

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST

Form N-Q

August 26, 2011

OMB APPROVAL

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

FORM N-Q

QUARTERLY SCHEDULE OF PORTFOLIO HOLDINGS
OF REGISTERED MANAGEMENT INVESTMENT COMPANY

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)

Dorothy E. Bourassa, 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: June 30, 2011

Form N-Q is to be used by management investment companies, other than small business investment companies registered on Form N-5 (239.24 and 274.5 of this chapter), to file reports with the Commission, not later than 60 days after close of the first and third fiscal quarters, pursuant to Rule 30b1-5 under the Investment Company Act of 1940 (17 CFR 270.30b1-5). The Commission may use the information provided on Form N-Q in its regulatory, disclosure review, inspection, and policymaking roles.

A registrant is required to disclose the information specified by Form N-Q, and the Commission will make this information public. A registrant is not required to respond to the collection of information contained in Form N-Q 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.

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ITEM 1. Schedule of Investments.

| Pioneer Municipal High Income Advantage Trust SCHEDULE OF INVESTMENTS 6/30/11 (unaudited) | | | |
|--|---|--|--------------|
| Principal Amount | S&P/ Moody's Ratings (unaudited) | | Value |
| TAX-EXEMPT OBLIGATIONS - 147.4% of Net Assets | | | |
| \$ 2,500,000 | NR/NR | Alabama - 0.6% Huntsville-Redstone Village Special Care Facilities Financing Authority, 5.5%, 1/1/43 | \$ 1,789,100 |
| 5,000,000 | NR/NR | Arizona - 3.3% Casa Grande Industrial Development Authority Hospital Revenue, 7.625%, 12/1/29 | \$ 4,657,600 |
| 1,492,000 | NR/Baa3 | Pima County Industrial Development Authority, 6.75%, 7/1/31 | 1,413,103 |
| 2,640,000 | NR/NR | Pima County Industrial Development Authority, 7.0%, 1/1/38 | 2,407,574 |
| 1,000,000 | NR/NR | San Luis Facility Development Corp., 7.25%, 5/1/27 | 900,130 |
| | | | \$ 9,378,407 |
| 1,000,000 | NR/NR | California - 12.8% California Enterprise Development Authority Recovery Zone Facility Revenue, 8.5%, 4/1/31 | \$ 1,022,420 |
| 3,140,000(a) | AA+/WR | California State University Revenue, RIB, 12.808%, 11/1/39 (144A) | 3,029,755 |
| 2,425,000 | A-/A1 | California State Various Purpose, 5.75%, 4/1/31 | 2,588,639 |
| 8,575,000(a) | AA+/NR | California State Various Purpose, RIB, 12.808%, 6/1/37 (144A) | 8,018,482 |
| 3,000,000 | BB+/NR | California Statewide Communities Development Authority, 7.25%, 10/14/38 (144A) | 3,030,600 |
| 803,175(b) | NR/NR | California Statewide Communities Development Authority, 9.0%, | 44,978 |

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|---------------|-----------|---|---------------|
| 2,680,000 † | AAA/Aaa | 12/1/38 Golden State Tobacco Securitization Corp., 6.75%, 6/1/39 | 2,999,724 |
| 1,500,000 | A-/NR | Madera Irrigation Financing Authority Water Revenue, 6.25%, 1/1/31 | 1,530,690 |
| 1,500,000 | A-/NR | Madera Irrigation Financing Authority Water Revenue, 6.5%, 1/1/40 | 1,530,375 |
| 2,500,000 | A/A2 | San Jose California Airport Revenue, 5.0%, 3/1/37 | 2,342,025 |
| 10,500,000(a) | AA+/NR | University of California, RIB, 13.36%, 5/15/38 | 10,019,940 |
| | | | \$ 36,157,628 |
| 2,850,000 † | NR/WR | Colorado - 1.4% Denver Health & Hospital Authority Healthcare Revenue, 6.0%, 12/1/31 | \$ 2,917,659 |
| 1,000,000 | NR/NR | Kremmling Memorial Hospital District, 7.125%, 12/1/45 | 971,240 |
| | | | \$ 3,888,899 |
| 7,750,000 | BBB/Baa1 | Connecticut - 3.0% Connecticut State Development Authority Revenue, 5.75%, 11/1/37 | \$ 7,494,405 |
| 1,000,000 | NR/NR | Hamden Connecticut Facility Revenue, 7.75%, 1/1/43 | 1,026,230 |
| | | | \$ 8,520,635 |
| 2,700,000 | BBB/Baa3 | District of Columbia - 3.3% District of Columbia Tobacco Settlement Financing Corp., 6.5%, 5/15/33 | \$ 2,747,277 |
| 6,825,000 | BBB/Baa3 | District of Columbia Tobacco Settlement Financing Corp., 6.75%, 5/15/40 | 6,613,971 |
| | | | \$ 9,361,248 |
| 1,000,000 | NR/NR | Florida - 3.9% Florida Development Finance Corp. Educational Facilities Revenue, 6.0%, 9/15/40 | \$ 877,280 |
| 2,000,000 | NR/NR | Florida Development Finance Corp. Educational Facilities Revenue, 7.625%, 6/15/41 | 1,956,600 |
| 2,000,000 | BBB+/Baa1 | Hillsborough County Industrial Development Authority Pollution Control Revenue, 5.5%, 10/1/23 | 2,032,240 |
| 1,980,000 | NR/NR | Hillsborough County Industrial Development Authority Revenue, 6.75%, 7/1/29 | 1,806,988 |
| 1,000,000 † | NR/WR | Hillsborough County Industrial Development Authority Revenue, 8.0%, 8/15/32 | 1,396,080 |
| 500,000 | NR/NR | | 437,515 |

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| 2,500,000 | A-/A2 | Miami Beach Health Facilities Authority, 5.375%, 11/15/28 Miami-Dade County Florida Aviation Revenue, 5.5%, 10/1/41 | 2,505,025 |
| | | | \$ 11,011,728 |
| 5,210,000(a) | NR/Aa3 | Georgia - 4.5% Atlanta Georgia Water and Wastewater Revenue, RIB, 12.808%, 11/1/43 (144A) | \$ 4,928,764 |
| 1,000,000 | CCC+/NR | Clayton County Development Authority Special Facilities Revenue, 9.0%, 6/1/35 | 1,074,140 |
| 900,000 | NR/NR | DeKalb County Georgia Hospital Authority Revenue, 6.0%, 9/1/30 | 891,828 |
| 750,000 | NR/NR | DeKalb County Georgia Hospital Authority Revenue, 6.125%, 9/1/40 | 719,010 |
| 1,065,000 | NR/Ba2 | Effingham County Industrial Development Authority, 6.5%, 6/1/31 | 1,065,895 |
| 3,360,000 | NR/NR | Fulton County Residential Care Facilities, 7.0%, 7/1/29 | 2,556,288 |
| 1,650,000 | NR/NR | Savannah Georgia Economic Development Authority Revenue, 7.4%, 1/1/34 | 1,580,502 |
| | | | \$ 12,816,427 |
| 1,000,000 | B/NR | Guam - 2.1% Guam Government of Department Education Certificates of Participation, 6.625%, 12/1/30 | \$ 982,480 |
| 4,400,000 † | AAA/NR | Northern Mariana Islands, 6.75%, 10/1/33 | 4,998,136 |
| | | | \$ 5,980,616 |
| 2,000,000 | BBB+/Baa1 | Idaho - 1.2% Power County Industrial Development Corp., 6.45%, 8/1/32 | \$ 2,001,220 |
| 1,500,000 | BBB+/Baa1 | Power County Pollution Control Revenue, 5.625%, 10/1/14 | 1,503,750 |
| | | | \$ 3,504,970 |
| \$ 3,000,000(c) | NR/NR | Illinois - 8.3% Centerpoint Intermodal Center, 8.5%, 6/15/23 (144A) | \$ 3,000,420 |
| 2,000,000 | NR/Caa2 | City of Chicago Illinois, 5.5%, 12/1/30 | 1,528,340 |
| 1,450,000 | A+/A1 | Illinois Finance Authority Revenue, 5.5%, 4/1/39 | 1,394,059 |
| 2,000,000 | AA+/Aa3 | Illinois Finance Authority Revenue, 6.0%, 8/15/25 | 2,081,360 |
| 1,000,000 | NR/NR | Illinois Finance Authority Revenue, 6.0%, 11/15/27 | 599,400 |
| 2,000,000 | AA+/Aa2 | | 2,123,840 |

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|--------------|----------|--|---------------|
| | | Illinois Finance Authority Revenue, 6.0%, 8/15/39 | |
| 2,500,000 | NR/NR | Illinois Finance Authority Revenue, 6.125%, 11/15/25 | 2,204,850 |
| 6,000,000 | NR/NR | Illinois Finance Authority Revenue, 8.25%, 5/15/45 | 5,788,020 |
| 2,500,000 | NR/NR | Illinois Finance Authority Revenue, 8.25%, 2/15/46 | 2,420,725 |
| 1,500,000(b) | NR/NR | Illinois Health Facilities Authority Revenue, 6.9%, 11/15/33 | 524,850 |
| 2,415,000 | NR/NR | Southwestern Illinois Development Authority Revenue, 5.625%, 11/1/26 | 1,822,021 |
| | | | \$ 23,487,885 |
| | | Indiana - 5.9% | |
| 250,000 | NR/Baa3 | East Chicago Indiana Exempt Facilities Revenue, 7.0%, 1/1/14 | \$ 241,047 |
| 10,000,000 | BBB-/WR | Indiana State Development Finance Authority Revenue, 5.75%, 10/1/11 | 10,027,900 |
| 5,000,000 | NR/Ba2 | Jasper County Industrial Economic Development Revenue, 5.6%, 4/1/29 | 4,704,900 |
| 1,900,000 | NR/NR | Vincennes Industrial Economic Development Revenue, 6.25%, 1/1/24 | 1,646,996 |
| | | | \$ 16,620,843 |
| | | Kansas - 0.3% | |
| 1,000,000 | NR/A2 | Kansas Development Finance Authority, 5.0%, 5/15/35 | \$ 941,510 |
| | | Kentucky - 1.4% | |
| 4,390,000 | BB-/NR | Kentucky Economic Development Finance Authority Hospital System Revenue, 5.875%, 10/1/22 | \$ 3,825,534 |
| | | Louisiana - 5.1% | |
| 2,500,000 | BBB-/Ba2 | Louisiana Local Government Environmental Facilities Development Authority Revenue, 6.75%, 11/1/32 | \$ 2,602,700 |
| 6,000,000 | NR/Baa1 | Louisiana Public Facilities Authority Revenue, 5.5%, 5/15/47 | 5,302,260 |
| 750,000 | BBB+/NR | Opelousas Louisiana General Hospital Authority Revenue, 5.75%, 10/1/23 | 762,465 |
| 5,915,000 | A-/Baa3 | Tobacco Settlement Financing Corp., 5.875%, 5/15/39 | 5,698,866 |
| | | | \$ 14,366,291 |
| | | Maryland - 1.5% | |
| 460,000 | NR/NR | Maryland Health & Higher Educational Facilities Authority | \$ 367,149 |

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| 1,250,000 | NR/NR | Revenue, 5.25%, 1/1/27 Maryland Health & Higher Educational Facilities Authority | 858,712 |
| 1,250,000 | NR/Baa3 | Revenue, 5.3%, 1/1/37 Maryland Health & Higher Educational Facilities Authority | 1,062,938 |
| 2,000,000 | NR/NR | Revenue, 5.75%, 7/1/38 Maryland Health & Higher Educational Facilities Authority | 2,030,020 |
| | | Revenue, 6.25%, 1/1/45 | \$ 4,318,819 |
| 755,000 | BB/NR | Massachusetts - 8.9% Massachusetts Development Finance Agency, 5.25%, 10/1/18 | \$ 707,246 |
| 8,000,000 | A/WR | Massachusetts Development Finance Agency, 5.75%, 1/1/42 | 8,104,000 |
| 1,930,000 | NR/NR | Massachusetts Development Finance Agency, 7.1%, 7/1/32 | 1,701,527 |
| 2,195,000 | BBB-/Baa3 | Massachusetts Health & Educational Facilities Authority Revenue, 5.375%, 7/15/28 | 2,003,881 |
| 3,420,000 | NR/NR | Massachusetts Health & Educational Facilities Authority Revenue, 6.5%, 1/15/38 | 2,706,417 |
| 10,760,000 | AA-/Aa3 | Massachusetts Housing Finance Agency, 5.35%, 12/1/45 | 10,071,575 |
| | | | \$ 25,294,646 |
| 2,000,000 | NR/Ba1 | Michigan - 0.9% Flint Michigan Hospital Building Authority Revenue, 7.375%, 7/1/35 | \$ 2,002,860 |
| 735,000 | NR/NR | Michigan Public Educational Facilities Authority Revenue, 7.0%, 10/1/36 | 652,790 |
| | | | \$ 2,655,650 |
| 1,000,000 | NR/NR | Minnesota - 0.4% Port Authority of the City of Bloomington, Minnesota Recovery Zone Facility Revenue, 9.0%, 12/1/35 | \$ 1,013,400 |
| 1,000,000 | NR/NR | Missouri - 1.8% Kansas City Tax Increment Financing Commission Tax Increment Revenue, 6.5%, 6/1/25 | \$ 990,020 |
| 1,500,000(b)(d) | NR/Ca | St. Louis Industrial Development Authority Revenue, 7.2%, 12/15/28 | 772,875 |
| 6,640,000(b)(d) | NR/Ca | St. Louis Industrial Development Authority Revenue, 7.25%, 12/15/35 | 3,403,332 |
| | | | \$ 5,166,227 |
| | | Montana - 0.6% | |

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| 2,445,000(e) | NR/NR | Hardin Increment Industrial Infrastructure Development Revenue, 0.0%, 9/1/31 | \$ 1,555,558 |
| 1,000,000(b)(d) | NR/NR | Two Rivers Authority, Inc., Project Revenue, 7.375%, 11/1/27 | 153,130 |
| | | | \$ 1,708,688 |
| 1,500,000 | A/A2 | Nevada - 2.0% Henderson Nevada Health Care Facilities Revenue, 5.625%, 7/1/24 | \$ 1,533,795 |
| 1,600,000(b)(d) | NR/NR | Nevada State Department of Business & Industry, 7.25%, 1/1/23 | 16 |
| 1,000,000(b)(d) | NR/NR | Nevada State Department of Business & Industry, 7.375%, 1/1/30 | 10 |
| 1,320,000(b)(d) | NR/NR | Nevada State Department of Business & Industry, 7.375%, 1/1/40 | 13 |
| 5,000,000 | A-/A3 | Reno Nevada Hospital Revenue, 5.25%, 6/1/41 | 4,243,550 |
| | | | \$ 5,777,384 |
| 1,125,000 | NR/NR | New Hampshire - 0.4% New Hampshire Health & Educational Facilities Authority Revenue, 5.875%, 7/1/34 | \$ 1,072,564 |
| \$ 2,500,000 | NR/NR | New Jersey - 12.7% Burlington County New Jersey Bridge Commission Revenue, 5.625%, 1/1/38 | \$ 2,023,275 |
| 13,000,000 | B/B3 | New Jersey Economic Development Authority Revenue, 6.25%, 9/15/29 | 12,232,220 |
| 3,500,000(a) | NR/Aa3 | New Jersey State Turnpike Authority, RIB, 13.532%, 1/1/28 (144A) | 4,674,530 |
| 15,375,000 | AA+/Aa1 | New Jersey Transportation Trust Fund Authority Revenue, 0.0%, 12/15/27 | 6,711,956 |
| 1,000,000 † | AAA/Aaa | Tobacco Settlement Financing Corp., 6.25%, 6/1/43 | 1,110,920 |
| 3,250,000 † | AAA/Aaa | Tobacco Settlement Financing Corp., 6.75%, 6/1/39 | 3,641,528 |
| 5,000,000 † | AAA/Aaa | Tobacco Settlement Financing Corp., 7.0%, 6/1/41 | 5,625,200 |
| | | | \$ 36,019,629 |
| 1,730,000 | NR/NR | New York - 9.7% Dutchess County Industrial Development Agency, 7.5%, 3/1/29 | \$ 1,690,591 |
| 3,000,000 | NR/NR | Nassau County New York Industrial Development Agency Revenue, 6.7%, 1/1/43 | 2,814,810 |

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| 5,000,000 | BB-/B1 | New York City Industrial Development Agency, 5.25%, 12/1/32 | 4,070,750 |
| 3,950,000 | BB-/B1 | New York City Industrial Development Agency, 7.625%, 12/1/32 | 3,986,301 |
| 3,000,000 | B-/Caa2 | New York City Industrial Development Agency, 8.0%, 8/1/12 | 3,091,680 |
| 2,000,000 | NR/Ba1 | New York State Dormitory Authority Revenue, 6.125%, 12/1/29 | 1,890,700 |
| 5,000,000 | AAA/Aaa | New York State Environmental Facilities Corp., 5.0%, 6/15/33 | 5,064,050 |
| 2,000,000 | BB/NR | Seneca Nation Indians Capital Improvement Authority Revenue, 5.25%, 12/1/16 (144A) | 1,879,660 |
| 3,000,000 | NR/NR | Ulster County New York Industrial Development Agency, 6.0%, 9/15/27 | 2,481,180 |
| 500,000 | NR/NR | Ulster County New York Industrial Development Agency, 6.0%, 9/15/37 | 382,975 |
| | | | \$ 27,352,697 |
| 5,010,000 | NR/NR | North Carolina - 1.8% Charlotte North Carolina Special Facilities Revenue, 7.75%, 2/1/28 | \$ 4,969,369 |
| 1,635,000 | NR/NR | Ohio - 3.0% Belmont County Health System Revenue, 5.7%, 1/1/13 | \$ 1,282,429 |
| 1,000,000 | NR/NR | Belmont County Health System Revenue, 5.8%, 1/1/18 | 736,200 |
| 5,000,000 | BB-/Baa3 | Buckeye Tobacco Settlement Financing Authority, 6.5%, 6/1/47 | 3,968,950 |
| 3,000,000 | CCC+/B3 | Cleveland Airport Special Revenue, 5.375%, 9/15/27 | 2,588,700 |
| | | | \$ 8,576,279 |
| 2,220,000 | B-/Caa2 | Oklahoma - 2.4% Tulsa Municipal Airport Trust Revenue, 6.25%, 6/1/20 | \$ 2,148,671 |
| 1,500,000 | B-/Caa2 | Tulsa Municipal Airport Trust Revenue, 7.35%, 12/1/11 | 1,503,735 |
| 3,000,000(c) | NR/Caa2 | Tulsa Municipal Airport Trust Revenue, 7.75%, 6/1/35 | 3,095,160 |
| | | | \$ 6,747,566 |
| 2,000,000 | A-/NR | Oregon - 0.7% Oregon State Facilities Authority Revenue, 5.25%, 10/1/40 | \$ 1,973,340 |
| 3,600,000 | CCC/NR | Pennsylvania - 6.2% | \$ 3,097,368 |

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|-----------------|-----------|---|---------------|
| 710,000 | BBB/Baa1 | Columbia County Hospital Authority Revenue, 5.85%, 6/1/24 | 711,243 |
| 1,430,000 | BB/NR | Hazleton Health Services Authority Hospital Revenue, 6.125%, 7/1/16 | 1,299,441 |
| 5,000,000 | B/Caa2 | Pennsylvania Economic Development Financing Authority Revenue, 5.125%, 6/1/18 | 4,301,650 |
| 5,000,000 | BBB/Baa3 | Pennsylvania Economic Development Financing Authority Revenue, 6.0%, 6/1/31 | 4,075,250 |
| 2,005,000 | B-/NR | Philadelphia Hospitals & Higher Education Facilities Authority Revenue, 5.0%, 7/1/34 | 2,004,880 |
| 2,245,000 | B-/NR | Scranton-Lackawanna Health & Welfare Authority Revenue, 6.1%, 7/1/11 | 2,206,543 |
| | | Scranton-Lackawanna Health & Welfare Authority Revenue, 6.15%, 7/1/12 | \$ 17,696,375 |
| 1,375,000(c)(d) | NR/NR | Rhode Island - 3.6% Central Falls Rhode Island Detention Facilities Revenue, 7.25%, 7/15/35 | \$ 1,114,204 |
| 1,500,000 | NR/NR | Rhode Island Health & Educational Building Corp Revenue, 8.375%, 1/1/46 | 1,506,120 |
| 8,285,000 | BBB/Baa3 | Tobacco Settlement Financing Corp., 6.25%, 6/1/42 | 7,502,482 |
| | | | \$ 10,122,806 |
| 7,140,000 † | BBB+/Baa1 | South Carolina - 5.1% South Carolina Jobs Economic Development Authority Revenue, 6.375%, 8/1/34 | \$ 8,000,941 |
| 860,000 † | BBB+/Baa1 | South Carolina Jobs Economic Development Authority Revenue, 6.375%, 8/1/34 | 963,699 |
| 4,400,000(f) | BBB/WR | Tobacco Settlement Revenue Management, 6.375%, 5/15/30 | 5,558,564 |
| | | | \$ 14,523,204 |
| \$ 5,000,000 | BBB+/Baa1 | Tennessee - 5.7% Johnson City Health & Educational Facilities Board Hospital Revenue, 6.5%, 7/1/38 | \$ 5,064,500 |
| 1,000,000 † | NR/A2 | Johnson City Health & Educational Facilities Board Hospital Revenue, 7.5%, 7/1/33 | 1,085,650 |
| 7,000,000 | NR/A1 | Knox County Health Educational & Housing Facilities Board Hospital Revenue, 6.5%, 4/15/31 | 7,245,910 |

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| 3,000,000 | BBB+/NR | Sullivan County Health Educational and Housing Facilities Board Hospital Revenue, 5.25%, 9/1/36 | 2,645,850 |
| | | | \$ 16,041,910 |
| 2,400,000 | BB+/Ba1 | Texas - 15.6% Central Texas Regional Mobility Authority Revenue, 6.75%, 1/1/41 | \$ 2,325,240 |
| 4,095,000 | CCC+/Caa2 | Dallas-Fort Worth International Airport Facilities Improvement Corp., 9.125%, 5/1/29 | 4,021,413 |
| 2,827,399(b)(d) | NR/NR | Gulf Coast Industrial Development Authority, 7.0%, 12/1/36 | 158,334 |
| 10,000,000 | CCC+/B3 | Houston Texas Airport System Special Facilities Revenue, 6.75%, 7/1/29 | 9,930,100 |
| 725,000 | NR/NR | IAH Public Facility Corp., Project Revenue Bonds, Series 2006, 6.0%, 5/1/16 | 674,402 |
| 1,000,000 | NR/NR | IAH Public Facility Corp., Project Revenue Bonds, Series 2006, 6.0%, 5/1/21 | 854,789 |
| 1,350,000 | NR/NR | IAH Public Facility Corp., Project Revenue Bonds, Series 2006, 6.125%, 5/1/26 | 1,107,378 |
| 2,750,000 | AA+/Aa3 | Lower Colorado River Authority, 5.0%, 5/15/31 | 2,757,535 |
| 845,000 | NR/NR | Lubbock Health Facilities Development Corp., 6.5%, 7/1/26 | 764,032 |
| 2,000,000 | NR/NR | Lubbock Health Facilities Development Corp., 6.625%, 7/1/36 | 1,731,080 |
| 9,750,000 | BBB+/A3 | North Texas Tollway Authority Revenue, 5.75%, 1/1/33 | 9,807,720 |
| 1,711,000 | NR/Aaa | Panhandle Regional Housing Finance Corp. Multifamily Housing Revenue, 6.6%, 7/20/31 | 1,787,875 |
| 1,000,000 | BBB-/Baa2 | Richardson Hospital Authority Revenue, 6.0%, 12/1/34 | 972,990 |
| 1,000,000 | NR/NR | Tarrant County Cultural Education Facilities Finance Corp., 8.125%, 11/15/39 | 986,550 |
| 1,500,000 | NR/NR | Tarrant County Cultural Education Facilities Finance Corp., 8.25%, 11/15/44 | 1,485,465 |
| 1,000,000(d) | CC/NR | Texas Midwest Public Facility Corp. Revenue, 9.0%, 10/1/30 | 706,270 |
| 4,700,000 | NR/Ba1 | Tomball Hospital Authority, 6.0%, 7/1/25 | 4,073,255 |
| | | | \$ 44,144,428 |
| 1,600,000 | NR/NR | Utah - 0.5% Spanish Fork Charter School Revenue, 5.7%, 11/15/36 (144A) | \$ 1,260,096 |

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| | | Virginia - 0.8% | |
| 2,000,000 | BBB+/Baa1 | Washington County Industrial Development Authority Revenue, 7.75%, 7/1/38 | \$ 2,233,260 |
| | | Washington - 3.4% | |
| 1,140,000 | BBB/Baa3 | Tobacco Settlement Authority Revenue, 6.5%, 6/1/26 | \$ 1,156,028 |
| 1,500,000 | NR/Baa2 | Washington State Health Care Facilities Authority, 5.5%, 12/1/39 | 1,327,740 |
| 2,000,000 | BBB/Baa2 | Washington State Health Care Facilities Authority, 6.125%, 8/15/37 | 1,925,560 |
| 2,000,000 | BBB/Baa2 | Washington State Health Care Facilities Authority, 6.25%, 8/15/42 | 1,941,180 |
| 5,000,000 | NR/NR | Washington State Housing Finance Commission Nonprofit Revenue Bonds, 5.625%, 1/1/27 | 3,401,350 |
| | | | \$ 9,751,858 |
| | | West Virginia - 0.5% | |
| 1,500,000 | NR/NR | West Virginia Hospital Finance Authority Hospital Revenue, 9.125%, 10/1/41 | \$ 1,530,855 |
| | | Wisconsin - 2.1% | |
| 2,500,000 | NR/NR | Wisconsin Public Finance Authority Continuing Care Retirement Community Revenue, 8.25%, 6/1/46 | \$ 2,489,775 |
| 1,000,000 | NR/NR | Wisconsin State Health & Educational Facilities Authority Revenue, 6.125%, 4/1/24 | 964,520 |
| 1,000,000 | NR/NR | Wisconsin State Health & Educational Facilities Authority Revenue, 6.25%, 4/1/34 | 919,900 |
| 1,500,000 | A+/A1 | Wisconsin State Health & Educational Facilities Authority Revenue, 6.625%, 2/15/39 | 1,587,555 |
| | | | \$ 5,961,750 |
| | | TOTAL TAX-EXEMPT OBLIGATIONS (Cost \$415,799,849) | \$ 417,564,521 |
| | | MUNICIPAL COLLATERALIZED DEBT OBLIGATION - 2.9% of Net Assets | |
| 13,000,000(c)(d) | NR/NR | Non-Profit Preferred Funding Trust I, Series E, 12.0%, 9/15/37 (144A) | \$ 8,157,110 |
| | | TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION | |

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|------------|---|------------------|
| | (Cost \$13,000,000) | \$ 8,157,110 |
| Shares | COMMON STOCK - 0.4% of Net Assets | |
| 110,442(g) | Delta Airlines, Inc. | \$ 1,012,753 |
| | TOTAL COMMON STOCK (Cost \$3,210,349) | \$ 1,012,753 |
| | TOTAL INVESTMENTS IN SECURITIES - 150.7% (Cost \$432,010,198) (h)(i) | \$ 426,734,384 |
| | OTHER ASSETS AND LIABILITIES 2.3% | \$ 6,481,109 |
| | PREFERRED SHARES AT REDEMPTION VALUE, INCLUDING DIVIDENDS PAYABLE - (53.0)% | \$ (150,002,777) |
| | NET ASSETS APPLICABLE TO COMMON SHAREOWNERS - 100.0% | \$ 283,212,716 |

(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 June 30, 2011, the value of these securities amounted to \$37,979,417, or 13.4% of total net assets applicable to common shareowners.

RIB Residual Interest Bonds.

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

WR Withdrawn rating.

† 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 June 30, 2011.

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

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

(d) Indicates a security that has been deemed illiquid. The aggregate cost of illiquid securities is \$30,230,377. The aggregate value is

\$14,465,294, or 5.1% of the total net assets applied to common shareowners.

- (e) Debt obligation initially issued at one coupon which converts to a higher coupon at a specific date.
The rate shown is the coupon rate at June 30, 2011.
- (f) Escrow to maturity.
- (g) Non-income producing.
- (h) The concentration of investments by type of obligation/market sector is as follows:

Insured:

| | |
|--------------|------|
| AGM | 8.3% |
| AMBAC | 2.1 |
| BHAC-CR MBIA | 1.6 |

Revenue Bonds:

| | |
|---------------------------|--------|
| Health Revenue | 33.6 |
| Tobacco Revenue | 10.9 |
| Development Revenue | 10.3 |
| Airport Revenue | 8.8 |
| Other Revenue | 7.4 |
| Pollution Control Revenue | 4.3 |
| Housing Revenue | 2.8 |
| Education Revenue | 2.6 |
| Transportation Revenue | 2.3 |
| Facilities Revenue | 2.2 |
| Water Revenue | 1.9 |
| Power Revenue | 0.5 |
| Gaming Authority Revenue | 0.4 |
| Utilities Revenue* | 0.0 |
| | 100.0% |

*Amount is less than 0.1%

- (i) At June 30, 2011 the net unrealized loss on investments based on cost for federal income tax purposes of \$426,768,587 was as follows:

| | |
|--|---------------|
| Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cost | \$ 34,237,643 |
| Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over value | (34,271,846) |
| Net unrealized loss | \$ (34,203) |

For financial reporting purposes net unrealized loss on investments was \$5,275,814 and cost of investments aggregated \$432,010,198.

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Purchases and sales of securities (excluding temporary cash investments) for the period ended June 30, 2011 aggregated \$17,667,683 and \$15,560,595, 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.

Highest priority is given to Level 1 inputs and lowest priority is given to Level 3.

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 using fair value methods are categorized as Level 3.

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

| | Level 1 | Level 2 | Level 3 | Total |
|--|-------------|---------------|---------|---------------|
| Tax exempt obligations | \$- | \$417,564,521 | \$- | \$417,564,521 |
| Municipal collateralized debt obligation | - | 8,157,110 | - | 8,157,110 |
| Common stock | 1,012,753 | - | - | 1,012,753 |
| Total | \$1,012,753 | \$425,721,631 | \$- | \$426,734,384 |

ITEM 2. CONTROLS AND PROCEDURES.

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

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

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

There were no significant changes in the registrant's internal control over financial reporting that occurred during the second fiscal quarter of the

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period covered by this report that have materially affected, or are reasonably likely to materially affect, the registrant's internal control over financial reporting.

ITEM 3. EXHIBITS.

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

Filed herewith.

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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 August 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 August 29, 2011

By (Signature and Title)* /s/ Mark Bradley
Mark Bradley, Treasurer

Date August 29, 2011

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