

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST
Form N-CSR
November 28, 2014

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

FORM N-CSR

CERTIFIED SHAREHOLDER REPORT OF REGISTERED
MANAGEMENT INVESTMENT COMPANIES

Investment Company Act file number 811-21409

Pioneer Municipal High Income Advantage Trust
(Exact name of registrant as specified in charter)

60 State Street, Boston, MA 02109
(Address of principal executive offices) (ZIP code)

Terrence J. Cullen, Pioneer Investment Management, Inc.,
60 State Street, Boston, MA 02109
(Name and address of agent for service)

Registrant's telephone number, including area code: (617) 742-7825

Date of fiscal year end: March 31

Date of reporting period: April 1, 2014 through September 30, 2014

Form N-CSR is to be used by management investment companies to file reports with the Commission not later than 10 days after the transmission to stockholders of any report that is required to be transmitted to stockholders under Rule 30e-1 under the Investment Company Act of 1940 (17 CFR 270.30e-1). The Commission may use the information provided on Form N-CSR in its regulatory, disclosure review, inspection, and policymaking roles.

A registrant is required to disclose the information specified by Form N-CSR, and the Commission will make this information public. A registrant is not required to respond to the collection of information contained in Form N-CSR unless the Form displays a currently valid Office of Management and Budget ("OMB") control number. Please direct comments concerning the accuracy of the information collection burden estimate and any suggestions for reducing the burden to Secretary, Securities and Exchange Commission, 450 Fifth Street, NW, Washington, DC 20549-0609. The OMB has reviewed this collection of information

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under the clearance requirements of 44 U.S.C. ss. 3507.

ITEM 1. REPORTS TO STOCKHOLDERS.

Pioneer Municipal High
Income Advantage Trust

Semiannual Report | September 30, 2014

Ticker Symbol: MAV

[LOGO] PIONEER
Investments (R)

visit us: us.pioneerinvestments.com

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Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/14 1

President's Letter

Dear Shareowner,

As we move into the final months of 2014, we remain confident that U.S. economic growth remains self-sustaining despite weakness in foreign economies, and that the expansion will continue until the economy reaches full employment. Unemployment has ticked down below 6% and the number of job openings is at the highest level since 2000, while the number of people filing initial unemployment claims has fallen to the lowest level in fourteen years. Wage growth, while still low, is outpacing inflation, consumer debt burdens are modest and lower gasoline prices are freeing up discretionary spending power.

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The global economic picture is less rosy, however, as the conflict between Russia and the Ukraine is exacting a toll on the European economy, Japan is still working through the impact of its large tax increase, and the growth of China's investment-driven economy has been slowing. There are also geopolitical and other threats to the outlook, such as the Ebola virus outbreak and the advance of ISIS in key areas of the Middle East. On balance, though, we expect the global economy to continue to grow over the remainder of 2014 and in 2015.

While our economic outlook is generally constructive and we believe opportunities remain for prudent investors to earn attractive returns, markets are likely to continue to be volatile, a scenario that offers the potential for rewards, but for increased risks as well.

Since 1928, Pioneer's investment professionals have worked on behalf of our shareholders, incorporating proprietary research to find attractive investment opportunities and prudent risk management to construct portfolios.

We continue to advocate the benefits of adhering to a disciplined investment strategy and encourage you to work with your financial advisor to develop and implement an overall investment plan that addresses both your short-and long-term goals.

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On August 11, 2014, I joined Pioneer as the new President and CEO of Pioneer Investment Management USA, Inc. In my role, I will focus on preserving many of the rich qualities of our history, while meeting the challenges and capitalizing on the opportunities presented by an ever-changing world.

We greatly appreciate your trust in us in the past and look forward to continuing to serve you in the future.

Sincerely,

/s/ Lisa M. Jones

Lisa M. Jones
President and CEO
Pioneer Investment Management USA, Inc.

Any information in this shareowner report regarding market or economic trends or the factors influencing the Trust's historical or future performance are statements of opinion as of the date of this report. These statements should not be relied upon for any other purposes. Past performance is no guarantee of future results, and there is no guarantee that market forecasts discussed will be realized.

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Portfolio Management Discussion | 9/30/14

Municipal bonds, especially higher-yielding municipals, delivered strong returns during the six-month period ended September 30, 2014. In the following interview, David Eurkus and Jonathan Chirunga discuss the factors that influenced the performance of Pioneer Municipal High Income Advantage Trust during the six-month period ended September 30, 2014. Mr. Eurkus, Director of Municipals, a senior vice president and a portfolio manager at Pioneer, and Mr. Chirunga, a vice president and portfolio manager at Pioneer, are responsible for the day-to-day management of the Trust.

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- Q How did Pioneer Municipal High Income Advantage Trust perform during the six-month period ended September 30, 2014?
- A Pioneer Municipal High Income Advantage Trust returned 8.33% at net asset value and 7.96% at market price during the six-month period ended September 30, 2014. During the same six-month period, the Trust's benchmarks, the Barclays High Yield Municipal Bond Index and the Barclays Municipal Bond Index, returned 6.21% and 4.12%, respectively. The Barclays High Yield Municipal Bond Index is an unmanaged measure of the performance of lower-rated municipal bonds, while the Barclays Municipal Bond Index is an unmanaged measure of the performance of investment-grade municipal bonds. Unlike the Trust, the two Barclays indices do not use leverage. While use of leverage increases investment opportunity, it also increases investment risk. During the same six-month period, the average return (at market price) of the 11 closed end funds in Lipper's High Yield Municipal Debt Closed End Funds category (which may or may not be leveraged) was 5.9%.

The shares of the Trust were selling at a 20.5% premium to net asset value at the end of the period, on September 30, 2014.

On September 30, 2014, the standardized 30-day SEC yield of the Trust's shares was 6.02%*.

- Q How would you describe the investment environment in the municipal bond market during the six-month period ended September 30, 2014?
- A Both lower-rated and higher-quality municipal bonds registered strong performance during the six-month period, as a rally in the municipal market that began in January 2014 continued throughout the period. Both traditional, tax-conscious investors and non-traditional investors saw
- * The 30-day SEC yield is a standardized formula that is based on the hypothetical annualized earning power (investment income only) of the Trust's portfolio securities during the period indicated.

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unusual value in the municipal market, which had slumped in 2013 amid concerns over credit quality and interest-rate volatility arising from speculation about potential changes in the U.S. Federal Reserve System's (the Fed's) monetary policy. Investors came to recognize that the concerns of 2013 had driven municipal bond prices - especially those of higher-yielding securities - to excessively low valuations, and over the six-month period, lower-rated municipals led the way as performance by the tax-exempt municipal bond market bounced back dramatically.

The rally was driven primarily by investors' belief in the credit-worthiness of the municipalities and institutions issuing tax-exempt bonds, and secondarily by the growing positive market sentiment about the health of the U.S. economy. In addition, as longer-term interest rates declined during the six-month period, the value of longer-maturity bonds tended to appreciate.

Investors also grew more confident that the Fed could engineer a gradual change in monetary policy without causing a significant market disruption. At the same time, previous pessimism about the credit quality of municipal credits began to dissipate as investors recognized that the debt problems of some individual municipal issuers - specifically, the City of Detroit and the Commonwealth of Puerto Rico--were not representative of the overall municipal market. In fact, municipal bond default rates actually fell to low levels during the period.

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While demand for municipal debt in general, and higher-yielding municipals in particular, grew, a decline in new bond issuance constricted supply, resulting in price appreciation for most municipal bonds as yield spreads (or yield advantages) between high-yield (below investment-grade) and higher-quality (investment-grade) municipals tightened.

Q What were the primary factors that affected the performance of the Trust relative to its two Barclays municipal bond benchmarks during the six-month period ended September 30, 2014?

A The Trust outperformed both of its benchmarks during the period, helped by good security selection results, particularly from holdings of project revenue bonds in the four core areas of the portfolio: securities issued by education institutions, power and energy projects, transportation programs, and hospital/health care institutions. Consistent with our long-term investment discipline, we focused the portfolio's investments almost exclusively on securities backed by the revenues of specific projects. We believe the revenue sources of such bonds can more easily be determined, especially when compared with general obligation bonds, as the revenue

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support for general obligation debt can vary depending on a number of factors, including economic and political trends. At the end of the period, roughly 6% of the Trust's total investment portfolio was held in general obligation securities, with the overwhelming majority of the Trust's total investment portfolio allocated to securities backed by specific, designated revenue sources.

Among individual holdings, the most noteworthy contributors to the Trust's performance during the period were longer-maturity bonds from three different sectors. In the hospital/health care group, securities issued by the Pennsylvania Hospital Authority and backed by revenues of Temple University Healthcare gained in value during the period. Among the Trust's holdings of tobacco lawsuit settlement bonds, the securities of Inland Empire Authority in California performed very well. Finally, in the transportation group, outstanding performers included the portfolio's holdings of Trans-Texas Private Activity Transportation bonds.

The Trust did, however, have some disappointing performers during the period. Credit problems led to price declines of the portfolio's holdings of bonds issued by the Central Falls (Rhode Island) Federal Detention Facility, and the St. Louis (Missouri) Convention Center.

Q How did the level of leverage in the Trust change over the six-month period ended September 30, 2014?

A At the end of the six-month period on September 30, 2014, 33.6% of the Trust's total managed assets were financed by leverage (or borrowed funds), compared with 34.5% of the Trust's total managed assets at the beginning of the six-month period on April 1, 2014. While the amount of borrowed funds employed by the Trust during the period did not increase or decrease, the percentage change was due to fluctuations in the values of securities in which the Trust had invested.

Q Did you use any derivatives while managing the Trust's portfolio during the six-month period ended September 30, 2014?

A No, the Trust had no derivative exposure during the six-month period.

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Q What is your investment outlook?

A We have a positive outlook for the municipal bond market in general. We anticipate that the domestic economy should continue to grow moderately, which should help to support the improvement of the financial health of municipalities and public agencies that issue municipal bonds. The domestic employment situation continues to improve and consumer spending has been increasing, while inflation remains low. The Fed, even as it ends its quantitative easing program, continues to maintain an accommodative monetary policy, which we believe should help sustain the economic recovery.

This is not to say, however, that there are not areas of concern. While unemployment rates are down, labor participation rates also are as low as they've been in roughly 35 years. Moreover, the potential effects of declining global economic growth on the domestic economy still are in question, as signs of weakness or slowing growth rates have appeared in most major foreign economies, including those in Europe, Japan, China and other emerging markets. Over the shorter term, however, the slowing of global growth has accelerated the movement of money flows into the U.S., thus helping to strengthen the U.S. dollar, while at the same time pushing market interest rates in the United States - including those in the municipal market - to lower levels.

The municipal market remains healthy, with strong demand and a limited supply of securities available for investment. At the same time, we believe municipal bonds still offer attractive value, particularly for tax-conscious investors. Going forward, we plan to maintain our emphasis on fundamental credit research when selecting securities for the Trust's portfolio, and to maintain a well-diversified** portfolio of securities, with a focus on project-revenue bonds backed by specific income streams.

** Diversification does not assure a profit nor prevent loss.

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Please refer to the Schedule of Investments on pages 13-23 for a full listing of Trust securities.

Investments in high-yield or lower-rated securities are subject to greater-than-average risk.

The Trust may invest in securities of issuers that are in default or that are in bankruptcy.

A portion of income may be subject to state, federal, and/or alternative minimum tax. Capital gains, if any, are subject to a capital gains tax.

When interest rates rise, the prices of fixed-income securities in the Trust will generally fall. Conversely, when interest rates fall, the prices of fixed-income securities in the Trust will generally rise.

By concentrating in municipal securities, the portfolio is more susceptible to adverse economic, political or regulatory developments than is a portfolio that invests more broadly.

Investments in the Trust are subject to possible loss due to the financial failure of the issuers of the underlying securities and the issuers' inability to meet their debt obligations.

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The Trust currently uses leverage through the issuance of preferred shares. Leverage creates significant risks, including the risk that the Trust's incremental income or capital appreciation for investments purchased with the proceeds of leverage will not be sufficient to cover the cost of leverage, which may adversely affect the return for the holders of common shares. Since February of 2008, regularly scheduled auctions for the Trust's preferred shares have failed and preferred shareowners have not been able to sell their shares at auction. The Board of Trustees of the Trust has considered, and continues to consider, this issue.

The Trust is required to meet certain regulatory and rating agency asset coverage requirements in connection with its outstanding preferred shares. In order to maintain required asset coverage levels, the Trust may be required to alter the composition of its investment portfolio or take other actions, such as redeeming preferred shares with the proceeds from portfolio transactions, at what might be inopportune times in the market. Such actions could reduce the net earnings or returns to holders of the Trust's common shares over time.

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Risks of investing in the Trust are discussed in greater detail in the Trust's original offering documents relating to its common shares and shareowner reports issued from time to time.

These risks may increase share price volatility.

Any information in this shareowner report regarding market or economic trends or the factors influencing the Trust's historical or future performance are statements of opinion as of the date of this report. These statements should not be relied upon for any other purposes. Past performance is no guarantee of future results, and there is no guarantee that market forecasts discussed will be realized.

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Portfolio Summary | 9/30/14

Portfolio Diversification

(As a percentage of total investment portfolio)

[THE FOLLOWING DATA WAS REPRESENTED AS A PIE CHART IN THE PRINTED MATERIAL]

| | |
|---------------------------|-------|
| Health Revenue | 18.6% |
| Insured | 16.6% |
| Other Revenue | 13.6% |
| Development Revenue | 10.3% |
| Education Revenue | 9.9% |
| Tobacco Revenue | 9.7% |
| Facilities Revenue | 9.3% |
| Transportation Revenue | 6.3% |
| Pollution Control Revenue | 2.1% |
| Water Revenue | 2.0% |
| Airport Revenue | 1.6% |

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Portfolio Maturity

(As a percentage of long-term holdings)

[THE FOLLOWING DATA WAS REPRESENTED AS A PIE CHART IN THE PRINTED MATERIAL]

| | |
|-------------|-------|
| 20+ years | 62.4% |
| 10-20 years | 33.9% |
| 7-10 years | 2.3% |
| 5-7 years | 0.3% |
| 2-5 years | 0.7% |
| 0-2 years | 0.4% |

The portfolio is actively managed and current holdings may be different.

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Prices and Distributions | 9/30/14

Share Prices and Distributions

Market Value per Common Share

| | 9/30/14 | 3/31/14 |
|--------------|---------|---------|
| Market Value | \$15.15 | \$14.60 |
| Premium | 20.5% | 21.0% |

Net Asset Value per Common Share

| | 9/30/14 | 3/31/14 |
|-----------------|---------|---------|
| Net Asset Value | \$12.57 | \$12.07 |

Distributions per Common Share*

Net

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| | Investment Income | Short-Term Capital Gains | Long-Term Capital Gains |
|------------------|----------------------|-----------------------------|----------------------------|
| 4/1/14 - 9/30/14 | \$0.57 | \$-- | \$-- |

The data shown above represents past performance, which is no guarantee of future results.

10 Largest Holdings

(As a percentage of long-term holdings)**

| | |
|---|-------|
| 1. North Texas Tollway Authority Transportation Revenue, 5.75%, 1/1/33 | 2.52% |
| 2. Lehman Municipal Trust Receipts, General Obligation, 13.087%, 7/28/31 | 2.47 |
| 3. Private Colleges & Universities Authority Revenue, 5.0%, 10/1/43 | 2.30 |
| 4. Massachusetts Development Finance Agency Revenue, 5.75%, 1/1/42 | 2.30 |
| 5. New Jersey Transportation Trust Fund Authority Revenue, 0.0%, 12/15/27 | 2.23 |
| 6. New York State Dormitory Authority Revenue, 5.0%, 3/15/39 | 1.98 |
| 7. Tobacco Settlement Financing Corp. Revenue, 6.25%, 6/1/42 | 1.92 |
| 8. New Jersey Economic Development Authority Revenue, 5.75%, 9/15/27 | 1.84 |
| 9. Jefferson Parish Hospital Service District No. 2, 6.375%, 7/1/41 | 1.80 |
| 10. State of Connecticut, General Obligation, 4.0%, 9/1/30 | 1.77 |

* The amount of distributions made to shareholders during the period was in excess of the net investment income earned by the Trust during the period. The Trust has accumulated undistributed net investment income which is part of the Trust's NAV. A portion of this accumulated net investment income was distributed to shareowners during the period.

** This list excludes temporary cash investments and derivative instruments. The portfolio is actively managed, and current holdings may be different. The holdings listed should not be considered recommendations to buy or sell any security listed.

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Performance Update | 9/30/14

Investment Returns

The mountain chart on the right shows the change in market value, including reinvestment of dividends and distributions, of a \$10,000 investment made in common shares of Pioneer Municipal High Income Advantage Trust during the periods shown, compared to that of the Barclays Municipal Bond Index and the

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Barclays High Yield Municipal Bond Index.

Average Annual Total Returns
(As of September 30, 2014)

| Period | Net Asset Value (NAV) | Market Price | Barclays Municipal Bond Index | Barclays High Yield Municipal Bond Index |
|----------|-----------------------|--------------|-------------------------------|--|
| 10 Years | 7.14% | 9.01% | 4.72% | 5.78% |
| 5 Years | 9.71 | 13.68 | 4.67 | 8.13 |
| 1 Year | 14.32 | 22.61 | 7.93 | 11.96 |

[THE FOLLOWING DATA WAS REPRESENTED AS A MOUNTAIN CHART IN THE PRINTED MATERIAL]

Value of \$10,000 Investment

| | Pioneer Municipal High Income Advantage Trust | Barclays Municipal Bond Index | Barclays High Yield Municipal Bond Index |
|-----------|---|-------------------------------|--|
| 9/30/2004 | \$10,000 | \$ 10,000 | \$ 10,000 |
| 9/30/2005 | \$11,376 | \$ 10,405 | \$ 11,075 |
| 9/30/2006 | \$12,354 | \$ 10,868 | \$ 12,264 |
| 9/30/2007 | \$13,440 | \$ 11,204 | \$ 12,615 |
| 9/30/2008 | \$ 9,629 | \$ 10,995 | \$ 11,349 |
| 9/30/2009 | \$12,487 | \$ 12,628 | \$ 11,865 |
| 9/30/2010 | \$15,614 | \$ 13,361 | \$ 13,305 |
| 9/30/2011 | \$16,779 | \$ 13,880 | \$ 13,861 |
| 9/30/2012 | \$21,255 | \$ 15,034 | \$ 15,911 |
| 9/30/2013 | \$19,342 | \$ 14,701 | \$ 15,666 |
| 9/30/2014 | \$23,716 | \$ 15,867 | \$ 17,540 |

Call 1-800-225-6292 or visit us.pioneerinvestments.com for the most recent month-end performance results. Current performance may be lower or higher than the performance data quoted.

Performance data shown represents past performance. Past performance is no guarantee of future results. Investment return and market price will fluctuate, and your shares may trade below NAV due to such factors as interest rate changes and the perceived credit quality of borrowers.

Total investment return does not reflect broker sales charges or commissions. All performance is for common shares of the Trust.

Shares of closed-end funds, unlike open-end funds, are not continuously offered. There is a one-time public offering and, once issued, shares of closed-end funds are bought and sold in the open market through a stock exchange, and frequently trade at prices lower than their NAV. NAV per common share is total assets less total liabilities, which include preferred shares, divided by the number of common shares outstanding.

When NAV is lower than market price, dividends are assumed to be reinvested at

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the greater of NAV or 95% of the market price. When NAV is higher, dividends are assumed to be reinvested at prices obtained through open-market purchases under the Trust's dividend reinvestment plan.

The performance table and graph do not reflect the deduction of fees and taxes that a shareowner would pay on Trust distributions or the sale of Trust shares. Had these fees and taxes been reflected, performance would have been lower.

The Barclays Municipal Bond Index is an unmanaged, broad measure of the municipal bond market. The Barclays High Yield Municipal Bond Index is unmanaged, totals over \$26 billion in market value and maintains over 1300 securities. Municipal bonds in this index have the following requirements: maturities of one year or greater, sub investment grade (below Baa or non-rated), fixed coupon rate, issue date later than 12/31/90, deal size over \$20 million, maturity size of at least \$3 million. Index returns are calculated monthly, assume reinvestment of dividends and, unlike Trust returns, do not reflect any fees, expenses or sales charges. The indices do not employ leverage. You cannot invest directly in the indices.

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Schedule of Investments | 9/30/14 (unaudited)

| Principal Amount USD (\$) | | Value |
|---------------------------------|--|--------------|
| | TAX EXEMPT OBLIGATIONS -- 144.8% of Net Assets | |
| | Alabama -- 1.7% | |
| 2,500,000 | Alabama Industrial Development Authority Solid Waste Disposal Revenue, 6.45%, 12/1/23 | \$ 2,500,000 |
| 2,500,000 | Huntsville-Redstone Village Special Care Facilities Financing Authority Nursing Home Revenue, 5.5%, 1/1/43 | 2,450,000 |
| | | \$ 4,950,000 |
| | Arizona -- 1.0% | |
| 2,640,000 (a) | Pima County Industrial Development Authority, .0%, 1/1/38 | \$ 2,900,000 |
| 32,000 | Pima County Industrial Development Authority Education Revenue, 6.75%, 7/1/31 | 2,900,000 |
| | | \$ 2,900,000 |
| | California -- 16.3% | |
| 6,990,000 | California County Tobacco Securitization Agency Revenue, 5.25%, 6/1/46 | \$ 4,700,000 |
| 1,845,000 | California Educational Facilities Authority Revenue, 5.25%, 4/1/40 | 2,400,000 |
| 1,550,000 | California Enterprise Development Authority Recovery Zone Facility Revenue, 8.5%, 4/1/31 | 1,700,000 |
| 5,000,000 | California Pollution Control Financing Authority, 5.0%, 7/1/37 (144A) | 5,100,000 |
| 3,000,000 | California School Finance Authority, 7.375%, 10/1/43 | 3,400,000 |
| 2,425,000 | California State General Obligation Various Purpose, 5.75%, 4/1/31 | 2,800,000 |
| 1,875,000 | California Statewide Communities Development Authority, | |

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| | | |
|----------------|--|---------|
| 757,342(b) (c) | 5.875%, 11/1/43 California Statewide Communities Development Authority Environmental Facilities Revenue, 9.0%, 12/1/38 | 1,9 |
| 25,000,000 (d) | Inland Empire Tobacco Securitization Authority Revenue, 6/1/36 | 5,0 |
| 3,140,000 (e) | Lehman Municipal Trust Receipts Revenue, RIB, 0.0%, 9/20/28 (144A) | 4,1 |
| 8,575,000 (e) | Lehman Municipal Trust Receipts, General Obligation, 13.087%, 7/28/31 | 10,6 |
| 1,500,000 | Madera Irrigation Financing Authority Water Revenue, 6.25%, 1/1/31 | 1,7 |
| 1,500,000 | Madera Irrigation Financing Authority Water Revenue, 6.5%, 1/1/40 | 1,7 |
| 2,500,000 | San Jose California Airport Revenue, RIB, 5.0%, 3/1/37 | 2,5 |
| | | \$ 48,4 |

The accompanying notes are an integral part of these financial statements.

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Schedule of Investments | 9/30/14 (unaudited) (continued)

| Principal Amount USD (\$) | | Value |
|---------------------------------|---|--------|
| 1,500,000 | Colorado -- 0.8% Colorado Educational & Cultural Facilities Authority, 8.0%, 9/1/43 | \$ 1,5 |
| 1,000,000 | Kremmling Memorial Hospital District Certificate of Participation, 7.125%, 12/1/45 | 8 |
| | | \$ 2,3 |
| 1,000,000 | Connecticut -- 2.9% Hamden Connecticut Facility Revenue, 7.75%, 1/1/43 | \$ 1,0 |
| 7,200,000 | State of Connecticut, General Obligation, 4.0%, 9/1/30 | 7,6 |
| | | \$ 8,6 |
| 2,700,000 | District of Columbia -- 3.3% District of Columbia Tobacco Settlement Financing Corp., 6.5%, 5/15/33 | \$ 3,1 |
| 6,825,000 | District of Columbia Tobacco Settlement Financing Corp., 6.75%, 5/15/40 | 6,7 |
| | | \$ 9,9 |
| 1,500,000 | Florida -- 4.5% Alachua County Health Facilities Authority Revenue, 8.125%, 11/15/41 | \$ 1,7 |
| 1,500,000 | Alachua County Health Facilities Authority Revenue, 8.125%, 11/15/46 | 1,7 |
| 500,000 | Capital Trust Agency Revenue Bonds, 7.75%, 1/1/41 | 5 |

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| | | |
|---------------|--|---------|
| 5,000,000 | Florida's Turnpike Enterprise Revenue, 4.0%, 7/1/32 | 5,2 |
| 1,000,000 (a) | Hillsborough County Industrial Development Authority Revenue, 8.0%, 8/15/32 | 1,3 |
| 2,500,000 | Miami-Dade County Florida Aviation Revenue, 5.5%, 10/1/41 | 2,8 |
| | | \$ 13,4 |
| | | |
| 5,210,000 (e) | Georgia -- 7.5% Atlanta Georgia Water and Wastewater Revenue, RIB, 12.827%, 11/1/43 (144A) | \$ 5,2 |
| 4,920,000 | Clayton County Development Authority Revenue, 9.0%, 6/1/35 | 5,1 |
| 900,000 | DeKalb County Georgia Hospital Authority Revenue, 6.0%, 9/1/30 | 9 |
| 750,000 | DeKalb County Georgia Hospital Authority Revenue, 6.125%, 9/1/40 | 8 |
| 8,750,000 | Private Colleges & Universities Authority Revenue, 5.0%, 10/1/43 | 9,9 |
| | | \$ 22,1 |
| | | |
| 1,000,000 | Guam -- 0.4% Guam Government of Department Education Certificates of Participation, 6.625%, 12/1/30 | \$ 1,1 |

The accompanying notes are an integral part of these financial statements.

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| Principal Amount USD (\$) | | Value |
|---------------------------|--|--------|
| 2,000,000 | Idaho -- 1.2% Power County Industrial Development Corp., Revenue, 6.45%, 8/1/32 | \$ 2,0 |
| 1,500,000 | Power County Pollution Control Revenue, 5.625%, 10/1/14 | 1,5 |
| | | \$ 3,5 |
| | | |
| 1,000,000 | Illinois -- 6.2% City of Country Club Hills, General Obligation, 5.0%, 12/1/31 | \$ 1,0 |
| 365,400 (d) | Illinois Finance Authority Revenue, 11/15/52 | 2 |
| 417,400 (e) | Illinois Finance Authority Revenue, 4.0%, 11/15/52 | 2 |
| 1,450,000 | Illinois Finance Authority Revenue, 5.5%, 4/1/39 | 1,5 |
| 1,605,000 | Illinois Finance Authority Revenue, 6.0%, 8/15/25 | 1,6 |
| 280,000 | Illinois Finance Authority Revenue, 6.0%, 8/15/38 | 3 |
| 2,000,000 | Illinois Finance Authority Revenue, 6.0%, 8/15/39 | 2,3 |
| 45,000 | Illinois Finance Authority Revenue, 7.0%, 11/15/17 | |
| 70,000 | Illinois Finance Authority Revenue, 7.0%, 11/15/27 | |
| 3,000,000 | Illinois Finance Authority Revenue, 8.125%, 2/15/40 | 3,1 |
| 5,000,000 | Illinois Finance Authority Revenue, 8.25%, 5/15/45 | 3,5 |
| 2,500,000 | Illinois Finance Authority Revenue, 8.25%, 2/15/46 | 2,6 |

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| | | | |
|-----------|---|----|-------|
| 1,985,000 | Southwestern Illinois Development Authority Revenue, 5.625%, 11/1/26 | | 1,6 |
| | | | ----- |
| | | \$ | 18,2 |
| ----- | | | |
| 250,000 | Indiana -- 0.9% City of Carmel Indiana Nursing Home Revenue, 7.0%, 11/15/32 | \$ | 2 |
| 750,000 | City of Carmel Indiana Nursing Home Revenue, 7.125%, 11/15/42 | | 8 |
| 500,000 | City of Carmel Indiana Nursing Home Revenue, 7.125%, 11/15/47 | | 5 |
| 1,585,000 | Vincennes Industrial Economic Development Revenue, 6.25%, 1/1/24 | | 9 |
| | | | ----- |
| | | \$ | 2,6 |
| ----- | | | |
| 1,000,000 | Kansas -- 0.4% Kansas Development Finance Authority Revenue, 5.0%, 5/15/35 | \$ | 1,0 |
| ----- | | | |
| 7,000,000 | Louisiana -- 5.9% Jefferson Parish Hospital Service District No. 2, 6.375%, 7/1/41 | \$ | 7,7 |
| 2,500,000 | Louisiana Local Government Environmental Facilities & Community Development Authority Revenue, 6.75%, 11/1/32 | | 2,8 |
| 6,000,000 | Louisiana Public Facilities Authority Revenue, 5.5%, 5/15/47 | | 6,3 |

The accompanying notes are an integral part of these financial statements.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/14 15

Schedule of Investments | 9/30/14 (unaudited) (continued)

| Principal Amount USD (\$) | | | Value |
|---------------------------------|--|----|-------|
| 750,000 | Louisiana -- (continued) Opelousas Louisiana General Hospital Authority Revenue, 5.75%, 10/1/23 | | 7 |
| | | | ----- |
| | | \$ | 17,6 |
| ----- | | | |
| 1,500,000 | Maine -- 1.9% Maine Health & Higher Educational Facilities Authority Revenue, 7.5%, 7/1/32 | \$ | 1,7 |
| 3,500,000 | Maine Turnpike Authority Revenue, 5.0%, 7/1/42 | | 3,8 |
| | | | ----- |
| | | \$ | 5,6 |
| ----- | | | |
| 4,500,000 | Maryland -- 3.6% Maryland Health & Higher Educational Facilities Authority Revenue, 5.0%, 7/1/43 | \$ | 4,8 |

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| | | |
|-------------------|---|---------|
| 1,250,000 | Maryland Health & Higher Educational Facilities Authority Revenue, 5.75%, 7/1/38 | 1,3 |
| 2,000,000 | Maryland Health & Higher Educational Facilities Authority Revenue, 6.25%, 1/1/45 | 2,2 |
| 2,245,000 | Maryland Health & Higher Educational Facilities Authority Revenue, 6.75%, 7/1/44 | 2,4 |
| | | \$ 10,8 |
| <hr/> | | |
| 2,200,000 | Massachusetts -- 5.9% Massachusetts Development Finance Agency Revenue, 5.0%, 7/1/39 | \$ 2,4 |
| 8,000,000 | Massachusetts Development Finance Agency Revenue, 5.75%, 1/1/42 | 9,9 |
| 1,720,000 | Massachusetts Development Finance Agency Revenue, 7.1%, 7/1/32 | 1,7 |
| 2,400,000 | Massachusetts Health & Educational Facilities Authority Revenue, 5.5%, 7/1/32 | 3,2 |
| 3,420,000 (b) (c) | Massachusetts Health & Educational Facilities Authority Revenue, 6.5%, 1/15/38 | |
| | | \$ 17,3 |
| <hr/> | | |
| 2,000,000 | Michigan -- 3.6% Flint Michigan Hospital Building Authority Revenue, 7.375%, 7/1/35 | \$ 2,1 |
| 2,235,000 | Kent Hospital Finance Authority Revenue, 6.25%, 7/1/40 | \$ 2,2 |
| 620,000 | Michigan Public Educational Facilities Authority Revenue, 7.0%, 10/1/36 | 6 |
| 5,000,000 | Michigan State University Revenue, 5.0%, 8/15/41 | 5,6 |
| | | \$ 10,6 |
| <hr/> | | |
| 2,000,000 | Minnesota -- 0.8% Port Authority of the City of Bloomington, Minnesota Recovery Zone Facility Revenue, 9.0%, 12/1/35 | \$ 2,2 |

The accompanying notes are an integral part of these financial statements.

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| Principal Amount USD (\$) | | Value |
|---------------------------|---|-------|
| 1,500,000 (b) (c) | Missouri -- 0.0%+ St. Louis Industrial Development Authority Revenue, 7.2%, 12/15/28 | \$ |
| 6,640,000 (b) (c) | St. Louis Industrial Development Authority Revenue, 7.25%, 12/15/35 | |
| | | \$ |
| <hr/> | | |
| 2,445,000 | Montana -- 0.7% Hardin Increment Industrial Infrastructure Development | |

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| | | |
|-------------------|---|---------|
| 1,000,000 (b) (c) | Revenue, 6.25%, 9/1/31 Two Rivers Authority, Inc., Project Revenue, 7.375%, 11/1/27 | \$ 1,9 |
| | | \$ 2, |
| 2,000,000 | Nevada -- 2.3% Nevada Highway Revenue, 5.0%, 2/1/43 | \$ 2,1 |
| 4,500,000 | Reno Nevada Hospital Revenue, 5.25%, 6/1/41 | 4,6 |
| | | \$ 6, |
| 1,125,000 (a) | New Hampshire -- 0.4% New Hampshire Health & Education Facilities Authority Revenue, 5.875%, 7/1/34 | \$ 1,1 |
| 7,500,000 | New Jersey -- 9.1% New Jersey Economic Development Authority Revenue, 5.75%, 9/15/27 | \$ 7,9 |
| 3,500,000 | New Jersey Health Care Facilities Financing Authority, 7.25%, 7/1/27 | 3,5 |
| 3,500,000 (e) | New Jersey State Turnpike Authority Transportation Revenue, RIB, 13.811%, 7/1/23 (144A) | 5,8 |
| 15,375,000 (d) | New Jersey Transportation Trust Fund Authority Revenue, 12/15/27 | 9,5 |
| | | \$ 268 |
| 7,000,000 | New York -- 9.7% New York City Industrial Development Agency Revenue, 5.25%, 12/1/32 | \$ 6,9 |
| 3,950,000 | New York City Industrial Development Agency Revenue, 7.625%, 12/1/32 | 3,9 |
| 7,500,000 | New York State Dormitory Authority Revenue, 5.0%, 3/15/39 | 8,5 |
| 5,000,000 | New York State Dormitory Authority Revenue, 5.0%, 10/1/41 | 5,7 |
| 2,000,000 | New York State Dormitory Authority Revenue, 6.125%, 12/1/29 | 2,1 |
| 1,400,463 | Westchester County Healthcare Corp., Revenue, 5.0%, 11/1/44 | 1,5 |
| | | \$ 28,8 |

The accompanying notes are an integral part of these financial statements.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/14 17

Schedule of Investments | 9/30/14 (unaudited) (continued)

| Principal Amount USD (\$) | Value |
|---------------------------------|-------|
|---------------------------------|-------|

Ohio -- 4.2%

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| | | | |
|---------------|--|----|------|
| 3,000,000 | Akron Bath Copley Joint Township Hospital District Revenue, 5.0%, 1/1/31 | \$ | 3,1 |
| 2,500,000 | Buckeye Tobacco Settlement Financing Authority Revenue, 5.875%, 6/1/47 | | 1,9 |
| 5,000,000 | Buckeye Tobacco Settlement Financing Authority Revenue, 6.5%, 6/1/47 | | 4,2 |
| 3,000,000 | Ohio State Water Development Authority Revenue, 3.0%, 5/15/19 | | 3,0 |
| | | \$ | 12,4 |
| ----- | | | |
| 3,000,000 (e) | Oklahoma -- 1.0% Tulsa Airports Improvement Trust, 7.75%, 6/1/35 | \$ | 3,0 |
| ----- | | | |
| 2,000,000 | Oregon -- 0.7% Oregon State Facilities Authority Revenue, 5.25%, 10/1/40 | \$ | 2,1 |
| ----- | | | |
| 1,965,000 | Pennsylvania -- 9.2% Pennsylvania Economic Development Financing Authority, 8.0%, 5/1/29 | \$ | 2,3 |
| 5,000,000 | Pennsylvania Economic Development Financing Authority Solid Waste Disposal Revenue, 6.0%, 6/1/31 | | 5,0 |
| 5,000,000 | Pennsylvania Turnpike Commission, 5.3%, 12/1/41 | | 5,3 |
| 1,000,000 | Philadelphia Authority for Industrial Development Revenue, 6.5%, 6/15/33 (144A) | | 1,0 |
| 2,000,000 | Philadelphia Authority for Industrial Development Revenue, 6.75%, 6/15/43 (144A) | | 2,0 |
| 6,000,000 | Philadelphia Authority for Industrial Development Revenue, 8.2%, 12/1/43 | | 6,4 |
| 5,000,000 | Philadelphia Hospitals & Higher Education Facilities Authority Revenue, 5.0%, 7/1/34 | | 5,0 |
| | | \$ | 27,2 |
| ----- | | | |
| 3,500,000 | Puerto Rico -- 1.0% Commonwealth of Puerto Rico, General Obligation, 8.0%, 7/1/35 | \$ | 3,0 |
| ----- | | | |
| 1,355,000 (c) | Rhode Island -- 3.6% Central Falls Rhode Island Detention Facility Corp., Revenue, 7.25%, 7/15/35 | | 8 |
| 1,500,000 | Rhode Island Health & Educational Building Corp., Revenue, 8.375%, 1/1/46 | | 1,7 |
| 8,285,000 | Tobacco Settlement Financing Corp. Revenue, 6.25%, 6/1/42 | | 8,2 |
| | | \$ | 10,8 |
| ----- | | | |
| 4,400,000 (f) | South Carolina -- 2.0% Tobacco Settlement Revenue Management Authority, 6.375%, 5/15/30 | \$ | 6,0 |
| ----- | | | |

The accompanying notes are an integral part of these financial statements.

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Principal
Amount
USD (\$)

| | | Value |
|-------------------|--|---------------|
| <hr/> | | |
| | Tennessee -- 3.0% | |
| 5,000,000 | Johnson City Health & Educational Facilities Board Hospital Revenue, 6.5%, 7/1/38 | \$ 5,7 |
| 3,000,000 | Sullivan County Health, Educational & Housing Facilities Board Revenue, 5.25%, 9/1/36 | 3,1 |
| | | <hr/> \$ 8,8 |
| <hr/> | | |
| | Texas -- 17.3% | |
| 1,000,000 | Arlington Higher Education Finance Corp., Revenue Bonds, 7.0%, 3/1/34 | \$ 1,0 |
| 1,500,000 | Arlington Higher Education Finance Corp. Revenue, 7.125%, 3/1/44 | 1,5 |
| 2,500,000 | Central Texas Regional Mobility Authority Revenue, 6.75%, 1/1/41 | 2,9 |
| 5,000,000 | Goose Creek Consolidated Independent School District, General Obligation, 4.0%, 2/15/26 | 5,5 |
| 2,663,453 (b) (c) | Gulf Coast Industrial Development Authority Revenue, 7.0%, 12/1/36 | |
| 3,000,000 | Houston Higher Education Finance Corp. Revenue, 5.0%, 9/1/38 | 3,2 |
| 315,000 | IAH Public Facility Corp., Facilities Revenue, Series 2006, 6.0%, 5/1/16 | 2 |
| 1,000,000 | IAH Public Facility Corp., Facilities Revenue, Series 2006, 6.0%, 5/1/21 | 6 |
| 1,350,000 | IAH Public Facility Corp., Facilities Revenue, Series 2006, 6.125%, 5/1/26 | 7 |
| 2,000,000 | Lubbock Health Facilities Development Corp., Nursing Home Revenue, 6.625%, 7/1/36 | 2,0 |
| 9,750,000 | North Texas Tollway Authority Transportation Revenue, 5.75%, 1/1/33 | 10,8 |
| 1,500,000 | Red River Health Facilities Development Corp., Revenue, 8.0%, 11/15/41 | 1,7 |
| 2,000,000 | Richardson Independent School District Revenue, General Obligation, 5.0%, 2/15/38 | 2,2 |
| 4,000,000 | Sanger Industrial Development Corp., Revenue, 8.0%, 7/1/38 | 4,4 |
| 1,000,000 | Tarrant County Cultural Education Facilities Finance Corp., Revenue, 8.125%, 11/15/39 | 9 |
| 750,000 | Tarrant County Cultural Education Facilities Finance Corp., Revenue, 8.25%, 11/15/44 | 7 |
| 1,000,000 (b) (c) | Texas Midwest Public Facility Corp., Revenue, 9.0%, 10/1/30 | 2 |
| 3,000,000 | Texas Private Activity Bond Surface Transportation Corp., 7.0%, 12/31/38 | 3,6 |
| 2,500,000 | Travis County Health Facilities Development Corp., Revenue, 7.125%, 1/1/46 | 2,7 |
| 5,000,000 | Tyler Independent School District, General Obligation, 5.0%, 2/15/38 | 5,6 |
| | | <hr/> \$ 51,2 |
| <hr/> | | |

The accompanying notes are an integral part of these financial statements.

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Schedule of Investments | 9/30/14 (unaudited) (continued)

| Principal Amount USD (\$) | | Value |
|---------------------------------|---|-------------|
| 3,000,000 | Virginia -- 3.4% Tobacco Settlement Financing Corp./VA Revenue, 5.0%, 6/1/47 | \$ 2,0 |
| 5,000,000 | Virginia Public School Authority Revenue, 4.0%, 8/1/25 | 5,6 |
| 2,000,000 | Washington County Industrial Development Authority Revenue, 7.75%, 7/1/38 | 2,3 |
| | | \$ 10,0 |
| 1,500,000 | Washington -- 4.2% Washington State Health Care Facilities Authority Revenue, 5.5%, 12/1/39 | \$ 1,7 |
| 2,000,000 | Washington State Health Care Facilities Authority Revenue, 6.125%, 8/15/37 | 2,1 |
| 2,000,000 | Washington State Health Care Facilities Authority Revenue, 6.25%, 8/15/42 | 2,1 |
| 1,100,000 | Washington State Housing Finance Commission Revenue, 6.75%, 10/1/47 | 1,1 |
| 5,000,000 | Washington State Housing Finance Committee Nonprofit Revenue, 5.625%, 1/1/27 | 5,0 |
| | | \$ 12,3 |
| 2,000,000 (c) 735,000 | West Virginia -- 0.9% City of Philippi WV, 7.75%, 10/1/44 West Virginia Hospital Finance Authority Hospital Revenue, 9.125%, 10/1/41 | \$ 2,0 7 |
| | | \$ 2,7 |
| 5,000,000 | Wisconsin -- 3.3% Wisconsin Public Finance Authority Continuing Care Retirement Community Revenue, 8.25%, 6/1/46 | \$ 5,8 |
| 1,500,000 | Wisconsin State Health & Educational Facilities Authority Revenue, 6.625%, 2/15/39 | 1,7 |
| 530,000 | Wisconsin State Public Finance Authority Revenue, 8.375%, 6/1/20 | 5 |
| 1,500,000 | Wisconsin State Public Finance Authority Revenue, 8.625%, 6/1/47 | 1,7 |
| | | \$ 9,9 |
| | TOTAL TAX EXEMPT OBLIGATIONS (Cost \$404,168,659) | \$ 429,6 |
| 13,000,000 (c) (e) | MUNICIPAL COLLATERALIZED DEBT OBLIGATIONS -- 0.5% of Net Assets Non-Profit Preferred Funding Trust I, 0.0%, 9/15/37 (144A) | \$ 1,5 |
| | TOTAL MUNICIPAL COLLATERALIZED | |

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DEBT OBLIGATIONS
(Cost -- \$13,000,000) \$ 1,5

The accompanying notes are an integral part of these financial statements.

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| Shares/Interest | | Value |
|-----------------|--|-----------|
| 6,000,000 | TAX EXEMPT MONEY MARKET MUTUAL FUND -- 2.0% of Net Assets BlackRock Liquidity Funds MuniFund Portfolio | \$ 6,0 |
| | TOTAL TAX EXEMPT MONEY MARKET MUTUAL FUND (Cost -- \$6,000,000) | \$ 6,0 |
| | TOTAL INVESTMENTS IN SECURITIES -- 147.3% (Cost -- \$423,168,659) (g) (h) | \$ 437,1 |
| | OTHER ASSETS AND LIABILITIES -- 3.2% | \$ 9,6 |
| | PREFERRED SHARES AT REDEMPTION VALUE, INCLUDING DIVIDENDS PAYABLE -- (50.5)% | \$ (150,0 |
| | NET ASSETS APPLICABLE TO COMMON SHAREOWNERS -- 100.0% | \$ 296,7 |

(144A) Security is exempt from registration under Rule 144A of the Securities Act of 1933. Such securities may be resold normally to qualified institutional buyers in a transaction exempt from registration. At September 30, 2014, the value of these securities amounted to \$25,003,524, or 8.4% of total net assets applicable to common shareowners.

RIB Residual Interest Bond. The interest rate is subject to change periodically and inversely based upon prevailing market rates. The interest rate shown is the rate at September 30, 2014.

+ Amount rounds to less than 0.1%.

(a) Prerefunded bonds have been collateralized by U.S. Treasury or U.S. Government Agency securities which are held in escrow to pay interest and principal on the tax exempt issue and to retire the bonds in full at the earliest refunding date.

(b) Security is in default and is non income producing.

(c) Indicates a security that has been deemed as illiquid. As of September 30, 2014 the aggregate cost of illiquid securities in the Trust's portfolio was \$28,473,314. As of that date, the aggregate value of illiquid securities in the Trust's portfolio of

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\$4,701,960 represented 1.6% of total net assets applicable to common shareowners.

- (d) Security issued with a zero coupon. Income is recognized through accretion of discount.
- (e) The interest rate is subject to change periodically. The interest is shown is the rate at September 30, 2014.
- (f) Escrow to maturity.

The accompanying notes are an integral part of these financial statements.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/14 21

Schedule of Investments | 9/30/14 (unaudited) (continued)

- (g) The concentration of investments by type of obligation/ market sector is as follows:

| | |
|---------------------------|--------|
| Insured | 16.6% |
| Revenue Bonds: | |
| Health Revenue | 18.6 |
| Other Revenue | 13.6 |
| Development Revenue | 10.3 |
| Education Revenue | 9.9 |
| Tobacco Revenue | 9.7 |
| Facilities Revenue | 9.3 |
| Transportation Revenue | 6.3 |
| Pollution Control Revenue | 2.1 |
| Water Revenue | 2.0 |
| Airport Revenue | 1.6 |
| | ----- |
| | 100.0% |
| | ===== |

- (h) At September 30, 2014, the net unrealized appreciation on investments based on cost for federal tax purposes of \$419,026,224 was as follows:

| | |
|--|---------------|
| Aggregate gross unrealized appreciation for all investments in which there is an excess of value over tax cost | \$ 46,956,246 |
| Aggregate gross unrealized depreciation for all investments in which there is an excess of tax cost over value | (28,821,513) |
| | ----- |
| Net unrealized appreciation | \$ 18,134,733 |
| | ----- |

For financial reporting purposes net unrealized appreciation on investments was \$13,992,298 and cost of investments aggregated \$423,168,659.

Purchases and sales of securities (excluding temporary cash investments) for the

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six months ended September 30, 2014 aggregated \$79,384,835 and \$73,488,650, respectively.

Various inputs are used in determining the value of the Trust's investments. These inputs are summarized in the three broad levels below.

Level 1 -- quoted prices in active markets for identical securities.

Level 2 -- other significant observable inputs (including quoted prices for similar securities, interest rates, prepayment speeds credit risks, etc.). See Notes to Financial Statements -- Note 1A.

Level 3 -- significant unobservable inputs (including the Trust's own assumptions in determining fair value of investments. See Notes to Financial Statements -- Note 1A.

The accompanying notes are an integral part of these financial statements.

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Generally, equity securities are categorized as Level 1, fixed income securities and senior loans are categorized as Level 2, and securities valued using fair value methods (other than prices supplied by independent pricing services or broker dealers) as Level 3. See Notes to Financial Statements -- Note 1A

The following is a summary of the inputs used as of September 30, 2014, in valuing the Trust's investments.

| | Level 1 | Level 2 | Level 3 | Total |
|--|---------------------|----------------------|--------------|----------------------|
| Tax Exempt Obligations | \$ -- | \$429,648,407 | \$ -- | \$429,648,407 |
| Municipal Collateralized Debt Obligation | -- | 1,512,550 | -- | 1,512,550 |
| Tax Exempt Money Market Mutual Funds | 6,000,000 | -- | -- | 6,000,000 |
| Total Investments in Securities | \$ 6,000,000 | \$431,160,957 | \$ -- | \$437,160,957 |

The following is a reconciliation of assets valued using significant unobservable inputs (Level 3):

| | Balance as of 3/31/14 | Realized gain (loss) (1) | Change in Unrealized appreciation (depreciation) (2) | Purchases | Sales | Accrued discounts/premiums | Transfer in/Le |
|------------------------|-----------------------|--------------------------|--|--------------|-----------------------|----------------------------|----------------|
| Tax exempt obligations | \$2,955,000 | \$339,303 | \$ (156,566) | \$ -- | \$ (3,139,500) | \$1,763 | \$- |
| Total | \$2,955,000 | \$339,303 | \$ (156,566) | \$ -- | \$ (3,139,500) | \$1,763 | \$- |

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* Transfers are calculated on the beginning of period values. During the six months ended September 30, 2014, there were no transfers between Levels 1, 2 and 3.

- (1) Realized gain (loss) on these securities is included in the realized gain (loss) from investments in the Statement of Operations.
- (2) Unrealized appreciation (depreciation) on these securities is included in the change in unrealized appreciation (depreciation) from investments in the Statement of Operations.

Net change in unrealized appreciation (depreciation) of Level 3 investments still held and considered Level 3 at 9/30/14: \$0.

The accompanying notes are an integral part of these financial statements.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/14 23

Statement of Assets and Liabilities | 9/30/14 (unaudited)

ASSETS:

| | |
|--|----------------|
| Investments in securities, at value (cost \$423,168,659) | \$ 437,160,957 |
| Receivables -- | |
| Investment securities sold | 3,819,375 |
| Interest receivable | 7,234,480 |
| Reinvestment of distributions | 160,522 |
| Prepaid expenses | 5,943 |
| <hr/> | |
| Total assets | \$ 448,381,277 |

LIABILITIES:

| | |
|-----------------------------|--------------|
| Due to custodian | 1,224,136 |
| Payables -- | |
| Trustee fees | 1,126 |
| Affiliated expenses payable | 225,576 |
| Administration fees payable | 79,608 |
| Accrued expenses payable | 88,806 |
| <hr/> | |
| Total liabilities | \$ 1,619,252 |

PREFERRED SHARES AT REDEMPTION VALUE:

| | |
|---|----------------|
| \$25,000 liquidation value per share applicable to 6,000 shares, including dividends payable of \$310 | \$ 150,000,310 |
|---|----------------|

NET ASSETS APPLICABLE TO COMMON SHAREOWNERS:

| | |
|--|----------------|
| Paid-in capital | \$ 320,925,877 |
| Undistributed net investment income | 6,673,542 |
| Accumulated net realized loss on investments | (44,830,002) |
| Net unrealized appreciation on investments | 13,992,298 |
| <hr/> | |
| Net assets applicable to common shareowners | \$ 296,761,715 |

NET ASSET VALUE PER COMMON SHARE:

| | |
|--|----------|
| No par value (unlimited number of shares authorized) | |
| Based on \$296,761,715 / 23,611,939 common shares | \$ 12.57 |

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The accompanying notes are an integral part of these financial statements.

24 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/14

Statement of Operations (unaudited)

For the Six Months Ended 9/30/14

INVESTMENT INCOME:

| | | |
|--|--------------|--------------|
| Interest | | \$13,690,598 |
| ----- | | |
| EXPENSES: | | |
| Management fees | \$ 1,329,146 | |
| Administrative reimbursements | 116,591 | |
| Transfer agent fees and expenses | 13,052 | |
| Shareholder communications expense | 5,602 | |
| Auction agent fees | 188,375 | |
| Custodian fees | 3,295 | |
| Professional fees | 62,981 | |
| Printing expenses | 8,620 | |
| Trustees' fees | 6,847 | |
| Pricing fees | 7,056 | |
| Miscellaneous | 28,091 | |
| ----- | | |
| Total expenses | | 1,769,656 |
| ----- | | |
| Net investment income | | \$11,920,942 |
| ----- | | |
| REALIZED AND UNREALIZED GAIN (LOSS) ON INVESTMENTS: | | |
| Net realized gain on investments | \$ 2,498,189 | |
| Change in net unrealized appreciation on investments | 10,687,091 | |
| ----- | | |
| Net gain on investments | | \$13,185,280 |
| ----- | | |
| DISTRIBUTIONS TO PREFERRED SHAREOWNERS FROM | | |
| NET INVESTMENT INCOME: | | |
| | | \$ (102,411) |
| ----- | | |
| Net increase in net assets resulting from operations | | \$25,003,811 |
| ===== | | |

The accompanying notes are an integral part of these financial statements.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/14 25

Statements of Changes in Net Assets

| | | |
|--|-------------|------------|
| | Six Months | |
| | Ended | |
| | 9/30/14 | Year Ended |
| | (unaudited) | 3/31/14 |

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FROM OPERATIONS:

| | | |
|--|---------------|-------------|
| Net investment income | \$ 11,920,942 | \$ 25,294,2 |
| Net realized gain on investments | 2,498,189 | 1,349,1 |
| Change in net unrealized appreciation (depreciation) on investments | 10,687,091 | (34,120,4 |
| Distributions to preferred shareowners from net investment income | (102,411) | (238,2 |
| | | |
| Net increase (decrease) in net assets resulting from operations | \$ 25,003,811 | \$ (7,715,2 |

DISTRIBUTIONS TO COMMON SHAREOWNERS:

| | | |
|--|-----------------|--------------|
| Net investment income and previously undistributed net investment income (\$0.57 and \$1.14 per share, respectively) | \$ (13,436,043) | \$ (26,754,5 |
| | | |
| Total distributions to common shareowners | \$ (13,436,043) | \$ (26,754,5 |

FROM TRUST SHARE TRANSACTIONS:

| | | |
|--|------------|------------|
| Reinvestment of distributions | \$ 985,835 | \$ 1,804,1 |
| | | |
| Net increase in net assets applicable to common shareowners from Trust share transactions | \$ 985,835 | \$ 1,804,1 |

| | | |
|---|---------------|--------------|
| Net increase (decrease) in net assets applicable to common shareowners | \$ 12,553,603 | \$ (32,665,6 |
|---|---------------|--------------|

NET ASSETS APPLICABLE TO COMMON SHAREOWNERS:

| | | |
|-------------------------------------|----------------|--------------|
| Beginning of period | 284,208,112 | 316,873,7 |
| | | |
| End of period | \$ 296,761,715 | \$ 284,208,1 |
| | | |
| Undistributed net investment income | \$ 6,673,542 | \$ 8,291,0 |

The accompanying notes are an integral part of these financial statements.

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Financial Highlights

| | Six Months Ended 9/30/14 (unaudited) | Year Ended 3/31/14 | Year Ended 3/31/13 | Year Ended 3/31/12 |
|---|---|--------------------------|--------------------------|--------------------------|
| | | | | |
| Per Share Operating Performance | | | | |
| Net asset value, beginning of period | \$ 12.07 | \$ 13.54 | \$ 12.87 | \$ 12.07 |
| | | | | |
| Increase (decrease) from investment operations: (a) | | | | |
| Net investment income | \$ 0.51 | \$ 1.08 | \$ 1.07 | \$ 0.56 |
| Net realized and unrealized gain (loss) on investments | 0.56 | (1.40) | 0.76 | |
| | | | | |
| Distributions to preferred shareowners from: | | | | |
| Net investment income | (0.00) (g) | (0.01) | (0.02) | |

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| | | | | |
|--|-----------|------------|------------|-----|
| Net increase (decrease) from investment operations | \$ 1.07 | \$ (0.33) | \$ 1.81 | \$ |
| Distributions to common shareowners from: | | | | |
| Net investment income and previously undistributed net investment income | (0.57)* | (1.14)* | (1.14)* | |
| Net increase (decrease) in net asset value | \$ 0.50 | \$ (1.47) | \$ 0.67 | \$ |
| Net asset value, end of period (b) | \$ 12.57 | \$ 12.07 | \$ 13.54 | \$ |
| Market value, end of period (b) | \$ 15.15 | \$ 14.60 | \$ 15.51 | \$ |
| Total return at market value (c) | 7.96% | 2.59% | 13.53% | |
| Ratios to average net assets of common shareowners: | | | | |
| Total expenses (d) | 1.21%(e) | 1.19% | 1.23% | |
| Net investment income before preferred share distributions | 8.15%(e) | 8.81% | 8.08% | |
| Preferred share distributions | 0.07%(e) | 0.08% | 0.14% | |
| Net investment income available to common shareowners | 8.08%(e) | 8.73% | 7.94% | |
| Portfolio turnover | 17% | 24% | 14% | |
| Net assets of common shareowners, end of (in thousands) | \$296,762 | \$ 284,208 | \$ 316,874 | \$2 |

The accompanying notes are an integral part of these financial statements.

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Financial Highlights (continued)

| | Six Months Ended 9/30/14 (unaudited) | Year Ended 3/31/14 | Year Ended 3/31/13 | Year Ended 3/31/12 |
|---|--------------------------------------|--------------------|--------------------|--------------------|
| Preferred shares outstanding (in thousands) | \$ 150,000 | \$ 150,000 | \$150,000 | \$ |
| Asset coverage per preferred share, end of period | \$ 74,460 | \$ 72,367 | \$ 77,813 | \$ |
| Average market value per preferred share (f) | \$ 25,000 | \$ 25,000 | \$ 25,000 | \$ |
| Liquidation value, including dividends payable, per preferred share | \$ 25,001 | \$ 25,001 | \$ 25,001 | \$ |

* The amount of distributions made to shareowners during the period were in excess of the net investment income earned by the Trust during the period. The Trust has accumulated undistributed net investment income which is part of the Trust's NAV. A portion of the accumulated net investment income was distributed to shareowners during the period.

- (a) The per common share data presented above is based upon the average common shares outstanding for the periods presented.
- (b) Net asset value and market value are published in Barron's on Saturday, The Wall Street Journal on Monday and The New York Times on Monday and Saturday.

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- (c) Total investment return is calculated assuming a purchase of common shares at the current market value on the first day and a sale at the current market value on the last day of the periods reported. Dividends and distributions, if any, are assumed for purposes of this calculation to be reinvested at prices obtained under the Trust's dividend reinvestment plan. Total investment return does not reflect brokerage commissions. Past performance is not a guarantee of future results.
- (d) Expense ratios do not reflect the effect of distribution payments to preferred shareowners.
- (e) Annualized.
- (f) Market value is redemption value without an active market.
- (g) Amount rounds to less than \$(0.005) per share.

The accompanying notes are an integral part of these financial statements.

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Notes to Financial Statements | 9/30/14 (unaudited)

1. Organization and Significant Accounting Policies

Pioneer Municipal High Income Advantage Trust (the Trust) was organized as a Delaware statutory trust on August 6, 2003. Prior to commencing operations on October 20, 2003, the Trust had no operations other than matters relating to its organization and registration as a diversified, closed-end management investment company under the Investment Company Act of 1940, as amended. The investment objective of the Trust is to seek a high level of current income exempt from regular federal income tax, and the Trust may, as a secondary objective, also seek capital appreciation to the extent that it is consistent with its primary investment objective.

The Trust's financial statements have been prepared in conformity with U.S. generally accepted accounting principles that require the management of the Trust to, among other things, make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of income, expenses and gain or loss on investments during the reporting period. Actual results could differ from those estimates.

The following is a summary of significant accounting policies followed by the Trust in the preparation of its financial statements, which are consistent with those policies generally accepted in the investment company industry:

A. Security Valuation

Security transactions are recorded as of trade date. Fixed income securities are valued at prices supplied by independent pricing services, which consider such factors as market prices, market events, quotations from one or more brokers, Treasury spreads, yields, maturities and ratings. Valuations may be supplemented by dealers and other sources, as required. The values of interest rate swaps are determined by obtaining dealer quotations. Equity securities that have traded on an exchange are valued at the last sale price on the principal exchange where they are traded. Equity securities that have not traded on the date of valuation or securities for

which sale prices are not available, generally are valued using the mean between the last bid and asked prices. Shares of money market mutual funds are valued at such funds' net asset value.

Securities for which independent pricing services are unable to supply prices or for which market prices and/or quotations are not readily available, or are considered to be unreliable are valued by a fair valuation team comprised of certain personnel of Pioneer Investment Management, Inc. (PIM), the Trust's

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investment adviser, pursuant to procedures adopted by the Trust's Board of Trustees. PIM's fair valuation team uses fair value methods approved by the Valuation Committee of the Board of Trustees. PIM's valuation team is responsible for monitoring developments that may impact fair valued securities and for discussing and assessing fair value on an ongoing basis, and at least quarterly, with the Valuation Committee of the Board of Trustees.

At September 30, 2014, there were no securities valued using fair value methods (in addition to securities valued using prices supplied by independent pricing services or broker-dealers).

Dividend income is recorded on the ex-dividend date, except that certain dividends from foreign securities where the ex-dividend date may have passed are recorded as soon as the Trust becomes aware of the ex-dividend data in the exercise of reasonable diligence.

Discount and premium on debt securities are accreted or amortized, respectively, daily, into interest income on a yield-to-maturity basis with a corresponding increase or decrease in the cost basis of the security. Interest income, including interest or income bearing cash accounts, is recorded on an accrual basis.

Gains and losses on sales of investments are calculated on the identified cost method for both financial reporting and federal income tax purposes.

B. Federal Income Taxes

It is the Trust's policy to comply with the requirements of the Internal Revenue Code applicable to regulated investment companies and to distribute all of its taxable income and net realized capital gains, if any, to its shareowners. Therefore, no federal income tax provision is required. As of March 31, 2014, the Trust did not accrue any interest or penalties with respect to uncertain tax positions, which if applicable, would be recorded as an income tax expense in the Statement of Operations. Tax returns filed within the prior three years remain subject to examination by federal and state tax authorities.

The amount and character of income and capital gain distributions to shareowners are determined in accordance with federal income tax rules, which may differ from U.S. generally accepted accounting principles. Distributions in excess of net investment income or net realized gains are temporary overdistributions for financial statement purposes resulting from differences in the recognition or classification of income or distributions for financial statement and tax purposes. Capital accounts within the financial statements are adjusted for permanent book/tax differences to reflect tax character, but are not adjusted for temporary differences.

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The tax character of distributions paid to shareowners during the year ended March 31, 2014 was as follows:

| | | |
|--------------------------|-------|------------|
| | ----- | 2014 |
| | ----- | |
| Distributions paid from: | | |
| Tax exempt income | \$ | 25,927,367 |
| Ordinary income | | 1,065,416 |
| | ----- | |
| Total | \$ | 26,992,783 |
| | ===== | |

The following shows the components of distributable earnings (losses) on a federal income tax basis at March 31, 2014:

| | | |
|---------------------------------|-------|--------------|
| | ----- | 2014 |
| | ----- | |
| Distributable earnings: | | |
| Undistributed tax-exempt income | \$ | 7,163,321 |
| Undistributed ordinary income | | 681,021 |
| Capital loss carryforward | | (48,372,812) |
| Post-October loss deferred | | (2,650,873) |
| Dividends payable | | (229) |
| Unrealized appreciation | | 7,447,642 |
| | ----- | |
| Total | \$ | (35,731,930) |
| | ===== | |

The difference between book-basis and tax-basis unrealized appreciation is primarily attributable to the difference between book and tax amortization methods for premiums and discounts on fixed income securities, the difference between book and tax accounting for swap agreements, book/tax difference in accrual of income on securities in default, and other book and tax temporary differences.

C. Automatic Dividend Reinvestment Plan

All common shareowners whose shares are registered in their own names automatically participate in the Automatic Dividend Reinvestment Plan (the Plan), under which participants receive all dividends and capital gain distributions (collectively, dividends) in full and fractional common shares of the Trust in lieu of cash. Shareowners may elect not to participate in the Plan. Shareowners not participating in the Plan receive all dividends and capital gain distributions in cash. Participation in the Plan is completely voluntary and may be terminated or resumed at any time without penalty by notifying American Stock Transfer & Trust Company, the agent for shareowners in administering the Plan (the Plan Agent), in writing prior to any dividend record date; otherwise such termination or resumption will be effective with respect to any subsequently declared dividend or other distribution.

If a shareowner's shares are held in the name of a brokerage firm, bank or other nominee, the shareowner can ask the firm or nominee to participate in the Plan on the shareowner's behalf. If the firm or nominee does not offer the Plan, dividends will be paid in cash to the shareowner of record. A firm or nominee may reinvest a shareowner's cash dividends in common shares of the Trust on terms that differ from the terms of the Plan.

Whenever the Trust declares a dividend on common shares payable in cash, participants in the Plan will receive the equivalent in common shares acquired by the Plan Agent either (i) through receipt of additional unissued but authorized common shares from the Trust or (ii) by purchase of outstanding common shares on the New York Stock Exchange or elsewhere. If, on the payment date for any dividend, the net asset value per common share is equal to or less than the market price per share plus estimated brokerage trading fees (market premium), the Plan Agent will invest the dividend amount in newly issued common shares. The number of newly issued common shares to be credited to each account will be determined by dividing the dollar amount of the dividend by the net asset value per common share on the date the shares are issued, provided that the maximum discount from the then current market price per share on the date of issuance does not exceed 5%. If, on the payment date for any dividend, the net asset value per common share is greater than the market value (market discount), the Plan Agent will invest the dividend amount in common shares acquired in open-market purchases. There are no brokerage charges with respect to newly issued common shares. However, each participant will pay a pro rata share of brokerage trading fees incurred with respect to the Plan Agent's open-market purchases. Participating in the Plan does not relieve shareowners from any federal, state or local taxes which may be due on dividends paid in any taxable year. Shareowners holding Plan shares in a brokerage account may not be able to transfer the shares to another broker and continue to participate in the Plan.

D. Risks

At times, the Trust's investments may represent industries or industry sectors that are interrelated or have common risks, making the Trust more susceptible to any economic, political, or regulatory developments or other risks affecting those industries and sectors. Information regarding the Trust's principal risks is contained in the Trust's original offering prospectus, with additional information included in the Trust's shareowner reports issued from time to time. Please refer to those documents when considering the Trust's principal risks.

The Trust may invest in both investment grade and below investment grade (high-yield) municipal securities with a broad range of maturities and credit ratings. Debt securities rated below investment grade are commonly referred to as "junk bonds" and are considered speculative. Below investment grade securities involve greater risk of loss, are subject to greater price volatility, and are less liquid and more difficult to value, especially during periods of economic uncertainty or change, than higher rated debt securities.

2. Management Agreement

PIM, the Trust's investment adviser, a wholly owned indirect subsidiary of

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UniCredit S.p.A. (UniCredit), manages the Trust's portfolio. Management fees payable under the Trust's Advisory Agreement with PIM are calculated daily at the annual rate of 0.60% of the Trust's average daily managed assets. "Managed assets" means (a) the total assets of the Trust, including any form of investment leverage, minus (b) all accrued liabilities incurred in the normal course of operations, which shall not include any liabilities or obligations attributable to investment leverage obtained through (i) indebtedness of any type (including, without limitation, borrowing through a credit facility or the issuance of debt securities), (ii) the issuance of preferred stock or other similar preference securities, and/or (iii) any other means. For the period ended September 30, 2014, the net management fee was 0.60% of the Trust's average daily managed assets, which was equivalent to 0.91% of the Trust's average daily net assets attributable to the common shareowners.

In addition, under PIM's management and administration agreements, certain other services and costs are paid by PIM and reimbursed by the Trust. At September 30, 2014, \$305,184 was payable to PIM related to management costs, administrative costs and certain other services is included in "Affiliated expenses payable" and "Administration fees payable" on the Statement of Assets and Liabilities.

3. Transfer Agents

Pioneer Investment Management Shareholder Services, Inc. (PIMSS), a wholly owned indirect subsidiary of UniCredit, through a sub-transfer agency agreement with American Stock Transfer & Trust Company, provides substantially all transfer agent and shareowner services related to the Trust's common shares at negotiated rates.

In addition, the Trust reimburses PIMSS for out-of-pocket expenses incurred by PIMSS related to shareowner communications activities such as proxy and statement mailings and outgoing phone calls.

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4. Expense Offset Arrangement

The Trust has entered into an arrangement with its custodian whereby credits realized as a result of uninvested cash balances are used to reduce a portion of the Trust's custodian expenses. For the period ended September 30, 2014, the Trust expenses were not reduced under such arrangement.

5. Trust Shares

There are an unlimited number of common shares of beneficial interest authorized.

Transactions in common shares of beneficial interest for the six months ended September 30, 2014 and the year ended March 31, 2014 were as follows:

| | 9/30/14 | 3/31/14 |
|---|------------|------------|
| Shares outstanding at beginning of period | 23,543,462 | 23,406,918 |
| Reinvestment of distributions | 68,477 | 136,544 |
| Shares outstanding at end of period | 23,611,939 | 23,543,462 |

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The Trust may classify or reclassify any unissued shares of beneficial interest into one or more series of preferred shares of beneficial interest. As of September 30, 2014, there were 6,000 APS as follows: Series A -- 3,000 and Series B -- 3,000.

Dividends on Series A and Series B are cumulative at a rate which is to be reset every seven days based on the results of an auction. An auction fails if there are more APS offered for sale than there are buyers. When an auction fails, the dividend rate for the period will be the maximum rate on the auction dates described in the prospectus for the APS. Preferred shareowners are not able to sell their APS at an auction if the auction fails. Since February 2008, the Trust's auctions related to the APS have failed. The maximum rate for each series is 125% of the 7 day commercial paper rate or adjusted Kenny rate. Dividend rates on APS ranged from 0.094% to 0.224% during the period ended September 30, 2014.

The Trust may not declare dividends or make other distributions on its common shares or purchase any such shares if, at the time of the declaration, distribution or purchase, the Trust does not comply with the asset coverage ratios described in the prospectus for the APS.

The APS are redeemable at the option of the Trust, in whole or in part, on any dividend payment date at \$25,000 per share plus any accumulated or unpaid dividends, whether or not declared. The APS are also subject to mandatory redemption at \$25,000 per share plus any accumulated or unpaid dividends, whether or not declared, if certain requirements relating to the composition of the assets and liabilities of the Trust as set forth in the Statement of Preferences are not satisfied.

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The holders of APS have voting rights equal to the holders of the Trust's common shares (one vote per share) and will vote together with holders of the common shares as a single class. Holders of APS are also entitled to elect two of the Trust's Trustees. In addition, the Investment Company Act of 1940, as amended, requires that along with approval by shareowners that might otherwise be required, the approval of the holders of a majority of any outstanding preferred shares, voting separately as a class, would be required to (a) adopt any plan of reorganization that would adversely affect the preferred shares and (b) take any action requiring a vote of security holders, including, among other things, changes in the Trust's subclassification as a closed-end management investment company or changes in its fundamental investment restrictions.

6. Subsequent Events

The Board of Trustees of the Trust declared on October 3, 2014 a dividend from undistributed and accumulated net investment income of \$0.0950 per common share, payable October 31, 2014, to common shareowners of record on October 16, 2014.

Subsequent to September 30, 2014, dividends declared and paid on preferred shares totaled \$17,484 in aggregate for the two outstanding preferred share series through November 11, 2014.

7. Change in Independent Registered Public Accounting Firm

The Board of Trustees of the Trust, with the approval and recommendation of the Audit Committee, appointed Deloitte & Touche LLP to serve as the Trust's independent registered public accounting firm for the fiscal year ending March 31, 2015. Deloitte & Touche LLP replaces Ernst & Young LLP, which resigned as the Trust's independent registered public accounting firm, effective upon

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completion of the audit of the Trust's financial statements for the fiscal year ended March 31, 2014.

During the periods that Ernst & Young LLP served as the Trust's independent registered public accounting firm, including the Trust's fiscal years ending March 31, 2014 and March 31, 2013, Ernst & Young LLP's reports on the financial statements of the Trust have not contained an adverse opinion or disclaimer of opinion and have not been qualified or modified as to uncertainty, audit scope or accounting principles. Further, there have been no disagreement with Ernst & Young LLP on any matter of accounting principles or practices, financial statement disclosure, or auditing scope or procedure, which, if not resolved to the satisfaction of Ernst & Young LLP would have caused Ernst & Young LLP to make reference to the subject matter of the disagreement in connection with its report on the financial statements. In addition, there have been no reportable events of the kind described in Item 304(a)(1)(v) of Regulation S-K under the Securities Exchange Act of 1934.

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ADDITIONAL INFORMATION (unaudited)

During the period, there have been no material changes in the Trust's investment objective or fundamental policies that have not been approved by the shareowners. There have been no changes in the Trust's charter or By-Laws that would delay or prevent a change in control of the Trust which has not been approved by the shareowners. During the period, there have been no changes in the principal risk factors associated with investment in the Trust. There were no changes in the persons who are primarily responsible for the day-to-day management of the Trust's portfolio.

Notice is hereby given in accordance with Section 23(c) of the Investment Company Act of 1940 that the Trust may purchase, from time to time, its common shares in the open market.

Results of Shareholder Meeting (unaudited)

At the annual meeting of shareowners held on September 23, 2014, shareowners of Pioneer Municipal High Income Advantage were asked to consider the proposal described below. A report of the total votes cast by the Trust's shareholders follows:

Proposal 1 -- To elect Class I Trustee.

| Nominee | For | Withheld |
|-----------------------|------------|----------|
| Benjamin M. Friedman | 20,782,071 | 559,063 |
| Margaret B. W. Graham | 20,746,762 | 594,912 |
| Kenneth J. Taubes | 20,835,429 | 506,245 |

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Approval of Investment Advisory Agreement

Pioneer Investment Management, Inc. (PIM) serves as the investment adviser to Pioneer Municipal High Income Advantage Trust (the Trust) pursuant to an

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investment advisory agreement between PIM and the Trust. In order for PIM to remain the investment adviser of the Trust, the Trustees of the Trust must determine annually whether to renew the investment advisory agreement for the Trust.

The contract review process began in January 2014 as the Trustees of the Trust agreed on, among other things, an overall approach and timeline for the process. Contract review materials were provided to the Trustees in March 2014 and July 2014. Supplemental contract review materials were provided to the Trustees in September 2014. In addition, the Trustees reviewed and discussed the Trust's performance at regularly scheduled meetings throughout the year, and took into account other information related to the Trust provided to the Trustees at regularly scheduled meetings, in connection with the review of the Trust's investment advisory agreement.

In March 2014, the Trustees, among other things, discussed the memorandum provided by Trust counsel that summarized the legal standards and other considerations that are relevant to the Trustees in their deliberations regarding the renewal of the investment advisory agreement, and reviewed and discussed the qualifications of the investment management teams, as well as the level of investment by the Trust's portfolio managers in the Trust. In July 2014, the Trustees, among other things, reviewed the Trust's management fee and total expense ratios, the financial statements of PIM and its parent companies, the profitability analyses provided by PIM, and possible economies of scale. The Trustees also reviewed the profitability of the institutional business of PIM and PIM's affiliate, Pioneer Institutional Asset Management, Inc. (together with PIM, "Pioneer"), as compared to that of PIM's fund management business, and considered the differences between the fees and expenses of the Trust and the fees and expenses of Pioneer's institutional accounts, as well as the different services provided by PIM to the Trust and by Pioneer to the institutional accounts. The Trustees further considered contract review materials in September 2014.

At a meeting held on September 16, 2014, based on their evaluation of the information provided by PIM and third parties, the Trustees of the Trust, including the Independent Trustees voting separately, unanimously approved the renewal of the investment advisory agreement for another year. In considering the renewal of the investment advisory agreement, the Trustees considered various factors that they determined were relevant, including the factors described below. In all quintile rankings referred to throughout this

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disclosure, first quintile is most favorable to the Trust's shareowners. The Trustees did not identify any single factor as the controlling factor in determining to approve the renewal of the agreement.

Nature, Extent and Quality of Services

The Trustees considered the nature, extent and quality of the services that had been provided by PIM to the Trust, taking into account the investment objective and strategy of the Trust. The Trustees reviewed the terms of the investment advisory agreement. The Trustees also reviewed PIM's investment approach for the Trust and its research process. The Trustees considered the resources of PIM and the personnel of PIM who provide investment management services to the Trust. They also reviewed the amount of non-Trust assets managed by the portfolio manager of the Trust. The Trustees considered the non-investment resources and personnel of PIM involved in PIM's services to the Trust, including PIM's compliance and legal resources and personnel. The Trustees noted the substantial attention and high priority given by PIM's senior management to the Pioneer fund complex.

The Trustees considered that PIM supervises and monitors the performance of the Trust's service providers and provides the Trust with personnel (including Trust officers) and other resources that are necessary for the Trust's business management and operations. The Trustees also considered that, as administrator, PIM is responsible for the administration of the Trust's business and other affairs. The Trustees considered the fees paid to PIM for the provision of administration services.

Based on these considerations, the Trustees concluded that the nature, extent and quality of services that had been provided by PIM to the Trust were satisfactory and consistent with the terms of the investment advisory agreement.

Performance of the Trust

In considering the Trust's performance, the Trustees regularly review and discuss analysis and data prepared by PIM and information comparing the Trust's performance with the performance of its peer group of funds as classified by each of Morningstar, Inc. (Morningstar) and Lipper, and with the performance of the Trust's benchmark index. They also discuss the Trust's performance with PIM on a regular basis. The Trustees confirmed that these regular reviews and discussions were factored into the Trustees' deliberations concerning the renewal of the advisory agreement. For purposes of their contract renewal deliberations, the Trustees considered the discussions held throughout the year regarding the Trust's performance and the performance results of the Trust over various time periods, including the Trust's performance results for periods ended June 30, 2014. The Trustees indicated that the Trust's performance was satisfactory and supported the renewal of the investment advisory agreement.

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Management Fee and Expenses

The Trustees considered information showing the fees and expenses of the Trust in comparison to the management fees and the expense ratios of a peer group of funds selected on the basis of criteria determined by the Independent Trustees for this purpose using data provided by Strategic Insight Mutual Fund Research and Consulting, LLC (Strategic Insight), an independent third party.

The Trustees considered that the Trust's management fee (based on managed assets) for the twelve months ended June 30, 2014 was in the third quintile relative to the management fees paid by other funds in its Strategic Insight peer group for the comparable period. The Trustees considered that the expense ratio (based on managed assets) of the Trust's common shares for the twelve months ended June 30, 2014 was in the third quintile relative its Strategic Insight peer group for the comparable period.

The Trustees reviewed management fees charged by Pioneer to institutional and other clients, including publicly offered European funds sponsored by affiliates of Pioneer, unaffiliated U.S. registered investment companies (in a sub-advisory capacity), and unaffiliated foreign and domestic separate accounts. The Trustees also considered PIM's costs in providing services to the Trust and Pioneer's costs in providing services to the other clients and considered the differences in management fees and profit margins for Trust and non-Trust services. In evaluating the fees associated with Pioneer's client accounts, the Trustees took into account the respective demands, resources and complexity associated with the Trust and client accounts. The Trustees noted that, in some instances, the fee rates for those clients were lower than the management fee for the Trust and considered that, under the investment advisory agreement with the Trust, PIM performs additional services for the Trust that it does not provide to those other clients or services that are broader in scope, including

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oversight of the Trust's other service providers and activities related to compliance and the extensive regulatory and tax regimes to which the Trust is subject. The Trustees also considered the different entrepreneurial risks associated with PIM's management of the Trust and Pioneer's management of the other client accounts.

The Trustees concluded that the management fee payable by the Trust to PIM was reasonable in relation to the nature and quality of the services provided by PIM to the Trust.

Profitability

The Trustees considered information provided by PIM regarding the profitability of PIM with respect to the advisory services provided by PIM to the Trust, including the methodology used by PIM in allocating certain of its costs to the management of the Trust. The Trustees also considered PIM's profit margin in connection with the overall operation of the Trust. They

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further reviewed the financial results realized by PIM and its affiliates from non-fund businesses. The Trustees considered PIM's profit margins with respect to the Trust in comparison to the limited industry data available and noted that the profitability of any adviser was affected by numerous factors, including its organizational structure and method for allocating expenses. The Trustees concluded that PIM's profitability with respect to the management of the Trust was not unreasonable.

Economies of Scale

The Trustees considered the extent to which PIM may realize economies of scale or other efficiencies in managing and supporting the Trust. Since the Trust is a closed-end fund that has not raised additional capital, the Trustees concluded that economies of scale were not a relevant consideration in the renewal of the investment advisory agreement.

Other Benefits

The Trustees considered the other benefits to PIM from its relationship with the Trust. The Trustees considered the character and amount of fees paid by the Trust, other than under the investment advisory agreement, for services provided by PIM and its affiliates. The Trustees further considered the revenues and profitability of PIM's businesses other than the fund business. Pioneer is the principal U.S. asset management business of Pioneer Global Asset Management, the worldwide asset management business of UniCredit Group, which manages over \$150 billion in assets (including the Funds). Pioneer and the Funds receive reciprocal intangible benefits from the relationship, including mutual brand recognition and, for the Funds, direct and indirect access to the resources of a large global asset manager. The Trustees concluded that any such benefits received by Pioneer as a result of its relationship with the Funds were reasonable and their consideration of the advisory agreement between the Trust and PIM and the fees thereunder were unaffected by Pioneer's possible receipt of any such intangible benefits.

Conclusion

After consideration of the factors described above as well as other factors, the Trustees, including all of the Independent Trustees, concluded that the investment advisory agreement between PIM and the Trust, including the fees payable thereunder, was fair and reasonable and voted to approve the proposed renewal of the investment advisory agreement for the Trust.

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Trustees, Officers and Service Providers

Trustees

Thomas J. Perna, Chairman
David R. Bock
Benjamin M. Friedman
Margaret B.W. Graham
Marguerite A. Piret
Fred J. Ricciardi**
Kenneth J. Taubes

Advisory Trustee

Lorraine H. Monchak*

Officers

Lisa M. Jones, President and Chief
Executive Officer
Mark E. Bradley, Treasurer and
Chief Financial Officer
Christopher J. Kelley, Secretary and
Chief Legal Officer

Investment Adviser and Administrator

Pioneer Investment Management, Inc.

Custodian and Sub-Administrator

Brown Brothers Harriman & Co.

Principal Underwriter

Pioneer Funds Distributor, Inc.

Legal Counsel

Morgan, Lewis & Bocktius LLP

Shareowner Services and Transfer Agent

Pioneer Investment Management Shareholder Services, Inc.

Proxy Voting Policies and Procedures of the Fund are available without charge, upon request, by calling our toll free number (1-800-225-6292). Information regarding how the Fund voted proxies relating to portfolio securities during the most recent 12-month period ended June 30 is publicly available to shareowners at us.pioneerinvestments.com. This information is also available on the Securities and Exchange Commission's web site at www.sec.gov.

* Ms. Monchak became a non-voting Advisory Trustee on November 10, 2014.

** Mr. Ricciardi became a Trustee on November 10, 2014.

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How to Contact Pioneer

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We are pleased to offer a variety of convenient ways for you to contact us for assistance or information.

You can call American Stock Transfer & Trust Company (AST) for:

Account Information

1-800-225-6292

Or write to AST:

For

Write to

General inquiries, lost dividend checks,
change of address, lost stock certificates,
stock transfer

American Stock
Transfer & Trust
Operations Center
6201 15th Ave.
Brooklyn, NY 11219

Dividend reinvestment plan (DRIP)

American Stock
Transfer & Trust
Wall Street Station
P.O. Box 922
New York, NY 10269-0560

Website

www.amstock.com

For additional information, please contact your investment advisor or visit our web site us.pioneerinvestments.com.

The Trust files a complete schedule of investments with the Securities and Exchange Commission for the first and third quarters for each fiscal year on Form N-Q. Shareowners may view the filed Form N-Q by visiting the Commission's web site at www.sec.gov. The filed form may also be viewed and copied at the Commission's Public Reference Room in Washington, DC. Information regarding the operations of the Public Reference Room may be obtained by calling 1-800-SEC-0330.

[LOGO] PIONEER
Investments (R)

Pioneer Investment Management, Inc.
60 State Street
Boston, MA 02109
us.pioneerinvestments.com

Securities offered through Pioneer Funds Distributor, Inc.
60 State Street, Boston, MA 02109
Underwriter of Pioneer Mutual Funds, Member SIPC
(C) 2014 Pioneer Investments 19435-08-1114

ITEM 2. CODE OF ETHICS.

(a) Disclose whether, as of the end of the period covered by the report, the registrant has adopted a code of ethics that applies to the registrant's principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions, regardless of whether these individuals are employed by the registrant or a third party. If the registrant has not adopted such a code of ethics, explain why it has not done so.

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The registrant has adopted, as of the end of the period covered by this report, a code of ethics that applies to the registrant's principal executive officer, principal financial officer, principal accounting officer and controller.

(b) For purposes of this Item, the term "code of ethics" means written standards that are reasonably designed to deter wrongdoing and to promote:

- (1) Honest and ethical conduct, including the ethical handling of actual or apparent conflicts of interest between personal and professional relationships;
- (2) Full, fair, accurate, timely, and understandable disclosure in reports and documents that a registrant files with, or submits to, the Commission and in other public communications made by the registrant;
- (3) Compliance with applicable governmental laws, rules, and regulations;
- (4) The prompt internal reporting of violations of the code to an appropriate person or persons identified in the code; and
- (5) Accountability for adherence to the code.

(c) The registrant must briefly describe the nature of any amendment, during the period covered by the report, to a provision of its code of ethics that applies to the registrant's principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions, regardless of whether these individuals are employed by the registrant or a third party, and that relates to any element of the code of ethics definition enumerated in paragraph (b) of this Item. The registrant must file a copy of any such amendment as an exhibit pursuant to Item 10(a), unless the registrant has elected to satisfy paragraph (f) of this Item by posting its code of ethics on its website pursuant to paragraph (f)(2) of this Item, or by undertaking to provide its code of ethics to any person without charge, upon request, pursuant to paragraph (f)(3) of this Item.

The registrant has made no amendments to the code of ethics during the period covered by this report.

(d) If the registrant has, during the period covered by the report, granted a waiver, including an implicit waiver, from a provision of the code of ethics to the registrant's principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions, regardless of whether these individuals are employed by the registrant or a third party, that relates to one or more of the items set forth in paragraph (b) of this Item, the registrant must briefly describe the nature of the waiver, the name of the person to whom the waiver was granted, and the date of the waiver.

Not applicable.

(e) If the registrant intends to satisfy the disclosure requirement under paragraph (c) or (d) of this Item regarding an amendment to, or a waiver from, a provision of its code of ethics that applies to the registrant's principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions and that relates to any element of the code of ethics definition enumerated in paragraph (b) of this Item by posting such information on its Internet website, disclose the registrant's Internet address and such intention.

Not applicable.

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(f) The registrant must:

(1) File with the Commission, pursuant to Item 12(a)(1), a copy of its code of ethics that applies to the registrant's principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions, as an exhibit to its annual report on this Form N-CSR (see attachment);

(2) Post the text of such code of ethics on its Internet website and disclose, in its most recent report on this Form N-CSR, its Internet address and the fact that it has posted such code of ethics on its Internet website; or

(3) Undertake in its most recent report on this Form N-CSR to provide to any person without charge, upon request, a copy of such code of ethics and explain the manner in which such request may be made.
See Item 10(2)

ITEM 3. AUDIT COMMITTEE FINANCIAL EXPERT.

(a) (1) Disclose that the registrant's board of trustees has determined that the registrant either:

(i) Has at least one audit committee financial expert serving on its audit committee; or

(ii) Does not have an audit committee financial expert serving on its audit committee.

The registrant's Board of Trustees has determined that the registrant has at least one audit committee financial expert.

(2) If the registrant provides the disclosure required by paragraph (a)(1)(i) of this Item, it must disclose the name of the audit committee financial expert and whether that person is "independent." In order to be considered "independent" for purposes of this Item, a member of an audit committee may not, other than in his or her capacity as a member of the audit committee, the board of trustees, or any other board committee:

(i) Accept directly or indirectly any consulting, advisory, or other compensatory fee from the issuer; or

(ii) Be an "interested person" of the investment company as defined in Section 2(a)(19) of the Act (15 U.S.C. 80a-2(a)(19)).

Ms. Marguerite A. Piret, an independent trustee, is such an audit committee financial expert.

(3) If the registrant provides the disclosure required by paragraph (a)(1)(ii) of this Item, it must explain why it does not have an audit committee financial expert.

Not applicable.

ITEM 4. PRINCIPAL ACCOUNTANT FEES AND SERVICES.

(a) Disclose, under the caption AUDIT FEES, the aggregate fees billed for each of the last two fiscal years for professional services rendered by the principal accountant for the audit of the registrant's annual financial statements or services that are normally provided by the accountant in connection with

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statutory and regulatory filings or engagements for those fiscal years.

N/A

(b) Disclose, under the caption AUDIT-RELATED FEES, the aggregate fees billed in each of the last two fiscal years for assurance and related services by the principal accountant that are reasonably related to the performance of the audit of the registrant's financial statements and are not reported under paragraph (a) of this Item. Registrants shall describe the nature of the services comprising the fees disclosed under this category.

N/A

(c) Disclose, under the caption TAX FEES, the aggregate fees billed in each of the last two fiscal years for professional services rendered by the principal accountant for tax compliance, tax advice, and tax planning. Registrants shall describe the nature of the services comprising the fees disclosed under this category.

N/A

(d) Disclose, under the caption ALL OTHER FEES, the aggregate fees billed in each of the last two fiscal years for products and services provided by the principal accountant, other than the services reported in paragraphs (a) through (c) of this Item. Registrants shall describe the nature of the services comprising the fees disclosed under this category.

N/A

(e) (1) Disclose the audit committee's pre-approval policies and procedures described in paragraph (c) (7) of Rule 2-01 of Regulation S-X.

PIONEER FUNDS

APPROVAL OF AUDIT, AUDIT-RELATED, TAX AND OTHER SERVICES PROVIDED BY THE INDEPENDENT AUDITOR

SECTION I - POLICY PURPOSE AND APPLICABILITY

The Pioneer Funds recognize the importance of maintaining the independence of their outside auditors. Maintaining independence is a shared responsibility involving Pioneer Investment Management, Inc ("PIM"), the audit committee and the independent auditors.

The Funds recognize that a Fund's independent auditors: 1) possess knowledge of the Funds, 2) are able to incorporate certain services into the scope of the audit, thereby avoiding redundant work, cost and disruption of Fund personnel and processes, and 3) have expertise that has value to the Funds. As a result, there are situations where it is desirable to use the Fund's independent auditors for services in addition to the annual audit and where the potential for conflicts of interests are minimal. Consequently, this policy, which is intended to comply with Rule 210.2-01(C)(7), sets forth guidelines and procedures to be followed by the Funds when retaining the independent audit firm to perform audit, audit-related tax and other services under those circumstances, while also maintaining independence.

Approval of a service in accordance with this policy for a Fund shall also constitute approval for any other Fund whose pre-approval is required pursuant to Rule 210.2-01(c)(7)(ii).

In addition to the procedures set forth in this policy, any non-audit services that may be provided consistently with Rule 210.2-01 may be approved by the Audit Committee itself and any pre-approval that may be waived in accordance

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with Rule 210.2-01(c) (7) (i) (C) is hereby waived.

Selection of a Fund's independent auditors and their compensation shall be determined by the Audit Committee and shall not be subject to this policy.

SECTION II - POLICY

| SERVICE CATEGORY | SERVICE CATEGORY DESCRIPTION | SPECIFIC PRE-APPROVED SERVICE SUBCATEGORIES |
|----------------------------|--|---|
| I. AUDIT SERVICES | Services that are directly related to performing the independent audit of the Funds | <ul style="list-style-type: none"> o Accounting research assistance o SEC consultation, registration statements, and reporting o Tax accrual related matters o Implementation of new accounting standards o Compliance letters (e.g. rating agency letters) o Regulatory reviews and assistance regarding financial matters o Semi-annual reviews (if requested) o Comfort letters for closed end offerings |
| II. AUDIT-RELATED SERVICES | Services which are not prohibited under Rule 210.2-01(C) (4) (the "Rule") and are related extensions of the audit services support the audit, or use the knowledge/expertise gained from the audit procedures as a foundation to complete the project. In most cases, if the Audit-Related Services are not performed by the Audit firm, the scope of the Audit Services would likely increase. The Services are typically well-defined and governed by accounting professional standards (AICPA, SEC, etc.) | <ul style="list-style-type: none"> o AICPA attest and agreed-upon procedures o Technology control assessments o Financial reporting control assessments o Enterprise security architecture assessment |

AUDIT COMMITTEE APPROVAL POLICY

AUDIT COMMITTEE REPORTING POLICY

o "One-time" pre-approval for the audit period for all pre-approved specific service subcategories. Approval of the independent auditors as auditors for a Fund shall constitute pre approval for

o A summary of all such services and related fees reported at each regularly scheduled Audit Committee meeting.

these services.

- o "One-time" pre-approval for the fund fiscal year within a specified dollar limit for all pre-approved specific service subcategories
- o Specific approval is needed to exceed the pre-approved dollar limit for these services (see general Audit Committee approval policy below for details on obtaining specific approvals)
- o Specific approval is needed to use the Fund's auditors for Audit-Related Services not denoted as "pre-approved", or to add a specific service subcategory as "pre-approved"
- o A summary of all such services and related fees (including comparison to specified dollar limits) reported quarterly.

SECTION III - POLICY DETAIL, CONTINUED

| SERVICE CATEGORY | SERVICE CATEGORY DESCRIPTION | SPECIFIC PRE-APPROVED SERVICE SUBCATEGORIES |
|-------------------|---|---|
| III. TAX SERVICES | Services which are not prohibited by the Rule, if an officer of the Fund determines that using the Fund's auditor to provide these services creates significant synergy in the form of efficiency, minimized disruption, or the ability to maintain a desired level of confidentiality. | <ul style="list-style-type: none"> o Tax planning and support o Tax controversy assistance o Tax compliance, tax returns, excise tax returns and support o Tax opinions |

AUDIT COMMITTEE APPROVAL POLICY

AUDIT COMMITTEE REPORTING POLICY

- o "One-time" pre-approval for the fund fiscal year within a specified dollar limit
- o A summary of all such services and related fees (including comparison to specified dollar limits) reported quarterly.

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- o Specific approval is needed to exceed the pre-approved dollar limits for these services (see general Audit Committee approval policy below for details on obtaining specific approvals)
- o Specific approval is needed to use the Fund's auditors for tax services not denoted as pre-approved, or to add a specific service subcategory as "pre-approved"

SECTION III - POLICY DETAIL, CONTINUED

| SERVICE CATEGORY | SERVICE CATEGORY DESCRIPTION | SPECIFIC PRE-APPROVED SERVICE SUBCATEGORIES |
|--|---|--|
| IV. OTHER SERVICES A. SYNERGISTIC, UNIQUE QUALIFICATIONS | Services which are not prohibited by the Rule, if an officer of the Fund determines that using the Fund's auditor to provide these services creates significant synergy in the form of efficiency, minimized disruption, the ability to maintain a desired level of confidentiality, or where the Fund's auditors posses unique or superior qualifications to provide these services, resulting in superior value and results for the Fund. | <ul style="list-style-type: none"> o Business Risk Management support o Other control and regulatory compliance projects |

| AUDIT COMMITTEE APPROVAL POLICY | AUDIT COMMITTEE REPORTING POLICY |
|--|---|
| <ul style="list-style-type: none"> o "One-time" pre-approval for the fund fiscal year within a specified dollar limit o Specific approval is needed to exceed the pre-approved dollar limits for these services (see general | <ul style="list-style-type: none"> o A summary of all such services and related fees (including comparison to specified dollar limits) reported quarterly. |

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Audit Committee approval policy below for details on obtaining specific approvals)

- o Specific approval is needed to use the Fund's auditors for "Synergistic" or "Unique Qualifications" Other Services not denoted as pre-approved to the left, or to add a specific service subcategory as "pre-approved"

SECTION III - POLICY DETAIL, CONTINUED

| SERVICE CATEGORY | SERVICE CATEGORY DESCRIPTION | SPECIFIC PROHIBITED SERVICE SUBCATEGORIES |
|---------------------|--|---|
| PROHIBITED SERVICES | Services which result in the auditors losing independence status under the Rule. | <ol style="list-style-type: none"> 1. Bookkeeping or other services related to the accounting records or financial statements of the audit client* 2. Financial information systems design and implementation* 3. Appraisal or valuation services, fairness* opinions, or contribution-in-kind reports 4. Actuarial services (i.e., setting actuarial reserves versus actuarial audit work)* 5. Internal audit outsourcing services* 6. Management functions or human resources 7. Broker or dealer, investment advisor, or investment banking services 8. Legal services and expert services unrelated to the audit 9. Any other service that the Public Company Accounting Oversight Board determines, by regulation, is impermissible |

| AUDIT COMMITTEE APPROVAL POLICY | AUDIT COMMITTEE REPORTING POLICY |
|---|---|
| <ul style="list-style-type: none"> o These services are not to be performed with the exception of the(*) services that may be permitted if they would not be subject to audit procedures at the audit client (as defined in rule 2-01(f)(4)) level the firm providing the service. | <ul style="list-style-type: none"> o A summary of all services and related fees reported at each regularly scheduled Audit Committee meeting will serve as continual confirmation that has not provided any restricted services. |

GENERAL AUDIT COMMITTEE APPROVAL POLICY:

- o For all projects, the officers of the Funds and the Fund's auditors will each make an assessment to determine that any proposed projects will not impair independence.
- o Potential services will be classified into the four non-restricted service categories and the "Approval of Audit, Audit-Related, Tax and Other Services" Policy above will be applied. Any services outside the specific pre-approved service subcategories set forth above must be specifically approved by the Audit Committee.
- o At least quarterly, the Audit Committee shall review a report summarizing the services by service category, including fees, provided by the Audit firm as set forth in the above policy.

(2) Disclose the percentage of services described in each of paragraphs (b) through (d) of this Item that were approved by the audit committee pursuant to paragraph (c) (7) (i) (C) of Rule 2-01 of Regulation S-X.

N/A

(f) If greater than 50 percent, disclose the percentage of hours expended on the principal accountants engagement to audit the registrant's financial statements for the most recent fiscal year that were attributed to work performed by persons other than the principal accountant's full-time, permanent employees.

N/A

(g) Disclose the aggregate non-audit fees billed by the registrants accountant for services rendered to the registrant, and rendered to the registrants investment adviser (not including any sub-adviser whose role is primarily portfolio management and is subcontracted with or overseen by another investment adviser), and any entity controlling, controlled by, or under common control with the adviser that provides ongoing services to the registrant for each of the last two fiscal years of the registrant.

N/A

(h) Disclose whether the registrants audit committee of the board of trustees has considered whether the provision of non-audit services that were rendered to the registrants investment adviser (not including any subadviser whose role is primarily portfolio management and is subcontracted with or overseen by another investment adviser), and any entity controlling, controlled by, or under common control with the investment adviser that provides ongoing services to the registrant that were not pre-approved pursuant to paragraph (c) (7) (ii) of Rule 2-01 of Regulation S-X is compatible with maintaining the principal accountant's independence.

The Funds audit committee of the Board of Trustees has considered whether the provision of non-audit services that were rendered to the Affiliates (as defined) that were not pre-approved pursuant to paragraph (c) (7) (ii) of Rule 2-01 of Regulation S-X is compatible with maintaining the principal accountant's independence.

ITEM 5. AUDIT COMMITTEE OF LISTED REGISTRANTS

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(a) If the registrant is a listed issuer as defined in Rule 10A-3 under the Exchange Act (17 CFR 240.10A-3), state whether or not the registrant has a separately-designated standing audit committee established in accordance with Section 3(a)(58)(A) of the Exchange Act (15 U.S.C. 78c(a)(58)(A)). If the registrant has such a committee, however designated, identify each committee member. If the entire board of directors is acting as the registrant's audit committee as specified in Section 3(a)(58)(B) of the Exchange Act (15 U.S.C. 78c(a)(58)(B)), so state.

N/A

(b) If applicable, provide the disclosure required by Rule 10A-3(d) under the Exchange Act (17 CFR 240.10A-3(d)) regarding an exemption from the listing standards for audit committees.

N/A

ITEM 6. SCHEDULE OF INVESTMENTS.

File Schedule of Investments in securities of unaffiliated issuers as of the close of the reporting period as set forth in 210.1212 of Regulation S-X [17 CFR 210.12-12], unless the schedule is included as part of the report to shareholders filed under Item 1 of this Form.

Included in Item 1

ITEM 7. DISCLOSURE OF PROXY VOTING POLICIES AND PROCEDURES FOR CLOSED-END MANAGEMENT INVESTMENT COMPANIES.

A closed-end management investment company that is filing an annual report on this Form N-CSR must, unless it invests exclusively in non-voting securities, describe the policies and procedures that it uses to determine how to vote proxies relating to portfolio securities, including the procedures that the company uses when a vote presents a conflict between the interests of its shareholders, on the one hand, and those of the company's investment adviser; principal underwriter; or any affiliated person (as defined in Section 2(a)(3) of the Investment Company Act of 1940 (15 U.S.C. 80a-2(a)(3)) and the rules thereunder) of the company, its investment adviser, or its principal underwriter, on the other. Include any policies and procedures of the company's investment adviser, or any other third party, that the company uses, or that are used on the company's behalf, to determine how to vote proxies relating to portfolio securities.

Information not required in semi annual reports on form NCSR.

ITEM 8. PORTFOLIO MANAGERS OF CLOSED-END MANAGEMENT INVESTMENT COMPANIES.

(a) If the registrant is a closed-end management investment company that is filing an annual report on this Form N-CSR, provide the following information:

(1) State the name, title, and length of service of the person or persons employed by or associated with the registrant or an investment adviser of the registrant who are primarily responsible for the day-to-day management of the registrant's portfolio ("Portfolio Manager"). Also state each Portfolio Manager's business experience during the past 5 years.

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Information not required in semi annual reports on form NCSR.

ITEM 9. PURCHASES OF EQUITY SECURITIES BY CLOSED-END MANAGEMENT INVESTMENT COMPANY AND AFFILIATED PURCHASERS.

(a) If the registrant is a closed-end management investment company, in the following tabular format, provide the information specified in paragraph (b) of this Item with respect to any purchase made by or on behalf of the registrant or any affiliated purchaser, as defined in Rule 10b-18(a)(3) under the Exchange Act (17 CFR 240.10b-18(a)(3)), of shares or other units of any class of the registrant's equity securities that is registered by the registrant pursuant to Section 12 of the Exchange Act (15 U.S.C. 781).

During the period covered by this report, there were no purchases made by or on behalf of the registrant or any affiliated purchaser as defined in Rule 10b-18(a)(3) under the Securities Exchange Act of 1934 (the Exchange Act), of shares of the registrants equity securities that are registered by the registrant pursuant to Section 12 of the Exchange Act.

ITEM 10. SUBMISSION OF MATTERS TO A VOTE OF SECURITY HOLDERS.

Describe any material changes to the procedures by which shareholders may recommend nominees to the registrant's board of directors, where those changes were implemented after the registrant last provided disclosure in response to the requirements of Item 407(c)(2)(iv) of Regulation S-R(17 CFR 229.407) (as required by Item 22(b)(15)) of Schedule 14A (17 CFR 240.14a-101), or this Item.

There have been no material changes to the procedures by which the shareholders may recommend nominees to the registrant's board of directors since the registrant last provided disclosure in response to the requirements of Item 407(c)(2)(iv) of Regulation S-R of Schedule 14(A) in its definitive proxy statement, or this item.

ITEM 11. CONTROLS AND PROCEDURES.

(a) Disclose the conclusions of the registrant's principal executive and principal financial officers, or persons performing similar functions, regarding the effectiveness of the registrant's disclosure controls and procedures (as defined in Rule 30a-3(c) under the Act (17 CFR 270.30a-3(c))) as of a date within 90 days of the filing date of the report that includes the disclosure required by this paragraph, based on the evaluation of these controls and procedures required by Rule 30a-3(b) under the Act (17 CFR 270.30(a)-3(b) and Rules 13a-15(b) or 15d-15(b) under the Exchange Act (17 CFR 240.13a-15(b) or 240.15d-15(b))).

The registrant's principal executive officer and principal financial officer have concluded that the registrant's disclosure controls and procedures are effective based on the evaluation of these controls and procedures as of a date within 90 days of the filing date of this report.

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(b) Disclose any change in the registrant's internal control over financial reporting (as defined in Rule 30a-3(d) under the Act (17CFR 270.30a-3(d)) that occurred during the second fiscal quarter of the period covered by this report that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting.

There were no significant changes in the registrant's internal control over financial reporting that occurred during the second fiscal quarter of the period covered by this report that have materially affected, or are reasonably likely to materially affect, the registrant's internal control over financial reporting.

The registrant's principal executive officer and principal financial officer, however, voluntarily are reporting the following information:

In August of 2006 the registrant's investment adviser enhanced its internal procedures for reporting performance information required to be included in prospectuses. Those enhancements involved additional internal controls over the appropriateness of performance data generated for this purpose. Such enhancements were made following an internal review which identified prospectuses relating to certain classes of shares of a limited number of registrants where, inadvertently, performance information not reflecting the deduction of applicable sales charges was included. Those prospectuses were revised, and the revised prospectuses were distributed to shareholders.

ITEM 12. EXHIBITS.

(a) File the exhibits listed below as part of this Form. Letter or number the exhibits in the sequence indicated.

(1) Any code of ethics, or amendment thereto, that is the subject of the disclosure required by Item 2, to the extent that the registrant intends to satisfy the Item 2 requirements through filing of an exhibit.

(2) A separate certification for each principal executive officer and principal financial officer of the registrant as required by Rule 30a-2(a) under the Act (17 CFR 270.30a-2(a)) , exactly as set forth below:

Filed herewith.

SIGNATURES

[See General Instruction F]

Pursuant to the requirements of the Securities Exchange Act of 1934 and the Investment Company Act of 1940, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

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(Registrant) Pioneer Municipal High Income Advantage Trust

By (Signature and Title)* /s/ Lisa M. Jones
Lisa M. Jones, President and Chief Executive Officer

Date November 28, 2014

Pursuant to the requirements of the Securities Exchange Act of 1934 and the Investment Company Act of 1940, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

By (Signature and Title)* /s/ Lisa M. Jones
Lisa M. Jones, President and Chief Executive Officer

Date November 28, 2014

By (Signature and Title)* /s/ Mark Bradley
Mark Bradley, Treasurer & Chief Accounting & Financial Officer

Date November 28, 2014

* Print the name and title of each signing officer under his or her signature.