

Pioneer Municipal High Income Advantage Fund, Inc.

Schedule of Investments | December 31,
2023

Ticker Symbol: MAV

Schedule of Investments | 12/31/23

(unaudited)

Principal Amount USD (\$)		Value
UNAFFILIATED ISSUERS — 159.7%		
MUNICIPAL BONDS — 158.2% of Net Assets(a)		
Arizona — 1.4%		
1,325,000	Arizona Industrial Development Authority, Doral Academy Nevada Fire Mesa, Series A, 5.00%, 7/15/39	\$ 1,334,474
1,965,000	Industrial Development Authority of the City of Phoenix, 3rd & Indian School Assisted Living Project, 5.40%, 10/1/36	1,807,682
Total Arizona		\$ 3,142,156
Arkansas — 8.5%		
1,500,000	Arkansas Development Finance Authority, Big River Steel Project, 4.75%, 9/1/49 (144A)	\$ 1,501,935
17,500,000	Arkansas Development Finance Authority, Green Bond, 5.45%, 9/1/52	17,568,600
Total Arkansas		\$ 19,070,535
California — 23.6%		
2,500,000	Bay Area Toll Authority, Series F-2, 2.60%, 4/1/56	\$ 1,655,275
38,610,000(b)	California County Tobacco Securitization Agency, Capital Appreciation, Stanislaus County, Subordinated, Series A, 6/1/46	10,272,577
5,000,000	California Health Facilities Financing Authority, Cedars-Sinai Health System, Series A, 3.00%, 8/15/51	4,000,600
1,500,000	California Municipal Finance Authority, Series A, 5.25%, 11/1/52 (AGM Insured)	1,690,350
1,875,000	California Statewide Communities Development Authority, Lancer Plaza Project, 5.875%, 11/1/43	1,878,787
2,000,000	California Statewide Communities Development Authority, Loma Linda University Medical Center, 5.50%, 12/1/58 (144A)	2,039,060
1,700,000	California Statewide Communities Development Authority, Loma Linda University Medical Center, Series A, 5.00%, 12/1/41 (144A)	1,697,484
5,915,000	California Statewide Communities Development Authority, Loma Linda University Medical Center, Series A, 5.00%, 12/1/46 (144A)	5,853,484
6,465,000	California Statewide Communities Development Authority, Loma Linda University Medical Center, Series A, 5.25%, 12/1/56 (144A)	6,485,494
2,300,000	City of Oroville, Oroville Hospital, 5.25%, 4/1/34	1,576,282
3,500,000	City of Oroville, Oroville Hospital, 5.25%, 4/1/39	2,429,175
5,500,000	City of Oroville, Oroville Hospital, 5.25%, 4/1/49	3,700,290

Principal Amount USD (\$)		Value
California — (continued)		
8,000,000	City of Oroville, Oroville Hospital, 5.25%, 4/1/54	\$ 5,544,080
4,000,000	San Diego County Regional Airport Authority, Private Activity, Series B, 5.25%, 7/1/58	4,319,240
	Total California	\$ 53,142,178
Colorado — 5.6%		
1,000,000	Aerotropolis Regional Transportation Authority, 4.375%, 12/1/52	\$ 843,710
500,000	Colorado Health Facilities Authority, Series A, 4.00%, 8/1/37	499,675
1,000,000	Colorado Health Facilities Authority, Series A, 4.00%, 8/1/44	925,290
1,000,000	Colorado Health Facilities Authority, Series A, 4.00%, 8/1/49	957,660
1,148,000(c)	Cottonwood Highlands Metropolitan District No. 1, Series A, 5.00%, 12/1/49	1,088,453
8,250,000	Dominion Water & Sanitation District, 5.875%, 12/1/52	8,320,868
	Total Colorado	\$ 12,635,656
Connecticut — 0.9%		
2,035,000	Mohegan Tribal Finance Authority, 7.00%, 2/1/45 (144A)	\$ 2,039,477
	Total Connecticut	\$ 2,039,477
Delaware — 0.4%		
450,000	Delaware State Economic Development Authority, Aspira of Delaware Charter, 3.00%, 6/1/32	\$ 382,122
700,000	Delaware State Economic Development Authority, Aspira of Delaware Charter, 4.00%, 6/1/42	570,927
	Total Delaware	\$ 953,049
District of Columbia — 3.0%		
6,630,000	District of Columbia Tobacco Settlement Financing Corp., Asset-Backed, 6.75%, 5/15/40	\$ 6,879,156
	Total District of Columbia	\$ 6,879,156
Florida — 3.0%		
2,500,000	County of Hillsborough, 3.00%, 8/1/46	\$ 2,031,900
550,000	County of Lake, Imagine South Lake, Charter School Project, 5.00%, 1/15/39 (144A)	560,709

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(unaudited) (continued)

Principal Amount USD (\$)		Value
	Florida — (continued)	
825,000	County of Lake, Imagine South Lake, Charter School Project, 5.00%, 1/15/49 (144A)	\$ 785,177
4,300,000	State of Florida Department of Transportation Turnpike System Revenue, Series B, 2.00%, 7/1/37	3,448,815
	Total Florida	\$ 6,826,601
	Idaho — 0.9%	
2,000,000	Power County Industrial Development Corp., FMC Corp. Project, 6.45%, 8/1/32	\$ 2,006,440
	Total Idaho	\$ 2,006,440
	Illinois — 6.4%	
3,760,000(c)	Chicago Board of Education, Series A, 5.00%, 12/1/47	\$ 3,758,271
1,000,000(c)	Chicago Board of Education, Series A, 7.00%, 12/1/46 (144A)	1,090,020
1,200,000(c)	Chicago Board of Education, Series D, 5.00%, 12/1/46	1,192,728
2,000,000(c)	Chicago Board of Education, Series H, 5.00%, 12/1/46	1,983,400
2,000,000(c)	City of Chicago, Series B-R, 5.50%, 1/1/34	2,026,720
140,903(b)	Illinois Finance Authority, Cabs Clare Oaks Project, Series B-1, 11/15/52	8,454
223,202(d)(e)	Illinois Finance Authority, Clare Oaks Project, Series A-3, 4.00%, 11/15/52	145,081
920,000	Illinois Housing Development Authority, Series B, 2.15%, 10/1/41 (GNMA FNMA FHLMC COLL Insured)	715,309
3,000,000	Metropolitan Pier & Exposition Authority, McCormick Place Expansion, 4.00%, 6/15/50	2,857,560
1,015,000(d)	Southwestern Illinois Development Authority, Village of Sauget Project, 5.625%, 11/1/26	761,250
	Total Illinois	\$ 14,538,793
	Indiana — 0.5%	
1,000,000	Indiana Finance Authority, Multipurpose Educational Facilities, Avondale Meadows Academy Project, 5.125%, 7/1/37	\$ 1,015,480
	Total Indiana	\$ 1,015,480

Principal Amount USD (\$)		Value
	Iowa — 3.8%	
6,900,000	Iowa Finance Authority, Alcoa Inc. Projects, 4.75%, 8/1/42	\$ 6,753,858
2,055,000	Iowa Tobacco Settlement Authority, Series A-2, 4.00%, 6/1/49	1,853,795
	Total Iowa	\$ 8,607,653
	Maine — 0.8%	
2,000,000	Maine Health & Higher Educational Facilities Authority, Series A, 4.00%, 7/1/50	\$ 1,906,040
	Total Maine	\$ 1,906,040
	Maryland — 1.0%	
2,700,000	Maryland State Transportation Authority, Series A, 3.00%, 7/1/47	\$ 2,167,479
	Total Maryland	\$ 2,167,479
	Massachusetts — 9.0%	
1,000,000(c)	Commonwealth of Massachusetts, Series C, 3.00%, 3/1/49	\$ 794,280
3,500,000	Massachusetts Development Finance Agency, Lowell General Hospital, Series G, 5.00%, 7/1/44	3,498,565
8,000,000	Massachusetts Development Finance Agency, WGBH Educational Foundation, Series A, 5.75%, 1/1/42 (AMBAC Insured)	10,438,400
1,315,000	Massachusetts Housing Finance Agency, Series A-1, 4.20%, 12/1/52	1,284,045
2,790,000(c)	Town of Arlington, 2.00%, 9/15/40	2,038,402
950,000(c)	Town of Plymouth, 2.00%, 5/1/34	811,443
2,160,000(c)	Town of Rockland, 2.20%, 8/1/50	1,430,179
	Total Massachusetts	\$ 20,295,314
	Michigan — 0.9%	
1,985,000	David Ellis Academy-West, 5.25%, 6/1/45	\$ 1,876,976
205,000	Michigan Public Educational Facilities Authority, Crescent Academy, 7.00%, 10/1/36	205,636
	Total Michigan	\$ 2,082,612
	Minnesota — 1.2%	
1,000,000	City of Ham Lake, DaVinci Academy, Series A, 5.00%, 7/1/47	\$ 952,720
1,740,000	City of Rochester, Health Care Facilities, Mayo Clinic, 4.00%, 11/15/48	1,744,402
	Total Minnesota	\$ 2,697,122

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(unaudited) (continued)

Principal Amount USD (\$)		Value
	Montana — 0.3%	
2,445,000(d)(e)	City of Hardin, Tax Allocation, Rocky Mountain Power, Inc., Project, 6.25%, 9/1/31	\$ 537,900
1,000,000(d)	Two Rivers Authority, 7.375%, 11/1/27	50,000
	Total Montana	\$ 587,900
	New Hampshire — 0.5%	
1,375,000	New Hampshire Health and Education Facilities Authority Act, Catholic Medical Centre, 3.75%, 7/1/40	\$ 1,083,651
	Total New Hampshire	\$ 1,083,651
	New Jersey — 0.4%	
1,000,000	New Jersey Economic Development Authority, Marion P. Thomas Charter School, Inc., Project, Series A, 5.375%, 10/1/50 (144A)	\$ 943,390
	Total New Jersey	\$ 943,390
	New York — 10.6%	
3,000,000	Erie Tobacco Asset Securitization Corp., Asset-Backed, Series A, 5.00%, 6/1/45	\$ 2,755,230
2,000,000	Metropolitan Transportation Authority, Green Bond, Series C-1, 5.25%, 11/15/55	2,105,920
5,000,000	Metropolitan Transportation Authority, Green Bond, Series D-2, 4.00%, 11/15/48	4,855,900
2,530,000	New York Counties Tobacco Trust IV, Settlement pass through, Series A, 5.00%, 6/1/45	2,357,150
3,240,000	New York Counties Tobacco Trust VI, Series 2B, 5.00%, 6/1/45	3,068,669
4,685,000	New York State Housing Finance Agency, Sustainability Bond, Series G, 2.73%, 11/1/51 (SONYMA Insured)	3,256,590
1,750,000	New York Transportation Development Corp., Green Bond, 5.375%, 6/30/60	1,818,408
2,000,000	TSASC, Inc., Series B, 5.00%, 6/1/48	1,803,200
1,168,828	Westchester County Healthcare Corp., Series A, 5.00%, 11/1/44	1,180,703
1,000,000	Westchester County Local Development Corp., Purchase Senior Learning Community, Inc. Project, 4.50%, 7/1/56 (144A)	760,420
	Total New York	\$ 23,962,190
	North Carolina — 1.5%	
500,000	City of Charlotte Airport Revenue, Series A, 5.00%, 7/1/42	\$ 524,835

Principal Amount USD (\$)		Value
	North Carolina — (continued)	
500,000	City of Charlotte Water & Sewer System Revenue, 2.00%, 7/1/41	\$ 355,115
1,000,000	City of Charlotte Water & Sewer System Revenue, 2.00%, 7/1/42	693,860
2,500,000(c)	County of Mecklenburg, 2.00%, 3/1/41	1,810,575
	Total North Carolina	\$ 3,384,385
	Ohio — 8.1%	
15,855,000	Buckeye Tobacco Settlement Financing Authority, Senior Class 2, Series B-2, 5.00%, 6/1/55	\$ 14,877,222
1,500,000	County of Muskingum, Genesis Healthcare System Project, 5.00%, 2/15/44	1,411,380
2,000,000	State of Ohio, 5.00%, 12/31/39	2,019,880
	Total Ohio	\$ 18,308,482
	Oregon — 4.4%	
10,000,000	Medford Hospital Facilities Authority, Asante Project, Series A, 4.00%, 8/15/45 (AGM Insured)	\$ 9,900,900
	Total Oregon	\$ 9,900,900
	Pennsylvania — 9.8%	
1,000,000	Chester County Industrial Development Authority, Collegium Charter School, Series A, 5.25%, 10/15/47	\$ 933,770
6,665,000	Montgomery County Higher Education and Health Authority, Thomas Jefferson University, 4.00%, 9/1/49	6,352,012
4,585,000	Montgomery County Higher Education and Health Authority, Thomas Jefferson University, Series B, 5.00%, 5/1/52	4,798,753
6,000,000	Pennsylvania Higher Educational Facilities Authority, University of Pennsylvania, 4.00%, 8/15/49	5,895,000
2,500,000	Philadelphia Authority for Industrial Development, 5.125%, 12/15/44 (144A)	2,357,100
500,000	Philadelphia Authority for Industrial Development, 5.50%, 6/1/49 (144A)	478,505
1,000,000	Philadelphia Authority for Industrial Development, Global Leadership Academy Charter School Project, Series A, 5.00%, 11/15/50	920,680
470,000	Philadelphia Authority for Industrial Development, Greater Philadelphia Health Action, Inc., Project, Series A, 6.625%, 6/1/50	471,057
	Total Pennsylvania	\$ 22,206,877

Schedule of Investments | 12/31/23

(unaudited) (continued)

Principal Amount USD (\$)		Value
Puerto Rico — 20.6%		
2,375,679(c)	Commonwealth of Puerto Rico, Restructured Series A-1, 4.00%, 7/1/37	\$ 2,233,376
5,021,480(c)	Commonwealth of Puerto Rico, Restructured Series A-1, 4.00%, 7/1/41	4,576,979
6,810,000(c)	Commonwealth of Puerto Rico, Restructured Series A-1, 4.00%, 7/1/46	6,067,710
2,000,000	Puerto Rico Commonwealth Aqueduct & Sewer Authority, Series A, 5.00%, 7/1/37 (144A)	2,008,240
16,250,000	Puerto Rico Commonwealth Aqueduct & Sewer Authority, Series A, 5.00%, 7/1/47 (144A)	15,636,237
1,000,000	Puerto Rico Electric Power Authority, Series AAA, 5.25%, 7/1/21	260,000
3,000,000	Puerto Rico Sales Tax Financing Corp. Sales Tax Revenue, Restructured Series A-1, 4.75%, 7/1/53	2,943,900
10,255,000	Puerto Rico Sales Tax Financing Corp. Sales Tax Revenue, Restructured Series A-1, 5.00%, 7/1/58	10,254,897
2,500,000	Puerto Rico Sales Tax Financing Corp. Sales Tax Revenue, Restructured Series A-2, 4.784%, 7/1/58	2,464,225
	Total Puerto Rico	\$ 46,445,564
Rhode Island — 0.2%		
1,355,000(d)	Central Falls Detention Facility Corp., 7.25%, 7/15/35	\$ 542,000
	Total Rhode Island	\$ 542,000
South Carolina — 2.3%		
4,400,000(f)	Tobacco Settlement Revenue Management Authority, Series B, 6.375%, 5/15/30	\$ 5,154,292
	Total South Carolina	\$ 5,154,292
South Dakota — 1.8%		
4,000,000	South Dakota Health & Educational Facilities Authority, Sanford Health, Series B, 4.00%, 11/1/44	\$ 3,973,720
	Total South Dakota	\$ 3,973,720
Texas — 13.7%		
500,000	Arlington Higher Education Finance Corp., 5.45%, 3/1/49 (144A)	\$ 530,345
1,000,000	Arlington Higher Education Finance Corp., Universal Academy, Series A, 7.00%, 3/1/34	1,003,540
1,500,000	Arlington Higher Education Finance Corp., Universal Academy, Series A, 7.125%, 3/1/44	1,500,405
5,300,000	Central Texas Regional Mobility Authority, Senior Lien, Series D, 3.00%, 1/1/46	4,030,915
7,345,000	City of Houston Airport System Revenue, 4.00%, 7/15/41	6,564,741

Principal Amount USD (\$)		Value
Texas — (continued)		
1,000,000	City of Houston Airport System Revenue, Series A, 4.00%, 7/1/41	\$ 893,760
5,000,000(e)	Greater Texas Cultural Education Facilities Finance Corp., 9.00%, 2/1/50 (144A)	4,675,000
6,960,000(d)	Sanger Industrial Development Corp., Texas Pellets Project, Series B, 8.00%, 7/1/38	1,713,900
946,978	Texas Department of Housing & Community Affairs, Series 2020-HOLL, 2.30%, 7/1/37 (FNMA HUD SECT 8 Insured)	792,800
1,000,000(e)	Texas Midwest Public Facility Corp., Secure Treatment Facility Project, Restructured, 12/1/30	691,090
2,500,000	Texas Private Activity Bond Surface Transportation Corp., Blueridge Transportation Group, LLC SH 288 Toll Lanes Project, 5.00%, 12/31/50	2,522,450
6,000,000	Texas Private Activity Bond Surface Transportation Corp., Segment 3C Project, 5.00%, 6/30/58	6,071,460
	Total Texas	\$ 30,990,406
Virginia — 12.3%		
2,035,000	Lynchburg Economic Development Authority, 3.00%, 1/1/51	\$ 1,506,836
9,550,000	Tobacco Settlement Financing Corp., Series B-1, 5.00%, 6/1/47	9,057,220
2,000,000	Virginia College Building Authority, Public Higher Education Financing Program, Series C, 3.00%, 9/1/51 (ST INTERCEPT Insured)	1,588,520
10,000(g)	Virginia Public Building Authority, Series A, 4.00%, 8/1/40	10,942
990,000	Virginia Public Building Authority, Series A, 4.00%, 8/1/40	1,023,743
1,000,000	Virginia Small Business Financing Authority, Senior Lien, 5.00%, 12/31/47	1,006,980
1,000,000	Virginia Small Business Financing Authority, Senior Lien 95 Express Lanes LLC Project, 4.00%, 1/1/48	926,160
5,500,000	Virginia Small Business Financing Authority, Transform 66-P3 Project, 5.00%, 12/31/49	5,528,765
2,500,000	Virginia Small Business Financing Authority, Transform 66-P3 Project, 5.00%, 12/31/52	2,510,475
4,600,000	Virginia Small Business Financing Authority, Transform 66-P3 Project, 5.00%, 12/31/56	4,613,202
	Total Virginia	\$ 27,772,843

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(unaudited) (continued)

Principal Amount USD (\$)		Value
750,000	Wisconsin — 0.8% Public Finance Authority, Roseman University Health Sciences Project, 5.875%, 4/1/45	\$ 756,000
1,000,000	Public Finance Authority, SearStone CCRC Project, Series A, 5.00%, 6/1/37 (144A)	955,930
	Total Wisconsin	\$ 1,711,930
	TOTAL MUNICIPAL BONDS (Cost \$364,199,594)	\$ 356,974,271
	U.S. GOVERNMENT AND AGENCY OBLIGATIONS — 1.5% of Net Assets	
1,200,000(b)	U.S. Treasury Bills, 1/16/24	\$ 1,197,546
2,200,000(b)	U.S. Treasury Bills, 1/23/24	2,193,239
	TOTAL U.S. GOVERNMENT AND AGENCY OBLIGATIONS (Cost \$3,390,302)	\$ 3,390,785
	TOTAL INVESTMENTS IN UNAFFILIATED ISSUERS — 159.7% (Cost \$367,589,896)	\$ 360,365,056
	OTHER ASSETS AND LIABILITIES — (59.7)%	\$(134,704,563)
	NET ASSETS — 100.0%	\$ 225,660,493

AGM	Assured Guaranty Municipal Corp.
AMBAC	Ambac Assurance Corporation.
FHLMC	Federal Home Loan Mortgage Corporation.
FNMA	Federal National Mortgage Association.
FNMA HUD SECT 8	Federal National Mortgage Association U.S. Department of Housing and Urban Development Section 8.
GNMA	Government National Mortgage Association.
SONYMA	State of New York Mortgage Agency.
ST INTERCEPT (144A)	State Aid Intercept. The resale of such security is exempt from registration under Rule 144A of the Securities Act of 1933. Such securities may be resold normally to qualified institutional buyers. At December 31, 2023, the value of these securities amounted to \$50,398,007, or 22.3% of net assets.
(a)	Consists of Revenue Bonds unless otherwise indicated.
(b)	Security issued with a zero coupon. Income is recognized through accretion of discount.
(c)	Represents a General Obligation Bond.
(d)	Security is in default.

- (e) The interest rate is subject to change periodically. The interest rate and/or reference index and spread shown at December 31, 2023.
- (f) Escrow to maturity.
- (g) Pre-refunded 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.

Various inputs are used in determining the value of the Fund's investments. These inputs are summarized in the three broad levels below.

Level 1 - unadjusted 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 risks, etc.).

Level 3 - significant unobservable inputs (including the Adviser's own assumptions in determining fair value of investments).

The following is a summary of the inputs used as of December 31, 2023 in valuing the Fund's investments:

	Level 1	Level 2	Level 3	Total
Municipal Bonds	\$—	\$356,974,271	\$—	\$356,974,271
U.S. Government and Agency Obligations	—	3,390,785	—	3,390,785
Total Investments in Securities	\$—	\$360,365,056	\$—	\$360,365,056

During the period ended December 31, 2023, there were no transfers in or out of Level 3.