

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST

Form N-Q

February 29, 2012

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: December 31, 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.

| Principal<br>Amount<br>USD \$ | S&P / Moody's<br>Ratings |   | Value        |
|-------------------------------|--------------------------|---|--------------|
|                               |                          | TAX-EXEMPT OBLIGATIONS — 141.5% OF NET<br>ASSETS  |              |
|                               |                          | ALABAMA — 1.4%  |              |
| 2,500,000                     | B-/B2                    | Alabama Industrial Development<br>Authority Revenue, 6.45%,<br>12/1/23                            | \$ 2,210,475 |
| 2,500,000                     | NR/NR                    | Huntsville-Redstone Village<br>Special Care Facilities Financing<br>Authority, 5.5%, 1/1/43       | 1,901,325    |
|                               |                          |   | \$ 4,111,800 |
|                               |                          | ARIZONA — 3.4%  |              |
| 5,000,000                     | NR/NR                    | Casa Grande Industrial<br>Development Authority Hospital<br>Revenue, 7.625%, 12/1/29              | \$ 5,003,300 |
| 2,640,000                     | NR/NR                    | Pima County Industrial<br>Development Authority, 7.0%,<br>1/1/38                                  | 2,484,214    |
| 1,492,000                     | NR/Baa3                  | Pima County Industrial<br>Development Authority, 6.75%,<br>7/1/31                                 | 1,465,845    |
| 1,000,000                     | NR/NR                    | San Luis Facility Development<br>Corp., 7.25%, 5/1/27   | 905,270      |
|                               |                          |   | \$ 9,858,629 |
|                               |                          | CALIFORNIA — 13.7%  |              |
| 1,000,000                     | NR/NR                    | California Enterprise<br>Development Authority Recovery<br>Zone Facility Revenue, 8.5%,<br>4/1/31 | \$ 1,046,070 |
| 3,140,000(a)                  | AA+/NR                   | California State University<br>Revenue, RIB, 11.087%, 9/20/28<br>(144A)                           | 3,525,372    |
| 2,425,000                     | A-/A1                    | California State Various Purpose,<br>5.75%, 4/1/31  | 2,717,261    |
| 8,575,000(a)                  | AA+/NR                   | California State Various Purpose,<br>RIB, 11.031%, 7/28/31 (144A)                                 | 9,250,453    |
| 3,000,000                     | BB+/NR                   |   | 3,062,760    |

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|               |          |   |               |
|---------------|----------|---|---------------|
|               |          | California Statewide<br>Communities Development<br>Authority, 7.25%, 10/1/38<br>(144A)                      |               |
| 757,342(b)    | NR/NR    | California Statewide<br>Communities Development<br>Authority, 9.0%, 12/1/38                                 | 7,339         |
| 2,680,000†    | AA+/Aaa  | Golden State Tobacco<br>Securitization Corp., 6.75%,<br>6/1/39  | 2,919,136     |
| 1,500,000     | A-/NR    | Madera Irrigation Financing<br>Authority Water Revenue, 6.5%,<br>1/1/40                                     | 1,612,125     |
| 1,500,000     | A-/NR    | Madera Irrigation Financing<br>Authority Water Revenue,<br>6.25%, 1/1/31                                    | 1,599,000     |
| 2,500,000     | A-/A2    | San Jose California Airport<br>Revenue, 5.0%, 3/1/37  | 2,511,125     |
| 10,500,000(a) | AA+/NR   | University of California, RIB,<br>11.304%, 5/15/32  | 11,255,580    |
|               |          |   | \$ 39,506,221 |
| 1,000,000     | NR/NR    | COLORADO — 0.4%<br>Kremmling Memorial Hospital<br>District, 7.125%, 12/1/45                                 | \$ 1,022,750  |
| 7,750,000     | NR/NR    | CONNECTICUT — 3.1%<br>Connecticut State Development<br>Authority Revenue, 5.75%,<br>11/1/37                 | \$ 7,772,475  |
| 1,000,000     | NR/NR    | Hamden Connecticut Facility<br>Revenue, 7.75%, 1/1/43   | 1,046,610     |
|               |          |   | \$ 8,819,085  |
| 2,700,000     | BBB/Baa1 | DISTRICT OF COLUMBIA — 3.4%<br>District of Columbia Tobacco<br>Settlement Financing Corp.,<br>6.5%, 5/15/33 | \$ 2,844,396  |
| 6,825,000     | BBB/Baa1 | District of Columbia Tobacco<br>Settlement Financing Corp.,<br>6.75%, 5/15/40                               | 6,841,243     |
|               |          |   | \$ 9,685,639  |
| 1,500,000     | NR/NR    | FLORIDA — 5.0%<br>Alachua County Health Facilities<br>Authority Revenue, 8.125%,<br>11/15/41                | \$ 1,499,445  |
| 1,500,000     | NR/NR    | Alachua County Health Facilities<br>Authority Revenue, 8.125%,<br>11/15/46                                  | 1,499,430     |
| 1,000,000     | NR/Ba3   | Capital Trust Agency Revenue<br>Bonds, 7.75%, 1/1/41  | 1,037,050     |

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|              |         |  |               |
|--------------|---------|--|---------------|
| 1,000,000    | NR/NR   | Florida Development Finance Corp., Educational Facilities Revenue, 7.75%, 6/15/42      | 1,001,110     |
| 2,000,000    | NR/NR   | Florida Development Finance Corp., Educational Facilities Revenue, 7.625%, 6/15/41     | 2,059,840     |
| 1,000,000    | NR/NR   | Florida Development Finance Corp., Educational Facilities Revenue, 6.0%, 9/15/40       | 951,400       |
| 1,980,000    | NR/NR   | Hillsborough County Industrial Development Authority Revenue, 6.75%, 7/1/29            | 1,901,236     |
| 1,000,000†   | NR/NR   | Hillsborough County Industrial Development Authority Revenue, 8.0%, 8/15/32            | 1,448,230     |
| 500,000      | NR/NR   | Miami Beach Health Facilities Authority, 5.375%, 11/15/28                              | 489,925       |
| 2,500,000    | A-/A2   | Miami-Dade County Florida Aviation Revenue, 5.5%, 10/1/41                              | 2,649,000     |
|              |         |  | \$ 14,536,666 |
|              |         | GEORGIA — 4.8%   |               |
| 5,210,000(a) | NR/Aa3  | Atlanta Georgia Water and Wastewater Revenue, RIB, 11.087%, 1/30/13 (144A)             | \$ 5,491,809  |
| 1,000,000    | CCC+/NR | Clayton County Development Authority Special Facilities Revenue, 9.0%, 6/1/35          | 1,077,080     |
| 900,000      | NR/NR   | DeKalb County Georgia Hospital Authority Revenue, 6.0%, 9/1/30                         | 947,736       |
| 750,000      | NR/NR   | DeKalb County Georgia Hospital Authority Revenue, 6.125%, 9/1/40                       | 771,495       |
| 1,065,000    | NR/Baa3 | Effingham County Industrial Development Authority, 6.5%, 6/1/31                        | 1,068,685     |
| 3,360,000    | NR/NR   | Fulton County Residential Care Facilities, 7.0%, 7/1/29                                | 2,910,633     |
| 1,650,000    | NR/NR   | Savannah Georgia Economic Development Authority Revenue, 7.4%, 1/1/34                  | 1,586,112     |
|              |         |  | \$ 13,853,550 |
|              |         | GUAM — 2.0%  |               |
| 1,000,000    | B/NR    | Guam Government of Department Education Certificates of Participation, 6.625%, 12/1/30 | \$ 1,029,550  |
| 4,400,000†   | AA+/NR  | Northern Mariana Islands, 6.75%, 10/1/33   | 4,888,312     |

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|--------------|-----------|--|---------------|
|              |           |  | \$ 5,917,862  |
|              |           | IDAHO — 1.2%   |               |
| 2,000,000    | BBB+/Baa1 | Power County Industrial Development Corp., 6.45%, 8/1/32             | \$ 2,001,820  |
| 1,500,000    | BBB+/Baa1 | Power County Pollution Control Revenue, 5.625%, 10/1/14              | 1,500,165     |
|              |           |  | \$ 3,501,985  |
|              |           | ILLINOIS — 6.8%  |               |
| 1,450,000    | A+/A1     | Illinois Finance Authority Revenue, 5.5%, 4/1/39                     | \$ 1,492,645  |
| 2,000,000    | AA-/Aa3   | Illinois Finance Authority Revenue, 6.0%, 8/15/25                    | 2,115,640     |
| 1,000,000(b) | NR/NR     | Illinois Finance Authority Revenue, 6.0%, 11/15/27                   | 519,870       |
| 280,000      | BBB+/NR   | Illinois Finance Authority Revenue, 6.0%, 8/15/38                    | 287,577       |
| 2,000,000    | AA+/Aa2   | Illinois Finance Authority Revenue, 6.0%, 8/15/39                    | 2,217,560     |
| 2,500,000    | NR/NR     | Illinois Finance Authority Revenue, 6.125%, 11/15/25                 | 2,287,250     |
| 6,000,000    | NR/NR     | Illinois Finance Authority Revenue, 8.25%, 5/15/45                   | 5,985,540     |
| 2,500,000    | NR/NR     | Illinois Finance Authority Revenue, 8.25%, 2/15/46                   | 2,520,875     |
| 1,500,000(b) | NR/NR     | Illinois Health Facilities Authority Revenue, 6.9%, 11/15/33         | 524,835       |
| 2,310,000    | NR/NR     | Southwestern Illinois Development Authority Revenue, 5.625%, 11/1/26 | 1,715,937     |
|              |           |  | \$ 19,667,729 |
|              |           | INDIANA — 2.2%   |               |
| 250,000      | NR/Baa3   | East Chicago Indiana Exempt Facilities Revenue, 7.0%, 1/1/14         | \$ 244,310    |
| 5,000,000    | NR/Baa3   | Jasper County Industrial Economic Development Revenue, 5.6%, 4/1/29  | 4,999,550     |
| 1,900,000    | NR/NR     | Vincennes Industrial Economic Development Revenue, 6.25%, 1/1/24     | 1,142,033     |
|              |           |  | \$ 6,385,893  |
|              |           | KANSAS — 0.3%  |               |
| 1,000,000    | NR/A2     | Kansas Development Finance Authority, 5.0%, 5/15/35                  | \$ 1,010,390  |
|              |           | KENTUCKY — 1.4%  |               |
| 4,390,000    | BB/NR     | Kentucky Economic Development Finance Authority                      | \$ 4,104,518  |

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|           |           | Hospital System Revenue,<br>5.875%, 10/1/22  |               |
|           |           | LOUISIANA — 7.1%   |               |
| 5,000,000 | BBB-/Baa2 | Jefferson Parish Hospital Service<br>Revenue, 6.375%, 7/1/41   | \$ 5,130,650  |
| 2,500,000 | BBB-/Baa3 | Louisiana Local Government<br>Environmental Facilities<br>Development Authority Revenue,<br>6.75%, 11/1/32 | 2,639,300     |
| 6,000,000 | NR/Baa1   | Louisiana Public Facilities<br>Authority Revenue, 5.5%,<br>5/15/47   | 6,018,120     |
| 750,000   | BBB-/NR   | Opelousas Louisiana General<br>Hospital Authority Revenue,<br>5.75%, 10/1/23                               | 771,293       |
| 5,915,000 | A-/A3     | Tobacco Settlement Financing<br>Corp., 5.875%, 5/15/39   | 5,917,011     |
|           |           |  | \$ 20,476,374 |
|           |           | MAINE — 0.6%   |               |
| 1,500,000 | NR/Baa3   | Maine Health & Higher<br>Educational Facilities Authority<br>Revenue, 7.5%, 7/1/32                         | \$ 1,663,470  |
|           |           | MARYLAND — 1.6%  |               |
| 460,000   | NR/NR     | Maryland Health & Higher<br>Educational Facilities Authority<br>Revenue, 5.25%, 1/1/27                     | \$ 392,435    |
| 1,250,000 | NR/NR     | Maryland Health & Higher<br>Educational Facilities Authority<br>Revenue, 5.3%, 1/1/37                      | 946,963       |
| 1,250,000 | NR/Baa3   | Maryland Health & Higher<br>Educational Facilities Authority<br>Revenue, 5.75%, 7/1/38                     | 1,166,512     |
| 2,000,000 | NR/NR     | Maryland Health & Higher<br>Educational Facilities Authority<br>Revenue, 6.25%, 1/1/45                     | 2,125,820     |
|           |           |  | \$ 4,631,730  |
|           |           | MASSACHUSETTS — 8.7%   |               |
| 675,000   | BB/NR     | Massachusetts Development<br>Finance Agency, 5.25%, 10/1/18  | \$ 662,175    |
| 1,885,000 | NR/NR     | Massachusetts Development<br>Finance Agency, 7.1%, 7/1/32  | 1,648,904     |
| 8,000,000 | A/NR      | Massachusetts Development<br>Finance Agency, 5.75%, 1/1/42   | 9,173,760     |
| 1,000,000 | NR/Caa1   | Massachusetts Health &<br>Educational Facilities Authority<br>Revenue, 6.0%, 10/1/23                       | 769,280       |
| 2,195,000 | BBB-/Baa3 | Massachusetts Health &<br>Educational Facilities Authority<br>Revenue, 5.375%, 7/15/28                     | 2,126,033     |

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| 3,420,000(b)    | NR/NR   | Massachusetts Health & Educational Facilities Authority Revenue, 6.5%, 1/15/38                     | 34,200        |
| 10,760,000      | AA-/Aa3 | Massachusetts Housing Finance Agency, 5.35%, 12/1/45   | 10,769,361    |
|                 |         |  | \$ 25,183,713 |
|                 |         | MICHIGAN — 1.7%  |               |
| 2,000,000       | NR/Ba1  | Flint Michigan Hospital Building Authority Revenue, 7.375%, 7/1/35                                 | \$ 2,071,640  |
| 2,235,000       | BB+/NR  | Kent Hospital Finance Authority Revenue, Metropolitan Hospital PJ-Series A, 6.25%, 7/1/40          | 2,201,386     |
| 725,000         | NR/NR   | Michigan Public Educational Facilities Authority Revenue, 7.0%, 10/1/36                            | 675,156       |
|                 |         |  | \$ 4,948,182  |
|                 |         | MINNESOTA — 0.4%   |               |
| 1,000,000       | NR/NR   | Port Authority of the City of Bloomington, Minnesota Recovery Zone Facility Revenue, 9.0%, 12/1/35 | \$ 1,033,680  |
|                 |         | MISSOURI — 1.2%  |               |
| 1,000,000       | NR/NR   | Kansas City Tax Increment Financing Commission Tax Increment Revenue, 6.5%, 6/1/25                 | \$ 1,014,840  |
| 1,500,000(b)(c) | NR/Ca   | St. Louis Industrial Development Authority Revenue, 7.2%, 12/15/28                                 | 449,985       |
| 6,640,000(b)(c) | NR/Ca   | St. Louis Industrial Development Authority Revenue, 7.25%, 12/15/35                                | 1,991,934     |
|                 |         |  | \$ 3,456,759  |
|                 |         | MONTANA — 0.7%   |               |
| 2,445,000(d)    | NR/NR   | Hardin Increment Industrial Infrastructure Development Revenue, 0.0%, 9/1/31                       | \$ 1,774,116  |
| 1,000,000(b)(c) | NR/NR   | Two Rivers Authority, Inc., Project Revenue, 7.375%, 11/1/27                                       | 139,810       |
|                 |         |  | \$ 1,913,926  |
|                 |         | NEVADA — 1.5%  |               |
| 1,320,000(b)(c) | NR/NR   | Director of the State of Nevada State Department of Business & Industry, 7.375%, 1/1/40            | \$ 1,584      |
| 1,600,000(b)(c) | NR/NR   | Nevada State Department of Business & Industry, 7.25%,   | 1,920         |

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|-----------------|---------|---|---------------|
|                 |         | 1/1/23  |               |
| 1,000,000(b)(c) | NR/NR   | Nevada State Department of Business & Industry, 7.375%, 1/1/30  | 1,200         |
| 4,500,000       | A-/A3   | Reno Nevada Hospital Revenue, 5.25%, 6/1/41   | 4,433,490     |
|                 |         |   | \$ 4,438,194  |
| 1,125,000       | NR/NR   | NEW HAMPSHIRE — 0.4%<br>New Hampshire Health & Educational Facilities Authority Revenue, 5.875%, 7/1/34 | \$ 1,132,234  |
| 2,500,000       | NR/NR   | NEW JERSEY — 13.1%<br>Burlington County New Jersey Bridge Commission Revenue, 5.625%, 1/1/38            | \$ 2,288,500  |
| 13,000,000      | B/B3    | New Jersey Economic Development Authority Revenue, 6.25%, 9/15/29                                       | 12,532,520    |
| 3,500,000(a)    | NR/Aa3  | New Jersey State Turnpike Authority, RIB, 8.746%, 7/1/23 (144A)   | 5,381,355     |
| 15,375,000      | AA+/Aa1 | New Jersey Transportation Trust Fund Authority Revenue, 0.01%, 12/15/27                                 | 7,546,050     |
| 3,250,000†      | AA+/Aaa | Tobacco Settlement Financing Corp., 6.75%, 6/1/39   | 3,548,642     |
| 5,000,000†      | AA+/Aaa | Tobacco Settlement Financing Corp., 7.0%, 6/1/41  | 5,476,400     |
| 1,000,000†      | AA+/Aaa | Tobacco Settlement Financing Corp., 6.25%, 6/1/43   | 1,084,810     |
|                 |         |   | \$ 37,858,277 |
| 1,730,000       | NR/NR   | NEW YORK — 10.2%<br>Dutchess County Industrial Development Agency, 7.5%, 3/1/29                         | \$ 1,726,090  |
| 3,000,000       | NR/NR   | Nassau County New York Industrial Development Agency Revenue, 6.7%, 1/1/43                              | 2,301,990     |
| 5,000,000       | BB-/B1  | New York City Industrial Development Agency, 5.25%, 12/1/32   | 3,952,050     |
| 3,950,000       | BB-/B1  | New York City Industrial Development Agency, 7.625%, 12/1/32  | 3,906,945     |
| 3,000,000       | NR/C    | New York City Industrial Development Agency, 8.0%, 8/1/12   | 2,735,430     |
| 2,000,000       | NR/Ba1  | New York State Dormitory Authority Revenue, 6.125%,   | 2,015,780     |



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|              |           | 12/1/29  |               |
| 5,000,000    | AAA/Aaa   | New York State Dormitory Authority Revenue,, 5.0%, 10/1/41                                       | 5,609,200     |
| 5,000,000    | AAA/Aaa   | New York State Environmental Facilities Corp., 5.0%, 6/15/33                                     | 5,206,200     |
| 2,000,000    | BB/NR     | Seneca Nation Indians Capital Improvement Authority Revenue, 5.25%, 12/1/16 (144A)               | 1,881,460     |
|              |           |  | \$ 29,335,145 |
| 5,010,000    | NR/NR     | NORTH CAROLINA — 1.7%<br>Charlotte North Carolina Special Facilities Revenue, 7.75%, 2/1/28      | \$ 5,016,613  |
| 5,000,000    | BB-/B3    | OHIO — 1.4%<br>Buckeye Tobacco Settlement Financing Authority, 6.5%, 6/1/47                      | \$ 3,939,100  |
| 2,220,000(b) | NR/NR     | OKLAHOMA — 1.4%<br>Tulsa Municipal Airport Revenue, 6.25%, 6/1/20                                | \$ 1,644,110  |
| 3,000,000(b) | NR/NR     | Tulsa Municipal Airport Trust Revenue, 7.75%, 6/1/35   | 2,269,830     |
|              |           |  | \$ 3,913,940  |
| 2,000,000    | A-/NR     | OREGON — 0.7%<br>Oregon State Facilities Authority Revenue, 5.25%, 10/1/40                       | \$ 2,067,880  |
| 3,600,000    | CC/NR     | PENNSYLVANIA — 5.4%<br>Columbia County Hospital Authority Revenue, 5.85%, 6/1/24                 | \$ 3,413,880  |
| 710,000      | BBB+/Baa3 | Hazleton Health Services Authority Hospital Revenue, 6.125%, 7/1/16                              | 711,384       |
| 1,000,000    | BB/NR     | Pennsylvania Economic Development Financing Authority Revenue, 5.125%, 6/1/18                    | 947,780       |
| 5,000,000    | B-/Caa2   | Pennsylvania Economic Development Financing Authority Solid Waste Disposal Revenue, 6.0%, 6/1/31 | 3,834,600     |
| 5,000,000    | BBB-/Baa3 | Philadelphia Hospitals & Higher Education Facilities Authority Revenue, 5.0%, 7/1/34             | 4,359,150     |
| 2,245,000    | B-/NR     | Scranton-Lackawanna Health & Welfare Authority Revenue, 6.15%, 7/1/12                            | 2,238,445     |
|              |           |  | \$ 15,505,239 |

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| 1,385,000(c)    | NR/NR     | RHODE ISLAND — 3.7%<br>Central Falls Rhode Island<br>Detention Facilities Revenue,<br>7.25%, 7/15/35  | \$ 1,089,081  |
| 1,500,000       | NR/NR     | Rhode Island Health &<br>Educational Building Corp<br>Revenue, 8.375%, 1/1/46   | 1,556,805     |
| 8,285,000       | BBB/B1    | Tobacco Settlement Financing<br>Corp., 6.25%, 6/1/42  | 8,064,785     |
|                 |           |   | \$ 10,710,671 |
| 7,140,000†      | BBB+/Baa1 | SOUTH CAROLINA — 5.1%<br>South Carolina Jobs Economic<br>Development Authority Revenue,<br>6.375%, 8/1/34                                   | \$ 7,791,954  |
| 860,000†        | BBB+/Baa1 | South Carolina Jobs Economic<br>Development Authority Revenue,<br>6.375%, 8/1/34  | 940,685       |
| 4,400,000(e)    | BBB/NR    | Tobacco Settlement Revenue<br>Management, 6.375%, 5/15/30   | 5,908,496     |
|                 |           |   | \$ 14,641,135 |
| 1,000,000†      | NR/A2     | TENNESSEE — 5.8%<br>Johnson City Health &<br>Educational Facilities Board<br>Hospital Revenue, 7.5%, 7/1/33                                 | \$ 1,057,920  |
| 5,000,000       | BBB+/Baa1 | Johnson City Health &<br>Educational Facilities Board<br>Hospital Revenue, Mountain<br>States Health Alliance, 6.5%,<br>7/1/38              | 5,388,700     |
| 7,000,000       | NR/A1     | Knox County Health Educational<br>& Housing Facilities Board<br>Hospital Revenue, Baptist Health<br>System East Tennessee, 6.5%,<br>4/15/31 | 7,197,680     |
| 3,000,000       | BBB+/NR   | Sullivan County Health,<br>Educational & Housing Facilities<br>Board Hospital Revenue, 5.25%,<br>9/1/36                                     | 2,962,980     |
|                 |           |   | \$ 16,607,280 |
| 2,400,000       | BB+/Ba1   | TEXAS — 13.2%<br>Central Texas Regional Mobility<br>Authority Revenue, 6.75%,<br>1/1/41   | \$ 2,403,984  |
| 2,663,453(b)(c) | NR/NR     | Gulf Coast Industrial<br>Development Authority, 7.0%,<br>12/1/36  | 25,782        |
| 10,000,000      | B-/B3     | Houston Texas Airport System<br>Special Facilities Revenue,   | 9,968,500     |

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|                 |           |   |               |
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|                 |           | 6.75%, 7/1/29   |               |
| 1,000,000       | NR/NR     | IAH Public Facility Corp.,<br>Project Revenue Bonds, Series<br>2006, 6.0%, 5/1/21         | 862,380       |
| 1,350,000       | NR/NR     | IAH Public Facility Corp.,<br>Project Revenue Bonds, Series<br>2006, 6.125%, 5/1/26       | 1,116,140     |
| 725,000         | NR/NR     | IAH Public Facility Corp.,<br>Project Revenue Bonds, Series<br>2006, 6.0%, 5/1/16         | 686,611       |
| 510,000         | AA-/Aa3   | Lower Colorado River Authority,<br>5.0%, 5/15/31  | 518,721       |
| 2,240,000       | AA-/Aa3   | Lower Colorado River Authority,<br>5.0%, 5/15/31  | 2,248,310     |
| 2,000,000       | NR/NR     | Lubbock Health Facilities<br>Development Corp., 6.625%,<br>7/1/36                         | 1,889,960     |
| 845,000         | NR/NR     | Lubbock Health Facilities<br>Development Corp., 6.5%, 7/1/26                              | 820,343       |
| 9,750,000       | BBB+/A3   | North Texas Tollway Authority<br>Revenue, 5.75%, 1/1/33                                   | 10,358,595    |
| 1,711,000       | NR/Aaa    | Panhandle Regional Housing<br>Finance Corp. Multifamily<br>Housing Revenue, 6.6%, 7/20/31 | 1,806,628     |
| 1,500,000       | NR/NR     | Red River Health Facilities<br>Development Corp., Revenue,<br>8.0%, 11/15/41              | 1,504,845     |
| 1,000,000       | A/Baa2    | Richardson Hospital Authority<br>Revenue, 6.0%, 12/1/34                                   | 1,013,290     |
| 1,000,000       | NR/NR     | Tarrant County Cultural<br>Education Facilities Finance<br>Corp., 8.125%, 11/15/39        | 1,005,490     |
| 1,500,000       | NR/NR     | Tarrant County Cultural<br>Education Facilities Finance<br>Corp., 8.25%, 11/15/44         | 1,512,255     |
| 1,000,000(b)(c) | D/NR      | Texas Midwest Public Facility<br>Corp., Revenue, 9.0%, 10/1/30                            | 500,820       |
|                 |           |   | \$ 38,242,654 |
|                 |           | VIRGINIA — 0.8%   |               |
| 2,000,000       | BBB+/Baa1 | Washington County Industrial<br>Development Authority Revenue,<br>7.75%, 7/1/38           | \$ 2,291,100  |
|                 |           | WASHINGTON — 3.6%   |               |
| 1,140,000       | BBB/A3    | Tobacco Settlement Authority<br>Revenue, 6.5%, 6/1/26                                     | \$ 1,166,858  |
| 2,000,000       | BBB/Baa2  | Washington State Health Care<br>Facilities Authority, 6.125%,<br>8/15/37                  | 2,046,040     |
| 2,000,000       | BBB/Baa2  | Washington State Health Care<br>Facilities Authority, 6.25%,                              | 2,048,280     |

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|               |         |  |                |
|---------------|---------|--|----------------|
|               |         | 8/15/42  |                |
| 1,500,000     | NR/Baa2 | Washington State Health Care Facilities Authority, 5.5%, 12/1/39   | 1,464,390      |
| 5,000,000     | NR/NR   | Washington State Housing Finance Committee Nonprofit Revenue, 5.625%, 1/1/27                                       | 3,596,250      |
|               |         |  | \$ 10,321,818  |
| 750,000       | NR/NR   | WEST VIRGINIA — 0.3%<br>West Virginia Hospital Finance Authority Hospital Revenue, 9.125%, 10/1/41                 | \$ 816,203     |
| 2,500,000     | NR/NR   | WISCONSIN — 2.1%<br>Wisconsin Public Finance Authority Continuing Care Retirement Community Revenue, 8.25%, 6/1/46 | \$ 2,592,375   |
| 1,500,000     | A+/A1   | Wisconsin State Health & Educational Facilities Authority Revenue, 6.625%, 2/15/39                                 | 1,636,980      |
| 1,000,000     | NR/NR   | Wisconsin State Health & Educational Facilities Authority Revenue, 6.125%, 4/1/24                                  | 1,001,690      |
| 1,000,000     | NR/NR   | Wisconsin State Health & Educational Facilities Authority Revenue, 6.25%, 4/1/34                                   | 973,540        |
|               |         |  | \$ 6,204,585   |
|               |         | TOTAL TAX-EXEMPT OBLIGATIONS<br>(Cost \$393,453,743)   | \$ 408,332,619 |
|               |         | MUNICIPAL COLLATERALIZED DEBT OBLIGATION — 3.1%  |                |
| 13,000,000(c) | NR/NR   | Non-Profit Preferred Funding Trust I, Series E, 12.0%, 9/15/37 (144A)  | \$ 8,924,500   |
|               |         | TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION<br>(Cost \$13,000,000)  | \$ 8,924,500   |
| Shares        |         |  | Value          |
|               |         | COMMON STOCK - OF NET ASSETS — 0.3%<br>TRANSPORTATION — 0.3%<br>AIRLINES — 0.3%                                    |                |
| 110,735(f)    |         | Delta Air Lines, Inc.  | \$ 895,846     |
|               |         | TOTAL COMMON STOCKS<br>(Cost \$3,210,349)  | \$ 895,846     |

|           |       |   |                 |
|-----------|-------|---|-----------------|
|           |       | TAX-EXEMPT MONEY MARKET MUTUAL FUND — 2.1% OF NET ASSETS                    |                 |
| 6,000,000 | NR/NR | BlackRock Liquidity Funds   |                 |
|           |       | MuniFund Portfolio  | \$ 6,000,000    |
|           |       | TOTAL TAX-EXEMPT MONEY MARKET MUTUAL FUND                                   |                 |
|           |       | (Cost \$6,000,000)  | \$ 6,000,000    |
|           |       | TOTAL INVESTMENTS IN SECURITIES — 147.0%                                    |                 |
|           |       | (Cost \$415,664,092)(g)(h)  | \$ 424,152,965  |
|           |       | OTHER ASSETS AND LIABILITIES — 5.0%   | \$ 14,467,215   |
|           |       | PREFERRED SHARES AT REDEMPTION VALUE, INCLUDING DIVIDENDS PAYABLE — (52.0)% | \$(150,004,114) |
|           |       | NET ASSETS APPLICABLE TO COMMON SHAREOWNERS — 100.0%                        | \$ 288,616,066  |

(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 December 31, 2011, the value of these securities amounted to \$37,517,709 or 13.0% of total net assets applicable to common shareowners.

NR Security not rated by 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 interest rate shown is the coupon rate at December 31, 2011.

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

(c) Indicates a security that has been deemed illiquid. The aggregate cost of illiquid securities is \$30,076,785. The aggregate fair value of \$13,126,616 represents 4.5% of the total net assets applicable to common shareowners.

(d) Debt obligation initially issued at one coupon which converts to a higher coupon at a specific date. The rate shown is the rate at December 31, 2011.

(e) Escrow to maturity.

(f) Non-income producing.

(g)

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

Insured:

FSA 8.2%

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|                           |      |
|---------------------------|------|
| AMBAC                     | 2.7  |
| BHAC-CR MBIA              | 1.8  |
| AGM                       | 1.5  |
| Revenue Bonds:            |      |
| Health Revenue            | 36.9 |
| Tobacco Revenue           | 10.3 |
| Other Revenue             | 8.5  |
| Development Revenue       | 7.8  |
| Airport Revenue           | 5.9  |
| Pollution Control Revenue | 4.8  |
| Education Revenue         | 3.7  |
| Housing Revenue           | 2.9  |
| Facilities Revenue        | 2.6  |
| Water Revenue             | 2    |
| Transportation Revenue    | 0.4  |
|                           | 100% |

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

|                           |      |   |
|---------------------------|------|---|
| Insured:                  |      |   |
| FSA                       | 8.2  | % |
| AMBAC                     | 2.7  |   |
| BHAC-CR MBIA              | 1.8  |   |
| AGM                       | 1.5  |   |
| Revenue Bonds:            |      |   |
| Health Revenue            | 36.9 |   |
| Tobacco Revenue           | 10.3 |   |
| Other Revenue             | 8.5  |   |
| Development Revenue       | 7.8  |   |
| Airport Revenue           | 5.9  |   |
| Pollution Control Revenue | 4.8  |   |
| Education Revenue         | 3.7  |   |
| Housing Revenue           | 2.9  |   |
| Facilities Revenue        | 2.6  |   |
| Water Revenue             | 2    |   |
| Transportation Revenue    | 0.4  |   |
|                           | 100  | % |

(h) At  
 December  
 31, 2011,  
 the net  
 unrealized  
 gain on  
 investments

based on  
cost for  
federal  
income  
tax  
purposes  
of  
\$414,302,035  
was as  
follows:

|   |              |
|---|--------------|
| Aggregate gross unrealized gain in which there is an excess of value over tax cost \$ | 39,554,529   |
| Aggregate gross unrealized loss in which there is an excess of tax cost over value    | (29,703,599) |
| Net unrealized gain\$   | 9,850,930    |

For financial reporting purposes net unrealized gain on investments was \$8,488,873 and cost of investments aggregated \$415,664,092.

Purchases and sales of securities (excluding temporary cash investments) for the period ended December 31, 2011 aggregated \$42,120,447 and \$55,310,358, 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 are categorized as Level 3.

The following is a summary of the inputs used as of December 31, 2011, in valuing the Trust's investments:

|  | Level 1 | Level 2       | Level 3 | Total         |
|--|---------|---------------|---------|---------------|
| Tax-exempt obligations                   | \$—     | \$408,332,619 | \$—     | \$408,332,619 |
| Municipal collateralized debt obligation | —       | 8,924,500     | —       | 8,924,500     |

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|                                     |             |               |     |               |
|-------------------------------------|-------------|---------------|-----|---------------|
| Common stock                        | 895,846     | —             | —   | 895,846       |
| Tax-exempt money market mutual fund | 6,000,000   | —             | —   | 6,000,000     |
| Total                               | \$6,895,846 | \$417,257,119 | \$— | \$424,152,965 |

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 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. <PAGE> 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 February 29, 2012 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 February 29, 2012 By (Signature and Title)\* /s/ Mark Bradley Mark Bradley, Treasurer Date February 29, 2012 \* Print the name and title of each signing officer under his or her signature.