performance. Two types of transaction-related expenses, commission and trade execution fees, are excluded from Investment Expense and included in the "Net Increase (Decrease) in the Fair Value of Investments" on the Statement of Changes in Net Investment Position as these fees are not readily separable from the acquisition or disposal of an investment. External management fees include base and performance fees paid to external managers. Administrative-related expenses include operating expenses, legal fees, custodial bank fees, R&D services, and investment consulting fees.

Core Fund
Time Weighted Annualized Asset Class Returns
(Gross of external management fees and costs)

	2018 Return %	2017 Return %
Public Equities	-9.2	24.0
Fixed Income	-0.8	5.4
Inflation Sensitive	-0.5	3.2
Real Estate	8.8	9.6
Private Equity/Debt	15.9	15.5
Multi Asset	-6.6	14.5

Investment Expense increased by $208.8 million over the prior calendar year. Approximately 78% of this change is due to an increase in transaction-related expenses from interest paid to counterparties that are now included in expenses because of an accounting change in 2018. In prior years, SWIB's financial statements netted interest paid to counterparties in reverse repurchase agreements with interest income. Reverse repurchase agreements involve the sale of assets with the simultaneous agreement to repurchase those assets for a pre-determined price, plus interest. The cash proceeds from reverse repurchase agreements are reinvested into TIPS. Starting in 2018, SWIB discontinued the netting of interest expense paid in reverse repurchase agreements with investment income. This approach provides more transparency by disclosing the income and expense amounts separately. More information about the accounting change can be found in the Notes to Financial Statements section of the annual report.

During calendar year 2018, SWIB increased the use of reverse repurchase agreements and, as interest rates rose in 2018, the rates for these agreements increased, which both contributed to the increase in interest expense compared to the prior calendar year.

The remaining increase in investment expense is due to increased base fees paid to external managers due to increased assets under management with such managers. The total amount of Core Fund assets managed externally grew by $3.1 billion in 2018 due to increased allocations to private markets and hedge funds. Because base management fees are calculated as a percentage of assets under management, asset growth translated into higher fees in 2018. Core Fund assets that are externally managed are invested in strategies where SWIB seeks to capitalize on external managers' expertise or to invest in highly specialized markets or products.

Variable Retirement Investment Trust Fund

The Variable Fund allows active employees participating in the WRS to put half of their pension fund contributions into this global stock fund. Approximately 15% of WRS members participate in the Variable Fund, with a Net Investment Position of $7.1 billion at December 31, 2018. By law, the Variable Fund invests primarily in stocks and provides participants the potential for higher returns in exchange for higher risk. Employees who choose this fund therefore accept a higher degree of market risk and greater volatility in investment returns. The investment objective of the Variable Fund is to meet or exceed broad equity market indices over a full market cycle.

Condensed Variable Fund financial information for the calendar years ended December 31, 2018 and December 31, 2017 is included in the table entitled **Variable Fund Condensed Financial Information.**

Variable Fund **Cash and Cash Equivalents** increased by $107.0 million, or 109%, when comparing calendar year-end 2018 to 2017. The increase can be attributed to an increase in securitized cash positions within certain passive portfolios. Securitized cash is invested in derivative instruments which provide SWIB similar returns as if the physical securities were held. Unlike physical securities, however, securitized cash positions provide a much higher degree of liquidity.

Invested Securities Lending Collateral and **Securities Lending Collateral Liability** represent cash collateral held for securities lending transactions. The $33.3 million change in these accounts was caused by a decrease in Variable Fund equity loans collateralized with cash. The Variable

Variable Fund Condensed Financial Information (In thousands)

	2018	2017	% Change
Cash and Cash Equivalents	$ 205,390	$ 98,379	109
Receivables	35,436	37,517	(6)
Invested Securities Lending Collateral	20,843	54,186	(62)
Prepaid Expenses	-	1,878	(100)
Investments	6,863,944	8,042,006	(15)
Total Investment Assets	7,125,613	8,233,966	(13)
Payables and Other Liabilities	4,881	1,340	264
Securities Lending Collateral Liability	20,843	54,186	(62)
Total Investment Liabilities	25,724	55,526	(54)
Net Investment Position Held in Trust	$ 7,099,889	$ 8,178,440	(13)
Investment Income (Loss)	$ (595,904)	$ 1,566,485	(138)
Investment Expense	(7,075)	(9,552)	(26)
Net Investment Income	(602,979)	1,556,933	(139)
Net Disbursements - Department of Employee Trust Funds	(475,572)	(394,791)	20
Net Increase (Decrease) in Net Investment Position Held in Trust	$ (1,078,551)	$ 1,162,142	(193)

Fund saw a corresponding increase in non-cash collateral.

The balance in **Prepaid Expenses** decreased by $1.9 million in calendar year 2018. This change is not representative of a change in total expenses, but rather reflects a difference in timing for the billing and payment of the Variable Fund operating budget expenses in 2018, as compared to the prior year.

Payables and Other Liabilities increased by $3.5 million when compared with the prior calendar year. As with the decrease in Prepaid Expenses, more than half of this increase in payables is related to the reflection of SWIB's operating budget as a prepaid in 2017. The remaining increase relates to more investment purchases pending settlement over 2018 year end.

Calendar year 2018 **Investment Income** decreased by $2.2 billion, when compared with the prior calendar year. The decrease in income was the result of a total fund investment return of -7.9%, as compared to 23.2% in 2017. The Variable Fund has an asset allocation target of 70% domestic and 30% international equities to satisfy its stock market mandate. Its performance is therefore largely dependent upon the equity market movements for the year. As with the Core Fund, SWIB has implemented a long-term approach to investing Variable Fund assets. As of December 31, 2018, the Variable Fund's 20-year annualized return was 5.9%, outperforming the benchmark return of 5.4%.

Retirement Funds
Financial Statements

Statement of Net Investment Position
As of December 31, 2018
(In thousands)

	Core Retirement Investment Trust Fund	Variable Retirement Investment Trust Fund
Investment Assets		
Cash and Cash Equivalents	$ 3,820,858	$ 205,390
Receivables:		
Interest & Dividends	292,232	14,745
Securities Lending Income	2,043	545
Investment Sales	3,547,747	20,146
Invested Securities Lending Collateral	445,786	20,843
Prepaid Expenses	9,774	-
Investments (at fair value):		
Equities	47,991,991	6,857,656
Fixed Income	31,739,324	-
Limited Partnerships	13,590,506	-
Multi Asset	5,759,422	-
Real Estate	1,372,027	-
Preferred Securities	199,356	10,690
Convertible Securities	326	-
To Be Announced Securities	686,251	-
Foreign Currency Contracts	(21,647)	353
Option Contracts	(8,148)	-
Futures Contracts	161,654	(4,755)
Swaps	(21,790)	-
Total Investment Assets	109,567,712	7,125,613
Investment Liabilities		
Payable for Investments Purchased	3,686,915	2,580
Obligations Under Reverse Repurchase Agreements	8,834,034	-
Short Sales	3,002,001	-
Collateral Due to Counterparty	3,811	280
Accounts Payable	84,168	1,894
Other Liabilities	24,627	127
Securities Lending Collateral Liability	445,786	20,843
Total Investment Liabilities	16,081,342	25,724
Net Investment Position Held in Trust	$ 93,486,370	$ 7,099,889

The accompanying notes are an integral part of this statement.

Statement of Changes in Net Investment Position
For the Calendar Year Ended December 31, 2018
(In thousands)

	Core Retirement Investment Trust Fund	Variable Retirement Investment Trust Fund
Additions		
Investment Income:		
Net Increase (Decrease) in the Fair Value of Investments	$ (4,982,256)	$ (772,551)
Interest	627,984	2,225
Dividends	1,213,537	166,934
Securities Lending Income	34,422	7,488
Limited Partnership Income	162,794	-
Income from Real Estate	53,242	-
Less		
Investment Expense	684,848	6,354
Securities Lending Fees	10,140	721
Net Investment Income (Loss)	(3,585,265)	(602,979)
Deductions		
Net Disbursements - Department of Employee Trust Funds	(3,199,793)	(475,572)
Net Increase (Decrease) in Net Investment Position Held in Trust	(6,785,058)	(1,078,551)
Net Investment Position Held in Trust:		
Beginning of the Year	100,271,428	8,178,440
End of the Year	$ 93,486,370	$ 7,099,889

The accompanying notes are an integral part of this statement.

Retirement Funds
Notes to Financial Statements

1. Description of Funds

The Wisconsin Legislature created the State of Wisconsin Investment Board (SWIB) for the sole purpose of providing professional investment management for the funds entrusted to it, including the assets of the Core Retirement Investment Trust Fund (Core Fund) and the Variable Retirement Investment Trust Fund (Variable Fund). The Board of Trustees for SWIB is responsible for the overall professional investment management of the assets of the Wisconsin Retirement System (WRS). The Core Fund and the Variable Fund, collectively Retirement Funds, represent the investment assets of the WRS.

The statements presented here reflect only the investment activity of these funds. Excluded from presentation in the statements are, for example, retirement reserves, contribution revenue, and benefit expense. The statements are not intended to present the financial activity for the State of Wisconsin as a whole.

All of the Retirement Funds' administrative operating expenses are funded through employer and employee contributions and investment earnings. Administrative operating expenses, in addition to external management fees, legal fees, custodial bank fees, research and data expenses, investment consulting fees, and most transaction-related fees such as dividend and interest expense, are included in "Investment Expense" on the Statement of Changes in Net Investment Position. Two types of transaction-related expenses, commission and trade execution fees, are excluded from Investment Expense and included on the "Net Increase (Decrease) in the Fair Value of Investments" on the Statement of Changes in Net Investment Position as these fees are not readily separable from the acquisition or disposal of an investment.

A. Core Retirement Investment Trust Fund

The Core Fund is managed by SWIB with oversight by a Board of Trustees as authorized in section 25.15 and 25.17 of the Wisconsin Statutes. The Core Fund and SWIB are not registered with the Securities and Exchange Commission as an investment company. The investments of the Core Fund consist of a diversified portfolio of securities. SWIB is required to make investment management decisions for the Retirement Funds solely for the benefit of the members of the WRS. Section 25.182 of the Wisconsin Statutes authorizes SWIB to manage the Core Fund in accordance with the "prudent investor" standard of responsibility. This standard is described in section 25.15(2) of the Wisconsin Statutes, which requires that SWIB manage the Retirement Funds with the diligence, skill, and care that a prudent person acting in a similar capacity and with the same resources would use in managing a large public pension fund.

The Core Fund consists primarily of assets invested for the WRS, which is administered by the Department of Employee Trust Funds (ETF) in accordance with Chapter 40 of the Wisconsin Statutes. All WRS contributions are invested in this trust fund unless participants have elected to have one-half of their contributions invested in the Variable Fund. In addition to the retirement contributions, the assets of various other benefit programs are invested in the Core Fund. Information regarding the other programs invested in the Core Fund can be found in the Comprehensive Annual Financial Report, prepared by ETF and located on their website: **www.etf.wi.gov**.

B. Variable Retirement Investment Trust Fund

The Variable Fund is managed by SWIB with oversight by a Board of Trustees as authorized by section 25.15 and 25.17 of the Wisconsin Statutes. The Variable Fund and SWIB are not registered with the Securities and Exchange Commission as an investment company. Section 25.17(5) of the Wisconsin Statutes states that assets of the Variable Fund shall be invested primarily in equity securities that shall include common stocks, real estate, or other recognized forms of equities whether or not subject to indebtedness, including securities convertible into common stocks and securities of corporations in the venture capital stage. Subject to that requirement, SWIB may invest the Variable Fund in any manner consistent with the "prudent investor" standard of responsibility in section 25.15(2) of the Wisconsin Statutes, which requires that SWIB manage the trust funds with the diligence, skill, and care that a prudent person acting in a similar capacity and with the same resources would use in managing a large public pension fund.

The Variable Fund consists primarily of the assets invested for the WRS. In addition, there are two other retirement/benefit plans invested in the Variable Fund. Additional information regarding the Variable Fund can also be found in the Comprehensive Annual Financial Report, prepared by ETF.

Participation in the Variable Fund is at the option of the employee. Participants have elected to invest one-half of their retirement contributions and matching amounts of employer contributions to this fund, and have the remainder invested in the Core Fund. Individual participants in the Variable Fund have a one-time option to terminate their Variable Fund participation and transfer their account to the Core Fund.

2. Significant Accounting Policies

A. Basis of Presentation

The accompanying financial statements were prepared in conformity with generally accepted accounting principles (GAAP) for governments as prescribed by the Governmental Accounting Standards Board (GASB).

B. Measurement Focus and Basis of Accounting

The financial statements are prepared based upon the flow of economic resources measurement focus and the full accrual basis of accounting. Under the accrual basis of accounting, revenues are recognized in the accounting period in which they are earned and become measurable, and expenses are recognized in the period incurred, if measurable. Security transactions and the related gains and losses are recorded on a trade date basis. Dividend income is recorded on the ex-dividend date, and interest income is accrued as earned.

C. Valuation of Securities

The investments of the Retirement Funds are reported in the Statement of Net Investment Position at fair value as prescribed by GASB and per section 25.17(14) of the Wisconsin Statutes. Unrealized gains and losses are reflected in the Statement of Changes in Net Investment Position as "Net Increase (Decrease) in the Fair Value of Investments."

The fair value of the Retirement Funds' assets is obtained or estimated in accordance with a pricing hierarchy established with SWIB's custodian, Bank of New York Mellon (BNY Mellon). As prescribed by the hierarchy, a variety of independent pricing sources are used to price assets based on type, class, or issue.

When a portfolio includes securities or instruments for which the custodial bank does not receive fair value information from its vendor pricing sources, a variety of third-party pricing methods are used, including appraisals, pricing models, and other methods deemed acceptable by industry standards.

The Cash and Cash Equivalents category reported on the Statement of Net Investment Position consists of short-term investments which are used to meet the liquidity requirements of the Retirement Funds. Cash and Cash Equivalents held by the Retirement Funds can include cash on deposit, foreign currencies, cash posted as collateral to counterparties, repurchase agreements, certificates of deposit, U.S. Treasury Bills, short-term investment funds, and other U.S or foreign liquid financial instruments with maturities that are generally less than three months. Cash and Cash Equivalents are reported at fair value or cost, which approximates fair value.

Privately-held debt, which is included in "Fixed Income" investments on the Statement of Net Investment Position, is priced using approaches that value each holding based on the best available information using the following hierarchy of pricing sources:

1. Custodian-supplied prices for assets that can be priced in accordance with the pricing hierarchy established with SWIB's custodian
2. Prices provided by a third party with expertise in the bond market

For private market investments where no readily ascertainable market value exists, including limited partnerships and real estate pooled funds, fair value is estimated based on the net asset value as reported by the general partner. The capital account balance as stated in the most recent available quarterly reporting period is adjusted for subsequent cash flows to derive fair value. The financial statements of the limited partnerships and real estate pooled funds are audited by independent auditors annually.

Certain portfolios make investments in privately-held companies alongside a strategic partner, such as a limited partnership fund manager. These co-investments are valued by SWIB's strategic partner, using a variety of methodologies such as reviews of subsequent financing rounds, discounted cash flow analyses, cash flow multiples analyses, reviews of market comparable sales or metrics, and reviews of third-party appraisals.

Real estate properties wholly owned by SWIB are valued by independent appraisers every three years. In years when appraisals are not performed, properties are informally appraised by the asset advisor. Each year, audited financial statements are prepared for each property.

SWIB employs portfolio strategies which involve investments across multiple asset classes. The "Multi Asset" category on the Statement of Net Investment Position consists primarily of hedge funds. SWIB values hedge funds based on monthly statements or estimated returns received from each of the hedge fund's administrators.

A third-party administrator's responsibility is to independently account for the hedge fund's activity and calculate the net asset value of the fund. Generally, hedge fund administrators price financial instruments traded in active markets based on quoted market prices or binding dealer quotations. For certain over-the-counter instruments, fair value is determined based on valuation models used by the administrator. Annually, the financial statements prepared by the administrator are audited by independent auditors.

Derivative financial instruments are marked to fair value daily, with valuation changes recognized in income during the period the instruments are held and when the instrument is sold or expires. The nature and use of derivative instruments are discussed in Note 5.

A limited number of securities are carried at cost. Certain non-public or closely-held investments are not reported at fair value, but are carried at cost since no independent quotation is available to estimate fair value for these securities.

D. Use of Estimates

The preparation of financial statements in accordance with GAAP requires management to make estimates that affect amounts reported herein. Due to the inherent uncertainty involved, actual results could differ from those estimates.

E. Accounting Changes

Effective January 1, 2018, Investment Income – Interest and Investment Expense reported on the Statement of Changes in Net Investment Position reflect gross amounts. In previous reporting periods, Investment Income – Interest on the Statement of Changes in Net Position was netted with interest expense from reverse repurchase agreements. Disclosing interest income and expense amounts separately improves transparency and compliance with GAAP. This change results in an increase in "Investment Income - Interest" and an offsetting increase in "Investment Expense" on the Statement of Changes in Net Investment Position as of December 31, 2018. Because the change in income and expense amounts offset, there is no impact on the

Retirement Funds' reported beginning or ending "Net Investment Position Held in Trust." Additional information on reverse repurchase agreements can be found in Note 3.

3. Deposit and Investment Risk

A. Credit Risk

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations to SWIB. Fixed income credit risk investment guidelines outline the minimum ratings required at the time of purchase by individual portfolios, or groups of portfolios, based on the portfolios' investment objectives. In addition, some fixed income portfolios are required to carry a minimum weighted average rating at all times. Information regarding SWIB's credit risk related to derivatives is found in Note 5.

The table entitled **Credit Quality Distribution** displays the lowest credit rating assigned by nationally recognized statistical rating organizations on debt securities held by the Retirement Funds as of December 31, 2018. Included in this table are fixed income securities, including certain short-term securities, classified as cash equivalents on the Statement of Net Investment Position. Also included are interest rate sensitive investments held in the Retirement Funds' securities lending collateral reinvestment pools, which are managed by SWIB's custodian. See Note 6 for additional information regarding the securities lending program.

The table also includes SWIB's investment in commingled fixed income funds which are not rated. Although the funds themselves are not assigned ratings, external management investment guidelines govern minimum credit quality standards for the investments within each portfolio. These standards are determined based on the investment objectives and risk parameters of each fund.

SWIB held $8.8 billion in reverse repurchase agreements at December 31, 2018. Investment guidelines permit certain portfolios to enter into reverse repurchase agreements, which are a sale of securities with a simultaneous agreement to repurchase the securities in the future at a pre-determined price plus a stated rate of interest. The market value of the securities underlying reverse repurchase agreements exceeds the cash received, providing the counterparty a margin against a decline in market value of the securities. If the counterparty defaults on their obligation to sell these securities back to SWIB or provide cash of equal value, SWIB could suffer an economic loss equal to the difference between the market value of the underlying securities plus accrued interest and the agreement obligation, including accrued interest.

Credit Quality Distribution
As of December 31, 2018
(In thousands)

Rating	Fair Value	% of Total
AAA/Aaa	$ 258,277	1%
A-1/P-1	711,368	2
AA/Aa	18,935,351	53
A-2/P-2	157,278	-
A	1,788,316	5
BBB/Baa	2,432,784	7
BB/Ba	888,905	2
B	901,929	3
CCC/Caa or below	141,242	-
Not Rated	1,311,725	4
Commingled Fixed Income Funds	8,176,574	23
Total	$ 35,703,749	100%

SWIB enters into reverse repurchase agreements with various counterparties and such transactions are governed by Master Repurchase Agreements (MRA). MRAs are negotiated contracts and contain terms in which SWIB seeks to minimize counterparty credit risk. SWIB also controls credit exposures by limiting trades with any one counterparty to stipulated amounts. The counterparty credit exposure is managed through the transfer of margin, in the form of cash or securities, between SWIB and the counterparty. The Retirement Funds' counterparty credit

Reverse Repurchase Agreements Counterparty Credit Exposure As of December 31, 2018 (In thousands)		
Fair Value of Collateral Held by Counterparty		$ 8,965,253
Less:		
Cash due to Counterparty	$8,834,033	
Collateral and Interest due to Counterparty	20,074	
Total due to Counterparty		8,854,107
Net Counterparty Credit Exposure		$ 111,146

exposure for reverse repurchase agreements at December 31, 2018 is summarized in the table entitled **Reverse Repurchase Agreements, Counterparty Credit Exposure.**

The cash proceeds from reverse repurchase agreements are reinvested by the Retirement Funds. The maturities of the purchases made with the proceeds of reverse repurchase agreements are not necessarily matched to the maturities of the agreements. The agreed-upon yields earned by the counterparty for the reverse repurchase agreements held were between 2.26% and 3.65% at December 31, 2018. Portfolio guidelines require agreements to mature between one and 90 days.

The cash due to counterparties resulting from reverse repurchase agreements is reported as "Obligations Under Reverse Repurchase Agreements" and the interest due to counterparties is included in "Other Liabilities" on the Statement of Net Investment Position. The underlying assets, as well as the reinvested proceeds, are reported in the "Investments" section on the Statement of Net Investment Position.

B. Custodial Credit Risk

Deposits — Custodial credit risk related to deposits is the risk that, in the event of the failure of a depository financial institution, SWIB will not be able to recover deposits that are in possession of an outside party. Cash deposits totaled $483.9 million as of December 31, 2018. Of the total, $91.7 million was collateralized by securities borrowed. Depository insurance covered another $2.0 million of the total. The remaining deposits, totaling $390.2 million, were uninsured and uncollateralized. These uninsured deposits represented balances held in foreign currencies in SWIB's custodian's nominee name, cash posted as collateral for derivatives transactions, and cash collateral posted in excess of the market value of securities borrowed by SWIB for short sales. In addition to cash deposits, the Retirement Funds also held $84.0 million in certificates of deposit, all of which were covered by depository insurance as of December 31, 2018.

Investments — Custodial credit risk for investments is the risk that, in the event of failure of the counterparty to a transaction, SWIB will not be able to recover the value of investments that are in the possession of an outside party. The Retirement Funds held seven repurchase agreements totaling $367.0 million as of December 31, 2018. These repurchase agreements were tri-party agreements held in a short-term cash management portfolio managed by SWIB's custodian. The underlying securities for these agreements were held by the tri-party agent, not in SWIB's name.

SWIB's custodial credit risk policy addresses the primary risks associated with safekeeping and custody. It requires that SWIB's custodial institution be selected through a competitive bid process and that the institution be designated a "Systemically Important Financial Institution" by the U.S. Federal Reserve. The policy also requires that SWIB be reflected as beneficial owner on all securities entrusted to the custodian and that SWIB have access to safekeeping and custody accounts. The custodian is also required to be insured for errors and omissions and must provide SWIB with an annual report on internal controls, prepared in accordance with the Statement on Standards for Attestation Engagements. Furthermore, SWIB management has established a system of controls for the oversight of services and related processes of the custodian. SWIB's current custodial bank was selected in accordance with these guidelines and meets all requirements stipulated in the custodial credit risk policy.

C. Concentration of Credit Risk

Concentration of credit risk is the risk of loss attributed to the magnitude of an organization's investment in a single issuer. SWIB limits concentrations of credit risk by establishing investment guidelines for individual portfolios or groups of portfolios that generally restrict issuer concentrations in any one company or Rule 144A securities to less than 5% of the portfolio's market value. The Retirement Funds did not hold any investments with a single issuer, exclusive of investments issued or explicitly guaranteed by the U.S. government, representing 5% or more of the Retirement Funds' value at December 31, 2018.

D. Interest Rate Risk

Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. SWIB uses a number of different methods to manage interest rate risk. Fixed income instruments held by the Retirement Funds include investments with variable rate securities, stepped rate securities, securities with no coupon, such as discount notes, and coupons that range between 0.0% and 14.75% at December 31, 2018.

Generally, SWIB analyzes long or intermediate term portfolios' interest rate risk using various duration calculations. Modified duration, which is stated in years, is the measure of price sensitivity of a fixed income security to an interest rate change of 100 basis points. The calculation is based on the weighted average of the present values for all cash flows. Some investments are analyzed using an option-adjusted duration calculation which is similar to the modified duration method. Option-adjusted duration incorporates the duration-shortening effect of any embedded call provisions in the securities. Duration statistics are weighted by the dollar value of the position to compute an average duration for each investment type.

Short-term portfolios' interest rate risk is analyzed using the weighted average maturity to next reset. Weighted average maturity is the maturity of each position in a portfolio weighted by the dollar value of the position to compute an average maturity for the portfolio as a whole. This measure indicates a portfolio's sensitivity to interest rate changes: a longer weighted average maturity implies greater volatility in response to interest rate changes.

SWIB's investment guidelines related to interest rate risk vary by portfolio. Some fixed income portfolios are required to be managed within a range of a targeted duration, while others are required to maintain a weighted average maturity at or below a specified number of days or years.

The table entitled **Interest Rate Sensitivity by Investment Type** presents the aggregated interest rate exposure for the Retirement Funds' assets at December 31, 2018. Weighted average maturity, where reset dates are assumed to be the effective maturity date for the security, is presented for repurchase agreements and short-term pooled investments. Longer-term instruments held by the Retirement Funds are presented using modified duration, as this measure more accurately states the interest rate sensitivity of these investments. The duration statistic is calculated utilizing reset dates for some floating rate instruments, such as term loans. Information about the interest rate sensitivity of derivative contracts can be found in Note 5.

SWIB invests in securities with contractual cash flows, such as asset-backed securities and U.S. government agencies. These types of structured product investments may be highly sensitive to interest rate changes in that they can be subject to early payment in a period of declining interest rates. The resulting changes in timing, or possible reduction in expected total cash flows, affect the fair value of these securities.

E. Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates will adversely impact the fair value of an investment. It includes the risk that currencies in which a portfolio's investments are denominated, or currencies in which a portfolio has taken on a long/short active position, will decline in value relative to the U.S. dollar.

Foreign currency exchange rates may fluctuate significantly for a number of reasons, including the forces of supply and demand in the foreign exchange markets, actual or perceived changes in interest rates, intervention by U.S. or foreign governments or central banks, currency controls, or political developments in the U.S. or abroad.

SWIB's policies include foreign currency risk management objectives relating to each individual portfolio. These guidelines address the foreign currency management activities permitted for each portfolio based on the portfolio mandates, risk tolerances, and objectives. SWIB also employs discretionary currency overlay strategies at the total fund level when currency market conditions suggest such strategies are warranted. Additional information related to the management of foreign currencies through the use of derivatives is discussed in Note 5.

The table entitled **Currency Exposures by Investment Type** present the Retirement Fund investments which were exposed to foreign currency risk at December 31, 2018.

4. Fair Value of Investments

Fair value measurements of the investments held by the WRS are categorized by the hierarchy established by generally-accepted accounting principles. The hierarchy, which has three levels, is based on the valuation inputs used to measure the fair value of the asset.

Level 1 – Investments reflect unadjusted quoted prices in active markets for identical assets.

Level 2 – Investments reflect prices that are based on inputs that are either directly or indirectly observable for an asset (including quoted prices for similar assets), which may include inputs in markets that are not considered to be active.

Level 3 – Investments reflect prices based upon valuation techniques in which significant inputs or significant value drivers are unobservable.

The fair value hierarchy gives the highest priority to Level 1 inputs and the lowest priority to Level 3. When the inputs used to measure fair value fall within different levels of the hierarchy, the level within which the fair value measurement is categorized is based on the lowest level input that is significant to fair value. The categorization of investments within the hierarchy is based upon the pricing transparency of the instrument and does not represent the investment's overall risk.

Interest Rate Sensitivity by Investment Type*
As of December 31, 2018
(In thousands)

Investment Type	Fair Value	Weighted Average Duration (years)	Weighted Average Maturity (days)
Asset Backed Securities	$ 211,145	2.5	
Commercial Paper	159,044		27
Corporate Bonds & Private Placements	5,476,637	5.4	
Foreign Government/Agency Bonds	3,081,113	6.1	
Municipal Bonds	105,001	10.2	
Repurchase Agreements	367,009		1
U.S. Government Agencies	209,439	3.9	
U.S. Treasury Inflation Protected Securities	14,565,286	7.2	
U.S. Treasury Securities	3,352,501	5.5	
Commingled Funds			
Domestic Fixed Income	4,696,198	7.6	
Emerging Market Fixed Income	1,137,086	5.8	
Short Term Cash Management	2,343,290		19
Total	$35,703,749		

* Excludes derivatives. See note 5 for information about the interest rate sensitivity of derivative instruments.

Currency Exposures by Investment Type
As of December 31, 2018
Stated in U.S. Dollars (In thousands)

Currency	Cash & Cash Equivalents	Equities	Fixed Income	Limited Partnerships	Preferred Securities	Futures Contracts	Options	Short Sales	Total
Australia Dollar	$ 7,060	$ 1,010,281	$ 33,175	$ -	$ -	$ 104	$ -	$ (101,966)	$ 948,654
Brazil Real	173	66,871	-	-	22,367	-	-	-	89,411
Canada Dollar	18,977	1,370,098	29,511	-	-	112	-	(107,750)	1,310,948
Chile Peso	38	2,821	-	-	-	-	-	-	2,859
Colombia Peso	1	139	-	-	-	-	-	-	140
Czech Republic Koruna	43	781	-	-	-	-	-	-	824
Denmark Krone	124	336,192	11,642	-	-	-	-	(62,985)	284,973
Euro Member Countries	24,757	4,949,313	899,966	878,328	101,057	488	(211)	(293,321)	6,560,377
Hong Kong Dollar	7,500	894,753	-	-	-	(13)	-	(26,587)	875,653
Hungary Forint	-	5,755	-	-	-	-	-	-	5,755
India Rupee	33	87,002	-	-	-	-	-	-	87,035
Indonesia Rupiah	585	27,159	-	-	-	-	-	-	27,744
Israel Shekel	780	32,287	-	-	-	-	-	(766)	32,301
Japan Yen	741,774	3,779,012	472,909	-	-	(1,295)	-	(355,929)	4,636,471
Korea (South) Won	107	207,485	-	-	219	-	-	-	207,811
Malaysia Ringgit	2,882	34,236	5,888	-	-	-	-	-	43,006
Mexico Peso	7,481	4,708	19,016	-	-	-	-	-	31,205
Morocco Dirham	9	-	-	-	-	-	-	-	9
New Zealand Dollar	671	44,344	2,520	-	-	-	-	(12,729)	34,806
Norway Krone	1,652	116,145	5,032	-	-	-	-	(9,163)	113,666
Philippines Peso	20	1,468	-	-	-	-	-	-	1,488
Poland Zloty	1,610	37,244	15,417	-	-	-	-	-	54,271
Russia Ruble	5	-	-	-	-	-	-	-	5
Singapore Dollar	4,417	229,390	6,757	-	-	-	-	(26,945)	213,619
South Africa Rand	5,477	45,475	17,726	-	38	-	-	-	68,716
Sweden Krona	1,121	390,946	9,155	6,163	-	-	-	(35,001)	372,384
Switzerland Franc	2,065	1,193,997	-	-	-	-	-	(66,321)	1,129,741
Taiwan New Dollar	68	87,575	-	-	-	-	-	-	87,643
Thailand Baht	7	76,585	-	-	-	-	-	-	76,592
Turkey Lira	3	56,103	-	-	-	-	-	-	56,106
United Kingdom Pound	46,931	2,576,496	167,151	189,654	13	(309)	(108)	(98,781)	2,881,047
Total	$ 876,371	$ 17,664,661	$ 1,695,865	$ 1,074,145	$ 123,694	$ (913)	$ (319)	$ (1,198,244)	$ 20,235,260

1) Commingled funds (including limited partnerships and other pooled vehicles) represent investments where the Retirement Funds own only a portion of the overall fund. While the overall fund may be denominated in U.S. dollars, the underlying investments may be exposed to foreign currency risk in various currencies. Commingled funds are shown in the denomination used by the fund for financial reporting.
2) Short Sales are reported as liabilities on the Statement of Net Investment Position. They are included in the above table because they have exposure to foreign currency risk.
3) Investment types holding instruments denominated only in U. S. Dollars are not included in the above table. At calendar year-end, these include: Convertible Securities, Multi Asset, Real Estate, TBAs, Swaps and Obligations Under Reverse Repurchase Agreements.
4) Values may not add due to rounding.

Commingled investments are not categorized under the fair value hierarchy but are disclosed within this note as investments measured at net asset value (NAV).

A. Fair Value Measurements
The fair value measurements of investments as of December 31, 2018 are found in the table entitled **Investments by Fair Value Level**.

Securities classified as Level 1 are generally valued at the official closing price (usually the last trade price) or the last bid price on the security's primary exchange. Such investments generally include exchange-traded securities such as equities, preferred stock, certain derivatives, and exchange-traded funds. U.S. Treasury Bills and only the most recently-issued US Treasury Notes and Bonds are classified as level 1 because available pricing for these securities is similarly reliable to exchange-traded securities.

Securities classified as Level 2 are valued using observable inputs by third-party pricing services using either a bid evaluation or a matrix-pricing technique. Bid evaluations may include market quotations that are based on yields, maturities, call features, and ratings. Matrix-pricing is used to value securities based on their relationship to benchmark market prices for securities with similar interest rates, maturities, and credit ratings. Pricing in this level may also include market approaches that incorporate benchmark interest rates. Debt securities comprise the majority of the level 2 investments because they are generally traded using a dealer market, with lower trading volumes than level 1 securities. Over-the-counter derivatives, such as swaps, TBAs, and foreign exchange contracts, are also included in level 2 because they are priced using a market approach that considers benchmark interest rates and foreign exchange rates.

Level 3 investments are generally valued using significant inputs that are unobservable to the marketplace. This may occur if an investment is illiquid or its value is based on estimates. For the WRS, such investments primarily include directly-held real estate, valued using appraisals and, as such, rely on unobservable inputs. Foreign Government/Agency securities in level 3 are valued using proprietary valuation models. Asset Backed Securities included in level 3 represent private placements that are valued at purchase price because third-party valuations are unavailable. Equities, convertibles, and preferred securities included in the level 3 hierarchy are generally privately-held securities valued using valuation models such as price multiples incorporating public company comparables, discounted cash flows and milestone valuation models. In some instances of privately-held preferred securities, valuation is determined based on recent financing rounds. Bank loans, which represent the majority of corporate bonds and private placements in the level 3 category, are priced by vendors using proprietary models which may incorporate unobservable inputs. Cash and Cash Equivalents included in level 3 represent securities priced at cost. Typically, due to their short-term nature, cost approximates fair value for these investments. Other factors such as infrequent trading, inactive market, or adjusted quoted prices may also result in level 3 measurements.

B. Investments Measured at NAV
The fair value of investments in certain fixed income funds, private equity limited partnerships, stock funds, real estate limited partnerships, and hedge funds are based on the investments' net asset value (NAV) per share (or its equivalent), provided by the investee. The December 31, 2018, investments valued using NAV are shown in the table entitled **Investments Measured at NAV** and include commingled/pooled funds, private equity, and real estate limited partnerships.

C. Private Equity and Real Estate Limited Partnerships
In general, the Private Equity Limited Partnerships participated in the following investment strategies at December 31, 2018:

Buyout – This strategy acquires shares of a private company to gain a controlling interest.

Mezzanine – Provides mezzanine debt to finance

Investments by Fair Value Level As of December 31, 2018 (In thousands)				
	Fair Value			
Asset Type	**Level 1**	**Level 2**	**Level 3**	**Total**
Cash Equivalents				
Certificates of Deposit	$ -	$ 41,709	$ 27,296	$ 69,005
Commercial Paper	-	-	159,044	159,044
Foreign Government/Agency	-	-	711,367	711,367
Total Cash Equivalents	-	41,709	897,707	939,416
Equities				
Domestic	30,805,076	-	78,165	30,883,241
International	17,660,734	-	3,928	17,664,662
Total Equities	48,465,810	-	82,093	48,547,903
Fixed Income				
Asset Backed Securities	-	207,145	4,000	211,145
Corporates Bonds & Private Placements	-	4,907,712	137,918	5,045,630
Foreign Government/Agency Bonds	-	2,369,745	-	2,369,745
Municipal Bonds	-	105,001	-	105,001
U.S. Government Agencies	-	209,439	-	209,439
U.S. Treasury Inflation Protected Securities	-	14,565,286	-	14,565,286
U.S. Treasury Securities	12,184	3,340,316	-	3,352,500
Total Fixed Income	12,184	25,704,644	141,918	25,858,746
Real Estate	-	-	1,372,027	1,372,027
Preferred Securities				
Domestic	-	44,529	41,822	86,351
International	123,476	-	219	123,695
Total Preferred Securities	123,476	44,529	42,041	210,046
Convertibles	-	-	326	326
Derivatives				
Foreign Exchange Contracts	-	(21,294)	-	(21,294)
Futures	156,899	-	-	156,899
Options	(8,095)	(53)	-	(8,148)
Swaps	-	(21,790)	-	(21,790)
To Be Announced Securities	-	686,251	-	686,251
Total Derivatives	148,804	643,114	-	791,918
Equity Short Sales	(3,002,001)	-	-	(3,002,001)
Total	$ 45,748,273	$ 26,433,996	$ 2,536,112	$74,718,381

Investments Measured at NAV
As of December 31, 2018
(In thousands)

Investments Measured at NAV	Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period (8)
Cash and Cash Equivalents (1)	$2,343,290	$ -	Daily	Same Day
Fixed Income (2)	6,219,438	261,883	Daily, Monthly, Quarterly, N/A	2-90 days, N/A
Private Equity Limited Partnerships (3)	8,168,019	5,721,846	N/A	N/A
Equities (4)	6,301,746	-	Daily, Monthly	2-30 days
Real Estate Limited Partnerships (5)	5,422,487	1,601,867	Quarterly, Annually, N/A	30-90 days, Other, N/A
Hedge Funds (6)	5,759,422	68,139	Various (Note 4D)	Various (Note 4D)
Total (7)	$34,214,402	$ 7,653,735		

(1) This category consists of short-term cash funds with the investment objective of safety of principal and liquidity while earning a competitive money market rate of return. The short-term cash funds have daily liquidity with same day notice.

(2) Corporate and government bond index funds make up a significant portion of this category (76%) and have the investment objective of approximating as closely as practicable the return of a given segment of the markets for publicly traded investments. The corporate and government index funds have daily liquidity with 2 days' notice. An additional 18% of this category represents long-only fixed income managers, which can invest across the credit quality spectrum, in varying geographies, and can include derivatives, high yield and structured securities. These long-only managers require a redemption notice period between one and two weeks and have daily or monthly liquidity. The remaining 6% of this category includes LLCs which invest in private real estate debt. The majority of these LLC investments distribute earnings over the life of the investment and have an estimated remaining life of less than 5 years. One LLC investment has an estimated remaining life of greater than 10 years. The private real estate debt LLC's that do not distribute earnings over the life of the fund permit quarterly redemptions with 90 days' notice.

(3) Private Equity Limited Partnerships include direct, co-investments with existing SWIB general partners, direct secondary investments and fund of funds. These investments are illiquid and are generally not resold or redeemed. Distributions from each fund will be received as the underlying investments are liquidated. The table entitled **Limited Partnerships - Estimated Remaining Life** provides an estimate of the period over which the underlying assets are expected to be liquidated.

(4) This category includes long-only equity managers (70%) with various fundamental, quantitative and other approaches spanning various styles, geographies and market cap weights. The majority of these long-only manager investments can be redeemed monthly with between 10 and 30 days' notice. One long-only manager investment can be redeemed daily with 30 days' notice. An additional 30% of this category represents emerging markets equity index funds with an investment strategy designed to track the return of the given segment of the emerging equity markets. These investments can be redeemed daily with 2 days' notice. This category includes investments that are in the process of being fully redeemed, with final distribution expected in 2019.

(5) This category includes funds that invest directly in real estate and real estate related assets. Approximately 70% of these investments are generally not resold or redeemed. Distributions from each fund will be received as the underlying investments are liquidated. The table entitled **Limited Partnerships - Estimated Remaining Life** provides an estimate of the period over which the underlying assets are expected to be liquidated. The remaining 30% of this category consists of open-ended funds that invest directly in real estate and real estate related assets. The majority of these investments can be redeemed quarterly with between 30 and 90 days' notice. One fund can be redeemed annually with notice provided in the first quarter of the calendar year.

(6) Hedge Fund investments are private investment funds that seek to produce absolute returns using a broad range of strategies. In certain instances, Hedge Fund investments are structured as limited partnerships, whereby participants receive distributions over the life of the fund. Estimated remaining life for the majority funds structured as limited partnerships is estimated to be between 5-10 years. One fund has an estimated remaining life of greater than 10 years. Additional information relating to Hedge Funds can be found in Note 4(D).

(7) SWIB had additional unfunded commitments of approximately $15.8 million, relating to assets not valued using NAV.

(8) Redemption terms described for NAV investments reflect contractual agreements and assume withdrawals are made without adverse market impact and under normal market conditions.

leveraged buyouts, recapitalizations, and corporate acquisitions.

Special Situations – This strategy can invest in public and private companies undergoing financial distress, a turnaround in business operations, or which are believed to be undervalued because of a discrete extraordinary event.

Venture Capital – This strategy invests in companies with potential for significant growth (generally small to early stage emerging firms).

The Real Estate Limited Partnerships generally consisted of the following investment strategies at December 31, 2018:

Core – Core investments are expected to deliver a significant percentage of their return from income and should demonstrate lower volatility than Opportunistic and Value investments due to lower leverage, higher occupancy, and asset location.

Value – Value investments typically have significant near-term leasing, repositioning, and/or renovation risk. This strategy is expected to have modest initial operating revenues with potential for substantial income growth and will likely encounter greater volatility than Core strategies, but lower volatility than Opportunistic strategies.

Opportunistic – Opportunistic investments usually have significant development, lease-up, financial restructuring, and/or liquidity risk with little or no initial operating income. This strategy typically uses the highest leverage, is expected to achieve most of its return from future capital gains, and is likely to encounter greater volatility than Core and Value strategies.

Limited partnerships are generally structured to provide distributions to participants of the fund as the holdings of the partnership are liquidated over time. The table entitled **Limited Partnerships - Estimated Remaining Life** illustrates the distribution of estimated remaining liquidation periods for the WRS' private equity and real estate limited partnership holdings as of December 31, 2018.

D. Hedge Funds

Hedge Fund investments are private investment funds that seek to produce absolute returns using a broad range of strategies. The Retirement Funds participated in the following Hedge Fund strategies at December 31, 2018:

Equity Long-Short – This strategy invests both long and short in publicly-traded stocks. These managers vary in their use of short selling and leverage.

Event-Driven– The funds in this strategy seek to gain an advantage from pricing inefficiencies that may occur before or after a corporate action or related event, such as a merger, spinoff, earnings call, bankruptcy, or restructuring.

Tactical Trading – The funds in this category invest their holdings in indexes, commodities, interest rate instruments, and currencies as a result of

Limited Partnerships - Estimated Remaining Life
As of December 31, 2018
(In thousands)

	Estimated Remaining Life*				
Limited Partnership Type	**<5 Years**	**5-10 Years**	**>10 Years**	**N/A (1)**	**Total**
Private Equity	$ 1,705,190	$ 4,955,151	$ 1,507,677	$ -	$ 8,168,018
Real Estate	595,928	3,094,962	178,149	1,553,449	5,422,488
Total	$ 2,301,118	$ 8,050,113	$ 1,685,826	$ 1,553,449	$ 13,590,506

*Estimated remaining life represents subjective estimates, assuming normal market conditions.
(1) N/A investments represent open-ended funds that can be redeemed.

relative value or directional forecasts from a systematic or discretionary approach.

Relative Value – This strategy uses a range of fixed income arbitrage, long/short credit, and/or quantitative strategies that seek to take advantage of price differentials.

Multistrategy – The funds in this category employ a wide range of strategies and instruments in managing assets.

When redeeming Hedge Fund investments, the agreements governing the investment vehicle oftentimes require advanced notice and may restrict the timing of withdrawals. The table entitled **Hedge Fund Redemption Timing** depicts redemption terms, irrespective of other contractual restrictions, for SWIB's Hedge Fund investments at December 31, 2018.

Hedge Fund agreements can also include "lock-up" periods, which restrict investors from redeeming their investment during a specified time frame. The lock-up period helps portfolio managers avoid liquidity problems. Lock-ups can be "hard," where redemptions are not permitted for a specified time period, or "soft," where redemptions are permitted provided the investor pays a penalty. In certain instances, a fund may have both hard and soft lock-up restrictions in place. In addition, Hedge Fund managers can also institute a "rolling" lock-up. A fund with a rolling lock-up period requires investors to commit to an initial lock-up period, and, if the investor does not submit a redemption notice within a set time prior to expiration of the lock-up, the lock-up is reset.

The table entitled **Hedge Fund Lock-ups** reflects the lock-up terms for the Hedge Fund investments held at December 31, 2018.

Similar to lock-ups, Hedge Fund agreements also commonly incorporate "gate" restrictions. An investor-level gate limits redemption on a particular redemption date to a specified percentage of the investor's account value, while a fund-level gate may limit total investor withdrawals on a particular redemption date to a percentage of aggregated fund-level (or master fund-level) net asset value. In certain instances, funds can have both investor- and fund-level gates

Hedge Fund Redemption Timing
As of December 31, 2018
(In thousands)

Redemption Frequency	Redemption Notice Period (days)	Fair Value
Monthly (1)	4 - 90	$ 1,581,235
Quarterly (1)	30 - 120	3,208,002
Other (1)(2)	60 - 90, N/A	970,185
Total		$ 5,759,422

(1) These categories include funds that are in the process of being fully redeemed, with final distribution expected in 2019.

(2) This category includes funds that are subject to rolling locks, whereby the fund automatically re-locks unless a withdrawal request is submitted. This category also includes funds that are structured as limited partnerships, whereby withdrawals are not permitted but the participants receive distributions over the life of the fund.

Hedge Fund Lock-ups
As of December 31, 2018
(In thousands)

Hedge Fund Lock Type	Initial Duration of Lock (years)	Year of Lock Expiration	Fair Value
Hard Lock	1 - 3	2019 - 2020	$ 392,365
Soft Lock	1	2019	696,162
Rolling Lock	2 - 3	2019 - 2021	704,384
None (1)	N/A	N/A	3,877,930
Other (2)	N/A	N/A	88,581
Total			$5,759,422

(1) This category includes funds that are in the process of being fully redeemed, with final distribution expected in 2019.

(2) This category includes funds that are structured as limited partnerships, whereby withdrawals are not permitted but the participants receive distributions over the life of the fund.

Hedge Fund Gates As of December 31, 2018 (In thousands)		
Hedge Fund Gate Type	**Gate Range**	**Fair Value**
Investor Level (1)	25%	$ 2,042,755
Fund Level	8.33% - 30%	1,367,103
None (1)	N/A	2,260,983
Other (2)	N/A	88,581
Total		$ 5,759,422

(1) These categories include funds that are in the process of being fully redeemed, with final distribution expected in 2019.

(2) This category includes funds that are structured as limited partnerships, whereby withdrawals are not permitted but the participants receive distributions over the life of the fund.

in place. Such funds are reflected in the "Investor Level" category. The table entitled **Hedge Fund Gates** summarizes the Hedge Fund gates in place at December 31, 2018.

5. Derivatives

A derivative instrument, as defined by GASB Statement No. 53, is a financial instrument or other contract that has all of the following characteristics:

- Settlement factors. It has (1) one or more reference rates and (2) one or more notional amounts or payment provisions or both. Those terms determine the amount of the settlement or settlements and, in some cases, whether or not a settlement is required.
- Leverage. It requires no initial net investment or an initial net investment that is smaller than would be required for other types of contracts that would be expected to have a similar response to changes in market factors.
- Net settlement. Its terms require or permit net settlement, it can readily be settled net by a means outside the contract, or it provides for delivery of an asset that puts the recipient in a position not substantially different from net settlement.

Derivatives may be used to implement investment strategies for the Retirement Funds. All derivative instruments are subjected to risk analysis and monitoring processes at the portfolio, asset class, and fund levels. Investment guidelines define allowable derivative activity for each portfolio and are based on the investment objectives which have been approved by the Board. Where derivatives are permitted, guidelines stipulate allowable instruments and the manner and degree to which they are to be used.

Gains and losses for all derivative instruments are reported in the Statement of Changes in Net Investment Position as "Net Increase (Decrease) in the Fair Value of Investments."

SWIB invests in derivative investments directly as well as indirectly through commingled or pooled investments. Information relating to investments held in commingled funds has not been separately disclosed in the financial statements or the accompanying footnotes, consistent with GASB reporting requirements.

A derivative can take the form of an individually-negotiated contract between the Retirement Funds and a specific counterparty. These types of negotiated positions are known as over-the-counter (OTC) contracts. OTC contracts can be structured as either "uncleared" or "cleared."

Uncleared OTC contracts are non-standardized bilateral contracts between counterparties and do not include the use of a centralized intermediary, such as a clearinghouse. Uncleared OTC transactions are subject to regulatory requirements with respect to data reporting and recordkeeping, trading relationship documentation, business conduct standards, portfolio reconciliation, and margin collection and posting. For these transactions, master netting agreements and credit support annexes governing the credit relationship and collateral exchange between two counterparties are put in place to mitigate counterparty credit risk.

Cleared OTC contracts offer additional protections to trade participants. These types of transactions employ the use of an intermediary between counterparties. The intermediary, known as a clearinghouse, serves to facilitate trading and mitigate risks. While not completely standardized, these contracts involve a high degree of standardization. Once cleared, the clearinghouse steps in as the counterparty to all trades. Regulatory bodies govern the tools and procedures for risk mitigation such as margin requirements and daily mark-to-market.

In addition to trading OTC, derivative contracts can also be transacted on established exchanges. These types of contracts are called “exchange-traded” and are completely standardized. Like cleared OTC contracts, the clearinghouse is an intermediary to the trade, reducing risks and standardizing the exchange of margin. The table entitled **Derivative Contract Types** summarizes the differences between OTC and exchange-traded contracts.

Collateral postings are commonplace for derivative contracts and vary based on the type of contract traded. SWIB posted $306.4 million in cash and $150.9 million in securities as collateral for derivatives positions as of December 31, 2018. More information regarding collateral requirements is included within the narrative that follows.

A. Uncleared OTC Derivatives

Inherent in the use of uncleared OTC derivatives, the Retirement Funds may be exposed to counterparty credit risk. Counterparty credit risk is the risk that a derivative counterparty may fail to meet its payment obligations under the terms of the derivative contract. SWIB seeks to mitigate this risk through counterparty credit evaluations and approvals, counterparty credit limits, and exposure monitoring procedures. Additionally, policies have been established which seek to implement master netting arrangements (MNA) with counterparties that permit the closeout and netting of transactions with the same counterparty upon the occurrence of certain events, such as payment default, rating downgrade, bankruptcy, illegality, or force majeure. Agreements may also require daily collateral postings to further mitigate credit risk.

The table entitled **OTC Derivatives Subject to Counterparty Credit Risk**, summarizes, by credit rating, the Retirement Funds’ exposure to counterparty credit risk relating to uncleared OTC contracts as of December 31, 2018. The number of uncleared OTC counterparties with credit exposure at year-end was 16.

Derivative Contract Types

Uncleared (OTC)	Cleared (OTC)	Exchange-traded
Trades negotiated over-the-counter	Trades negotiated over-the-counter	Trades executed on organized exchanges
Customized trade terms are agreed upon by counterparties	Trades limited to standardized terms	Trades limited to standardized terms
Traded bilaterally between counterparties	Trades are submitted through a clearinghouse, which is counterparty	Trades are booked with exchange’s clearinghouse, which is counterparty
Margin (collateral) often exchanged but subject to negotiation between counterparties	Mandatory margin requirements	Mandatory margin requirements
Common example: Forward Contracts	Common example: Credit Default Swaps	Common example: Futures Contracts

OTC Derivative Investments Subject to Counterparty Credit Risk
As of December 31, 2018
(In thousands)

Counterparty Credit Rating	FX Receivables	Swap Receivables	To Be Announced Securities[1]	Warrants[1,2]	Total
AA	$ 20,603	$ -	$ -	$ -	$ 20,603
A	3,842,839	867,334	19,975	-	4,730,148
Not Rated	-	-	-	3,709	3,709
					4,754,460
				Less Collateral and MNA offsets[3]	4,743,202
				Total OTC Counterparty Credit Risk	$ 11,258

[1]Exposure to counterparty credit risk for To Be Announced Securities and Warrants is limited to unrealized gains on open positions.

[2]Warrants issued by privately held company that is not rated by statistical credit rating organization.

[3]Includes net collateral positions and liabilities with counterparties that have master netting arrangements (MNA).

B. Cleared OTC and Exchange-Traded Derivatives
Counterparty credit risk is mitigated by an intermediary for cleared OTC and exchange-traded derivative contracts. For these types of derivative investments, a clearinghouse interposes itself as counterparty to all trades and extends a guarantee that trades will be settled as originally intended. To ensure performance, margin requirements are imposed. The requirements are established with the intent to cover nearly all expected price changes based on market risk. Margin payments are settled daily based upon the price movements of the contracts, thereby significantly reducing counterparty credit risk.

C. Foreign Currency Spot and Forward Contracts
Foreign Currency Spot and Forward contracts are uncleared OTC agreements between two counterparties to exchange designated currencies at a specific time in the future. No cash is exchanged when a foreign exchange spot or forward contract is initiated. Depending upon market movements, forward contracts may require collateral postings either to SWIB or to counterparties. Spot contracts are exempt from collateralization. For deliverable contracts, amounts due are paid or received on the contracted settle date. In other instances (most often in emerging markets), contracts are established as non-deliverable forwards (NDFs). Unlike deliverable contracts, NDFs are only settled in U.S. dollars.

Currency exposure management is permitted through the use of currency derivative instruments. Direct hedging of currency exposure back to the U.S. dollar is permitted when consistent with the strategy of the portfolio. Cross-currency exposure management to transfer out of an exposed currency and into a benchmark currency is permitted. In some portfolios, currencies of non-benchmark countries may be held through the use of forward contracts, provided that the notional value of any single non-benchmark currency does not exceed 5% of the market value of the portfolio. SWIB may employ discretionary currency overlay strategies at the total fund and asset class level when currency market conditions suggest such strategies are warranted.

Losses may arise from future changes in the value of the underlying currency, or if the counterparties do not perform under the terms of the contract. Spot and forward contracts are valued daily with the changes in fair value included in "Net Increase (Decrease) in Fair Value of Investments" on the Statement of Changes in Net Investment Position. The net receivable or payable for spot and forward contracts is reflected as "Foreign Currency Contracts" on the Statement of Net Investment Position. The table entitled **Foreign Currency Spot and Forward Contracts** presents the fair value of foreign currency spot and forward contract assets and liabilities held by the Retirement Funds as of December 31, 2018.

D. Futures Contracts
A futures contract is an exchange-traded agreement to buy or sell a financial instrument, index, or commodity at an agreed upon price and time in the future.

The fair value of futures contracts represents the unrealized gain/(loss) on the contracts since trade inception and is reflected as "Futures Contracts" on the Statement of Net Investment Position. Futures contracts are marked to market daily, based upon the closing market price of the contract at the board of trade or exchange on which they are traded. Gains and losses resulting from investments in futures contracts are included in the "Net Increase (Decrease) in the Fair Value of Investments" on the Statement of Changes in Net Investment Position.

Futures contracts involve, to varying degrees, risk of loss in excess of the margin deposited with the clearinghouse. Losses may arise from future changes in the value of the underlying instrument.

Futures contracts may be entered into for purposes such as the following:

- To efficiently gain or adjust market exposures for trust fund rebalancing,
- To adjust sector, interest rate, or duration exposures, and
- To securitize cash or act as a substitute for cash market transactions.

The table entitled **Futures Contracts** presents the Retirement Funds investments in futures contracts as of December 31, 2018.

The table entitled **Futures Contracts with Interest Rate Sensitivity** presents the interest rate sensitivity of fixed income futures contracts as of December 31, 2018. Duration, which is stated in years, is the measure of price sensitivity of a fixed income security to an interest rate change of 100 basis points. Duration statistics presented in this table are weighted by the notional value of each position to compute an average duration for the contract types held.

E. Options
An option contract gives the purchaser of the contract the right, but not the obligation, to buy (call) or sell (put) the security or index underlying the contract at an agreed upon price on or before the expiration of the option contract. The seller of the contract is subject to market risk, while the purchaser is subject to credit risk and market risk,

Futures Contracts
As of December 31, 2018
(In thousands)

Futures Contract Description	Position	Expiration	Notional Amount	Fair Value*
Commodity	Long	Feb 19 - Dec 19	$ 35,119	$ 1,165
	Short	Jan 19 - Mar 19	(84,317)	1,556
Currency	Short	Mar 19	(96,032)	545
Equity	Long	Jan 19 - Mar 19	2,989,953	287
	Short	Jan 19 - Mar 19	(76,877)	534
Fixed Income	Long	Mar 19	8,450,993	157,276
	Short	Mar 19	(1,132,321)	(4,464)
Total			$ 10,086,518	$ 156,899

*Fair Value includes foreign currency gains/(losses).

Foreign Currency Spot and Forward Contracts
As of December 31, 2018
(In thousands)

Currency	Notional (local currency)	Fair Value ($US)	Unrealized Gain/(Loss) ($US)
Foreign Currency Contract Receivables			
Argentina Peso	65,630	$ 1,739	$ 95
Australia Dollar	145,860	102,689	(2,742)
Brazil Real	144,410	37,240	(480)
Canada Dollar	236,011	172,837	(3,325)
Chile Peso	25,104,410	36,173	(1,213)
China Yuan Renminbi	84,753	12,337	125
Colombia Peso	7,955,086	2,444	(56)
Czech Republic Koruna	363,002	16,134	103
Denmark Krone	193,332	29,622	116
Euro Member Countries	194,885	222,826	1,249
Hong Kong Dollar	332,831	42,511	(36)
Hungary Forint	2,047,032	7,305	57
India Rupee	4,215,616	60,344	1,656
Indonesia Rupiah	386,877,630	26,860	464
Israel Shekel	17,578	4,710	(22)
Japan Yen	34,317,739	312,867	6,238
Korea (South) Won	9,412,682	8,447	19
Mexico Peso	622,102	31,549	888
New Zealand Dollar	24,416	16,372	(267)
Norway Krone	627,842	72,509	(439)
Peru Sol	9,254	2,732	7
Philippines Peso	786,569	14,916	117
Poland Zloty	46,181	12,296	82
Russia Ruble	1,510,656	21,719	(905)
Singapore Dollar	44,696	32,798	289
South Africa Rand	251,532	17,467	(182)
Sweden Krona	1,080,795	121,915	2,457
Switzerland Franc	142,698	144,768	1,057
Taiwan New Dollar	593,776	19,459	161
Thailand Baht	565,384	17,374	142
Turkey Lira	53,378	9,776	184
United Kingdom Pound	65,097	82,910	(234)
United States Dollar	2,147,797	2,147,797	-
Total Receivables		$ 3,863,442	$ 5,605

Foreign Currency Spot and Forward Contracts
As of December 31, 2018
(In thousands)

Currency	Notional (local currency)	Fair Value ($US)	Unrealized Gain/(Loss) ($US)
Foreign Currency Contract Payables			
Australia Dollar	(90,224)	$ (63,519)	$ 1,836
Brazil Real	(100,581)	(25,947)	(7)
Canada Dollar	(90,410)	(66,206)	1,241
Chile Peso	(31,939,063)	(46,030)	121
China Yuan Renminbi	(195,170)	(28,410)	(352)
Colombia Peso	(9,167,700)	(2,817)	(10)
Czech Republic Koruna	(247,795)	(11,013)	16
Denmark Krone	(313,280)	(47,995)	(347)
Euro Member Countries	(441,523)	(504,916)	(3,372)
Hong Kong Dollar	(189,734)	(24,235)	35
Hungary Forint	(4,125,059)	(14,721)	76
India Rupee	(1,156,019)	(16,545)	(807)
Indonesia Rupiah	(430,370,864)	(29,847)	(223)
Israel Shekel	(33,452)	(8,967)	118
Japan Yen	(95,146,259)	(868,998)	(22,294)
Korea (South) Won	(17,910,643)	(16,073)	(228)
Mexico Peso	(14,156)	(710)	(25)
New Zealand Dollar	(36,303)	(24,345)	533
Norway Krone	(309,752)	(35,774)	361
Philippines Peso	(55,024)	(1,043)	(13)
Poland Zloty	(43,446)	(11,569)	46
Russia Ruble	(1,261,432)	(18,164)	47
Singapore Dollar	(27,221)	(19,975)	(165)
South Africa Rand	(148,879)	(10,270)	447
Sweden Krona	(482,751)	(54,457)	(1,067)
Switzerland Franc	(21,109)	(21,418)	(112)
Taiwan New Dollar	(521,596)	(17,093)	(58)
Thailand Baht	(455,758)	(14,005)	(109)
Turkey Lira	(10,989)	(1,995)	(43)
United Kingdom Pound	(131,614)	(167,639)	(2,544)
United States Dollar	(1,710,040)	(1,710,040)	-
Total Payables		(3,884,736)	$ (26,899)
Net		$ (21,294)	$ (21,294)

to the extent of the premium paid to enter into the contract.

Futures Contracts with Interest Rate Sensitivity As of December 31, 2018 (In thousands)				
Contract Type	Position	Notional Amount	Fair Value	Weighted Average Duration (years)
U.S. Treasury Notes	Long	$ 6,512,993	$ 83,867	3.6
U.S. Treasury Notes	Short	(816,864)	(4,107)	4.0
U.S. Treasury Bonds	Long	1,489,365	72,175	16.4
U.S. Treasury Bonds	Short	(176,478)	80	16.4
Foreign Government Bonds	Long	448,634	1,234	4.7
Foreign Government Bonds	Short	(138,978)	(437)	7.2
Total		$ 7,318,672	$ 152,812	

Trust fund rebalancing policies and certain portfolio investment guidelines permit the use of exchange-traded and OTC options. Investment guidelines allow options to be used to improve market exposure efficiency, enhance expected returns, or provide market exposure hedges. Exchange rules require that the seller of short exchange-traded option contracts cover these positions either by collateral deposits in the form of cash or by pledging, in escrow, the actual securities that would be transferred to the option purchaser in the event the option contract were exercised. In the case of OTC options, investment guidelines mitigate counterparty credit risk by establishing minimum credit ratings and requiring master netting agreements with provisions for collateral exchanges.

The fair value of option contracts is based upon the closing market price of the contract and is reflected as "Option Contracts" on the Statement of Net Investment Position. Gains and losses as a result of investments in option contracts are included in the "Net Increase (Decrease) in the Fair Value of Investments" on the Statement of Changes in Net Investment Position. The table entitled **Option Contracts** presents the fair value of option contracts as of December 31, 2018.

Option Contracts As of December 31, 2018 (In thousands)							
Description	Contract Type	Position	Exchange-Traded (EXCH) vs. OTC	Expiration	Notional	Fair Value	Unrealized Gain/(Loss)
Equity	CALL	Long	EXCH	Jan 19 - Dec 19	$ 11,876	$ 413	$ (703)
Equity	CALL	Short	EXCH	Jan 19 - Feb 19	(189,992)	(2,309)	(211)
Equity	PUT	Short	EXCH	Jan 19 - Feb 19	(750,901)	(5,933)	468
Equity	PUT	Short	OTC	Jan 19 - Feb 19	(173,032)	(319)	455
Total					$ (1,102,049)	$ (8,148)	$ 9

F. Swaps

Swaps are negotiated contractual agreements between two counterparties which can be cleared or uncleared OTC investments. As is specified in SWIB's investment guidelines, swaps may be used as an alternative to physical securities when it is deemed advantageous for portfolio construction. In addition, swaps may be used to adjust asset class exposures for the Retirement Funds. Guideline limits and soft risk parameters for each portfolio are applied to the aggregate exposures which includes both physical and synthetic securities. A synthetic security is a security or combination of securities that mirrors the properties of another reference security.

Throughout the calendar year, the Retirement Funds held positions in Total Return Swaps (TRS) and Credit Default Swaps (CDS). The table entitled **Open Swap Positions** lists the open swap contracts held at December 31, 2018.

The open CDS contract represents a cleared OTC position where SWIB sold credit protection. Under the terms of the contract, SWIB receives periodic payments and, in exchange, agrees to pay a formula-determined amount to counterparties for losses incurred if stipulated credit events occur. CDS spreads are sensitive to credit spread and interest rate changes. The fair value of CDS is determined using the closing price as reported by the applicable clearinghouse.

The open TRS contracts represent uncleared OTC positions where SWIB receives the return of the underlying equity index, in exchange, agrees to pay the stipulated rate benchmark. The rate benchmark is based on the 3-month London Interbank Offering Rate (LIBOR) and is sensitive to interest rate changes. The fair value for TRS is determined based on the change in quoted market price of the underlying equity index and represents the unrealized gain/(loss) on the contracts since trade inception.

Open Swap Positions
As of December 31, 2018
(In thousands)

Type	Maturity Date	Reference Rate	Notional Amount	Fair Value	Unrealized Gain/(Loss)
Credit Default	Jun-23	NA (1)	$ 175,000	$ 1,404	$ (1,764)
Total Return	Apr-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	49,407	(4,479)	(4,479)
Total Return	Apr-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	150,001	1,130	1,130
Total Return	Jun-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	50,001	(742)	(742)
Total Return	Jul-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	98,822	(7,599)	(7,599)
Total Return	Jul-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	24,703	(2,240)	(2,240)
Total Return	Jul-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	24,998	(2,036)	(2,036)
Total Return	Sep-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	47,067	(3,246)	(3,246)
Total Return	Sep-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	150,001	1,130	1,130
Total Return	Oct-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	49,411	(3,801)	(3,801)
Total Return	Dec-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	46,116	(2,464)	(2,464)
Total Return	Dec-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	49,999	23	23
Total Return	Dec-19	Pay 3-month LIBOR plus Spread, Receive Equity Index Return	150,001	1,130	1,130
Total			$1,065,527	$ (21,790)	$ (24,958)

(1) SWIB sold credit protection in exchange for periodic payments.

The fair value of CDS and TRS is reflected as "Swaps" on the Statement of Net Investment Position. Gains and losses resulting from investments in swap contracts are included in the "Net Increase (Decrease) in the Fair Value of Investments" on the Statement of Changes in Net Investment Position. Any interest owed but not yet paid relating to swap contracts is reported within the category "Other Liabilities" on the Statement of Net Position. Interest expense relating to swap contracts is reported as "Investment Expense" on the Statement of Changes in Net Investment Position.

TBA Contracts
As of December 31, 2018
(In thousands)

Position	Contract Maturity	Fair Value	Unrealized Gain/(Loss)	Weighted Average Duration (years)
Long	Jan 19-Apr 19	$3,220,294	$ 19,975	4.8
Short	Jan 19	(2,534,043)	(39,076)	6.6
Total		$ 686,251	$ (19,101)	

G. To Be Announced Securities

To be announced mortgage-backed (TBA) securities are uncleared OTC forward contracts consisting of mortgage-backed securities (MBS) issued by Government National Mortgage Association, a government entity, and by government-sponsored enterprises such as, the Federal National Mortgage Association or the Federal Home Loan Mortgage Corp. The term TBA is derived from the fact that the actual MBS that will be delivered to fulfill a TBA trade is not designated at the time the trade is made. Instead, the specific pool of mortgages making up the MBS is announced 48 hours prior to the established trade settlement date. Eligibility rules and standards for MBS pools deliverable into TBA contracts ensure that delivered MBS pools are fungible. Payment for TBA securities is not made until the settlement date.

Certain portfolio investment guidelines allow for both long and short TBA positions. To mitigate counterparty credit risk, guidelines establish minimum credit ratings and require master netting agreements which include provisions for collateral exchanges.

TBAs, much like their underlying MBS securities, may be highly sensitive to interest rate changes. This is because the MBS pool on which these forward contracts are based can be subject to early payment in a period of declining interest rates. The price of TBAs can fluctuate as the marketplace predicts changes in timing, or possible reductions in expected cash flows, associated with a change in interest rates. The table entitled TBA Contracts includes the interest rate sensitivity of TBA contracts as of December 31, 2018. Duration, which is stated in years, is the measure of price sensitivity of a fixed income security to an interest rate change of 100 basis points. Duration statistics presented in this table are weighted by the fair value of each position to compute an average duration for the contracts held.

The fair value of TBAs is reflected in "To Be Announced Securities" on the Statement of Net Investment Position. The unrealized gain/loss associated with these contracts is included within the "Net Increase (Decrease) in the Fair Value of Investments" on the Statement of Changes in Net Investment Position.

H. Warrants

A warrant is a contract that entitles the holder to buy the underlying stock of the issuing company at a specified price. Warrants and options are similar in that the two instruments allow the holder special rights to buy securities. However, warrants differ from options in that they provide additional financing to the issuing company when exercised.

As of December 31, 2018, SWIB held warrant contracts giving SWIB the right to purchase 190,780 shares of preferred stock at a price of 1 Euro per share. SWIB was issued these warrants in 2017 in conjunction with an investment in a privately held company. The $3.9 million fair value of these warrants is based upon third-party valuations and is included in the "Equities" section on the Statement of Net Investment Position. The associated unrealized gain of $3.7 million is included in the "Net Increase (Decrease) in the Fair Value of Investments" on the Statement of Changes in Net Investment Position.

6. Securities Lending Transactions

State statutes and Board policies permit SWIB to use investments of the Retirement Funds to enter into securities lending transactions. These transactions involve the lending of securities to broker-dealers and other entities in exchange for collateral, in the form of cash or securities, with the simultaneous agreement to return the collateral for identical securities in the future. SWIB's custodian is an agent in lending the Retirement Funds' directly-held domestic and international securities. When the Retirement Funds' securities are delivered to a borrower as part of a securities lending agreement, the borrower is required to place collateral with the lending agent equal to at least 102% of the loaned securities' fair value, including interest accrued, as of the delivery date, so long as the securities and the collateral are denominated in the same currency. In the event that securities are loaned against collateral denominated in a different currency, the borrower is required to place collateral with the lending agent totaling at least 105% of the loaned securities' fair value, including interest accrued, as of the delivery date. Collateral is marked to market daily and adjusted as needed to maintain the required minimum level. Pledging or selling non-cash collateral securities cannot be done without a borrower default. On December 31, 2018, the fair value of the securities on loan to counterparties was approximately $11.3 billion.

Cash collateral is reinvested by the lending agent in two separate pools, a U.S. dollar cash collateral pool and a pool denominated in Euros. These pools are administered in accordance with contractual investment guidelines which are designed to minimize the risk of principal loss and provide a modest rate of return. Investment guidelines limit credit and liquidity risk by restricting new investments to overnight repurchase agreements collateralized with high quality U.S. government, U.S. government agencies, and sovereign debt securities. To further reduce credit risk, SWIB's custodian provides indemnification to SWIB against counterparty default. The earnings generated from the collateral investments, plus or minus the rebates received from or paid to the dealers and less fees paid to agents, results in the net earnings from lending activities, which are then split on a percentage basis with the lending agent. Cash from the U.S. dollar pool may be posted as collateral relating to short sale transactions and earns the Overnight Bank Funding rate plus 10 basis points. See Note 7 for additional information relating to short sales.

At December 31, 2018, the Retirement Funds had minimal credit risk exposure to borrowers because loans are collateralized in excess of 100%. In addition to the cash collateral reinvestment indemnification, the contract with the lending agent requires it to indemnify the Retirement Funds if the borrowers fail to return the loaned securities and the collateral is inadequate to replace the securities lent. The Retirement Funds are also indemnified against losses resulting from violations of investment guidelines.

The majority of security loans are open-ended and can be terminated on demand by the Retirement Funds or the borrower. Maturities of investments made with cash collateral are not necessarily matched to the maturities of the securities loaned because most loans do not have a fixed maturity date. The risk that SWIB would be unable to return collateral to securities borrowers upon termination of the loan is mitigated by the highly liquid nature of investments held in the collateral reinvestment pools. The average maturities of the loans and the average maturities of the assets held in the collateral reinvestment pools were similar at December 31, 2018.

Securities lending is allowed in certain commingled fund investments. As an investor in such funds, SWIB does not own the underlying securities and does not separately report on securities lending activity. All earnings of these funds are reported in the Statement of Changes in Net Investment

Position as "Net Increase (Decrease) in the Fair Value of Investments."

7. Short Sales

The Retirement Funds may sell a security it does not own in anticipation of purchasing the security later at a lower price. This is known as a short sale transaction. For the duration of the short sale transaction, a liability is recorded under "Short Sales" on the Statement of Net Investment Position. The liability presented on the Statement of Net Investment Position represents the fair value of the shorted securities necessary for delivery to the purchaser and is marked-to-market daily. Realized and unrealized gains and losses associated with short sales are recorded on the Statement of Changes in Net Investment Position, within in the "Net Increase (Decrease) in Fair Value of Investments" category. Prior to executing a short sale, SWIB will borrow the security from a party currently holding it. While the transaction is open, the Retirement Funds incur expenses for securities borrowing costs. In addition, as a security borrower, the Retirement Funds may incur dividend and interest expense as such payments must be remitted to the security lender during the course of the loan. During the duration of the borrow, there may be corporate action elections requiring the borrower to deliver items such as cash or securities to the lender. Expenses resulting from short sales are included in "Investment Expense" on the Statement of Changes in Net Investment Position.

Risks arise from short sales due to the possible illiquidity of the securities markets and from potential adverse movements in security values. The cost to acquire the securities sold short may exceed the amount of proceeds initially received, as well as the amount of the liability recorded as "Short Sales" in the Statement of Net Investment Position. Short sales expose the short seller to potentially unlimited liability because there is no upward limit on the price a shorted security could attain. Certain portfolio guidelines permit short sales and mitigate risks in various ways, such as: limiting the total value of short sales as a percentage of portfolio value, establishing portfolio vs. benchmark tracking error limits, and monitoring other statistical and economic risk measures of the portfolio. Investment performance and risk associated with each portfolio is measured against benchmarks and monitored by management.

When a short sale occurs, the shorting portfolio must borrow the security and deliver it to the buyer. If the shorted security is owned by another Retirement Fund portfolio, investment policies allow the borrowing of the shorted securities from other Retirement Fund portfolios, including inter-fund borrowings. In addition to borrowing securities from existing Retirement Fund portfolios, SWIB may borrow securities from external sources. These borrowings are facilitated by SWIB's custodian.

Except in the case of borrowings within the same trust fund, the Retirement Funds are required to post collateral to the lender, at the required rate of 102% for in-currency loans and 105% for cross-currency loans. The Retirement Funds posted $95.4 million in cash and $1,890.9 million in securities as collateral to security lenders representing $61.7 million in excess of the fair market value of the securities borrowed as of December 31, 2018. If the security lender recalled the security and SWIB was not able to supply the lender with the security, the lender would be permitted to use SWIB's collateral to fund the purchase of the security.

8. Investment Policy and Asset Allocation

As part of SWIB's fiduciary responsibilities, SWIB is required by section 25.15(2)(b) of the Wisconsin Statutes "To diversify investments in order to minimize the risk of large losses, unless under the circumstances it is clearly prudent not to do so, considering each trust's or fund's portfolio as a whole at any point in time." SWIB exercises this duty in part by establishing its investment policy and by setting the asset allocation.

SWIB's Board of Trustees has established the asset allocation pursuant to a comprehensive and ongoing evaluation of the appropriate risk and return standards for each fund under management. The Board of Trustees consists of nine members meeting specific requirements as follows:

- Six Governor-appointed and State Senate-approved members, including:
  - Four with at least ten years investment experience
  - One with at least ten years financial experience and who works for a local government participant in the Local Government Investment Pool
  - One additional member
- Educator participant in the WRS appointed by the Teachers Retirement Board
- Non-educator participant in the WRS appointed by the Wisconsin Retirement Board
- Secretary of the Department of Administration or designee

The Board-approved investment policy for the WRS is intended to assist in development of a diversified portfolio of investments within acceptable risk parameters. The policy represents a delegation of standing authority to the Executive Director/Chief Investment Officer and investment managers within the organization to make prudent investments within the investment guidelines, pursuant to sections 15.02(4) and 25.15(2) of the Wisconsin Statutes and section IB 2.02 of the Wisconsin Administrative Code.

Additionally, the Investment Committee (IC) was created to provide oversight of SWIB investments within the parameters established by the Board of Trustees. Oversight includes analysis of risk and return of the portfolios, asset classes, and Core and Variable Funds. The IC is responsible for proposing to the Board of Trustees changes to the WRS investment policy, approving investment guidelines or strategies for internally-managed portfolios, approving the general strategies for each asset class, and for approving new investment instruments and derivatives strategies. Effective June 2017, the IC became responsible for approving and maintaining guidelines for internally-managed portfolios pursuant of the Board's investment policy. Previously, the internally-managed portfolio guidelines were approved by the Board of Trustees with recommendations coming from the IC. The change in oversight for internally-managed portfolios provides SWIB staff with the ability to more quickly respond to changing investment conditions and is more consistent with the Board's delegation of investment authority to internal investment management staff. The Board of Trustees reserves all rights to modify and amend IC guidelines at any time at its discretion.

The IC approved WRS Investment Guidelines include several policies, including a derivatives use policy, rebalancing procedures, and a leverage use policy. The derivatives use policy sets forth the objectives, monitoring, and reporting guidelines relating to derivative investments. The rebalancing procedures used in both mandatory and discretionary asset class rebalancing are described in the Investment Guidelines, and the leverage use policy describes SWIB's leverage philosophy. The total amount of financial leverage is approved by the Board of Trustees through the WRS asset allocation process.

The Board adopts the Retirement Funds' asset allocation policy, based on recommendations by the IC, the Board's asset allocation consultant, Executive Director/Chief Investment Officer, and Managing Director of Asset and Risk Allocation. SWIB undertakes a comprehensive review of its strategic asset allocation plan every other year, including asset/liability modeling, to determine a suitable target allocation for each asset class included in the Core and Variable Funds, and an annual review to assess whether any interim adjustments should be made. The strategic nature of these reviews contemplates a long-term time horizon over which potential results are evaluated. This exercise is not an attempt to predict short-term market movements, but an effort to understand the long-term impacts of poor, normal, and above average market results.

In addition to potential future market impact, SWIB also contemplates the objectives of the funds, the impact of actuarial analysis, and the soundness of investment return and risk expectations. SWIB's asset allocation policies reflect the Board's program of risk allocation that involves reducing equity exposure by leveraging low-volatility assets, such as "fixed income" securities. This investment strategy results in Core Fund strategic targets which exceed 100% of invested assets. Currently, the Board has approved an asset allocation target of 10% financial leverage for the Core Fund; however, over time, it is anticipated SWIB may increase its financial leverage. Before implementing leverage beyond 10%, the Board, SWIB's asset allocation consultant, and staff will engage in additional focused asset allocation discussion and the Board will approve any additional financial leverage.

SWIB's asset allocation review process also includes assumptions regarding expected rates of return. Long-term (e.g. 30-year) expected real rates of return on pension plan investments are determined using a building block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected real rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. The table entitled **Asset Allocation Targets and Expected Returns** presents the policy asset allocation targets and the best estimates of expected geometric rates of return for each major asset class as of December 31, 2018.

For purposes of determining asset allocation targets, investments may be categorized differently than they are within the financial statements. For example, SWIB's management considers inflation-sensitive assets separately from other "fixed income" investments for asset allocation purposes.

Asset Allocation Targets and Expected Returns
As of December 31, 2018

Core Fund Asset Class	Asset Allocation %	Long-Term Expected Nominal Rate of Return %	Long-Term Expected Real Rate of Return %
Global Equities	49	8.1	5.5
Fixed Income	24.5	4.0	1.5
Inflation Sensitive Assets	15.5	3.8	1.3
Real Estate	9	6.5	3.9
Private Equity/Debt	8	9.4	6.7
Multi Asset	4	6.7	4.1
Total Core Fund	**110**	**7.3**	**4.7**
Variable Fund Asset Class			
U.S. Equities	70	7.6	5.0
International Equities	30	8.5	5.9
Total Variable Fund	**100**	**8.0**	**5.4**

New England Pension Consultants Long Term US CPI (Inflation) Forecast: 2.5%

Asset Allocations are managed within established ranges; target percentages may differ from actual monthly allocations

9. Related-Party Disclosure

During the calendar year, the Core Fund entered into reverse repurchase agreement transactions with the State Investment Fund (SIF), for which the investment assets are managed by SWIB, as a counterparty. The transactions were governed by an MRA, and investment guidelines limit exposure with the SIF to $3.0 billion. Credit exposure is also managed through the transfer of margin between the Core Fund and SIF. As of December 31, 2018, the Core Fund held $1.6 billion in a bilateral reverse repurchase agreement with the SIF. The repurchase agreement was an overnight agreement collateralized with U.S. Treasury securities in the amount of 102%. The Core Fund enters into similar reverse repurchase agreement transactions with other counterparties. The Core Fund is also a participant in the SIF, with an investment totaling $1.6 billion at December 31, 2018. The SIF is a short-term, commingled fund with the investment objective of safety of principal and liquidity while earning a competitive money market rate of return.

10. Contingencies

On September 5, 2008, the Internal Revenue Service (IRS) provided SWIB with a "Notice of Transferee Liability". This claim seeks taxes, penalties, and interest relating to the sale of Shockley Communications Corporation (SCC) stock in 2001.

SWIB is classified as a tax-exempt entity by the IRS. However, the IRS asserts that the shareholders' sale of SCC stock in 2001 should have been characterized as a sale of assets by SCC, on which SCC should have paid income taxes. Based on the theory of transferee liability, the IRS asserts that the former SCC shareholders, including SWIB, are liable for SCC's unpaid taxes, penalties, and interest.

SWIB has filed a petition in the United States Tax Court contesting the proposed IRS assessment. The principal shareholders of SCC were issued similar notices from the IRS and have been litigating their case through the Tax Court and United States Court of Appeals. In April 2014, SWIB and the IRS agreed to stay the Tax Court proceeding with respect to SWIB pending the resolution of the tax case initiated by the principal shareholders of SCC challenging the IRS' characterization of the SCC sale. In 2015, the Tax Court found that the principal shareholders of SCC were liable as putative transferees for the tax, penalties, and interest owed by SCC related to its sale. In October 2017, the 11th Circuit Court of Appeals upheld the 2015 Tax Court opinion with respect to the principal shareholders of SCC; concluding its litigation. Because SWIB has separate and distinct arguments from the principal shareholders of SCC, the Tax Court granted SWIB the opportunity to pursue its case with the Court. In 2018, SWIB's tax counsel and the IRS filed briefs with the Tax Court, and SWIB is awaiting the Court's opinion. Although SWIB's case is still pending, at the end of 2015, SWIB determined it was prudent to accrue a potential loss from the SCC transaction based on the Tax Court's initial adverse opinion against the principal shareholders. SWIB's potential liability, as a putative transferee of SCC assets, is reasonably estimated to be between $20.0 million and $56.0 million as of December 31, 2018. Although results may differ, this estimated range of loss is based on a possible settlement strategy with the IRS and the maximum potential liability to the IRS for the taxes, interest, and potential penalties of SCC based on the Tax Court's decision against the principal shareholders. Accordingly, in calendar year 2015, SWIB accrued a loss of $16.6 million, which represented the estimated minimum amount of the possible loss to which SWIB believes it may be exposed. In calendar year 2018, SWIB accrued an additional loss of $3.4 million to account for accrued interest.

In the ordinary course of operations, SWIB may be party to other various legal actions. SWIB's Chief Legal Counsel handles these matters either directly or with assistance of outside legal counsel. As of December 31, 2018, these matters are not anticipated to have a material financial impact on the WRS' financial position.