REGULAR MEETING OF THE
MONTANA BOARD OF INVESTMENTS
DEPARTMENT OF COMMERCE
2401 Colonial Drive, 3rd Floor, Helena, Montana
October 6, 2016

AGENDA

COMMITTEE MEETINGS

A. Audit Committee
   1. Public Comment – Public Comment on issues with Committee Jurisdiction
   2. Approval of August 2016 Committee Meeting Minutes
   3. Comments from Chair and Reference to Checklist
   4. Executive Director General Comments

B. Human Resource Committee
   1. Public Comment – Public Comment on issues with Committee Jurisdiction
   2. Executive Director Recommendation – Decision

Tab 1 CALL TO ORDER – Mark Noennig, Chairman
   A. Notice of Video Recording of Meeting
   B. Roll Call
   C. Public Comment – Public Comment on issues with Board Jurisdiction
   D. Approval of September 2016 Conference Call Meeting Minutes – Decision
   E. Administrative Business
      1. Audit Committee Report
      2. HR Committee Report – Decision
   F. Comments from TRS and PERS Board Members
   G. Comments from Board Legislative Liaisons

Tab 2 EXECUTIVE DIRECTOR REPORTS – David Ewer
   9:45 AM

BREAK

Tab 3 CASH MANAGEMENT OF STATE MONIES
   Julie Feldman, CPA, John Romasko, CFA & Department of Administration Staff

Tab 5 CAPITAL MARKETS MEAN VARIANCE OPTIMIZATION & MONTE CARLO ANALYSIS – RVK

LUNCH SERVED

Tab 4 STIP RESERVE FUND
   Joe Cullen, CFA, CAIA, FRM, & John Romasko, CFA – Decision

Tab 6 MDEP TRANSITION REPORT – Rande Muffick, CFA

Tab 7 PENSION INVESTMENT OPTIONS AND CONSIDERATIONS
   Joe Cullen, CFA, CAIA, FRM, Dan Zarling, CFA & Eron Krpan, CIPM

BREAK

Tab 8 PRIVATE EQUITY REVIEW – Ethan Hurley, CAIA & Private Equity Team

RECAP OF STAFF TO DO LIST AND ADJOURNMENT – Mark Noennig, Chairman

Appendix

A. Annual Board Meeting Schedule
B. Systematic Work and Education Plan
C. Acronym Index
D. Terminology List
E. Public Market Manager Evaluation Policy
F. Educational Resources

The Board of Investments makes reasonable accommodations for any known disability that may interfere with a person’s ability to participate in public meetings. Persons needing an accommodation must notify the Board (call 444-0001 or write to P.O. Box 200126, Helena, Montana 59620) no later than three days prior to the meeting to allow adequate time to make needed arrangements.
EXECUTIVE DIRECTOR REPORTS
### MBOI Snapshot

**As of 8/31/2016**

#### Investment Pools

<table>
<thead>
<tr>
<th>Pool Type</th>
<th>Internal/External</th>
<th>Market Value</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>MONTANA DOMESTIC EQUITY POOL</td>
<td>Internal 50%</td>
<td>$3,935,192,532</td>
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<tr>
<td></td>
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<td>$3,695,782,952</td>
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<td></td>
<td>Active 22%</td>
<td>$2,121,032,294</td>
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<td>Passive 22%</td>
<td>$1,814,750,658</td>
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<tr>
<td>MONTANA INTERNATIONAL POOL</td>
<td>Internal 50%</td>
<td>$1,635,736,291</td>
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<tr>
<td></td>
<td>External 50%</td>
<td>$1,396,973,700</td>
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<td></td>
<td>Active 22%</td>
<td>$774,627,291</td>
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<tr>
<td></td>
<td>Passive 22%</td>
<td>$622,346,409</td>
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</tr>
<tr>
<td>MONTANA PRIVATE EQUITY POOL</td>
<td>Internal 50%</td>
<td>$1,079,259,083</td>
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</tr>
<tr>
<td></td>
<td>External 50%</td>
<td>$883,717,742</td>
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</tr>
<tr>
<td></td>
<td>Active 22%</td>
<td>$662,471,583</td>
<td>10.53%</td>
</tr>
<tr>
<td></td>
<td>Passive 22%</td>
<td>$420,246,159</td>
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</tr>
<tr>
<td>MONTANA REAL ESTATE POOL</td>
<td>Internal 50%</td>
<td>$903,023,967</td>
<td>8.81%</td>
</tr>
<tr>
<td></td>
<td>External 50%</td>
<td>$742,516,428</td>
<td>8.81%</td>
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<tr>
<td></td>
<td>Active 22%</td>
<td>$534,352,673</td>
<td>8.81%</td>
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<tr>
<td></td>
<td>Passive 22%</td>
<td>$308,163,755</td>
<td>8.81%</td>
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<tr>
<td>RETIREMENT FUNDS BOND POOL</td>
<td>Internal 50%</td>
<td>$2,406,543,010</td>
<td>23.5%</td>
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<tr>
<td></td>
<td>External 50%</td>
<td>$2,034,401,230</td>
<td>23.5%</td>
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<tr>
<td></td>
<td>Active 22%</td>
<td>$1,272,689,410</td>
<td>23.5%</td>
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<tr>
<td></td>
<td>Passive 22%</td>
<td>$861,751,820</td>
<td>23.5%</td>
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<tr>
<td>SHORT TERM INVESTMENT POOL</td>
<td>Internal 50%</td>
<td>$291,855,687</td>
<td>2.85%</td>
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<tr>
<td></td>
<td>External 50%</td>
<td>$232,684,543</td>
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<tr>
<td></td>
<td>Active 22%</td>
<td>$168,309,510</td>
<td>2.85%</td>
</tr>
<tr>
<td></td>
<td>Passive 22%</td>
<td>$104,375,033</td>
<td>2.85%</td>
</tr>
</tbody>
</table>

Grand Total: $10,251,610,570

#### Pension by Plan

<table>
<thead>
<tr>
<th>Plan Type</th>
<th>Market Value</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC EMPLOYEES' RETIREMENT</td>
<td>$5,116,654,337</td>
<td>49.91%</td>
</tr>
<tr>
<td>TEACHERS' RETIREMENT</td>
<td>$3,739,272,064</td>
<td>36.47%</td>
</tr>
<tr>
<td>FIREFIGHTERS' RETIREMENT</td>
<td>$343,614,343</td>
<td>3.35%</td>
</tr>
<tr>
<td>SHERRIF'S RETIREMENT</td>
<td>$304,566,949</td>
<td>2.97%</td>
</tr>
<tr>
<td>GAME WARDENS' RETIREMENT</td>
<td>$317,560,034</td>
<td>2.97%</td>
</tr>
<tr>
<td>HIGHWAY PATROL RETIREMENT</td>
<td>$130,888,875</td>
<td>1.28%</td>
</tr>
<tr>
<td>JUDGES' RETIREMENT</td>
<td>$89,246,895</td>
<td>0.87%</td>
</tr>
<tr>
<td>VOL. FIREMANS' RETIREMENT</td>
<td>$34,207,558</td>
<td>0.33%</td>
</tr>
</tbody>
</table>

Grand Total: $10,251,610,570

#### Top 10 Non-Pension Accounts

<table>
<thead>
<tr>
<th>Account Type</th>
<th>Market Value</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATE FUND INSURANCE</td>
<td>$1,497,159,832</td>
<td>29.79%</td>
</tr>
<tr>
<td>TREASURERS FUND</td>
<td>$735,605,365</td>
<td>14.64%</td>
</tr>
<tr>
<td>PUBLIC SCHOOL TRUST</td>
<td>$708,043,533</td>
<td>14.09%</td>
</tr>
<tr>
<td>STATE AGENCY OTHER</td>
<td>$573,200,602</td>
<td>11.49%</td>
</tr>
<tr>
<td>PERMANENT COAL TRUST</td>
<td>$568,810,840</td>
<td>11.32%</td>
</tr>
<tr>
<td>TREASURE STATE ENDOWMENT</td>
<td>$294,112,152</td>
<td>5.85%</td>
</tr>
<tr>
<td>TOBACCO TRUST</td>
<td>$217,325,988</td>
<td>4.32%</td>
</tr>
<tr>
<td>MONTANA STATE UNIVERSITY</td>
<td>$182,206,236</td>
<td>3.63%</td>
</tr>
<tr>
<td>UCFSR RESTORATION</td>
<td>$134,624,045</td>
<td>2.68%</td>
</tr>
</tbody>
</table>

Grand Total: $5,026,159,304

#### STIP

<table>
<thead>
<tr>
<th>Account Type</th>
<th># Accounts</th>
<th>Total Market Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total STIP</td>
<td>466</td>
<td>1,058,742,768</td>
</tr>
<tr>
<td>Loans Outstanding</td>
<td>$80,516,842</td>
<td></td>
</tr>
<tr>
<td>Bonds Outstanding</td>
<td>$97,340,000</td>
<td></td>
</tr>
<tr>
<td># of Borrowers</td>
<td>189</td>
<td></td>
</tr>
<tr>
<td>2016 Loan Rate</td>
<td>1.55%</td>
<td></td>
</tr>
</tbody>
</table>

**Intercap Statistics**

- Loans Outstanding: $80,516,842
- Bonds Outstanding: $97,340,000
- # of Borrowers: 189
- 2016 Loan Rate: 1.55%

**Average Current Month STIP Yield:** 0.6174%
Cash Management
MEMORANDUM

Montana Board of Investments
Department of Commerce
2401 Colonial Drive, 3rd Floor
Helena, MT 59601 (406) 444-0001

To:       Members of the Board

From:    David Ewer, Executive Director
         (With input from Julie Feldman, CPA, John Romasko, CFA, Neil Fryer, Department of Administration)

Date:    October 6, 2016

Subject: Cash Management of State Monies

Background

For forty years, the Board of Investments (the “Board”) has been responsible for administering the Unified Investment Program, which is constitutionally-mandated. With only a few exceptions, this program mandates that all state money, regardless of source or use, flows into or out of the Board of Investments. The yearly velocity is in the billions of dollars, the number of transactions is in the tens of thousands. The Board serves as a vital utility, but rather than delivering gas or electricity, the Board delivers cash for the entire campus of state government.

Along with the Board of Investments, there are three other key entities at the highest level that are responsible for the state’s cash movement: the Department of Administration’s Treasury Unit, the state’s depository bank, US Bank in Helena, and the state’s custodial bank, State Street Bank, in Boston.

The chart below shows the daily cash flow possibilities among the various entities:
Montana’s State Treasurer, *ex officio*, is Sheila Hogan, Director of the Department of Administration. The Department’s State Accounting Bureau assists the Board of Investments in administering the treasury function and overall cash management. The Bureau Chief annually prepares General Fund cash projections which estimate monthly cash availability and potential cash deficits possibly necessitating the State to issue Tax and Revenue Anticipation Notes (TRANS).

The Treasury Unit deposits the agency collections not deposited directly at US Bank, reconciles all bank accounts, provides a collateralization report on a monthly basis, reconciles all Electronic Funds Transfer, provides prior notification to the Board of Investments of large outgoing wires, and reports all payment and receipt activity to the Board. Additionally the Department works with US Bank on all payment and collection issues and works with the Board in establishing and maintaining all external depository bank accounts and reviewing and approving deposit exceptions as allowed under State law.

The Board’s involvement with cash management is closely related to managing the Short Term Investment Pool (STIP) portfolio. In general, STIP provides the liquidity for all aspects of the cash management function, including the pension funds, various state agencies, the State’s General Fund, and local governments choosing to participate in STIP.

**Cash Flow Types Occurring Throughout the Year**

- **Inflows**: Income from income and property taxes, oil and gas taxes, investment earnings and US government payments.
- **Outflows**: Vendor payments, pension benefits, State of Montana payroll, FICA, school payments (OPI).
- **Settlements**: Security purchases, sales and maturities for STIP, Trust Funds Investment Pool (TFIP), State Fund, Montana Real Estate Pool (MTRP), All Other Funds and pool participant unit purchases and sales. These transactions are included in the State Street/US Bank daily net wire.

**Daily Cash Flow Types to US Bank, the Depository Bank**

- Deposits by the Department of Revenue and Treasury Unit
- ACH (Automated Clearing House) deposits/withdrawals
- Wires in/out including State Street Bank net wire
- Warrants cashed

**Appendix A**

As a reference tool, Appendix A accompanying this memo includes specific Board policy, governance or orientation material directly relating to cash management and the general duties of the State Treasurer.

**Senior Staff Involving Cash Management**

While literally scores of state and private sector employees are part of the State’s cash management, three state employees have principal responsibilities and will make brief presentations during the Board’s October 2016 meeting relating to their respective areas.
Neil Fryer, Financial Operations Supervisor State Accounting Bureau - Neil is responsible for the Treasury and Warrant Writer units within the Department of Administration. Neil will provide an overview of the functions of the Treasury and Warrant Writer, as they relate to the cash management process, along with updates to the state’s disaster recovery plans.

John Romasko, CFA, Investment Officer - John is the Board’s principal staff person who oversees bulk cash movement to and from the depository bank, in Helena and the custodial bank, State Street Bank in Boston. John monitors and assures sufficient liquidity, and invests idle monies.

Julie Feldman, CPA, Financial Manager - Julie is the principal overseer of specific cash movement from the ‘customer’ perspective, i.e., all the STIP customers, primarily state agencies, but many Montana local governments as well, who may use STIP. She and BOI accounting staff are responsible for accounting for the “bulk” cash transactions with respect to the STIP money pool; hers is a dual role.

Questions and Answers (Q and A)

In anticipation of some likely questions, Staff has compiled our responses in the following Q and A:

1. **How does the state pay its bills?**
   Bills are paid through the Department of Administration by issuing checks (called ‘warrants’) drawn against funds at US Bank in Helena. The Board of Investments administers the daily movement of cash between US Bank (the ‘Depository bank’) and State Street Bank (the ‘Custodial bank’).

2. **How does the state track, account, and invest or expend its monies?**
   State agencies remit the cash they collect to the state’s Treasury Unit. Agencies must use SABHRS (Statewide Accounting Budgeting and Human Resource System) to track their cash and other funds. The Unified Investment Program mandates that the Board of Investments is in charge of where and how the money is invested. State agencies use the Treasurer’s Fund or separate STIP accounts for holding their cash. The Treasurer’s Fund has its own STIP account.

3. **What is STIP? How big is it? Who governs it?**
   STIP is the Board’s Short Term Investment Pool, which operates similarly to a money market fund. Its current size is $2.8 billion. Its governance is entirely under the Board of Investments. State agencies that must revert earnings to the State’s General Fund use the Treasurer’s Fund and may not have a separate STIP account.

4. **How much available cash does STIP maintain?**
   STIP maintains at least 10% in daily liquidity and 15% weekly liquidity.

5. **How many STIP customers are there?**
   As of June 30, 2016, there were a total of 491 accounts: 326 state accounts and 165 local government accounts.

6. **Can anyone use STIP?**
   No. State agencies must be authorized by law to have their own STIP account; otherwise they must use the Treasurer’s Fund. Montana local governments may choose to invest in STIP.
7. **What is the difference between the State’s Depository bank and its Custodial bank? Who is responsible for hiring them?**

The Depository bank, US Bank, assigns a bank account in the State of Montana’s name. This account is used to deposit daily cash receipts and pay the State’s warrants. The Department of Administration is responsible for hiring the Depository bank. The Custodial bank, as the name implies, holds (has ‘custody’ of) the securities within the Board’s seven investment pools and the All Other Funds investments. The Custodial bank provides an investment accounting system. The Custodial bank is hired by the Board of Investments and the Department of Administration.

8. **How are these banks paid?**

Both banks are paid by a permanent law (a ‘statutory’ appropriation) rather than the biennial appropriation process. Both vendor functions must be bid out under the State’s procurement laws.

9. **What safeguards are in place to protect the state’s money?**

a. Compartmentalization with separate functions between the Treasury Unit and the BOI. No single individual has the authority to direct the entire cash management process.

b. User access and dollar limitations are controlled by US Bank’s security module and Board internal control policies.

c. Daily reconciliation of STIP and Treasurer’s cash.

d. There are numerous internal controls.

e. Audits are done annually.
Appendix A

Cash Management Authorization

From the Board’s Governance Manual:

**The Unified Investment Program** - The Montana Constitution requires that the Legislature provide for a Unified Investment Program for public funds. Section 17-6-201, MCA, established the Unified Investment Program, created the Montana Board of Investments (the “Board”) and gave the Board sole authority to invest state funds in accordance with state law and the state constitution. State law requires that the Board operate under the "prudent expert principle," defined as: 1) discharging its duties with the care, skill, prudence, and diligence that a prudent person acting in a like capacity with the same resources and familiar with like matters exercises in the conduct of an enterprise of a like character with like aims; 2) diversifying the holdings of each fund to minimize the risk of loss and maximize the rate of return; and 3) discharging its duties solely in the interest of and for the beneficiaries of the funds managed.

**Selection of Custodial Bank and Investment Consultant** – While this Governance Policy delegates general contracting authority to the Executive Director, the Board reserves the right and the authority to make the final selection of the Custodial Bank and the Investment Consultant after which the Executive Director shall negotiate a contract.

From Montana Code Annotated:

**17-6-101. Deposit of funds in hands of state treasurer.** (1) Under the direction of the board of investments, the state treasurer shall deposit public money in the treasurer’s possession and under the treasurer’s control in solvent banks, building and loan associations, savings and loan associations, and credit unions located in the state, except as otherwise provided by law, subject to national supervision or state examination.

(2) If needed financial services are not available through solvent banks, building and loan associations, savings and loan associations, and credit unions located in the state, the state treasurer may deposit public money in out-of-state financial institutions subject to national supervision.

(3) The state treasurer shall deposit funds in banks, building and loan associations, savings and loan associations, and credit unions in amounts that may be designated by the board of investments and shall withdraw deposits when instructed to by the board of investments.

(4) When money has been deposited under the board of investments and in accordance with the law, the state treasurer is not liable for loss on account of any deposit occurring from any cause other than the treasurer’s own neglect or fraud.

(5) The state treasurer shall withdraw all deposits or any part of the deposits from time to time to pay and discharge the legal obligations of the state presented to the treasurer in accordance with the law.

(6) The state treasurer may contract with a financial institution to provide general depository banking services. The cost of contracting for banking services is statutorily appropriated, as provided in 17-7-502, from the general fund.

**17-1-111. General fiscal duties of state treasurer.** (1) The state treasurer is the custodian of all money and securities of the state unless otherwise expressly provided by law.

(2) It is the duty of the state treasurer to:

(a) receive and account for all money belonging to the state, not expressly required by law to be received and kept by some other person;

(b) pay warrants out of the funds upon which they are drawn;

(c) upon payment of any warrant, record the receipt of the person to whom it is paid;

(d) keep an account of all money received and disbursed;
(e) at the request of either house of the legislature or of any legislative committee, give information in writing as to the condition of the treasury or on any subject relating to the duties of the office of state treasurer;

(f) superintend the fiscal concerns of the state;

(g) suggest plans for the improvement and management of the public revenue;

(h) keep an account of all warrants drawn upon the treasury and of other appropriation records that the treasurer determines to be essential for the support of the accounting records maintained in the department;

(i) keep a register of warrants, showing the fund upon which each warrant is drawn, each warrant's number, who received the warrant, and the date issued;

(j) require all persons who have received money belonging to the state but who have not accounted for it to settle their accounts;

(k) draw warrants on the state treasury for the payment of money directed by law to be paid out of the treasury, except that a warrant may not be drawn unless authorized by law;

(l) authenticate with the official seal of the state all warrants drawn and all copies of papers issued from the office of state treasurer;

(m) collect and pay into the state treasury all fees received;

(n) discharge other duties as may be imposed upon the state treasurer by law; and

(o) provide information through the state's official internet website detailing how donations can be made to the state general fund or to any function of state government.
The Board’s SHORT TERM INVESTMENT POOL (STIP) PROGRAM is used by state agencies, local governments and the retirement systems as an alternative to idle cash. STIP investments are short, highly liquid and among the safest obtainable. Although not a money market fund, STIP is structured in a similar way. Its yield tends to be higher due to lower expenses and an ability to make investments of a longer duration due to the predictable nature of government cash needs.

On October 6, 2015 the Board approved, that for financial reporting purposes the STIP portfolio will be reported on a Net Asset Value basis beginning with the month of October 2015 versus amortized cost.

STIP is NOT Federal Deposit Insurance Corporation (FDIC) insured or otherwise insured or guaranteed by the federal government, the State of Montana, the Board or any other entity against investment losses. The Board maintains a reserve fund to offset possible losses and limit fluctuations in STIP's net asset value (NAV).

Created in 1973, STIP provides participants ready access to cash. Shares are fixed at $1.00, fractional shares may be purchased, and participants may buy or sell shares with one business days’ notice. The over $2.5 billion in pool investments are managed by Board Staff. There were 490 accounts invested in STIP during the year, including 170 local government accounts. All investments are made by Board staff and all income is distributed to participants on the first day of the month. The pool reported earnings for state and local government agencies of $2.82 million (unaudited) in Fiscal Year 2015. The table below shows the percent of shares by major participant type.

### STIP By Participant Type

- **Trust Funds**: 4%
- **Investment Pool**: 2%
- **Insurance Reserves**: 2%
- **State Operating Funds**: 62%
- **Local Government Funds**: 23%
- **Pension Funds**: 7%
The TREASURER'S FUND (Fund) is comprised of surplus cash in all state accounts that do not retain their investment earnings. All earnings are deposited in the state general fund. State law authorizes the Board to determine the amount of surplus cash in the Fund to be invested and the type of investments to be made. Invested balances at book value vary widely due to varying levels of excess cash in the state’s general fund and other accounts comprising the Fund. The Fund is managed to maximize income, rather than for total rate of return. This Fund has been a major participant in STIP since 1973 when STIP was created.

Treasurer's Fund Balance as of June 30, 2015 was $1.1 Billion.

<table>
<thead>
<tr>
<th>TREASURER'S FUND RETURNS</th>
<th>1-Year</th>
<th>2-Year</th>
<th>10-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.27%</td>
<td>.21%</td>
<td>1.70%</td>
</tr>
</tbody>
</table>

Treasurer's Fund By Investment Type

- US Agency Bonds: 7%
- US Government Direct Obligations: 5%
- US Bank Sweep Repo: 1%
- Cash Equivalents (STIP): 87%
Reserve Rationale

- It is in the STIP Clients’ best interest to maintain a stable Net Asset Value (NAV).
- The reserve is part of a system to reduce fluctuations in the NAV.
  - It can offset losses realized on assets sales.
  - It can offset declines in portfolio values due to market volatility.
  - The reserve provides flexibility in management during times of stress.
  - A troubled security can be sold before further deterioration without “breaking the buck.”
  - It allows for troubled but credit worthy securities to be held to maturity.

Calculating a Sufficient Reserve

- The Reserve should be sufficient to cover the expected decline in the net asset value (NAV) of the portfolio from foreseeable declines due to adverse market conditions under normal operating conditions.
  - The expected decline in the NAV should be a product of interest rate changes and the duration of the portfolio assets along with the product of spread changes and the spread duration of portfolio assets. The example below demonstrates the risk from changes in spread far outweighs the risk of change in overall interest rates.
  - A foreseeable decline in NAV could be based on the largest changes in yield seen over the past 25 years. The example below shows the largest changes over a 13-week time frame.
  - Normal operating conditions of the STIP portfolio assume not only is the portfolio within guidelines; risk is not intentionally maximized to the limits of the policy guidelines. The example below demonstrates the current risk measurements.

<table>
<thead>
<tr>
<th></th>
<th>Yield Change</th>
<th>Maximum 13 week Yld Change</th>
<th>As of 9/20/2016</th>
</tr>
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<tbody>
<tr>
<td><strong>Non - Spread Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money Market Funds</td>
<td>None</td>
<td>6.0%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Agencies</td>
<td>H15T1YR</td>
<td>16.2%</td>
<td>0.02%</td>
</tr>
<tr>
<td>Treasuries</td>
<td>H15T1YR</td>
<td>3.6%</td>
<td>0.01%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25.8%</td>
<td>0.03%</td>
</tr>
<tr>
<td><strong>Spread Assets</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Asset Back Commercial Paper</td>
<td>ACPB030D</td>
<td>29.6%</td>
<td>0.04%</td>
</tr>
<tr>
<td>Corporate CP/CD/ Notes &lt; 1yr</td>
<td>H15F090D</td>
<td>35.5%</td>
<td>0.20%</td>
</tr>
<tr>
<td>Corporate CP/CD/ Notes &gt; 1yr</td>
<td>BAML CY31</td>
<td>9.1%</td>
<td>0.66%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>74.2%</td>
<td>0.90%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0%</td>
<td>0.93%</td>
</tr>
</tbody>
</table>

- The table shows a sufficient reserve of approximately 1.00%. Significant seasonality exists in STIP balances. Historically, the balance has fluctuated an average of 12% from seasonal lows to highs.
Pace of STIP Reserve

- The amount of reserve to deduct from the yield should be a balance between the need for current yield and the need to reach a sufficient reserve level within a reasonable time period. The table below shows an example of the current level along with several potential levels available to reach 100% of the projected seasonal high.

<table>
<thead>
<tr>
<th></th>
<th>Current 8/31/2016</th>
<th>Projected Seasonal High</th>
<th>Projected Seasonal High</th>
<th>Projected Seasonal High</th>
</tr>
</thead>
<tbody>
<tr>
<td>STIP NAV</td>
<td>$2,852,513,728</td>
<td>$3,043,917,512</td>
<td>$3,043,917,512</td>
<td>$3,043,917,512</td>
</tr>
<tr>
<td>Reserve - Current</td>
<td>$15,209,080 0.533%</td>
<td>$14,917,848 0.490%</td>
<td>$14,917,848 0.490%</td>
<td>$14,917,848 0.490%</td>
</tr>
<tr>
<td>Reserve - Goal 1% NAV</td>
<td>$28,525,137 1.000%</td>
<td>$30,439,175 1.000%</td>
<td>$30,439,175 1.000%</td>
<td>$30,439,175 1.000%</td>
</tr>
<tr>
<td>Difference</td>
<td>$(13,316,057)</td>
<td>$(15,521,327)</td>
<td>$(15,521,327)</td>
<td>$(15,521,327)</td>
</tr>
<tr>
<td>Current Annual Reserve</td>
<td>$2,920,000 0.102%</td>
<td>$3,439,874 0.120%</td>
<td>$2,435,134 0.080%</td>
<td>$7,609,794 0.250%</td>
</tr>
<tr>
<td>Estimate Annual Recovery</td>
<td>$2,750,000</td>
<td>$2,750,000</td>
<td>$2,750,000</td>
<td>$2,750,000</td>
</tr>
<tr>
<td>Years to Reach Goal</td>
<td>(2.35)</td>
<td>(2.51)</td>
<td>(2.99)</td>
<td>(1.50)</td>
</tr>
</tbody>
</table>

Definitions

- **Maturity**
  - **WAM** is the Weighted Average Maturity. It is the average of the shorter of days to maturity or days to coupon reset date in the case of floating rate securities.
  - **WAL** is the Weighted Average Life. It is the average of the days until the maturity of the securities.

- **Yield Change Proxies** are based on various available indices. The selection of the index attempts to best match the characteristics of specific parts of the STIP Portfolio and include:

<table>
<thead>
<tr>
<th>Proxy Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1ST1YR</td>
<td>Federal Reserve Constant 1yr Maturity</td>
</tr>
<tr>
<td>ACPB030D</td>
<td>Bloomberg A1/P1 Asset Back Commercial Paper 30 Maturity</td>
</tr>
<tr>
<td>H1SF090D</td>
<td>Federal Reserve Financial CP 90 Day Maturity</td>
</tr>
<tr>
<td>BAML CY31</td>
<td>BAML 1-3yr A Rated Corporate Bonds</td>
</tr>
</tbody>
</table>

- **Estimated Annual Recoveries** The former SIV assets have been written off the financial statements but the BOI still holds the securities and receives interest and principal payments on them. The estimate is a projection of what the BOI will receive annually over the next several years.
Reserve fund – This Policy requires maintenance of a reserve fund to offset possible losses. STIP interest earnings may be used to fund this reserve before the net earnings are distributed to the STIP Participants. However, the reserves may not be adequate to cover investment losses.

6. Reserve.

The STIP will maintain a reserve account. The reserve will be available to offset realized gains or losses. Additionally, the reserve will be available to offset unrealized gains or losses, or to limit fluctuations in the net asset value (NAV), to the extent deemed prudent by Staff.

A deduction from earnings will occur while the amount of the reserve is below 1.15% of the NAV.

The level of deduction will be calculated based on the deemed best balance between participants’ need for current earnings and the increase in safety from building the reserve. When the reserve is between 0.50% and 1.15% of the NAV the deduction from earnings will be an amount, including recoveries and earnings on the reserve account, sufficient to reach the target within 3 years. Should the reserve fall below 0.50% of the NAV, staff will evaluate the amount of deduction appropriate to return the reserve to 0.50%.

The STIP Net Asset Value (NAV) will be calculated based on the assumption that the STIP reserve is considered a liability on the financial statements.

Any use of the reserve will be reported to the Board.
Investment Consultant
Montana Board of Investments
Asset Allocation Overview
October 2016
Asset Allocation and Portfolio Returns

1. The Strategic Asset Allocation of investment portfolios is the most powerful driver of portfolio returns.

2. Multiple research studies show the dominance of asset allocation in determining overall fund returns & variability.
   a. **100% of Return Amount Over Time** – Research indicates that Funds making timing and selection bets against their long-term policy mix were unsuccessful in adding significant value by engaging in timing and/or manager selection.
   b. **90% of Return Variability Over Time** – Research indicates that roughly 90% of the movement of a Fund’s total return was explained by target policy fluctuation.

Overview of Mean Variance Optimization (MVO)

Mean Variance Optimization (MVO) Overview

Using inputs of expected return, volatility, and correlation, MVO enables investors to identify combinations of distinct asset class allocations that maximize portfolio returns for a given level of risk. MVO shifts the focus from individual manager selection to long-term and strategic asset allocation decisions.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provides a useful framework for discussing the concept of diversification</td>
<td>1. Volatility serves as the only proxy of risk</td>
</tr>
<tr>
<td>2. Focuses investment decision-making on asset allocation</td>
<td>2. Simplified assumption of risk/return trade-off fails to capture how real world investors weigh gains versus losses</td>
</tr>
<tr>
<td>3. Provides a quantitative tool to evaluate risk/return tradeoffs</td>
<td>3. Employs static correlations, which do not capture the reality of return dynamics</td>
</tr>
<tr>
<td></td>
<td>4. Models are sensitive to small changes in assumptions</td>
</tr>
<tr>
<td></td>
<td>5. Unconstrained models concentrate allocations in the highest returning and/or lowest risk asset classes.</td>
</tr>
</tbody>
</table>
### Key Challenge for Institutional Investors

Long term return expectations have declined substantially across many traditional asset classes.

### RVK Capital Market Assumptions 2012 vs. 2016

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>2012</th>
<th>2016</th>
<th>Change (2016 - 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Return (Arithmetic)</td>
<td>Standard Deviation</td>
<td>Return (Compound)</td>
</tr>
<tr>
<td>Large/Mid Cap US Equity</td>
<td>7.75%</td>
<td>17.75%</td>
<td>6.32%</td>
</tr>
<tr>
<td>Small Cap US Equity</td>
<td>8.50%</td>
<td>21.25%</td>
<td>6.48%</td>
</tr>
<tr>
<td>Dev'd Large/Mid Cap Int'l Equity</td>
<td>8.00%</td>
<td>19.00%</td>
<td>6.37%</td>
</tr>
<tr>
<td>Dev'd Small Cap Int'l Equity</td>
<td>8.75%</td>
<td>23.00%</td>
<td>6.40%</td>
</tr>
<tr>
<td>Emerging Markets Equity</td>
<td>10.50%</td>
<td>29.00%</td>
<td>6.88%</td>
</tr>
<tr>
<td>Intermediate Duration Fixed Income</td>
<td>4.25%</td>
<td>5.75%</td>
<td>4.09%</td>
</tr>
<tr>
<td>Core Real Estate</td>
<td>7.00%</td>
<td>12.50%</td>
<td>6.28%</td>
</tr>
<tr>
<td>Global REITs</td>
<td>7.50%</td>
<td>18.00%</td>
<td>6.02%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>11.75%</td>
<td>30.25%</td>
<td>7.87%</td>
</tr>
</tbody>
</table>

## Asset Class Assumptions and Index Performance

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>2016 RVK Assumption</th>
<th>Historical Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Return (Arithmetic)</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Large/Mid Cap US Equity</td>
<td>7.00%</td>
<td>17.75%</td>
</tr>
<tr>
<td>Small Cap US Equity</td>
<td>7.75%</td>
<td>21.25%</td>
</tr>
<tr>
<td>Dev'd Large/Mid Cap Int'l Equity</td>
<td>8.25%</td>
<td>19.00%</td>
</tr>
<tr>
<td>Dev'd Small Cap Int'l Equity</td>
<td>8.50%</td>
<td>23.00%</td>
</tr>
<tr>
<td>Emerging Markets Equity</td>
<td>11.00%</td>
<td>29.00%</td>
</tr>
<tr>
<td>Intermediate Duration Fixed Income</td>
<td>3.50%</td>
<td>6.00%</td>
</tr>
<tr>
<td>Core Real Estate</td>
<td>6.50%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Global REITs</td>
<td>6.50%</td>
<td>19.00%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>10.25%</td>
<td>25.50%</td>
</tr>
<tr>
<td></td>
<td>S&amp;P 500 (Cap Wtd)</td>
<td>Jan 1926 – Dec 2015</td>
</tr>
<tr>
<td></td>
<td>MSCI EAFE (Gross)</td>
<td>Jan 1970 – Dec 2015</td>
</tr>
<tr>
<td></td>
<td>MSCI EAFE – Small Cap (Gross)</td>
<td>Jan 1999 – Dec 2015</td>
</tr>
<tr>
<td></td>
<td>MSCI Emerging Markets (Gross)</td>
<td>Jan 1988 – Dec 2015</td>
</tr>
<tr>
<td></td>
<td>NCREIF ODCE (Gross) (AWA) (Q)</td>
<td>Jan 1978 – Sep 2015</td>
</tr>
<tr>
<td></td>
<td>MSCI World Real Estate (Gross)</td>
<td>Jan 1995 – Dec 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arithmetic Return</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Large/Mid Cap US Equity</td>
<td>11.35%</td>
<td>18.85%</td>
</tr>
<tr>
<td>Small Cap US Equity</td>
<td>12.80%</td>
<td>19.52%</td>
</tr>
<tr>
<td>Dev'd Large/Mid Cap Int'l Equity</td>
<td>10.52%</td>
<td>17.03%</td>
</tr>
<tr>
<td>Dev'd Small Cap Int'l Equity</td>
<td>9.79%</td>
<td>18.18%</td>
</tr>
<tr>
<td>Emerging Markets Equity</td>
<td>12.79%</td>
<td>23.23%</td>
</tr>
<tr>
<td>Intermediate Duration Fixed Income</td>
<td>7.56%</td>
<td>5.42%</td>
</tr>
<tr>
<td>Core Real Estate</td>
<td>8.49%</td>
<td>5.43%</td>
</tr>
<tr>
<td>Global REITs</td>
<td>8.64%</td>
<td>20.01%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>13.43%</td>
<td>9.46%</td>
</tr>
</tbody>
</table>

MBOI Asset Allocation Review
# MBOI Current Asset Allocation & Allowable Ranges

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Current Allocation (as of 6/30/2016)¹</th>
<th>Approved Range²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Equity</td>
<td>37.7%</td>
<td>28 – 44%</td>
</tr>
<tr>
<td>International Equity</td>
<td>15.4%</td>
<td>14 – 22%</td>
</tr>
<tr>
<td>Fixed Income</td>
<td>23.7%</td>
<td>22 – 30%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>11.2%</td>
<td>9 – 15%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>9.3%</td>
<td>6 – 10%</td>
</tr>
<tr>
<td>Cash Equivalents</td>
<td>2.8%</td>
<td>1 – 5%</td>
</tr>
</tbody>
</table>

¹ Current Allocation as of 6/30/2016 using the Public Employees Retirement Plan as a proxy for all retirement plans.

² Approved asset allocation ranges are based on the Montana Board of Investments Retirement Plans Investment Policy approved on April 5, 2016.
MBOI Asset Allocation Analysis

Current and Potential Portfolios

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Current Allocation</th>
<th>Conservative Allocation</th>
<th>Aggressive Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad US Equity</td>
<td>20</td>
<td>45</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
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<td>20</td>
<td>20</td>
<td>25</td>
<td>44</td>
<td>38</td>
<td>23</td>
<td>40</td>
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<tr>
<td>Broad International Equity</td>
<td>10</td>
<td>25</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>13</td>
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<td>25</td>
<td>25</td>
<td>15</td>
<td>14</td>
<td>25</td>
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<tr>
<td>Int. Duration Fixed Income</td>
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<td>50</td>
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<td>40</td>
<td>36</td>
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<td>14</td>
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<tr>
<td>Core Real Estate</td>
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<td>10</td>
<td>17</td>
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<td>20</td>
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<tr>
<td>Private Equity</td>
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<td>7</td>
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<tr>
<td>Cash Equivalents</td>
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<tr>
<td>Capital Apprecation</td>
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<td>Inflation</td>
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<td>9</td>
<td>10</td>
<td>10</td>
<td>6</td>
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<tr>
<td><strong>Expected Return</strong></td>
<td>5.48</td>
<td>5.71</td>
<td>5.94</td>
<td>6.17</td>
<td>6.40</td>
<td>6.63</td>
<td>6.86</td>
<td>7.09</td>
<td>7.32</td>
<td>7.55</td>
<td>6.66</td>
<td>6.08</td>
<td>6.42</td>
<td>7.42</td>
<td></td>
</tr>
<tr>
<td>Return (Compound)</td>
<td>5.18</td>
<td>5.38</td>
<td>5.57</td>
<td>5.74</td>
<td>5.90</td>
<td>6.06</td>
<td>6.21</td>
<td>6.36</td>
<td>6.47</td>
<td>6.39</td>
<td>5.94</td>
<td>5.62</td>
<td>5.35</td>
<td></td>
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</tr>
<tr>
<td>Return/Risk Ratio</td>
<td>0.68</td>
<td>0.69</td>
<td>0.67</td>
<td>0.64</td>
<td>0.62</td>
<td>0.60</td>
<td>0.58</td>
<td>0.56</td>
<td>0.54</td>
<td>0.47</td>
<td>0.53</td>
<td>0.62</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RVK Expected Eq Beta (LCUS Eq = 1)</td>
<td>0.41</td>
<td>0.42</td>
<td>0.45</td>
<td>0.48</td>
<td>0.52</td>
<td>0.55</td>
<td>0.59</td>
<td>0.63</td>
<td>0.69</td>
<td>0.85</td>
<td>0.57</td>
<td>0.52</td>
<td>0.81</td>
<td></td>
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</tr>
<tr>
<td>RVK Liquidity Metric (T-Bills = 100)</td>
<td>76</td>
<td>72</td>
<td>68</td>
<td>66</td>
<td>65</td>
<td>64</td>
<td>64</td>
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<td>76</td>
<td>75</td>
<td>73</td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes
1. Conservative allocation reduces risk primarily via higher fixed income allocation.
2. Aggressive Allocation increases return primarily via higher equity allocation.
MBOI Asset Allocation Analysis – Efficient Frontier

Efficient Frontier and Model Portfolios

![Efficient Frontier and Model Portfolios](image-url)
Current Allocation and Alternative Portfolios

**Probability of Exceeding a 7.75% Compound Return over 10 Years**

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Conservative Allocation</th>
<th>Aggressive Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Allocation</td>
<td>32%</td>
<td>39%</td>
</tr>
</tbody>
</table>

**Expected 10-Year Compound Return**

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Conservative Allocation</th>
<th>Aggressive Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Allocation</td>
<td>5.94%</td>
<td>6.35%</td>
</tr>
</tbody>
</table>

**One-Year Max Drawdowns (1% Probability)**

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Conservative Allocation</th>
<th>Aggressive Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Allocation</td>
<td>-27.93%</td>
<td>-33.75%</td>
</tr>
</tbody>
</table>
Challenges for MBOI

1. **Stretched valuations in key asset classes**
   - U.S. Equity valuations appear high according to several metrics, such as book values and cyclically-adjusted P/Es
   - Fixed Income yields are near historical lows, reducing income returns and increasing price sensitivity to interest rate increases

2. **Probability that the current allocation achieves a long-term return of 7.75% falls below 50%**

3. **Stretching for additional return to meet aggressive objectives may introduce risks that are inconsistent with the MBOI risk profile (e.g., drawdown, liquidity, volatility, headline, etc.)**
Key Issues for Consideration

1. **International vs. Domestic Equity** – Should the MBOI shift the allocation to include more international equity relative to peers and global indices?

2. **Fixed Income Diversification** – Should MBOI seek greater diversification and potential return enhancement by introducing fixed income sectors with less interest rate sensitivity and U.S. exposure?

3. **New Sub-Asset Classes** – Should MBOI seek greater diversification and potential return by introducing new sub-asset classes?
### International Equity vs. U.S. Equity Allocations

#### U.S. Equities as a Percentage of Total Public Equity Allocation

- **MBOI:** 71%
- **Public Plans >$1bn:** 59%

#### Regional Composition of Equity Allocation vs. MSCI ACWI IMI Index

- **MSCI ACWI IMI Index:**
  - U.S. Equities: 53%
  - Non-US Equities: 47%
- **MBOI:**
  - U.S. Equities: 71%
  - Non-US Equities: 29%
- **Public Plans >$1bn:**
  - U.S. Equities: 59%
  - Non-US Equities: 41%

#### Price/Book Value of U.S. and International Equity Indices

(March 2009 – March 2016)

- **MSCI Emerging Market Index**
- **S&P 500 Index**
- **MSCI ACWI Ex US IMI Index**

**Sources:** RVK Public Plan Survey as of 12/31/2015; Bloomberg Index Performance 6/30/2016.
Fixed Income Trends and Valuations


<table>
<thead>
<tr>
<th>Fixed Income Sub-Asset Classes</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Return (Arithmetic)</td>
</tr>
<tr>
<td>Intermediate Duration Fixed Income</td>
<td>3.50%</td>
</tr>
<tr>
<td>Non-US Dev’d Sovereign Fixed Income UH</td>
<td>2.25%</td>
</tr>
<tr>
<td>Emerging Markets Debt Local Currency</td>
<td>6.75%</td>
</tr>
<tr>
<td>Emerging Markets Debt Hard Currency</td>
<td>5.75%</td>
</tr>
<tr>
<td>TIPS</td>
<td>4.00%</td>
</tr>
<tr>
<td>Long Duration Fixed Income</td>
<td>4.25%</td>
</tr>
<tr>
<td>High Yield</td>
<td>6.50%</td>
</tr>
<tr>
<td>Convertibles</td>
<td>5.80%</td>
</tr>
<tr>
<td>Bank Loans</td>
<td>5.25%</td>
</tr>
<tr>
<td>Low Duration Fixed Income</td>
<td>2.50%</td>
</tr>
</tbody>
</table>

Segments with less interest rate sensitivity
Segments with less US Dollar sensitivity

Sources: Bloomberg 10-year Treasury Yield/Last Price. RVK CMA 2016 Fixed Income and Sub-Asset Classes.
Potential New Sub-Asset Classes

Rationale for Considering New Sub-Asset Classes

1. **Return Enhancement** – The MBOI may enhance overall portfolio returns by adding sub-asset classes with more attractive valuations and/or greater opportunity for manager alpha.

2. **Diversification** – The MBOI may reduce portfolio volatility by adding asset classes with return streams that are less correlated to current exposures.

Potential Asset Classes for Consideration

- Preferred Securities
- Master Limited Partnerships (MLPs)
- Emerging Market Debt (EMD)
- High Yield Fixed Income (HY)
- Direct Lending
- Global Tactical Asset Allocation (GTAA)
Preferred Securities

Investment Thesis

Preferred securities are investments that have attributes of both fixed income and equity securities. Preferred securities have a priority of claims to dividends and corporate assets relative to common shareholders but are subordinate to bondholders and other creditors. Attractive attributes of these investments include a moderate to high dividend yield, moderate to low interest rate risk, and a high level of market inefficiency. Risks include sector concentration in financial services and equity-like sensitivity to major equity market declines.

### Preferred Securities Attributes

<table>
<thead>
<tr>
<th></th>
<th>Expected Return</th>
<th>Expected Volatility</th>
<th>Correlation with Equities</th>
<th>Correlation with Fixed Income</th>
<th>Market Inefficiency</th>
<th>Active Manager Conviction</th>
<th>Income Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Return</td>
<td>5.30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected Volatility</td>
<td>3.60%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation with Equities</td>
<td>0.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation with Fixed Income</td>
<td>0.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Inefficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Active Manager Conviction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Income Yield</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
</tr>
</tbody>
</table>

1 S&P 500 used as proxy for equity correlations
2 Barclays US Aggregate Bond Index used as proxy for fixed income correlations

### Historical Preferred Securities Index Return

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>3 Years</th>
<th>5 Years</th>
<th>10 Years</th>
<th>2015</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% BofA ML All Cap/50% BofA ML Fxd Pref Idx</td>
<td>6.57</td>
<td>6.96</td>
<td>7.08</td>
<td>5.10</td>
<td>4.18</td>
<td>12.15</td>
<td>0.58</td>
<td>17.47</td>
<td>2.27</td>
</tr>
<tr>
<td>Russell 3000 Index</td>
<td>2.14</td>
<td>11.12</td>
<td>11.60</td>
<td>7.40</td>
<td>0.48</td>
<td>12.55</td>
<td>33.55</td>
<td>16.42</td>
<td>1.03</td>
</tr>
<tr>
<td>Barclays US Agg Bond Index</td>
<td>6.00</td>
<td>4.06</td>
<td>3.76</td>
<td>5.13</td>
<td>0.55</td>
<td>5.97</td>
<td>-2.02</td>
<td>4.21</td>
<td>7.84</td>
</tr>
</tbody>
</table>

### Sources:

Expected Return and Risk for preferred securities was provided by Cohen and Steers and is based on a five-year time horizon.
Master Limited Partnerships (MLPs)

Investment Thesis
MLPs are equity securities focused primarily on the US midstream energy sector. Assets held by MLPs include pipeline, transportation, storage, and processing infrastructure that link upstream energy assets to end markets. Attractive attributes include high income yield, attractive current valuations, attractive long-term growth prospects, low correlations to both fixed income and equity, and a high level of market inefficiency. Risks include short term sensitivity to oil and natural gas prices and equity-like volatility.

Historical MLP Index Returns

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>3 Years</th>
<th>5 Years</th>
<th>10 Years</th>
<th>2015</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P MLP Index</td>
<td>-25.19</td>
<td>-11.20</td>
<td>-2.77</td>
<td>2.39</td>
<td>-39.11</td>
<td>2.16</td>
<td>22.78</td>
<td>-1.03</td>
<td>7.90</td>
</tr>
<tr>
<td>Russell 3000 Index</td>
<td>2.14</td>
<td>11.12</td>
<td>11.60</td>
<td>7.40</td>
<td>0.48</td>
<td>12.55</td>
<td>33.55</td>
<td>16.42</td>
<td>1.03</td>
</tr>
</tbody>
</table>

MLP Attributes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Return</td>
<td>9.00%</td>
</tr>
<tr>
<td>Expected Volatility</td>
<td>22.00%</td>
</tr>
<tr>
<td>Correlation with Equities¹</td>
<td>0.52</td>
</tr>
<tr>
<td>Correlation with Fixed Income²</td>
<td>-0.08</td>
</tr>
<tr>
<td>Market Inefficiency</td>
<td>High</td>
</tr>
<tr>
<td>Active Manager Conviction</td>
<td>High</td>
</tr>
<tr>
<td>Income Yield</td>
<td>High</td>
</tr>
</tbody>
</table>

¹ S&P 500 used as proxy for equity correlations
² Barclays US Aggregate Bond Index used as proxy for fixed income correlations

Sources: Expected Return and Risk for MLPs are based on RVK Capital Market Assumptions.
Emerging Markets Debt (USD)

Investment Thesis
Emerging markets debt are fixed income securities issued by companies and/or governments in emerging market countries. Emerging market debt can be denominated in either US or local currency. Potential advantages include diversification beyond the US economy and US Dollar, higher yield coupled with a stronger ability to repay due to country growth prospects, and strong potential active manager value-added due to elevated levels of market inefficiency. Key risks include higher return volatility and potential currency risk.

Historical Emerging Market Index Returns

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>3 Years</th>
<th>5 Years</th>
<th>10 Years</th>
<th>2015</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPM CEMBI Diversified Index</td>
<td>5.86</td>
<td>6.19</td>
<td>5.90</td>
<td>7.54</td>
<td>1.18</td>
<td>5.70</td>
<td>-1.72</td>
<td>16.95</td>
<td>3.24</td>
</tr>
<tr>
<td>Russell 3000 Index</td>
<td>2.14</td>
<td>11.12</td>
<td>11.60</td>
<td>7.40</td>
<td>0.48</td>
<td>12.55</td>
<td>33.55</td>
<td>16.42</td>
<td>1.03</td>
</tr>
<tr>
<td>Barclays US Agg Bond Index</td>
<td>6.00</td>
<td>4.06</td>
<td>3.76</td>
<td>5.13</td>
<td>0.55</td>
<td>5.97</td>
<td>-2.02</td>
<td>4.21</td>
<td>7.84</td>
</tr>
</tbody>
</table>

Sources: Expected Return and Risk for emerging markets debt are based on RVK Capital Market Assumptions.

EMD Hard Currency Attributes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Return</td>
<td>5.75%</td>
</tr>
<tr>
<td>Expected Volatility</td>
<td>12.50%</td>
</tr>
<tr>
<td>Correlation with Equities</td>
<td>0.60</td>
</tr>
<tr>
<td>Correlation with Fixed Income</td>
<td>0.56</td>
</tr>
<tr>
<td>Market Inefficiency</td>
<td>Medium</td>
</tr>
<tr>
<td>Active Manager Conviction</td>
<td>High</td>
</tr>
<tr>
<td>Income Yield</td>
<td>High</td>
</tr>
</tbody>
</table>

1 S&P 500 used as proxy for equity correlations
2 Barclays US Aggregate Bond Index used as proxy for fixed income correlations
High Yield Fixed Income

Investment Thesis
High yield fixed income primarily includes investments in corporate bonds with ratings that are below BBB. Attractive attributes of these investments include higher yields, less interest rate sensitivity, and moderate alpha potential due to relatively high market inefficiencies. Risks include increased return volatility due to sensitivity to economic weakness and the possibility of managers experiencing higher than expected default rates.

Historical High Yield Index Returns

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>3 Years</th>
<th>5 Years</th>
<th>10 Years</th>
<th>2015</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>BofA ML US Hi Yld Master II Index</td>
<td>1.71</td>
<td>4.18</td>
<td>5.71</td>
<td>7.44</td>
<td>-4.64</td>
<td>2.50</td>
<td>7.42</td>
<td>15.58</td>
<td>4.38</td>
</tr>
<tr>
<td>Russell 3000 Index</td>
<td>2.14</td>
<td>11.12</td>
<td>11.60</td>
<td>7.40</td>
<td>0.48</td>
<td>12.55</td>
<td>33.55</td>
<td>16.42</td>
<td>1.03</td>
</tr>
<tr>
<td>Barclays US Agg Bond Index</td>
<td>6.00</td>
<td>4.06</td>
<td>3.76</td>
<td>5.13</td>
<td>0.55</td>
<td>5.97</td>
<td>-2.02</td>
<td>4.21</td>
<td>7.84</td>
</tr>
</tbody>
</table>

Sources: Expected Return and Risk for high yield fixed income are based on RVK Capital Market Assumptions.

High Yield Fixed Income Attributes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Return</td>
<td>6.50%</td>
</tr>
<tr>
<td>Expected Volatility</td>
<td>15.00%</td>
</tr>
<tr>
<td>Correlation with Equities¹</td>
<td>0.74</td>
</tr>
<tr>
<td>Correlation with Fixed Income²</td>
<td>0.25</td>
</tr>
<tr>
<td>Market Inefficiency</td>
<td>Medium</td>
</tr>
<tr>
<td>Active Manager Conviction</td>
<td>High</td>
</tr>
<tr>
<td>Income Yield</td>
<td>High</td>
</tr>
</tbody>
</table>

¹ S&P 500 used as proxy for equity correlations
² Barclays US Aggregate Bond Index used as proxy for fixed income correlations
Direct Lending

Investment Thesis
Direct lending investments are private loans focused on middle market companies in the US. Direct lending funds take advantage of unmet loan demand from companies that are too large to qualify for SBC loans, but too small to access the public markets. Direct lending funds are often structured as private equity vehicles. Advantages include higher return and income yield relative to core fixed income, strong diversification benefits relative to core fixed income, and robust opportunities for alpha generation due to market inefficiencies. Disadvantages include relative illiquidity and potential losses associated with adverse manager selection.

Sample Direct Lending Return: White Oak Global Advisors

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>3 Years</th>
<th>5 Years</th>
<th>9 Years</th>
<th>2015</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Return - White Oak Global Advisors</td>
<td>14.29</td>
<td>12.34</td>
<td>8.66</td>
<td>11.33</td>
<td>12.64</td>
<td>12.45</td>
<td>8.15</td>
<td>8.62</td>
<td>2.89</td>
</tr>
<tr>
<td>Russell 3000 Index</td>
<td>2.14</td>
<td>11.12</td>
<td>11.60</td>
<td>7.40</td>
<td>0.48</td>
<td>12.55</td>
<td>33.55</td>
<td>16.42</td>
<td>1.03</td>
</tr>
<tr>
<td>Barclays US Agg Bond Index</td>
<td>6.00</td>
<td>4.06</td>
<td>3.76</td>
<td>5.13</td>
<td>0.55</td>
<td>5.97</td>
<td>-2.02</td>
<td>4.21</td>
<td>7.84</td>
</tr>
</tbody>
</table>

Notes: RVK only consults with private Direct Lending managers and products. Because of the private and idiosyncratic nature of the direct lending products, definitive capital market assumptions, correlations, risks, and returns are difficult to quantify. This is a strength of this asset class, in that manager expertise and very low correlations with traditional asset classes can offer yield enhancement.
Global Tactical Asset Allocation (GTAA)

Investment Thesis
Global Tactical Asset Allocation (GTAA) includes strategies that invest across a broad spectrum of asset classes, including but not limited to domestic equities, international equities, fixed income, cash, currencies, and private assets. Potential advantages include diversification, downside protection, and manager alpha. Potential disadvantages include high fees and active manager risk.

<table>
<thead>
<tr>
<th>GTAA Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Return</td>
</tr>
<tr>
<td>Expected Volatility</td>
</tr>
<tr>
<td>Correlation with Equities</td>
</tr>
<tr>
<td>Correlation with Fixed Income</td>
</tr>
<tr>
<td>Market Inefficiency</td>
</tr>
<tr>
<td>Active Manager Conviction</td>
</tr>
<tr>
<td>Income Yield</td>
</tr>
</tbody>
</table>

¹ Data unavailable

Sample GTAA Return: GMO Benchmark Free (GBMFX)

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>3 Years</th>
<th>5 Years</th>
<th>10 Years</th>
<th>2015</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Return - GMO Benchmark Free (GBMFX)</td>
<td>-4.30</td>
<td>1.34</td>
<td>3.60</td>
<td>5.40</td>
<td>-4.28</td>
<td>1.21</td>
<td>10.73</td>
<td>10.01</td>
<td>3.86</td>
</tr>
<tr>
<td>Russell 3000 Index</td>
<td>2.14</td>
<td>11.12</td>
<td>11.60</td>
<td>7.40</td>
<td>0.48</td>
<td>12.55</td>
<td>33.55</td>
<td>16.42</td>
<td>1.03</td>
</tr>
<tr>
<td>Barclays US Agg Bond Index</td>
<td>6.00</td>
<td>4.06</td>
<td>3.76</td>
<td>5.13</td>
<td>0.55</td>
<td>5.97</td>
<td>-2.02</td>
<td>4.21</td>
<td>7.84</td>
</tr>
</tbody>
</table>

Sources: Expected Return and Risk for GTAA are based on RVK Capital Market Assumptions.
Potential Structures

1. **Opportunistic Allocation** – New sub-asset classes are classified as a distinct asset class composite with a target range (similar to domestic equity and fixed income).
   - The primary advantage of this approach is that performance is easier to differentiate from other investments in the portfolio.
   - Primary disadvantages include benchmarking challenges and additional administrative costs incurred due to new asset class composite set up and monitoring requirements.

2. **Embedding in Current Composites** – A second option is to embed sub-asset classes within existing asset class composites that display similar investment attributes. For example, emerging markets debt managers could be incorporated into the existing fixed income composite.
   - The primary advantage of this strategy is the relative simplicity of implementation.
   - The primary disadvantage is the introduction of additional tracking error in the composite relative to benchmarks and peers.
Recap of Key Issues for Consideration

1. Relative Allocation to International and Domestic equity in Public Equity Portfolios

2. Potential Diversification into New Fixed Income Sectors

3. Potential Introduction of New Sub-Asset Classes
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MEMORANDUM

Montana Board of Investments
Department of Commerce
2401 Colonial Drive, 3rd Floor
Helena, MT 59601 (406) 444-0001

To: Members of the Board

From: Rande R. Muffick, Director of Public Market Investments

Date: October 6, 2016

Subject: Montana Domestic Equity Pool – Transition

The main objective of this transition was to pare risk within the Montana Domestic Equity Pool (MDEP) and also to shift some of the mid cap allocation into the large cap allocation. The size of the transition amounted to $63 million and included the following managers/funds:

<table>
<thead>
<tr>
<th>Manager</th>
<th>Action</th>
<th>Amount (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackRock Equity 500 Index Fund</td>
<td>Increased Investment</td>
<td>$63 million</td>
</tr>
<tr>
<td>Nicholas Mid Cap Growth</td>
<td>Terminated</td>
<td>$63 million</td>
</tr>
</tbody>
</table>

BlackRock Transition Services was selected as transition manager based upon their ability to execute the transaction into their BlackRock Equity 500 Index Fund.

The overall cost of the transition amounted to 8 basis points of the market value of the transition or approximately $51,354. This amount resulted mainly from some slight trading costs but was 3 basis points lower than the pre trade estimate projected by BlackRock.

The transition was completed on July 25, 2016 as all trading of the legacy assets was completed at the market close on that day and cash proceeds from the liquidation were contributed to the target fund as of close on that day also. Because the trades were done on a “market on close” basis any significant market impact costs were avoided.

The table on the following page displays MDEP as of the end of August following the effects of the transition. The various components of the costs and other information are included on the following pages from the post trade summary provided by BlackRock.
<table>
<thead>
<tr>
<th>Manager Name</th>
<th>Market Value (millions)</th>
<th>%</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATE STREET BANK + TRUST CO</td>
<td>163.9</td>
<td>4.16%</td>
<td></td>
</tr>
<tr>
<td><strong>CASH EQUIVALENT Total</strong></td>
<td><strong>163.9</strong></td>
<td><strong>4.16%</strong></td>
<td></td>
</tr>
<tr>
<td>BLACKROCK EQUITY INDEX FUND</td>
<td>2228.0</td>
<td>56.53%</td>
<td></td>
</tr>
<tr>
<td>STATE STREET SP IF ALT INV</td>
<td>6.0</td>
<td>0.15%</td>
<td></td>
</tr>
<tr>
<td><strong>LARGE CAP INDEXED Total</strong></td>
<td><strong>2233.9</strong></td>
<td><strong>56.68%</strong></td>
<td></td>
</tr>
<tr>
<td>ANALYTIC INVESTORS MU3B</td>
<td>154.3</td>
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<td>135.4</td>
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<td>271.6</td>
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<td>316.9</td>
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<tr>
<td><strong>LARGE CAP ACTIVE Total</strong></td>
<td><strong>878.2</strong></td>
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</tr>
<tr>
<td><strong>LARGE CAP Total</strong></td>
<td><strong>3276.1</strong></td>
<td><strong>83.13%</strong></td>
<td><strong>72-91%</strong></td>
</tr>
<tr>
<td>ARTISAN MID CAP VALUE</td>
<td>135.1</td>
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<td>BLACKROCK MIDCAP EQUITY IND FD</td>
<td>67.0</td>
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<tr>
<td>IRIDIAN ASSET MANAGEMENT MU3V</td>
<td>67.5</td>
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<td>NICHOLAS INVESTMENT PARTNERS</td>
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<td>0.00%</td>
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<tr>
<td>TIMESSQUARE CAPITAL MGMT</td>
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<tr>
<td><strong>MID CAP Total</strong></td>
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<tr>
<td>ALLIANCE BERNSTEIN SMALL CAP3R</td>
<td>30.7</td>
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<td></td>
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<td>DIMENSIONAL FUND ADVISORS INC</td>
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<td>VAUGHAN NELSON INV</td>
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<td>VOYA INVESTMENT MANAGEMENT</td>
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<td></td>
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<tr>
<td>WELLS CAPITAL MGT MU3W</td>
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<tr>
<td><strong>SMALL CAP Total</strong></td>
<td><strong>239.1</strong></td>
<td><strong>6.07%</strong></td>
<td><strong>3-11%</strong></td>
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<tr>
<td><strong>MDEP Total</strong></td>
<td><strong>3941.0</strong></td>
<td><strong>100.00%</strong></td>
<td></td>
</tr>
</tbody>
</table>
Portfoio Activity

The following schematic details the activity breakdown that took place when moving from the legacy to target portfolios.

---

The above results are aggregated in a table below and showed versus the projected activity breakdown on pre-transition analysis.

<table>
<thead>
<tr>
<th>Pre-Transition Estimate</th>
<th>Actual Results</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trade Value</td>
<td>Total (%)</td>
</tr>
<tr>
<td></td>
<td>Total Value</td>
<td></td>
</tr>
<tr>
<td>Develop</td>
<td>$65,1222</td>
<td>4%</td>
</tr>
<tr>
<td>Open Market Trade</td>
<td>$394,139,394</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>$146,526,927</td>
<td>100%</td>
</tr>
</tbody>
</table>

---

BlackRock
Montana Board of Investments
## Transition Costs

Costs are broken down into their component parts in the tables and graphics below. Commissions and taxes are a known cost, whereas spread and market impact are estimates and opportunity costs act as the balancing item. Opportunity cost is broken down further into [as relevant] gains or losses on security trades caused by market movements between the closing prices on the benchmark date and the time of execution.

<table>
<thead>
<tr>
<th>Pre-Transition Estimate</th>
<th>Actual Results</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>USP</td>
</tr>
<tr>
<td>Commission*</td>
<td>(19,523)</td>
<td>(3)</td>
</tr>
<tr>
<td>Tax</td>
<td>(345)</td>
<td>(5)</td>
</tr>
<tr>
<td>Spread</td>
<td>(19,200)</td>
<td>(3)</td>
</tr>
<tr>
<td>Market Impact</td>
<td>(25,040)</td>
<td>(4)</td>
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<tr>
<td>Tradable Cost</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td>(94,000)</td>
<td>(11)</td>
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<td>Opportunity Cost</td>
<td>62,007</td>
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<table>
<thead>
<tr>
<th>Total Implementation Sheathfall</th>
<th>From</th>
<th>(12,400)</th>
<th>To</th>
<th>(22,100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>(42,285)</td>
<td>(42,285)</td>
<td>(6)</td>
<td></td>
</tr>
</tbody>
</table>

* Refers to the Binner Trading Report and Revenue Transparency section terms details.

### Implementation Sheathfall (US) Distribution

![Diagram of Implementation Sheathfall (US) Distribution]

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Montana Board of Investments

Page 4 of 8
Pension Investment Options and Considerations

October 6, 2016
Asset Allocation Timetable

- October – Thoughts/Considerations
- November – Recommendation
- Calendar 2017 – Implementation
Important to understand philosophical bias prior to making decisions

- Balance is Critical
  - Risk and Return
  - Sense of urgency and willingness to have patience

- Prediction of investment outcomes isn’t always most important, it is also how you react to the dynamic economic and capital market circumstances.

- With respect to the direction, magnitude, and timing of investment decisions, timing is the most challenging to get correct consistently.

- Long term focus. Short term monitor. Make decisions based on long-term benefits net of costs.

- Simple or Complex approach is too binary. Important to focus on impact on the objective.

- Implementation - Critical not just what you do (Asset Allocation), but how you do it (Due Diligence and Disciplined Process), and flexibility to do it (Liquidity)

- Achieving Objectives
  - Defense first – Risk Management
  - Offense Second – Return Management
  - Safety Always – Preservation of Capital
Working with the Pension Plans

• Our Shared Goal:
  – Sustainable Retirement Benefits

• Communication is Critical
  – The better we understand ongoing contribution, benefit payment levels, and actuarial valuation, the more customized we can specify the investment strategy and the more process we can execute our investment process
Retirement Funding

\[ B = C + I - E \]
\[ I = B + E - C \]
\[ I \geq (B + E - C) \]
\[ I \geq \text{Net Cash Need} \]

- Helpful for understanding Flows, but too simple to put into practice for an investment process. Need to take into account changes over multiple time periods over the entire horizon.
Benefit Payments

• Asset Allocation
  – Strategic Focus on Cash Flows – not a residual
  – Asset Classes/Sub-asset classes

• Implementation
  – Benefit Payments are funded from the pension plan assets
  – Must be aware of $ amount and % amount
  – Maintain flexibility. No need to specify sources of cash flow
  – Structure (asset pools)
Strategic Asset Allocation

• Not an exact science; comprehensive process that is dynamic and includes judgement
• Long-term investing; liquidity is key
• Sources of Risk drive sources of Return
• Focused on Objective
• Defines Investment Opportunities
• “Optimal” Asset Mix
• Preservation of capital and reaching return objectives aren’t either/or choices
Returns

- Drivers of Portfolio/Plan Returns
  - Asset Class Returns
  - Asset Class Weights
- Difference between Actuarial and Market Value Returns
- Importance of compounding and length of the investment horizon
The expected return for a portfolio as described above is 6.3%

A portfolio’s actual returns can differ considerably from expected returns even if asset weights are held constant and the returns are “consistent” with each asset class return distribution.
If a Portfolio had a realized expected return of 6.3% annualized for a ten year period, it could generate an annualized return over a 30-year period of 7.75%, if the portfolio was able to generate an annualized return of 8.48% between years eleven to thirty.

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<th>3.0</th>
<th>4.0</th>
<th>5.0</th>
<th>6.0</th>
<th>7.0</th>
<th>8.0</th>
<th>9.0</th>
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<td></td>
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<td>-16.0%</td>
<td>-8.7%</td>
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<td>9.75</td>
<td>9.44</td>
<td>9.13</td>
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<td>6.82</td>
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<td>6.34</td>
<td>5.65</td>
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<td>11.96</td>
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<td>(1.37)</td>
<td>(4.05)</td>
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<td>(5.80)</td>
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<tr>
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<td>35.15</td>
<td>27.21</td>
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<td>12.35</td>
<td>8.73</td>
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<td>(0.44)</td>
<td>(4.24)</td>
<td>(7.70)</td>
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<tr>
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<td>39.73</td>
<td>30.35</td>
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<tr>
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<tr>
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<td>(0.34)</td>
<td>(2.36)</td>
<td>(4.29)</td>
<td>(9.72)</td>
<td>(14.57)</td>
<td></td>
</tr>
</tbody>
</table>

Return Needed During Second Period to Equate 30 Year Return Equal to: **7.75** (Assumes no cash Flows)
Risk

• Use of Standard Deviation as measure of Risk
  – Estimate to what extent outcomes (actual returns) might be different than expected
  – Output not an input in most cases

• “Real” Risk – failure to achieve objective
  • Components difficult to define: multi-dimensional
  • Dynamic

• Risk Capacity, Risk Tolerance, Risk Appetite
• Some can be eliminated; most risk needs to be managed
Many types of Risk (incomplete list)

- Behavioral
- Credit
- Currency
- Equity
- Inflation
- Interest Rate
- Liquidity
- Operational
- Political
- Regulatory
- Volatility
Liquidity Risk

• Most direct connection with cash flow oriented objective
• If Managed appropriately
  – Never forced to sell
  – Take advantage of Opportunities
  – Cost: short-term drag on returns
  – Potential Benefit: long-term returns

• Importance of “Dry Powder”
  • Contrast with “remain fully invested” approach
Valuation Matters

• Forward Focus
  – Don’t “reach” for historical or expected returns

• Value is determined by fundamental/economic factors in the long-run, however in shorter time periods value may be significantly influenced by market participant actions/behaviors

• Long term returns will benefit from increasing exposure to investments with valuations that look attractive (“cheap”) and reducing exposure to investments with investments that have valuations that are based on optimistic scenarios (“rich”)
Implementation

• Pool Structure
  – Mechanism to implement investment strategy
  – Not the same as asset classes

• Asset Allocation Ranges are important
  • Incorporates belief that returns will be volatile
  • Recognizes that an asset class as a percentage of total is impacted by other asset classes (denominator effect)
  • Acknowledges that a constant specific target doesn’t always align with the “value” of an asset class or the “relative value” compared to other asset classes
Key Takeaways

• Cash flow risk is the primary focus
• Focus on the entire time horizon, not optimization of sub-periods
• Prepare, don’t predict
• “Value” based approach is critical to long-term success
• Strategic allocation that maintains some “dry powder” allows for flexibility to act upon judgements at critical times
MEMORANDUM

To: Members of the Board
From: Ethan Hurley, Director of Private Investments
Date: October 6, 2016
Subject: Montana Real Estate Pool (MTRP)

Following this memo are the items listed below:

i. New commitments:
The table below summarizes the investment decisions made by staff since the last board meeting. One new commitment was made to CBRE Strategic Partners US Value 8, LP. An investment brief summarizing this fund and the general partner follows.

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Vintage</th>
<th>Subclass</th>
<th>Property Type</th>
<th>Amount</th>
<th>Decision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBRE Strategic Partners US Value 8, LP</td>
<td>2016</td>
<td>Value Add</td>
<td>Diversified</td>
<td>$25M</td>
<td>8/4/16</td>
</tr>
</tbody>
</table>
PRIVATE EQUITY
Overview of the Montana Private Equity Pool (MPEP)
Table of Contents

1. Private Equity vs. Public Equity
2. MPEP – Role and Approach
3. MPEP – Objectives and Results
4. MPEP – Macro Risks
5. General Terms Associated with Private Equity Fund Investments
6. Private Equity Fund Investment Strategies & Sub-Strategies
7. Measurement of Private Equity Fund Level Returns
8. Lifecycle of a Private Equity Fund
10. MPEP – What We Have
11. MPEP – Current Focus
12. MPEP – Due Diligence Process
13. Appendix A – Board Brief Key
Montana Private Equity Pool (MPEP)

- Fourth largest Asset Pool for Retirement Plans
  - Allocation range: 9%-15%
- Illiquid assets
- “Equity-like” Risks
Pension Allocation as of 6/30/16

- **RRBP**: 23.6%
- **MTRP**: 9.3%
- **MPEP**: 11.2%
- **STIP**: 2.8%
- **MDEP**: 37.7%
- **MTIP**: 15.4%
MPEP– Role and Approach

• Provide the Plans with exposure to a diverse spectrum of private investment opportunities across different industries, both within and outside the United States.

• Primarily invest in private equity partnership interests.

• Diversify across a number of funds, vintage years, investment opportunities, and geographies.
Private Equity – Objectives and Results

• Objectives
  – High returns
  – Diversification vs. public equities

• Private equity vs public equity
  – Similarities
  – Differences

• Return Results
  – Returns have been high over time; higher than public equities
Private Equity growth of $1 : $16.14
S&P 1500 Growth of $1 : $6.01
Private Equity – Risks

- Cash Flow (Liquidity/Timing)
  - Decision to invest, actual investment, Return on Investment
- Operating and Business
- Country/Industry
- Financial/Leverage
- Valuation
- Structure
- Manager
General Terms Associated with Private Equity Fund Investments
### Summary
Kinderhook Capital Fund V, LP is seeking $650 million to invest in lower middle-market companies operating in the following sectors: light manufacturing, healthcare services and business/environmental services. Targeted portfolio companies will have enterprise values between $25 million and $200 million and require equity commitments of $25 million to $75 million. Kinderhook will focus on acquiring family and founder-run business as well as non-core divisions of corporate parents.

### Commitment
Staff made the decision to commit $35 million to Kinderhook Capital Fund V, LP on May 11, 2016. MBOI had previously committed $20 million to Kinderhook Capital Fund IV, LP in 2014.

<table>
<thead>
<tr>
<th>Fund Overview</th>
<th>Key Terms</th>
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</thead>
<tbody>
<tr>
<td><strong>Fund Name</strong></td>
<td>Kinderhook Capital Fund V, LP</td>
</tr>
<tr>
<td><strong>General Partner</strong></td>
<td>Kinderhook Capital Fund V GP, LLC</td>
</tr>
<tr>
<td><strong>Adviser/Mgmt Co.</strong></td>
<td>Kinderhook Industries, LLC</td>
</tr>
<tr>
<td><strong>Vintage Year</strong></td>
<td>TBD</td>
</tr>
<tr>
<td><strong>Closing Dates</strong></td>
<td></td>
</tr>
<tr>
<td>a. Initial / Next</td>
<td></td>
</tr>
<tr>
<td>b. Montana</td>
<td>June 7, 2016</td>
</tr>
<tr>
<td>c. Target Final</td>
<td>June 7, 2016</td>
</tr>
<tr>
<td>d. Final</td>
<td>June 7, 2016</td>
</tr>
<tr>
<td><strong>Strategy/Subclass</strong></td>
<td>Lower middle market buyout</td>
</tr>
<tr>
<td><strong>Fund Size</strong></td>
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<tr>
<td><strong>Fund Cap</strong></td>
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<tr>
<td><strong>Contact</strong></td>
<td>Tom Tuttle</td>
</tr>
<tr>
<td><strong>Placement Agent</strong></td>
<td><a href="mailto:ttuttle@kinderhookindustries.com">ttuttle@kinderhookindustries.com</a></td>
</tr>
<tr>
<td><strong>Legal Counsel</strong></td>
<td>Kirkland &amp; Ellis LLP</td>
</tr>
<tr>
<td><strong>Auditors</strong></td>
<td>RSM McGladrey, Inc.</td>
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<tr>
<td><strong>Minimum Subscription</strong></td>
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<tr>
<td><strong>Target Returns</strong></td>
<td>3.0x MOIC/30% IRR gross</td>
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</tbody>
</table>
The Limited Partnership – The Fund

• The common legal structure used for private equity funds
• Governed by the Limited Partnership Agreement ("LPA")
  • Sets out the key terms, “rules of the road”: investment limitations and constraints, fund term, management and control, distribution rights, etc.
  • Is subject to discussion and negotiation
• Comprised of:
  • General Partner (The “GP”), Advisor/Management Co.
    • Has management responsibility for the fund
    • Invests the fund’s capital
    • Will make a financial commitment to the fund as an alignment of interest
    • Advisor/Management Co. is an affiliate of the GP and receives a management fee as well as incentive compensation ("carried interest") based on the performance of the fund
  • Limited Partners ("LPs")
    • Pensions, endowments, foundations and other investors
    • Make a financial investment in the partnership ("commitment")
    • Not involved in the day-to-day management of the partnership
    • Receive income and capital gains distributions from investments
Key Terms Associated with Private Equity Funds

- **Term**
  - The duration of the partnership
  - Typically 10 years with extension provisions

- **Investment period**
  - The time period over which the manager is expected to invest the fund
  - Typically 4-6 years

- **Vintage Year**
  - The year of fund formation and/or the first capital call from investors
  - Useful when comparing performance across similar types of funds

- **Committed Capital**
  - The total dollar value amount of capital pledged to a fund
  - Is not invested on day one of the fund, but is called from investors over time
  - Comes from the LPs as well as the GP
  - GP’s capital commitment typically 1%-5%, sometimes as high as 10% - 20%

- **Capital Call**
  - Also known as a draw down
  - Is the actual act of the fund requesting money be transferred to make an investment and/or pay fees and expenses
Key Terms Associated with Private Equity Funds (cont’d)

- **Co-Investments**
  - Outside fund capital raised by the GP
  - Can help to accommodate fund investments that would otherwise violate investment size limitations
  - May be offered on a no fee/no carry basis

- **GP Removal**
  - A provision that allows the GP to be removed with or without cause

- **Key Man Provision**
  - A clause that prevents the GP from making new investments after the departure of a specified number of agreed upon key executives

- **Preferred Return (aka Hurdle Rate)**
  - The minimum required rate of return to LPs before the GP is allowed to receive carried interest

- **Carried Interest**
  - The profit sharing interest of the GP which is payable once LPs have achieved repayment of their invested capital plus the preferred return
  - Typically 20%

- **Clawback**
  - A payment from the GP to LPs of distributions received by the General Partner that exceed the agreed-upon carried interest percentage
• Distribution Waterfall (two types)
  Primary difference is the timing of carried interest received by the GP

**European Waterfall**

— LPs first receive
  • 100% of distributions until 100% of contributed capital plus all expenses has been received for **all** investments plus the preferred return (usually 8%)

— Catchup
  • GP will take some portion, typically 80 – 100%, of subsequent distributions until it has “caught up” to its share (20%) of previously distributed profits for **all** investments over and above the 8% preferred return to LPs

— Thereafter, distributions are shared for **all** investments
  • GP receives 20%
  • LPs receive 80%

**Deal-by-Deal Waterfall**

— LPs first receive
  • 100% of distributions until 100% of contributed capital plus associated expenses have been received for **each** realized investment while maintaining the preferred return (usually 8%)

— Catchup
  • GP will take some portion, typically 80 – 100%, of distributions until it has “caught up” to its share (20%) of previously distributed profits for **each** investment over and above the 8% preferred return

— Thereafter, distributions are shared for **each** investment
  • GP receives 20%
  • LPs receive 80%
Key Terms Associated with a Private Equity Funds - Costs

- **Management Fee**
  - Annual fee paid by LPs to the GP
  - Paid quarterly in advance or in arrears
  - Typically 1.5% - 2.0% per year during the investment period based on capital committed
  - Thereafter can range from 1.0% - 2.0% based on the cost of active investments

- **Fee Offset**
  - Fees received by GP from a variety of fund activities, for example, portfolio monitoring or transaction fees
  - Offset 50% – 100% against the management fee paid by LPs

- **Organizational Expenses**
  - Fees, costs and expenses incurred with the establishment and organization of the fund and its infrastructure
  - Examples of these costs are printing, filing fees and legal
  - The Fund will reimburse the GP to a specified maximum which can range from $500,000 - $2.5M
Key Documents Associated with Private Equity Funds

• **Subscription Agreement**
  – The application submitted by an investor wishing to join the partnership.
  – All prospective investors must be approved by the GP prior to admission to the fund

• **Private Placement Memorandum ("PPM")**
  – A document provided to prospective investors that states the objectives, risks and principal terms of the fund
  – Includes a description of the strategy, the firm’s track record, biographies of the management team and risk factors involved with the fund

• **Side Letter**
  – A legal agreement between an LP and the GP that addresses specific needs and issues that may arise with that LP
    • Ex: FOIA and related state law provisions, administrative matters (reporting requirements) or special LP rights (Advisory Board membership, fee/carried interest concessions, etc.)
  – May be subject to a Most Favored Nation ("MFN") clause whereby side letter agreements entered into by one LP may be available to other LPs
    • carve-outs (i.e. size of commitment) may limit an LP’s ability to adopt other investors’ provisions
Private Equity Fund Investment Strategies & Sub-Strategies
**Buyout**

- “LBO”=leveraged buyout=takeover of a company using equity and borrowed funds
- Large/Mega buyout
  - Typically fund sizes of $2B and up
  - Companies with revenues >$1B, EBITDA of >$300M
- Middle market buyout
  - Fund sizes of $750M to $2B
  - Companies with revenues <$1B, EBITDA of $25M - $300M
- Lower middle market buyout
  - Fund sizes <$750M
  - Companies with revenues of $10M - $300M, EBITDA of $3M - $25M
- Special Situations – Energy-focused funds
- Growth equity – investments in fast-growing companies made with low or no leverage; often minority ownership

**Venture Capital**

- Start-ups and emerging companies
- Primarily information technology and biotech industries
- Can range from seed-stage to later-stage investments
  - Seed-stage = a business idea is funded, capital may be used for product development, testing or market research
  - Early-stage = product or service is available, the company may or may not be generating revenues, capital may be used to expand marketing and/or manufacturing
  - Later-stage = company is generating revenue but may not be generating profits, funding is used to fuel growth prior to an Initial Public Offering (IPO)
**Private Debt**

- **Direct lending**
  - Loans to small and medium-sized companies
  - May be loans to private equity-sponsored or non-sponsored companies
  - May involve the use of fund-level leverage
  - Ranges from senior to junior securities and secured or unsecured by collateral

- **Mezzanine**
  - Capital that may be used to finance an acquisition, recapitalization or to finance growth
  - Subordinated to senior debt but senior to equity in the capital structure
  - Typically pays higher interest rates than senior debt and also comes with an equity “kicker” to enhance returns

- **Distressed**
  - Financial – companies with poorly organized or unsustainable capital structures
  - Operational – companies in need of operational restructuring
  - Includes distressed debt investing (debt trading strategies as well as strategies aimed at gaining control of a company)

**Secondaries**

- Funds formed to acquire existing private equity fund interests
- May also do more non-traditional transactions such as structured secondaries (e.g. deferred payments from buyer to the seller)
- May also do synthetic secondaries/spinouts where a new limited partnership is formed to hold a portfolio of direct investments

**Co-Investments**

- A minority investment made directing into an operating company alongside a private equity fund
- May be a direct investment by a private equity investor or an investment in a fund that makes co-investments
- Attractive for many LPs given that co-investments generally avoid management fees and carried interest
Measurement of Private Equity Fund Level Returns
• **IRR (Internal Rate of Return)**
  - The dollar-weighted rate of return that makes the combined net present value of all positive and negative cash flows equal to zero
  - Cash flows occurring earlier in the time period have a greater effect on the IRR
  - Can be negative initially as capital is called for investments and management fees, but then increases as investments gain in value and are sold

• **PIC (Paid in Capital)**
  - The amount of committed capital that has been transferred from the Limited Partner to the General Partner, includes all investment costs, fees and expenses

• **DPI (Distributions to Paid in Capital)**
  - A ratio of distributions paid to Limited Partners divided by paid in capital
  - Increases over the life of a fund

• **RVPI (Residual Value to Paid in Capital)**
  - A ratio of the current value of investments held in a fund divided by paid in capital
  - Increases initially as investments are made and increase in value and then decreases as they are sold off

• **TVPI (Total Value to Paid in Capital, aka MOIC)**
  - The value of distributions plus residual value divided by paid in capital
  - Increases over the life of the fund
  - \((\text{DPI} + \text{RVPI})/ \text{PIC} = \text{MOIC}\)
Illustrations of Metrics Used to Evaluate & Measure Private Equity Fund Returns

**IRR (%)**

-40% ≤ IRR (%) ≤ 40%

**DPI (x)**

0 ≤ DPI (x) ≤ 1.6x

**RVPI (x)**

0.7x ≤ RVPI (x) ≤ 1.3x

**TVPI (x)**

0.7x ≤ TVPI (x) ≤ 2.3x
Life Cycle of a Private Equity Fund
MBOI’s Experience – Carlyle Partners IV, LP
Vintage Year 2005 Fund

Cash Drawn
Cash Distributed
Cumulative Cash Flow

-40,000,000 -30,000,000 -20,000,000 -10,000,000 0 10,000,000 20,000,000 30,000,000 40,000,000
Review – MPEP Annual Flows
Commitments vs. Remaining Uncalled Capital by Vintage Year

$0
$100,000,000
$200,000,000
$300,000,000
$400,000,000
$500,000,000
$600,000,000
$700,000,000
$800,000,000


1 YTD 2016 through August 2016
Contributions vs. Distributions by Vintage Year

1YTD 2016 through August 2016
Net Cash Flows by Vintage Year

Net Cash Flows

1YTD 2016 through August 2016
MPEP - What We Have
The portfolio is well diversified by strategy, with the most significant strategy weight consisting of Buyout at approximately 63% of total exposure. When combined with Co-Investment and Special Situations, the overall exposure to Buyout is 73%. Given that the timing of investments and realizations are controlled by the fund manager, it is not possible to precisely predict the future direction of the portfolio’s exposure to any given strategy. Staff intends to continue to allocate commitments across strategies in every vintage year, subject to the availability of quality managers. Commitments to Distressed and other private equity strategies will be made on a more opportunistic basis and thus should continue to account for a less significant portion of the total portfolio exposure.
The portfolio is broadly diversified by industry with the information technology, industrials, healthcare, commercial services and supplies and consumer discretionary sectors representing the five largest industry exposures at approximately 67% of total assets. With the exception of energy and the information technology-related industries, the portfolio’s underlying managers tend to be multi-sector investors. Therefore, composition of the portfolio by industry is and will continue to primarily be a function of a manager’s industry expertise and success in sourcing deals rather than a function of staff’s desire to over or underweight a specific industry.
The portfolio’s predominant geographic exposure is to developed North America, representing 85.7% of the market value and uncalled capital domiciled in or targeted for the US and Canada. No significant divergence from this is expected in the near-term. International investments will continue to be targeted both on a one-off opportunistic basis as well as through fund-of-funds.

<table>
<thead>
<tr>
<th>Geography</th>
<th>Remaining Commitments (1)</th>
<th>Percentage</th>
<th>Market Value (2)</th>
<th>Percentage</th>
<th>Total Exposure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>US &amp; Canada</td>
<td>$ 590,522,143</td>
<td>90.4%</td>
<td>$ 913,334,551</td>
<td>82.9%</td>
<td>$ 1,503,856,694</td>
<td>85.7%</td>
</tr>
<tr>
<td>Western Europe</td>
<td>$ 10,584,647</td>
<td>1.6%</td>
<td>$ 79,422,538</td>
<td>7.2%</td>
<td>$ 90,007,184</td>
<td>5.1%</td>
</tr>
<tr>
<td>Asia/ROW</td>
<td>$ 52,306,468</td>
<td>8.0%</td>
<td>$ 108,903,659</td>
<td>9.9%</td>
<td>$ 161,210,127</td>
<td>9.2%</td>
</tr>
<tr>
<td>Total</td>
<td>$ 653,413,257</td>
<td>100.0%</td>
<td>$ 1,101,660,748</td>
<td>100.0%</td>
<td>$ 1,755,074,005</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

(1) Remaining commitments are based upon the investment location of the partnerships.
(2) Market Value represents the aggregate market values of the underlying investment companies of the partnerships.
The portfolio is invested primarily through direct private equity commitments. To the extent the quality of managers invested with directly is comparable to the quality of managers available through a fund-of-funds, a direct strategy should outperform fund-of-funds due to a reduced fee burden. In the medium-term, the portfolio is likely to continue to depend upon fund-of-funds managers for its targeted international investments. Longer term it is the intention of staff to leverage fund-of-funds relationships to slowly move away from this model in order to access more of these specialized managers directly and to reduce overall costs.
MPEP - Current Focus
## MPEP—Strategy and Rationale

<table>
<thead>
<tr>
<th><strong>What</strong></th>
<th><strong>Why</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Focus on North America</td>
<td>• Well understood, resource constraints, deepest, most liquid, “rules of the game”</td>
</tr>
<tr>
<td>• Move the program toward smaller market cap strategies</td>
<td>• More value creation levers, greater alignment of interest, lower leverage/entry multiples</td>
</tr>
<tr>
<td>• Be selective with larger cap re-ups</td>
<td>• Fewer value creation levers, do not totally disregard but focus on our key relationships, best managers</td>
</tr>
<tr>
<td>• Maintain some venture exposure; not actively looking to add exposure</td>
<td>• Focus on the right access, long-term return profile</td>
</tr>
<tr>
<td>• Maintain some secondaries exposure</td>
<td>• Earlier return of capital, focus on differentiation</td>
</tr>
<tr>
<td>• Opportunistically sell in the secondaries market</td>
<td>• Active portfolio management, divest of non-strategic relationships</td>
</tr>
</tbody>
</table>
**MPEP—Strategy and Rationale (cont’d)**

**What**

- Direct Lending
- Selectively add diversified global emerging market managers, focus on Asia
- Sector-focused funds – focus on energy
- Deemphasize fund-of-funds generally in favor of direct fund commitments

**Why**

- Small to medium size enterprises with limited capital solutions, special situations, no access to high yield, adds diversification
- Growth story, augment pool exposure
- Will consider funds investing across the value chain including upstream (operators & allocators), midstream, downstream and oil field services and equipment, distressed opportunities
- If comparable to a fund-of-funds, a direct strategy should outperform due to a reduced fee burden
MPEP Due Diligence Process
Due Diligence Process

- Deal Sourcing
- Fund Monitoring
- Due Diligence
- Legal Review
- Staff Review
Due Diligence Process
Deal Sourcing

Network of Contacts
- Limited Partners
- Plan Sponsors
- General Partners
- Intermediaries
  - Placement Agents
  - Consultants
  - Service Providers
- Periodicals

Forward Calendar
- Funds in the Market
- Rejected Funds
- New Funds
- Re-Ups / New Funds
- Closed Funds
• **Due Diligence Defined:**
  – An investigation or audit of a potential investment
  – Checklists used to ensure that the process is repeatable and disciplined
Due Diligence Process

Due Diligence Checklist

• **Onsites with GPs**
  – Interview staff
  – Review systems, controls
  – Understand firm culture

• **Standard Documents Reviewed**
  – Private Placement Memorandum (PPM)
  – Due Diligence Questionnaire (DDQ)
  – Limited Partnership Agreement (LPA)
  – Manager Valuation Policy
  – Quarterly/Annual Reports
  – Quarterly/Annual Financial Statements
  – SEC: Form ADV Part II
• **Other Requests**
  
  – Investment Memos
  
  – Limited Partner Advisory Committee (LPAC) Presentations & Meeting Minutes
  
  – Annual Meeting Presentations
  
  – Insurance Coverage
  
  – Industry Studies
  
  – Investor Rights Agreements
• **Other Requests (cont’d)**
  – Placement Agent Disclosure Questionnaire
  – Manager Fee and Expense Questionnaire
  – All Funds Historical Transaction Attribution Analysis
  – History of Fund Secondary Transactions
  – Reference Checks: On-List and Off List (focus)
  – Confirmation of auditor
  – Google Search of Firm, Funds, and Individuals
    • Monitor Political Contributions in Montana [www.fec.gov](http://www.fec.gov)
  – Supplemental information requests from MBOI
• **Discussion & Decision**
  – Presentation of Executive Summary Report by lead analyst to all team members
  – Discussion: Assess any issues raised and whether the conclusion justifies the recommendation
  Decision(s):
    • Investment in the Fund
    • Commitment size to the Fund
  – Identify issues to be negotiated during the legal review
• **Legal Review**
  – MBOI legal counsel reviews legal documents and presents report for staff to review
    • Compliance to any negotiated changes in fund terms
    • Compliance to any requested supplemental reports
  – MBOI legal counsel submits the completed and signed legal documents for a scheduled closing
  – MBOI legal counsel will later review any MFN provisions MBOI is eligible to elect for approval
Due Diligence Process

Fund Monitoring

- **Fund Monitoring**
  - Provide Fund information to SSB: Private Edge Group
  - Review Quarterly/Annual Reports & Financials
    - Quarterly Internal Review (RYG) of MPEP/MTRP activity
    - Participate in manager scheduled Quarterly Calls (if any)
  - Schedule in-person, on-site meetings at MBOI
  - Annual General Meetings (AGM), selectively
    - Schedule meetings with existing and prospective fund managers in conjunction with AGM attendance
  - LPAC Membership (if any) Participation, selectively
• **Resources Employed**
  – Internal Staff: Private Investments Team
  – Reporting: State Street Bank - Private Edge Group
  – Legal: Jackson & Walker/Luxan & Murfitt
Appendix A – Board Brief Key

**Summary:** Brief information regarding the Fund's investment objectives and investment strategy while including the types of transactions the Fund will pursue.

**Commitment:** The amount of money that the Board is committed to contribute to the Fund on a specified date.

**Fund Overview:** Summarizes the Fund’s organizational structure, size, class, important dates, target returns, and other pertinent information.

**Fund Name:** The legally recognized name of the Fund.

**General Partner:** The legally recognized name of the general (managing) partner of the Fund.

**Adviser/Mgmt Co.:** The parent that sponsors the Fund.

**Vintage Year:** The year the initial investment was made by the Fund. The vintage year helps explain the Fund’s returns because a vintage year occurring at the peak or bottom of a business cycle can affect later returns.

**Fundraising Timeline**

- **Initial:** The date of the Fund’s first commitment from a limited partner.
- **Montana:** The official date that the general partner closed on Montana’s commitment.
- **Target Final:** The target date for the Fund’s final closing. After this date, the Fund will no longer be open to new investors.
- **Final Close:** The actual date for the Fund’s last closing.

**Risk Class:** Describes the strategy of the Fund within the fund class.

- **Fund Class:** The class and strategy within the asset class that the Fund invests. Common strategies are:
  - **Buyout:** Funds that gain a controlling interest in a company. Within this strategy, Fund’s typically focus buyouts on either large, middle market, or lower-middle market companies.
  - **Distressed:** Typically, the Fund will obtain a controlling position in companies it believes are fundamentally under-valued, but are near or sometimes already in bankruptcy.
  - **Fund of funds:** This strategy involves holding a portfolio of other investment funds rather than investing directly in companies.
  - **Venture capital:** The Fund focuses its investments in early stage companies.

- **Risk Class:** Describes the strategy of the Fund within the fund class.
**Fund Size / Fund Cap:** The amount of money the Fund is targeting to raise, which is usually capped by a maximum amount of money the Fund can raise.

**Contact:** Contact information of the person responsible for investor relations.

**Placement Agent:** An intermediary who has economic incentives to raise capital for the Fund.

**Legal Counsel:** The law firm providing counsel on the Fund documents to the general partner.

**Auditors:** The firm that is auditing the Fund.

**Subscription:** The minimum amount the general partner will accept from a limited partner.

**Target Returns:** How much the Fund anticipates to return to investors.

**Key Terms:** Important aspects of the Fund to consider.

**Law/Jurisdiction:** The domicile of the Fund whose laws the Fund are obligated to follow.

**GP Commitment:** The amount of money the general partner is committed to contribute to the Fund. When the general partner commits a large amount to the Fund it typically signifies that the general partner has confidence in the Fund and its interests are aligned with the interests of the limited partners.

**GP Removal:** Any provisions that allow the general partner to be removed with or without cause.

**Key Man Provision:** A clause that prevents the general partner from making new investments after the departure of a specified number of agreed upon key executives.

**Co-Investments:** Whether or not there is opportunity to invest directly into the Fund’s investments. Co-investments typically do not have a management fee or carry.

**Management Fees:** Any fees due to the manager for managing the Fund.

**Investment Period:** Fees charged to limited partners during the period in which the manager invests the Fund’s capital. Typically, the management fee is based on committed capital during the investment period.

**1st Close Discount:** A discount given to limited partners who commit to the first close.

**Thereafter:** Fees charged following the investment period, through the end of the term.

**Taildown:** Any reduction in fees after the investment period.

**Payable:** When the fee is due to the Fund.

**Fee Offset:** The percentage by which management fees are reduced for other fees charges by the manager (portfolio monitoring fees, transaction fees, etc.).
Appendix A (cont’d) – Board Brief Key

**Clawback**: A provision that ensures that the general partner does not receive more than its agreed percentage of carried interest over the life of the fund. Typically, a Clawback provision entails a minimum return test at the fund level at specified time intervals.

**MFN Provision**: Whether or not the Fund has a most-favored-nation provision. This provision requires that any beneficial treatment the Fund provides to a client must also be provided to the Board.

**Leverage / Borrowing**: The amount of debt used to fund a subscription line of credit.

**Carried Interest**: The share of all profits that the general partner receives when the Preferred Return (8%) is exceeded. Typically, 20% of aggregate gains in excess of the Fund’s Preferred Return is shared with the general partner and 80% of aggregate gains is allocated to the limited partner.

**Catch-Up**: A provision that allows the general partner to temporarily receive a disproportionate share of the Fund’s profits. This continues until the general partner has accumulated 20% of the Fund’s current gains, then all future gains are shared 20%/80%.

**Organizational Expenses**: The maximum amount the Fund can be charged associated with organizing the fund.

**Preferred Return**: The minimum return that the limited partner must receive before the general partner receives carried interest, usually 8%.

**Fund Term**: The legal life of the Fund. When the term ends, the Fund is obligated to liquidate its holdings.

**Waterfall**: The sequence in which proceeds are distributed.

- **European**: Aggregated proceeds are distributed at the end of the Fund.
- **Deal-by-Deal**: Proceeds are distributed on a deal-by-deal basis, not at the fund level, sometimes called American style. This is beneficial for the general partner because carry is distributed after each deal, provided the Preferred Return is met.

**Executive Management Profiles**: Biographical summaries of executive managers.

**Investment Philosophy**: Outline of the Fund’s investment style and strategy.

- **Investment Style**: The Fund’s overarching strategy for choosing investments.
- **Geographic Preference**: The geographic areas where the Fund primarily invests.
- **Investment Strategy**: The Fund’s objective and strategy for selecting investments.
- **Target Investment Size**: The target size per investment for the Fund.
- **Investment Pace**: The rate of investment by Fund managers.

**Portfolio Risk Management**: Summarizes the diversification requirements and investment constraints for the portfolio.
Feb. 23-24  **Quarterly Meeting**
Quarterly reports and subcommittee meetings
Annual Report and Financial Statements – reception and status
Financial Audit
Ethics
Disaster recovery
INTERCAP program
Outreach efforts – loan and municipal programs

April 5  **Non-Quarterly Meeting**
All policy review, scrub and revise
Capital market/asset allocation overview
RVK presentation (TBD)

May 24-25  **Quarterly Meeting**
Quarterly reports and subcommittee meetings
Exempt pay compensation review
Domestic Equities Review
Staffing level review
Custodial banking relationship

August 16-17  **Quarterly Meeting**
Quarterly reports and subcommittee meetings
CEM Benchmarking
International Equities Review
MBOI Budget and legislative-related action-decision
Internal Controls
Fiscal Year performance through June 30\textsuperscript{th}
RVK presentation (TBD)

October 6  **Non-Quarterly Meeting**
Cash management of state monies
Private Equity Review
Staff Asset Allocation Educational Presentation

Nov. 15-16  **Quarterly Meeting**
Quarterly reports and subcommittee meetings
Annual Report and Financial Statements Submission for FY 2016
Affirm or Reset Asset Allocation Ranges
Benchmark Review – *Postpone to February Meeting*?
Real Estate and Timber Review
Resolution 217
Resolution 218
PERS/TRS annual update
2017 Legislative Session issues
Securities litigation status
Proxy voting public equities
Exempt staff annual performance review
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<td>Asset Allocation Range Approval (Board must review/approve annually as per policy)</td>
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<td>Custodial bank relationship, performance, continuity</td>
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<td>Customer relationships (State government)</td>
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<td>Disaster Recovery and other emergency preparedness</td>
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<td>Exempt staff performance and raises (HR policy requires annual consideration)</td>
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<td>Ethics policy – (Board policy requires annual affirmations)</td>
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<td>Policy Statements Review (Governance policy requires annual investment policy review)</td>
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<td>Legislative session and interim matters</td>
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<td>Outreach efforts for Board - loan and municipal programs</td>
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<td>Private Equity Review</td>
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<td>Public Domestic Equities Review</td>
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<td>Public International Equities Review</td>
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<td>Real Estate and timberland</td>
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<td>Resolution 217 update of current Investment Firms (Board policy requires annual update)</td>
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<td>Resolution 218 role of deputy director to serve as acting executive if necessary</td>
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<td>Securities Lending</td>
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<td>Securities Litigation</td>
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<td>Staffing levels (required biannually in board policy)</td>
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<td>State Fund as major client</td>
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MONTANA BOARD OF INVESTMENTS
ACRONYM INDEX

ACH........................................................................................................Automated Clearing House

ADR.....................................................................................................American Depository Receipts

AOF..................................................................................................All Other Funds

ARC.................................................................................................Actuarially Required Contribution

BOI..................................................................................................Board of Investments

CFA.................................................................................................Chartered Financial Analyst

EM..........................................................................................................Emerging Market

FOIA.................................................................................................Freedom of Information Act

FWP.................................................................................................Fish Wildlife and Parks

FX.........................................................................................................Foreign Exchange

IPS.................................................................................................Investment Policy Statement

LDI.................................................................................................Liability-Driven Investing

MBOH...........................................................................................Montana Board of Housing

MBOI.............................................................................................Montana Board of Investments

MDEP.............................................................................................Montana Domestic Equity Pool

MFFA............................................................................................Montana Facility Finance Authority

MPEP.............................................................................................Montana Private Equity Pool

MPT.................................................................................................Modern Portfolio Theory

MSTA.............................................................................................Montana Science and Technology Alliance

MTIP.............................................................................................Montana International Pool

MTRP.............................................................................................Montana Real Estate Pool

MTSBA........................................................................................Montana School Boards Association

MVO.................................................................................................Mean-Variance Optimization
MONTANA BOARD OF INVESTMENTS
ACRONYM INDEX

NAV .......................................................................................................................... Net Asset Value
PERS ....................................................................................................................... Public Employees’ Retirement System
PFL .......................................................................................................................... Partnership Focus List
QZAB .................................................................................................................... Qualified Zone Academy Bonds
QSCB .................................................................................................................... Qualified School Construction Bonds
RFBP ..................................................................................................................... Retirement Funds Bond Pool
RFP ......................................................................................................................... Request for Proposal
SABHRS .......................................................... Statewide Accounting Budgeting and Human Resource System
SLQT ..................................................................................................................... Securities Lending Quality Trust
SSBCI ................................................................................................................... State Small Business Credit Initiative
STIP ....................................................................................................................... Short Term Investment Pool
TFBP ...................................................................................................................... Trust Funds Bond Pool
TFIP ....................................................................................................................... Trust Funds Investment Pool
TIF .......................................................................................................................... Tax Increment Financing
TIFD ....................................................................................................................... Tax Increment Financing District
TRS ....................................................................................................................... Teachers’ Retirement System
TUCS ..................................................................................................................... Trust Universe Comparison Service
VIX ........................................................................................................................ Volatility Index
**Terminology Commonly Used and Generally Understood at the Montana Board of Investments**

*(And most typical context used at BOI)*

**Active management (typically with respect to stocks)**
Investment method which involves hiring a manager to research securities and actively make investment decisions to buy and sell securities in an effort to outperform an assigned index, rather than purchasing a portfolio of securities that would simply replicate the index holdings (*passive* investing).

**Actuarial assumed rate (pension concept)**
The investment return rate used by actuaries that enables them to project the investment growth of retirement system assets into the future (typically perpetual).

**Actuarial funding status (pension concept)**
A measurement made by actuaries to measure a pension system’s financial soundness (ratio of actuarial liabilities to the actuarial value of the assets available to pay the liabilities).

**Alpha (investment term)**
Return on an investment portfolio in excess of the market return or benchmark return; generally used in the context of *active* management (as passive management, by definition, does not seek excess returns, or ‘alpha’).

**Alternative Investments**
A wide range of investments, other than traditional assets such as publically traded stocks and bonds. The most common nontraditional or alternative investments are private equity, real estate, commodities, and hedge funds.

**Arbitrage (bond program)**
A structural or systematic difference between investment types which may allow profiting from the ‘difference,’ i.e., arbitrage. The most common context for the use of ‘arbitrage’ at the BOI is the federal law that prevents ‘arbitrage,’ i.e., the profiting of investing tax-exempt securities (e.g. INTERCAP) into taxable yields investments (such as U.S. Treasuries).

**Asset Allocation and Asset Allocation Range (general investment principle)**
The Board’s invested assets are divided or allocated into various asset classes such as stocks and bonds, each with its own characteristics, with the objective of attaining an optimal mix of risk and return. The total expected return of a portfolio is primarily determined by the mix or allocation to its underlying assets classes. Given the importance of ‘asset allocation,’ the BOI Board sets the asset allocation ‘range’ for each broad investment type or asset class.

**Average life (fixed income, particularly bonds)**
The average time period the debt is expected to be outstanding. This is typically the maturity date for a traditional bond structure, however it will be shorter for bonds having a sinking fund or amortizing payment structure.

**Barclay’s Aggregate Index (fixed income)**
A composite of outstanding bond issues, including corporate, structured, and government bonds whose overall investment features such as return and investment type are tracked over many years. This is the most common benchmark used for comparing the performance of a portfolio that invests in U.S. investment grade fixed income securities. Formerly known as the Lehman Aggregate bond index.

**Basis points (investment jargon)**
A basis point is $100^{th}$ of a percentage. Ten basis points is one tenth of a percent, typically written as 10 bps.
Benchmark (standard investment concept)
The concept of employing a particular independent or market investment return as a measurement to judge an investment portfolio’s return; typically chosen investment benchmarks have the following attributes: they are investible, quantifiable, chosen in advance, easily understandable, and have a long history; common examples are the S & P 500 Index and the Barclay’s Aggregate Index.

Beta (investment jargon)
A measure of the risk (or volatility) of a security or a portfolio in comparison to the market as a whole. If the stock or portfolio moves identically to that market, its beta value is 1; if its price volatility (or movement) is greater than that market’s price volatility, it is said to have beta greater than 1.

Cap, as in large ‘cap’ (generally for stocks, i.e., public equities)
‘Cap’ is short for capitalization, as a reference to the market value of a publically-traded company. The current stock price times the total shares outstanding of the company equals its market capitalization or market ‘cap’; often used contextually such as ‘large-cap,’ ‘mid-cap,’ and ‘small-cap’ for different sized public companies.

Clawback (private equity)
A clause in the agreement between the general partner and the limited partners of a private equity fund. The clawback gives limited partners the right to reclaim a portion of distributions to a general partner for profitable investments based on significant losses from later investments in a portfolio which ultimately resulted in the general partner receiving more distributions than it was legally entitled to.

Core (context varies for equity, fixed income, real estate)
In equity and fixed income, ‘core’ refers to investments that are generally always found in the portfolio and normally expect to hold for a very long time e.g. ‘core’ holdings of the largest U.S. companies, or U.S. treasuries; in real estate, ‘core’ generally refers to the best quality of real estate holdings such as prime commercial property in major metropolitan cities that have low leverage and low levels of vacancy.

Correlation (common statistical concept)
A measure of how two or more investment values or two asset classes move relative to each other during the same time period. A central concept in portfolio construction is to seek investments whose values do not move together at the same time, i.e., are uncorrelated. A correlation of 1 means that two or more investments ‘move’ precisely together.

Custom benchmark (or sometimes custom index)
A way to measure investment performance using a tailor-made measurement versus a generic industry-standard benchmark. At the BOI, total pension performance is measured against the Board’s ‘custom index’ or ‘custom benchmark’ which is a weighted blend of all the underlying asset class benchmarks used to measure the asset class returns.

Derivatives (investment jargon)
Investment securities whose performance itself depends (or is ‘derived’) from another underlying investment return. Examples include stock options, puts/calls, and forward currency contracts whose returns are based on the underlying stock or currency.

Developed markets (equity)
Countries having a long period of stable industrialization; or are the most economically developed.

Discount (fixed income, generally)
Used most often with respect to bonds, the price paid that is less than face (or ‘par’) value. A $1 million face-value of a bond purchased for less than a million is bought at a ‘discount.’ Described as the difference between a bond’s current market price and its face or redemption value.
Diversification (standard investment concept)
The concept of spreading risk by putting assets in several investment categories, each having different attributes with respect to type, expected return, risk, and correlation, to best protect against the risk of loss.

Duration (bonds)
Almost exclusively used when discussing fixed income bonds, a measurement of how sensitive a bonds’ change in price is to a change in general market interest rates, expressed in years (specifically calculated as a weighted average term to maturity of the bond’s cash flows). The greater the duration of a bond, the greater the volatility of price for changes in market interest rates.

Efficiency (usually when discussing various stock markets)
Used to describe markets where it is very difficult to achieve return in excess of that of the overall market from individual stock selection. When information is widely available on a company and its securities are traded regularly the market is considered ‘efficient.’

Emerging Markets (most often for public equities)
Certain international securities markets that are typically small, new, have low turnover, and are located in countries where below-average income prevails and is developing in response to the spread of capitalism.

Enhanced (pertaining to stocks)
Generally linked with ‘index’ as in enhanced index, an indexed investment management style that has been modified to include the portfolio manager’s idea of how to outperform the index by omitting some stocks in the index and overweighting others in a limited manner designed to enhance returns but at minimal risk.

Enhancement (bond program)
At BOI, the term generally refers to credit support or a bond or loan guarantee. For example the Board’s INTERCAP bonds are ‘enhanced’ by the BOI’s performance guarantee bringing down the yearly interest rate.

Excess returns (standard investment concept)
Returns are ‘excess’ if they are more than the market or more than the benchmark they are measured against.

Exempt staff vs. classified staff (specific to Montana state government)
“Exempt” refers to the Board’s seven employees who, under state law, do not fall under the state’s standard employment rules (the ‘classified’ staff).

Fiduciary (from the Latin verb, fidere, to trust)
The concept of trust and watchfulness; a fiduciary is charged with the responsibility of investing the money wisely for the beneficiary’s benefit. Board members are the ultimate ‘fiduciaries’ for the Board’s assets and are obligated to be a good agent.

FTE (state government jargon)
An acronym in state government: “full time equivalent” as in full time employee. The concept is a slot or position, not the actual individuals. The BOI is currently authorized for 32 FTE’s.

Fund of funds (private equity)
A concept used in alternative investments referring to using an investment manager to invest in other managers or funds, as opposed to making direct investments in funds.

GAAP/GASB (accounting terminology)
GAAP...Generally Accepted Accounting Principles; Montana state law uses GAAP accounting principles unless specifically allowed otherwise. GASB...Government Accounting Standards Board, the board that sets GAAP
standards for U.S. governments (FASB...Financial Accounting Standards Board, the entity for commercial and business accounting standards).

**General obligation (municipal finance term)**
Used to describe the promise that a government makes to bond holders, backed by taxing and further borrowing power, it is generally considered the highest level of commitment to bondholders. At the local government level, general obligation bonds typically require a vote of the residents.

**General partner vs. limited partner (private equity)**
In private equity, the general partner is responsible for the operations of the partnership and makes the actual underlying investment decisions; the limited partner is the investor, and therefore has limited liability for investment decisions; the BOI is the ‘limited’ partner in its private equity fund investments (and real estate funds as well).

**Growth (as to style public equities)**
An investment style that more heavily invests in companies whose earnings are expected to grow at an above average rate to the market. A growth stock usually does not pay a dividend, as the company would prefer to reinvest retained earnings in capital projects to grow the company (vs. ‘value,’ which considers buying established companies they feel are trading at bargain prices to the fundamental analysis of the company’s financial statements and internal competitive factors).

**Indenture (bond and loan programs)**
The central document describing the contract between investors and the borrower or user of the proceeds. The Board’s INTERCAP program is structured around a bond indenture.

**Hedge fund (as defined by Investopedia)**
An aggressively managed portfolio of investments that uses advanced investment strategies such as leverage, long, short and derivative positions in both domestic and international markets with the goal of generating high returns (either in an absolute sense or over a specified market benchmark).

**Hurdle Rate (private equity)**
a minimum return per annum that must be generated for limited partners of a private equity fund before the general partner can begin receiving a percentage of profits from investments.

**Index (investment concept)**
Typically a single measure of a broadly-based group of investments that can be used to judge, or be compared to the return performance of an individual investment or manager.

**Indexing (investment concept)**
Typically refers to investing in a portfolio to match a broad range of investments that are set within a pre-determined grouping, such as the S&P 500, so as to match its performance; such investing is generally labeled ‘passive’ or indexed investing; or buying shares in an Index Fund.

**In-state loan program (Montana-specific)**
Programs that are funded by the state’s coal severance tax monies.

**Internal service vs. enterprise fund (state accounting concept)**
Within Montana state government: a program whose funding is dependent on mandatory participation by another state government program is labeled an ‘internal’ service fund; a program whose funding is dependent on voluntary participation is labeled an enterprise fund. At BOI, the investment program is an internal service fund because participation is not voluntary; the Board’s bond and loan programs, because their use is voluntary, are accounted for as an enterprise.
**Investment grade (bonds)**
Bond ratings from Moody’s, Standard and Poor’s, and Fitch high enough to be considered secure enough for most investors (bonds rated AAA – BBB). Below investment-grade bonds (below BBB) are generally considered to have a more speculative outlook and carry more risk of default.

**IRR (private equity)**
A measure of investment performance, short for ‘internal rate of return,’ expressed as a percentage (the ‘internal rate of return’ number, or discount rate) that mathematically will equalize the total future cash flows of an investment to the initial cash outflow of the investment; the concept accounts for the time value of money.

**Leverage (investment concept)**
As an investment concept, a way to increase a return on an investment through a combination of one’s own money and also by borrowing additional money to enhance such an investment; high ‘leverage’ is also associated with high risk.

**Mean Variance Optimization Model (‘Modern Portfolio Theory’)**
A theory that it is possible to construct a portfolio to maximize the return for the least amount of risk or volatility. This theory is based on various asset types and their level of expected return, risk (volatility) and their correlation with each other or how the asset values move with each other. The central idea of the model is to blend investments so that in total, they provide both the best expected return and optimal amount of diversification to minimize deep performance swings (volatility); a central tenant is that long term historical returns are indicative of future returns.

**Mezzanine finance (private equity)**
Subordinated debt with an equity ‘kicker’ or ability to share in the equity value of the company. It is typically lower quality because it is generally subordinated to debt provided by senior lenders such as banks, thus is considered higher risk.

**Multiple (as in “multiple” of invested capital, private equity)**
The ratio of total cash returned over the life of the investment plus the investment’s residual value over the total cash expended in making the investment. A multiple of 2 means, regardless of the total investment time period, that total cash returned was twice the cash invested.

**130/30 Strategy (public equities)**
Also called ‘partial long short,’ this strategy involves the establishment of a short position in select stocks while taking the proceeds of those shorts and buying additional long positions in stocks. The net effect is an overall market position that is 100% long, but the active decisions on individual stock selections are amplified by this ability to short. If the stock selections are successful, the strategy enables the portfolio to profit more than if a stock had simply not been owned, as with traditional long-only portfolios.

**Opportunistic (real estate)**
In real estate, a euphemism for the most risky real estate investments, typically distressed, raw land, newly developed buildings or other high risk investments in the real estate sector, (versus, ‘core,’ which are the best quality fully leased commercial properties).

**Overweight or underweight (investment concept)**
Generally the level of holdings of a certain type of investment that is above or below either a benchmark’s weight (portion of total investment), or the percentage held of a particular asset class compared to the Board’s asset allocation policy weight. Also used to describe an external investment manager’s decision to have more (or less) of a particular investment than the percentage or weighting found in the benchmark.
Passive management or passive investment (most often in public equities, but not exclusively)
An investment style where a fund’s portfolio mirrors a market index, such as the S&P 500, with limited selection decisions by the manager, resulting in market returns. Passive management is the opposite of active management in which a fund’s manager attempts to beat the market with various investment strategies and buy/sell decisions of a portfolio of securities to enhance returns.

P/E ratio (equity)
The price of a publically traded stock divided by its estimated or actual earnings is the price/earnings or P/E ratio. This can also be calculated for a stock index or portfolio of stocks. Over the last 100 years, the S&P 500 has had an overall P/E ratio of about 15, or a total index price of about 15 times the annual earnings of its underlying companies.

Pacing study (private equity)
An analysis of the likely timing and amount of the drawdown of committed but yet uninvested monies and the estimated distributions or returns from the funds held in an alternative investment portfolio, generally used to judge the future size of the portfolio and its potential liquidity needs, i.e., cash funding demands.

Par (fixed income)
The initial principal amount designated by the issuer of the bond, or face value of a bond.

Passive
For investments, generally not materially participating in an investment decision, meaning an investment portfolio whose returns follows that of a broad market index, such as an investable stock index, i.e. the S & P 500.

Passive weight (generally equities)
The percentage of a stock held in a particular index portfolio, or percentage of an overall asset class that is held in passive portfolios.

Policy Portfolio
A fixed-target asset allocation, as opposed to asset allocation ranges, which theoretically allows gauging whether deviations from the target portfolio had a positive or negative impact on overall performance.

Portable alpha (public equities)
An investment strategy which involves the active selection of securities while neutralizing overall beta or market risk. This often involves the use of derivative investments such as futures to replicate the market return, either taking a short or long position, while then selecting securities which are expected to add return in an absolute sense or in addition to the market return. As an example, this strategy can be found with certain hedge funds where a market exposure is shorted while individual securities such as specific stocks are purchased that are expected to outperform the general market. The concept of portable applies when the ability to generate positive alpha can be overlaid or ported onto a portfolio. This is not a strategy employed by any of MBOI’s existing managers.

Premium (fixed income)
Most often the amount paid over the stated face amount (often called ‘par’) of a bond, but also used in other contexts, typically paying more (the premium) than a market price (as in a take-over bid for a company).

Proxy (publically traded companies)
An agent legally authorized to act on behalf of another party. Shareholders not attending a company’s annual meeting may choose to vote their shares by proxy by allowing someone else to cast votes on their behalf, but the word ‘proxy’ is used more frequently colloquially as a ‘close approximation.’
**Prudent expert, prudent person (a central fiduciary concept)**

These legal terms have long histories of court-determined standards of care, deriving originally under English common law. The BOI is empowered to operate under the ‘prudent expert rule,’ which states that the Board shall manage a portfolio:

a) *with the care, skill, prudence, and diligence, under the circumstances then prevailing, that a prudent man acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of a like character and with like aims;*

b) *diversify the holdings of each fund within the unified investment program to minimize the risk of loss and to maximize the rate of return unless, under the circumstances, it is clearly prudent not to do so; and *

c) *discharge the duties solely in the interest of and for the benefit of the funds forming the unified investment program.*

At an ‘expert’ level; there is more room for accepting risk under the prudent expert rule than the prudent person rule.

**Rebalancing (general investment term)**

The process of realigning the weightings of the portfolio of assets. Rebalancing involves periodically buying or selling assets in the portfolio to maintain the original desired level of asset allocation and/or to stay within predetermined asset category range; it is part of a disciplined investment approach within modern portfolio theory.

**Resolution (government term)**

Generally a formal and written action by a governmental (or corporate) body that has long term significance and requiring a vote of the governing body. BOI uses ‘resolutions’ generally only for its most significant and long term actions and/or policies.

**Securities lending (general investment)**

Investments that are temporally borrowed by other investors for a fee; the BOI allows most of its publically traded investments to be loaned for additional marginal income.

**Standard deviation (common statistical concept)**

A specific statistic that measures the dispersion of returns from the mean over a specific time period to determine the “historical volatility” of returns for a stock, or portfolio, or asset class; more specifically a single unit (i.e., one standard deviation) of dispersion that accounts for approximately 66% of all data around a mean using a ‘normal’ (or ‘uniform’ or ‘bell-shaped’ curve; as opposed to a skewed or asymmetrical) distribution. The standard deviation is used as a gauge for the amount of expected future volatility.

**SABHRS (accounting jargon)**

Montana state government’s State Accounting, Budgeting and Human Resource System; the State’s central information management system. BOI investment and other financial data must tie and be reported on this system, which is the official book of record and includes the state’s financial statements.

**Style drift (often in reference to public equity managers, but applicable to other managers, too)**

As the name implies, a divergence from an investor’s professed investment bias or style or objective.

**Tracking error (statistical concept in investments)**

A measurement of the standard deviation of a portfolio’s return versus the return of the benchmark it was attempting to outperform. The concept is often used when discussing investment managers. For example some styles are expected to have high ‘tracking errors,’ (e.g., deep ‘value’ investors who buy companies that may be dogs for years), versus passive managers, whose stock volatility is expected to be very close to their benchmark. Tracking error can either be intentional or unintentional; it can also be regarded as an accepted deviation or contrary to the management agreement. High *unexpected* tracking error is generally a serious concern to be examined and understood.
**Underwriter (bond program)**
In investments, the agent who buys investments to be resold to the public; at BOI, the investment firms that buy the Board’s bonds to be resold to the public.

**Unified Investment Program (Montana Constitution)**
The Program in the State’s constitution requiring a central investment program which the legislature has assigned to the BOI.

**Value (as to style when discussing public equities)**
An investment style that focuses on buying established companies that investors believe are undervalued and trading at bargain prices to the fundamental analysis of the company’s financial statements and internal competitive factors.

**Venture capital (private equity)**
A higher-risk/high-return type of investing in startup firms and small businesses with perceived long-term growth potential. Sometimes these are already existing business ventures with limited operating history that need additional management expertise and access to capital. (For start-ups, ‘seed capital,’ or ‘angel investor’ are terms differentiating this even higher risk type of investment.)

**Volatility (investment jargon)**
A statistical measure of the dispersion of returns for a given security or market index. Volatility is typically measured by using the standard deviation of returns from the security or market index. Commonly, the higher the volatility, the riskier the security.

**Yield (general investment, but most often within fixed income)**
The amount returned to the investor above the original investment generally expressed as a percentage. Yield can be thought of as the expected return from the combination of interest and price accrual or amortization to maturity (in the case of a bond trading at a discount or premium to par).

**Yield curve (fixed income)**
A line that plots the prevailing interest rates at a given time for bonds ranging in maturity from as short as three months out to 30 years. When plotted across these various maturities (typically 2, 5, 7, 10 and 30 years), the resultant line is shaped like a curve with generally low interest rates (the yield) for shorter maturities and gradually higher interest rates for longer maturities, because generally investors demand higher interest rates for longer term investments. The yield curve for U.S. Treasury debt is the most common when referring to the prevailing level of interest rates.
MONTANA BOARD OF INVESTMENTS
PUBLIC MARKETS MANAGER EVALUATION POLICY

INTRODUCTION

The purpose of this policy is to broadly define the monitoring and evaluation of external public markets managers. This policy also provides a basis for the retention and/or termination of managers employed within the Montana Domestic Equity Pool (MDEP), the Montana International Equity Pool (MTIP), the Retirement Funds Bond Pool (RFBP), and the Trust Funds Investment Pool (TFIP).

The costs involved in transitioning assets between managed portfolios can be significant and have the potential to detract from returns. Therefore it is important that the decision process be based on a thorough assessment of relevant evaluation criteria prior to implementing any manager changes. Staff will consider such costs when deciding to add or subtract to manager weights within the pools as well as in deciding to retain or terminate managers.

MONITORING PROCESS

Periodic Reviews: Staff will conduct periodic reviews of the external managers and will document such periodic reviews and subsequent conclusions. Periodic reviews may include quarterly conference calls on portfolio performance and organizational issues as well as reviews conducted in the offices of the Montana Board of Investments (MBOI) and on-site at the offices of the external managers. Reviews will cover the broad manager evaluation criteria indicated in this policy as well as further, more-detailed analysis related to the criteria as needed.

Continual Assessment: Staff will make a continual assessment of the external managers by establishing and maintaining manager profiles, monitoring company actions, and analyzing the performance of the portfolios managed with the use of in-house data bases and sophisticated analytical systems, including systems accessed through the Master Custodian and the Investment Consultant. This process culminates in a judgment which takes into account all aspects of the manager’s working relationship with MBOI, including portfolio performance.

Staff will actively work with the Investment Consultant in the assessment of managers which will include use of database research, conference calls and discussions specific to each manager, and in any consideration of actions to be taken with respect to managers.

MANAGER EVALUATIONS

The evaluation of managers includes the assessment of the managers with respect to the following qualitative and quantitative criteria.

Qualitative Criteria:
- Firm ownership and/or structure
- Stability of personnel
- Client base and/or assets under management
- Adherence to investment philosophy and style (style drift)
- Unique macroeconomic and capital market events that affect manager performance
MONTANA BOARD OF INVESTMENTS
PUBLIC MARKETS MANAGER EVALUATION POLICY

- Client service, reporting, and reconciliation issues
- Ethics and regulatory issues
- Compliance with respect to contract and investment guidelines
- Asset allocation strategy changes that affect manager funding levels

Quantitative Criteria:
- Performance versus benchmark – Performance of managers is evaluated on a three-year rolling period after fees.
- Performance versus peer group – Performance of managers is evaluated on a three-year rolling period before fees.
- Performance attribution versus benchmark – Performance of managers is evaluated on a quarterly and annual basis.
- Other measures of performance, including the following statistical measures:
  - Tracking error
  - Information ratio
  - Sharpe ratio
  - Alpha and Beta

PERFORMANCE MEASUREMENT

Performance calculations and relative performance measurement compared to the relevant benchmark(s) and peer groups are based on a daily time-weighted rate of return. The official book of record for performance measurement is the Master Custodian.

The performance periods relevant to the manager review process will depend in part on market conditions and whether any unique circumstances are apparent that may impact a manager’s performance strength or weakness. Generally, however, a measurement period should be sufficiently long to enable observation across a variety of different market conditions. This would suggest a normal evaluation period of three to five years.

ACTIONS

Watch List Status: Staff will maintain a “Watch List” of external managers that have been noted to have deficiencies in one or more evaluation criteria. An external manager may be put on the “Watch List” for deficiencies in any of the above mentioned criteria or for any other reason deemed necessary by the Chief Investment Officer (CIO). A manager may be removed from the “Watch List” if the CIO is satisfied that the concerns which led to such status have been remedied and/or no longer apply.

Termination: The CIO may terminate a manager at any time for any reason deemed to be prudent and necessary and consistent with the terms of the appropriate contract.
MONTANA BOARD OF INVESTMENTS
PUBLIC MARKETS MANAGER EVALUATION POLICY

ROLES AND RESPONSIBILITIES

CIO: The CIO is responsible for the final decision regarding retention of managers, placement on and removal of “Watch List” status, and termination of managers.

Staff: Staff is responsible for monitoring external managers, portfolio allocations and recommending allocation changes to the CIO, and recommending retention or termination of external managers to the CIO.

Investment Consultant: The consultant is responsible for assisting staff in monitoring and evaluating managers and for reporting independently to the Board on a quarterly basis.

External Managers: The external managers are responsible for all aspects of portfolio management as set forth in their respective contracts and investment guidelines. Managers also must communicate with staff as needed regarding investment strategies and results in a consistent manner. Managers must cooperate fully with staff regarding administrative, accounting, and reconciliation issues as well as any requests from the Investment Consultant and the Custodian.
## Recommended Educational Resources

### RVK Resources

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<thead>
<tr>
<th>Publication</th>
<th>Cost</th>
<th>Link</th>
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<tbody>
<tr>
<td>RVK Quarterly Commentary</td>
<td>Free</td>
<td><a href="www.rvkuhns.com">www.rvkuhns.com</a></td>
<td>Each quarter, RVK publishes a brief commentary that provides a high level overview of key macroeconomic events, as well as a performance summary for major asset classes. The commentary provides a quick reference for Board members, who wish to better understand the most important market events prior to each quarterly meeting.</td>
</tr>
<tr>
<td>RVK Investment Perspectives</td>
<td>Free</td>
<td><a href="www.rvkuhns.com">www.rvkuhns.com</a></td>
<td>Each quarter, RVK publishes a white paper covering topics of common concern for our clients. If Board members wish to receive future issues proactively, RVK can add their email addresses to a distribution list. Alternatively, the white papers can be downloaded from the RVK site.</td>
</tr>
<tr>
<td>Investment Committee Best Practices&lt;sup&gt;New&lt;/sup&gt;</td>
<td>Free for RVK Clients Only</td>
<td>Copies Provided on Request</td>
<td>This 60-page study is the culmination of a one-year research effort, which involved an exhaustive literature review, completion of several surveys of investment professionals, and interviews with more than 30 investment committee chairs, staff, and industry thought leaders. The primary reason for producing this study was to address the fact that many investment committees face similar operational and strategic challenges, but are unable to address them collectively because they tend to operate in silos. This study is intended to accelerate improvement efforts by revealing these common challenges and sharing key insights, tactics, and case studies that may help resolve them.</td>
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### Electronic Newsletters

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<tr>
<td>CFA Financial Briefs</td>
<td>Free</td>
<td><a href="https://www.smartbrief.com/cfa/index.jsp">https://www.smartbrief.com/cfa/index.jsp</a></td>
<td>Each day, this newsletter compiles the most notable headlines relating to economics, investment management, and major geopolitical events. Each headline has a link to the underlying article. This email serves as the daily newspaper for many in the investing community.</td>
</tr>
<tr>
<td>JPMorgan Eye on the Market</td>
<td>Free</td>
<td>Send Email Request to <a href="mailto:gerard.r.fancovic@jpmorgan.com">gerard.r.fancovic@jpmorgan.com</a></td>
<td>Eye on the Market is released 2-3 times per week and provides in depth analysis on events shaping the global economy. The content is typically more balanced than John Mauldin’s letter, but should be viewed with some skepticism given the role of JPMorgan as an asset manager.</td>
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### Periodicals

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<tr>
<td>Pensions &amp; Investments</td>
<td>$325/Year</td>
<td><a href="http://www.pionline.com">www.pionline.com</a></td>
<td>Pensions and Investments is a bi-weekly publication that covers current events impacting defined benefit plans. The PI Online web site also provides a variety of research reports and databases to support the decision-making of defined benefit plan staff and board members.</td>
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<tr>
<td>The Economist</td>
<td>$134/Year</td>
<td><a href="http://www.economist.com">www.economist.com</a></td>
<td>The Economist is perhaps the most respected source of reporting and analysis on current events shaping the global economy. The Economist can help staff and board members stay familiar with the key factors and events that impact the performance of the portfolio.</td>
</tr>
<tr>
<td>Institutional Investor</td>
<td>$575/Year</td>
<td><a href="https://www.institutionalinvestor.com">https://www.institutionalinvestor.com</a></td>
<td>Institutional Investor provides a monthly magazine that serves as both a source of news and proprietary research. A subscription also provides varying degrees of access to proprietary data and research online. Subscriptions range from $575/year to $1,680/year depending on the desired level of access to online resources. We believe that the online research capabilities are most relevant to staff, and therefore would only recommend the $575 “silver” package for Board Members.</td>
</tr>
<tr>
<td>FundFire</td>
<td>MBOI already subscribed</td>
<td><a href="http://www.fundfire.com/">http://www.fundfire.com/</a></td>
<td>FundFire is a source of competitive intelligence for the separately managed account industry. A subscription provides access to original articles and summaries of industry news which helps investors, managers and consultants stay abreast of the changes in their industry. Investment managers read FundFire to find out what competitors and prospective clients are doing and thinking. Financial advisors, investment consultants, pension plans, endowments and foundations rely on FundFire to power their money management IQ.</td>
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### Books

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<tr>
<td>Pioneering Portfolio Management</td>
<td>$24</td>
<td><a href="http://tinyurl.com/3sa4c4u">http://tinyurl.com/3sa4c4u</a></td>
<td>This book was written by David Swensen, the Chief Investment Officer of the Yale Endowment. The book provides a blue print for Mr. Swensen’s investing strategy, which has resulted in superior long term returns for decades. While the book is especially applicable to university endowments, many of the insights are relevant to public pension funds.</td>
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# Recommended Educational Resources

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<td>The Little Book of Behavioral Investing</td>
<td>$16</td>
<td><a href="http://tinyurl.com/3dyag98f">http://tinyurl.com/3dyag98f</a></td>
<td>This book was written by a senior investment professional at GMO, a global asset management firm led by renowned investor Jeremy Grantham. The book provides a comprehensive overview of common behavioral biases that can negatively impact the investment decision-making process. The lessons are easily comprehensible to both expert and novice investors.</td>
</tr>
<tr>
<td>Cambridge Handbook of Institutional Investment and Fiduciary Duty</td>
<td>$135</td>
<td><a href="http://tinyurl.com/nwegkvg">http://tinyurl.com/nwegkvg</a></td>
<td>This book provides commentary and guidance on the evolving standards governing institutional investment. It features a wide range of contributors who share their perspectives on the forces that drive the current emphasis on short-term investment returns. This book is not yet available, and appears to be more academic in focus. However, it covers fiduciary duty in great detail, and may be a great resource for new and existing board members.</td>
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