

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST

Form N-Q

August 27, 2010

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)

Terrence J. Cullen, 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, 2010

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

A registrant is required to disclose the information specified by Form N-Q, and the Commission will make this information public. A registrant is not required to respond to the collection of information contained in Form N-Q unless the Form displays a currently valid Office of Management and Budget ("OMB") control number. Please direct comments concerning the accuracy of the information collection burden estimate and any suggestions for reducing the burden to Secretary, Securities and Exchange Commission, 450 Fifth Street, NW, Washington, DC 20549-0609. The OMB has reviewed this collection of information under the clearance requirements of 44 U.S.C. ss. 3507.

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ITEM 1. Schedule of Investments.

Pioneer Municipal High Income Advantage Trust  
SCHEDULE OF INVESTMENTS 6/30/10 (unaudited)

Principal Amount	Value
TAX-EXEMPT OBLIGATIONS - 143.9% of Net Assets	
Alabama - 0.7%	
2,500,000Huntsville-Redstone Village Special Care Faci	\$ 1,896,625
Arizona - 3.4%	
5,000,000Casa Grande Industrial Development Authority	\$ 4,987,500
1,521,000Pima County Industrial Development Authority,	1,473,803
2,640,000Pima County Industrial Development Authority,	2,466,974
1,000,000San Luis Facility Development Corp., 7.25%, 5	917,080
	\$ 9,845,357
California - 12.3%	
3,140,000California State University Revenue, RIB, 12.	\$ 3,232,504
2,425,000California State Various Purpose, 5.75%, 4/1/	2,570,621
8,575,000California State Various Purpose, RIB, 12.752	8,574,057
803,175 California Statewide Communities Development	79,113
2,680,000Golden State Tobacco Securitization Corp., 6.	3,113,838
2,500,000San Jose California Airport Revenue, 5.0%, 3/	2,470,775
10,500,00University of California, RIB, 13.063%, 5/15/	10,897,740
7,670,000Valley Health System Hospital Revenue, 6.875%	4,205,768
	\$ 35,144,416
Colorado - 1.1%	
2,850,000Denver Health & Hospital Authority Healthcare	\$ 3,070,704
Connecticut - 2.7%	
7,750,000Connecticut State Development Authority Reven	\$ 7,706,987
District of Columbia - 3.3%	
2,700,000District of Columbia Tobacco Settlement Finan	\$ 2,585,331
6,825,000District of Columbia Tobacco Settlement Finan	6,737,981
	\$ 9,323,312
Florida - 3.7%	
4,500,000Hillsborough County Industrial Development Authority Pollution Control Revenue,	
5.5%, 10/1/23	\$ 4,588,290
1,980,000Hillsborough County Industrial Development Au	1,928,401
1,000,000Hillsborough County Industrial Development Au	1,135,630
500,000 Miami Beach Health Facilities Authority, 5.37	432,435
2,500,000Miami-Dade County Florida Aviation Revenue, 5	2,541,450
	\$ 10,626,206
Georgia - 4.6%	
5,210,000Atlanta Georgia Water and Wastewater Revenue,	\$ 5,113,615
1,000,000Clayton County Development Authority Special	1,037,850
900,000 DeKalb County Hospital Authority Revenue, 6.0	899,910
750,000 DeKalb County Hospital Authority Revenue, 6.1	744,308
1,065,000Effingham County Industrial Development Autho	1,064,925
3,360,000Fulton County Residential Care Facilities, 7.	2,531,525
1,650,000Savannah Georgia Economic Development Authori	1,652,937
	\$ 13,045,070
Guam - 1.8%	

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4,500,000Northern Mariana Islands, 6.75%, 10/1/33	\$	5,221,035
Idaho - 1.7%		
2,000,000Power County Industrial Development Corp., 6.	\$	2,011,700
3,000,000Power County Pollution Control Revenue, 5.625		2,999,850
	\$	5,011,550
Illinois - 7.5%		
3,000,000Centerpoint Intermodal Center, 7.5%, 6/15/23	\$	3,024,810
2,000,000City of Chicago Illinois, 5.5%, 12/1/30		1,464,080
1,450,000Illinois Finance Authority Revenue, 5.5%, 4/1		1,445,708
1,000,000Illinois Finance Authority Revenue, 6.0%, 11/		778,660
2,000,000Illinois Finance Authority Revenue, 6.0%, 8/1		2,093,900
2,000,000Illinois Finance Authority Revenue, 6.0%, 8/1		2,175,520
2,500,000Illinois Finance Authority Revenue, 6.125%, 1		2,208,250
6,000,000Illinois Finance Authority Revenue, 8.25%, 5/		5,884,740
1,500,000Illinois Health Facilities Authority Revenue,		570,600
2,525,000Southwestern Illinois Development Authority R		1,843,906
	\$	21,490,174
Indiana - 5.8%		
250,000 East Chicago Indiana Exempt Facilities Reven	\$	240,833
10,000,00Indiana State Development Finance Authority R		10,189,800
5,000,000Jasper County Industrial Economic Development		4,540,900
1,995,000Vincennes Industrial Economic Development Rev		1,675,421
	\$	16,646,954
Kentucky - 1.5%		
500,000 Kentucky Economic Development Finance Authority Hospital		
System Revenue, 5.7%, 10/1/10	\$	500,055
4,400,000Kentucky Economic Development Finance Authority Hospital		
System Revenue, 5.875%, 10/1/22		3,909,400
	\$	4,409,455
Louisiana - 6.2%		
2,500,000Louisiana Local Government Environmental Faci	\$	2,578,300
Authority Revenue, 6.75%, 11/1/32		
6,000,000Louisiana Public Facilities Authority Revenue		5,317,320
750,000 Opelousas Louisiana General Hospital Authorit		759,135
9,415,000Tobacco Settlement Financing Corp., 5.875%, 5		9,190,641
	\$	17,845,396
Maryland - 0.9%		
460,000 Maryland Health & Higher Educational Faciliti	\$	380,379
1,250,000Maryland Health & Higher Educational Faciliti		894,363
1,250,000Maryland Health & Higher Educational Faciliti		1,185,200
	\$	2,459,942
Massachusetts - 7.6%		
830,000 Massachusetts Development Finance Agency, 5.2	\$	737,140
5,000,000Massachusetts Development Finance Agency, 5.7		5,523,650
1,930,000Massachusetts Development Finance Agency, 7.1		1,766,008
2,195,000Massachusetts Health & Educational Facilities		1,920,054
1,000,000Massachusetts Health & Educational Facilities		1,126,140
10,760,00Massachusetts Housing Finance Agency, 5.35%,		10,541,787
	\$	21,614,779
Michigan - 3.5%		
1,500,000Delta County Michigan Economic Development Co	\$	1,652,700
500,000 Flint Michigan Hospital Building Authority Re		505,700
3,000,000Macomb County Hospital Finance Authority Reve		3,483,570
745,000 Michigan Public Educational Facilities Author		680,252
4,130,000Michigan State Hospital Finance Authority Rev		3,622,712
3,405,000Wayne Charter Escrow, 0.0%, 12/1/15		
	\$	9,944,934
Missouri - 0.9%		
1,500,000St. Louis Industrial Development Authority Re	\$	480,540
6,640,000St. Louis Industrial Development Authority Re		2,124,070
	\$	2,604,610

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Montana - 0.5%	
2,445,000Hardin Increment Industrial Infrastructure De	\$ 1,385,435
1,000,000Two Rivers Authority, Inc., Project Revenue,	174,950
	\$ 1,560,385
Nevada - 2.1%	
1,500,000Henderson Nevada Health Care Facilities Reven	\$ 1,539,645
1,600,000Nevada State Department of Business & Industr	16,000
1,000,000Nevada State Department of Business & Industr	10,000
1,320,000Nevada State Department of Business & Industr	13,200
5,000,000Reno Nevada Hospital Revenue, 5.25%, 6/1/41	4,579,800
	\$ 6,158,645
New Hampshire - 0.4%	
1,125,000New Hampshire Health & Educational Facilities	\$ 1,067,557
New Jersey - 11.9%	
2,500,000Burlington County New Jersey Bridge Commissio	\$ 2,158,775
13,000,000New Jersey Economic Development Authority Rev	11,951,290
3,500,000New Jersey State Turnpike Authority, RIB, 13.	4,882,430
10,375,000New Jersey Transportation Trust Fund Authorit	4,284,875
1,000,000Tobacco Settlement Financing Corp., 6.25%, 6/	1,155,470
3,250,000Tobacco Settlement Financing Corp., 6.75%, 6/	3,802,045
5,000,000Tobacco Settlement Financing Corp., 7.0%, 6/1	5,883,650
	\$ 34,118,535
New York - 7.9%	
1,800,000Dutchess County Industrial Development Agency	\$ 1,796,148
3,000,000Nassau County New York Industrial Development	2,949,330
5,000,000New York City Industrial Development Agency,	3,705,400
3,950,000New York City Industrial Development Agency,	3,944,154
2,000,000New York State Dormitory Authority Revenue, 6	1,992,000
5,000,000New York State Environmental Facilities Corp.	5,125,500
3,000,000Ulster County New York Industrial Development	2,718,900
500,000 Ulster County New York Industrial Development	409,965
	\$ 22,641,397
North Carolina - 2.1%	
6,000,000Charlotte North Carolina Special Facilities R	\$ 6,003,720
Ohio - 1.7%	
2,375,000Belmont County Health System Revenue, 5.7%, 1	\$ 1,726,554
1,000,000Belmont County Health System Revenue, 5.8%, 1	727,460
3,000,000Cleveland Airport Special Revenue, 5.375%, 9/	2,487,600
	\$ 4,941,614
Oklahoma - 2.8%	
1,500,000Jackson County Memorial Hospital Authority Re	\$ 1,501,050
2,220,000Tulsa Municipal Airport Trust Revenue, 6.25%,	2,026,616
1,500,000Tulsa Municipal Airport Trust Revenue, 7.35%,	1,499,850
3,000,000Tulsa Municipal Airport Trust Revenue, 7.75%,	3,015,210
	\$ 8,042,726
Oregon - 1.1%	
3,000,000Oregon State Facilities Authority Revenue, 5.	\$ 3,021,030
Pennsylvania - 8.8%	
3,000,000Allegheny County Hospital Development Authori	\$ 3,159,690
500,000 Allegheny County Hospital Development Authori	526,615
3,600,000Columbia County Hospital Authority Revenue, 5	3,222,036
830,000 Hazleton Health Services Authority Hospital R	829,992
1,405,000Montgomery County Higher Education & Health Authority	
Hospital Revenue, 6.6%, 7/1/10	1,405,197
1,430,000Pennsylvania Economic Development Financing Authority	
Revenue, 5.125%, 6/1/18	1,284,941
2,330,000Pennsylvania Economic Development Financing A	2,292,137
5,000,000Pennsylvania Economic Development Financing A	4,315,100
5,000,000Philadelphia Hospitals & Higher Education Fac	4,079,050

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2,005,000	Scranton-Lackawanna Health & Welfare Authorit	1,979,476
2,245,000	Scranton-Lackawanna Health & Welfare Authorit	2,189,953
		\$ 25,284,187
	Rhode Island - 3.2%	
1,385,000	Central Falls Rhode Island Detention Faciliti	\$ 1,186,405
8,285,000	Tobacco Settlement Financing Corp., 6.25%, 6/	7,847,801
		\$ 9,034,206
	South Carolina - 6.2%	
1,500,000	Connector 2000 Association, Inc., Toll Road R	\$ 303,750
7,140,000	South Carolina Jobs Economic Development Auth	8,244,986
860,000	South Carolina Jobs Economic Development Auth	998,778
3,000,000	South Carolina Jobs Economic Development Auth	3,112,800
4,400,000	Tobacco Settlement Revenue Management, 6.375%	5,231,204
		\$ 17,891,518
	Tennessee - 3.8%	
1,000,000	Johnson City Health & Educational Facilities	\$ 1,133,710
7,000,000	Knox County Health Educational & Housing Facilities Board	
	Hospital Revenue, 6.5%, 4/15/31	7,450,660
2,400,000	Sullivan County Health Educational and Housing Facilities Board	
	Hospital Revenue, 5.25%, 9/1/36	2,193,120
		\$ 10,777,490
	Texas - 16.4%	
2,827,399	Gulf Coast Industrial Development Authority,	\$ 278,499
10,000,00	Houston Texas Airport System Special Faciliti	9,729,200
845,000	IAH Public Facility Corp., Project Revenue Bo	779,791
1,000,000	IAH Public Facility Corp., Project Revenue Bo	831,290
1,350,000	IAH Public Facility Corp., Project Revenue Bo	1,083,524
2,750,000	Lower Colorado River Authority, 5.0%, 5/15/31	2,777,775
845,000	Lubbock Health Facilities Development Corp.,	813,346
2,000,000	Lubbock Health Facilities Development Corp.,	1,846,560
7,750,000	Matagorda County Navigation District Number 1	7,677,150
9,750,000	North Texas Tollway Authority Revenue, 5.75%,	10,246,372
1,711,000	Panhandle Regional Housing Finance Corp. Multifamily Housing	
	Revenue, 6.6%, 7/20/31	1,814,533
1,000,000	Richardson Hospital Authority Revenue, 6.0%,	948,500
1,000,000	Tarrant County Cultural Education Facilities	994,090
1,500,000	Tarrant County Cultural Education Facilities	1,497,210
1,000,000	Texas Midwest Public Facility Corp. Revenue,	1,034,700
4,700,000	Tomball Hospital Authority, 6.0%, 7/1/25	4,568,870
		\$ 46,921,410
	Utah - 0.5%	
1,600,000	Spanish Fork Charter School Revenue, 5.7%, 11	\$ 1,295,760
	Virginia - 0.8%	
2,000,000	Washington County Industrial Development Auth	\$ 2,274,700
	Washington - 3.1%	
1,155,000	Tobacco Settlement Authority Revenue, 6.5%, 6	\$ 1,180,202
2,000,000	Washington State Health Care Facilities Autho	2,038,500
2,000,000	Washington State Health Care Facilities Autho	2,045,900
5,000,000	Washington State Housing Finance Commission Nonprofit	
	Revenue Bonds, 5.625%, 1/1/27	3,740,550
		\$ 9,005,152
	Wisconsin - 1.4%	
2,900,000	Aztalan Wisconsin Exempt Facilities Revenue,	\$ 391,500
1,000,000	Wisconsin State Health & Educational Faciliti	1,006,360
1,000,000	Wisconsin State Health & Educational Faciliti	972,190
1,500,000	Wisconsin State Health & Educational Faciliti	1,622,025
		\$ 3,992,075
	TOTAL TAX-EXEMPT OBLIGATIONS	
	(Cost \$405,289,753)	\$ 411,939,613

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MUNICIPAL COLLATERALIZED DEBT OBLIGATION - 3.4% of Net Assets			
13,000,000	Non-Profit Preferred Funding Trust I, Series	\$	9,638,070
TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION			
	(Cost \$13,000,000)	\$	9,638,070
Shares COMMON STOCK - 0.5% of Net Assets			
109,889	Delta Airlines, Inc.	\$	1,291,196
TOTAL COMMON STOCK			
	(Cost \$3,210,349)	\$	1,291,196
TAX-EXEMPT MONEY MARKET MUTUAL FUND - 1.0% of Net Assets			
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 - 148.8%			
	(Cost \$424,500,102) (i) (j)	\$	425,868,879
	OTHER ASSETS AND LIABILITIES 3.6%	\$	10,327,030
	PREFERRED SHARES AT REDEMPTION VALUE,		
	INCLUDING DIVIDENDS PAYABLE - (52.4)%	\$	(150,005,046)
	NET ASSETS APPLICABLE TO COMMON SHAREOWNERS -	\$	286,190,863

(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, 2010, the value of these securities amounted to \$35,761,246, or 12.5% 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, 2010.

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

(c) The interest rate is subject to change periodically. The interest rate shown is the coupon rate at June 30, 2010.

(d) Non-income producing.

(e) Security is valued using fair value methods (other than prices supplied by independent pricing services).

(f) Debt obligation initially issued at one coupon rate which converts to a higher coupon rate at a specific date. The rate shown is the coupon rate at June 30, 2010.

(g) Indicates a security that has been deemed illiquid. The aggregate cost of illiquid securities is \$16,341,938. The

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aggregate value is

\$10,042,770, or 3.5% of the total net assets applied to common shareowners.

(h) Escrow to maturity.

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

Insured	
AGM	8.2 %
AMBAC	1.9
MBIA	1.0
Q-SBLF	0.2
Revenue Bonds:	
Health Revenue	35.5
Airport Revenue	11.4
Tobacco Revenue	11.1
Other Revenue	8.0
Pollution Control Revenue	6.6
Development Revenue	5.1
Housing Revenue	2.9
Facilities Revenue	2.5
Transportation Revenue	2.5
Water Revenue	1.2
Power Revenue	1.1
Education Revenue	0.8
Utilities Revenue*	0.0
	100.0%

Amount is less than 0.1%

(j) At June 30, 2010, the net unrealized gain on investments based on cost for federal income tax purposes of \$419,754,512 was as follows:

Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cos \$	39,904,297
Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over valu	(33,789,930)
Net unrealized gain	\$ 6,114,367

For financial reporting purposes net unrealized gain on investments was \$1,368,777 and cost of investments aggregated \$424,500,102.

Purchases and sales of securities (excluding temporary cash investments) for the period ended June 30, 2010 aggregated \$10,694,210 and \$8,042,380, respectively.

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)

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The following is a summary of the inputs used as of June 30, 2010, in valuing the Fund's assets:

	Level 1	Level 2	Level 3	Total
Tax exempt obligations	\$0	\$411,939,613	\$0	\$411,939,613
Municipal collateralized	0	9,368,070	0	9,368,070
Common Stock	1,291,196	0	0	1,291,196
Tax exempt money market	3,000,000	0	0	3,000,000
<b>Total</b>	<b>\$4,291,196</b>	<b>\$421,307,683</b>	<b>\$0</b>	<b>\$425,598,879</b>

Following is a reconciliation of assets valued using significant unobservable inputs (Level 3):

	Tax-Exempt Obligation Michigan
Balance as of 3/31/10	\$0
Realized gain (loss)	0
Change in unrealized gain (loss)	0
Net purchases (sales)	0
Transfers in and out of level 3	0
Balance as of 6/30/10	\$0

### 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)).

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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 27, 2010

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 27, 2010

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

Date August 27, 2010

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