

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST
Form N-Q
March 01, 2007

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

FORM N-Q

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)

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, 2006

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 270.30b-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 12/31/06 (unaudited)

| Principal Amount | | Value |
|------------------|--|------------|
| | TAX-EXEMPT OBLIGATIONS - 134.8% of Net Assets | |
| | Alaska - 1.2% | |
| 3,875,000 | (a)Alaska State Housing Finance Corp., RIB, | 4,406,456 |
| | Arizona - 4.1% | |
| 5,000,000 | Casa Grande Industrial Development Autho | 5,551,450 |
| 3,000,000 | (a)Downtown Phoenix Hotel Corp., RIB, 5.30 | 4,432,360 |
| 1,000,000 | Pima County Industrial Development Autho | 1,057,230 |
| 1,560,000 | Pima County Industrial Development Autho | 1,652,804 |
| 1,000,000 | +Pima County Industrial Development Autho | 1,215,590 |
| 2,000,000 | San Luis Facility Development Corp., 7.22 | 2,035,800 |
| | | 14,945,234 |
| | California - 6.5% | |
| 2,680,000 | Golden State Tobacco Securitization Corp | 3,068,386 |
| 9,520,000 | (a)University of California, RIB, 5.706% | 5,118,042 |
| 9,320,000 | Valley Health System Hospital Revenue, | 69,334,353 |
| | | 23,720,781 |
| | Colorado - 1.9% | |
| 2,850,000 | Denver Health & Hospital Authority Healt | 3,044,398 |
| 3,520,000 | Northwest Parkway Public Highway Authori | 3,690,122 |
| | | 6,734,520 |
| | District of Columbia - 2.1% | |
| 2,700,000 | District of Columbia Tobacco Settlement | 3,241,512 |
| 4,000,000 | District of Columbia Tobacco Settlement | 4,390,680 |
| | | 7,632,192 |
| | Florida - 5.6% | |
| 1,000,000 | Greater Orlando Aviation Authority, 6.5% | 1,059,540 |
| 4,500,000 | Hillsborough County Florida Industrial Development Authority | |
| | Pollution Control Revenue, 5.5%, 10/1/23 | 4,695,255 |
| 2,000,000 | Hillsborough County Florida Industrial Development Authority | |
| | Pollution Control Revenue, 6.75%, 7/1/29 | 2,054,100 |
| 500,000 | Miami Beach Health Facilities Authority, | 507,915 |
| 1,500,000 | Miami Beach Health Facilities Authority, | 1,649,940 |
| 10,000,000 | Miami-Dade County Aviation Revenue, 5.0% | 10,475,700 |
| | | 20,442,450 |
| | Georgia - 2.1% | |
| 4,000,000 | (a)Atlanta Georgia Water and Wastewater Rev | 4,631,520 |
| 1,065,000 | Effingham County Industrial Development | 1,129,667 |
| 1,650,000 | Savannah Georgia Economic Development Au | 1,816,601 |
| | | 7,577,788 |
| | Guam - 1.5% | |
| 5,000,000 | Northern Mariana Islands, 6.75%, 10/1/33 | 5,596,150 |
| | Idaho - 2.3% | |
| 2,000,000 | Power County Industrial Development Corp | 2,127,820 |
| 5,920,000 | Power County Pollution Control Revenue, | 6,085,168 |
| | | 8,212,988 |
| | Illinois - 6.1% | |

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| | | |
|------------|--|------------|
| 4,000,000 | Centerpoint Intermodal Center, 8.0%, 6/14, | 115,240 |
| 1,000,000 | Illinois Finance Authority Revenue, 5.1% | 1,019,760 |
| 1,100,000 | Illinois Finance Authority Revenue, 5.5% | 1,127,027 |
| 1,850,000 | Illinois Finance Authority Revenue, 5.75% | 1,926,923 |
| 1,000,000 | Illinois Finance Authority Revenue, 6.0% | 1,056,370 |
| 3,000,000 | Illinois Finance Authority Revenue, 6.0% | 3,140,880 |
| 1,645,000 | Illinois Health Facilities Authority Rev1, | 661,680 |
| 1,400,000 | Illinois Health Facilities Authority Rev1, | 400,350 |
| 2,400,000 | Illinois Health Facilities Authority Rev2, | 400,096 |
| 1,500,000 | Illinois Health Facilities Authority Rev1, | 661,790 |
| 2,700,000 | Southwestern Illinois Development Author2, | 740,527 |
| | | 22,250,643 |
| | Indiana - 4.9% | |
| 10,000,000 | Indiana State Development Finance Author10, | 377,300 |
| 5,000,000 | Jasper County Industrial Economic Develo5, | 056,000 |
| 2,315,000 | Vincennes Industrial Economic Developmen2, | 332,802 |
| | | 17,766,102 |
| | Kentucky - 1.4% | |
| 500,000 | Kentucky Economic Development Finance Au508, | 325 |
| 4,400,000 | Kentucky Economic Development Finance Au4, | 476,296 |
| | | 4,984,621 |
| | Louisiana - 3.0% | |
| 750,000 | Opelousas Louisiana General Hospital Aut799, | 125 |
| 9,415,000 | Tobacco Settlement Financing Corp., 5.87% | 10,087,984 |
| | | 10,887,109 |
| | Maryland - 0.5% | |
| 710,000 | Maryland Health & Higher Educational Fac708, | 253 |
| 1,250,000 | Maryland Health & Higher Educational Fac1, | 233,350 |
| | | 1,941,603 |
| | Massachusetts - 9.0% | |
| 1,000,000 | Lynn Massachusetts Water & Sewer Commiss1, | 056,820 |
| 5,000,000 | Massachusetts Bay Transportation Authori5, | 674,800 |
| 5,000,000 | Massachusetts Bay Transportation Authori5, | 858,000 |
| 2,195,000 | Massachusetts Health & Educational Facil2, | 217,828 |
| 1,000,000 | Massachusetts Health & Educational Faci11, | 081,220 |
| 3,520,000 | (a)Massachusetts State College Building Aut4, | 176,586 |
| 900,000 | Massachusetts State Development Finance 892, | 917 |
| 2,920,000 | Massachusetts State Development Finance 2, | 985,846 |
| 4,710,000 | Massachusetts State Development Finance 4, | 922,751 |
| 3,335,000 | (a)Massachusetts State Housing Finance Agen3, | 571,218 |
| | | 32,437,986 |
| | Michigan - 5.1% | |
| 1,650,000 | Crescent Academy Project, 5.75%, 12/1/361, | 635,942 |
| 3,000,000 | +Delta County Michigan Economic Developme3, | 369,180 |
| 3,000,000 | Macomb County Hospital Finance Authority3, | 185,040 |
| 4,130,000 | Michigan State Hospital Finance Authorit4, | 103,031 |
| 1,000,000 | Michigan State Strategic Fund Solid Wast1, | 023,140 |
| 3,000,000 | (b)Wayne Charter County Michigan Special Ai2, | 353,680 |
| 3,405,000 | (b)Wayne Charter County Michigan Special Ai2, | 774,360 |
| | | 18,444,373 |
| | Missouri - 0.9% | |
| 1,500,000 | St. Louis Industrial Development Authori1, | 444,665 |
| 1,840,000 | St. Louis Industrial Development Authori1, | 771,589 |
| | | 3,216,254 |
| | Montana - 0.7% | |
| 2,445,000 | (c)Hardin Increment Industrial Infrastructur1, | 606,585 |
| 1,000,000 | Two Rivers Authority, Inc., Project Reve1, | 029,870 |
| | | 2,636,455 |
| | Nevada - 2.2% | |
| 2,425,000 | Clark County Industrial Development Reve2, | 424,806 |
| 2,500,000 | Clark County Industrial Development Reve2, | 501,050 |
| 1,600,000 | Nevada State Department of Business & In1, | 701,264 |

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|------------|--|------------|
| 1,000,000 | Nevada State Department of Business & In | 1,066,700 |
| 370,000 | Nevada State Department of Business & In | 394,679 |
| | | 8,088,499 |
| | New Hampshire - 1.5% | |
| 1,000,000 | New Hampshire Health & Educational Facill | 1,054,460 |
| 1,125,000 | New Hampshire Health & Educational Facill | 1,188,934 |
| 3,000,000 | +New Hampshire Higher Educational & Healt | 3,125,670 |
| | | 5,369,064 |
| | New Jersey - 8.9% | |
| 13,000,000 | New Jersey Economic Development Authorit | 13,413,660 |
| 2,500,000 | New Jersey Health Care Facilities Financ | 2,617,150 |
| 1,420,000 | New Jersey Health Care Facilities Financ | 1,422,215 |
| 2,495,000 | (aNew Jersey State Turnpike Authority, RIB | 4,152,179 |
| 1,000,000 | Tobacco Settlement Financing Corp., 6.25 | 1,117,050 |
| 3,250,000 | Tobacco Settlement Financing Corp., 6.75 | 3,723,168 |
| 5,000,000 | Tobacco Settlement Financing Corp., 7.0% | 5,797,750 |
| | | 32,243,172 |
| | New York - 10.6% | |
| 3,000,000 | Dutchess County Industrial Development A | 3,342,030 |
| 5,000,000 | Nassau County New York Industrial Develo | 5,201,300 |
| 6,980,000 | New York City Industrial Development Age | 6,891,075 |
| 2,000,000 | New York City Industrial Development Age | 2,098,500 |
| 2,000,000 | New York City Industrial Development Age | 2,021,200 |
| 3,950,000 | New York City Industrial Development Age | 4,434,981 |
| 2,600,000 | New York City Industrial Development Age | 2,633,176 |
| 5,000,000 | New York State Environmental Facilities | 5,250,200 |
| 4,500,000 | Suffolk County New York Industrial Devel | 4,657,095 |
| 2,000,000 | Yonkers Industrial Development Agency Ci | 2,011,660 |
| | | 38,541,217 |
| | North Carolina - 5.9% | |
| 11,350,000 | Charlotte North Carolina Special Facilit | 11,473,147 |
| 7,140,000 | Charlotte North Carolina Special Facilit | 7,630,232 |
| 2,000,000 | North Carolina Capital Facilities Financ | 2,111,580 |
| | | 21,214,959 |
| | Ohio - 2.7% | |
| 3,800,000 | Belmont County Health System Revenue, 5.3 | 3,745,090 |
| 1,000,000 | Belmont County Health System Revenue, 5.9 | 77,760 |
| 5,000,000 | Cleveland Airport Special Revenue, 5.37 | 5,046,050 |
| | | 9,768,900 |
| | Oklahoma - 1.0% | |
| 2,045,000 | Jackson County Memorial Hospital Authori | 2,055,900 |
| 1,500,000 | Tulsa Municipal Airport Transportation R | 1,505,280 |
| | | 3,561,180 |
| | Pennsylvania - 7.1% | |
| 3,000,000 | Allegheny County Hospital Development Au | 3,572,250 |
| 500,000 | Allegheny County Hospital Development Au | 594,385 |
| 1,000,000 | Clarion County Hospital Authority Revenu | 1,015,960 |
| 3,600,000 | Columbia County Hospital Authority Reven | 3,359,304 |
| 3,200,000 | Delaware County Industrial Development A | 2,595,040 |
| 1,250,000 | Hazleton Health Services Authority Hospil | 1,253,575 |
| 3,360,000 | Montgomery County Higher Education & Hea | 3,430,661 |
| 1,430,000 | Pennsylvania Economic Development Financ | 1,413,512 |
| 1,805,000 | Pennsylvania Economic Development Financ | 1,811,534 |
| 2,330,000 | Pennsylvania Economic Development Financ | 2,339,064 |
| 2,005,000 | Scranton-Lackawanna Health & Welfare Aut | 2,055,987 |
| 2,245,000 | Scranton-Lackawanna Health & Welfare Aut | 2,302,090 |
| | | 25,743,362 |
| | Rhode Island - 3.9% | |
| 4,485,000 | Central Falls Rhode Island Detention Fac | 5,041,319 |
| 8,285,000 | Tobacco Settlement Financing Corp., 6.25 | 8,944,403 |
| | | 13,985,722 |
| | South Carolina - 5.8% | |

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|------------|---|-------------|
| 1,500,000 | Connector 2000 Association, Inc., Toll R | 1,339,680 |
| 1,600,000 | Loris Community Hospital District, 5.625 | 1,655,232 |
| 7,140,000 | +South Carolina Jobs Economic Development | 8,229,421 |
| 860,000 | +South Carolina Jobs Economic Development | 985,818 |
| 3,000,000 | +South Carolina Jobs Economic Development | 3,451,230 |
| 4,400,000 | Tobacco Settlement Revenue Management, | 65,156,096 |
| | | 20,817,477 |
| | Tennessee - 2.4% | |
| 1,000,000 | Johnson City Health & Educational Facili | 1,167,270 |
| 7,000,000 | Knox County Health Educational & Housing | 7,553,280 |
| | | 8,720,550 |
| | Texas - 16.8% | |
| 11,300,000 | Alliance Airport Authority Special Facill | 11,526,000 |
| 8,650,000 | Brazos River Authority Pollution Control | 9,720,610 |
| 7,350,000 | Gulf Coast Industrial Development Author | 7,578,806 |
| 10,000,000 | Houston Texas Airport System Revenue, 6.10 | 10,757,300 |
| 1,000,000 | IAH Public Facility Corp., 6.0%, 5/1/16 | 998,210 |
| 1,000,000 | IAH Public Facility Corp., 6.0%, 5/1/21 | 975,250 |
| 1,350,000 | IAH Public Facility Corp., 6.125%, 5/1/21 | 1,310,904 |
| 845,000 | Lubbock Health Facilities Development Co | 884,952 |
| 2,000,000 | Lubbock Health Facilities Development Co | 2,100,980 |
| 7,750,000 | Matagorda County Navigation District Num | 7,983,740 |
| 1,885,000 | (b)Panhandle Texas Regional Housing Finance | 188,538 |
| 5,000,000 | Tomball Hospital Authority, 6.0%, 7/1/25 | 5,208,500 |
| 1,500,000 | Willacy County Local Government Corp., | 61,524,225 |
| | | 60,758,015 |
| | Utah - 0.4% | |
| 1,600,000 | Spanish Fork Charter School Revenue, 5.71 | 1,601,552 |
| | Virginia - 0.4% | |
| 1,555,000 | +Pocahontas Parkway Association of Virgin | 1,626,266 |
| | Washington - 5.7% | |
| 5,000,000 | Port Seattle Washington Special Faciliti | 5,183,600 |
| 5,500,000 | (b)Port Seattle Washington Special Faciliti | 5,460,015 |
| 1,385,000 | Tobacco Settlement Authority Revenue, 6.1 | 1,525,467 |
| 6,960,000 | (a)Washington State Economic Development | 8,404,757 |
| | | 20,573,839 |
| | Wisconsin - 0.6% | |
| 1,000,000 | Wisconsin State Health & Educational Faci | 1,056,450 |
| | Revenue, 6.125%, 4/1/24 | |
| 1,000,000 | Wisconsin State Health & Educational Facilities Authority | |
| | Revenue, 6.25%, 4/1/34 | 1,059,160 |
| | | 2,115,610 |
| | TOTAL TAX-EXEMPT OBLIGATIONS | |
| | (Cost \$435,391,184) | 488,563,089 |
| | MUNICIPAL COLLATERALIZED DEBT OBLIGATION - 3.6% of Net Assets | |
| 13,000,000 | Non-Profit Preferred Funding Trust I, Se | 12,974,650 |
| | TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION | |
| | (Cost \$13,000,000) | 12,974,650 |
| Shares | TAX-EXEMPT MONEY MARKET MUTUAL FUND - 0.0% of Net Assets | |
| 4,386 | BlackRock Provident Institutional Munici | 4,386 |
| | TOTAL TAX-EXEMPT MONEY MARKET MUTUAL FUND | |
| | (Cost \$4,386) | 4,386 |
| | TOTAL INVESTMENTS IN SECURITIES - 138.4% | |
| | (Cost \$448,395,570) (d) (e) | 501,542,125 |
| | OTHER ASSETS AND LIABILITIES - 3.0% | 10,927,744 |

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PREFERRED SHARES AT REDEMPTION VALUE,
 INCLUDING DIVIDENDS PAYABLE - (41.4)% (150,090,489)
 NET ASSETS APPLICABLE TO COMMON SHAREOWNERS 362,379,380

(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, 2006, the value of these securities amounted to \$49,265,588, or 13.6% of total net assets applicable to common shareowners.

RIB Residual Interest Bonds.

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

+ Prerefunded bonds have been collateralized by U.S. Treasury 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 rate at December 31, 2006.

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

(c) 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, 2006.

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

| | | |
|---------------------------|-------|---|
| Insured | 13.0 | % |
| General Obligation | 3.7 | |
| Revenue Bonds: | | |
| Health Revenue | 24.9 | |
| Airport Revenue | 13.6 | |
| Development Revenue | 11.3 | |
| Tobacco Revenue | 9.4 | |
| Transportation Revenue | 8.0 | |
| Facilities Revenue | 5.8 | |
| Pollution Control Revenue | 5.6 | |
| Education Revenue | 1.5 | |
| Other Revenue | 1.4 | |
| Water Revenue | 1.0 | |
| Housing Revenue | 0.8 | |
| Power Revenue | 0.0 | |
| | 100.0 | % |

(e) At December 31, 2006, the net unrealized gain on investments based on cost for federal income tax purposes of \$445,623,386 was as follows:

Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cost \$ 58,495,195

Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over value (2,576,456)
 Net unrealized gain \$ 55,918,739

For financial reporting purposes net unrealized gain on

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investments was \$53,146,555
and cost of investments aggregated \$448,395,570.

ITEM 2. 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-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 their 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 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

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Date March 1, 2007

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 March 1, 2007

By (Signature and Title)* /s/ Vincent Nave
Vincent Nave, Treasurer

Date March 1, 2007

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