

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST
Form N-CSR
November 28, 2011

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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, 2011 through September 30, 2011

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

ITEM 1. REPORTS TO SHAREOWNERS.

Pioneer Municipal High
Income Advantage Trust

Semiannual Report | September 30, 2011

Ticker Symbol: MAV

[LOGO]PIONEER
Investments(R)

visit us: us.pioneerinvestments.com

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President's Letter

Dear Shareowner,

During the first three quarters of 2011, the U.S. economy struggled to gain solid footing. The economy went through a soft patch in the first half, and the second half, so far, has been highlighted by the U.S. government's battle over the debt ceiling and Standard & Poor's downgrade of the U.S. Treasury's credit rating from the top rating of "AAA" for the first time in history. After rallying nicely in the first half, U.S. equity markets reacted sharply this summer to the political stalemate and the downgrade. There has been continued pressure on equities due to concerns about the growing European sovereign-debt crisis and its potential impact on the global economy.

Despite legitimate reasons for concern, we believe there are also reasons for optimism that the U.S. economy will continue to exhibit low to flat growth and not head into a severe recession. Corporations continue to post solid earnings and, for the most part, are maintaining their positive earnings outlooks. They also have strong balance sheets with improved net leverage and high cash levels. Auto production has rebounded following the Japanese supply chain interruptions caused by the earthquake and tsunami last spring. Retail sales growth year-over-year has remained strong despite low consumer confidence. And despite

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high unemployment in the U.S., private sector employment has grown consistently since February 2010. There are certainly risks to our outlook, including possible contagion from the European sovereign-debt and banking crisis, the fiscal drag from federal and state budget cuts in the U.S., as well as potential "negative feedback loops" from capital market volatility. But broadly speaking, we think this subpar economic recovery is consistent with recoveries from other "balance sheet"-caused recessions.

The difficult recovery process has been accompanied by wide market swings. While this is a challenging environment, our investment professionals continue to focus on finding good opportunities to invest in both equity and bond markets using the same disciplined approach Pioneer has used since 1928. Our approach is to identify undervalued individual securities with the greatest potential for success, carefully weighing risk against reward. Our teams of investment professionals continually monitor and analyze the relative valuations of different sectors and securities globally to help build portfolios that we believe can help you achieve your investment goals.

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At Pioneer, we have long advocated the benefits of staying diversified and investing for the long term. The strategy has generally performed well for many investors. Our advice, as always, is to work closely with a trusted financial advisor to discuss your goals and work together to develop an investment strategy that meets your individual needs. There is no single best strategy that works for every investor.

We invite you to learn more about Pioneer and our time-tested approach to investing by consulting with your financial advisor or visiting us online at us.pioneerinvestments.com. We greatly appreciate your trust in us and we thank you for investing with Pioneer.

Sincerely,

/s/Daniel K. Kingsbury

Daniel K. Kingsbury
President and CEO
Pioneer Investment Management USA, Inc.

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

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Portfolio Management Discussion | 9/30/11

During the six months ended September 30, 2011, the municipal bond market reversed direction and showed solid returns, as investors recognized the attractive value that municipal bonds offered. In the following interview, David Eurkus discusses the factors that influenced the performance of Pioneer Municipal High Income Advantage Trust over the six months ended September 30, 2011. Mr. Eurkus, vice president and portfolio manager at Pioneer, and a member of Pioneer's fixed-income team, is responsible for the daily management of the Trust.

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Q How did Pioneer Municipal High Income Advantage Trust perform during the six months ended September 30, 2011?

A Pioneer Municipal High Income Advantage Trust produced a total return of 18.64% at net asset value, and 14.53% at market price, during the six months ended September 30, 2011, with common shares of the Trust selling at a 8.50% premium to net asset value at the end of the period. During the same six months, the Trust's benchmarks, the Barclays Capital Municipal Bond Index and the Barclays Capital High Yield Municipal Bond Index, returned 7.85% and 8.72%, respectively. The Barclays Capital Municipal Bond Index is designed to track the performance of investment-grade municipal bonds, while the Barclays Capital High Yield Municipal Bond Index is designed to track the performance of lower-rated municipal bonds. Unlike the Trust, the two Barclays Capital indices do not use leverage. Over the same six-month period ended September 30, 2011, the average return (at market price) of the 14 closed end funds in Lipper's High-Yield Municipal Debt Closed End Funds (Leveraged) category was 11.98%. On September 30, 2011, the 30-day SEC yield on the Trust's shares was 8.87%.

Q How would you describe the investment environment for municipal securities during the six months ended September 30, 2011?

A After struggling in the final quarter of 2010 and the first quarter of 2011, the municipal bond market changed course, as investors returned to the market, recognizing the value that municipal bonds offered. From an interest-rate and income perspective, investors were attracted to the relatively high tax-free yields that municipal bonds provided - yields that were higher than those of taxable bonds and money market funds, which were at near-zero levels. Strong investor demand and very light supply relative to historical norms were big factors in the positive performance of the municipal bond market over the six-month period. Year-over-year, new bond issuance declined by approximately 40%, largely because heavy new bond issuance occurred in the final quarter of 2010, when the Federal government ended the Build America Bonds (BAB) program, which had authorized the issuance of taxable municipal securities subsidized by the U.S. Treasury. To take advantage of the BAB program before it expired, municipalities issued

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a significant supply of new bonds; as a result, they did not have to issue new bonds in the early months of 2011.

Over the six-month period ended September 30, 2011, both high-yield and investment-grade municipal bonds generated relatively strong returns, with higher-yielding bonds outperforming higher-quality securities. The Trust outperformed both the Barclays Capital Municipal Bond Index and the Barclays Capital High Yield Municipal Bond Index. The Trust's performance was consistent with its portfolio's overall positioning, which had exposure to both high-yield and investment-grade municipals. At the end of the period on September 30, 2011, 42.8% of the Trust's total investment portfolio was invested in high-yield, below-investment-grade debt, and 54.1% of the Trust's total investment portfolio was invested in higher-quality municipal bonds. The Trust held 154 issues in 41 states.

Q How did you position the Trust over the six months ended September 30, 2011?

A We are long-term investors, and during the six months ended September 30, 2011 we maintained a consistent positioning, keeping the Trust's portfolio fully invested and well diversified. We focus on producing generous

current income for the Trust's shareowners through investments in securities that we believe, as a result of our credit research, are backed by issuers that have the ability to pay out consistent, reliable income. Most of the Trust's portfolio continued to be invested in revenue bonds over the six-month period; these bonds rely on revenues from specific funding sources that produce their own fees and revenues, such as hospital/health care facilities, colleges and universities, or water treatment plants. In contrast to revenue bonds, general obligation bonds do not require a dedicated stream of tax revenues to cover the specific debt issuance and are more likely to experience downgrades in credit quality by various rating agencies due to the financial problems currently facing many state and local governments. At the end of the six-month period on September 30, 2011, only 0.6% of the Trust's total investment portfolio was invested in general obligation bonds.

In selecting bonds for the Trust's portfolio during the period, we maintained our emphasis on sectors that are vital to the domestic economy, such as hospitals, universities, power-generating stations and airports. At 34.4% of the Trust's total investment portfolio, health care institutions represented the largest group in the Trust, followed by transportation facilities, including airports, and insurance bonds, at 14.4% and 13.2%, respectively, of the Trust's total investment portfolio. Other sectors included tobacco bonds and education, which accounted for 11.0% and 5.0%, respectively, of the Trust's total investment portfolio as of September 30, 2011. In general, the Trust's holdings performed in line with our expectations, with most of the areas in which we invested the Trust producing positive results.

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Q Could you describe how leverage is used in managing the Trust?

A The Trust employs leverage provided by auction preferred shares to invest the Trust in additional longer-maturity municipal securities that typically pay higher dividends than the dividend rates payable on the preferred shares, thereby increasing the Trust's yield. The use of leverage can increase the Trust's potential to pay higher yields to its shareowners than would generally be paid by an unleveraged portfolio. During periods of low market interest rates and modest borrowing costs, the use of leverage can have a significant positive effect on the Trust's yield. However, just as the use of leverage provides the potential to enhance yield, it also can increase investment risk. During periods when municipal bond prices tend to change, the use of leverage can magnify the effect of changing prices on the Trust's total return, which is the combination of yield and price change. When bond prices rise, the use of leverage can further enhance the Trust's total return; when bond prices decline, the use of leverage can magnify the price loss to the Trust.

Q How did the level of leverage employed by the Trust change over the six-month period ended September 30, 2011?

A At the end of the six-month period (September 30, 2011), 33.6% of the Trust's total managed assets were financed by leverage. While the figure was lower than the 36.0% of the Trust's managed assets leveraged at the beginning of the six-month period on April 1, 2011, the decrease was due to appreciation in the values of the bonds held by the Trust. The absolute amount of leverage used by the Trust was unchanged over the six months ended September 30, 2011.

Q What is your investment outlook?

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- A We believe that the municipal bond market should remain attractive to investors, especially in the face of what appears to be limited supply in a continued low-interest-rate environment.

Despite our positive outlook for the municipal bond market, we cannot ignore the macroeconomic issues in play on a global scale. We do not anticipate a double-dip recession in the United States; however, we expect economic growth to be slower than originally thought. The Federal Reserve System (the Fed) has stated that it is likely to keep interest rates low (in the 0.00% to 0.25% range) until 2013, and we expect inflation to be relatively subdued.

As we manage the Trust in the months ahead, our investment discipline will continue to be based on independent fundamental analysis. Before a security is added to the Trust's portfolio, we will maintain our practice of analyzing both the credit-worthiness of the issuer and the reliability and sustainability of the security's revenue stream. We believe there is value in the high-yield municipal bond market, as the tax-advantaged yields of municipal securities compare favorably with yields provided by taxable bonds.

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Please refer to the Schedule of Investments on pages 11-22 for a full listing of Trust securities.

Investments in high-yield or lower-rated securities are subject to greater-than-average risk. The Trust may invest in securities of issuers that are in default or that are in bankruptcy.

A portion of income may be subject to state, federal, and/or alternative minimum tax. Capital gains, if any, are subject to a capital gains tax. When interest rates rise, the prices of fixed-income securities in the Trust will generally fall. Conversely, when interest rates fall, the prices of fixed-income securities in the Trust will generally rise. By concentrating in municipal securities, the portfolio is more susceptible to adverse economic, political or regulatory developments than is a portfolio that invests more broadly. Investments in the Trust are subject to possible loss due to the financial failure of the issuers of the underlying securities and the issuers' inability to meet their debt obligations.

The Trust currently uses leverage through the issuance of preferred shares. Leverage creates significant risks, including the risk that the Trust's income or capital appreciation 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 maintain 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.

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.

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These risks may increase share price volatility.

Past performance is no guarantee of future results, and there is no guarantee that market forecasts discussed will be realized.

Any information in this shareowner report regarding market or economic trends or the factors influencing the Trust's historical or future performance are statements of opinion as of the date of this report. These statements should not be relied upon for any other purposes.

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Portfolio Summary | 9/30/11

Portfolio Diversification

(As a percentage of total investment portfolio)

[THE FOLLOWING DATA IS A REPRESENTATION OF A PIE CHART IN THE PRINTED MATERIAL]

| | |
|---------------------------|-------|
| Health Revenue | 34.4% |
| Insured | 13.2% |
| Tobacco Revenue | 11.0% |
| Airport Revenue | 9.0% |
| Other Revenue | 7.8% |
| Development Revenue | 7.2% |
| Education Revenue | 5.0% |
| Pollution Control Revenue | 4.8% |
| Housing Revenue | 2.9% |
| Transportation Revenue | 2.4% |
| Water Revenue | 1.9% |
| Gaming Authority Revenue | 0.4% |
| Utilities Revenue* | 0.0% |

* Amount is less than 0.1%

Portfolio Maturity

(As a percentage of long-term holdings)

[THE FOLLOWING DATA IS A REPRESENTATION OF A PIE CHART IN THE PRINTED MATERIAL]

| | |
|------------|-------|
| 0-1 year | 9.0% |
| 1-3 years | 12.2% |
| 3-6 years | 15.5% |
| 6-8 years | 17.2% |
| 8-10 years | 11.2% |
| 10+ years | 34.9% |

Quality Distribution

(As a percentage of total investment portfolio; based on Standard & Poor's ratings)

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[THE FOLLOWING DATA IS A REPRESENTATION OF A PIE CHART IN THE PRINTED MATERIAL]

| | |
|------------|-------|
| AAA | 10.7% |
| AA | 11.3% |
| A | 13.5% |
| BBB | 18.6% |
| BB & Lower | 45.9% |

Bond ratings are ordered highest to lowest in portfolio. Based on Standard & Poor's measures AAA (highest possible rating) through BBB are considered investment grade; BB or lower ratings are considered non-investment grade. Cash equivalents and some bonds may not be rated.

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

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Prices and Distributions | 9/30/11

Share Prices and Distributions

Market Value per Common Share

| | 9/30/11 | 3/31/11 |
|---------|---------|---------|
| | \$13.85 | \$12.64 |
| Premium | 8.5% | 9.5% |

Net Asset Value per Common Share

| | 9/30/11 | 3/31/11 |
|--|---------|---------|
| | \$12.77 | \$11.54 |

Distributions per Common Share

Net

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| | Investment Income | Short-Term Capital Gains | Long-Term Capital Gains |
|----------------|----------------------|-----------------------------|----------------------------|
| 4/1/11-9/30/11 | \$0.5650 | \$ -- | \$ -- |

10 Largest Holdings

(As a percentage of long-term holdings)*

| | |
|--|-------|
| 1. New Jersey Economic Development Authority Revenue, 6.25%, 9/15/29 | 2.85% |
| 2. University of California, RIB, 13.23%, 5/15/38 | 2.60 |
| 3. Massachusetts Housing Finance Agency, 5.35%, 12/1/45 | 2.43 |
| 4. North Texas Tollway Authority Revenue, 5.75%, 1/1/33 | 2.32 |
| 5. Indiana Development Finance Authority Revenue, 5.75%, 10/1/11 | 2.30 |
| 6. Houston Texas Airport System Special Facilities Revenue, 6.75%, 7/1/29 | 2.30 |
| 7. California State Various Purpose, RIB, 13.049%, 6/1/37 (144A) | 2.12 |
| 8. Massachusetts Development Finance Agency, 5.75%, 1/1/42 | 2.07 |
| 9. Non-Profit Preferred Funding Trust I, Series E, 12.0%, 9/15/37 (144A) | 1.82 |
| 10. South Carolina Jobs Economic Development Authority Revenue, 6.375%, 8/1/34 | 1.82 |

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

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Performance Update | 9/30/11

Investment Returns

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

Cumulative Total Returns
(As of September 30, 2011)

| Period | Net Asset Value (NAV) | Market Price |
|--------|--------------------------|-----------------|
| | | |

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| | | |
|-------------------------------|--------|--------|
| Life-of-Trust (10/17/2003) | 61.37% | 67.20% |
| 5 Years | 20.11 | 35.83 |
| 1 Year | 7.15 | 7.46 |

[THE FOLLOWING DATA IS A REPRESENTATION OF A MOUNTAIN CHART IN THE PRINTED MATERIAL]

Value of \$10,000 Investment

| | Pioneer Municipal High Income Advantage Trust | Barclays Capital Municipal Bond Index | Barclays Capital High Yield Municipal Bond Index |
|-------|--|--|---|
| 10/03 | \$10,000 | \$10,000 | \$10,000 |
| 9/04 | \$10,289 | \$10,513 | \$11,043 |
| 9/05 | \$11,841 | \$10,939 | \$12,231 |
| 9/06 | \$13,435 | \$11,425 | \$13,544 |
| 9/07 | \$13,873 | \$11,779 | \$13,932 |
| 9/08 | \$11,170 | \$11,559 | \$12,533 |
| 9/09 | \$12,907 | \$13,275 | \$13,104 |
| 9/10 | \$15,060 | \$14,046 | \$14,694 |
| 9/11 | \$16,137 | \$14,592 | \$15,308 |

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.

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 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 includes 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 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.

Index comparison begins October 31, 2003. The Barclays Capital Municipal Bond Index is a broad measure of the municipal bond market. The Barclays Capital High Yield Municipal Bond Index totals over \$26 billion in market value and maintains over 1300 securities. Municipal bonds in this index have the following requirements: maturities of one year or greater, sub investment grade (below Baa or non-rated), fixed coupon rate, issue date later than 12/31/90, deal size over \$20 million, maturity size of at least \$3 million. Index returns are calculated

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monthly, assume reinvestment of dividends and, unlike Trust returns, do not reflect any fees, expenses or sales charges. The indices are not leveraged. You cannot invest directly in the indices.

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Schedule of Investments | 9/30/11 (unaudited)

| Principal Amount USD (\$) | S&P/Moody's Ratings | | Val |
|---------------------------|---------------------|--|------|
| ----- | | | |
| | | TAX-EXEMPT OBLIGATIONS -- 144.0% of Net Assets | |
| | | ALABAMA -- 1.4% | |
| 2,500,000 | B-/B2 | Alabama Industrial Development Authority Revenue, 6.45%, 12/1/23 | \$ |
| 2,500,000 | NR/NR | Huntsville-Redstone Village Special Care Facilities Financing Authority, 5.5%, 1/1/43 | \$ |
| ----- | | | |
| | | ARIZONA -- 3.3% | |
| 5,000,000 | NR/NR | Casa Grande Industrial Development Authority Hospital Revenue, 7.625%, 12/1/29 | \$ |
| 2,640,000 | NR/NR | Pima County Industrial Development Authority, 7.0%, 1/1/38 | |
| 1,492,000 | NR/Baa3 | Pima County Industrial Development Authority, 6.75%, 7/1/31 | |
| 1,000,000 | NR/NR | San Luis Facility Development Corp., 7.25%, 5/1/27 | \$ |
| ----- | | | |
| | | CALIFORNIA -- 13.3% | |
| 1,000,000 | NR/NR | California Enterprise Development Authority Recovery Zone Facility Revenue, 8.5%, 4/1/31 | \$ |
| 3,140,000 (a) | AA+/WR | California State University Revenue, RIB, 13.105%, 11/1/39 (144A) | |
| 8,575,000 (a) | AA+/NR | California State Various Purpose, RIB, 13.049%, 6/1/37 (144A) | |
| 2,425,000 | A-/A1 | California State Various Purpose, 5.75%, 4/1/31 | |
| 3,000,000 | BB+/NR | California Statewide Communities Development Authority, 7.25%, 10/1/38 (144A) | |
| 757,342 (b) | NR/NR | California Statewide Communities Development Authority, 9.0%, 12/1/38 | |
| 2,680,000+ | AAA/Aaa | Golden State Tobacco Securitization Corp., 6.75%, 6/1/39 | |
| 1,500,000 | A-/NR | Madera Irrigation Financing Authority Water Revenue, 6.25%, 1/1/31 | |
| 1,500,000 | A-/NR | Madera Irrigation Financing Authority Water Revenue, 6.5%, 1/1/40 | |
| 2,500,000 | A/A2 | San Jose California Airport Revenue, 5.0%, 3/1/37 | |
| 10,500,000 (a) | AA+/NR | University of California, RIB, 13.23%, 5/15/38 | 1 |
| ----- | | | |
| | | COLORADO -- 1.3% | |
| 2,850,000+ | NR/WR | Denver Health & Hospital Authority Healthcare | \$ 3 |

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| | | | |
|-----------|-------|--|----|
| 1,000,000 | NR/NR | Revenue, 6.0%, 12/1/31 Kremmling Memorial Hospital District, 7.125%, 12/1/45 | \$ |
|-----------|-------|--|----|

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

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Schedule of Investments | 9/30/11 (unaudited) (continued)

| Principal Amount USD (\$) | S&P/Moody's Ratings | | Val |
|---------------------------|---------------------|---|------|
| 7,750,000 | BBB/Baa1 | CONNECTICUT -- 3.0% Connecticut State Development Authority Revenue, 5.75%, 11/1/37 | \$ |
| 1,000,000 | NR/NR | Hamden Connecticut Facility Revenue, 7.75%, 1/1/43 | \$ |
| 2,700,000 | BBB/Baa3 | DISTRICT OF COLUMBIA -- 3.1% District of Columbia Tobacco Settlement Financing Corp., 6.5%, 5/15/33 | \$ |
| 6,825,000 | BBB/Baa3 | District of Columbia Tobacco Settlement Financing Corp., 6.75%, 5/15/40 | \$ |
| 1,000,000 | NR/Ba3 | FLORIDA -- 3.5% Capital Trust Agency Revenue Bonds, 7.75%, 1/1/41 | \$ |
| 1,000,000 | NR/NR | Florida Development Finance Corp., Educational Facilities Revenue, 6.0%, 9/15/40 | |
| 2,000,000 | NR/NR | Florida Development Finance Corp., Educational Facilities Revenue, 7.625%, 6/15/41 | |
| 1,980,000 | NR/NR | Hillsborough County Industrial Development Authority Revenue, 6.75%, 7/1/29 | |
| 1,000,000+ | NR/WR | Hillsborough County Industrial Development Authority Revenue, 8.0%, 8/15/32 | |
| 500,000 | NR/NR | Miami Beach Health Facilities Authority, 5.375%, 11/15/28 | |
| 2,500,000 | A-/A2 | Miami-Dade County Florida Aviation Revenue, 5.5%, 10/1/41 | \$ 1 |
| 5,210,000 (a) (c) | NR/Aa3 | GEORGIA -- 4.5% Atlanta Georgia Water and Wastewater Revenue, RIB, 13.105%, 11/1/43 (144A) | \$ |
| 1,000,000 | CCC+/NR | Clayton County Development Authority Special Facilities Revenue, 9.0%, 6/1/35 | |
| 900,000 | NR/NR | DeKalb County Georgia Hospital Authority Revenue, 6.0%, 9/1/30 | |

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| | | |
|-----------|--------|---|
| 750,000 | NR/NR | DeKalb County Georgia Hospital Authority Revenue, 6.125%, 9/1/40 |
| 1,065,000 | NR/Ba2 | Effingham County Industrial Development Authority, 6.5%, 6/1/31 |
| 3,360,000 | NR/NR | Fulton County Residential Care Facilities, 7.0%, 7/1/29 |
| 1,650,000 | NR/NR | Savannah Georgia Economic Development Authority Revenue, 7.4%, 1/1/34 |

\$ 1

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

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Principal Amount USD (\$) S&P/Moody's Ratings Val

| | | | |
|------------|--------|--|----|
| 1,000,000 | B/NR | GUAM -- 2.0% Guam Government of Department Education Certificates of Participation, 6.625%, 12/1/30 | \$ |
| 4,400,000+ | AAA/NR | Northern Mariana Islands, 6.75%, 10/1/33 | \$ |

| | | | |
|-----------|-----------|---|----|
| 2,000,000 | BBB+/Baa1 | IDAHO -- 1.2% Power County Industrial Development Corp., 6.45%, 8/1/32 | \$ |
| 1,500,000 | BBB+/Baa1 | Power County Pollution Control Revenue, 5.625%, 10/1/14 | \$ |

| | | | |
|---------------|---------|---|----|
| 3,000,000 (d) | NR/NR | ILLINOIS -- 8.2% Centerpoint Intermodal Center, 8.5%, 6/15/23 (144A) | \$ |
| 2,000,000 | NR/Caa2 | City of Chicago Illinois, 5.5%, 12/1/30 | |
| 2,500,000 | NR/NR | Illinois Finance Authority Revenue, 6.125%, 11/15/25 | |
| 1,000,000 | NR/NR | Illinois Finance Authority Revenue, 6.0%, 11/15/27 | |
| 6,000,000 | NR/NR | Illinois Finance Authority Revenue, 8.25%, 5/15/45 | |
| 2,500,000 | NR/NR | Illinois Finance Authority Revenue, 8.25%, 2/15/46 | |
| 1,450,000 | A+/A1 | Illinois Finance Authority Revenue, 5.5%, 4/1/39 | |
| 2,000,000 | AA+/Aa3 | Illinois Finance Authority Revenue, 6.0%, 8/15/25 | |
| 2,000,000 | AA+/Aa2 | Illinois Finance Authority Revenue, 6.0%, 8/15/39 | |
| 280,000 | BBB+/NR | Illinois Finance Authority Revenue, 6.0%, 8/15/38 | |
| 1,500,000 (b) | NR/NR | Illinois Health Facilities Authority Revenue, 6.9%, 11/15/33 | |
| 2,415,000 | NR/NR | Southwestern Illinois Development Authority Revenue, 5.625%, 11/1/26 | |

\$ 2

| | | |
|---------|---------|--|
| 250,000 | NR/Baa3 | INDIANA -- 5.7% East Chicago Indiana Exempt Facilities Revenue, |
|---------|---------|--|

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| | | | |
|------------|---------|--|-----|
| 10,000,000 | BBB-/WR | 7.0%, 1/1/14 Indiana Development Finance Authority Revenue, 5.75%, 10/1/11 | \$ |
| 5,000,000 | NR/Ba2 | Jasper County Industrial Economic Development Revenue, 5.6%, 4/1/29 | 1 |
| 1,900,000 | NR/NR | Vincennes Industrial Economic Development Revenue, 6.25%, 1/1/24 | --- |
| ----- | | | |
| 1,000,000 | NR/A2 | KANSAS -- 0.3% Kansas Development Finance Authority, 5.0%, 5/15/35 | \$ |
| ----- | | | |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11 13

Schedule of Investments | 9/30/11 (unaudited) (continued)

| Principal Amount USD (\$) | S&P/Moody's Ratings | | Val |
|---------------------------------|------------------------|---|-----|
| 4,390,000 | BB-/NR | KENTUCKY -- 1.4% Kentucky Economic Development Finance Authority Hospital System Revenue, 5.875%, 10/1/22 | \$ |
| ----- | | | |
| 2,500,000 | BBB-/Ba2 | LOUISIANA -- 5.1% Louisiana Local Government Environmental Facilities Development Authority Revenue, 6.75%, 11/1/32 | \$ |
| 6,000,000 | NR/Baa1 | Louisiana Public Facilities Authority Revenue, 5.5%, 5/15/47 | |
| 750,000 | BBB+/NR | Opelousas Louisiana General Hospital Authority Revenue, 5.75%, 10/1/23 | |
| 5,915,000 | A-/Baa3 | Tobacco Settlement Financing Corp., 5.875%, 5/15/39 | --- |
| ----- | | | |
| 1,500,000 | NR/Baa3 | MAINE -- 0.5% Maine Health & Higher Educational Facilities Authority Revenue, 7.5%, 7/1/32 | \$ |
| ----- | | | |
| 1,250,000 | NR/Baa3 | MARYLAND -- 1.5% Maryland Health & Higher Educational Facilities Authority Revenue, 5.75%, 7/1/38 | \$ |
| 2,000,000 | NR/NR | Maryland Health & Higher Educational Facilities Authority Revenue, 6.25%, 1/1/45 | |
| 460,000 | NR/NR | Maryland Health & Higher Educational Facilities Authority Revenue, 5.25%, 1/1/27 | |
| 1,250,000 | NR/NR | Maryland Health & Higher Educational Facilities Authority Revenue, 5.3%, 1/1/37 | --- |
| ----- | | | |
| | | | \$ |

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| | | | |
|---------------|-----------|--|------|
| 675,000 | BB/NR | MASSACHUSETTS -- 9.0% | |
| | | Massachusetts Development Finance Agency, 5.25%, 10/1/18 | \$ |
| 1,885,000 | NR/NR | Massachusetts Development Finance Agency, 7.1%, 7/1/32 | |
| 8,000,000 | A/WR | Massachusetts Development Finance Agency, 5.75%, 1/1/42 | |
| 2,195,000 | BBB-/Baa3 | Massachusetts Health & Educational Facilities Authority Revenue, 5.375%, 7/15/28 | |
| 3,420,000 (b) | NR/NR | Massachusetts Health & Educational Facilities Authority Revenue, 6.5%, 1/15/38 | |
| 10,760,000 | AA-/Aa3 | Massachusetts Housing Finance Agency, 5.35%, 12/1/45 | 1 |
| | | | \$ 2 |

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

14 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11

| Principal Amount USD (\$) | S&P/Moody's Ratings | | Val |
|---------------------------|---------------------|--|-----|
| 2,000,000 | NR/Ba1 | MICHIGAN -- 1.7% | |
| | | Flint Michigan Hospital Building Authority Revenue, 7.375%, 7/1/35 | \$ |
| 2,235,000 | BB+/NR | Kent Hospital Finance Authority Revenue, Metropolitan Hospital PJ-Series A, 6.25%, 7/1/40 | |
| 725,000 | NR/NR | Michigan Public Educational Facilities Authority Revenue, 7.0%, 10/1/36 | \$ |
| 1,000,000 | NR/NR | MINNESOTA -- 0.3% | |
| | | Port Authority of the City of Bloomington, Minnesota Recovery Zone Facility Revenue, 9.0%, 12/1/35 | \$ |
| 1,000,000 | NR/NR | MISSOURI -- 1.6% | |
| | | Kansas City Tax Increment Financing Commission Tax Increment Revenue, 6.5%, 6/1/25 | \$ |
| 6,640,000 (b) (e) | NR/Ca | St. Louis Industrial Development Authority Revenue, 7.25%, 12/15/35 | |
| 1,500,000 (b) (e) | NR/Ca | St. Louis Industrial Development Authority Revenue, 7.2%, 12/15/28 | \$ |
| 2,445,000 (f) | NR/NR | MONTANA -- 0.6% | |
| | | Hardin Increment Industrial Infrastructure Development Revenue, 0.0%, 9/1/31 | \$ |
| 1,000,000 (b) (e) | NR/NR | Two Rivers Authority, Inc., Project Revenue, 7.375%, 11/1/27 | |

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| Principal Amount USD (\$) | S&P/Moody's Ratings | Description | Val |
|---------------------------|---------------------|---|-----|
| | | NEVADA -- 1.6% | |
| 1,320,000 (b) (e) | NR/NR | Director of the State of Nevada State Department of Business & Industry, 7.375%, 1/1/40 | \$ |
| 1,600,000 (b) (e) | NR/NR | Nevada State Department of Business & Industry, 7.25%, 1/1/23 | |
| 1,000,000 (b) (e) | NR/NR | Nevada State Department of Business & Industry, 7.375%, 1/1/30 | |
| 5,000,000 | A-/A3 | Reno Nevada Hospital Revenue, 5.25%, 6/1/41 | |
| | | NEW HAMPSHIRE -- 0.4% | |
| 1,125,000 | NR/NR | New Hampshire Health & Educational Facilities Authority Revenue, 5.875%, 7/1/34 | \$ |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11 15

Schedule of Investments | 9/30/11 (unaudited) (continued)

| Principal Amount USD (\$) | S&P/Moody's Ratings | Description | Val |
|---------------------------|---------------------|--|------|
| | | NEW JERSEY -- 12.5% | |
| 2,500,000 | NR/NR | Burlington County New Jersey Bridge Commission Revenue, 5.625%, 1/1/38 | \$ |
| 13,000,000 | B/B3 | New Jersey Economic Development Authority Revenue, 6.25%, 9/15/29 | 1 |
| 3,500,000 (a) | NR/Aa3 | New Jersey State Turnpike Authority, RIB, 13.774%, 1/1/28 (144A) | |
| 15,375,000 | AA+/Aa1 | New Jersey Transportation Trust Fund Authority Revenue, 0.01%, 12/15/27 | |
| 3,250,000+ | AAA/Aaa | Tobacco Settlement Financing Corp., 6.75%, 6/1/39 | |
| 5,000,000+ | AAA/Aaa | Tobacco Settlement Financing Corp., 7.0%, 6/1/41 | |
| 1,000,000+ | AAA/Aaa | Tobacco Settlement Financing Corp., 6.25%, 6/1/43 | \$ 3 |
| | | NEW YORK -- 9.3% | |
| 1,730,000 | NR/NR | Dutchess County Industrial Development Agency, 7.5%, 3/1/29 | \$ |
| 3,000,000 | NR/NR | Nassau County New York Industrial Development Agency Revenue, 6.7%, 1/1/43 | |
| 3,950,000 | BB-/B1 | New York City Industrial Development Agency, 7.625%, 12/1/32 | |
| 5,000,000 | BB-/B1 | New York City Industrial Development Agency, 5.25%, 12/1/32 | |
| 3,000,000 | B-/Caa2 | New York City Industrial Development Agency, 8.0%, 8/1/12 | |
| 2,000,000 | NR/Ba1 | New York State Dormitory Authority Revenue, 6.125%, 12/1/29 | |

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| | | | |
|-----------|---------|---|--|
| 5,000,000 | AAA/Aaa | New York State Environmental Facilities Corp., 5.0%, 6/15/33 | |
| 2,000,000 | BB/NR | Seneca Nation Indians Capital Improvement Authority Revenue, 5.25%, 12/1/16 (144A) | |
| 3,000,000 | NR/NR | Ulster County New York Industrial Development Agency, 6.0%, 9/15/27 | |
| 500,000 | NR/NR | Ulster County New York Industrial Development Agency, 6.0%, 9/15/37 | |

\$ 2

| | | | |
|-----------|-------|---|--|
| 5,010,000 | NR/NR | NORTH CAROLINA -- 1.7% Charlotte North Carolina Special Facilities Revenue, 7.75%, 2/1/28 | |
|-----------|-------|---|--|

\$

| | | | |
|-----------|----------|---|--|
| 5,000,000 | BB-/Baa3 | OHIO -- 1.3% Buckeye Tobacco Settlement Financing Authority, 6.5%, 6/1/47 | |
|-----------|----------|---|--|

\$

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

16 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11

| Principal Amount USD (\$) | S&P/Moody's Ratings | | Val |
|---------------------------------|------------------------|--|-----|
|---------------------------------|------------------------|--|-----|

| | | | |
|---------------|---------|--|--|
| 1,500,000 | B-/Caa2 | OKLAHOMA -- 2.2% Tulsa Municipal Airport Trust Revenue, 7.35%, 12/1/11 | |
| 2,220,000 | B-/Caa2 | Tulsa Municipal Airport Trust Revenue, 6.25%, 6/1/20 | |
| 3,000,000 (d) | NR/Caa2 | Tulsa Municipal Airport Trust Revenue, 7.75%, 6/1/35 | |

\$

\$

| | | | |
|-----------|-------|--|--|
| 2,000,000 | A-/NR | OREGON -- 0.7% Oregon State Facilities Authority Revenue, 5.25%, 10/1/40 | |
|-----------|-------|--|--|

\$

| | | | |
|-----------|----------|--|--|
| 3,600,000 | CCC/NR | PENNSYLVANIA -- 5.3% Columbia County Hospital Authority Revenue, 5.85%, 6/1/24 | |
| 710,000 | BBB/Ba1 | Hazleton Health Services Authority Hospital Revenue, 6.125%, 7/1/16 | |
| 1,430,000 | BB/NR | Pennsylvania Economic Development Financing Authority Revenue, 5.125%, 6/1/18 | |
| 5,000,000 | B/Caa2 | Pennsylvania Economic Development Financing Authority Solid Waste Disposal Revenue, 6.0%, 6/1/31 | |
| 5,000,000 | BBB/Baa3 | Philadelphia Hospitals & Higher Education Facilities Authority Revenue, 5.0%, 7/1/34 | |
| 2,245,000 | B-/NR | Scranton-Lackawanna Health & Welfare Authority Revenue, 6.15%, 7/1/12 | |

\$ 1

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| Principal Amount USD (\$) | S&P/Moody's Ratings | Description | Val |
|---------------------------|---------------------|--|---------------|
| ----- | | | |
| | | RHODE ISLAND -- 3.4% | |
| 1,385,000 (d) (e) | NR/NR | Central Falls Rhode Island Detention Facilities Revenue, 7.25%, 7/15/35 | \$ |
| 1,500,000 | NR/NR | Rhode Island Health & Educational Building Corp Revenue, 8.375%, 1/1/46 | |
| 8,285,000 | BBB/Baa3 | Tobacco Settlement Financing Corp., 6.25%, 6/1/42 | ----- \$ 1 |
| ----- | | | |
| | | SOUTH CAROLINA -- 5.0% | |
| 7,140,000+ | BBB+/Baa1 | South Carolina Jobs Economic Development Authority Revenue, 6.375%, 8/1/34 | \$ |
| 860,000+ | BBB+/Baa1 | South Carolina Jobs Economic Development Authority Revenue, 6.375%, 8/1/34 | |
| 4,400,000 (g) | BBB/WR | Tobacco Settlement Revenue Management, 6.375%, 5/15/30 | ----- \$ 1 |
| ----- | | | |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11 17

Schedule of Investments | 9/30/11 (unaudited) (continued)

| Principal Amount USD (\$) | S&P/Moody's Ratings | Description | Val |
|---------------------------|---------------------|---|---------------|
| ----- | | | |
| | | TENNESSEE -- 5.6% | |
| 1,000,000+ | NR/A2 | Johnson City Health & Educational Facilities Board Hospital Revenue, 7.5%, 7/1/33 | \$ |
| 5,000,000 | BBB+/Baa1 | Johnson City Health & Educational Facilities Board Hospital Revenue, Mountain States Health Alliance, 6.5%, 7/1/38 | |
| 7,000,000 | NR/A1 | Knox County Health Educational & Housing Facilities Board Hospital Revenue, Baptist Health System East Tennessee, 6.5%, 4/15/31 | |
| 3,000,000 | BBB+/NR | Sullivan County Health, Educational & Housing Facilities Board Hospital Revenue, 5.25%, 9/1/36 | ----- \$ 1 |
| ----- | | | |
| | | TEXAS -- 15.3% | |
| 2,400,000 | BB+/Ba1 | Central Texas Regional Mobility Authority Revenue, 6.75%, 1/1/41 | \$ |
| 4,095,000 | CCC+/Caa2 | Dallas-Fort Worth International Airport Facilities Improvement Corp., 9.125%, 5/1/29 | |
| 2,663,453 (b) (e) | NR/NR | Gulf Coast Industrial Development Authority, 7.0%, 12/1/36 | |
| 10,000,000 | CCC+/B3 | Houston Texas Airport System Special Facilities Revenue, 6.75%, 7/1/29 | |
| 725,000 | NR/NR | IAH Public Facility Corp., Project Revenue Bonds, Series 2006, 6.0%, 5/1/16 | |

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| | | | |
|---------------|-----------|--|---|
| 1,000,000 | NR/NR | IAH Public Facility Corp., Project Revenue Bonds, Series 2006, 6.0%, 5/1/21 | |
| 1,350,000 | NR/NR | IAH Public Facility Corp., Project Revenue Bonds, Series 2006, 6.125%, 5/1/26 | |
| 2,750,000 | AA+/Aa3 | Lower Colorado River Authority, 5.0%, 5/15/31 | |
| 845,000 | NR/NR | Lubbock Health Facilities Development Corp., 6.5%, 7/1/26 | |
| 2,000,000 | NR/NR | Lubbock Health Facilities Development Corp., 6.625%, 7/1/36 | |
| 9,750,000 | BBB+/A3 | North Texas Tollway Authority Revenue, 5.75%, 1/1/33 | 1 |
| 1,711,000 | NR/Aaa | Panhandle Regional Housing Finance Corp., Multifamily Housing Revenue, 6.6%, 7/20/31 | |
| 1,000,000 | BBB-/Baa2 | Richardson Hospital Authority Revenue, 6.0%, 12/1/34 | |
| 1,000,000 | NR/NR | Tarrant County Cultural Education Facilities Finance Corp., 8.125%, 11/15/39 | |
| 1,500,000 | NR/NR | Tarrant County Cultural Education Facilities Finance Corp., 8.25%, 11/15/44 | |
| 1,000,000 (e) | CC/NR | Texas Midwest Public Facility Corp. Revenue, 9.0%, 10/1/30 | |
| 4,700,000 | NR/Ba1 | Tomball Hospital Authority, 6.0%, 7/1/25 | |

\$ 4

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

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| Principal Amount USD (\$) | S&P/Moody's Ratings | | Val |
|---------------------------|---------------------|---|---------------|
| 1,600,000 | NR/NR | UTAH -- 0.4% Spanish Fork Charter School Revenue, 5.7%, 11/15/36 (144A) | \$ |
| 2,000,000 | BBB+/Baa1 | VIRGINIA -- 0.8% Washington County Industrial Development Authority Revenue, 7.75%, 7/1/38 | \$ |
| 1,140,000 | BBB/Baa3 | WASHINGTON -- 3.4% Tobacco Settlement Authority Revenue, 6.5%, 6/1/26 | \$ |
| 2,000,000 | BBB/Baa2 | Washington State Health Care Facilities Authority, 6.125%, 8/15/37 | |
| 2,000,000 | BBB/Baa2 | Washington State Health Care Facilities Authority, 6.25%, 8/15/42 | |
| 1,500,000 | NR/Baa2 | Washington State Health Care Facilities Authority, 5.5%, 12/1/39 | |
| 5,000,000 | NR/NR | Washington State Housing Finance Committee Nonprofit Revenue, 5.625%, 1/1/27 | |
| | | WEST VIRGINIA -- 0.5% | ----- \$ 1 |

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| | | | |
|---|-------|---|------|
| 1,500,000 | NR/NR | West Virginia Hospital Finance Authority Hospital Revenue, 9.125%, 10/1/41 | \$ |
| 2,500,000 | NR/NR | WISCONSIN -- 2.1% Wisconsin Public Finance Authority Continuing Care Retirement Community Revenue, 8.25%, 6/1/46 | \$ |
| 1,000,000 | NR/NR | Wisconsin State Health & Educational Facilities Authority Revenue, 6.25%, 4/1/34 | |
| 1,500,000 | A+/A1 | Wisconsin State Health & Educational Facilities Authority Revenue, 6.625%, 2/15/39 | |
| 1,000,000 | NR/NR | Wisconsin State Health & Educational Facilities Authority Revenue, 6.125%, 4/1/24 | \$ |
| TOTAL TAX EXEMPT OBLIGATIONS (Cost \$414,324,273) | | | \$42 |
| 13,000,000 (e) | NR/NR | MUNICIPAL COLLATERALIZED DEBT OBLIGATION -- 2.7% Non-Profit Preferred Funding Trust I, Series E, 12.0%, 9/15/37 (144A) | \$ |
| TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION (Cost \$13,000,000) | | | \$ |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11 19

Schedule of Investments | 9/30/11 (unaudited) (continued)

| Shares | Val |
|---------------------|---|
| | COMMON STOCK -- 0.3% -- of Net Assets Transportation -- 0.3% |
| 110,735 (c) (e) (h) | Airlines -- 0.3% Delta Air Lines, Inc. |
| | TOTAL COMMON STOCK (Cost \$3,210,349) |
| | TOTAL INVESTMENTS IN SECURITIES -- 147.0% (Cost \$430,534,622) (h) (i) |
| | OTHER ASSETS AND LIABILITIES -- 3.7% |
| | PREFERRED SHARES AT REDEMPTION VALUE, INCLUDING DIVIDENDS PAYABLE -- (50.7)% |
| | NET ASSETS APPLICABLE TO COMMON SHAREOWNERS -- 100.0% |

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(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, 2011, the value of these securities amounted to \$40,458,873 or 13.7% of total net assets applicable to common shareowners.

NR Security not rated by S&P or Moody's.

WR Rating withdrawn by either S&P or Moody's.

RIB Residual Interest Bonds.

+ 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.

(a) The interest rate is subject to change periodically and inversely based upon prevailing market rates. The rate shown is the coupon rate at September 30, 2011.

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

(c) Non-income producing.

(d) The interest rate is subject to change periodically. The interest rate shown is the rate at September 30, 2011.

(e) Indicates a security that has been deemed illiquid. The aggregate cost of illiquid securities is \$30,076,359. The aggregate value of \$13,488,155 represents 4.6% of the total net assets applicable to common shareowners.

(f) Debt obligation initially issued at one coupon which converts to a higher coupon at a specific date. The rate shown is the rate at September 30, 2011.

(g) Escrow to maturity.

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

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

| | |
|---------------------------|------|
| Insured: | |
| AMBAC | 2.3% |
| Assured Gty -- FSA | 1.1 |
| FSA | 8.1 |
| BHAC-CR MBIA | 1.7 |
| Revenue Bonds: | |
| Health Revenue | 34.4 |
| Tobacco Revenue | 11.0 |
| Airport Revenue | 9.0 |
| Other Revenue | 7.8 |
| Development Revenue | 7.2 |
| Education Revenue | 5.0 |
| Pollution Control Revenue | 4.8 |

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| | |
|--------------------------|--------|
| Housing Revenue | 2.9 |
| Transportation Revenue | 2.4 |
| Water Revenue | 1.9 |
| Gaming Authority Revenue | 0.4 |
| Utilities Revenue* | 0.0 |
| | ----- |
| | 100.0% |
| | ===== |

* Amount is less than 0.1%

(i) At September 30, 2011, the net unrealized gain on investments based on cost for federal income tax purposes of \$418,262,725 was as follows:

| | |
|--|--------------|
| Aggregate gross unrealized gain in which there is an excess of value over tax cost | \$46,691,490 |
| Aggregate gross unrealized loss in which there is an excess of tax cost over value | (29,601,891) |
| | ----- |
| Net unrealized gain | \$17,089,599 |
| | ===== |

For financial reporting purposes net unrealized gain on investments was \$4,817,702 and cost of investments aggregated \$430,534,622.

Purchases and sales of securities (excluding temporary cash investments) for the six months ended September 30, 2011 aggregated \$25,385,817 and \$26,982,790, respectively.

Various inputs are used in determining the value of the Trust's investments. These inputs are summarized in the three broad levels listed 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 risk, etc.)
- Level 3 -- significant unobservable inputs (including the Trust's own assumptions in determining fair value of investments)

Generally, equity securities are categorized as Level 1, fixed income securities and senior loans are categorized as Level 2 and securities valued using fair value methods (See Note 1A) are categorized as Level 3.

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11 21

Schedule of Investments | 9/30/11 (unaudited) (continued)

The following is a summary of the inputs used as of September 30, 2011, in valuing the Trust's investments:

| | Level 1 | Level 2 | Level 3 | Total |
|--|---------|---------|---------|-------|
|--|---------|---------|---------|-------|

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| | | | | | |
|---|----|-----------|---------------|------|---------------|
| Tax Exempt Obligations | \$ | -- | \$426,612,091 | \$-- | \$426,612,091 |
| Municipal Collateralized Debt Obligation | | -- | 7,909,720 | -- | 7,909,720 |
| Common Stock | | 830,513 | -- | -- | 830,513 |
| <hr style="border-top: 1px dashed black;"/> | | | | | |
| Total | | \$830,513 | \$434,521,811 | \$-- | \$435,352,324 |
| <hr style="border-top: 3px double black;"/> | | | | | |

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

22 Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11

Statement of Assets and Liabilities | 9/30/11 (unaudited)

ASSETS:

| | |
|--|---------------|
| Investments in securities, at value (cost \$430,534,622) | \$435,352,324 |
| Cash | 3,677,839 |
| Receivables -- | |
| Investment securities sold | 90,000 |
| Interest receivable | 9,488,050 |
| Prepaid expenses | 48,613 |
| <hr style="border-top: 1px dashed black;"/> | |
| Total assets | \$448,656,826 |

LIABILITIES:

| | |
|---|--------------|
| Payable -- | |
| Dividends payable to common shareowners | \$ 2,063,083 |
| Due to affiliates | 226,695 |
| Administration fee payable | 73,690 |
| Accrued expenses | 63,443 |
| <hr style="border-top: 1px dashed black;"/> | |
| Total liabilities | \$ 2,426,911 |

PREFERRED SHARES AT REDEMPTION VALUE:

| | |
|--|---------------|
| \$25,000 liquidation value per share applicable to 6,000 shares, including dividends payable of \$5,301 | \$150,005,301 |
|--|---------------|

NET ASSETS APPLICABLE TO COMMON SHAREOWNERS:

| | |
|--|---------------|
| Paid-in capital | \$329,379,402 |
| Undistributed net investment income | 15,376,085 |
| Accumulated net realized loss on investments | (53,348,575) |
| Net unrealized gain on investments | 4,817,702 |
| <hr style="border-top: 1px dashed black;"/> | |
| Net assets applicable to common shareowners | \$296,224,614 |

NET ASSET VALUE PER COMMON SHARE:

| | |
|--|----------|
| No par value (unlimited number of shares authorized) | |
| Based on \$296,224,614 / 23,204,288 common shares | \$ 12.77 |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11 23

Statement of Operations (unaudited)

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For the Six Months Ended 9/30/11

| | | |
|---|-------------|--------------|
| INVESTMENT INCOME: | | |
| Interest | | \$15,857,588 |
| ----- | | |
| EXPENSES: | | |
| Management fees | \$1,297,821 | |
| Administration fees | 151,321 | |
| Transfer agent fees and expenses | 3,065 | |
| Shareowner communications expense | 10,513 | |
| Auction agent fees | 195,777 | |
| Custodian fees | 55,487 | |
| Registration fees | 11,597 | |
| Professional fees | 101,275 | |
| Printing expense | 14,021 | |
| Trustees' fees | 6,891 | |
| Pricing fee | 17,973 | |
| Miscellaneous | 17,583 | |
| ----- | | |
| Total expenses | | \$ 1,883,324 |
| ----- | | |
| Net expenses | | \$ 1,883,324 |
| ----- | | |
| Net investment income | | \$13,974,264 |
| ----- | | |
| REALIZED AND UNREALIZED GAIN (LOSS) ON INVESTMENTS: | | |
| Net realized gain from investments | \$2,102,089 | |
| ----- | | |
| Change in net unrealized loss from investments | 25,701,961 | |
| ----- | | |
| Net gain on investments | | \$27,804,050 |
| ----- | | |
| DISTRIBUTIONS TO PREFERRED SHAREOWNERS FROM NET INVESTMENT INCOME: | | \$ (231,184) |
| ----- | | |
| Net increase in net assets applicable to common shareowners resulting from operations | | \$41,547,130 |
| ===== | | |

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

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Statement of Changes in Net Assets

| | Six Months Ended 9/30/11 (unaudited) | Year Ended 3/30/11 |
|---|--|-----------------------|
| FROM OPERATIONS: | | |
| Net investment income | \$ 13,974,264 | \$ 27,151,232 |
| Net realized gain on investments | 2,102,089 | 632,300 |
| Change in unrealized gain (loss) on investments | 25,701,961 | (19,037,834) |
| Distributions to preferred shareowners from net investment income | (231,184) | (725,370) |

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| | | |
|---|-----------------|-----------------|
| Net increase in net assets applicable to common shareowners resulting from operations | \$ 41,547,130 | \$ 8,020,328 |
| DISTRIBUTIONS TO COMMON SHAREOWNERS: | | |
| Net investment income (\$0.57 and \$1.06 per share, respectively) | \$ (13,087,863) | \$ (24,440,922) |
| Total distributions to common shareowners | \$ (13,087,863) | \$ (24,440,922) |
| FROM TRUST SHARE TRANSACTIONS: | | |
| Reinvestment in distributions | \$ 895,359 | \$ 1,739,573 |
| Net increase in net assets applicable to common shareowners from Trust share transactions | \$ 895,359 | \$ 1,739,573 |
| Net increase (decrease) in net assets applicable to common shareowners | \$ 29,354,626 | \$ (14,681,021) |
| NET ASSETS APPLICABLE TO COMMON SHAREOWNERS: | | |
| Beginning of period | 266,869,988 | 281,551,009 |
| End of period | \$ 296,224,614 | \$266,869,988 |
| Undistributed net investment income | \$ 15,376,085 | \$ 14,720,868 |

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

Pioneer Municipal High Income Advantage Trust | Semiannual Report | 9/30/11 25

Financial Highlights

| | Six Months Ended 9/30/11 (unaudited) | Year Ended 3/31/11 | Year Ended 3/31/10 |
|--|---|--------------------------|--------------------------|
| Per Common Share Operating Performance | | | |
| Net asset value, beginning of period | \$ 11.54 | \$ 12.24 | \$ 9.23 |
| Increase (decrease) from investment operations:(a) | | | |
| Net investment income | \$ 0.60 | \$ 1.18 | \$ 1.18 |
| Net realized and unrealized gain (loss) on investments | 1.21 | (0.79) | 2.83 |
| Distributions to preferred shareowners from: | | | |
| Net investment income | (0.01) | (0.03) | (0.04) |
| Net increase (decrease) from investment operations | \$ 1.80 | \$ 0.36 | \$ 3.97 |
| Distributions to common shareowners from: | | | |
| Net investment income | (0.57) | (1.06) | (0.96) |
| Net increase (decrease) in net asset value | \$ 1.23 | \$ (0.70) | \$ 3.01 |
| Net asset value, end of period(b) | \$ 12.77 | \$ 11.54 | \$ 12.24 |
| Market value, end of period(b) | \$ 13.85 | \$ 12.64 | \$ 13.10 |

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| | | | |
|--|----------|-------|--------|
| Total return at market value(c) | 14.53% | 4.97% | 57.76% |
| Ratios to average net assets of common shareowners | | | |
| Net expenses(d) | 1.34%(f) | 1.35% | 1.41% |
| Net investment income before preferred share dividends | 9.88%(f) | 9.54% | 10.66% |
| Preferred share dividends | 0.16%(f) | 0.25% | 0.33% |
| Net investment income available to common shareowners | 4.51%(f) | 9.29% | 10.33% |
| Portfolio turnover | 6% | 10% | 8% |

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

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| | Six Months Ended 9/30/11 | Year Ended 3/31/11 | Year Ended 3/31/10 |
|--|--------------------------------|--------------------------|--------------------------|
| Net assets of common shareowners, end of period (in thousands) | \$296,225 | \$266,870 | \$281,551 |
| Preferred shares outstanding (in thousands) | \$150,000 | \$150,000 | \$150,000 |
| Asset coverage per preferred share, end of period | \$ 74,371 | \$ 69,479 | \$ 71,926 |
| Average market value per preferred share(e) | \$ 25,000 | \$ 25,000 | \$ 25,000 |
| Liquidation value, including dividends payable, per preferred share | \$ 25,001 | \$ 25,001 | \$ 25,001 |
| Ratio to average net assets of common shareowners before waivers and reimbursements of expenses | | | |
| Net expenses(d) | 1.34%(f) | 1.35% | 1.41% |
| Net investment income before preferred share dividends | 9.88%(f) | 9.54% | 10.66% |
| Preferred share dividends | 0.16%(f) | 0.25% | 0.33% |
| Net investment income available to common shareowners | 9.72%(f) | 9.29% | 10.33% |

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

The information above represents the audited operating performance data for a common share outstanding, total investment return, ratios to average net assets and other supplemental data for the periods indicated. This information has been determined based upon financial information provided in the financial statements and market value data for the Trust's common shares.

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

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Notes to Financial Statements | 9/30/11

1. Organization and Significant Accounting Policies

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

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

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

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

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

A. Security Valuation

Security transactions are recorded as of trade date. Fixed income securities with remaining maturity of more than sixty days are valued at prices supplied by independent pricing services, which consider such factors as market

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prices, market events, quotations from one or more brokers, Treasury spreads, yields, maturities and ratings. Valuations may be supplemented by dealers and other sources, as required. The values of interest rate swaps are determined by obtaining dealer quotations. Equity securities that have

traded on an exchange are valued at the last sale price on the principal exchange where they are traded. Equity securities that have not traded on the date of valuation, or securities for which sale prices are not available, generally are valued using the mean between the last bid and asked prices. 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 using fair value methods pursuant to procedures adopted by the Board of Trustees.

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. Thus, the valuation of the Trust's securities may differ from exchange prices.

At September 30, 2011, there were no securities that were valued using fair value methods (other than securities valued using prices supplied by independent pricing services). Inputs used when applying fair value methods to value a security may include credit ratings, the financial condition of the company, current market conditions and comparable securities. Short-term fixed income securities with remaining maturities of sixty days or less generally are valued at amortized cost. Money market mutual funds are valued at net asset value.

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

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.

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

B. Federal Income Taxes

It is the Trust's policy to comply with the requirements of the Internal Revenue Code applicable to regulated investment companies and to distribute all of its taxable income and net realized capital gains, if any, to its shareowners. Therefore, no federal income tax provision is required. Tax years for the prior three fiscal years remain subject to examination by tax authorities.

The amounts and characterizations of distributions to shareowners for financial reporting purposes are determined in accordance with federal income tax rules. Therefore, the sources of the Trust's distributions may be shown in the accompanying financial statements as from or in excess of net investment income or net realized gain (loss) on investment transactions, or as from paid-in capital, depending on the type of book/tax differences that may exist.

Under the recently enacted Regulated Investment Company Modernization Act of 2010, the Fund will be permitted to carry forward capital losses incurred in taxable years beginning after December 22, 2010 for an unlimited period. However, any losses incurred during those future years

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will be required to be utilized prior to the losses incurred in pre-enactment tax years. As a result of this ordering rule, pre-enactment capital loss carryforwards may be more likely to expire unused. Additionally, post enactment capital losses that are carried forward will retain their character as either short-term or long-term capital losses rather than being considered all short-term as under previous law.

The tax character of current year distributions payable to common and preferred shareowners will be determined at the end of the current taxable year. The tax character of distributions paid to common and preferred shareowners during the year ended March 31, 2011 was as follows:

| | 2011 |
|--------------------------|---------------------|
| Distributions paid from: | |
| Tax exempt income | \$24,632,869 |
| Ordinary income | 533,423 |
| Total | \$25,166,292 |

The following shows the components of distributable earnings (losses) on a federal income tax basis at March 31, 2011:

| | 2011 |
|---------------------------------|------------------------|
| Distributable earnings: | |
| Undistributed tax-exempt income | \$ 9,407,467 |
| Undistributed ordinary income | 35,116 |
| Capital loss carryforward | (53,183,034) |
| Post-October-loss deferred | (2,141,689) |
| Dividends payable | (6,377) |
| Unrealized depreciation | (15,725,538) |
| Total | \$ (61,614,055) |

The difference between book-basis and tax-basis unrealized appreciation is primarily attributable to the difference between book and tax amortization

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methods for premiums and discounts on fixed income securities, the difference between book and tax accounting for swap agreements, book/tax difference in accrual of income on securities in default, and other temporary differences.

C. Automatic Dividend Reinvestment Plan

All common shareowners whose shares are registered in their own names automatically participate in the Automatic Dividend Reinvestment Plan (the

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

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

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

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of brokerage trading fees incurred with respect to the Plan Agent's open-market purchases. Participating in the Plan does not relieve shareowners from any federal, state or local taxes which may be due on dividends paid in any taxable year. Shareowners holding Plan shares in a brokerage account may not be able to transfer the shares to another broker and continue to participate in the Plan.

2. Management Agreement

Pioneer Investment Management, Inc. (PIM), the Trust's investment adviser, 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 of the issuance of debt securities), (ii) the issuance of

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preferred stock or other similar preference securities, and/or (iii) any other means. For the six months ended September 30, 2011, the net management fee was 0.60% of the Trust's average daily managed assets, which was 0.92% of the Trust's average daily net assets attributable to the common shareowners.

In addition, under PIM's management and administration agreements, certain other services and costs are paid by PIM and reimbursed by the Trust. At September 30, 2011, \$226,695 was payable to PIM related to management costs, administrative costs and certain other reimbursements and is included in "Due to affiliates" on the Statement of Assets and Liabilities.

Effective September 1, 2010, PIM has retained State Street Bank and Trust Company (State Street) to provide certain administrative and accounting services to the Trust on its behalf. For such services, PIM pays State Street a monthly fee at an annual rate of 0.07% of the Trust's average daily managed assets up to \$500 million and 0.03% for average daily managed assets in excess of \$500 million, subject to a minimum monthly fee of \$10,000. Previously, PIM had retained Princeton Administrators, LLC (Princeton) to provide such services. PIM paid Princeton a monthly fee at an annual rate of 0.07% of the Trust's average daily managed assets up to \$500 million and 0.03% for average daily managed assets in excess of \$500 million, subject to a minimum monthly fee of \$10,000. Neither State Street nor Princeton received compensation directly from the Trust for providing such services.

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3. Transfer Agents

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

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

4. Interest Rate Swaps

The Trust may enter into interest rate swap transactions to attempt to protect itself from increasing dividend or interest expense on its leverage resulting from increasing short-term interest rates. The cost of leverage may rise with an increase in interest rates, generally having the effect of lower yields and potentially lower dividends to common shareowners. Interest rate swaps can be used to "lock in" the cost of leverage and reduce the negative impact that rising short-term interest rates would have on the Trust's leveraging costs.

An interest rate swap is an agreement between two parties, which involves exchanging floating rate and fixed rate interest payments for a specified period of time. Interest rate swaps involve the accrual of the net interest payments between the parties on a daily basis, with the net amount recorded within the unrealized appreciation/depreciation of interest rate swaps on the Statement of Assets and Liabilities. Once the interim payments are settled in cash, at the pre-determined dates specified in the agreement, the net amount is recorded as realized gain or loss from interest rate swaps on the Statement of Operations. During the term of the swap, changes in the value of the swap are recognized as

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unrealized gains and losses by "marking-to-market" the value of the swap based on values obtained from dealer quotations. When the swap is terminated, the Trust will record a realized gain or loss equal to the difference, if any, between the proceeds from (or cost of) closing the contract and the cost basis of the contract. The Trust is exposed to credit risk in the event of non-performance by the other party to the interest rate swap. Risk may also arise with regard to market movements in the value of the swap arrangement that do not exactly offset the changes in the related dividend requirement or interest expense on the Trust's leverage.

There were no interest rate swap contracts outstanding at September 30, 2011.

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5. Trust Shares

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

Transactions in common shares of beneficial interest for the six months ended September 30, 2011 and the year ended March 31, 2011 were as follows:

| | 9/30/11 | 3/31/11 |
|---|------------|------------|
| Shares outstanding at beginning of period | 23,133,791 | 22,995,047 |
| Reinvestment of distributions | 70,497 | 138,744 |
| Shares outstanding at end of period | 23,204,288 | 23,133,791 |

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, 2011, 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 0.121% to 0.468% during the six months ended September 30, 2011.

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

The APS are redeemable at the option of the Trust, in whole or in part, on any dividend payment date at \$25,000 per share plus any accumulated or unpaid dividends, whether or not declared. The APS are also subject to mandatory redemption at \$25,000 per share plus any accumulated or unpaid dividends,

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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

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amended, requires that along with approval by shareowners that might otherwise be required, the approval of the holders of a majority of any outstanding preferred shares, voting separately as a class, would be required to (a) adopt any plan of reorganization that would adversely affect the preferred shares and (b) take any action requiring a vote of security holders, including, among other things, changes in the Trust's subclassification as a closed-end management investment company or changes in its fundamental investment restrictions.

6. Subsequent Events

The Board of Trustees of the Trust declared a dividend from undistributed net investment income of \$0.095 per common share payable October 31, 2011, to common shareowners of record on October 14, 2011.

Subsequent to September 30, 2011, dividends declared and paid on preferred shares totaled \$36,330 in aggregate for the September 30 outstanding preferred share series through November 9, 2011.

In preparing these financial statements, PIM has evaluated the impact of all events and transactions for potential recognition or disclosure and has determined that other than disclosed above, there were no subsequent events requiring recognition or disclosure in the financial statements.

ADDITIONAL INFORMATION (unaudited)

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

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

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Results of Shareholder Meeting (unaudited)

At the annual meeting of shareowners held on September 21, 2011 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 Class II Trustees.

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| Nominee | For | Withheld |
|----------------------|----------------|----------|
| Benjamin J. Friedman | 21,041,503.755 | 972,742 |
| Margaret B.W. Graham | 21,078,807.755 | 935,438 |
| Daniel K. Kingsbury | 21,092,575.755 | 921,670 |

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Trustees, Officers and Service Providers

Trustees

John F. Cogan, Jr., Chairman
 David R. Bock
 Mary K. Bush
 Benjamin M. Friedman
 Margaret B.W. Graham
 Daniel K. Kingsbury
 Thomas J. Perna
 Marguerite A. Piret
 Stephen K. West

Officers

John F. Cogan, Jr., President
 Daniel K. Kingsbury, Executive
 Vice President
 Mark E. Bradley, Treasurer
 Christopher J. Kelley, Secretary

Investment Adviser and Administrator
 Pioneer Investment Management, Inc.

Custodian
 Brown Brothers Harriman & Co.

Legal Counsel
 Bingham McCutchen LLP

Transfer Agent
 Pioneer Investment Management Shareholder Services, Inc.

Shareowner Services and Sub-Transfer Agent
 American Stock Transfer & Trust Company

Preferred Share Auction/Transfer Agent and Registrar
 Deutsche Bank Trust Company Americas

Sub-Administrator
 State Street Bank and 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.

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This page for your notes.

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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

1-800-710-0935

Or write to AST:

For

Write to

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

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

Dividend reinvestment plan (DRIP)

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

Website

www.amstock.com

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

The Trust files a complete statement of investments with the Securities and

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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 <http://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.

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 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

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

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

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

ITEM 3. AUDIT COMMITTEE FINANCIAL EXPERT.

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

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

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

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

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

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

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

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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

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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

| 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 | <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 |

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professional standards (AICPA,
SEC, etc.)

AUDIT COMMITTEE APPROVAL POLICY

AUDIT COMMITTEE
REPORTING POLICY

- | | |
|---|---|
| <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> o A summary of all such services and related fees reported at each regularly scheduled Audit Committee meeting. |
| <ul style="list-style-type: none"> o "One-time" pre-approval for the fund fiscal year within a specified dollar limit for all pre-approved specific service subcategories | <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 limit 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 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 | <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 |

desired level of confidentiality.

| 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 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 |
|--|---|--|
| <p>IV. OTHER SERVICES</p> <p>A. SYNERGISTIC, UNIQUE QUALIFICATIONS</p> | <p>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.</p> | <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 pre-approved to the left, or to add a specific service subcategory as "pre-approved" | <ul style="list-style-type: none"> o A summary of all such services and related fees (including comparison to specified dollar limits) reported quarterly. |

SECTION III - POLICY DETAIL, CONTINUED

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

determines, by regulation, is impermissible

AUDIT COMMITTEE APPROVAL POLICY

AUDIT COMMITTEE REPORTING POLICY

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.

o A summary of all services and related fees reported at each regularly scheduled Audit Committee meeting will serve as continual confirmation that has not provided any restricted services.

GENERAL AUDIT COMMITTEE APPROVAL POLICY:

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

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

N/A

(f) If greater than 50 percent, disclose the percentage of hours expended on the principal accountant's 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 registrant's accountant for services rendered to the registrant, and rendered to the registrant's 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 registrant's audit committee of the board of trustees

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has considered whether the provision of non-audit services that were rendered to the registrant's 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)). 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.

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)).

(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 I Investments in securities of unaffiliated issuers as of the close of the reporting period as set forth in 210.12-12 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

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underwriter, on the other. Include any policies and procedures of the company's investment adviser, or any other third party, that the company uses, or that are used on the company's behalf, to determine how to vote proxies relating to portfolio securities.

Information not required in semi annual reports on form NCSR.

Item 8. Portfolio Managers of Closed-End Management Investment Companies.

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

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

Information not required in semi annual reports on form NCSR.

Item 9. Purchases of Equity Securities by Closed-End Management Investment Company and Affiliated Purchasers.

(a) If the registrant is a closed-end management investment company, in the following tabular format, provide the information specified in paragraph (b) of this Item with respect to any purchase made by or on behalf of the registrant or any affiliated purchaser, as defined in Rule 10b-18(a)(3) under the Exchange Act (17 CFR 240.10b-18(a)(3)), of shares or other units of any class of the registrants equity securities that is registered by the registrant pursuant to Section 12 of the Exchange Act (15 U.S.C. 781). Instruction to paragraph (a). Disclose all purchases covered by this Item, including purchases that do not satisfy the conditions of the safe harbor of Rule 10b-18 under the Exchange Act (17 CFR 240.10b-18), made in the period covered by the report. Provide disclosures covering repurchases made on a monthly basis. For example, if the reporting period began on January 16 and ended on July 15, the chart would show repurchases for the months from January 16 through February 15, February 16 through March 15, March 16 through April 15, April 16 through May 15, May 16 through June 15, and June 16 through July 15.

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 registrants board of directors, where those changes were implemented after the registrant last provided disclosure in response to the requirements of Item 7(d)(2)(ii)(G) 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 registrants board of directors since the registrant last provided disclosure in response

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to the requirements of Item 7(d)(2)(ii)(G) 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 officer or officers and principal financial officer or officers, or persons performing similar functions, about the effectiveness of the registrant's disclosure controls and procedures (as defined in Rule 30a-2(c) under the Act (17 CFR 270.30a-2(c))) based on their evaluation of these controls and procedures as of a date within 90 days of the filing date of the report that includes the disclosure required by this paragraph.

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

(b) Disclose whether or not there were significant changes in the registrant's internal controls or in other factors that could significantly affect these controls subsequent to the date of their evaluation, including any corrective actions with regard to significant deficiencies and material weaknesses.

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.

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

(a) 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

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satisfy the Item 2 requirements through filing of an exhibit.

(b) A separate certification for each principal executive officer and principal financial officer of the registrant as required by Rule 30a-2 under the Act (17 CFR 270.30a-2).

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

By (Signature and Title)* /s/ John F. Cogan, Jr.
John F. Cogan, Jr, President

Date November 29, 2011

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/ John F. Cogan, Jr.
John F. Cogan, Jr., President

Date November 29, 2011

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

Date November 29, 2011

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