

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST  
Form N-Q  
March 01, 2011

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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: December 31, 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 12/31/10 (unaudited)

Principal Amount		Value
	TAX-EXEMPT OBLIGATIONS - 146.8% of Net Assets	
	Alabama - 0.7%	
2,500,000	Huntsville-Redstone Village Special Care Facil	1,849,375
	Arizona - 3.4%	
5,000,000	Casa Grande Industrial Development Authority H	4,716,850
1,512,000	Pima County Industrial Development Authority,	1,414,400
2,640,000	Pima County Industrial Development Authority,	2,376,370
1,000,000	San Luis Facility Development Corp., 7.25%, 5/	954,500
		9,462,120
	California - 9.7%	
3,140,000	California State University Revenue, RIB, 12.6	2,853,066
2,425,000	California State Various Purpose, 5.75%, 4/1/3	2,445,346
8,575,000	California State Various Purpose, RIB, 12.641%	6,469,838
803,175	California Statewide Communities Development A	63,250
2,680,000	Golden State Tobacco Securitization Corp., 6.7	3,023,388
2,500,000	San Jose California Airport Revenue, 5.0%, 3/1	2,275,950
10,500,000	University of California, RIB, 12.988%, 5/15/3	9,586,920
		26,717,758
	Colorado - 1.4%	
2,850,000	Denver Health & Hospital Authority Healthcare	2,994,410
1,000,000	Kremmling Memorial Hospital District, 7.125%,	950,780
		3,945,190
	Connecticut - 2.6%	
7,750,000	Connecticut State Development Authority Revenu	7,276,785
	District of Columbia - 3.4%	
2,700,000	District of Columbia Tobacco Settlement Financ	2,662,173
6,825,000	District of Columbia Tobacco Settlement Financ	6,637,654
		9,299,827
	Florida - 4.2%	
1,000,000	Florida Development Finance Corp., 6.0%, 9/15/	853,590
4,500,000	Hillsborough County Industrial Development Aut	4,573,080
1,980,000	Hillsborough County Industrial Development Aut	1,819,778
1,000,000	Hillsborough County Industrial Development Aut	1,356,690
500,000	Miami Beach Health Facilities Authority, 5.375	422,325
2,500,000	Miami-Dade County Florida Aviation Revenue, 5.	2,425,150
		11,450,613
	Georgia - 4.4%	
5,210,000	Atlanta Georgia Water and Wastewater Revenue,	4,214,109
1,000,000	Clayton County Development Authority Special F	1,085,800
900,000	DeKalb County Georgia Hospital Authority Reven	888,668
750,000	DeKalb County Georgia Hospital Authority Reven	730,433
1,065,000	Effingham County Industrial Development Author	1,003,124
3,360,000	Fulton County Residential Care Facilities, 7.0	2,541,605
1,650,000	Savannah Georgia Economic Development Authorit	1,598,751
		12,062,490
	Guam - 2.2%	
1,000,000	Guam Government Department Education Certifica	971,650
4,400,000	Northern Mariana Islands, 6.75%, 10/1/33	5,081,868
		6,053,518
	Idaho - 1.8%	
2,000,000	Power County Industrial Development Corp., 6.4	1,970,120
3,000,000	Power County Pollution Control Revenue, 5.625%	2,994,600
		4,964,720
	Illinois - 8.6%	

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3,000,000	Centerpoint Intermodal Center, 7.5%, 6/15/23 (	2,999,970
2,000,000	City of Chicago Illinois, 5.5%, 12/1/30	1,625,140
1,450,000	Illinois Finance Authority Revenue, 5.5%, 4/1/	1,346,195
2,000,000	Illinois Finance Authority Revenue, 6.0%, 8/15	2,049,180
1,000,000	Illinois Finance Authority Revenue, 6.0%, 11/1	748,850
2,000,000	Illinois Finance Authority Revenue, 6.0%, 8/15	2,102,820
2,500,000	Illinois Finance Authority Revenue, 6.125%, 11	2,203,275
6,000,000	Illinois Finance Authority Revenue, 8.25%, 5/1	5,958,360
2,500,000	Illinois Finance Authority Revenue, 8.25%, 2/1	2,471,350
1,500,000	Illinois Health Facilities Authority Revenue,	552,600
2,440,000	Southwestern Illinois Development Authority Re	1,678,793
		23,736,533
	Indiana - 6.0%	
250,000	East Chicago Indiana Exempt Facilities Revenue	239,295
10,000,000	Indiana State Development Finance Authority Re	10,083,200
5,000,000	Jasper County Industrial Economic Development	4,502,850
1,900,000	Vincennes Industrial Economic Development Reve	1,631,549
		16,456,894
	Kansas - 0.3%	
1,000,000	Kansas Development Finance Authority, 5.0%, 5/	901,050
	Kentucky - 1.4%	
4,400,000	Kentucky Economic Development Finance Authorit	3,774,496
	Louisiana - 5.1%	
2,500,000	Louisiana Local Government Environmental Facil	2,512,425
6,000,000	Louisiana Public Facilities Authority Revenue,	5,070,120
750,000	Opelousas Louisiana General Hospital Authority	751,425
5,915,000	Tobacco Settlement Financing Corp., 5.875%, 5/	5,644,093
		13,978,063
	Maryland - 1.5%	
460,000	Maryland Health & Higher Educational Facilitie	366,855
1,250,000	Maryland Health & Higher Educational Facilitie	860,038
1,250,000	Maryland Health & Higher Educational Facilitie	1,096,050
2,000,000	Maryland Health & Higher Educational Facilitie	1,937,140
		4,260,083
	Massachusetts - 8.4%	
755,000	Massachusetts Development Finance Agency, 5.25	713,090
5,000,000	Massachusetts Development Finance Agency, 5.75	5,050,750
1,930,000	Massachusetts Development Finance Agency, 7.1%	1,735,070
2,195,000	Massachusetts Health & Educational Facilities	1,903,592
1,000,000	Massachusetts Health & Educational Facilities	1,093,039
3,420,000	Massachusetts Health & Educational Facilities	2,868,559
10,760,000	Massachusetts Housing Finance Agency, 5.35%, 1	9,727,255
		23,091,355
	Michigan - 3.7%	
1,500,000	Delta County Michigan Economic Development Cor	1,606,995
500,001	Flint Michigan Hospital Building Authority Rev	483,650
3,000,000	Macomb County Hospital Finance Authority Reven	3,407,520
735,000	Michigan Public Educational Facilities Authori	644,419
4,130,000	Michigan State Hospital Finance Authority Reve	3,991,232
3,405,000	Wayne Charter Escrow, 0.0%, 12/1/15	34
		10,133,850
	Missouri - 1.5%	
1,500,000	St. Louis Industrial Development Authority Rev	780,660
6,640,000	St. Louis Industrial Development Authority Rev	3,451,472
		4,232,132
	Montana - 0.6%	
2,445,000	Hardin Increment Industrial Infrastructure Dev	1,391,181
1,000,000	Two Rivers Authority, Inc., Project Revenue, 7	150,040
		1,541,221
	Nevada - 2.2%	
1,500,000	Henderson Nevada Health Care Facilities Revenu	1,526,400
1,600,000	Nevada State Department of Business & Industry	15

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1,000,000	Nevada State Department of Business & Industry	10
1,320,000	Nevada State Department of Business & Industry	13
5,000,000	Reno Nevada Hospital Revenue, 5.25%, 6/1/41	4,402,550
		5,928,988
	New Hampshire - 0.4%	
1,125,000	New Hampshire Health & Educational Facilities	1,027,046
	New Jersey - 12.5%	
2,500,000	Burlington County New Jersey Bridge Commission	2,046,800
13,000,000	New Jersey Economic Development Authority Reve	12,105,080
3,500,000	New Jersey State Turnpike Authority, RIB, 13.4	3,982,090
15,375,000	New Jersey Transportation Trust Fund Authority	5,614,950
1,000,000	Tobacco Settlement Financing Corp., 6.25%, 6/1	1,123,170
3,250,000	Tobacco Settlement Financing Corp., 6.75%, 6/1	3,688,945
5,000,000	Tobacco Settlement Financing Corp., 7.0%, 6/1/	5,703,750
		34,264,785
	New York - 8.1%	
1,800,000	Dutchess County Industrial Development Agency,	1,742,652
3,000,000	Nassau County New York Industrial Development	2,750,760
5,000,000	New York City Industrial Development Agency, 5	3,842,450
3,950,000	New York City Industrial Development Agency, 7	3,976,663
2,000,000	New York State Dormitory Authority Revenue, 6.	1,937,900
5,000,000	New York State Environmental Facilities Corp.,	4,926,900
3,000,000	Ulster County New York Industrial Development	2,634,510
500,000	Ulster County New York Industrial Development	394,865
		22,206,700
	North Carolina - 1.7%	
5,010,000	Charlotte North Carolina Special Facilities Re	4,808,748
	Ohio - 2.9%	
1,635,000	Belmont County Health System Revenue, 5.7%, 1/	1,193,500
1,000,000	Belmont County Health System Revenue, 5.8%, 1/	730,460
5,000,000	Buckeye Tobacco Settlement Financing Authority	3,587,550
3,000,000	Cleveland Airport Special Revenue, 5.375%, 9/1	2,508,330
		8,019,840
	Oklahoma - 2.9%	
1,295,000	Jackson County Memorial Hospital Authority Rev	1,295,376
2,220,000	Tulsa Municipal Airport Trust Revenue, 6.25%,	2,103,494
1,500,000	Tulsa Municipal Airport Trust Revenue, 7.35%,	1,493,910
3,000,000	Tulsa Municipal Airport Trust Revenue, 7.75%,	3,064,380
		7,957,160
	Oregon - 1.0%	
3,000,000	Oregon State Facilities Authority Revenue, 5.2	2,775,120
	Pennsylvania - 7.3%	
3,600,000	Columbia County Hospital Authority Revenue, 5.	3,088,764
830,000	Hazleton Health Services Authority Hospital Re	830,407
1,430,000	Pennsylvania Economic Development Financing Au	1,239,367
2,330,000	Pennsylvania Economic Development Financing Au	2,307,749
5,000,000	Pennsylvania Economic Development Financing Au	4,235,800
5,000,000	Philadelphia Hospitals & Higher Education Faci	4,118,400
2,005,000	Scranton-Lackawanna Health & Welfare Authority	1,987,436
2,245,000	Scranton-Lackawanna Health & Welfare Authority	2,188,269
		19,996,192
	Rhode Island - 3.1%	
1,385,000	Central Falls Rhode Island Detention Facilitie	1,138,525
8,285,000	Tobacco Settlement Financing Corp., 6.25%, 6/1	7,431,810
		8,570,335
	South Carolina - 5.3%	
1,500,000	Connector 2000 Association, Inc., Toll Road Re	221,250
7,140,000	South Carolina Jobs Economic Development Autho	8,006,439
860,000	South Carolina Jobs Economic Development Autho	974,681
4,400,000	Tobacco Settlement Revenue Management, 6.375%,	5,365,800
		14,568,170

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Tennessee - 3.8%		
1,000,000	Johnson City Health & Educational Facilities B	1,105,860
7,000,000	Knox County Health Educational & Housing Facil	7,353,920
2,400,000	Sullivan County Health Educational and Housing	2,040,816
		10,500,596
Texas - 18.1%		
4,095,000	Dallas-Fort Worth International Airport Facili	4,255,196
2,827,398	Gulf Coast Industrial Development Authority, 7	222,658
10,000,000	Houston Texas Airport System Special Facilitie	9,850,700
845,000	IAH Public Facility Corp., Project Revenue Bon	786,509
1,000,000	IAH Public Facility Corp., Project Revenue Bon	859,760
1,350,000	IAH Public Facility Corp., Project Revenue Bon	1,119,110
2,750,000	Lower Colorado River Authority, 5.0%, 5/15/31	2,691,370
845,000	Lubbock Health Facilities Development Corp., 6	798,567
2,000,000	Lubbock Health Facilities Development Corp., 6	1,798,820
7,750,000	Matagorda County Navigation District Number 1	7,319,565
9,750,000	North Texas Tollway Authority Revenue, 5.75%,	9,351,128
1,711,000	Panhandle Regional Housing Finance Corp. Multi	1,759,267
1,000,000	Richardson Hospital Authority Revenue, 6.0%, 1	897,390
1,000,000	Tarrant County Cultural Education Facilities F	1,004,100
1,500,000	Tarrant County Cultural Education Facilities F	1,513,335
1,000,000	Texas Midwest Public Facility Corp. Revenue, 9	984,270
4,700,000	Tomball Hospital Authority, 6.0%, 7/1/25	4,702,961
		49,914,706
Utah - 0.4%		
1,600,000	Spanish Fork Charter School Revenue, 5.7%, 11/	1,192,000
Virginia - 0.8%		
2,000,000	Washington County Industrial Development Autho	2,209,140
Washington - 3.9%		
1,155,000	Tobacco Settlement Authority Revenue, 6.5%, 6/	1,168,179
2,000,000	Washington State Health Care Facilities Author	1,982,960
2,500,000	Washington State Health Care Facilities Author	2,208,125
2,000,000	Washington State Health Care Facilities Author	1,999,820
5,000,000	Washington State Housing Finance Commission No	3,469,650
		10,828,734
Wisconsin - 1.4%		
2,900,000	Aztalan Wisconsin Exempt Facilities Revenue, 7	362,500
1,000,000	Wisconsin State Health & Educational Facilitie	970,530
1,000,000	Wisconsin State Health & Educational Facilitie	928,930
1,500,000	Wisconsin State Health & Educational Facilitie	1,577,145
		3,839,105
TOTAL TAX-EXEMPT OBLIGATIONS		
	(Cost \$411,041,321)	403,795,438
MUNICIPAL COLLATERALIZED DEBT OBLIGATION - 2.9% of Net Assets		
13,000,000	Non-Profit Preferred Funding Trust I, Series E	7,849,530
	TOTAL MUNICIPAL COLLATERALIZED DEBT OBLIGATION	
	(Cost \$13,000,000)	7,849,530
Shares COMMON STOCK - 0.5% of Net Assets		
110,442	Delta Airlines, Inc.	1,391,569
	TOTAL COMMON STOCK	
	(Cost \$3,210,349)	1,391,569
TOTAL INVESTMENTS IN SECURITIES - 150.1%		
	(Cost \$427,251,670) (i) (j)	413,036,537
	OTHER ASSETS AND LIABILITIES 4.4%	12,086,014
	PREFERRED SHARES AT REDEMPTION VALUE, INCLUDIN-	150,010,569
	NET ASSETS APPLICABLE TO COMMON SHAREOWNERS -	275,111,982

(144A) Security is exempt from registration under Rule 144A of the Securities

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Act of 1933.

Such securities may be resold normally to qualified institutional buyers in a transaction exempt from registration.

At December 31, 2010, the value of these securities amounted to \$29,560,603, or 10.7% 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 December 31, 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 rate at December 31, 2010.

(d) Non-income producing.

(e) Security is fair valued (See Note A).

(f) 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 December 31, 2010.

(g) Indicates a security that has been deemed illiquid. The aggregate cost of

illiquid securities is \$16,342,295. The aggregate value is \$8,212,043, or 3.0% 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	
FSA	5.9 %
AMBAC	1.8
MBIA	1.4
AGM	0.7
Q-SBLF	0.2
Health Revenue	35.5
Tobacco Revenue	11.1
Development Revenue	9.7
Airport Revenue	8.7
Other Revenue	7.4
Pollution Control Revenue	6.5
Housing Revenue	2.8
Facilities Revenue	2.5
Transportation Revenue	2.3

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Education Revenue	1.2
Water Revenue	1.2
Power Revenue	1.1
Utilities Revenue*	0.0
	100.0%

Amount is less than 0.1%

- (j) At December 31, 2010, the net unrealized gain on investments based on cost for federal income tax purposes of \$421,164,839 was as follows:

Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cost \$ 31,254,889

Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over value (39,383,191)  
 Net unrealized gain \$ (8,128,302)

For financial reporting purposes net unrealized loss on investments was \$14,215,133 and cost of investments aggregated \$427,251,670.

Purchases and sales of securities (excluding temporary cash investments) for the nine months ended December 31, 2010 aggregated \$35,093,146 and \$30,073,880, 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.

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 December 31, 2010, in valuing the Trust's Investments:

The following is a summary of the inputs used as of December 31, 2010, in valuing the Fund's assets:

	Level 1	Level 2	Level 3	Total
Tax exempt obligations	\$0	\$403,795,404	\$0	\$403,795,404
Municipal collateralized	0	7,849,530	34	7,849,564
Common Stock	1,391,569	0	0	1,391,569
Total	\$1,391,569	\$411,644,934	\$34	\$413,036,537

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

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Change in unrealized gain (loss)	0
Net purchases (sales)	34
Transfers in and out of level 3	
Balance as of 12/31/10	\$34

### 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.

### 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.



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John F. Cogan, Jr, President

Date March 1, 2011

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, 2011

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

Date March 1, 2011

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