

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST

Form N-Q

August 28, 2009

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, 2009

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 6/30/09 (unaudited)		
Principal Amount (\$)		Value (\$)
	TAX-EXEMPT OBLIGATIONS - 155.7%	
	Arizona - 3.5%	
5,000,000	Casa Grande Industrial Development Authority, Hospital	4,068,650
1,531,000	Pima County Industrial Development Authority, 6.75%, 7/	1,138,084
2,640,000	Pima County Industrial Development Authority, 7.0%, 1/1	2,002,730
1,000,000	San Luis Facility Development Corp., 7.25%, 5/1/27	861,600
		8,071,064
	California - 15.2%	
3,140,000 (a)	California State University Revenue, RIB, 11.991%, 11/1	2,879,129
2,425,000	California State Various Purpose, 5.75%, 4/1/31	2,337,385
8,575,000 (a)	California State Various Purpose, RIB, 11.861%, 6/1/37	5,947,877
6,000,000	California Statewide Communities Development Authority,	4,800,000
2,680,000 +	Golden State Tobacco Securitization Corp., 6.75%, 6/1/3	3,119,011
2,500,000	San Jose California Airport Revenue, 5.0%, 3/1/37	2,185,550
10,500,000 (a)	University of California, RIB, 12.877%, 5/15/38	9,435,300
7,670,000	Valley Health System Hospital Revenue, 6.875%, 5/15/23	4,424,823
		35,129,075
	Colorado - 1.4%	
2,850,000 +	Denver Health & Hospital Authority Healthcare Revenue,	3,149,478
	Connecticut - 2.9%	
7,750,000	Connecticut State Development Authority Revenue, 5.75%,	6,758,543
	District of Columbia - 3.5%	
2,700,000	District of Columbia Tobacco Settlement Financing Corp.	2,273,751
6,825,000	District of Columbia Tobacco Settlement Financing Corp.	5,794,698
		8,068,449
	Florida - 3.6%	
4,500,000	Hillsborough County Florida Industrial Development Authority	
Pollution		
	Control Revenue, 5.5%, 10/1/23	4,281,885
1,980,000	Hillsborough County Florida Industrial Development Authority	
Pollution		
	Control Revenue, 6.75%, 7/1/29	1,529,887
500,000	Miami Beach Health Facilities Authority, 5.375%, 11/15/	309,540
2,500,000	Miami-Dade County Florida Aviation Revenue, 5.5%, 10/1/	2,356,250
		8,477,562
	Georgia - 4.0%	
5,210,000 (a)	Atlanta Georgia Water and Wastewater Revenue, RIB, 11.2	4,507,953
1,065,000	Effingham County Industrial Development Authority, 6.5%	838,102
3,360,000	Fulton County Residential Care Facilities, 7.0%, 7/1/29	2,336,342
1,650,000	Savannah Georgia Economic Development Authority Revenue	1,506,648
		9,189,045
	Guam - 2.3%	
4,600,000 +	Northern Mariana Islands, 6.75%, 10/1/33	5,383,334
	Idaho - 2.0%	
2,000,000	Power County Industrial Development Corp., 6.45%, 8/1/3	1,743,480
3,000,000	Power County Pollution Control Revenue, 5.625% 10/1/14	2,885,700
		4,629,180
	Illinois - 6.4%	
3,000,000 (b)	Centerpoint Intermodal Center, 10.0%, 6/15/23 (144A)	2,364,990
3,000,000	City of Chicago Illinois, 5.0%, 1/1/28	3,012,000

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2,000,000	City of Chicago Illinois, 5.5%, 12/1/30	910,140
1,000,000	Illinois Finance Authority Revenue, 6.0%, 11/15/27	747,810
2,000,000	Illinois Finance Authority Revenue, 6.0%, 8/15/39	2,047,060
2,500,000	Illinois Finance Authority Revenue, 6.125%, 11/15/25	1,891,725
1,645,000	Illinois Health Facilities Authority Revenue, 5.5%, 11/	1,569,807
1,500,000 (c)	Illinois Health Facilities Authority Revenue, 6.9%, 11/	660,600
2,700,000	Southwestern Illinois Development Authority Revenue, 5.	1,742,040
		14,946,172
	Indiana - 7.3%	
10,000,000	Indiana State Development Finance Authority Revenue, 5.	9,590,400
5,000,000	Jasper County Industrial Economic Development Revenue,	3,294,200
2,500,000 (b)	Rockport Indiana Pollution Control Revenue, 6.25%, 6/2/	2,572,175
2,085,000	Vincennes Industrial Economic Development Revenue, 6.25	1,546,674
		17,003,449
	Kentucky - 1.6%	
500,000	Kentucky Economic Development Finance Authority Hospita	484,635
4,400,000	Kentucky Economic Development Finance Authority Hospita	3,237,388
		3,722,023
	Louisiana - 6.4%	
2,500,000	Louisiana Local Government Environmental Facilities Dev	2,007,075
6,000,000	Louisiana Public Facilities Authority Revenue, 5.5%, 5/	4,760,400
750,000	Opelousas Louisiana General Hospital Authority Revenue,	652,770
9,415,000	Tobacco Settlement Financing Corp., 5.875%, 5/15/39	7,380,136
		14,800,381
	Maryland - 0.4%	
460,000	Maryland Health & Higher Educational Facilities Authori	292,224
1,250,000	Maryland Health & Higher Educational Facilities Authori	727,175
		1,019,399
	Massachusetts - 6.3%	
2,195,000	Massachusetts Health & Educational Facilities Authority	1,676,804
1,000,000 +	Massachusetts Health & Educational Facilities Authority	1,145,480
10,760,000	Massachusetts Housing Finance Agency, 5.35%, 12/1/45	9,542,183
900,000	Massachusetts Development Finance Agency, 5.25%, 10/1/1	709,173
1,955,000	Massachusetts Development Finance Agency, 7.1%, 7/1/32	1,520,482
		14,594,122
	Michigan - 4.0%	
1,500,000 +	Delta County Michigan Economic Development Corp., 6.25%	1,694,490
3,000,000 +	Macomb County Hospital Finance Authority Revenue, 5.875	3,485,940
745,000	Michigan Public Educational Facilities Authority Revenu	568,457
4,130,000	Michigan State Hospital Finance Authority Revenue, 5.5%	2,812,860
1,000,000	Michigan State Strategic Fund Solid Waste Disposal Reve	772,570
		9,334,317
	Missouri - 1.3%	
1,850,000	Kansas City Industrial Development Authority Revenue, 5	1,259,221
1,500,000 (c)	St. Louis Industrial Development Authority Revenue, 7.2	328,560
6,640,000 (c)	St. Louis Industrial Development Authority Revenue, 7.2	1,453,496
		3,041,277
	Montana - 0.5%	
2,445,000 (d)	Hardin Increment Industrial Infrastructure Development	1,074,944
1,000,000 (c)	Two Rivers Authority, Inc., Project Revenue, 7.375%, 11	195,090
		1,270,034
	Nevada - 2.4%	
1,500,000	Henderson Nevada Health Care Facilities Revenue, 5.625%	1,490,250
1,600,000	Nevada State Department of Business & Industry, 7.25%,	80,000
1,000,000	Nevada State Department of Business & Industry, 7.375%,	50,000
1,320,000	Nevada State Department of Business & Industry, 7.375%,	66,000
5,000,000	Reno Nevada Hospital Revenue, 5.25%, 6/1/41	3,914,850
		5,601,100
	New Hampshire - 0.4%	
1,125,000	New Hampshire Health & Educational Facilities Authority	946,463
	New Jersey - 13.1%	

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2,500,000	Burlington County New Jersey Bridge Commission Revenue,	1,663,400
13,000,000	New Jersey Economic Development Authority Revenue,	6.25 9,696,180
3,500,000 (a)	New Jersey State Turnpike Authority, RIB, 13.272%, 1/1/	4,250,120
10,375,000	New Jersey Transportation Trust Fund Authority Revenue,	3,663,413
1,000,000 +	Tobacco Settlement Financing Corp., 6.25%, 6/1/43	1,170,140
3,250,000 +	Tobacco Settlement Financing Corp., 6.75%, 6/1/39	3,864,250
5,000,000 +	Tobacco Settlement Financing Corp., 7.0%, 6/1/41	5,990,100
		30,297,603
	New York - 6.1%	
1,000,000	Nassau County New York Industrial Development Agency Re	756,500
5,000,000	New York City Industrial Development Agency, 5.25%, 12/	3,017,200
2,000,000	New York City Industrial Development Agency, 5.375%, 6/	1,728,180
3,950,000	New York City Industrial Development Agency, 7.625%, 12	3,227,308
5,000,000	New York State Environmental Facilities Corp., 5.0%, 6/	5,039,150
500,000	Ulster County New York Industrial Development Agency, 6	344,540
		14,112,878
	North Carolina - 2.1%	
6,000,000	Charlotte North Carolina Special Facilities Revenue, 7.	4,800,720
	Ohio - 2.3%	
3,115,000	Belmont County Health System Revenue, 5.7%, 1/1/13	2,790,448
1,000,000	Belmont County Health System Revenue, 5.8%, 1/1/18	754,830
3,000,000	Cleveland Airport Special Revenue, 5.375%, 9/15/27	1,740,750
		5,286,028
	Oklahoma - 3.2%	
1,695,000	Jackson County Memorial Hospital Authority Revenue, 7.3	1,692,373
2,220,000	Tulsa Municipal Airport Trust Revenue, 6.25%, 6/1/20	1,735,973
1,500,000	Tulsa Municipal Airport Trust Revenue, 7.35%, 12/1/11	1,425,390
3,000,000 (b)	Tulsa Municipal Airport Trust Revenue, 7.75%, 6/1/35	2,506,320
		7,360,056
	Pennsylvania - 11.2%	
3,000,000 +	Allegheny County Hospital Development Authority Revenue	3,401,040
500,000 +	Allegheny County Hospital Development Authority Revenue	566,840
1,000,000	Clarion County Hospital Authority Revenue, 5.625%, 7/1/	1,001,310
3,600,000	Columbia County Hospital Authority Revenue, 5.85%, 6/1/	2,740,284
945,000	Hazleton Health Services Authority Hospital Revenue, 6.	831,987
1,405,000	Montgomery County Higher Education & Health Authority H	1,408,920
1,430,000	Pennsylvania Economic Development Financing Authority R	1,127,998
1,805,000	Pennsylvania Economic Development Financing Authority R	1,758,774
2,330,000	Pennsylvania Economic Development Financing Authority R	2,211,683
5,000,000	Pennsylvania Economic Development Financing Authority R	3,305,950
5,000,000	Philadelphia Hospitals & Higher Education Facilities Au	3,507,650
2,005,000	Scranton-Lackawanna Health & Welfare Authority Revenue,	1,920,128
2,245,000	Scranton-Lackawanna Health & Welfare Authority Revenue,	2,108,212
		25,890,776
	Rhode Island - 3.2%	
1,385,000	Central Falls Rhode Island Detention Facilities Revenue	959,944
8,285,000	Tobacco Settlement Financing Corp., 6.25%, 6/1/42	6,401,074
		7,361,018
	South Carolina - 7.8%	
1,500,000	Connector 2000 Association, Inc., Toll Road Revenue, 5.	516,765
7,140,000 +	South Carolina Jobs Economic Development Authority Reve	8,103,186
860,000 +	South Carolina Jobs Economic Development Authority Reve	986,024
3,000,000 +	South Carolina Jobs Economic Development Authority Reve	3,335,340
4,400,000 (e)	Tobacco Settlement Revenue Management, 6.375%, 5/15/30	5,075,224
		18,016,539
	Tennessee - 4.2%	
1,000,000 +	Johnson City Health & Educational Facilities Board Hosp	1,133,610
7,000,000	Knox County Health Educational & Housing Facilities Boa	6,934,760
2,400,000	Sullivan County Health Educational and Housing Faciliti	1,594,104
		9,662,474
	Texas - 20.9%	

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8,650,000	Brazos River Authority Pollution Control Revenue, 6.75%	4,152,259
4,000,000	Brazos River Authority Pollution Control Revenue, 7.7%	2,005,000
7,350,000	Gulf Coast Industrial Development Authority, 7.0%, 12/1	3,233,118
10,000,000	Houston Texas Airport System Special Facilities Revenue	8,046,800
960,000	IAH Public Facility Corp., Project Revenue Bonds, Serie	862,973
1,000,000	IAH Public Facility Corp., Project Revenue Bonds, Serie	804,040
1,350,000	IAH Public Facility Corp., Project Revenue Bonds, Serie	1,030,374
2,750,000	Lower Colorado River Authority, 5.0%, 5/15/31	2,738,972
845,000	Lubbock Health Facilities Development Corp., 6.5%, 7/1/	650,743
2,000,000	Lubbock Health Facilities Development Corp., 6.625%, 7/	1,488,780
7,750,000	Matagorda County Navigation District Number 1 Revenue,	6,422,115
10,000,000	North Texas Tollway Authority Revenue, 5.75%, 1/1/33	9,748,600
1,711,000	Panhandle Regional Housing Finance Corp. Multifamily Ho	1,770,218
1,000,000	Richardson Hospital Authority Revenue, 6.0%, 12/1/34	753,660
1,000,000	Texas Midwest Public Facility Corp. Revenue, 9.0%, 10/1	997,130
4,700,000	Tomball Hospital Authority, 6.0%, 7/1/25	3,651,759
		48,356,541
	Utah - 0.5%	
1,600,000	Spanish Fork Charter School Revenue, 5.7%, 11/15/36 (14	1,067,008
	Virginia - 0.9%	
2,000,000	Washington County Industrial Development Authority Reve	2,125,640
	Washington - 3.4%	
1,195,000	Tobacco Settlement Authority Revenue, 6.5%, 6/1/26	1,180,445
2,000,000	Washington State Health Care Facilities Authority, 6.12	1,629,840
2,000,000	Washington State Health Care Facilities Authority, 6.25	1,592,140
5,000,000	Washington State Housing Finance Commission Nonprofit R	3,548,150
		7,950,575
	Wisconsin - 1.4%	
2,900,000	Aztalan Wisconsin Exempt Facilities Revenue, 7.50%, 5/1	162,400
1,000,000	Wisconsin State Health & Educational Facilities Authori	827,470
1,000,000	Wisconsin State Health & Educational Facilities Authori	701,360
1,500,000	Wisconsin State Health & Educational Facilities Authori	1,537,905
		3,229,135
	TOTAL TAX-EXEMPT OBLIGATIONS	
	(Cost \$407,085,795)	360,651,458
	MUNICIPAL COLLATERALIZED DEBT OBLIGATION - 3.8%	
13,000,000 (b)	(Non-Profit Preferred Funding Trust I, Series E, 12.0%,	8,953,490
	TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION	
	(Cost \$13,000,000)	8,953,490
Shares	COMMON STOCK - 0.3%	
109,377 (g)	Delta Airlines, Inc.	633,293
	TOTAL COMMON STOCK	
	(Cost \$3,210,349)	633,293
	TAX-EXEMPT MONEY MARKET MUTUAL FUND - 1.3%	
3,000,000	BlackRock Liquidity Funds MuniFund Portfolio	3,000,000
	TOTAL TAX-EXEMPT MONEY MARKET MUTUAL FUND	
	(Cost \$3,000,000)	3,000,000
	TOTAL INVESTMENTS IN SECURITIES - 161.1%	
	(Cost \$426,296,144) (h) (i)	\$373,238,241
	OTHER ASSETS AND LIABILITIES - 3.6%	\$8,429,357
	PREFERRED SHARES AT REDEMPTION VALUE,	
	INCLUDING DIVIDENDS PAYABLE - (64.7)%	(\$150,003,373)
	NET ASSETS APPLICABLE TO COMMON SHAREOWNERS - 100.0%	\$231,664,225

(144A) Security is exempt from registration under Rule 144A of the Securities Act of 1933. Such securities may be resold

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normally to qualified institutional buyers in a transaction exempt from registration. At June 30, 2009, the value of these securities amounted to \$31,229,788, or 13.5% of total net assets applicable to common shareowners.

RIB Residual Interest Bonds.

+ Prerefunded bonds have been collateralized by U.S. Treasury or U.S. Government Agency securities which are held in escrow to pay interest and principal on the tax exempt issue and to retire the bonds in full at the earliest refunding date.

(a) The interest rate is subject to change periodically and inversely based upon prevailing market rates. The rate shown is the coupon rate at June 30, 2009.

(b) The interest rate is subject to change periodically. The interest rate shown is the rate at June 30, 2009.

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

(d) 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, 2009.

(e) Escrow to maturity.

(f) Indicates a security that has been deemed illiquid. The aggregate cost of illiquid securities is \$13,000,000. The aggregate value is \$8,953,490, or 3.9% of the total net assets applied to common shareowners.

(g) Non-income producing.

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

Insured	
FSA	7.2%
AMBAC	1.4
NATL-RE	1.0
ACA	0.5
Q-SBLF	0.2
Revenue Bonds:	
Health Revenue	32.9
Tobacco Revenue	11.3
Airport Revenue	10.6
Pollution Control Revenue	8.7
Other Revenue	8.0
Development Revenue	5.6
Housing Revenue	3.0
Transportation Revenue	2.8
Facilities Revenue	1.9
Water Revenue	1.4
Utilities Revenue	1.3
Power Revenue	1.1
Education Revenue	1.1
	100.0%

(i) At June 30, 2009, the net unrealized loss on investments based on cost for federal income tax purposes

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of \$421,877,493 was as follows:

Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cost \$20,241,163

Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over value (68,880,415)  
Net unrealized loss (\$48,639,252)

For financial reporting purposes net unrealized loss on investments was \$53,057,903 and cost of investments aggregated \$426,296,144.

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)

The following is a summary of the inputs used as of June 30, 2009, in valuing the Trust's assets:

	Level 1	Level 2	Level 3	Total
Tax-exempt obligations	\$0	\$360,651,458	\$0	\$360,651,458
Municipal collateralized debt oblig	0	8,953,490	0	8,953,490
Common Stock	633,293	0	0	633,293
Tax-exempt money market mutual fund	3,000,000	0	0	3,000,000
Total	\$3,633,293	\$369,604,948	\$0	\$373,238,241

### 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

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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 28, 2009

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 28, 2009

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

Date August 28, 2009

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