

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST

Form N-Q

August 26, 2008

OMB APPROVAL

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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: June 30, 2008

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.

Principal Amount (\$)	Pioneer Municipal High Income Advantage Trust SCHEDULE OF INVESTMENTS 6/30/08 (unaudited)	Value (\$)
	TAX-EXEMPT OBLIGATIONS - 140.3% of Net Assets	
	Arizona - 4.3%	
5,000,000	Casa Grande Industrial Development Authority, Hospital	5,000,500
1,000,000	Pima County Industrial Development Authority, 6.3%, 7/1	972,810
1,551,000	Pima County Industrial Development Authority, 6.75%, 7/	1,561,841
2,640,000	Pima County Industrial Development Authority, 7.0%, 1/1	2,492,978
1,000,000	+ Pima County Industrial Development Authority, 7.5%, 7/1	1,183,970
2,000,000	San Luis Facility Development Corp., 7.25%, 5/1/27	1,794,020
	13,006,119	
	California - 11.1%	
2,680,000	+ Golden State Tobacco Securitization Corp., 6.75%, 6/1/3	3,036,467
8,170,000	(a)Lehman Municipal Trust Receipts, RIB, 11.121%, 6/1/37 (	8,326,864
3,140,000	(a)Lehman Municipal Trust Receipts, RIB, 11.451%, 11/1/39	3,299,606
2,500,000	San Jose California Airport Revenue, 5.0%, 3/1/37	2,433,000
9,520,000	(a)University of California, RIB, 11.757%, 5/15/38 (144A)	9,745,814
9,015,000	Valley Health System Hospital Revenue, 6.875%, 5/15/23	6,610,699
	33,452,450	
	Colorado - 2.3%	
2,850,000	+ Denver Health & Hospital Authority Healthcare Revenue,	3,105,103
3,520,000	+ Northwest Parkway Public Highway Authority, 7.125%, 6/1	3,940,253
	7,045,356	
	District of Columbia - 2.2%	
2,700,000	District of Columbia Tobacco Settlement Financing Corp.	2,594,754
4,000,000	District of Columbia Tobacco Settlement Financing Corp.	4,010,360
	6,605,114	
	Florida - 5.5%	
1,000,000	Greater Orlando Aviation Authority, 6.5%, 11/15/36	706,750
4,500,000	Hillsborough County Florida Industrial Development Authority	
Pollution	Control Revenue, 5.5%, 10/1/23	4,408,650
1,980,000	Hillsborough County Florida Industrial Development Authority	
Pollution	Control Revenue, 6.75%, 7/1/29	1,923,827
6,890,000	(a)Lehman Municipal Trust Receipts, RIB, 11.619%, 7/1/37 (	7,456,565
500,000	Miami Beach Health Facilities Authority, 5.375%, 11/15/	434,640
1,500,000	Miami Beach Health Facilities Authority, 6.7%, 11/15/19	1,529,250
	16,459,682	
	Georgia - 7.0%	
4,000,000	(a)Atlanta Georgia Water and Wastewater Revenue, RIB, 11.9	3,977,440
1,065,000	Effingham County Industrial Development Authority, 6.5%	979,395
3,360,000	Fulton County Residential Care Facilities, 7.0%, 7/1/29	2,850,086
7,500,000	Main Street Natural Gas, Inc., Gas Project Revenue Bond	7,153,800
4,500,000	Main Street Natural Gas, Inc., Gas Project Revenue Bond	4,317,300
1,650,000	Savannah Georgia Economic Development Authority Revenue	1,694,781
	20,972,802	
	Guam - 2.7%	
3,000,000	Northern Mariana Islands, 5.0%, 6/1/30	2,459,760
4,600,000	+ Northern Mariana Islands, 6.75%, 10/1/33	5,234,708
400,000	Northern Mariana Islands, 6.75%, 10/1/33	405,932
	8,100,400	
	Idaho - 2.6%	
2,000,000	Power County Industrial Development Corp., 6.45%, 8/1/3	1,992,580

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5,920,000	Power County Pollution Control Revenue, 5.625% 10/1/14	5,948,179
		7,940,759
	Illinois - 5.9%	
4,000,000	Centerpoint Intermodal Center, 8.0%, 6/15/23 (144A)	3,699,640
1,100,000	Illinois Finance Authority Revenue, 5.5%, 5/15/26	964,590
2,350,000	Illinois Finance Authority Revenue, 5.75%, 5/15/38	2,003,211
1,000,000	Illinois Finance Authority Revenue, 6.0%, 11/15/27	922,540
3,000,000	Illinois Finance Authority Revenue, 6.0%, 11/15/39	2,658,450
2,500,000	Illinois Finance Authority Revenue, 6.125%, 11/15/25	2,330,450
1,645,000	Illinois Health Facilities Authority Revenue, 5.5%, 11/	1,489,449
1,500,000	Illinois Health Facilities Authority Revenue, 6.9%, 11/	1,288,950
2,700,000	Southwestern Illinois Development Authority Revenue, 5.	2,384,235
		17,741,515
	Indiana - 5.3%	
10,000,000	Indiana State Development Finance Authority Revenue, 5.10	120,000
5,000,000	Jasper County Industrial Economic Development Revenue,	3,945,950
2,170,000	Vincennes Industrial Economic Development Revenue, 6.25	1,967,843
		16,033,793
	Kentucky - 1.5%	
500,000	Kentucky Economic Development Finance Authority Hospita	496,105
4,400,000	Kentucky Economic Development Finance Authority Hospita	4,059,968
		4,556,073
	Louisiana - 4.0%	
2,500,000	Louisiana Local Government Environmental Facilities Dev	2,490,225
750,000	Opelousas Louisiana General Hospital Authority Revenue,	760,920
9,415,000	Tobacco Settlement Financing Corp., 5.875%, 5/15/39	8,728,552
		11,979,697
	Maryland - 0.5%	
710,000	Maryland Health & Higher Educational Facilities Authori	602,733
1,250,000	Maryland Health & Higher Educational Facilities Authori	1,007,050
		1,609,783
	Massachusetts - 4.8%	
2,195,000	Massachusetts Health & Educational Facilities Authority	2,048,308
1,000,000	+ Massachusetts Health & Educational Facilities Authority	1,117,140
900,000	Massachusetts State Development Finance Agency, 5.25%,	807,318
2,920,000	Massachusetts State Development Finance Agency, 6.0%, 1	2,743,720
4,540,000	Massachusetts State Development Finance Agency, 7.1%, 7	4,574,005
3,335,000	(a)Massachusetts State Housing Finance Agency, RIB, 11.947	3,097,481
		14,387,972
	Michigan - 3.9%	
1,650,000	Crescent Academy Project Full Term Certificates of Part	1,237,203
1,500,000	+ Delta County Michigan Economic Development Corp., 6.25%	1,651,740
3,000,000	Macomb County Hospital Finance Authority Revenue, 5.875	2,755,140
4,130,000	Michigan State Hospital Finance Authority Revenue, 5.5%	3,784,071
1,000,000	Michigan State Strategic Fund Solid Waste Disposal Reve	1,006,570
1,470,000	Star International Academy Full Term Certificates of Pa	1,316,606
		11,751,330
	Missouri - 3.0%	
1,850,000	Kansas City Industrial Development Authority Revenue, 5	1,625,281
1,500,000	St. Louis Industrial Development Authority Revenue, 7.2	1,374,450
6,640,000	St. Louis Industrial Development Authority Revenue, 7.2	6,096,250
		9,095,981
	Montana - 0.8%	
2,445,000	(b)Hardin Increment Industrial Infrastructure Development	1,541,988
1,000,000	Two Rivers Authority, Inc., Project Revenue, 7.375%, 11	725,590
		2,267,578
	Nevada - 1.0%	
2,425,000	Clark County Industrial Development Revenue, 5.5%, 10/1	2,090,617
1,600,000	Nevada State Department of Business & Industry, 7.25%,	477,984
1,000,000	Nevada State Department of Business & Industry, 7.375%,	298,660
70,000	Nevada State Department of Business & Industry, 7.375%,	20,907
		2,888,168

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	New Hampshire - 0.6%	
1,000,000	New Hampshire Health & Educational Facilities Authority	864,120
1,125,000	New Hampshire Health & Educational Facilities Authority	1,081,586
		1,945,706
	New Jersey - 9.4%	
2,500,000	Burlington County New Jersey Bridge Commission Revenue,	2,246,575
13,000,000	New Jersey Economic Development Authority Revenue, 6.25	9,639,630
2,500,000	New Jersey Health Care Facilities Financing Authority R	2,345,025
2,495,000	(a)New Jersey State Turnpike Authority, RIB, 15.746%, 1/1/	3,389,383
1,000,000	+ Tobacco Settlement Financing Corp., 6.25%, 6/1/43	1,122,680
3,250,000	+ Tobacco Settlement Financing Corp., 6.75%, 6/1/39	3,721,543
5,000,000	+ Tobacco Settlement Financing Corp., 7.0%, 6/1/41	5,779,000
		28,243,836
	New York - 9.3%	
3,000,000	Dutchess County Industrial Development Agency Revenue,	3,190,590
1,000,000	Nassau County New York Industrial Development Agency Re	999,730
6,980,000	New York City Industrial Development Agency, 5.25%, 12/	4,327,460
2,000,000	New York City Industrial Development Agency, 5.375%, 6/	1,881,560
2,000,000	New York City Industrial Development Agency, 6.9%, 8/1/	959,980
3,950,000	New York City Industrial Development Agency, 7.625%, 12	3,397,158
2,300,000	New York City Industrial Development Agency, 7.8%, 1/1/	2,303,059
5,000,000	New York State Environmental Facilities Corp., 5.0%, 6/	5,058,950
4,500,000	Suffolk County New York Industrial Development Agency,	3,525,210
500,000	Ulster County New York Industrial Development Agency, 6	445,995
2,000,000	Yonkers Industrial Development Agency Civic Facilities	1,986,520
		28,076,212
	North Carolina - 4.7%	
11,350,000	Charlotte North Carolina Special Facilities Revenue, 5.	7,867,025
7,140,000	Charlotte North Carolina Special Facilities Revenue, 7.	6,324,255
		14,191,280
	Ohio - 2.2%	
3,800,000	Belmont County Health System Revenue, 5.7%, 1/1/13	3,745,318
1,000,000	Belmont County Health System Revenue, 5.8%, 1/1/18	922,940
3,000,000	Cleveland Airport Special Revenue, 5.375%, 9/15/27	1,993,800
		6,662,058
	Oklahoma - 1.7%	
1,875,000	Jackson County Memorial Hospital Authority Revenue, 7.3	1,883,663
2,220,000	Tulsa Municipal Airport Transportation Revenue, 6.25%,	1,765,233
1,500,000	Tulsa Municipal Airport Transportation Revenue, 7.35%,	1,432,560
		5,081,456
	Pennsylvania - 9.2%	
3,000,000	+ Allegheny County Hospital Development Authority Revenue	3,486,240
500,000	+ Allegheny County Hospital Development Authority Revenue	581,040
1,000,000	Clarion County Hospital Authority Revenue, 5.625%, 7/1/	1,001,800
3,600,000	Columbia County Hospital Authority Revenue, 5.85%, 6/1/	3,099,096
3,110,000	(c)Delaware County Industrial Development Authority Revenue	2,379,865
1,050,000	Hazleton Health Services Authority Hospital Revenue, 6.	1,045,737
2,415,000	Montgomery County Higher Education & Health Authority H	2,419,733
1,430,000	Pennsylvania Economic Development Financing Authority R	1,299,799
1,805,000	Pennsylvania Economic Development Financing Authority R	1,782,311
2,330,000	Pennsylvania Economic Development Financing Authority R	2,288,643
5,000,000	Philadelphia Hospitals & Higher Education Facilities Au	4,207,450
2,005,000	Scranton-Lackawanna Health & Welfare Authority Revenue,	1,999,587
2,245,000	Scranton-Lackawanna Health & Welfare Authority Revenue,	2,237,143
		27,828,444
	Rhode Island - 4.1%	
4,485,000	Central Falls Rhode Island Detention Facilities Revenue	4,543,754
8,285,000	Tobacco Settlement Financing Corp., 6.25%, 6/1/42	7,819,052
		12,362,806
	South Carolina - 6.6%	
1,500,000	Connector 2000 Association, Inc., Toll Road Revenue, 5.	964,155
1,600,000	Loris Community Hospital District, 5.625%, 1/1/29	1,574,208

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7,140,000	+	South Carolina Jobs Economic Development Authority Reve	8,069,771
860,000	+	South Carolina Jobs Economic Development Authority Reve	969,426
3,000,000	+	South Carolina Jobs Economic Development Authority Reve	3,393,720
4,400,000	(d)	Tobacco Settlement Revenue Management, 6.375%, 5/15/30	4,970,196
			19,941,476
		Tennessee - 2.8%	
1,000,000	+	Johnson City Health & Educational Facilities Board Hosp	1,173,890
7,000,000		Knox County Health Educational & Housing Facilities Boa	7,201,670
			8,375,560
		Texas - 14.6%	
8,650,000		Brazos River Authority Pollution Control Revenue, 6.75%	7,138,672
4,000,000		Brazos River Authority Pollution Control Revenue, 7.7%	3,760,200
7,350,000		Gulf Coast Industrial Development Authority, 7.0%, 12/1	6,482,773
10,000,000		Houston Texas Airport System Special Facilities Revenue	7,893,500
1,000,000		IAH Public Facility Corp., Project Revenue Bonds, Serie	940,920
1,000,000		IAH Public Facility Corp., Project Revenue Bonds, Serie	909,010
1,350,000		IAH Public Facility Corp., Project Revenue Bonds, Serie	1,202,877
845,000		Lubbock Health Facilities Development Corp., 6.5%, 7/1/	814,665
2,000,000		Lubbock Health Facilities Development Corp., 6.625%, 7/	1,931,020
7,750,000		Matagorda County Navigation District Number 1 Revenue,	6,985,075
5,000,000		Tomball Hospital Authority, 6.0%, 7/1/25	5,021,750
810,000	(d)	Willacy County Local Government Corp., 6.0%, 3/1/09	830,039
			43,910,501
		Utah - 0.5%	
1,600,000		Spanish Fork Charter School Revenue, 5.7%, 11/15/36 (14	1,369,920
		Washington - 4.7%	
5,500,000		Port Seattle Washington Special Facilities Revenue, 7.2	4,587,055
1,290,000		Tobacco Settlement Authority Revenue, 6.5%, 6/1/26	1,304,474
2,000,000		Washington State Health Care Facilities Authority, 6.12	1,899,840
2,000,000		Washington State Health Care Facilities Authority, 6.25	1,922,580
5,000,000		Washington State Housing Finance Commission Nonprofit R	4,490,900
			14,204,849
		Wisconsin - 1.5%	
3,000,000		Aztalan Wisconsin Exempt Facilities Revenue, 7.50%, 5/1	2,532,660
1,000,000		Wisconsin State Health & Educational Facilities Authori	964,680
1,000,000		Wisconsin State Health & Educational Facilities Authori	927,740
			4,425,080
		TOTAL TAX-EXEMPT OBLIGATIONS	
		(Cost \$430,929,675)	422,513,756
		MUNICIPAL COLLATERALIZED DEBT OBLIGATION - 4.1% of Net Assets	
13,000,000	(e)	Non-Profit Preferred Funding Trust I, Series E, 12.0%, 12,420,850	
		TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION	
		(Cost \$13,000,000)	12,420,850
Shares		COMMON STOCK - 0.2% of Net Assets	
83,773	(f)	Northwest Airlines Corp.	557,928
		TOTAL COMMON STOCK	
		(Cost \$3,210,349)	557,928
		TAX-EXEMPT MONEY MARKET MUTUAL FUND - 2.7% of Net Assets	
8,000,000		BlackRock Liquidity Funds MuniFund Portfolio	8,000,000
		TOTAL TAX-EXEMPT MONEY MARKET MUTUAL FUND	
		(Cost \$8,000,000)	8,000,000
		TOTAL INVESTMENTS IN SECURITIES - 147.3%	
		(Cost \$455,140,024) (g) (h)	443,492,534

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OTHER ASSETS AND LIABILITIES - 2.5%	7,579,975
PREFERRED SHARES AT REDEMPTION VALUE,	
INCLUDING DIVIDENDS PAYABLE - (49.8)%	(150,006,099)
NET ASSETS APPLICABLE TO COMMON SHAREOWNERS - 100.0%	301,066,410

(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, 2008, the value of these securities amounted to \$59,381,654, or 19.7% 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 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, 2008.

(b) 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, 2008.

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

(d) Escrow to maturity.

(e) Indicates a security that has been deemed illiquid. The aggregate cost of illiquid securities is \$13,000,000. The aggregate value is \$12,420,850, or 4.1% of the net assets.

(f) Non-income producing.

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

Insured	
FSA	5.7%
ACA	1.4
AMBAC	0.6
General Obligation	5.5
Revenue Bonds:	
Health Revenue	27.2
Development Revenue	11.1
Tobacco Revenue	9.7
Airport Revenue	8.7
Facilities Revenue	7.0
Pollution Control Revenue	6.1
Other Revenue	5.6
Transportation Revenue	4.4
Utilities Revenue	2.6
Housing Revenue	1.7
Education Revenue	1.3

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Water Revenue	1.1
Power Revenue	0.3
	100.0%

(h) At June 30, 2008, the net unrealized loss on investments based on cost for federal income tax purposes of \$451,177,623 was as follows:

Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cost	\$19,478,863
Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over value	(27,163,952)
Net unrealized gain	\$(7,685,089)

For financial reporting purposes net unrealized loss on investments was \$11,647,490 and cost of investments aggregated \$455,140,024.

### FAS 157 Footnote Disclosures

Various inputs are used in determining the value of the Fund'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 Fund's own assumptions in determining fair value of investments)

The following is a summary of the inputs used as of June 30, 2008, in valuing the Fund's assets:

Valuation Inputs	Investments in Securities	Other Financial Instruments
Level 1 - Quoted Prices	557,928	0
Level 2 - Other Significant Observable Inputs	442,934,606	(329,607)
Level 3 - Significant Unobservable Inputs	0	0
Total	443,492,534	(329,607)

### 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

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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

Date August 29, 2008

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, 2008

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

Date August 29, 2008

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