

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST

Form N-CSRS

November 28, 2016

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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, 2016 through September 30, 2016

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, 2016

Ticker Symbol: MAV

[LOGO] PIONEER
Investments(R)

visit us: us.pioneerinvestments.com

Table of Contents

| | |
|---|----|
| President's Letter | 2 |
| Portfolio Management Discussion | 4 |
| Portfolio Summary | 10 |
| Prices and Distributions | 11 |
| Performance Update | 12 |
| Schedule of Investments | 13 |
| Financial Statements | 23 |
| Notes to Financial Statements | 28 |
| Approval of Investment Advisory Agreement | 37 |
| Trustees, Officers and Service Providers | 41 |

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 1

President's Letter

Dear Shareowner,

While investors were greeted with a challenging market environment for the first several weeks of the new year, the U.S. market generated modest single-digit returns for both stocks and bonds through September 30th (the Bloomberg Barclays Aggregate Bond Index was up by 5.8% through 9/30/16, and the Standard & Poor's 500 Index was up by 7.8%). Yet, it is becoming increasingly clear that the investment landscape is undergoing significant change. For the past eight years, global central banks have been the dominant force in the markets by maintaining short-term interest rates at close to zero in an effort to stimulate economic growth. With little room to lower rates further, however, central banks may be losing their effectiveness. Many economies around the world are experiencing

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slow growth as they face a variety of challenges, including the shifting geopolitics driving "Brexit" - the United Kingdom's pending exit from the European Union - as well as related movements in Europe, limited productivity gains, aging populations, and transitioning economic models in China and other emerging markets. In the United States, gross domestic product grew at a rate of approximately 1.2% in the first half of 2016, although there are signs of stronger growth ahead, driven primarily by U.S. consumers.

Investors currently face a difficult environment. Government bond yields outside the U.S. are near zero and offer minimal opportunity to produce income. The central bank-driven bull market in riskier assets has pushed up valuations towards historic highs in the equity and investment-grade and high-yield corporate bond markets. Central banks have pledged to move gradually to normalize interest-rate policies as the global economy recovers, but it may take many years for this historic credit cycle to unwind. Politics may also influence markets or investor sentiment given the current global political landscape, with the U.S. elections in November, continued challenges with Brexit, and the December 2016 referendum on the Italian political system. These factors may make it even more challenging for investors to achieve returns similar to those experienced during periods of perceived market stability or economic growth. Against this backdrop, investors are likely to face challenges when it comes to finding opportunities for both income and capital appreciation, and while much has been made of passive investing, we believe all investment decisions are active choices.

Throughout Pioneer's history, we have believed in the importance of active management. During challenging market conditions, we view the value of active management as even more compelling. Our experienced and tenured investment teams focus on identifying value across global markets using

2 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

proprietary research, careful risk management, and a long-term perspective. We believe our shareowners can benefit from the experience and tenure of our investment teams as well as the insights generated from our extensive research process.

As always, and particularly during times of market uncertainty, we encourage you to work with your financial advisor to develop an overall investment plan that addresses both your short- and long-term goals, and to implement such a plan in a disciplined manner.

We greatly appreciate the trust you have placed in us 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.
September 30, 2016

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. Past performance is no guarantee of future results.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 3

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Portfolio Management Discussion | 9/30/16

Municipal bonds, both investment grade and high yield, generated healthy returns during the six-month period ended September 30, 2016. 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. 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.

Q How did Pioneer Municipal High Income Advantage Trust perform during the six-month period ended September 30, 2016?

A Pioneer Municipal High Income Advantage Trust returned 4.60% at net asset value and -2.68% at market price during the six-month period ended September 30, 2016. During the same six-month period, the Trust's benchmarks, the Bloomberg Barclays High Yield Municipal Bond Index and the Bloomberg Barclays Municipal Bond Index, returned 6.45% and 2.30%, respectively. The Bloomberg Barclays High Yield Municipal Bond Index is an unmanaged measure of the performance of lower-rated municipal bonds, while the Bloomberg Barclays Municipal Bond Index is an unmanaged measure of the performance of investment-grade municipal bonds. Unlike the Trust, the two 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 4.98%.

The shares of the Trust were selling at a 2.83% premium to net asset value at the end of the period, on September 30, 2016.

On September 30, 2016, the standardized 30-day SEC yield of the Trust's shares was 3.41%*.

Q How would you describe the investment environment in the municipal bond market during the six-month period ended September 30, 2016?

A Overall, the six-month period featured a positive environment for tax-advantaged municipal bond investments. The beginning of the period in April 2016 saw a continuation of the positive market trends that had generated solid gains by municipal bonds, both high yield and investment grade, during the previous months. Declining market interest rates

* 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.

4 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

throughout the yield curve combined with persistent demand from both traditional and non-traditional municipal bond investors drove municipal bond prices generally higher. During that early part of the period, yield spreads - or the differences in yields between higher- and lower-quality securities with similar maturities - were tightening. That led to strong performance by higher-yielding, lower-quality municipal debt instruments.

After the fast start to the period, a temporary disruption hit the municipal market early in the summer when the Commonwealth of Puerto Rico,

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a major issuer of high-yield municipal debt, announced it would default on its general obligation bonds. While the initial market reaction to the announcement was a spike in volatility, the environment soon settled down as it became evident to investors that the renegotiation of Puerto Rico's debt would likely result in issuance of newer securities priced at higher levels than the market prices in effect before the default announcement. In the end, Puerto Rico's debt actually outperformed the municipal market for the full six-month period, as did the distressed debt of other financially troubled issuers such as the State of Illinois and the City of Chicago.

Q Which of your investment decisions had the biggest effects on the Trust's benchmark-relative performance during the six-month period ended September 30, 2016, and how was the Trust positioned at the end of the period?

A The Trust's return at net asset value (NAV) over the six-month period trailed the return of the Bloomberg Barclays High Yield Municipal Bond Index (the high-yield municipal index), and exceeded the return of the investment-grade Bloomberg Barclays Municipal Bond Index. While the portfolio's weightings in high-yield and investment-grade municipal bonds tend to shift based on market conditions and other factors, in general, the Trust's exposure to high-yield municipal bonds is greater, and so for the purposes of this discussion, we measure the Trust's benchmark-relative performance against the high-yield municipal index.

The principal reason for the Trust's underperformance of the high-yield municipal index was the portfolio's underexposure to the aforementioned Puerto Rico debt. After the default announcement on July 1, the value of bonds issued by the Commonwealth of Puerto Rico still represented more than 12% of the high-yield municipal index, while the Trust's exposure to Puerto Rico was limited to less than 1% of its total investment portfolio (0.9% as of September 30, 2016). The Trust's underweight caused it to underperform the high-yield municipal index when Puerto Rico's bonds eventually rallied. Even though the underweight to Puerto Rico detracted from benchmark-relative returns, the Trust's investment in Puerto Rico

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 5

actually boosted benchmark-relative performance at the individual security - or security selection - level during the six-month period. The high-yield municipal index's Puerto Rico component features some lower-quality issues that struggled during the period, and many of those underperformed the general obligation Puerto Rico bond held in the Trust's portfolio. Despite the problems experienced during the six-month period, we remain confident that the Trust's investment in Puerto Rico can benefit performance over the longer term. Similarly, the Trust's benchmark-relative performance also felt the negative effects of the portfolio's lack of exposure to the debt issued by the State of Illinois, the City of Chicago, and the Chicago Board of Education, which together represented 6% of the high-yield municipal index. Our long-term investment discipline in managing the Trust, which places a priority on credit research and deep analysis of the ability of bond issuers to meet their obligations, resulted in the Trust's underexposure to the most distressed parts of the high-yield municipal universe during the six-month period.

While the Trust's underweights to the lowest-quality parts of the municipal market detracted from benchmark-relative returns during the period, our emphasis on holding the debt of tobacco Master Settlement Agreements (commonly referred to as tobacco bonds) in the portfolio had a significant positive effect on benchmark-relative performance. At the end of the period, tobacco bonds accounted for 9% of the Trust's total investment portfolio.

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One other factor that detracted from the Trust's performance during the period was that the cost of borrowing increased. That is, the Trust's use of leverage during the period became more expensive due to rising interest rates on short-term, money market municipal debt. This reduced the Trust's income and negatively affected its total return.

Consistent with our long-term investment discipline, we kept the Trust's portfolio well diversified* by sectors during the six-month period, with an emphasis on project revenue bonds, which are supported by revenues of specific projects. We believe the financial support for such projects is more consistent and predictable than it is for general obligation bonds, which essentially rely on state and local tax revenue.

With regard to individual holdings, positions in the Trust's portfolio that benefited the Trust's benchmark-relative performance during the period included bonds issued by the Massachusetts Development Authority,

* Diversification does not assure a profit nor protect against loss.

6 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

California County Tobacco Securitization Agency, Buckeye (Ohio) Tobacco Settlement Financing Authority, and Private Colleges & Universities Authority (Georgia), for Emory University.

Holdings that detracted from the Trust's benchmark-relative returns during the period included bonds issued by West Virginia Hospital Finance Authority (Highland Hospital), Illinois Finance Authority, and Greenfields of Geneva Project, a continuing care retirement community in Illinois.

At the end of the period on September 30, 2016, revenue bonds represented more than 84% of the Trust's total investment portfolio. Among the Trust's allocation to revenue bonds, the three largest sector weights at the end of the period were in health care (more than 17% of the Trust's total investment portfolio), education (13%), and tobacco (9%).

Q What were the principal factors that affected the Trust's yield during the six-month period ended September 30, 2016?

A The Trust's monthly dividend distributions decreased from 7 cents per share to 6.25 cents per share in August 2016. Two main factors were responsible for the dividend cut and the resulting loss in yield.

The first and primary factor, as noted earlier, was that the Trust's interest costs for borrowing money - or the use of leverage - increased during the period due to rising interest rates on short-term, money market municipal debt. As those rates increased, the cost of the Trust's preferred shares, which the Trust issues to finance its borrowings, also increased, thereby diminishing the Trust's current income available for distribution to shareholders. The second factor was the longer-term decline in interest rates in the fixed-income markets in general, including the broader municipal bond market. As bonds in the Trust's portfolio of investments either reached maturity or were called away by issuers to be refinanced with lower-cost debt, comparable alternatives offering the same current income were not available for investment without compromising our credit standards, and we were unwilling to compromise our credit standards to reach for more income. In addition, the Trust has drawn on accumulated net investment income in paying its distributions in recent periods, but these reserves will be depleted over time.

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Q How did the level of leverage in the Trust change during the six-month period ended September 30, 2016?

A At the end of the six-month period on September 30, 2016, 33.0% of the Trust's total managed assets were financed by leverage obtained through the issuance of preferred shares, compared with 33.4% of the Trust's total

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 7

managed assets financed by leverage at the start of the period on April 1, 2016. The decline in leverage as a percentage of total managed assets was due to the increase in values of securities in which the Trust had invested.

Q Did the Trust invest in any derivative securities during the six-month period ended September 30, 2016?

A No, the Trust had no investments in derivative securities during the period.

Q What is your investment outlook?

A We think strong investor demand and a continued tightening of supply should support the municipal bond market, even in the face of sluggish economic growth. We project that growth in U.S. gross domestic product (GDP) is likely to increase at a moderate annualized pace of 2.00% in the coming months. The third quarter's announced GDP growth rate of 2.9% certainly was a welcome change from the much slower rates seen in the first and second quarters of this year (0.8% and 1.4%, respectively). While economic growth has been slow overall in 2016, it nevertheless has been persistent, and economists widely anticipate that the U.S. Federal Reserve System (the Fed) will raise short-term interest rates in December, a full year after its last, very modest rate increase of 0.25% in December 2015. That factor, combined with the announcement that the European Central Bank will begin withdrawing some of its monetary stimulus, could lead to some general tightening in the capital markets. Another unknown affecting our market outlook is the outcome of the 2016 presidential campaign, which could have an influence on tax rates in the U.S. starting next year. That, in turn, could have an effect on the demand for municipal debt. Uncertainties in foreign markets are another factor that could affect market trends.

Nevertheless, we continue to believe that a steadily improving job market and healthy activity in the housing sector should help sustain the domestic economy's expansion. Regardless of the economic climate, we intend to maintain our investment strategy of keeping the Trust's portfolio well diversified across both investment-grade and high-yield municipal debt securities, with an emphasis on project revenue bonds backed by predictable and reliable funding sources.

Please refer to the Schedule of Investments on pages 13-22 for a full listing of Trust securities.

All investments are subject to risk, including the possible loss of principal. In the past several years, financial markets have experienced increased volatility, depressed valuations, decreased liquidity and heightened uncertainty. These conditions may continue, recur, worsen or spread.

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

8 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

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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.

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, which is likely to result in a decrease in the market value of the Trust's shares.

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. Past performance is no guarantee of future results.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 9

Portfolio Summary | 9/30/16

Portfolio Diversification

(As a percentage of total investment portfolio)

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

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| | |
|------------------------------|-------|
| Insured: | 15.2% |
| Revenue Bonds: Other Revenue | 20.6% |
| Health Revenue | 17.5% |
| Education Revenue | 13.1% |
| Tobacco Revenue | 9.0% |
| Transportation Revenue | 7.1% |
| Facilities Revenue | 6.8% |
| Development Revenue | 6.5% |
| Water Revenue | 1.9% |
| Pollution Revenue | 1.7% |
| Airport Revenue | 0.6% |

Portfolio Maturity

(As a percentage of total investments)

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

| | |
|-------------|-------|
| 5-7 years | 0.1% |
| 7-10 years | 3.7% |
| 10-20 years | 36.5% |
| 20+ years | 59.7% |

10 Largest Holdings

(As a percentage of long-term holdings)*

1. New Jersey Transportation Trust Fund Authority, 12/15/27 (BHAC Insured)
2. Massachusetts Development Finance Agency, WGBH Foundation, Series A, 5.75%, 1/1/42 (AMBAC Insured)
3. Private Colleges & Universities Authority, Emory University, Series A, 5.0%, 10/1/43
4. North Texas Tollway Authority, Series F, 5.75%, 1/1/33
5. Buckeye Tobacco Settlement Financing Authority, Asset-Backed, Series A-2, 6.5%, 6/1/47
6. Lehman Municipal Trust Receipts, RIB, 11.532%, 6/1/37 (144A) (AGM Insured)
7. New York State Dormitory Authority, Series C, 5.0%, 3/15/39
8. New Jersey Economic Development Authority, Continental Airlines, 5.75%, 9/15/27
9. State of Connecticut, Series E, 4.0%, 9/1/30
10. Jefferson Parish Hospital Service District No. 2, East Jefferson General Hospital, 6.375%, 7/

* This list excludes temporary cash investments and derivative instruments. The portfolio is actively managed, and current holdings may be different.

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The holdings listed should not be considered recommendations to buy or sell any security listed.

10 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

Prices and Distributions | 9/30/16

Share Prices and Distributions

Market Value per Common Share

| | 9/30/16 | 3/31/16 |
|--------------|----------|----------|
| Market Value | \$ 13.09 | \$ 13.87 |
| Premium | 2.8% | 10.5% |

Net Asset Value per Common Share

| | 9/30/16 | 3/31/16 |
|-----------------|---------|---------|
| Net Asset Value | \$12.73 | \$12.55 |

Distributions per Common Share:* 4/1/16 - 9/30/16

| Net Investment Income | Short-Term Capital Gains | Long-Term Capital Gains |
|-----------------------|--------------------------|-------------------------|
| \$ 0.41 | \$ -- | \$ -- |

Yields

| | 9/30/16 | 3/31/16 |
|--|---------|---------|
|--|---------|---------|

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| | | | |
|------|----------|----------|----------|
| 9/11 | \$13,583 | \$12,771 | \$11,302 |
| 9/12 | \$17,206 | \$13,833 | \$12,974 |
| 9/13 | \$15,657 | \$13,527 | \$12,774 |
| 9/14 | \$19,195 | \$14,600 | \$14,302 |
| 9/15 | \$17,598 | \$15,061 | \$14,480 |
| 9/16 | \$19,158 | \$15,902 | \$16,119 |

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 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 Bloomberg Barclays Municipal Bond Index is an unmanaged, broad measure of the municipal bond market. The Bloomberg Barclays High Yield Municipal Bond Index is unmanaged, totals over \$26 billion in market value and maintains over 1,300 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.

12 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

Schedule of Investments | 9/30/16 (unaudited)

Principal
Amount
USD (\$)

Value

TAX EXEMPT OBLIGATIONS -- 147.5%
of Net Assets (a)

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| | | | |
|-------------------|--|----|------|
| | Alabama -- 1.7% | | |
| 2,500,000 | Alabama Industrial Development Authority, Pine City Fiber Co., 6.45%, 12/1/23 | \$ | 2,51 |
| 2,500,000 | Huntsville-Redstone Village Special Care Facilities Financing Authority, Redstone Village Project, 5.5%, 1/1/43 | | 2,50 |
| | | \$ | 5,01 |
| ----- | | | |
| | Arizona -- 0.7% | | |
| 2,000,000 | City of Phoenix, AZ, Industrial Development Authority, 3rd & Indian School Assisted Living Project, 5.4%, 10/1/36 | \$ | 1,99 |
| 32,000 | County of Pima, AZ, Industrial Development Authority, Arizona Charter Schools Project, Series C, 6.75%, 7/1/31 | | 3 |
| | | \$ | 2,02 |
| ----- | | | |
| | California -- 17.1% | | |
| 6,990,000 | California County Tobacco Securitization Agency, Asset-Backed, Gold County Funding Corp., 5.25%, 6/1/46 | \$ | 6,98 |
| 38,610,000 (b) | California County Tobacco Securitization Agency, Capital Appreciation, Stanislaus County, Subordinated, Series A, 6/1/46 | | 5,48 |
| 1,845,000 | California Educational Facilities Authority, Stanford University, 5.25%, 4/1/40 | | 2,68 |
| 1,550,000 | California Enterprise Development Authority, Sunpower Corp., 8.5%, 4/1/31 | | 1,76 |
| 5,000,000 | California Pollution Control Financing Authority, 5.0%, 7/1/37 (144A) | | 5,14 |
| 3,000,000 | California School Finance Authority, Classical Academies Project, Series A, 7.375%, 10/1/43 | | 3,63 |
| 1,875,000 | California Statewide Communities Development Authority, Lancer Plaza Project, 5.875%, 11/1/43 | | 2,01 |
| 757,342 (c) | California Statewide Communities Development Authority, Microgy Holdings Project, 9.0%, 12/1/38 | | |
| 1,500,000 (d) | City of Madera, CA, Irrigation Financing Authority, 6.25%, 1/1/31 | | 1,75 |
| 1,500,000 (d) | City of Madera, CA, Irrigation Financing Authority, 6.5%, 1/1/40 | | 1,76 |
| 2,500,000 | City of San Jose, CA, Series B, 5.0%, 3/1/37 (AMBAC Insured) | | 2,54 |
| 1,000,000 | Golden State Tobacco Securitization Corp., Asset-Backed, Series A-1, 5.125%, 6/1/47 | | 99 |
| 8,575,000 (e) (f) | Lehman Municipal Trust Receipts, RIB, 11.532%, 6/1/37 (144A) (AGM Insured) | | 9,27 |
| 3,140,000 (e) | Lehman Municipal Trust Receipts, RIB, 11.692%, 11/1/39 (144A) (AGM Insured) | | 3,73 |
| 1,000,000 | River Islands Public Financing Authority, Community Facilities, 5.5%, 9/1/45 | | 1,10 |
| 2,425,000 (f) | State of California, Various Purposes, 5.75%, 4/1/31 | | 2,70 |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 13

Schedule of Investments | 9/30/16 (unaudited) (continued)

Principal

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| Amount USD (\$) | | Value |
|--------------------|---|----------------------------|
| 465,000 | California -- (continued) Tobacco Securitization Authority of Southern California, Series A-1, 5.125%, 6/1/46 | \$ 46 ----- \$ 52,05 |
| 1,500,000 | Colorado -- 0.5% Colorado Educational & Cultural Facilities Authority, Rocky Mountain Classical Academy Project, 8.0%, 9/1/43 | \$ 1,59 |
| 175,000 (e) | Connecticut -- 3.8% Connecticut State Health & Educational Facility Authority, Yale University, Series V-1, 0.76%, 7/1/36 | \$ 17 |
| 2,235,000 | Mohegan Tribal Finance Authority, 7.0%, 2/1/45 (144A) | 2,33 |
| 7,200,000 (f) | State of Connecticut, Series E, 4.0%, 9/1/30 | 8,03 |
| 1,000,000 | Town of Hamden, CT, Whitney Center Project, Series A, 7.75%, 1/1/43 | 1,05 ----- \$ 11,59 |
| 2,635,000 | District of Columbia -- 3.4% District of Columbia Tobacco Settlement Financing Corp., Asset-Backed, 6.5%, 5/15/33 | \$ 3,23 |
| 6,825,000 | District of Columbia Tobacco Settlement Financing Corp., Asset-Backed, 6.75%, 5/15/40 | 7,06 ----- \$ 10,30 |
| 1,500,000 | Florida -- 4.3% Alachua County Health Facilities Authority, Terraces Bonita Springs Project, Series A, 8.125%, 11/15/41 | \$ 1,78 |
| 1,500,000 | Alachua County Health Facilities Authority, Terraces Bonita Springs Project, Series A, 8.125%, 11/15/46 | 1,78 |
| 2,500,000 (d) | County of Miami-Dade, FL, Aviation Revenue, Series B, 5.5%, 10/1/41 | 2,83 |
| 5,000,000 | Florida's Turnpike Enterprise, Department of Transportation, Series A, 4.0%, 7/1/32 | 5,52 |
| 1,000,000 (d) | Hillsborough County Industrial Development Authority, Various Health Facilities, 8.0%, 8/15/32 | 1,20 ----- \$ 13,13 |
| 1,735,000 (e) | Georgia -- 4.6% Athens-Clarke County Unified Government Development Authority, University of Georgia Athletic Association Project, 0.78%, 8/1/33 | \$ 1,73 |
| 900,000 | DeKalb County Georgia Hospital Authority, DeKalb Medical Center, Inc. Project, 6.0%, 9/1/30 | 1,03 |
| 750,000 | DeKalb County Georgia Hospital Authority, DeKalb Medical Center, Inc. Project, 6.125%, 9/1/40 | 85 |
| 8,750,000 | Private Colleges & Universities Authority, Emory University, Series A, 5.0%, 10/1/43 | 10,49 ----- \$ 14,12 |

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

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14 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

| Principal Amount USD (\$) | | Value |
|---------------------------|---|----------|
| 1,000,000 | Guam -- 0.4% Guam Department of Education, Certificates of Participation, John F. Kennedy High School, Series A, 6.625%, 12/1/30 | \$ 1,09 |
| 2,000,000 | Idaho -- 0.7% Power County Industrial Development Corp., FMC Corp. Project, 6.45%, 8/1/32 | \$ 2,00 |
| 417,400 (e) | Illinois -- 3.4% Illinois Finance Authority, Clare Oaks Project, Series B, 4.0%, 11/15/52 | \$ 29 |
| 261,000 (b) | Illinois Finance Authority, Clare Oaks Project, Series C-1, 11/15/52 | |
| 52,200 (b) | Illinois Finance Authority, Clare Oaks Project, Series C-2, 11/15/52 | 1 |
| 52,200 (b) | Illinois Finance Authority, Clare Oaks Project, Series C-3, 11/15/52 | |
| 3,000,000 (c) | Illinois Finance Authority, Greenfields of Geneva Project, Series A, 8.125%, 2/15/40 | 2,38 |
| 2,500,000 (c) | Illinois Finance Authority, Greenfields of Geneva Project, Series A, 8.25%, 2/15/46 | 1,98 |
| 1,450,000 | Illinois Finance Authority, Memorial Health System, 5.5%, 4/1/39 | 1,57 |
| 2,000,000 | Illinois Finance Authority, Northwestern Memorial Hospital, Series A, 6.0%, 8/15/39 | 2,28 |
| 280,000 | Illinois Finance Authority, Swedish Covenant, Series A, 6.0%, 8/15/38 | 31 |
| 1,555,000 | Southwestern Illinois Development Authority, Village of Sauget Project, 5.625%, 11/1/26 | 1,45 |
| | | \$ 10,33 |
| 250,000 | Indiana -- 0.6% City of Carmel, IN, Barrington Carmel Project, Series A, 7.0%, 11/15/32 | \$ 28 |
| 750,000 | City of Carmel, IN, Barrington Carmel Project, Series A, 7.125%, 11/15/42 | 85 |
| 500,000 | City of Carmel, IN, Barrington Carmel Project, Series A, 7.125%, 11/15/47 | 56 |
| | | \$ 1,70 |
| 1,000,000 | Kansas -- 0.4% Kansas Development Finance Authority, Hayes Medical Center, Inc., Series Q, 5.0%, 5/15/35 | \$ 1,07 |
| 7,000,000 | Louisiana -- 5.7% Jefferson Parish Hospital Service District No. 2, East Jefferson General Hospital, 6.375%, 7/1/41 | \$ 7,89 |

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2,500,000 Louisiana Local Government Environmental Facilities & Community Development Authority, Westlake Chemical Corp. Project, 6.75%, 11/1/32

2,65

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 15

Schedule of Investments | 9/30/16 (unaudited) (continued)

| Principal Amount USD (\$) | | Value |
|------------------------------|---|----------|
| ----- | | |
| | Louisiana -- (continued) | |
| 1,650,000 (d) | Louisiana Public Facilities Authority, Ochsner Clinic Foundation Project, Series A, 5.5%, 5/15/47 | \$ 1,69 |
| 4,350,000 | Louisiana Public Facilities Authority, Ochsner Clinic Foundation Project, Series A, 5.5%, 5/15/47 | 4,45 |
| 750,000 | Opelousas Louisiana General Hospital Authority, Opelousas General Health System Project, 5.75%, 10/1/23 | 75 |
| | | ----- |
| | | \$ 17,44 |
| ----- | | |
| | Maine -- 1.9% | |
| 1,500,000 | Maine Health & Higher Educational Facilities Authority, Maine General Medical Center, 7.5%, 7/1/32 | \$ 1,78 |
| 3,500,000 | Maine Turnpike Authority, Series A, 5.0%, 7/1/42 | 4,09 |
| | | ----- |
| | | \$ 5,88 |
| ----- | | |
| | Maryland -- 3.8% | |
| 2,000,000 | Maryland Health & Higher Educational Facilities Authority, Charlestown Community, 6.25%, 1/1/45 | \$ 2,33 |
| 2,225,000 | Maryland Health & Higher Educational Facilities Authority, City Neighbors, Series A, 6.75%, 7/1/44 | 2,53 |
| 1,250,000 | Maryland Health & Higher Educational Facilities Authority, Doctor's Community Hospital, 5.75%, 7/1/38 | 1,41 |
| 4,500,000 | Maryland Health & Higher Educational Facilities Authority, Maryland University Medical System, Series A, 5.0%, 7/1/43 | 5,15 |
| | | ----- |
| | | \$ 11,43 |
| ----- | | |
| | Massachusetts -- 10.9% | |
| 7,000,000 (b) | Massachusetts Bay Transportation Authority, Series A, 7/1/28 | \$ 5,35 |
| 2,575,000 | Massachusetts Development Finance Agency, Broad Institute, Inc., Series A, 5.25%, 4/1/37 | 2,99 |
| 987,904 | Massachusetts Development Finance Agency, Linden Ponds, Inc., Series A-1, 5.5%, 11/15/46 | 94 |
| 2,200,000 | Massachusetts Development Finance Agency, Partner's Healthcare System, Series M-4, 5.0%, 7/1/39 | 2,53 |
| 8,000,000 | Massachusetts Development Finance Agency, WGBH Foundation, Series A, 5.75%, 1/1/42 (AMBAC Insured) | 11,53 |
| 100,000 (e) | Massachusetts Health & Educational Facilities Authority, Children's Hospital Corp., Series N-4, 0.83%, 10/1/49 | 10 |
| 4,325,000 | Massachusetts Health & Educational Facilities Authority, | |

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| | | |
|---------------|--|----------|
| 3,490,000 (e) | Massachusetts Institute of Technology, Series K, 5.5%, 7/1/32 | 6,21 |
| | Massachusetts Health & Educational Facilities Authority, Harvard University, Series R, 0.69%, 11/1/49 | 3,49 |
| | | \$ 33,17 |
| 2,000,000 | Michigan -- 3.6% Flint Michigan Hospital Building Authority, Hurley Medical Center, 7.375%, 7/1/35 | \$ 2,27 |
| 2,235,000 | Kent Hospital Finance Authority, Metropolitan Hospital Project, Series A, 6.25%, 7/1/40 | 2,24 |

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

16 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

| Principal Amount USD (\$) | | Value |
|---------------------------------|---|----------|
| 560,000 | Michigan -- (continued) Michigan Public Educational Facilities Authority, Crescent Academy, 7.0%, 10/1/36 | \$ 58 |
| 5,000,000 | Michigan State University, Series A, 5.0%, 8/15/41 | 5,94 |
| | | \$ 11,04 |
| 2,000,000 | Minnesota -- 2.2% Bloomington Port Authority, Radisson Blu Mall of America, 9.0%, 12/1/35 | \$ 2,19 |
| 3,755,000 (f) | State of Minnesota, Series B, 4.0%, 8/1/27 | 4,53 |
| | | \$ 6,73 |
| 425,000 (e) | Mississippi -- 0.1% Mississippi Business Finance Corp., Chevron USA, Inc. Project, Series B, 0.85%, 12/1/30 | \$ 42 |
| 2,445,000 (c) | Montana -- 0.2% City of Hardin, MT, Tax Allocation, Rocky Mountain Power, Inc. Project, 6.25%, 9/1/31 | \$ 48 |
| 1,000,000 (c) | Two Rivers Authority, Inc., 7.375%, 11/1/27 | 11 |
| | | \$ 60 |
| 4,500,000 (d) | Nevada -- 2.2% City of Reno, NV, Renown Regional Medical Center Project, Series A, 5.25%, 6/1/41 | \$ 4,63 |
| 2,000,000 | County of Washoe, NV, Fuel Tax, 5.0%, 2/1/43 | 2,16 |
| | | \$ 6,79 |
| 7,500,000 | New Jersey -- 8.9% New Jersey Economic Development Authority, Continental Airlines, 5.75%, 9/15/27 | \$ 8,55 |

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| | | |
|---------------|---|----------|
| 3,500,000(e) | New Jersey State Turnpike Authority, RIB, 12.257%, 1/1/28 (144A) (AGM Insured) | 6,77 |
| 15,375,000(b) | New Jersey Transportation Trust Fund Authority, 12/15/27 (BHAC Insured) | 11,73 |
| | | \$ 27,06 |
| ----- | | |
| 5,000,000 | New York -- 6.8% New York State Dormitory Authority, Columbia University, 5.0%, 10/1/41 | \$ 5,82 |
| 2,000,000 | New York State Dormitory Authority, Orange Medical Center, 6.125%, 12/1/29 | 2,16 |
| 7,500,000 | New York State Dormitory Authority, Series C, 5.0%, 3/15/39 | 8,97 |
| 1,500,000 | New York State Dormitory Authority, Trustees of Columbia University, 5.0%, 10/1/45 | 2,20 |
| 1,357,463 | Westchester County Healthcare Corp., Series A, 5.0%, 11/1/44 | 1,55 |
| | | \$ 20,72 |
| ----- | | |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 17

Schedule of Investments | 9/30/16 (unaudited) (continued)

| Principal Amount USD (\$) | | Value |
|---------------------------------|---|----------|
| 1,495,000(e) | North Carolina -- 0.5% Charlotte-Mecklenburg Hospital Authority, Carolinas Healthcare System, Series B, 0.88%, 1/15/26 | \$ 1,49 |
| 3,000,000(d) | Ohio -- 7.0% Akron Bath Copley Joint Township Hospital District, Akron General Health System, 5.0%, 1/1/31 | \$ 3,55 |
| 2,500,000 | Buckeye Tobacco Settlement Financing Authority, Asset-Backed, Series A-2, 5.875%, 6/1/47 | 2,44 |
| 9,945,000 | Buckeye Tobacco Settlement Financing Authority, Asset-Backed, Series A-2, 6.5%, 6/1/47 | 10,11 |
| 2,000,000(e) | Ohio Air Quality Development Authority, FirstEnergy Solutions Corp. Project, Series D, 4.25%, 8/1/29 | 2,00 |
| 2,500,000(f) | State of Ohio, Common Schools, Series B, 5.0%, 6/15/29 | 2,99 |
| | | \$ 21,11 |
| ----- | | |
| 2,000,000 | Oregon -- 0.7% Oregon State Facilities Authority, Samaritan Health Services, Series A, 5.25%, 10/1/40 | \$ 2,19 |
| ----- | | |
| 1,000,000(e) | Pennsylvania -- 10.9% Beaver County Industrial Development Authority, FirstEnergy Solutions Corp. Project, Series A, 3.5%, 4/1/41 | \$ 87 |

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| | | |
|-------------------|---|---------------|
| 3,000,000 (e) | Beaver County Industrial Development Authority, FirstEnergy Solutions Corp. Project, Series B, 4.25%, 10/1/47 | 3,000,000 |
| 600,000 (e) | Geisinger Authority, Geisinger Health System, Series B, 0.88%, 8/1/22 | 600,000 |
| 1,965,000 | Pennsylvania Economic Development Financing Authority, US Airways Group, Series B, 8.0%, 5/1/29 | 2,290,000 |
| 5,000,000 | Pennsylvania Economic Development Financing Authority, USG Corp. Project, 6.0%, 6/1/31 | 5,000,000 |
| 5,000,000 | Pennsylvania Turnpike Commission, Series D, 5.3%, 12/1/41 | 5,530,000 |
| 500,000 | Philadelphia Authority for Industrial Development, Greater Philadelphia Health Action, Inc. Project, Series A, 6.625%, 6/1/50 | 530,000 |
| 6,000,000 | Philadelphia Authority for Industrial Development, Nueva Esperanza, Inc., 8.2%, 12/1/43 | 6,970,000 |
| 1,000,000 | Philadelphia Authority for Industrial Development, Performing Arts Charter School Project, 6.5%, 6/15/33 (144A) | 1,060,000 |
| 2,000,000 | Philadelphia Authority for Industrial Development, Performing Arts Charter School Project, 6.75%, 6/15/43 (144A) | 2,130,000 |
| 5,000,000 | Philadelphia Hospitals & Higher Education Facilities Authority, Temple University Health System, Series A, 5.0%, 7/1/34 | 5,060,000 |
| | | \$ 33,080,000 |
| <hr/> | | |
| 6,500,000 (c) (f) | Puerto Rico -- 1.4% Commonwealth of Puerto Rico, Series A, 8.0%, 7/1/35 | \$ 4,250,000 |

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

18 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

| Principal Amount USD (\$) | | Value |
|------------------------------|--|--------------|
| <hr/> | | |
| 1,355,000 (c) | Rhode Island -- 0.7% Central Falls Detention Facility Corp., 7.25%, 7/15/35 | \$ 330,000 |
| 1,500,000 | Rhode Island Health & Educational Building Corp., Tockwatten Home Issue, 8.375%, 1/1/46 | 1,750,000 |
| | | \$ 2,080,000 |
| <hr/> | | |
| 4,400,000 (g) | South Carolina -- 2.1% Tobacco Settlement Revenue Management Authority, Series B, 6.375%, 5/15/30 | \$ 6,290,000 |
| <hr/> | | |
| 4,000,000 | South Dakota -- 1.4% South Dakota Health & Educational Facilities Authority, Sanford Health, Series B, 4.0%, 11/1/44 | \$ 4,230,000 |
| <hr/> | | |
| 5,000,000 | Tennessee -- 1.9% Johnson City Health & Educational Facilities Board, Mountain States Health Alliance, 6.5%, 7/1/38 | \$ 5,760,000 |

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| Principal Amount USD (\$) | Description | Value |
|---------------------------|--|---------|
| | Texas -- 19.3% | |
| 1,000,000 | Arlington Higher Education Finance Corp., Universal Academy, Series A, 7.0%, 3/1/34 | \$ 1,05 |
| 1,500,000 | Arlington Higher Education Finance Corp., Universal Academy, Series A, 7.125%, 3/1/44 | 1,58 |
| 2,500,000 (d) | Central Texas Regional Mobility Authority, Sub Lien, 6.75%, 1/1/41 | 3,08 |
| 2,500,000 (f) | County of Harris TX, Series A, 5.0%, 10/1/26 | 3,19 |
| 5,000,000 (f) | Goose Creek Consolidated Independent School District, Series C, 4.0%, 2/15/26 (PSF-GTD Insured) | 5,85 |
| 2,663,453 (c) | Gulf Coast Industrial Development Authority, Microgy Holdings Project, 7.0%, 12/1/36 | |
| 1,260,000 (e) | Harris County Health Facilities Development Corp., The Methodist Hospital System, Series A-2, 0.87%, 12/1/41 | 1,26 |
| 3,000,000 | Houston Higher Education Finance Corp., St. John's School Project, Series A, 5.0%, 9/1/38 | 3,38 |
| 3,355,000 | North Texas Tollway Authority, Series A, 5.0%, 1/1/30 | 4,09 |
| 9,750,000 (d) | North Texas Tollway Authority, Series F, 5.75%, 1/1/33 | 10,33 |
| 1,500,000 (d) | Red River Health Facilities Development Corp., MRC Crestview, Series A, 8.0%, 11/15/41 | 1,99 |
| 2,000,000 (f) | Richardson Independent School District, School Building, 5.0%, 2/15/38 (PSF-GTD Insured) | 2,34 |
| 6,960,000 | Sanger Industrial Development Corp., Texas Pellets Project, Series B, 8.0%, 7/1/38 | 6,02 |
| 1,000,000 | Tarrant County Cultural Education Facilities Finance Corp., Mirador Project, Series A, 8.125%, 11/15/39 | 84 |
| 750,000 | Tarrant County Cultural Education Facilities Finance Corp., Mirador Project, Series A, 8.25%, 11/15/44 | 63 |
| 1,000,000 (c) | Texas Midwest Public Facility Corp., Secure Treatment Facility Project, 9.0%, 10/1/30 | 11 |
| 3,365,000 | Texas Private Activity Bond Surface Transportation Corp., NTE Mobility Partners LLC, 7.0%, 12/31/38 | 4,23 |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 19

Schedule of Investments | 9/30/16 (unaudited) (continued)

| Principal Amount USD (\$) | Description | Value |
|---------------------------|--|----------|
| | Texas -- (continued) | |
| 2,500,000 | Travis County Health Facilities Development Corp., Longhorn Village Project, 7.125%, 1/1/46 | \$ 2,83 |
| 5,000,000 (f) | Tyler Independent School District, School Building, 5.0%, 2/15/38 (PSF-GTD Insured) | 5,85 |
| | | \$ 58,74 |
| | Virginia -- 3.6% | |
| 2,000,000 | County of Washington, VA, Industrial Development Authority, Mountain States Health Alliance, Series C, 7.75%, 7/1/38 | \$ 2,25 |
| 3,000,000 | Tobacco Settlement Financing Corp., Series B-1, | |

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| | | |
|---|---|--------------|
| 5,000,000 | 5.0%, 6/1/47 Virginia Public School Authority Revenue, 4.0%, 8/1/25 (State Aid Withholding) | 2,92 5,90 |
| | | \$ 11,08 |
| 2,500,000 (f) | Washington -- 6.0% King County, Issaquah School District No. 411, 4.0%, 12/1/31 (SCH BD GTY Insured) | \$ 2,86 |
| 2,500,000 | University of Washington, Series B, 5.0%, 6/1/29 | 3,10 |
| 1,500,000 (d) | Washington State Health Care Facilities Authority, Kadlec Regional Medical Center, 5.5%, 12/1/39 | 1,77 |
| 2,000,000 | Washington State Health Care Facilities Authority, VA Mason Medical, Series A, 6.125%, 8/15/37 | 2,08 |
| 2,000,000 | Washington State Health Care Facilities Authority, VA Mason Medical, Series A, 6.25%, 8/15/42 | 2,08 |
| 1,100,000 | Washington State Housing Finance Commission, Mirabella Project, Series A, 6.75%, 10/1/47 | 1,20 |
| 5,000,000 | Washington State Housing Finance Commission, Skyline at First Hill Project, Series A, 5.625%, 1/1/27 | 5,05 |
| | | \$ 18,17 |
| 2,000,000 (c) | West Virginia -- 0.6% City of Philippi, WV, Alderson-Broadbudd College, Inc., Series A, 7.75%, 10/1/44 | \$ 1,19 |
| 725,000 (c) | West Virginia Hospital Finance Authority, Highland Hospital Group, 9.125%, 10/1/41 | 67 |
| | | \$ 1,87 |
| 5,000,000 | Wisconsin -- 3.5% Public Finance Authority, Glenridge Palmer Ranch, Series A, 8.25%, 6/1/46 | \$ 6,21 |
| 750,000 | Public Finance Authority, Roseman University Health Sciences Project, 5.875%, 4/1/45 | 80 |
| 1,500,000 | Public Finance Authority, SearStone CCRC Project, Series A, 8.625%, 6/1/47 (144A) | 1,78 |
| <p>The accompanying notes are an integral part of these financial statements.</p> <p>20 Pioneer Municipal High Income Advantage Trust Semiannual Report 9/30/16</p> | | |
| Principal Amount USD (\$) | | Value |
| 1,500,000 (d) | Wisconsin -- (continued) Wisconsin Health & Educational Facilities Authority, Pro Healthcare, Inc. Group, 6.625%, 2/15/39 | \$ 1,70 |
| | | \$ 10,50 |
| TOTAL TAX EXEMPT OBLIGATIONS (Cost \$405,257,088) | | \$ 448,31 |

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| | | |
|----------------|--|------------|
| 13,000,000 (e) | MUNICIPAL COLLATERALIZED DEBT OBLIGATION -- 0.3% of Net Assets Non-Profit Preferred Funding Trust I, Series E, 0.0%, 9/15/37 (144A) | \$ 1,02 |
| ----- | | |
| | TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION (Cost \$13,000,000) | \$ 1,02 |
| ----- | | |
| | TOTAL INVESTMENTS IN SECURITIES -- 147.8% (Cost -- \$418,257,088) (h) | \$ 449,33 |
| ----- | | |
| | OTHER ASSETS AND LIABILITIES -- 1.5% | \$ 4,69 |
| ----- | | |
| | PREFERRED SHARES AT REDEMPTION VALUE, INCLUDING DIVIDENDS PAYABLE -- (49.3)% | \$ (150,02 |
| ----- | | |
| | NET ASSETS APPLICABLE TO COMMON SHAREOWNERS -- 100.0% | \$ 304,00 |
| ===== | | |

(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, 2016, the value of these securities amounted to \$33,258,745, or 10.9% of total net assets applicable to common shareowners.

RIB Residual Interest Bond is purchased in a secondary market. 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, 2016.

- (a) Consists of Revenue Bonds unless otherwise indicated.
- (b) Security issued with a zero coupon. Income is recognized through accretion of discount.
- (c) Security is in default.
- (d) 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.
- (e) The interest rate is subject to change periodically. The interest rate shown is the rate at September 30, 2016.
- (f) Represents a General Obligation Bond.
- (g) Escrow to maturity.

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 21

Schedule of Investments | 9/30/16 (unaudited) (continued)

- (h) At September 30, 2016, the net unrealized appreciation on investments based on cost for federal tax purposes of \$412,712,590 was as follows:

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| | |
|--|----------|
| Aggregate gross unrealized appreciation for all investments in which there is an excess of value over tax cost | \$ 55,06 |
| Aggregate gross unrealized depreciation for all investments in which there is an excess of tax cost over value | (18,43 |
| | ----- |
| Net unrealized appreciation | \$ 36,62 |
| | ===== |

For financial reporting purposes net unrealized appreciation on investments was \$31,080,687 and cost of investments aggregated \$418,257,088.

Purchases and sales of securities (excluding temporary cash investments) for the six months ended September 30, 2016 aggregated \$33,758,444 and \$18,858,475 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 following is a summary of the inputs used as of September 30, 2016, in valuing the Trust's investments.

| | Level 1 | Level 2 | Level 3 | Total |
|--|---------|----------------|---------|-----------|
| Tax Exempt Obligations | \$ -- | \$ 448,315,065 | \$ -- | \$ 448,31 |
| Municipal Collateralized Debt Obligation | -- | 1,022,710 | -- | 1,02 |
| Total | \$ -- | \$ 449,337,775 | \$ -- | \$ 449,33 |

During the six months ended September 30, 2016, there were no transfers between Levels 1, 2 and 3.

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

22 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

Statement of Assets and Liabilities | 9/30/16 (unaudited)

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ASSETS:

| | | |
|--|----|-------------|
| Investments in securities (cost \$418,257,088) | \$ | 449,337,775 |
| Cash | | 732,372 |
| Receivables -- | | |
| Interest | | 6,198,492 |
| Investment securities sold | | 147,000 |
| Reinvestment of distributions | | 99,587 |
| ----- | | |
| Total assets | \$ | 456,515,226 |
| ----- | | |

LIABILITIES:

| | | |
|---------------------------------|----|-----------|
| Payables -- | | |
| Investment securities purchased | \$ | 2,000,300 |
| Administration fee | | 124,582 |
| Trustees' fees | | 24 |
| Due to affiliates | | 215,186 |
| Accrued expenses | | 139,484 |
| ----- | | |
| Total liabilities | \$ | 2,479,576 |
| ----- | | |

PREFERRED SHARES AT REDEMPTION VALUE:

| | | |
|--|----|-------------|
| \$25,000 liquidation value per share applicable to 6,000 shares, including dividends payable of \$27,696 | \$ | 150,027,696 |
| ----- | | |

NET ASSETS APPLICABLE TO COMMON SHAREOWNERS:

| | | |
|--|----|--------------|
| Paid-in capital | \$ | 324,103,764 |
| Undistributed net investment income | | 1,306,803 |
| Accumulated net realized loss on investments | | (52,483,300) |
| Net unrealized appreciation on investments | | 31,080,687 |
| ----- | | |
| Net assets applicable to common shareowners | \$ | 304,007,954 |
| ===== | | |

NET ASSET VALUE PER COMMON SHARE:

| | | |
|--|----|-------|
| No par value (unlimited number of shares authorized) | | |
| Based on \$304,007,954 / 23,872,987 common shares | \$ | 12.73 |
| ===== | | |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 23

Statement of Operations (unaudited)

For the Six Months Ended 9/30/16

INVESTMENT INCOME:

| | | |
|----------|----|------------|
| Interest | \$ | 11,086,249 |
| ----- | | |

EXPENSES:

| | | |
|------------------------------------|----|-----------|
| Management fees | \$ | 1,366,922 |
| Administrative expense | | 128,902 |
| Transfer agent fees | | 4,855 |
| Shareholder communications expense | | 11,541 |
| Auction agent fees | | 72,099 |
| Custodian fees | | 3,400 |

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| | | |
|---|------------|---------------|
| Professional fees | 32,936 | |
| Printing expense | 2,790 | |
| Trustees' fees | 8,740 | |
| Pricing fees | 10,316 | |
| Miscellaneous | 59,342 | |
| ----- | | |
| Total expenses | | \$ 1,701,843 |
| ----- | | |
| Net investment income | | \$ 9,384,406 |
| ----- | | |
| REALIZED AND UNREALIZED GAIN (LOSS) ON INVESTMENTS: | | |
| Net realized gain (loss) on investments: | \$ 274,634 | |
| Change in net unrealized appreciation (depreciation) on investments: | 4,911,025 | |
| ----- | | |
| Net realized and unrealized gain (loss) on investments | | \$ 5,185,659 |
| ----- | | |
| DISTRIBUTIONS TO PREFERRED SHAREOWNERS FROM NET INVESTMENT INCOME: | | |
| | | \$ (581,657) |
| ----- | | |
| Net increase in net assets resulting from operations | | \$ 13,988,408 |
| ===== | | |

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

24 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

Statements of Changes in Net Assets

| | Six Months Ended 9/30/16 (unaudited) | Year Ended 3/31/16 |
|--|---|-----------------------|
| ----- | | |
| FROM OPERATIONS: | | |
| Net investment income (loss) | \$ 9,384,406 | \$ 19,744,6 |
| Net realized gain (loss) on investments | 274,634 | 463,3 |
| Change in net unrealized appreciation (depreciation) on investments | 4,911,025 | (191,7 |
| Distributions to preferred shareowners from net investment income | (581,657) | (392,0 |
| ----- | | |
| Net increase in net assets resulting from operations | \$ 13,988,408 | \$ 19,624,1 |
| ----- | | |
| DISTRIBUTIONS TO COMMON SHAREOWNERS: | | |
| Net investment income and previously undistributed net investment income (\$0.41 and \$0.96 per share, respectively) | \$ (9,656,686) | \$ (22,682,2 |
| ----- | | |
| Total distributions to common shareowners | \$ (9,656,686) | \$ (22,682,2 |
| ----- | | |
| FROM TRUST SHARE TRANSACTIONS: | | |
| Reinvestment of distributions | \$ 658,572 | \$ 1,744,9 |
| ----- | | |
| Net increase in net assets applicable to | | |

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| | | | | |
|--|----|-------------|----|-----------|
| common shareowners from Trust share transactions | \$ | 658,572 | \$ | 1,744,9 |
| Net increase (decrease) in net assets applicable to common shareowners | \$ | 4,990,294 | \$ | (1,313,1 |
| NET ASSETS APPLICABLE TO COMMON SHAREOWNERS: | | | | |
| Beginning of period | | 299,017,660 | | 300,330,8 |
| End of period | \$ | 304,007,954 | \$ | 299,017,6 |
| Undistributed net investment income | \$ | 1,306,803 | \$ | 2,160,7 |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 25

Financial Highlights

| | Six Months Ended 9/30/16 (unaudited) | Year Ended 3/31/16 | Year Ended 3/31/15 |
|--|---|--------------------------|--------------------------|
| Per Share Operating Performance | | | |
| Net asset value, beginning of period | \$ 12.55 | \$ 12.68 | \$ 12.07 |
| Increase (decrease) from investment operations: (a) | | | |
| Net investment income | \$ 0.39 | \$ 0.83 | \$ 0.95 |
| Net realized and unrealized gain (loss) on investments | 0.22 | 0.02 | 0.81 |
| Distributions to preferred shareowners from: | | | |
| Net investment income | \$ (0.02) | \$ (0.02) | \$ (0.01) |
| Net increase (decrease) from investment operations | \$ 0.59 | \$ 0.83 | \$ 1.75 |
| Distributions to common shareowners from: | | | |
| Net investment income and previously undistributed net investment income | \$ (0.41)* | \$ (0.96)* | \$ (1.14) |
| Net increase (decrease) in net asset value | \$ 0.18 | \$ (0.13) | \$ 0.61 |
| Net asset value, end of period (b) | \$ 12.73 | \$ 12.55 | \$ 12.68 |
| Market value, end of period (b) | \$ 13.09 | \$ 13.87 | \$ 15.48 |
| Total return at market value (c) | (2.68)% (d) | (3.48)% | 14.70% |
| Ratios to average net assets of common shareowners: | | | |
| Total expenses (e) | 1.12% (f) | 1.21% | 1.22% |
| Net investment income before preferred share distributions | 6.15% (f) | 6.72% | 7.61% |
| Preferred share distributions | 0.38% (f) | 0.13% | 0.07% |
| Net investment income available to common shareowners | 5.77% (f) | 6.59% | 7.54% |
| Portfolio turnover | 4% | 11% | 20% |
| Net assets of common shareowners, end of period (in thousands) | \$304,008 | \$299,018 | \$300,331 |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 26

| | Six Months Ended 9/30/16 (unaudited) | Year Ended 3/31/16 | Year Ended 3/31/16 |
|---|---|--------------------------|--------------------------|
| Preferred shares outstanding (in thousands) | \$150,000 | \$150,000 | \$150,000 |
| Asset coverage per preferred share, end of period | \$ 75,673 | \$ 74,837 | \$ 75,000 |
| Average market value per preferred share (g) | \$ 25,000 | \$ 25,000 | \$ 25,000 |
| Liquidation value, including dividends payable, per preferred share | \$ 25,005 | \$ 25,001 | \$ 25,000 |

* 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 decrease in distributions may have a negative effect on the market value of the Trust's shares.

- (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.
- (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) Not annualized.
- (e) Expense ratios do not reflect the effect of distribution payments to preferred shareowners.
- (f) Annualized.
- (g) Market value is redemption value without an active market.

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 27

Notes to Financial Statements | 9/30/16 (unaudited)

1. Organization and Significant Accounting Policies

Pioneer Municipal High Income Advantage Trust (the Trust) was organized as a

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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 (U.S. GAAP) 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 Trust is an investment company and follows investment company accounting and reporting guidance under U.S. GAAP. The following is a summary of significant accounting policies followed by the Trust in the preparation of its financial statements:

A. Security Valuation

The net asset value of the Trust is computed once daily, on each day the New York Stock Exchange (NYSE) is open, as of the close of regular trading on the NYSE.

Fixed income securities are valued by using 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, or may use a pricing matrix or other fair value methods or techniques to provide an estimated value of the security or instrument. A pricing matrix is a means of valuing a debt security on the basis of current market prices for other debt securities, historical trading patterns in the market for fixed income securities and/or other factors. Valuations may be supplemented by dealers and other sources, as required. Non-U.S. debt securities that are listed on an exchange will be valued at the bid price obtained from an independent third party pricing service.

28 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

Shares of open-end registered investment companies (including money market mutual funds) are valued at such funds' net asset value. Repurchase agreements are valued at par. Cash may include overnight time deposits at approved financial institutions.

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 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 fair valuation team is responsible for monitoring developments that may impact fair valued securities and for discussing and assessing fair values on an ongoing basis, and at least quarterly, with the Valuation Committee of the Board of Trustees.

Inputs used when applying fair value methods to value a security may

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include credit ratings, the financial condition of the company, current market conditions and comparable securities. The Trust may use fair value methods if it is determined that a significant event has occurred after the close of the exchange or market on which the security trades and prior to the determination of the Trust's net asset value. Examples of a significant event might include political or economic news, corporate restructurings, natural disasters, terrorist activity or trading halts. Thus, the valuation of the Trust's securities may differ significantly from exchange prices and such differences could be material.

At September 30, 2016, no securities were valued using fair value methods (other than securities valued using prices supplied by independent pricing services).

B. Investment Income and Transactions

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. Interest income, including interest on income bearing cash accounts, is recorded on an accrual basis, net of unrecoverable foreign taxes withheld at the applicable country rates.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 29

Discounts and premiums on purchase prices of debt securities are accreted or amortized, respectively, daily, into interest income on an effective yield to maturity basis with a corresponding increase or decrease in the cost basis of the security. Premiums and discounts related to certain mortgage-backed securities are amortized or accreted in proportion to the monthly paydowns.

Security transactions are recorded as of trade date. Gains and losses on sales of investments are calculated on the identified cost method for both financial reporting and federal income tax purposes.

C. 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 net taxable income and net realized capital gains, if any, to its shareowners. Therefore, no federal income tax provision is required. As of March 31, 2016, 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 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.

The tax character of current year distributions payable to shareholders will be determined at the end of the current taxable year. The tax character of distributions paid to shareowners during the year ended March

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31, 2016 was as follows:

| | 2016 |
|--------------------------|----------------------|
| Distributions paid from: | |
| Tax exempt income | \$ 22,572,825 |
| Ordinary income | 501,420 |
| Total | \$ 23,074,245 |

30 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

The following shows the components of distributable earnings (losses) on a federal income tax basis at March 31, 2016:

| | 2016 |
|--------------------------------------|------------------------|
| Distributable earnings: | |
| Undistributed ordinary income | \$ 621,291 |
| Capital loss carryforward | (58,056,651) |
| Other book/tax temporary differences | 5,544,498 |
| Tax-exempt spillback | 1,293,668 |
| Unrealized appreciation | 26,169,662 |
| Total | \$ (24,427,532) |

The difference between book-basis and tax-basis unrealized appreciation is primarily attributable to the realization for tax purposes of unrealized gains on investments in passive foreign investment companies, the book/tax differences in the accrual of income on securities in default, the difference between book and tax amortization methods and discounts on fixed income securities and book/tax temporary differences.

D. Automatic Dividend Reinvestment Plan

All 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 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.

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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 shares of the Trust on terms that differ from the terms of the Plan.

Whenever the Trust declares a dividend on shares payable in cash, participants in the Plan will receive the equivalent in shares acquired by the Plan Agent either (i) through receipt of additional unissued but authorized shares from the Trust or (ii) by purchase of outstanding shares on the New

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 31

York Stock Exchange or elsewhere. If, on the payment date for any dividend, the net asset value per 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 shares. The number of newly issued shares to be credited to each account will be determined by dividing the dollar amount of the dividend by the net asset value per 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 share is greater than the market value (market discount), the Plan Agent will invest the dividend amount in shares acquired in open-market purchases. There are no brokerage charges with respect to newly issued 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 be able to transfer the shares to another broker and continue to participate in the Plan.

E. Risks

The value of securities held by the Trust may go up or down, sometimes rapidly or unpredictably, due to general market conditions, such as real or perceived adverse economic, political or regulatory conditions, inflation, changes in interest rates, lack of liquidity in the bond markets or adverse investor sentiment. In the past several years, financial markets have experienced increased volatility, depressed valuations, decreased liquidity and heightened uncertainty. These conditions may continue, recur, worsen or spread.

Interest rates in the U.S. recently have been historically low, so the Trust faces a heightened risk that interest rates may rise. A general rise in interest rates may cause investors to move out of fixed income securities on a large scale, which could adversely affect the price and liquidity of fixed income securities.

The municipal bond market can be susceptible to unusual volatility, particularly for lower-rated and unrated securities. Liquidity can be reduced unpredictably in response to overall economic conditions or credit tightening. Municipal issuers may be adversely affected by rising health care costs, increasing unfunded pension liabilities, and by the phasing out of federal programs providing financial support. Unfavorable conditions and developments relating to projects financed with municipal securities can result in lower revenues to issuers of municipal securities, potentially resulting in defaults. Issuers often depend on revenues from these projects

to make principal and interest payments. The value of municipal securities can also be adversely affected by changes in the financial condition of one or

32 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

more individual municipal issuers or insurers of municipal issuers, regulatory and political developments, tax law changes or other legislative actions, and by uncertainties and public perceptions concerning these and other factors. Municipal securities may be more susceptible to down-grades or defaults during recessions or similar periods of economic stress. In recent periods, an increasing number of municipal issuers in the United States have defaulted on obligations and commenced insolvency proceedings. Financial difficulties of municipal issuers may continue or get worse. To the extent the Trust invests significantly in a single state, including California, Massachusetts and Texas, or in securities the payments on which are dependent upon a single project or source of revenues, or that relate to a sector or industry, including health care facilities, education, transportation, special revenues and pollution control, the Trust will be more susceptible to associated risks and developments.

2. Management Agreement

PIM, a wholly owned indirect subsidiary of 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 six months ended September 30, 2016, the net management fee was 0.60% (annualized) of the Trust's average daily managed assets, which was equivalent to 0.90% (annualized) of the Trust's average daily net assets attributable to 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, 2016, \$339,768 was payable to PIM related to management costs, administrative costs and certain other services is included in "Due to affiliates" and "Administration fee" on the Statement of Assets and Liabilities.

3. Transfer Agent

American Stock Transfer & Trust Company (AST) serves as the transfer agent with respect to the Trust's common shares. The Trust pays AST an annual fee, as is agreed to from time to time by the Trust and AST, for providing such services.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 33

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

Deutsche Bank Trust Company Americas (Deutsche Bank) is the transfer agent, registrar, dividend-paying agent and auction agent with respect to the Trust's auction preferred shares (APS). The Trust pays Deutsche Bank an annual fee, as is agreed to from time to time by the Trust and Deutsche Bank, for providing

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such services.

4. 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, 2016 and the year ended March 31, 2016 were as follows:

| | 9/30/16 | 3/31/16 |
|---|------------|------------|
| Shares outstanding at beginning of period | 23,822,909 | 23,686,670 |
| Reinvestment of distributions | 50,078 | 136,239 |
| Shares outstanding at end of period | 23,872,987 | 23,822,909 |

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, 2016, 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 0.402% to 1.345% during the six months ended September 30, 2016.

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

34 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

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.

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

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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.

5. Subsequent Events

A monthly dividend was declared on October 4, 2016 from undistributed and accumulated net investment income of \$0.0625 per common share payable October 31, 2016, to common shareowners of record on October 18, 2016.

Subsequent to September 30, 2016, dividends declared and paid on preferred shares totaled \$251,799 in aggregate for the two outstanding preferred share series through November 10, 2016.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 35

ADDITIONAL INFORMATION

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

At the annual meeting of shareowners held on September 20, 2016, shareowners of Pioneer Municipal High Income Advantage Trust 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 three Class I Trustees.

| Nominee | For | Withheld |
|---------------------|----------------|---------------|
| Class I | | |
| David R. Bock* | 3,631,200 | 117,800 |
| Lisa M. Jones | 19,760,205,977 | 1,534,828,383 |
| Lorraine H. Monchak | 19,649,043,329 | 1,645,991,031 |

*Elected by preferred shares only.

36 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

Approval of Investment Advisory Agreement

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Pioneer Investment Management, Inc. (PIM) serves as the investment adviser to Pioneer Municipal High Income Advantage Trust (the Trust) pursuant to an 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 2016 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 2016 and May 2016. 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 2016, 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 May 2016, 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 July and September 2016.

At a meeting held on September 13, 2016, 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 approving the renewal of the investment advisory agreement, the Trustees considered various factors that they determined were relevant, including the factors described below. The Trustees did not identify any single factor as the controlling factor in determining to approve the renewal of the agreement.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 37

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 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

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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 throughout the year 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' regular reviews and discussions were factored into the Trustees' deliberations concerning the renewal of the advisory agreement.

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. In all quintile rankings referred to below, first quintile is most favorable to the Trust's shareowners.

38 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

The Trustees considered that the Trust's management fee (based on managed assets) for the most recent fiscal year 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 most recent fiscal year was in the second 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 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

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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 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,

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 39

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.

40 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

Trustees, Officers and Service Providers

Trustees

Officers

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Thomas J. Perna, Chairman
David R. Bock
Benjamin M. Friedman
Margaret B.W. Graham
Lisa M. Jones
Lorraine H. Monchak
Marguerite A. Piret
Fred J. Ricciardi
Kenneth J. Taubes

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 & Bockius LLP

Transfer Agent
American Stock Transfer & Trust Company

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.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 41

This page for your notes.

42 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

This page for your notes.

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16 43

This page for your notes.

44 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/16

How to Contact Pioneer

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,

American Stock
Transfer & Trust

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| | |
|-----------------------------------|--|
| stock transfer | 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) 2016 Pioneer Investments 19435-10-1116

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.

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

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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.

(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

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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 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 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

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| 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 these services.

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

- o "One-time" pre-approval for the fund fiscal year within a specified dollar limit for all pre-approved specific service subcategories

- o A summary of all such services and related fees (including comparison to specified dollar limits) reported quarterly.

- o Specific approval is

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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"

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

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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 possess 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 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 | <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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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. | 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

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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 Fund's 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

(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)).

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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.

N/A

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.

N/A

ITEM 9. PURCHASES OF EQUITY SECURITIES BY CLOSED-END MANAGEMENT

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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.

(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,

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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.

(Registrant) Pioneer Municipal High Income Advantage Trust

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

Date November 28, 2016

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 & Chief Executive Officer

Date November 28, 2016

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

Date November 28, 2016

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