District of Columbia
Bowie
College Park
Frederick County
Gaithersburg
Greenbelt
Montgomery County
Prince George's County
Rockville
Takoma Park
Alexandria
Arlington County
Fairfax
Fairfax County
Falls Church
Loudoun County
Manassas
Manassas Park
Prince William County

Memorandum

Date: February 28, 2006

To: Jim Ponticello
VDOT

From: Daivamani Sivasailam
Department of Transportation Planning

Subject: Evaluation of 2005 Vehicle Registration Data for Northern Virginia Jurisdictions of the Washington Non-Attainment Area

Attached to this memo is the draft documentation, findings and recommendations for developing 2005 vehicle registration and diesel sales fraction inputs to the Mobile 6.2 model using the VIN decoder software. Some of the issues we will like to bring to your attention are the dip in the percentage of 2 year old vehicles (light duty), no diesel vehicles for a number of years in the light duty side, and the high percentage of diesel vehicles for model year 25+ again in the light duty arena. For registration data we recommend using the VIN generated results by jurisdiction and facility type. For diesel sales fraction we recommend aggregating the data to generate diesel sales fraction by northern Virginia but for each vehicle type with the exception of school and transit buses. Please review the data set and provide your comments.

Cc: Michael Freeman.

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Date: February 28, 2006

To: File

From: Michael Freeman

Subject: Evaluation of 2005 Vehicle Registration Data for Northern Virginia Jurisdictions of the Washington Area

Background

The Mobile 6.2 model that is used to develop emissions rates for mobile source emissions inventory for the State Implementation Plan (SIP) and transportation conformity analysis requires a number of vehicle-specific inputs. In the Washington non-attainment region emissions rates are developed for each jurisdiction in the non-attainment area. Two of the inputs are: vehicle registration data used to develop age distribution by vehicle type, and the percentage of diesel vehicles for each vehicle type. As part of the interagency consultation procedures in place, the transportation department and the environmental department have agreed to update these data sets once every three years. The region has been using 2002 registration data sets for all emissions analysis and we are in the process of using the 2005 raw registration data information to develop 2005 input files to the Mobile 6.2 model.

Vehicle registration data have been used to develop the two input files used in the Mobile 6.2 model; namely "xxx.rdt" (age distribution by vehicle type) and "xxx.dsf" (percentage of diesel vehicles for each vehicle type and for each model year). VDOT staff has transmitted to TPB staff 2005 raw registration data files as well as "xxx.rdt" and "xxx.dsf" files developed using their own methodology from the 2005 raw registration data. TPB staff has

used these raw data to produce a second set of "xxx.rdt" and "xxx.dsf" files using a method that includes vehicle identification number (VIN) decoding software. This memo will document TPB staff's findings and make recommendations for developing rdt and dsf files for future air quality planning studies.

Methodology

COG used the following outline to develop rdt and dsf files (depicted graphically in Attachment 1.0).:

1) Extract all unique VIN (deleting duplicates and purging expired registrations) by jurisdiction from the 2005 vehicle registration database (July 2005 snapshot) and decode with VINPOWER decoding software. The decoding software provided model year, Mobile 6.2 vehicle type, and other vehicle attributes. Attachment 1A summarizes the VIN control totals and decoded results. A summary of the number of decoded VIN by vehicle type and jurisdiction is provided in Attachment 1B.
2) Convert the decode results:
    a. Vehicle age distribution: This is the first of the two input files needed.
        i. *Vehicle type*: The VIN decoder software breaks down the registration data in to the Mobile 6.2 28 vehicle categories. However, the current version of Mobile 6.2 16 can only handle registration (xxx.rdt) files in 16 vehicle types and it uses the "xxx.dsf" files internally to break it into 28 categoires. Therefore, the decoded data are converted from the 28 (Mobile 6.2) types to 16 vehicle types by combining the diesel and gasoline vehicle types. Attachment 2 shows the method used for converting the 28 types to 16 types.
        ii. *Model Years*: Since the raw registration file reflects July 1, 2005 conditions, it includes model year 2005 and 2006 as the first year vehicles. The Mobile 6.2 guidance recommends combining the two model years into model year 'one'. In addition, Vinpower does not

decode VINs for vehicles that were manufactured prior to 1980 since the VINs did not meet International Standards Organization (ISO) standards prior to 1980. In order to solve this problem, we used the decoded results to directly assign vehicles to model years one through twenty-four, and used the year 24 profile to develop year 25 and older model years. The vehicle registration records were used to determine control totals by jurisdiction for: (A) Mobile 6 vehicle type years < than 25; (B) Mobile 6 vehicle types year = 25 or older. For Mobile 6 vehicle type year = 25, apply regional distribution for mobile year = 24 and normalize to match control total % from step (B). For Mobile years 1 through 24, use vin decode results to develop distributions by vehicle type and year. Then normalize years 1 through 24 of each row so that years 1 through 25 = 100%. Develop 16 (vehicle type) by 25 (Mobile 6 year) matrices by jurisdiction. This is the rdt file for input into Mobile 6.

b. Diesel percentages by vehicle type: This is the second input file needed in Mobile 6.2 model. For percentage of diesel vehicles by vehicle type and by year (xxx.dsf) file development, use the vehicle equivalency table and the VIN decode to calculate the number of diesel and gasoline vehicles for each of the 16 vehicle types. The ratio of diesel vehicles to the total number of vehicles is the dsf for each category. Since the VIN decoder will not decode for year 25, use the dsf calculated for year 24 for year 25, also.

Comparison with VDOT Data

The next step in the processes was to compare the data developed using the methodology described above with data developed by VDOT staff. The attached comparison charts were used to summarize the findings.

1) Vehicle Age Distribution

a. For LDV and LDT1, LDT2, LDT3, LDT4 (less so than the others) vehicle types, the estimates from VDOT and the VIN Decodes are very close for each jurisdiction.
b. Generally "Heavy Duty" vehicle categories do not track as well as "Light Duty" vehicle categories among all jurisdictions.
c. For the motorcycle category, the VDOT method seems to put all vehicles older than 12 years into the 12th year category and no values are provided for years 13 through 25.

2) Percentage of Diesel Vehicles: For this comparison we aggregated all the northern Virginia data into one instead of breaking down by jurisdiction and compared them against Mobile 6 defaults. The reason behind this action was due to the fact that diesel vehicles by vehicle types were low in a number of jurisdictions and by aggregating we were able to increase the total number of vehicles for each vehicle type.

a *LDV: Both the vin decodes and Mobile defaults have dsf values near zero for* years 1 to 20. For years 20 to 25, the mobile defaults increase to about 0.08, but the dsf values based on VIN decodes increase to about 0.25 for the same years.

b *LDT1/LDT2:* The DSF values generated by the VIN decode method are near zero for a number of years as compared to the Mobile 6 default.

c *LDT3/LDT4:* The VIN decoder identifies diesel vehicles in most of the years for these categories. For LDT3 both VIN decode and Mobile defaults have low values, typically less than 0.02. For LDT4, the Mobile default is also low, but the VIN decode values rise from about 0.1 in year 19 to 0.4 in year 24.

d. *HDV2B:* VIN decoder and Mobile defaults are fairly close with VIN decodes slightly higher in years 1 through 10 and mobile defaults slightly higher in years 11 through 24.
e. *HDV3/HDV4:* VIN decodes are lower than Mobile defaults for these categories, particularly in later years.
f. *HDV5/HDV6/HDV7:* VIN decodes are higher than Mobile defaults for these categories.
g. *HDV8A/HDV8B:* Both VIN decodes and Mobile defaults have dsf values at or near 1.0.

Recommendations

1) Age Distributions

- Use distributions developed by COG based on VIN decode results for each jurisdiction and 14 vehicle types. For school bus and transit bus use Mobile defaults for HDBT/HDBS because busses vehicle registration data reflects that busses are purchased infrequently in large numbers with big variations from year.

2) Diesel Fractions

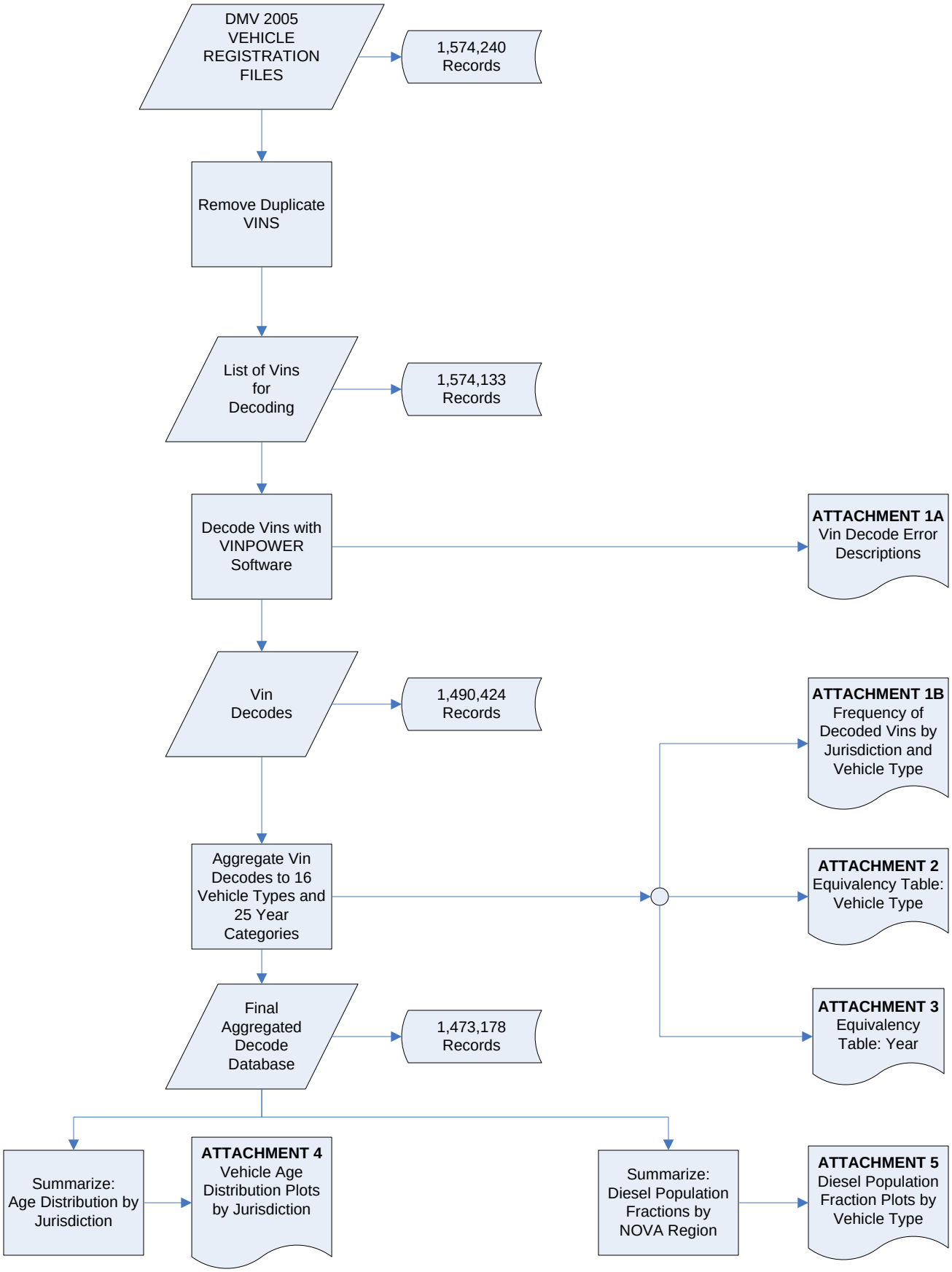
- It is clear we need to use NOVA level aggregation for vehicle type diesel percentages. It is recommended we use VIN decode results for LDV, and all the HD vehicles. For the remaining types HDBT and HDBS it is recommended we use Mobile 6 defaults.

Summary Recommendation Table

Vehicle Type	Vin Generated		Mobile 6 Defaults	
	RDT **(By Jurisdiction)**	DSF (By NOVA Region)	RDT	DSF
LDV	X	X		
LDT1	X	X		
LDT2	X	X		
LDT3	X	X		
LDT4	X	X		
HDV2B	X	X		
HDV3	X	X		
HDV4	X	X		
HDV5	X	X		
HDV6	X	X		
HDV7	X	X		
HDV8A	X	X		
HDV8B	X	X		
HDBS			X	X
HDBT			X	X
MC	X	X		

LIST OF ATTACHMENTS

ATTACHMENT 1.0
Vin Decode Process Flowchart



ATTACHMENT 1B
FREQUENCY OF DECODED VINS BY JURISDICTION AND VEHICLE TYPE

Sum of Count	Jurisdiction					
Vehicle Type	ALX	ARL	FFX	LDN	PW	Grand Total
HDBS	238	139	1,767	447	512	3,103
HDBt	281	182	1,287	539	1,413	3,702
HDV2B	1,568	1,376	14,527	6,195	9,562	33,228
HDV3	274	264	2,928	1,404	2,447	7,317
HDV4	345	280	2,466	876	1,489	5,456
HDV5	84	55	744	362	541	1,786
HDV6	301	95	1,680	798	1,211	4,085
HDV7	145	70	963	448	669	2,295
HDV8A	193	156	1,696	946	1,322	4,313
HDV8B	26	17	334	252	330	959
LDT1	1,032	1,142	6,224	1,429	2,587	12,414
LDT2	29,450	28,581	201,269	56,439	85,170	400,909
LDT3	6,123	5,001	45,544	15,717	25,426	97,811
LDT4	1,494	1,210	13,188	4,965	7,369	28,226
LDV	84,759	83,001	437,485	92,847	145,737	843,829
MC	1,281	1,447	10,275	3,775	6,967	23,745
Grand Total	127,594	123,016	742,377	187,439	292,752	1,473,178

Sum of Count (%)	Jurisdiction					
Vehicle Type	ALX	ARL	FFX	LDN	PW	Grand Total
HDBS	0.02%	0.01%	0.12%	0.03%	0.03%	0.21%
HDBt	0.02%	0.01%	0.09%	0.04%	0.10%	0.25%
HDV2B	0.11%	0.09%	0.99%	0.42%	0.65%	2.26%
HDV3	0.02%	0.02%	0.20%	0.10%	0.17%	0.50%
HDV4	0.02%	0.02%	0.17%	0.06%	0.10%	0.37%
HDV5	0.01%	0.00%	0.05%	0.02%	0.04%	0.12%
HDV6	0.02%	0.01%	0.11%	0.05%	0.08%	0.28%
HDV7	0.01%	0.00%	0.07%	0.03%	0.05%	0.16%
HDV8A	0.01%	0.01%	0.12%	0.06%	0.09%	0.29%
HDV8B	0.00%	0.00%	0.02%	0.02%	0.02%	0.07%
LDT1	0.07%	0.08%	0.42%	0.10%	0.18%	0.84%
LDT2	2.00%	1.94%	13.66%	3.83%	5.78%	27.21%
LDT3	0.42%	0.34%	3.09%	1.07%	1.73%	6.64%
LDT4	0.10%	0.08%	0.90%	0.34%	0.50%	1.92%
LDV	5.75%	5.63%	29.70%	6.30%	9.89%	57.28%
MC	0.09%	0.10%	0.70%	0.26%	0.47%	1.61%
Grand Total	8.66%	8.35%	50.39%	12.72%	19.87%	100.00%

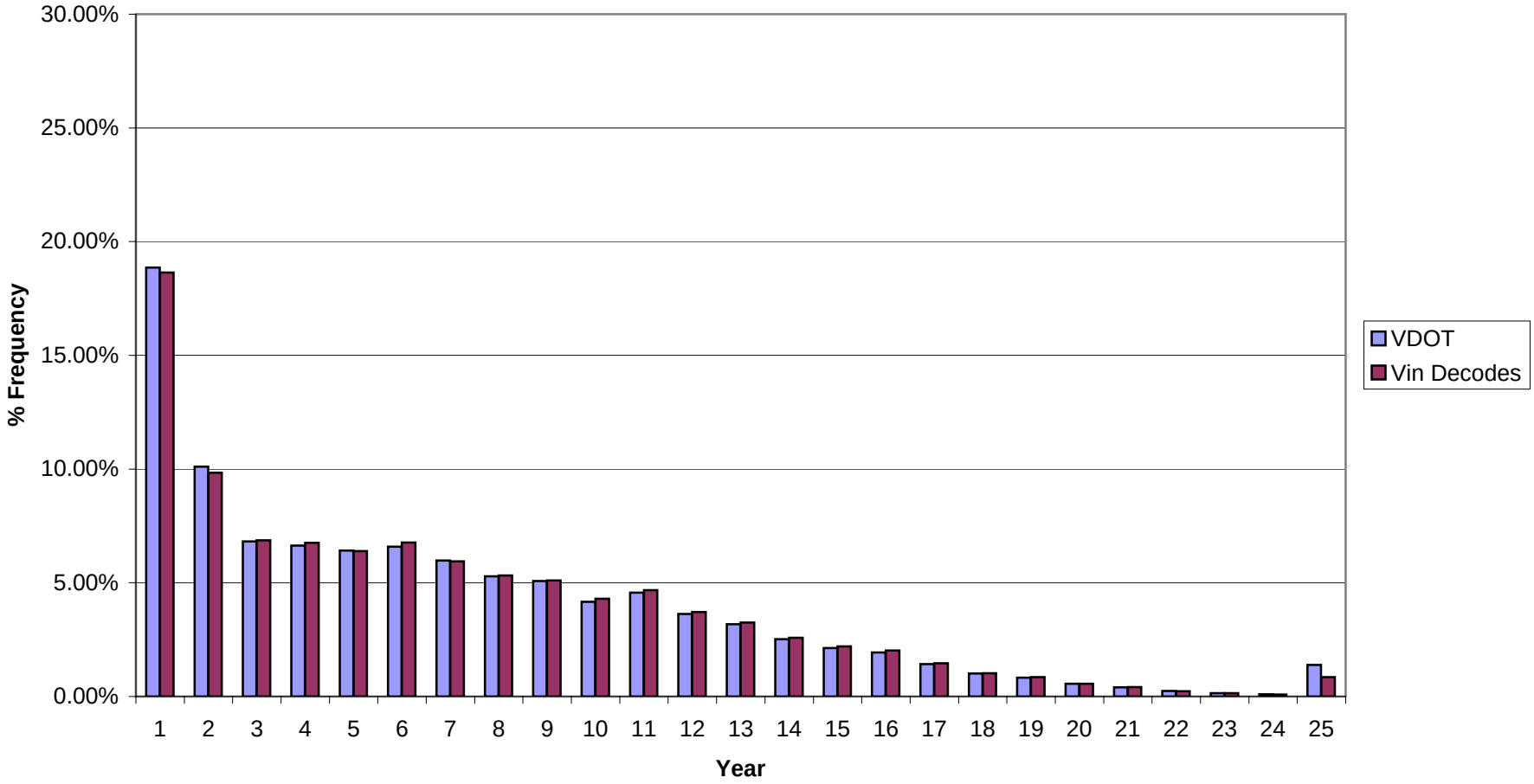
ATTACHMENT 2
EQUIVALENCY TABLE - VEHICLE TYPE

Mobile 6 Vehicle Type		COG Vehicle Type																TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
		LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4	HDV5	HDV6	HDV7	HDV8A	HDV8B	HDBS	HDBT	MC	
1	LDGV	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
2	LDGT1	-	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
3	LDGT2	-	-	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
4	LDGT3	-	-	-	1.00	-	-	-	-	-	-	-	-	-	-	-	-	1.00
5	LDGT4	-	-	-	-	1.00	-	-	-	-	-	-	-	-	-	-	-	1.00
6	HDGV2B	-	-	-	-	-	1.00	-	-	-	-	-	-	-	-	-	-	1.00
7	HDGV3	-	-	-	-	-	-	1.00	-	-	-	-	-	-	-	-	-	1.00
8	HDGV4	-	-	-	-	-	-	-	1.00	-	-	-	-	-	-	-	-	1.00
9	HDGV5	-	-	-	-	-	-	-	-	1.00	-	-	-	-	-	-	-	1.00
10	HDGV6	-	-	-	-	-	-	-	-	-	1.00	-	-	-	-	-	-	1.00
11	HDGV7	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-	-	-	1.00
12	HDGV8A	-	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-	-	1.00
13	HDGV8B	-	-	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-	1.00
14	LDDV	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
15	LDDT12	-	0.50	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00
16	HDDV2B	-	-	-	-	-	1.00	-	-	-	-	-	-	-	-	-	-	1.00
17	HDDV3	-	-	-	-	-	-	1.00	-	-	-	-	-	-	-	-	-	1.00
18	HDDV4	-	-	-	-	-	-	-	1.00	-	-	-	-	-	-	-	-	1.00
19	HDDV5	-	-	-	-	-	-	-	-	1.00	-	-	-	-	-	-	-	1.00
20	HDDV6	-	-	-	-	-	-	-	-	-	1.00	-	-	-	-	-	-	1.00
21	HDDV7	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-	-	-	1.00
22	HDDV8A	-	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-	-	1.00
23	HDDV8B	-	-	-	-	-	-	-	-	-	-	-	-	1.00	-	-	-	1.00
24	MC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	1.00
25	HDGB	-	-	-	-	-	-	-	-	-	-	-	-	-	0.50	0.50	-	1.00
26	HDDBT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	-	1.00
27	HDDBS	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	-	-	1.00
28	LDDT34	-	-	-	0.50	0.50	-	-	-	-	-	-	-	-	-	-	-	1.00

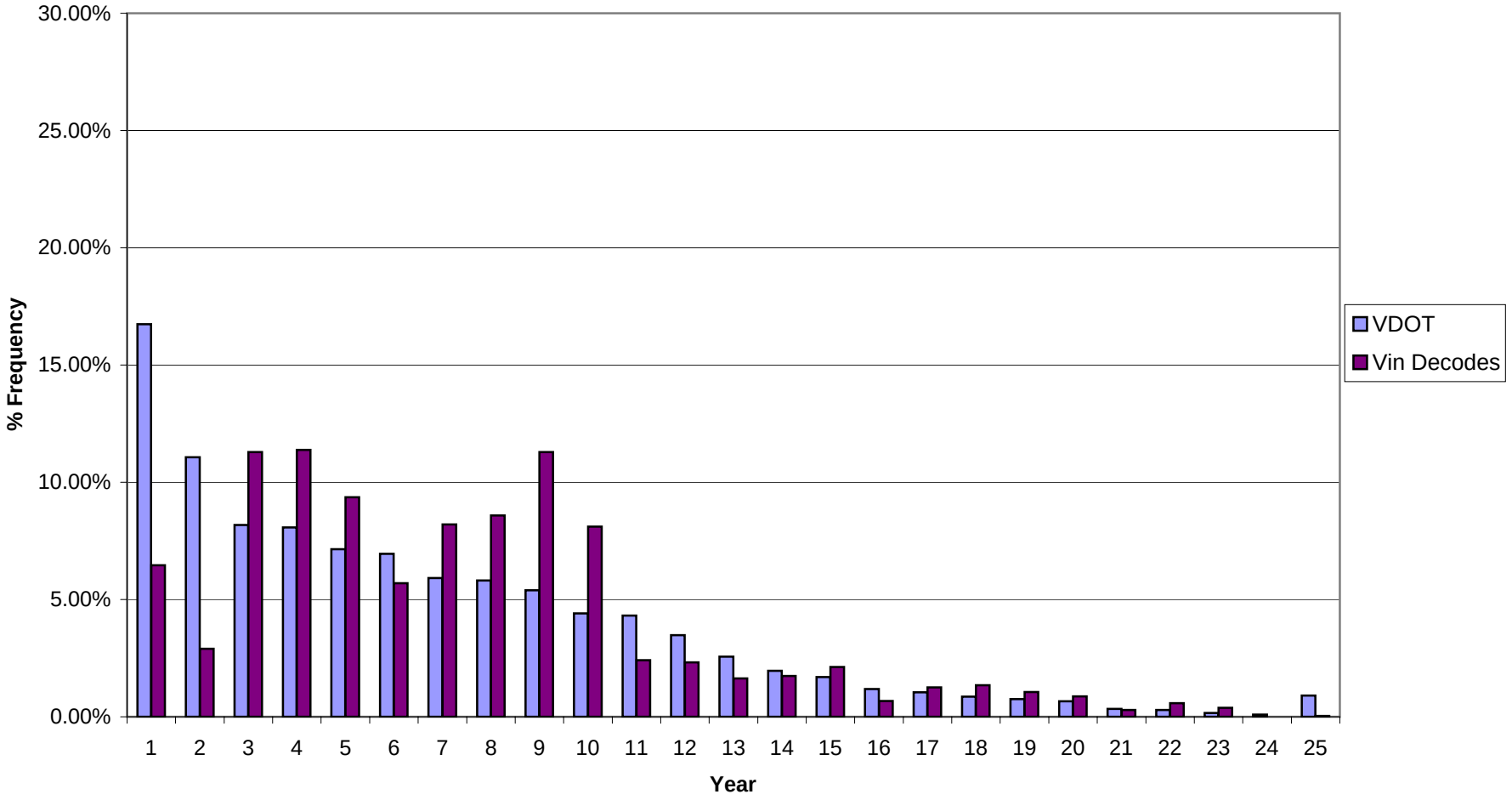
EQUIVALENCY TABLE - YEAR

Vehicle Model Year	Mobile 6 Year
2006, 2005	1
2004	2
2003	3
2002	4
2001	5
2000	6
1999	7
1998	8
1997	9
1996	10
1995	11
1994	12
1993	13
1992	14
1991	15
1990	16
1989	17
1988	18
1987	19
1986	20
1985	21
1984	22
1983	23
1982	24
<= 1981	25

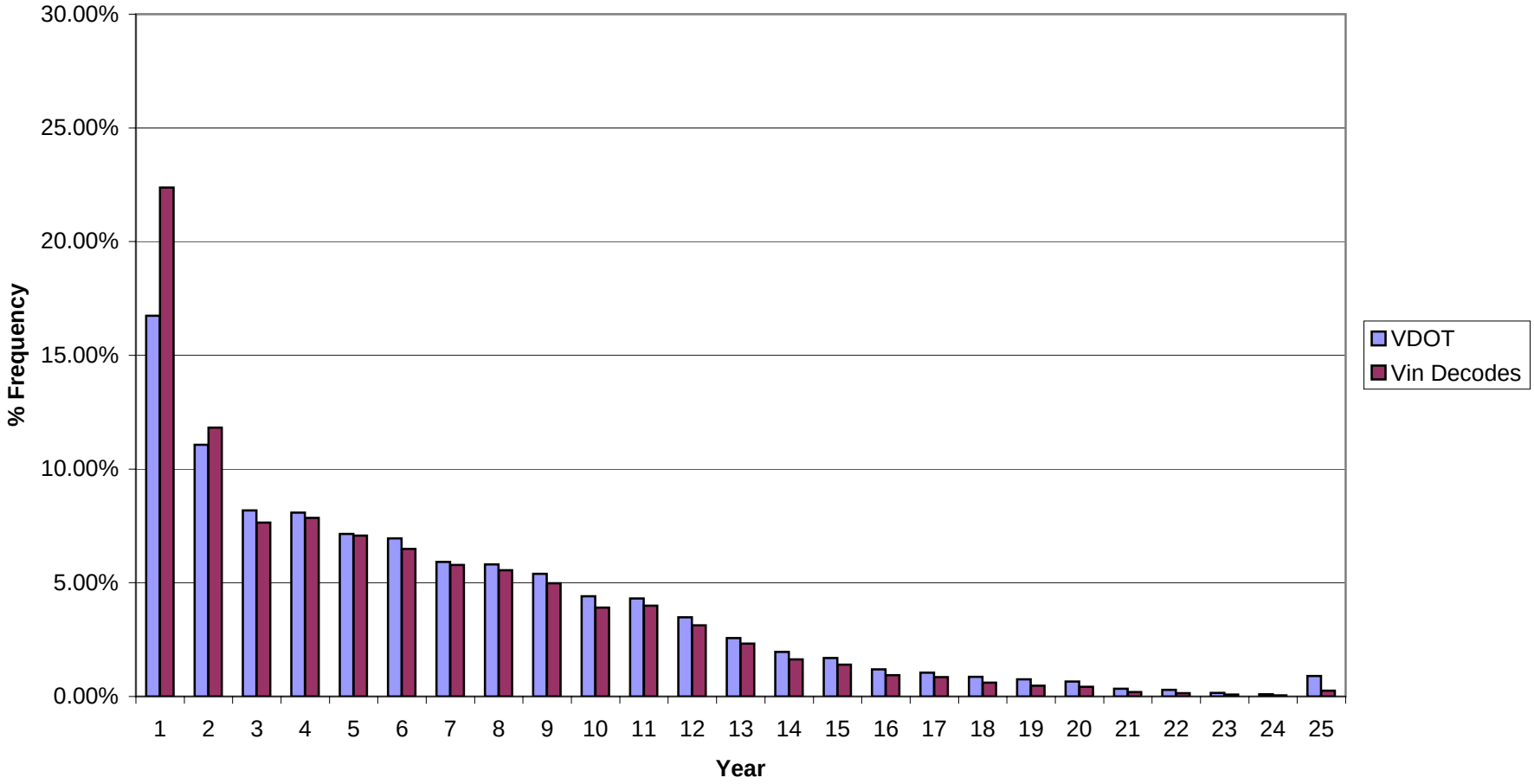
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = LDV
Number of Decoded Vins = 84,759



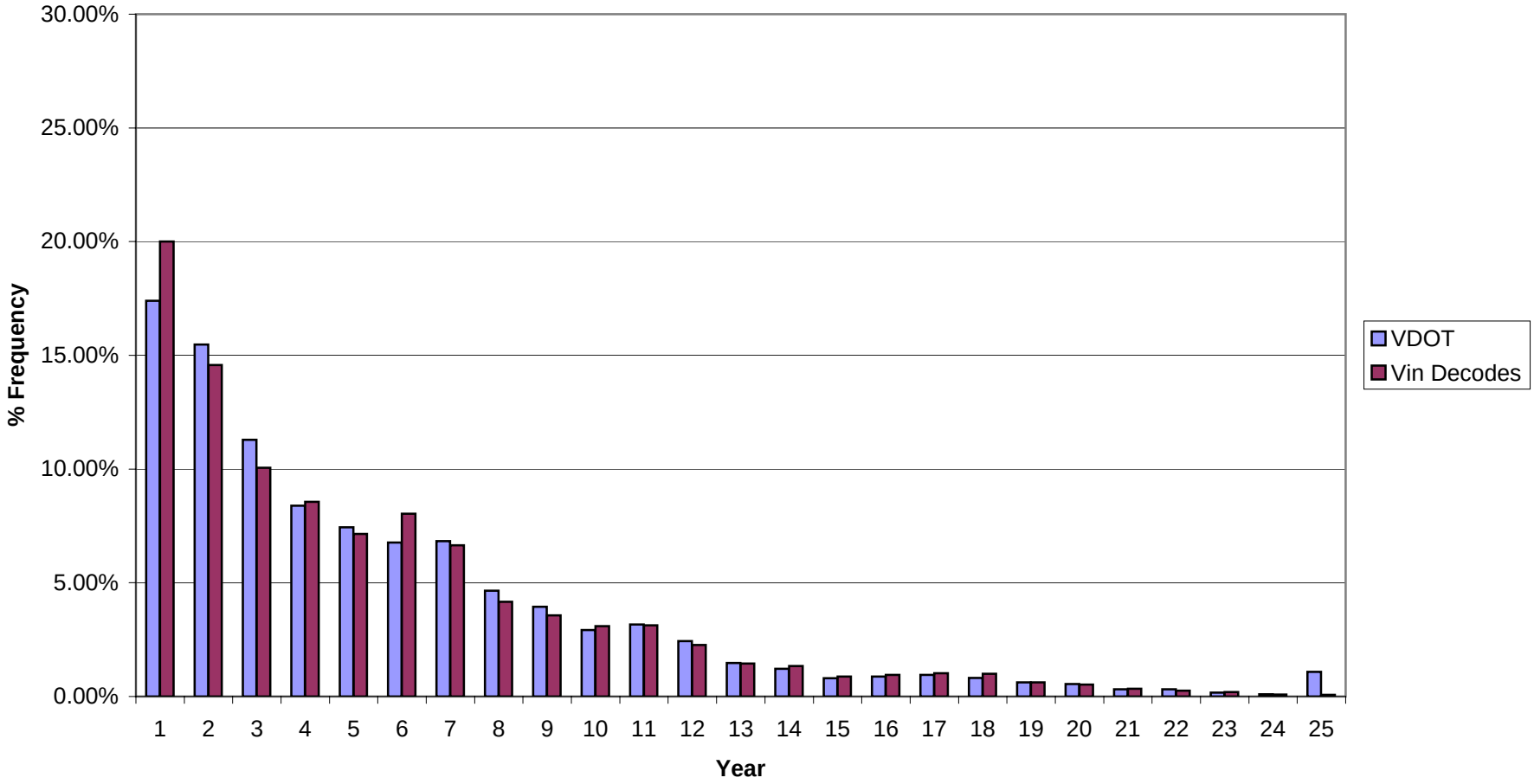
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = LDT1
Number of Decoded Vins = 1,032



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = LDT2
Number of Decoded Vins = 29,450



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = LDT3
Number of Decoded Vins = 6,123



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
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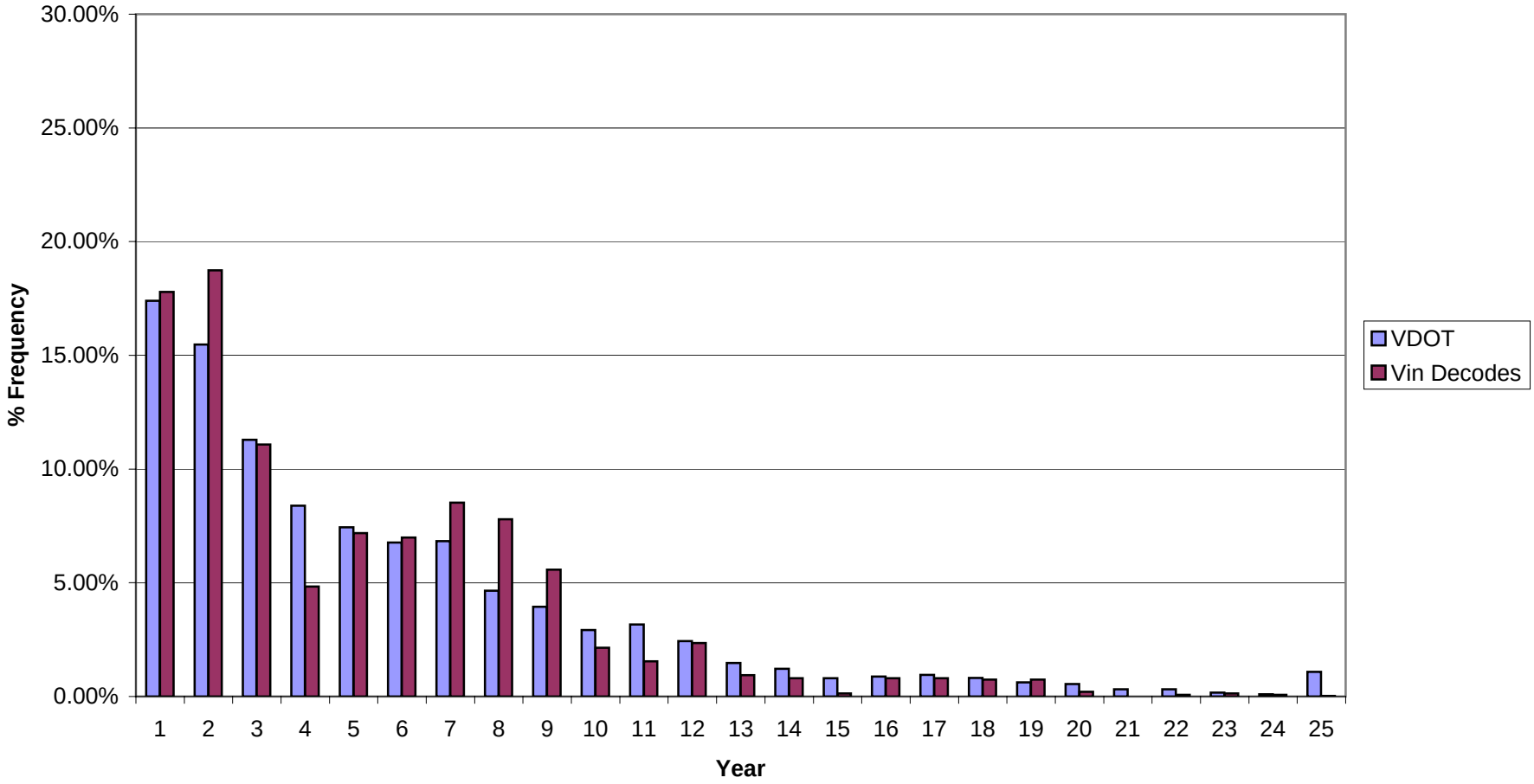
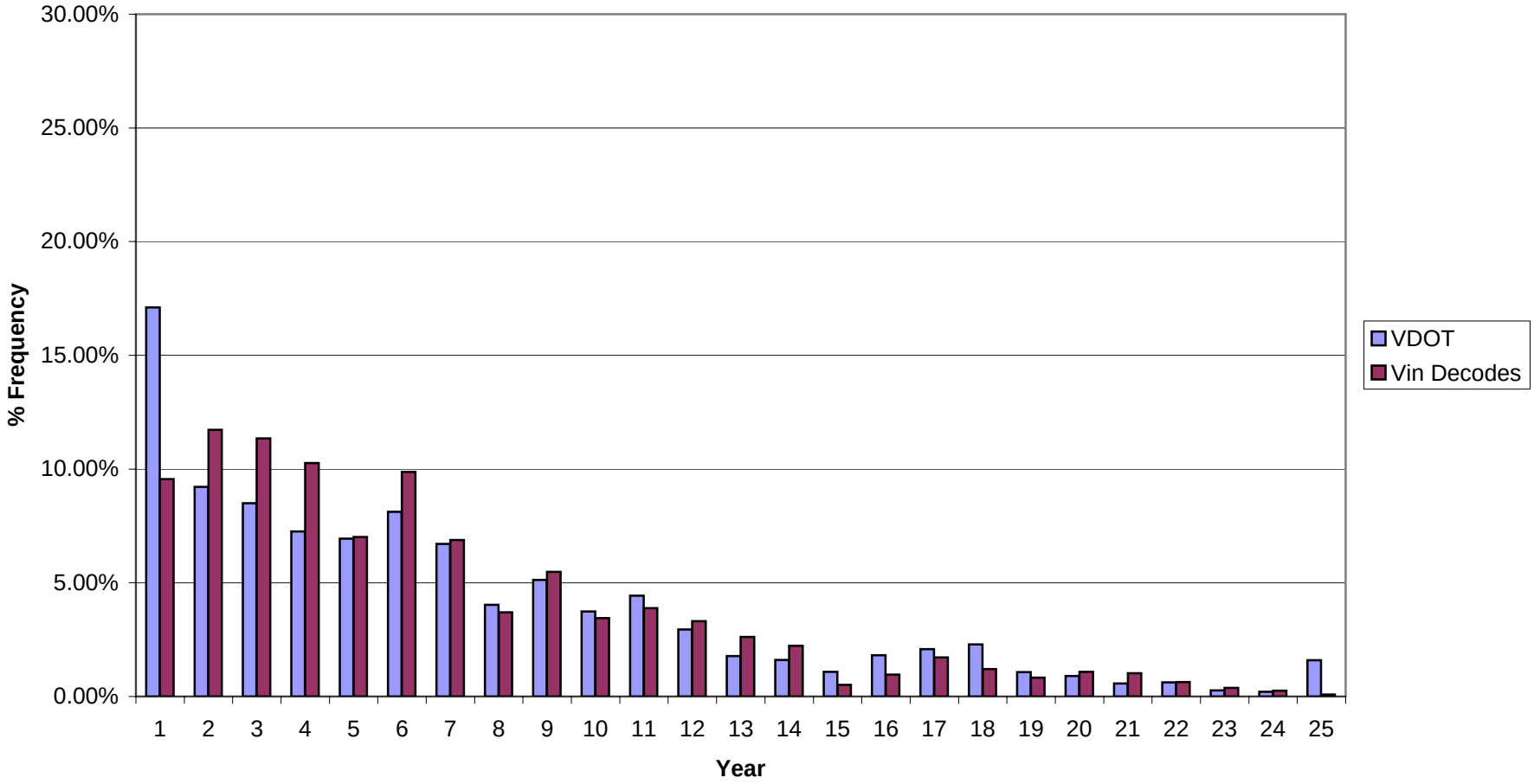
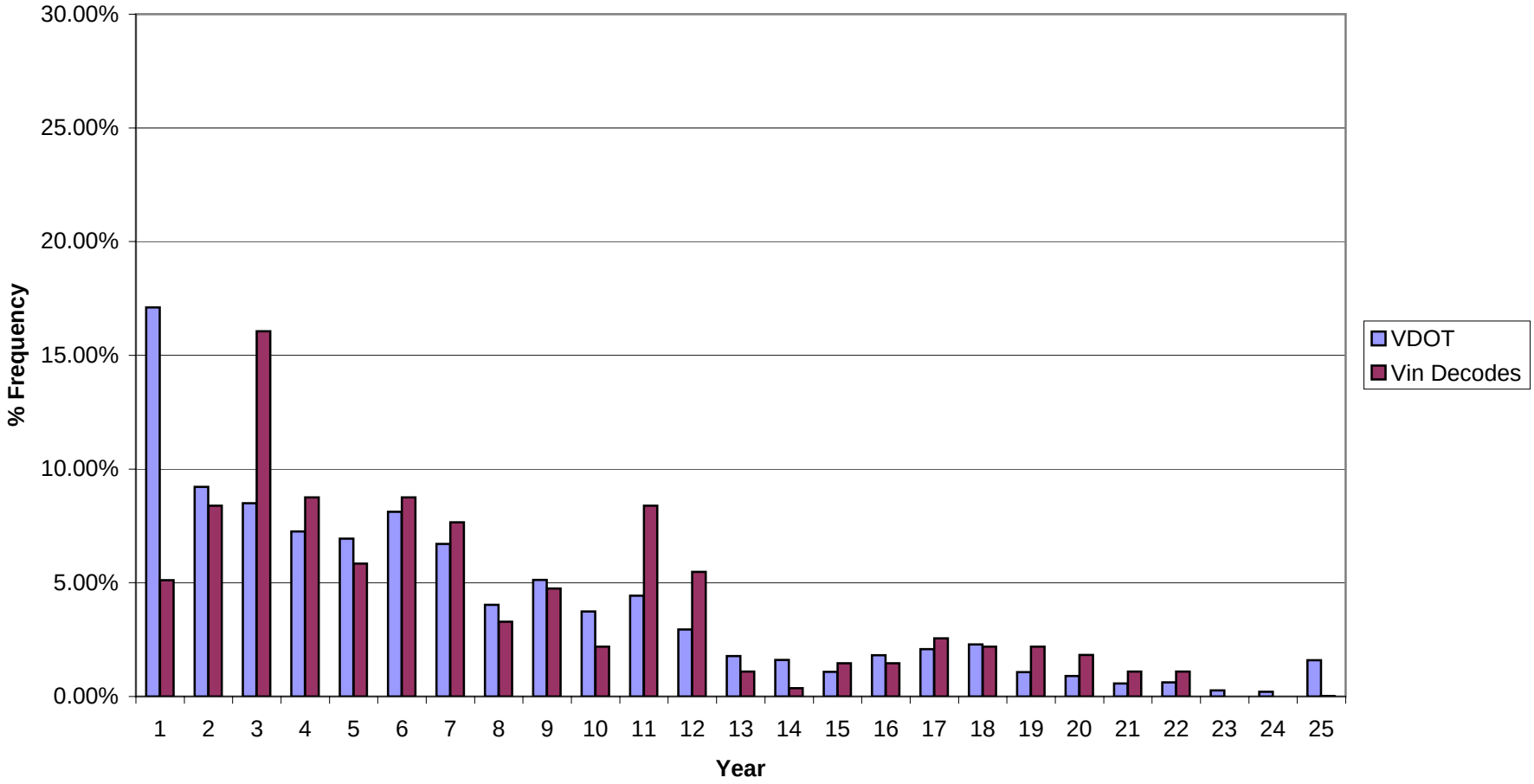
Vehicle Type = LDT4
Number of Decoded Vins = 1,494



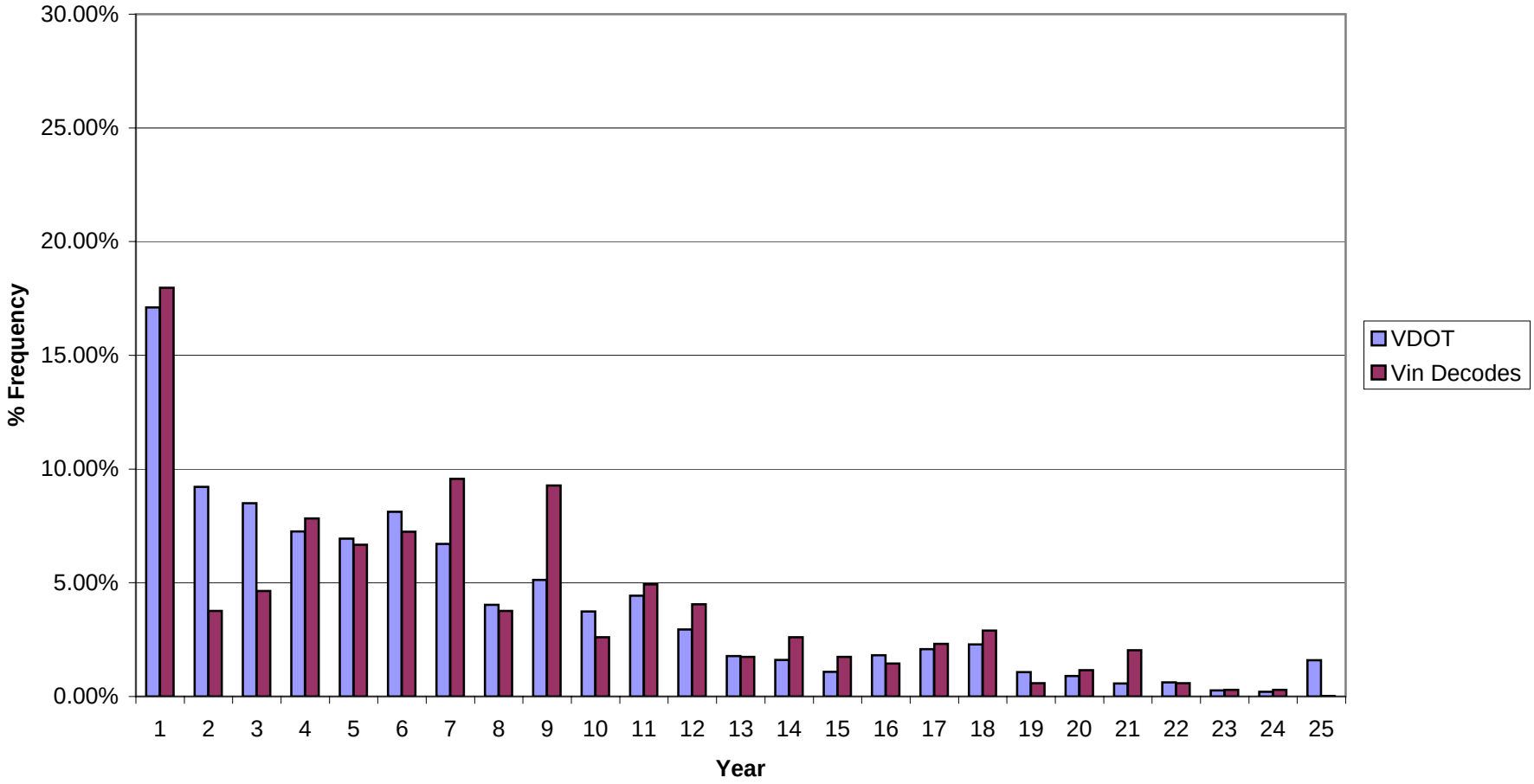
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV2B
Number of Decoded Vins = 1,568



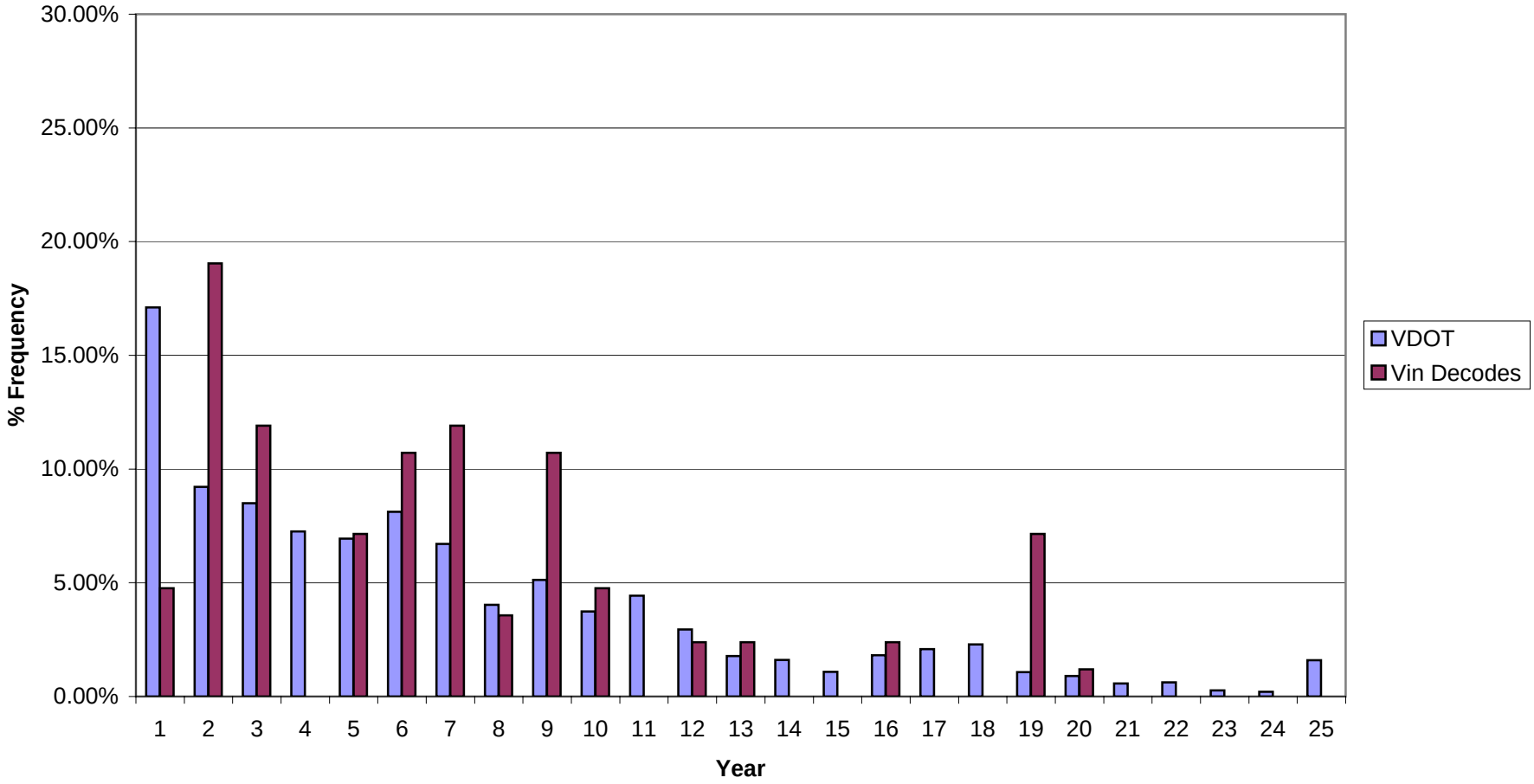
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV3
Number of Decoded Vins = 274



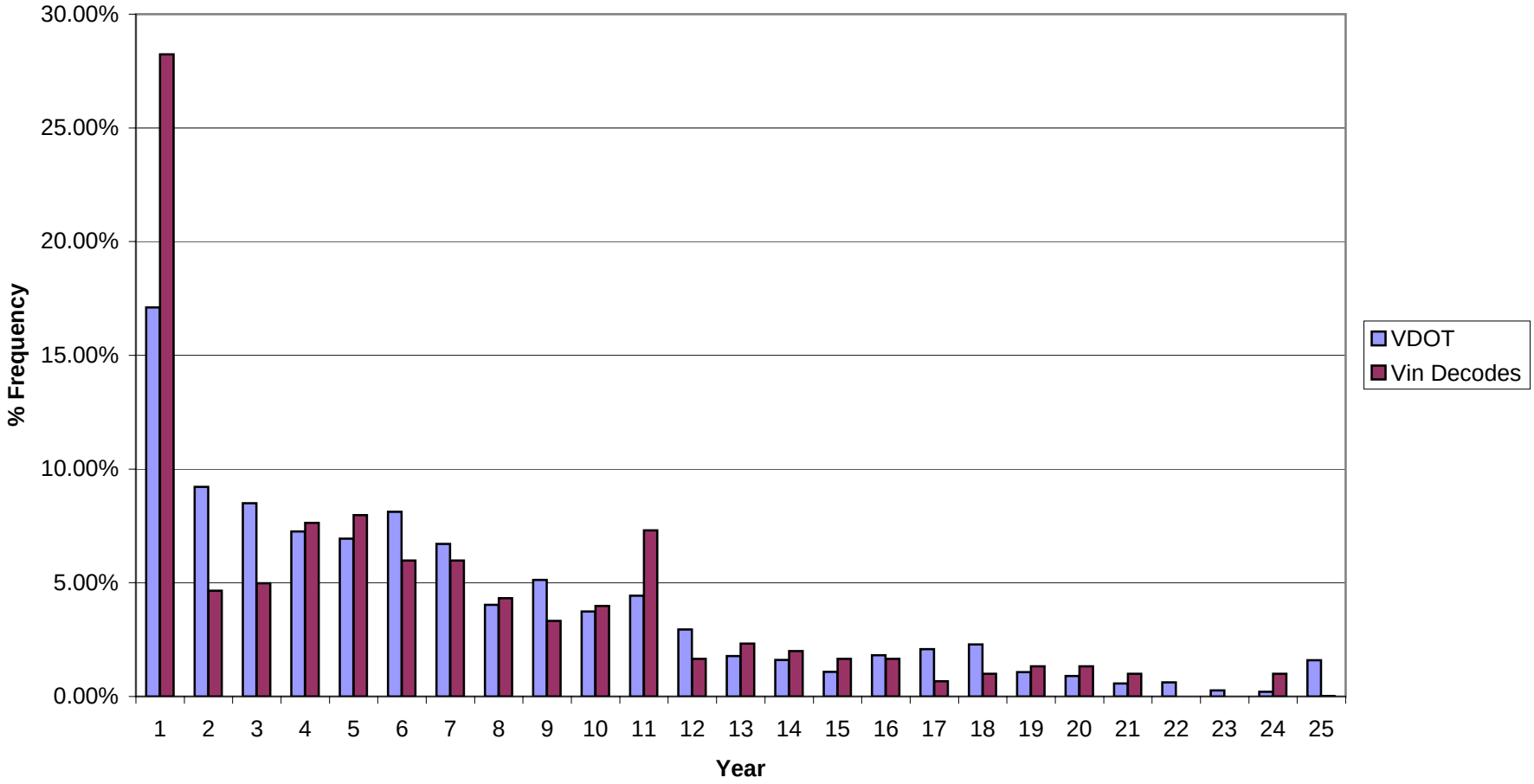
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV4
Number of Decoded Vins = 345



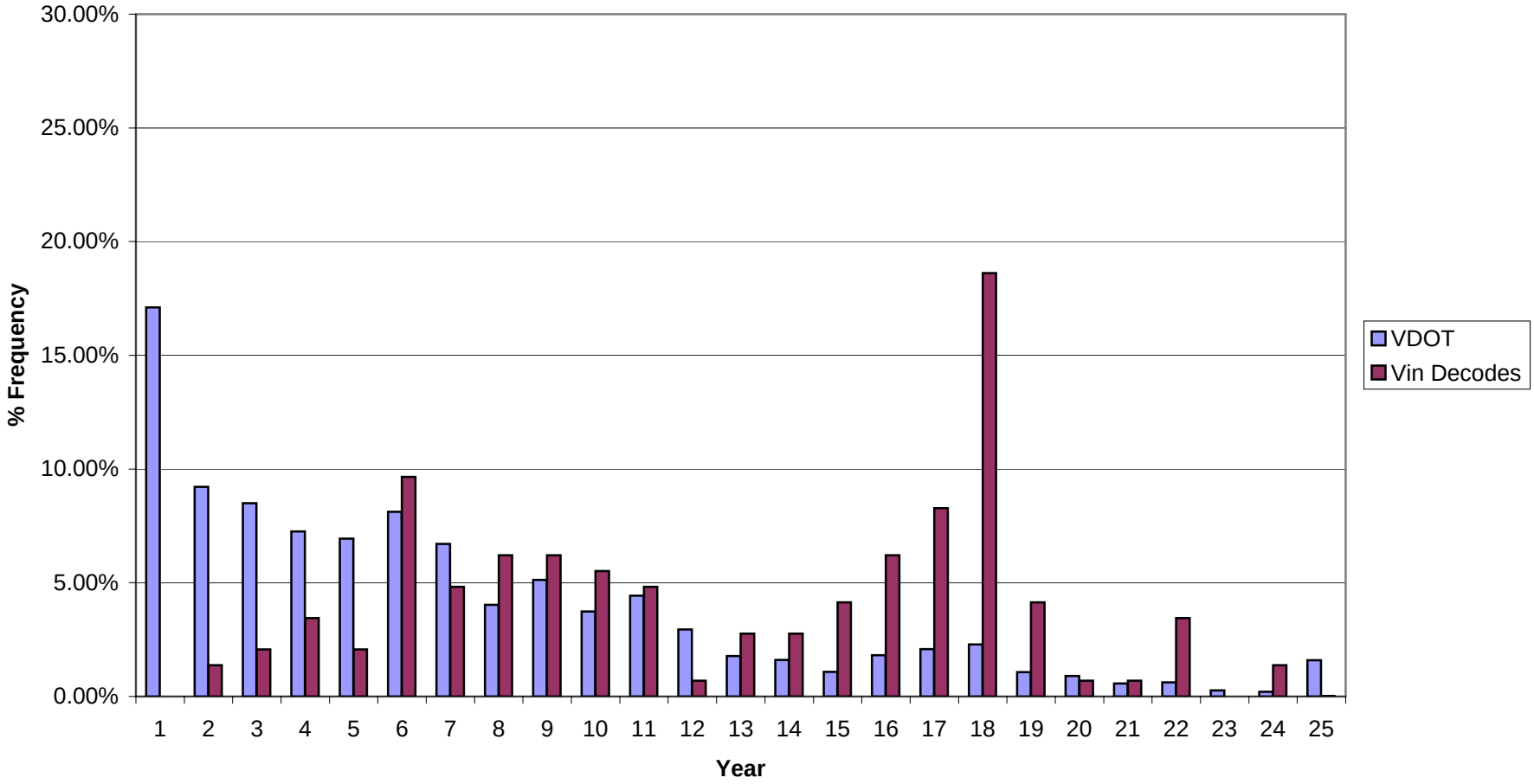
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV5
Number of Decoded Vins = 84



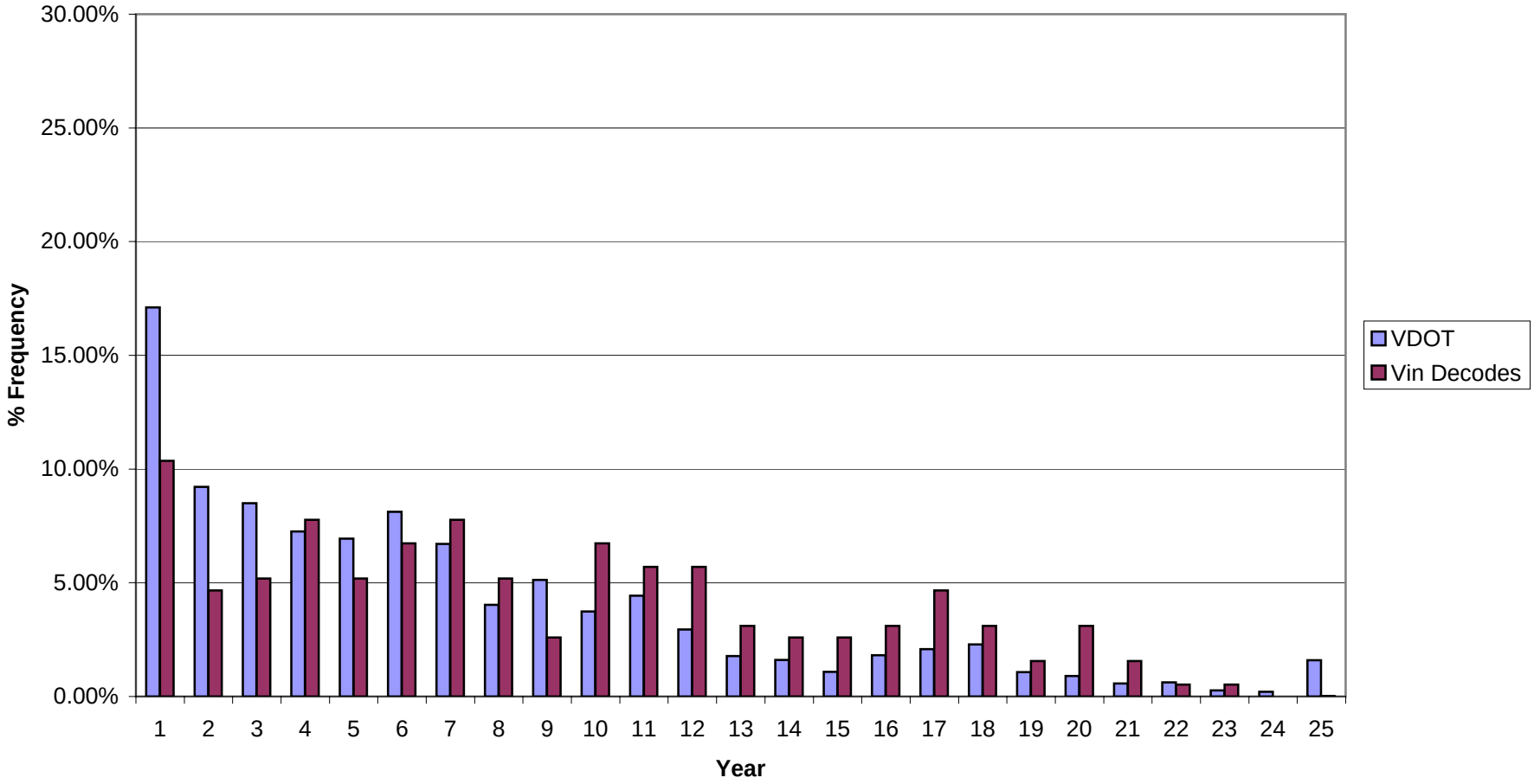
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV6
Number of Decoded Vins = 301



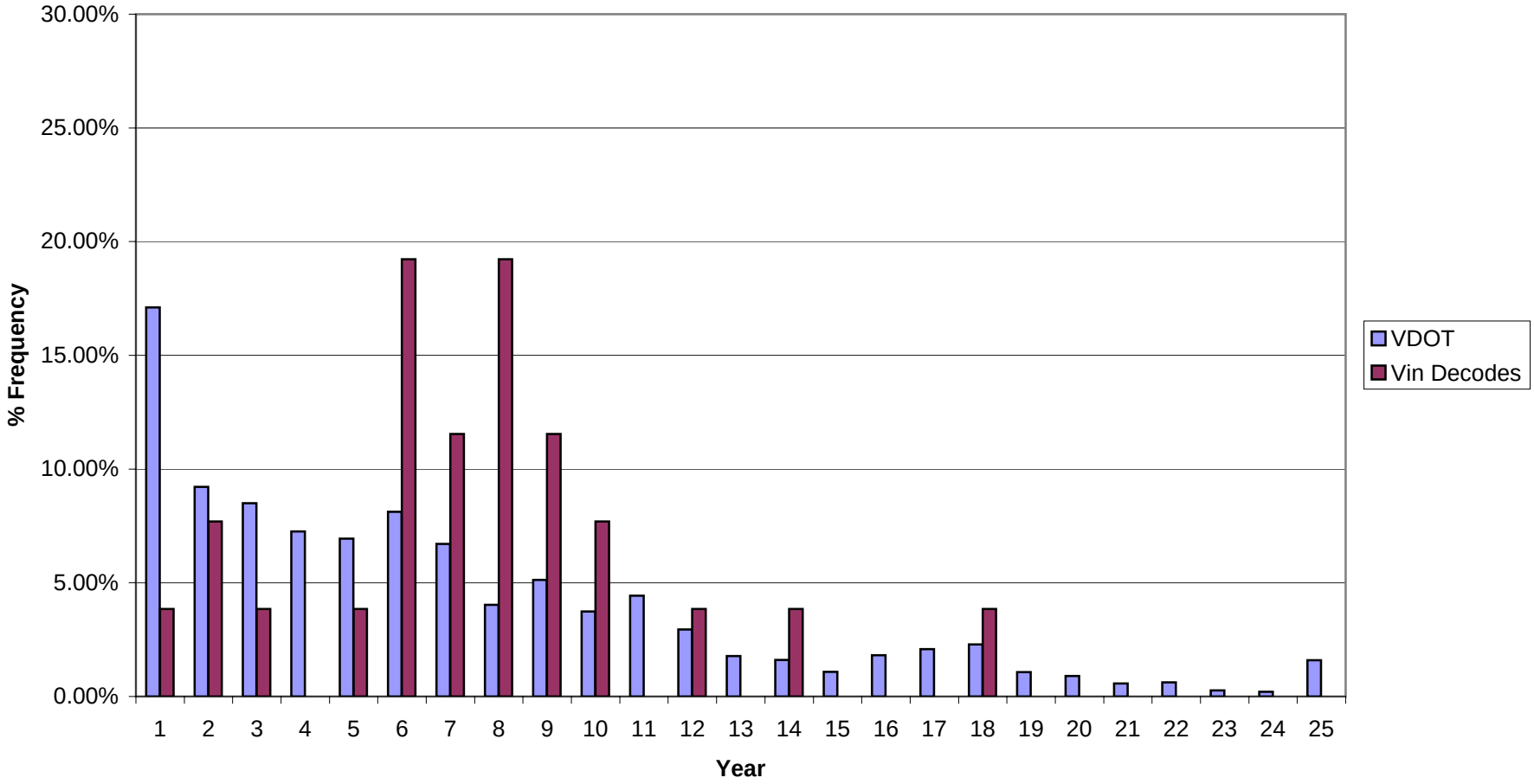
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV7
Number of Decoded Vins = 145



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV8A
Number of Decoded Vins = 193



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDV8B
Number of Decoded Vins = 26



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
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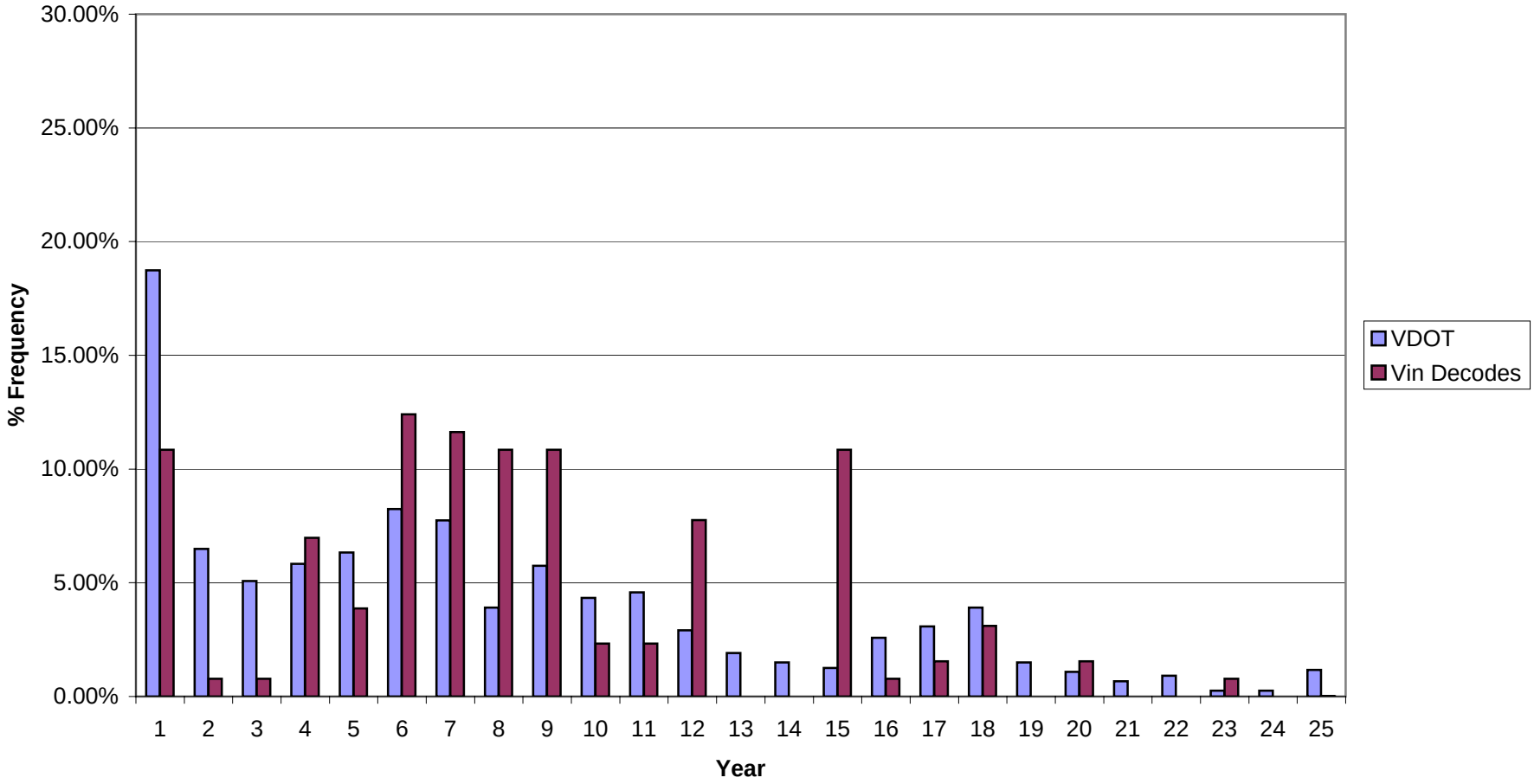
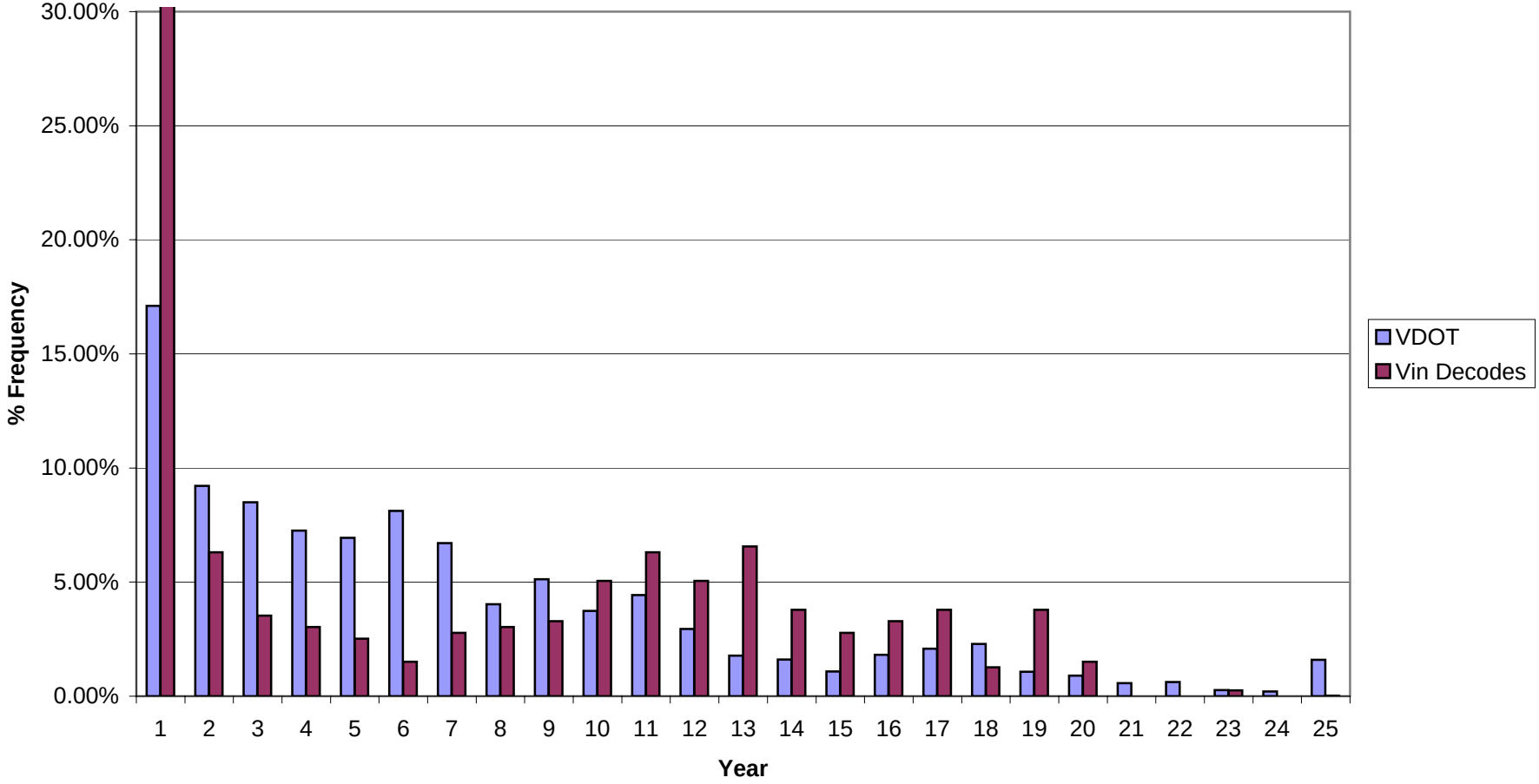
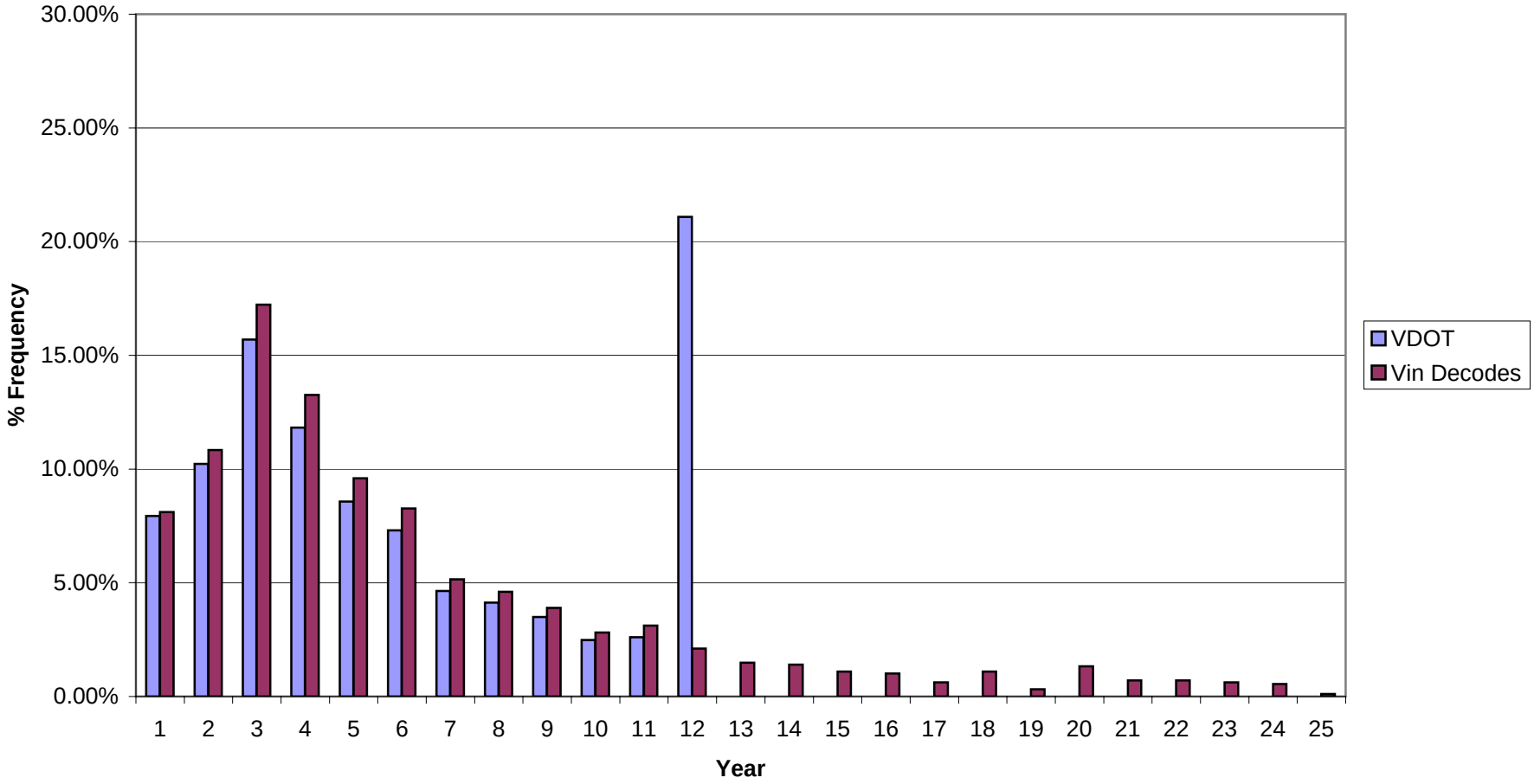
Vehicle Type = HDBT
Number of Decoded Vins = 281



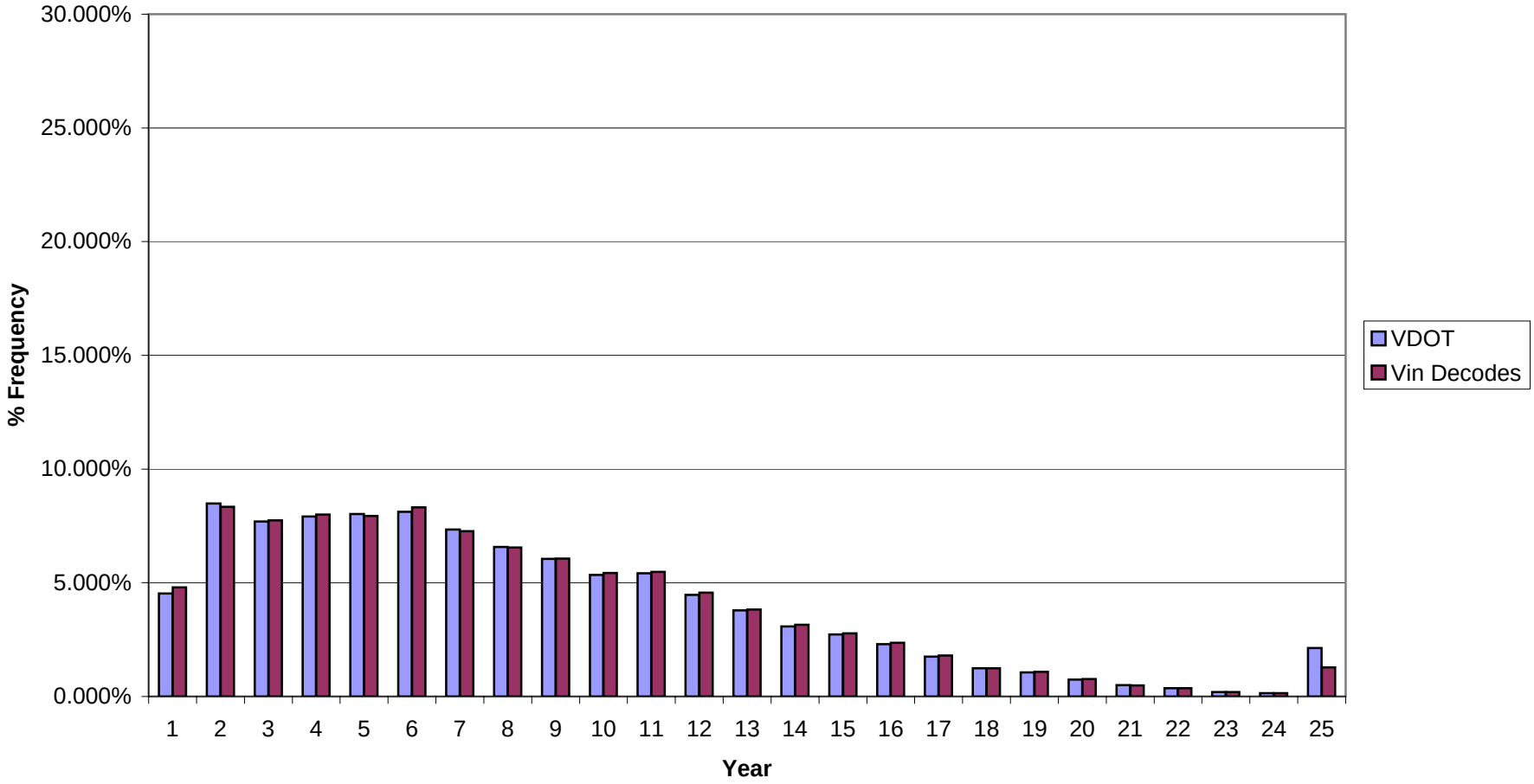
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = HDBS
Number of Decoded Vins = 238



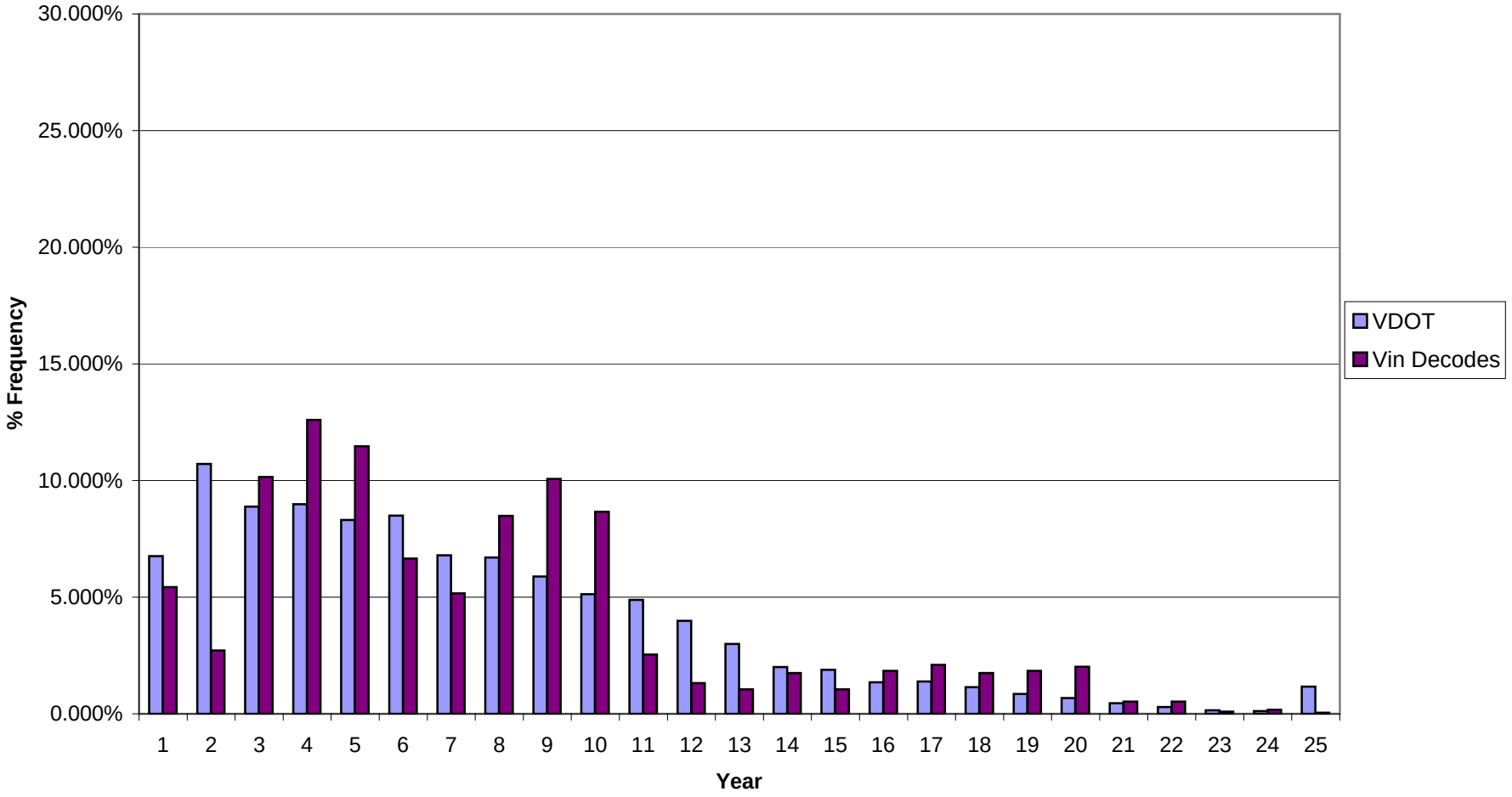
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ALEX
Vehicle Type = MC
Number of Decoded Vins = 1,281



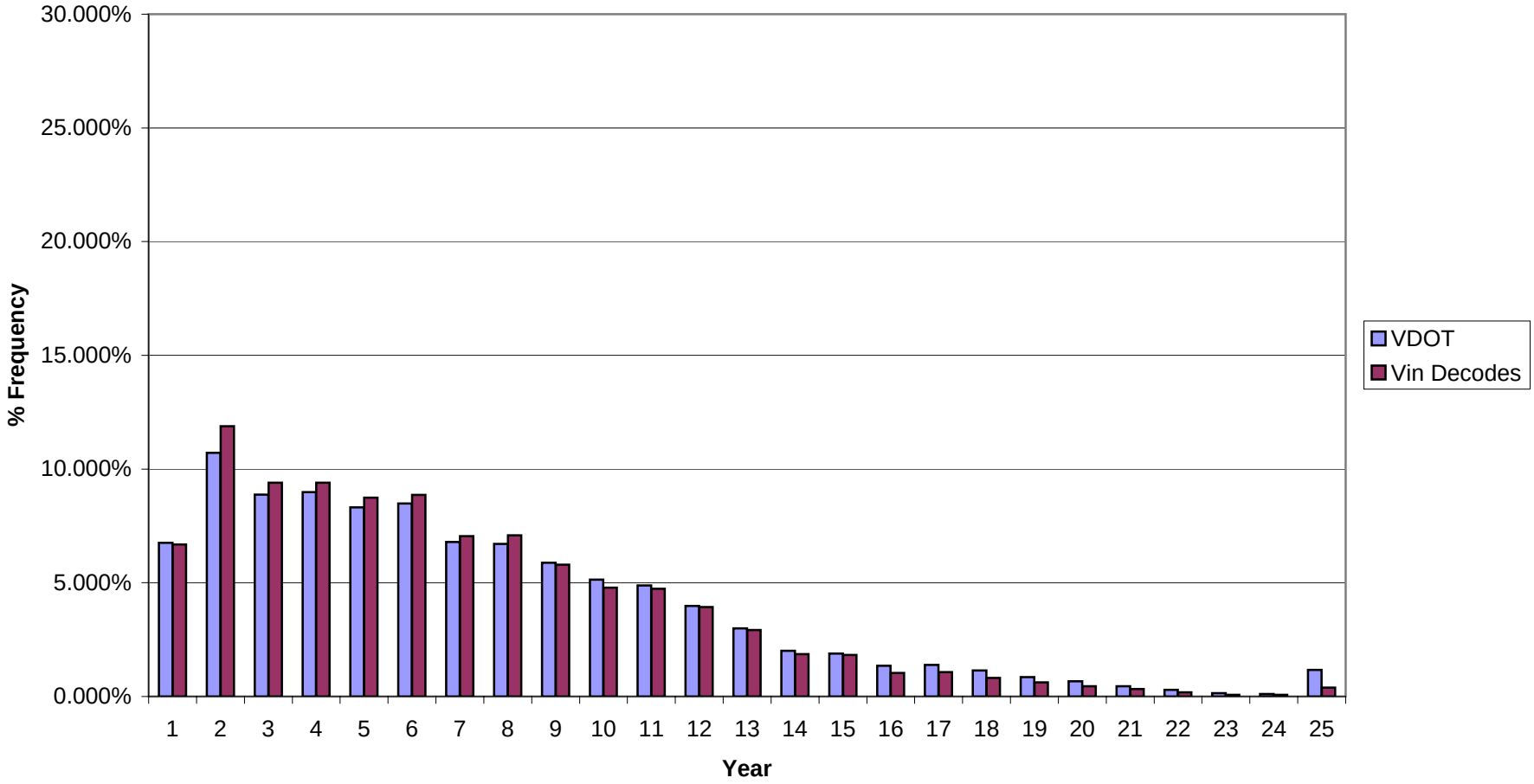
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = LDV
Number of Decoded Vins = 83,001



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = LDT1
Number of Decoded Vins = 1,142

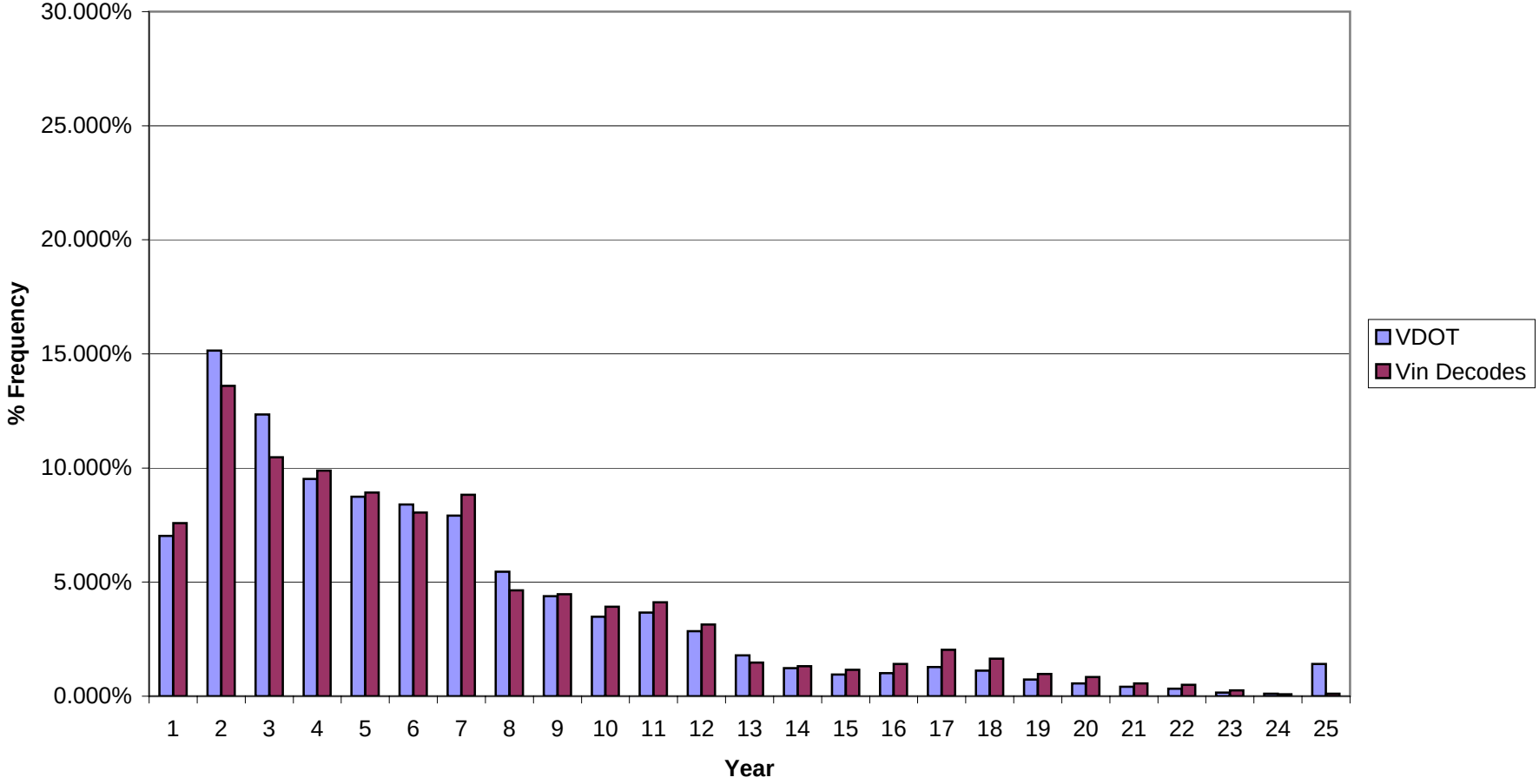


Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = LDT2
Number of Decoded Vins = 28,581

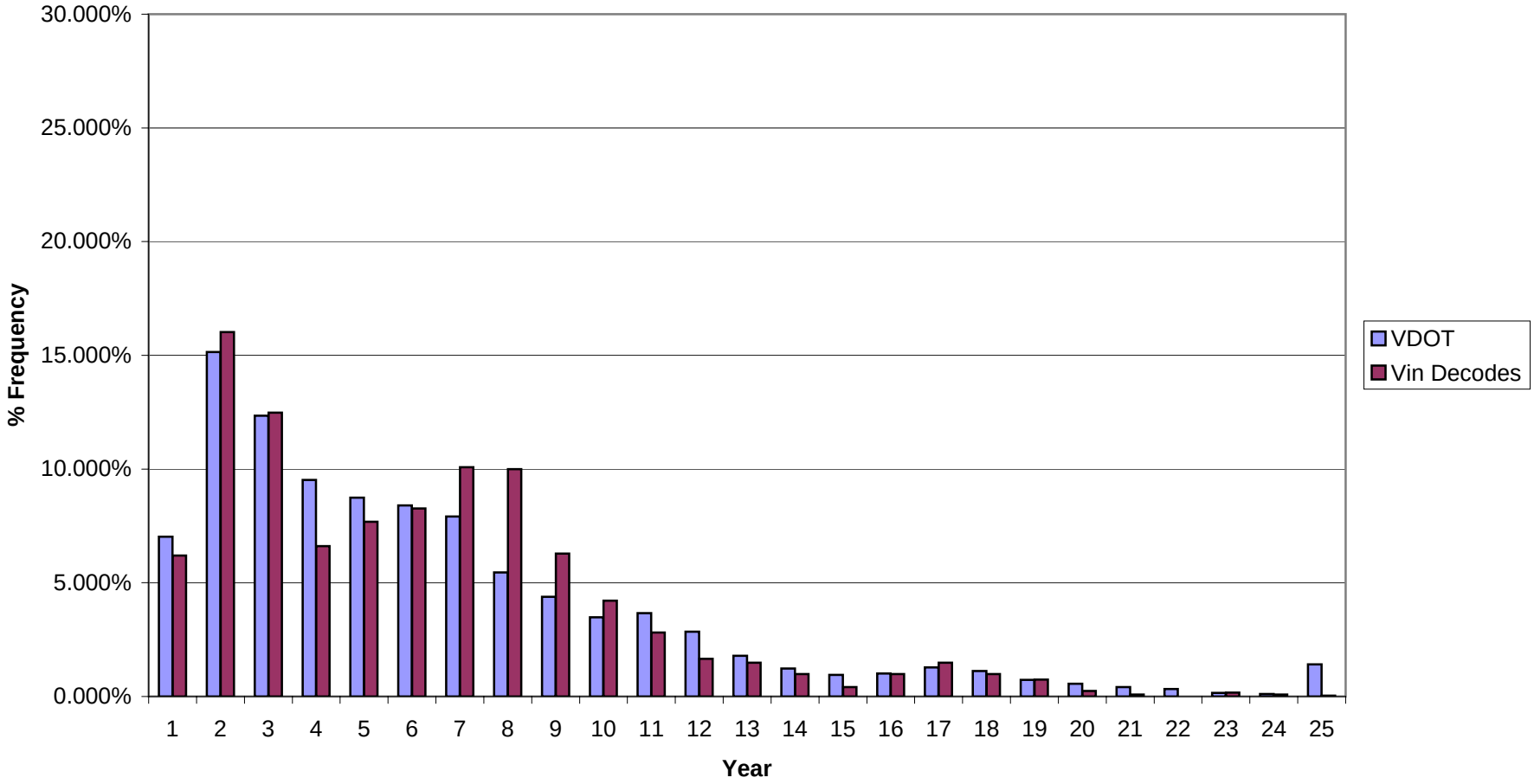


ATTACHMENT 4B

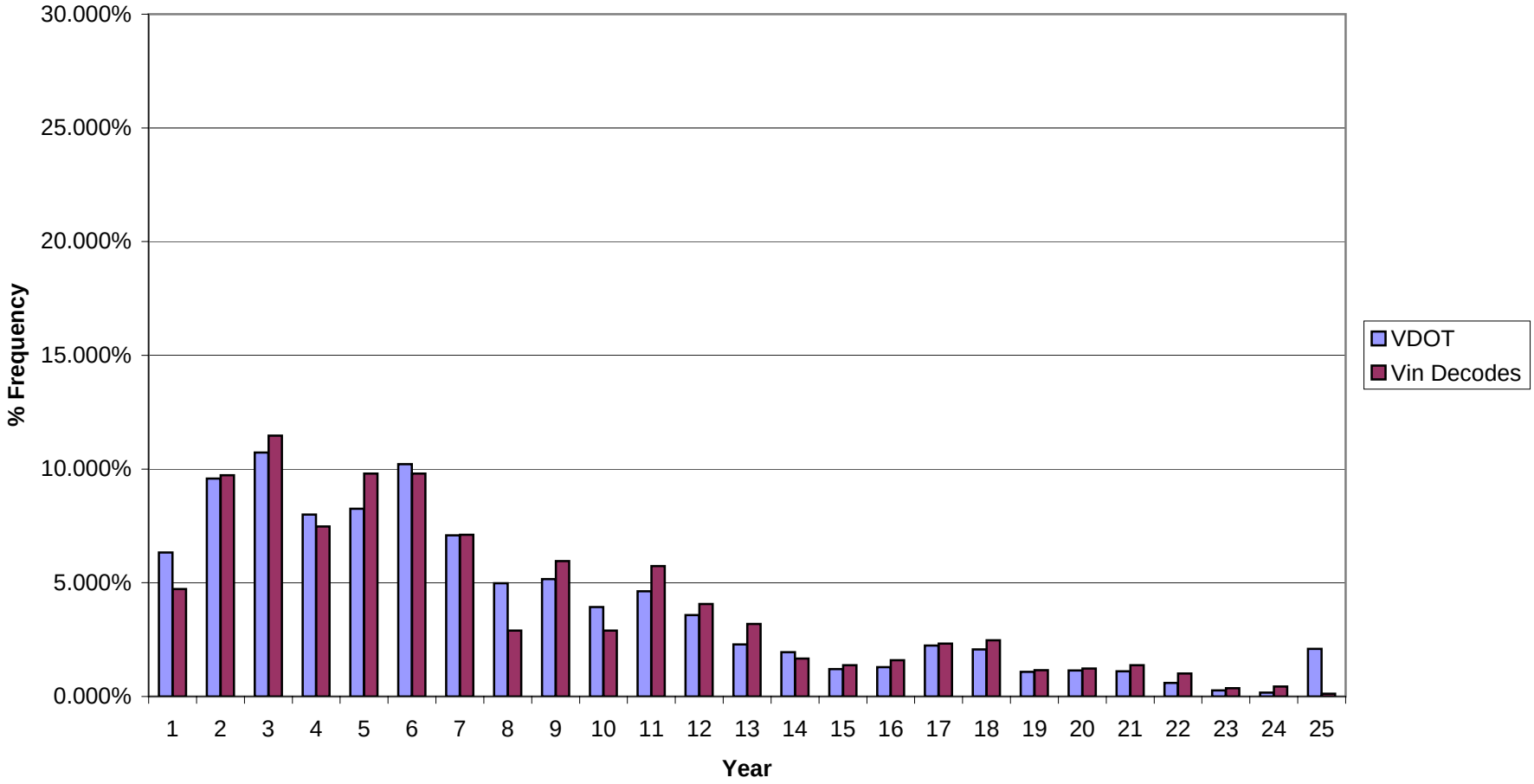
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = LDT3
Number of Decoded Vins = 5,001



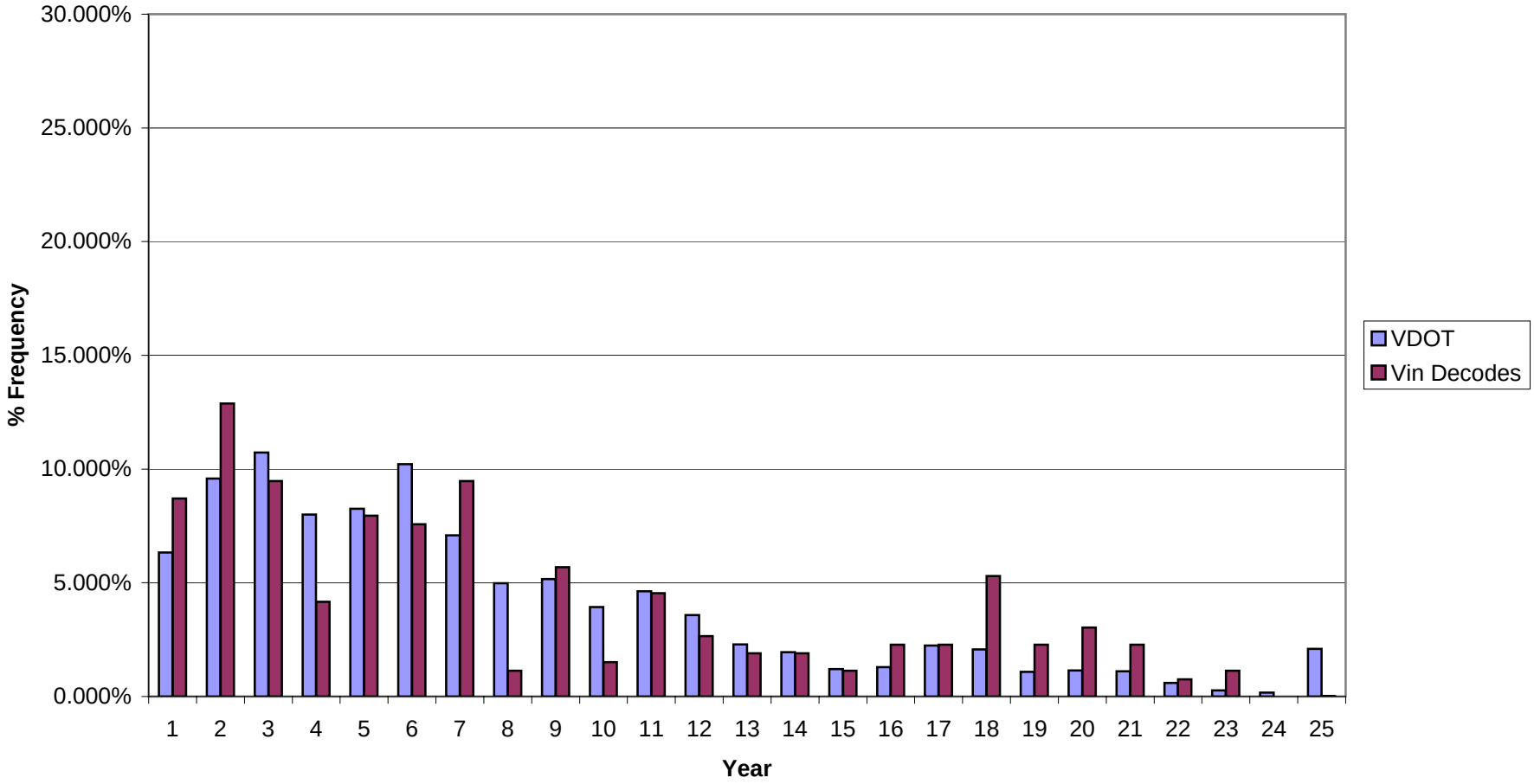
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = LDT4
Number of Decoded Vins = 1,210



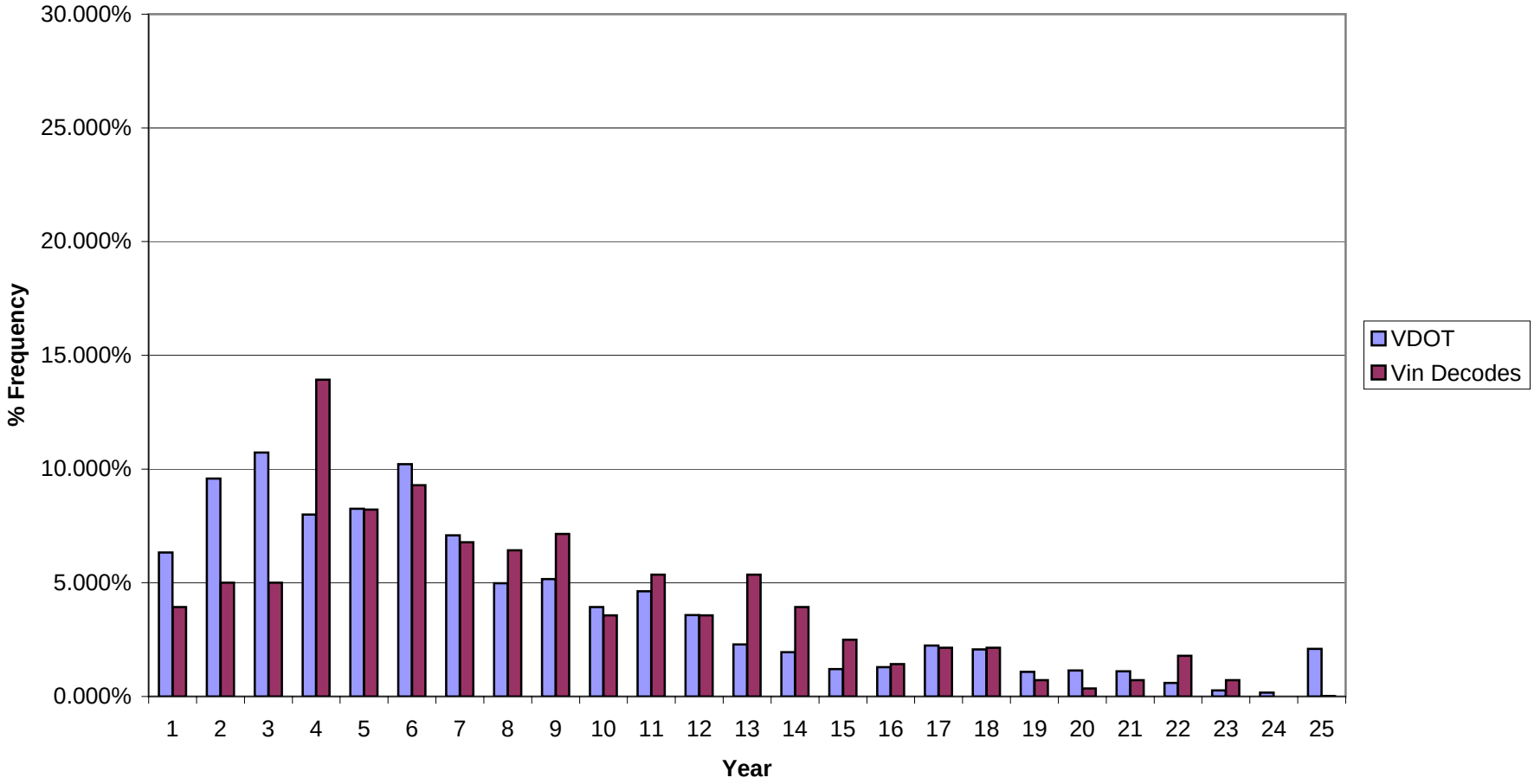
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV2B
Number of Decoded Vins = 1,376



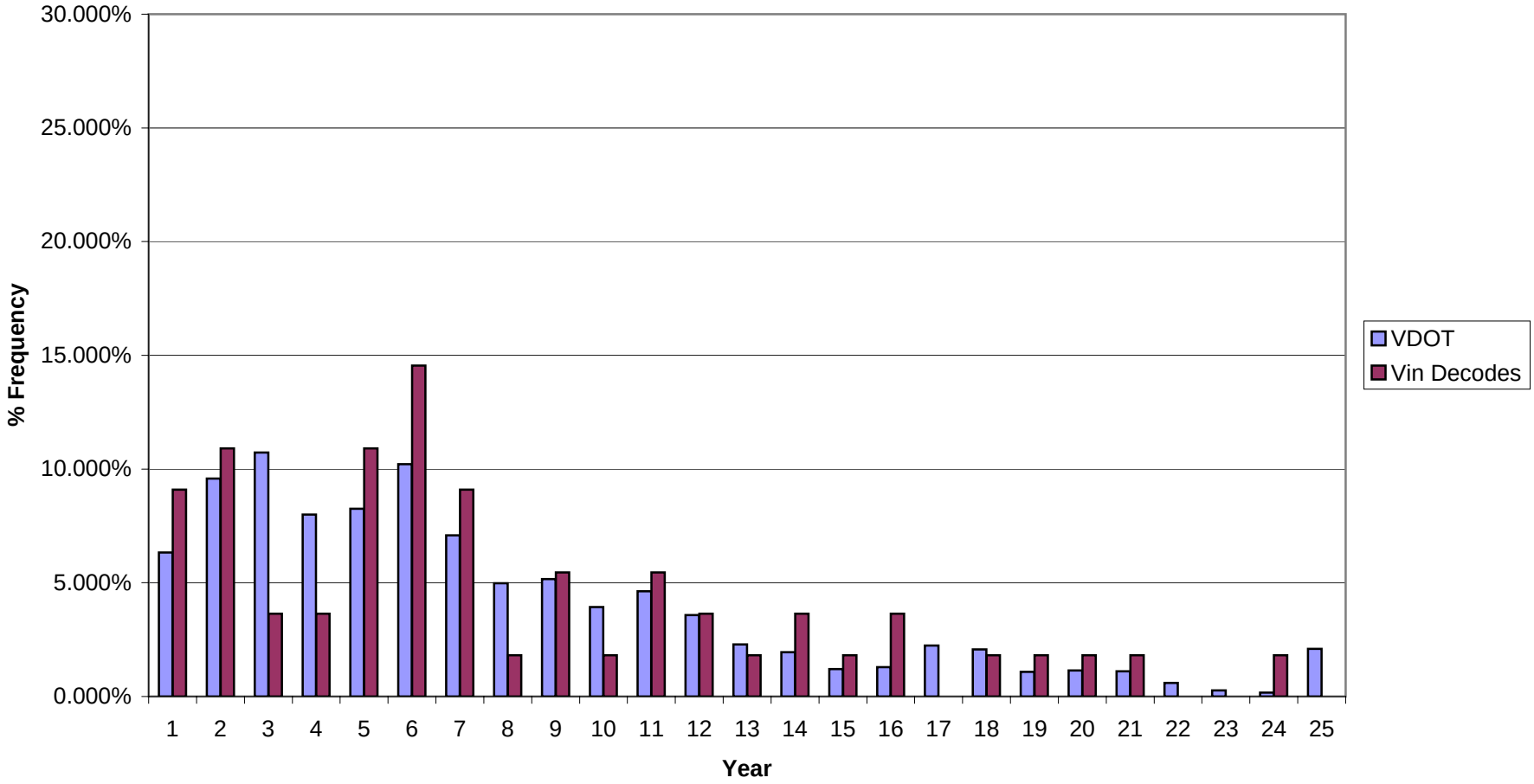
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV3
Number of Decoded Vins = 264



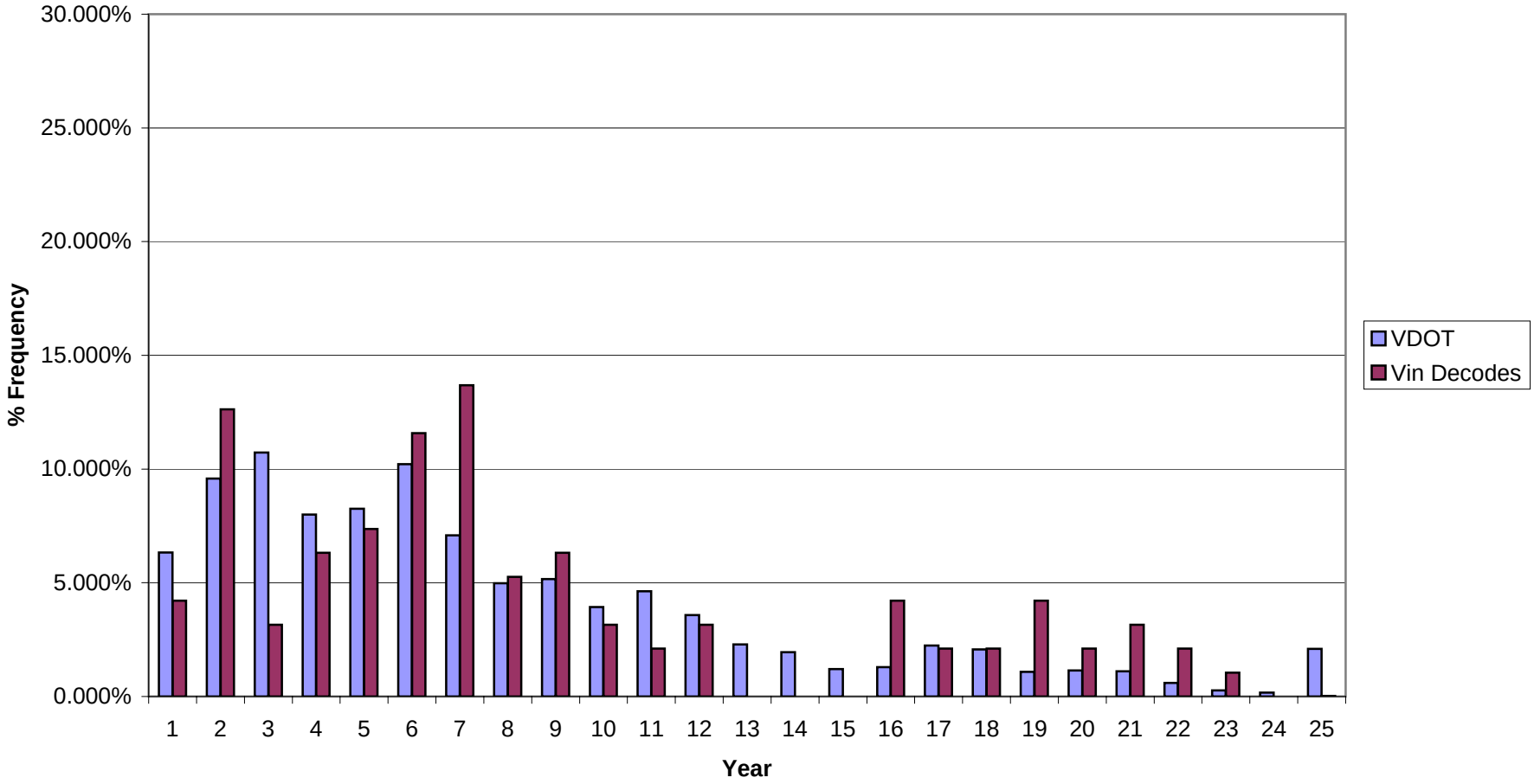
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV4
Number of Decoded Vins = 280



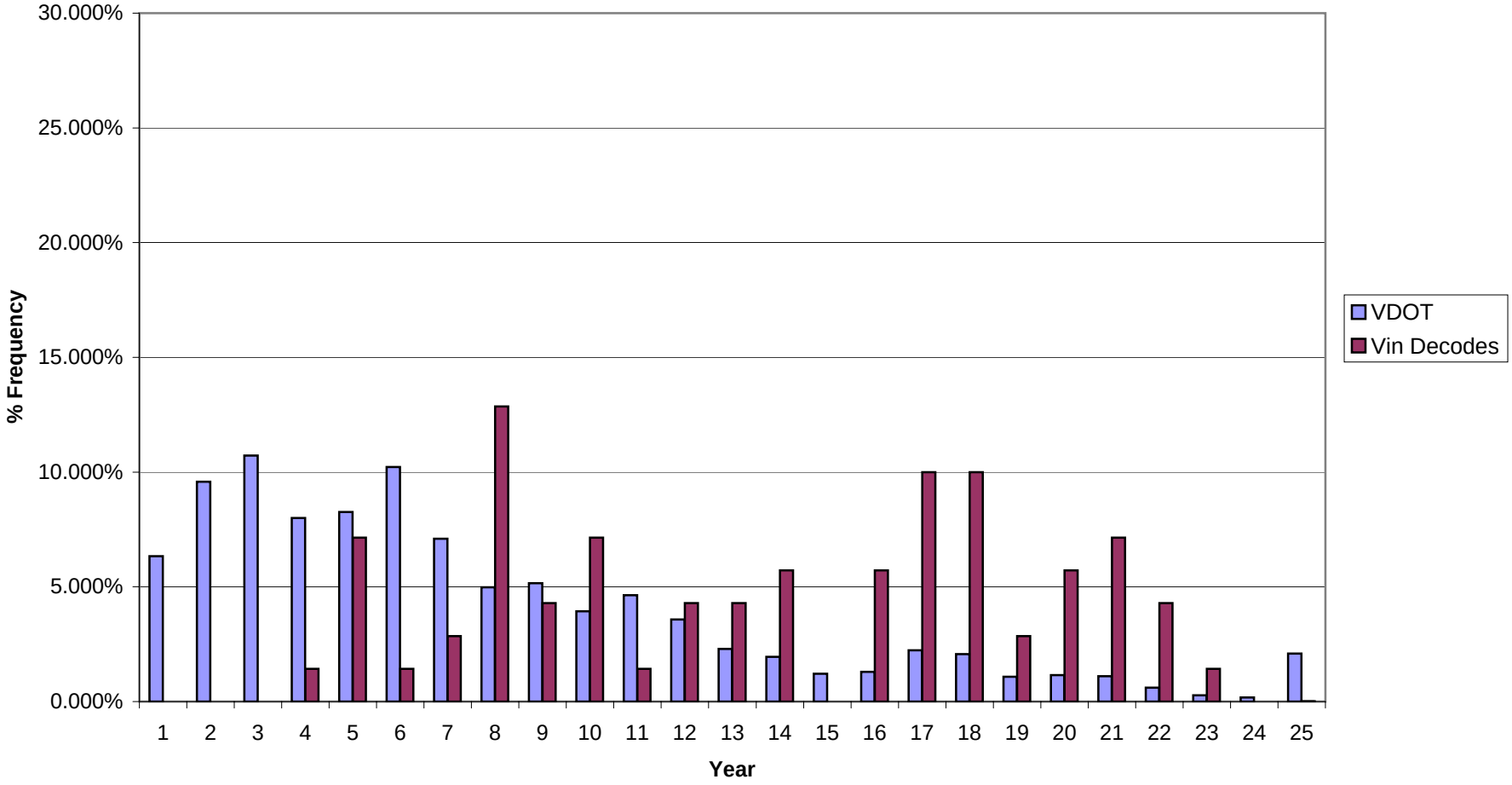
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV5
Number of Decoded Vins = 55



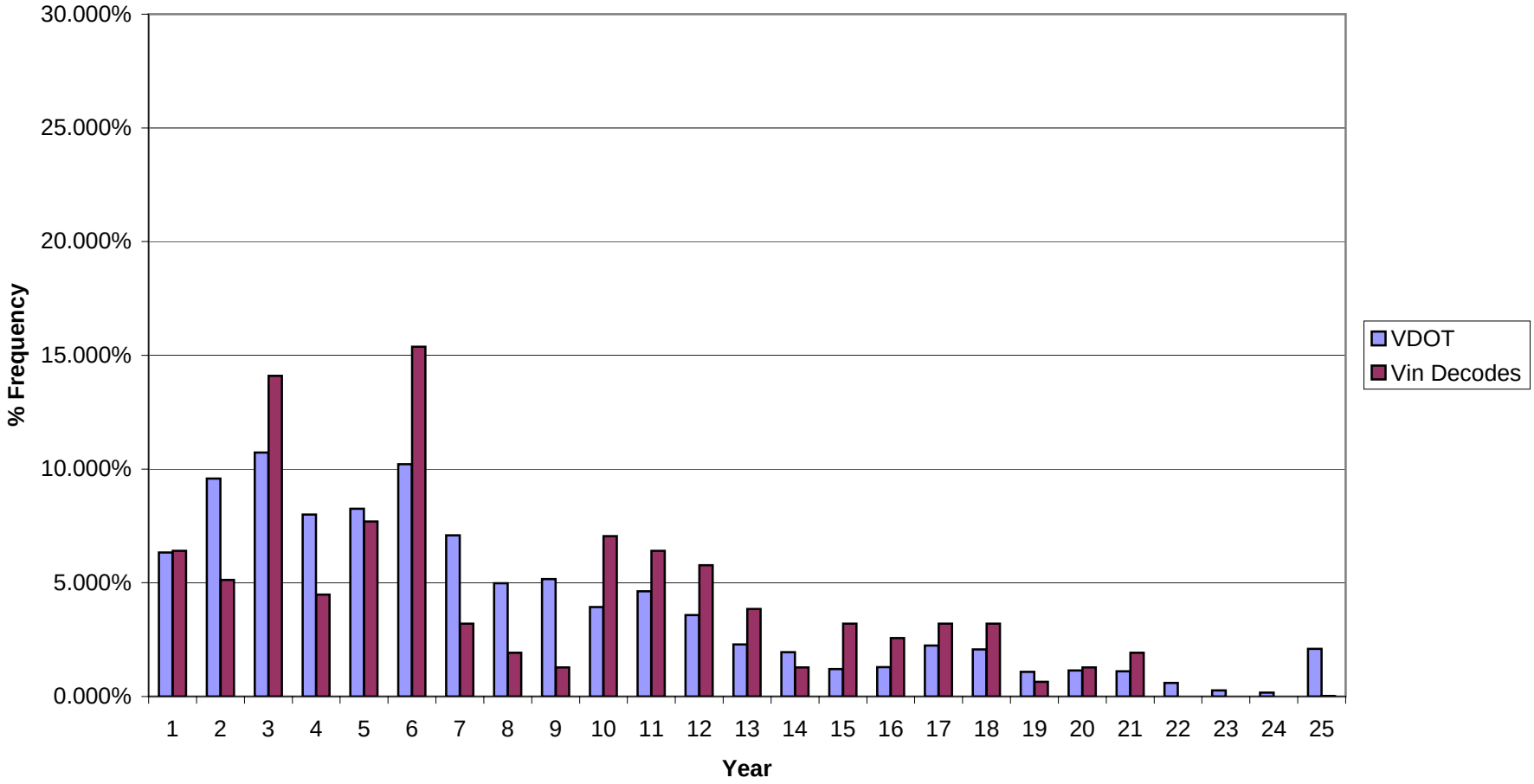
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV6
Number of Decoded Vins = 95



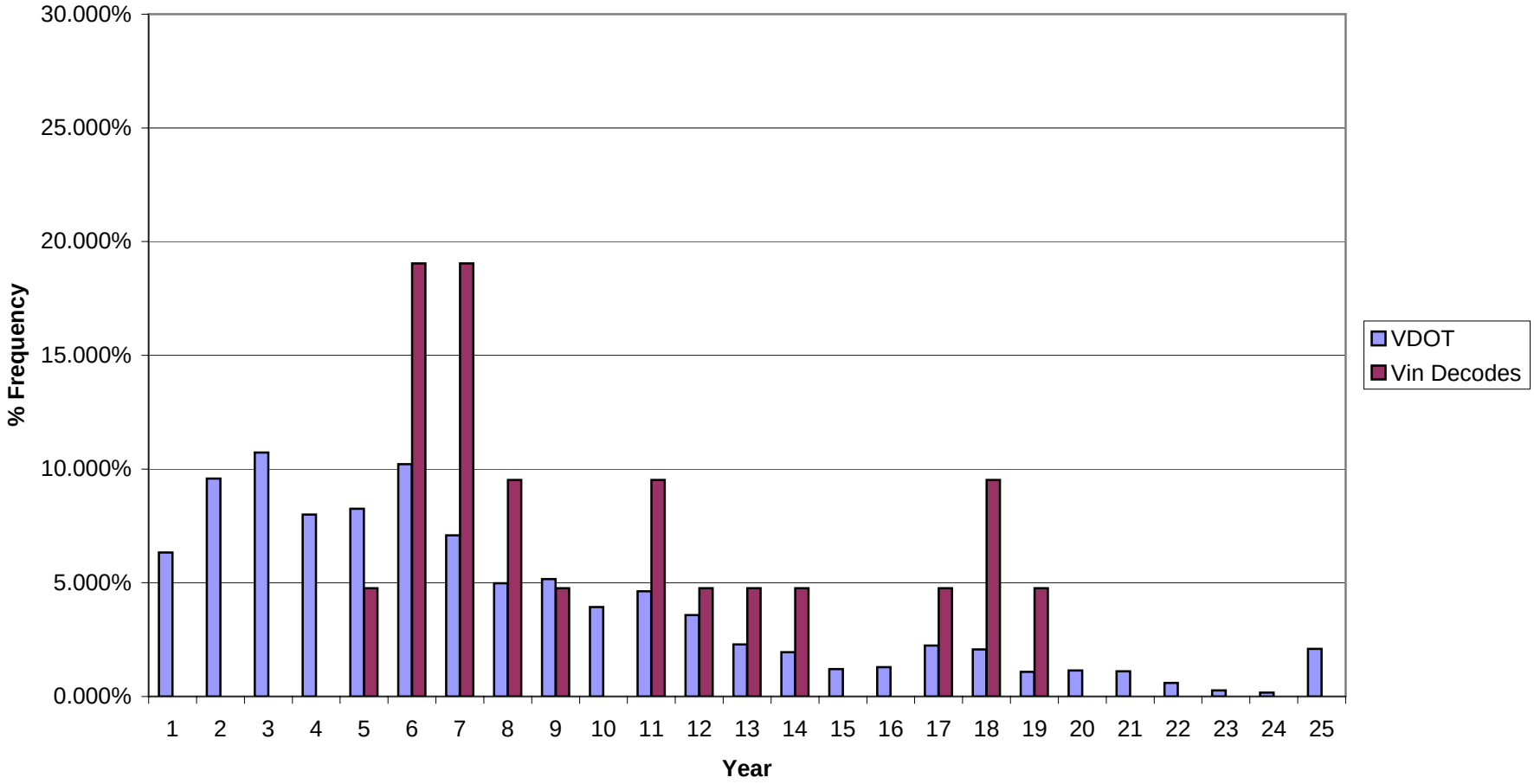
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV7
Number of Decoded Vins = 70



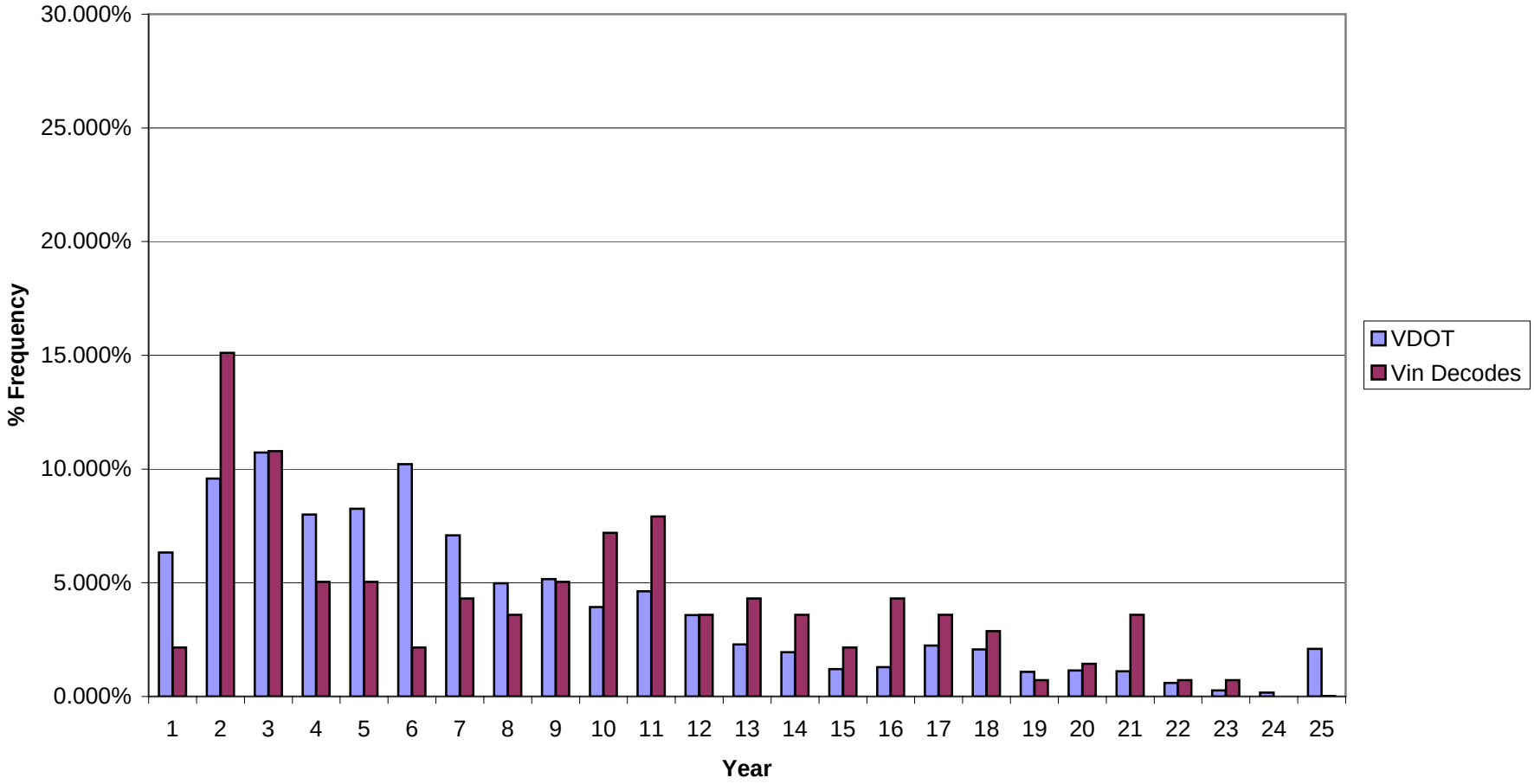
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV8A
Number of Decoded Vins = 156



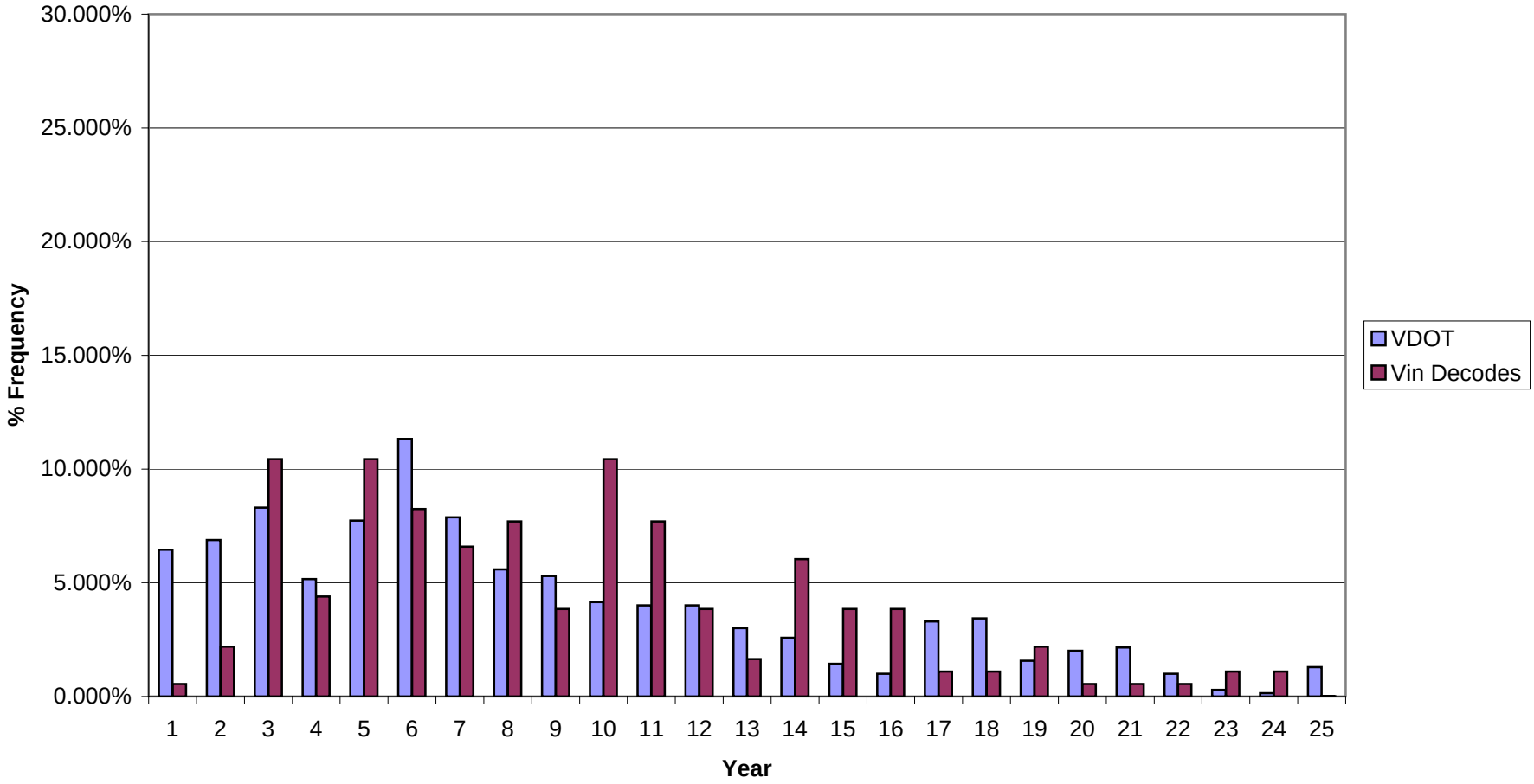
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDV8B
Number of Decoded Vins = 17



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDBS
Number of Decoded Vins = 139

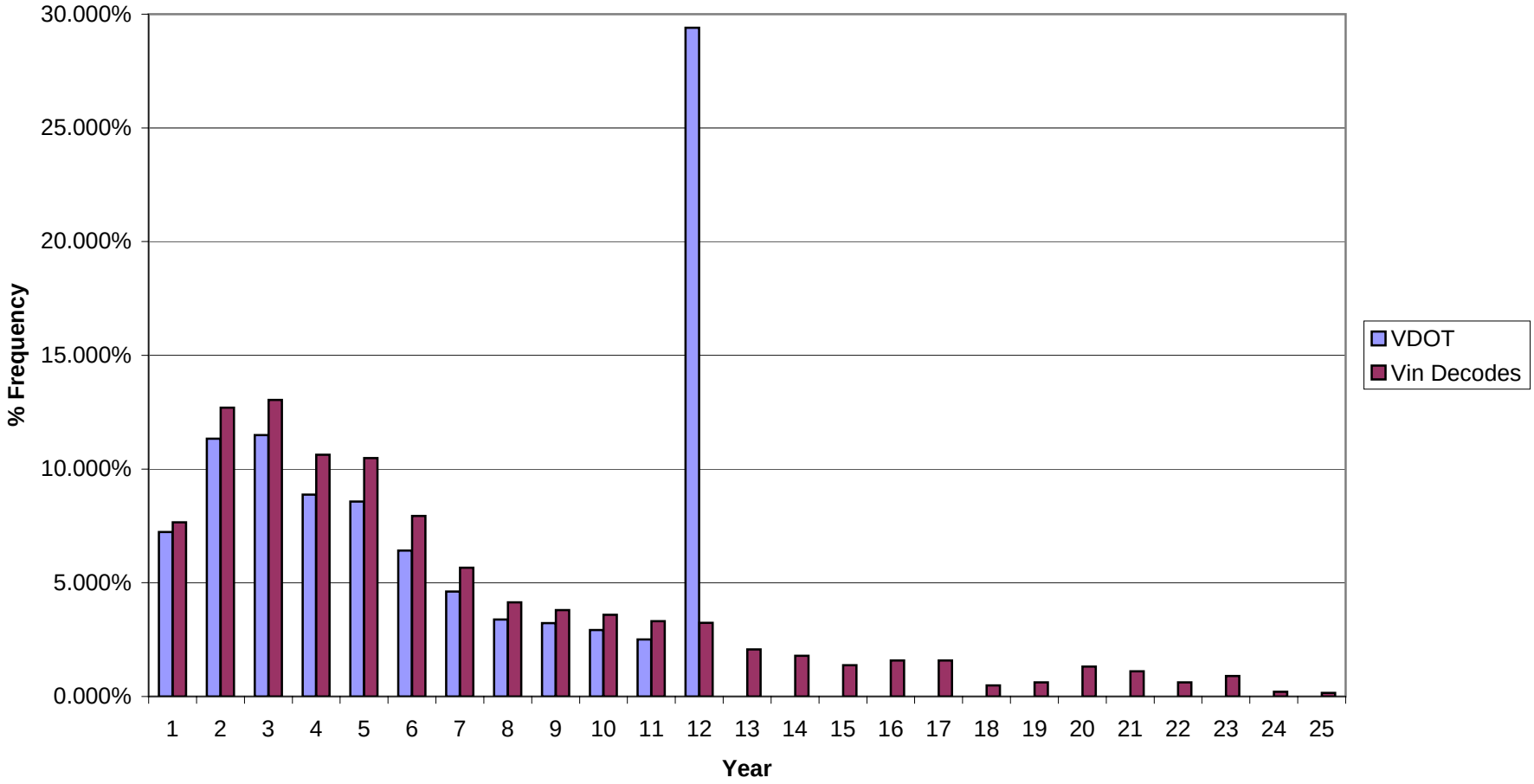


Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = HDBT
Number of Decoded Vins = 182

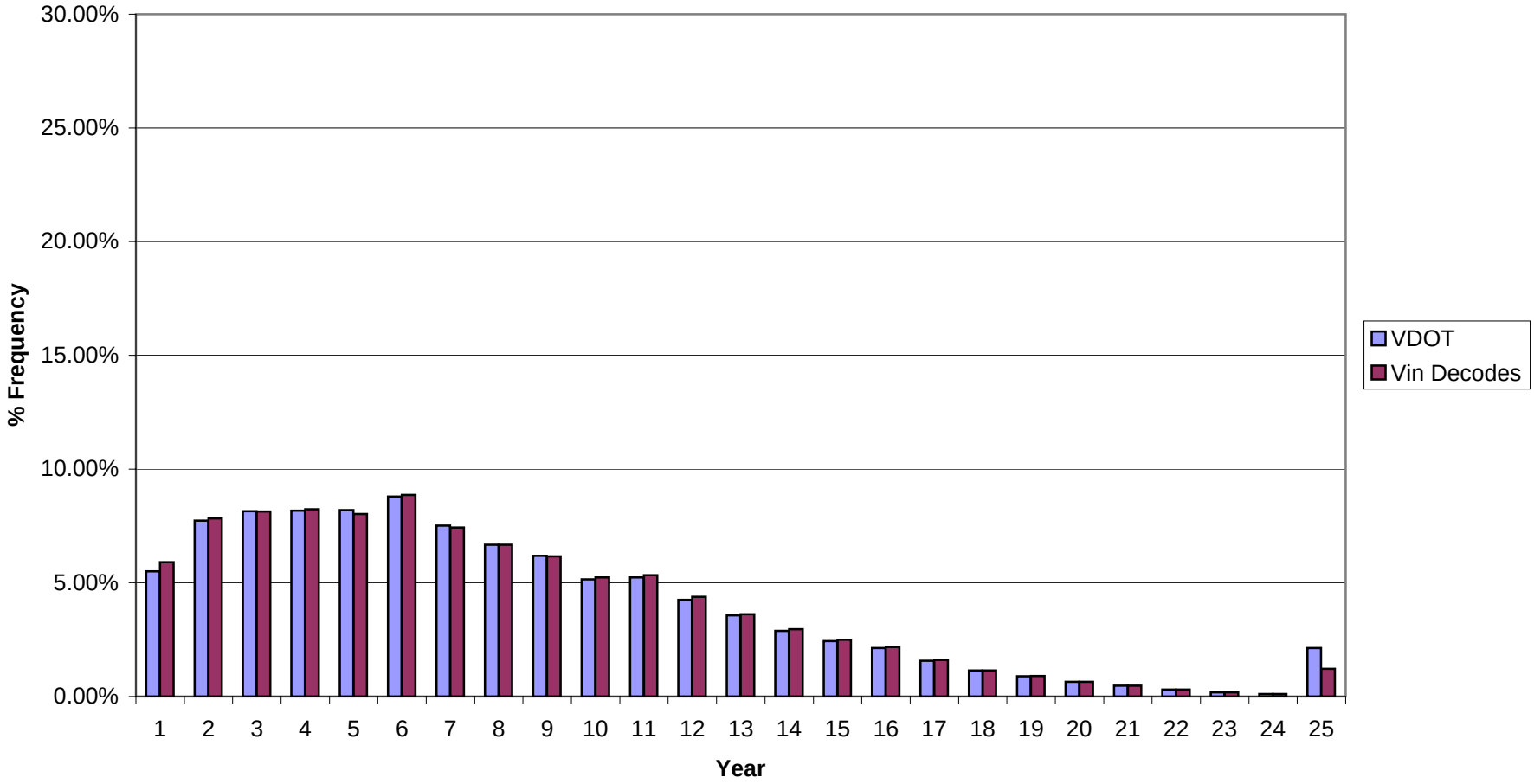


ATTACHMENT 4B

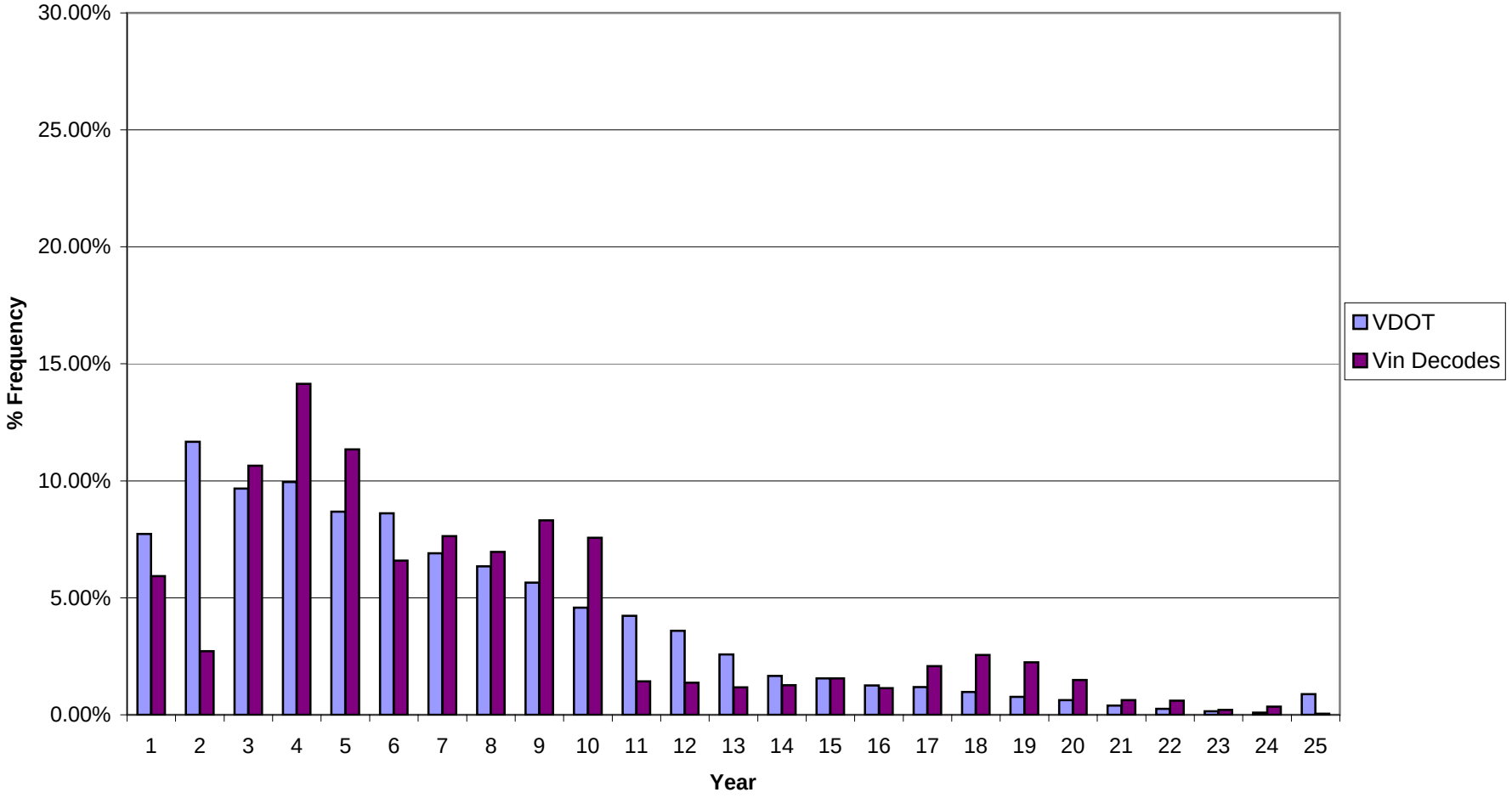
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = ARL
Vehicle Type = MC
Number of Decoded Vins = 1,447



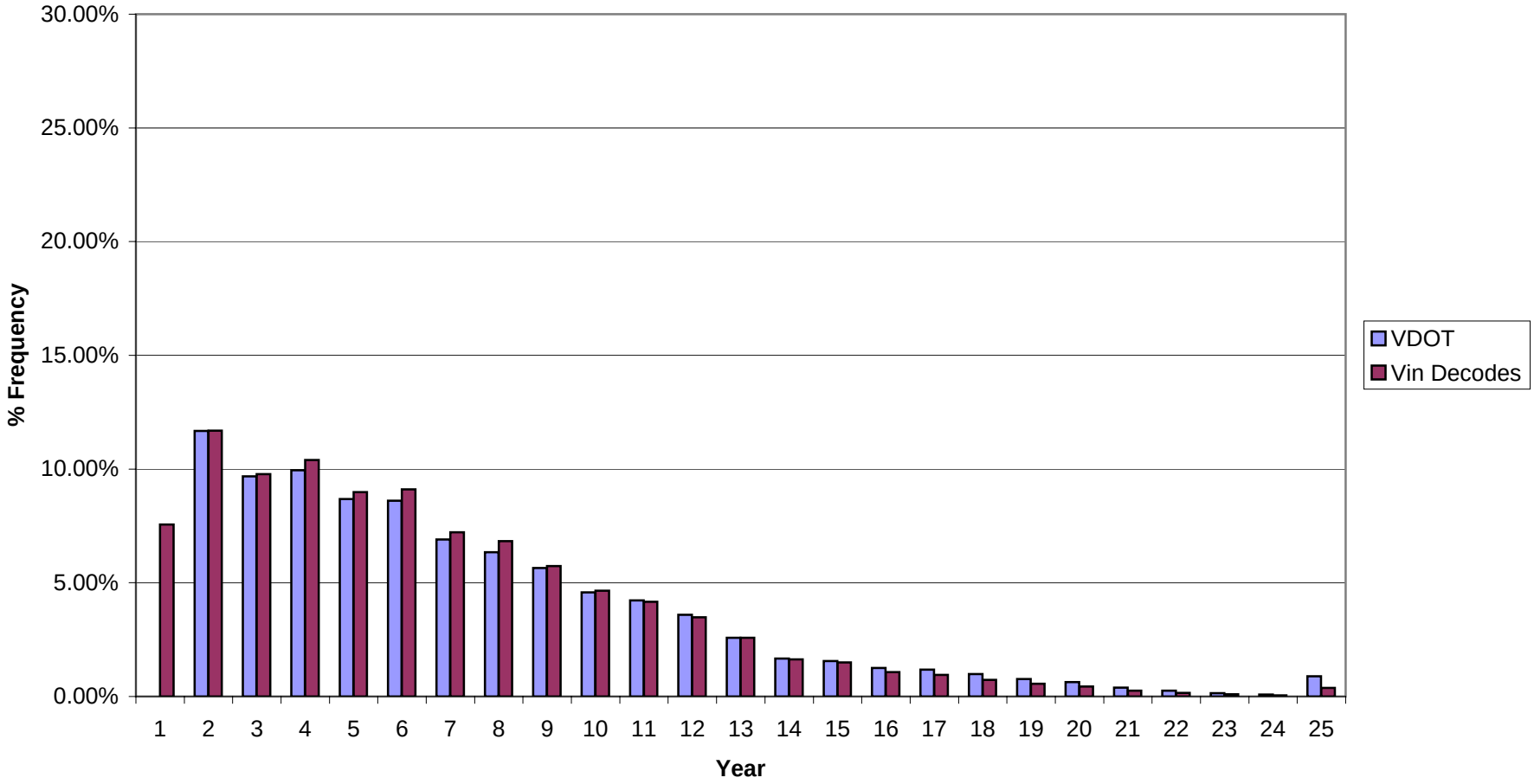
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = LDV
Number of Decoded Vins = 437,485



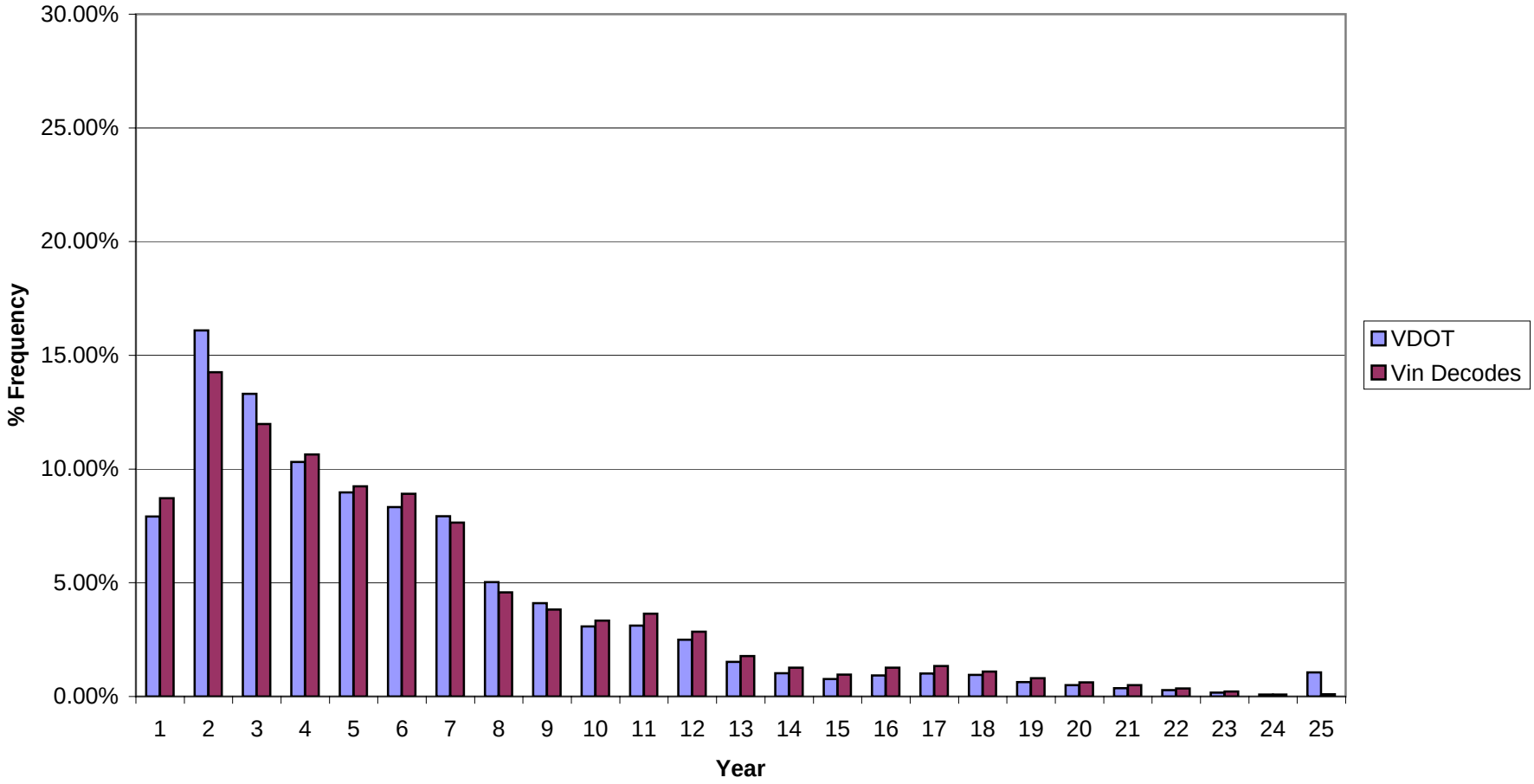
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = LDT1
Number of Decoded Vins = 6,224



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = LDT2
Number of Decoded Vins = 201,269

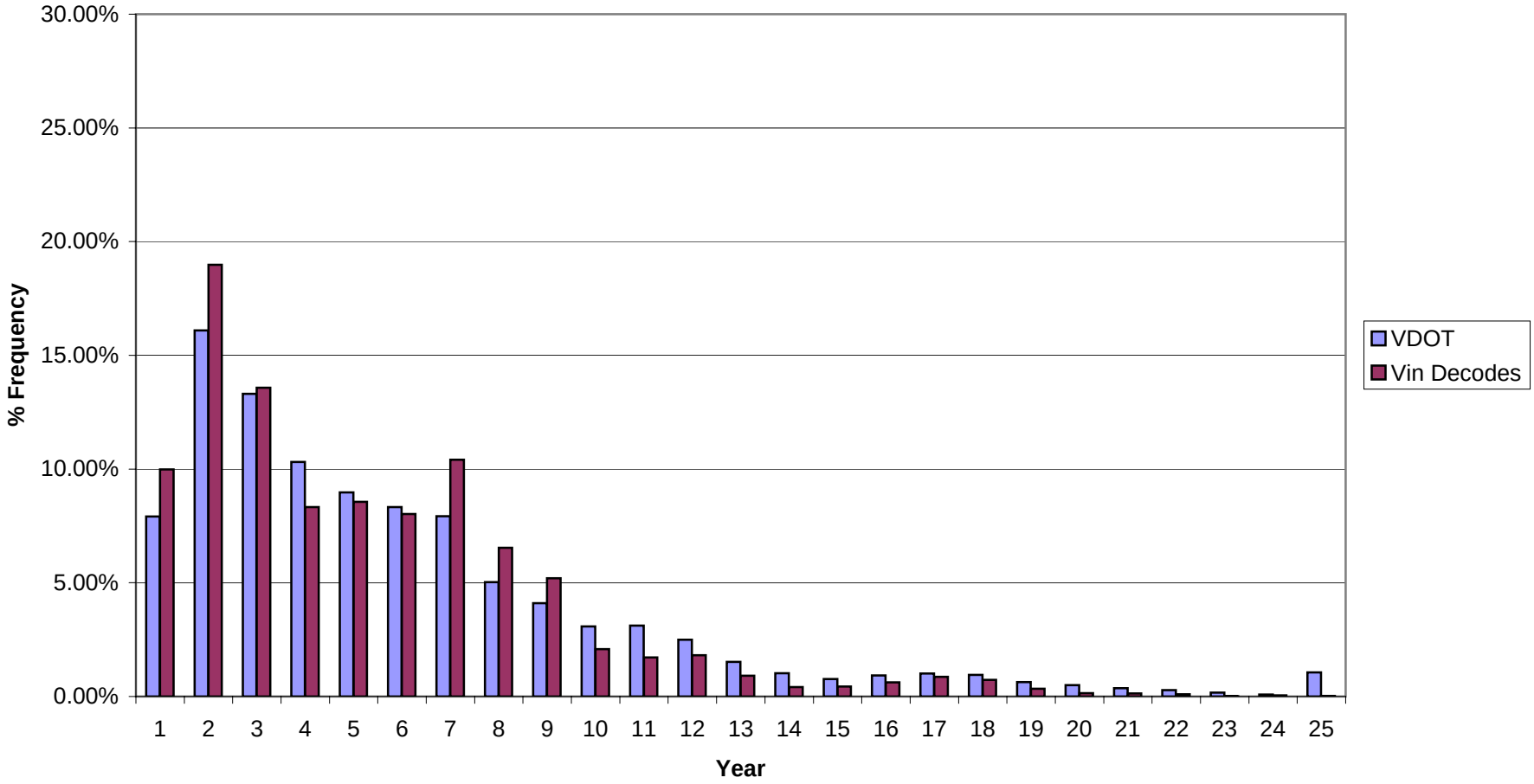


Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = LDT3
Number of Decoded Vins = 45,544

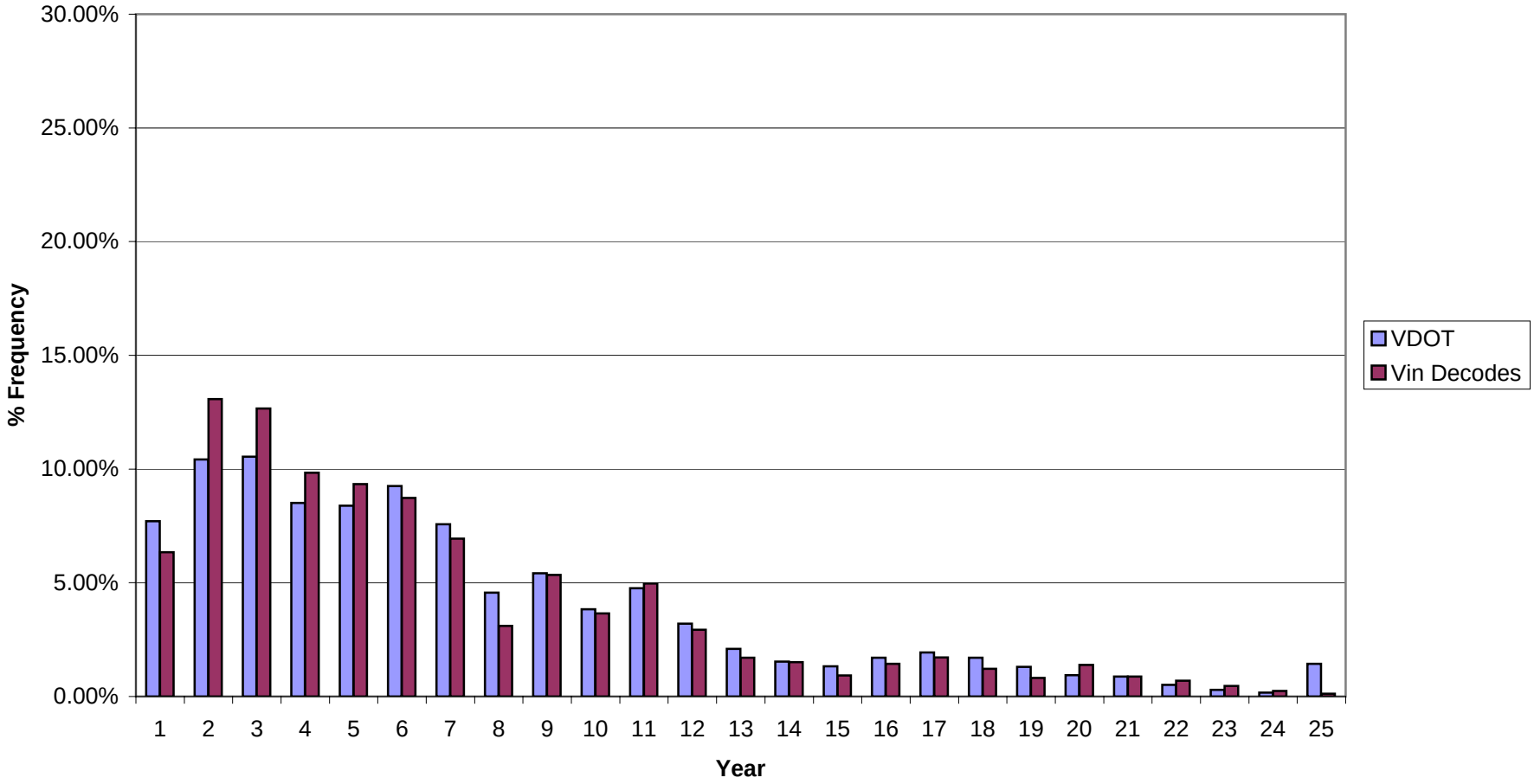


ATTACHMENT 4C

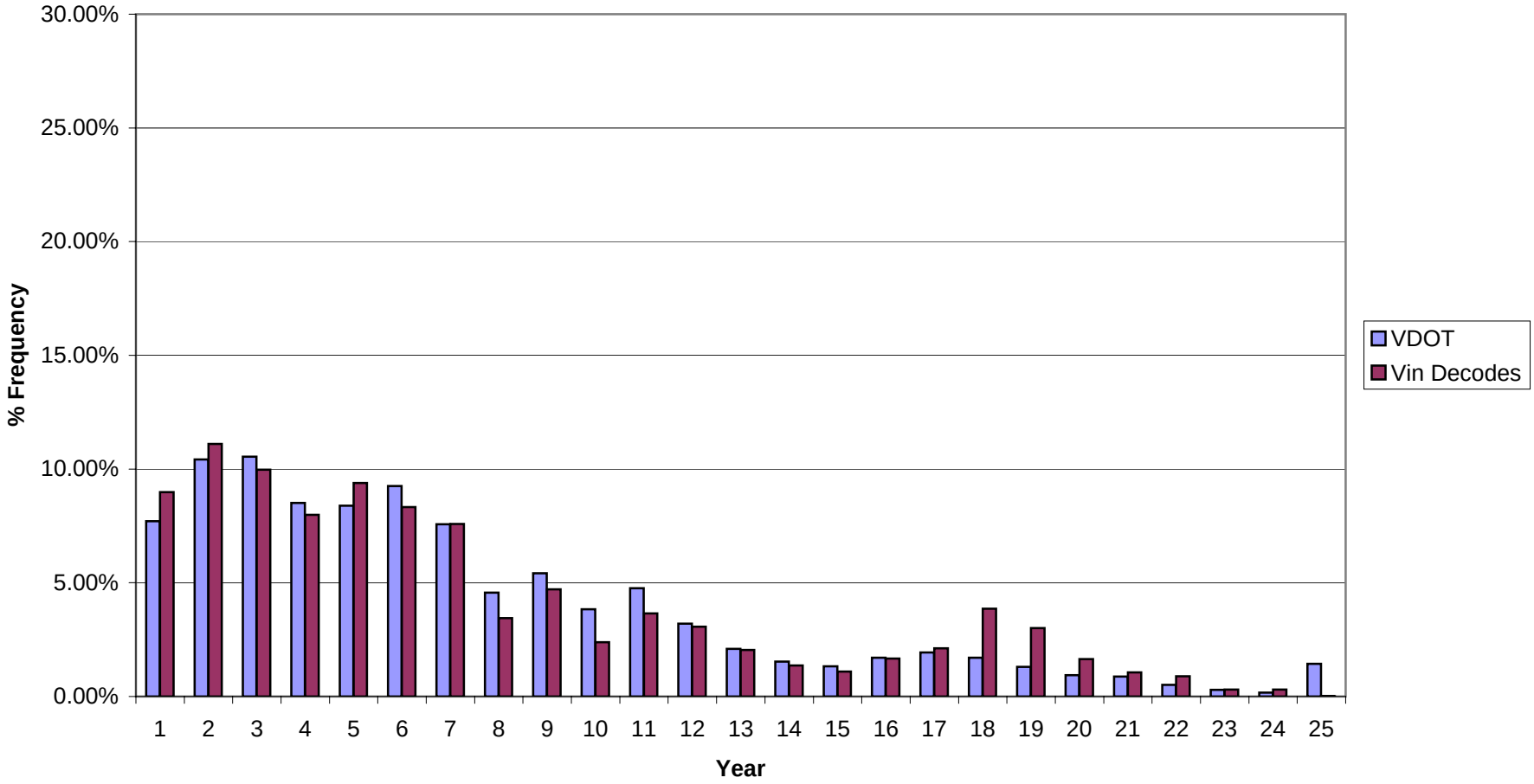
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = LDT4
Number of Decoded Vins = 13,188



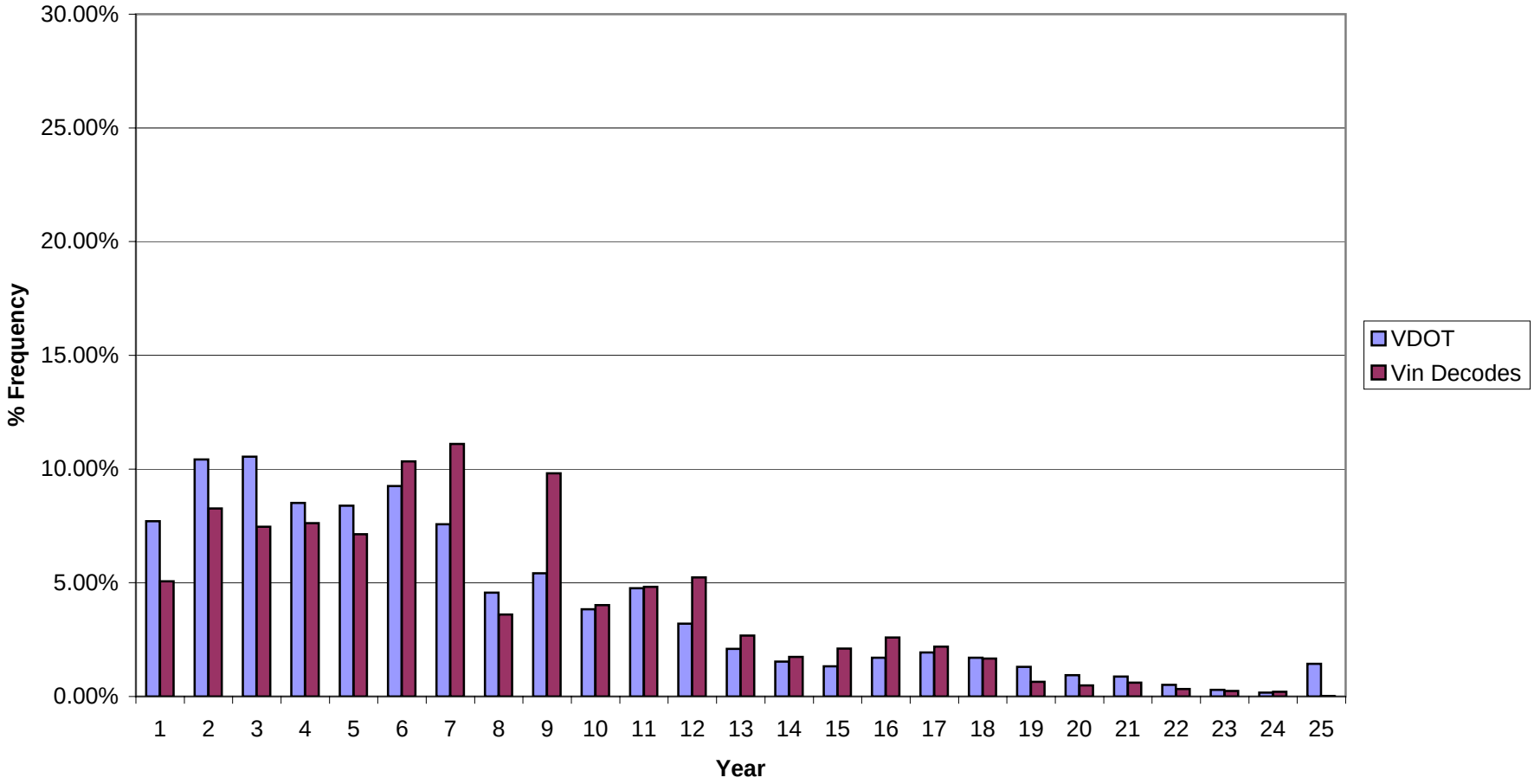
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV2B
Number of Decoded Vins = 14,527



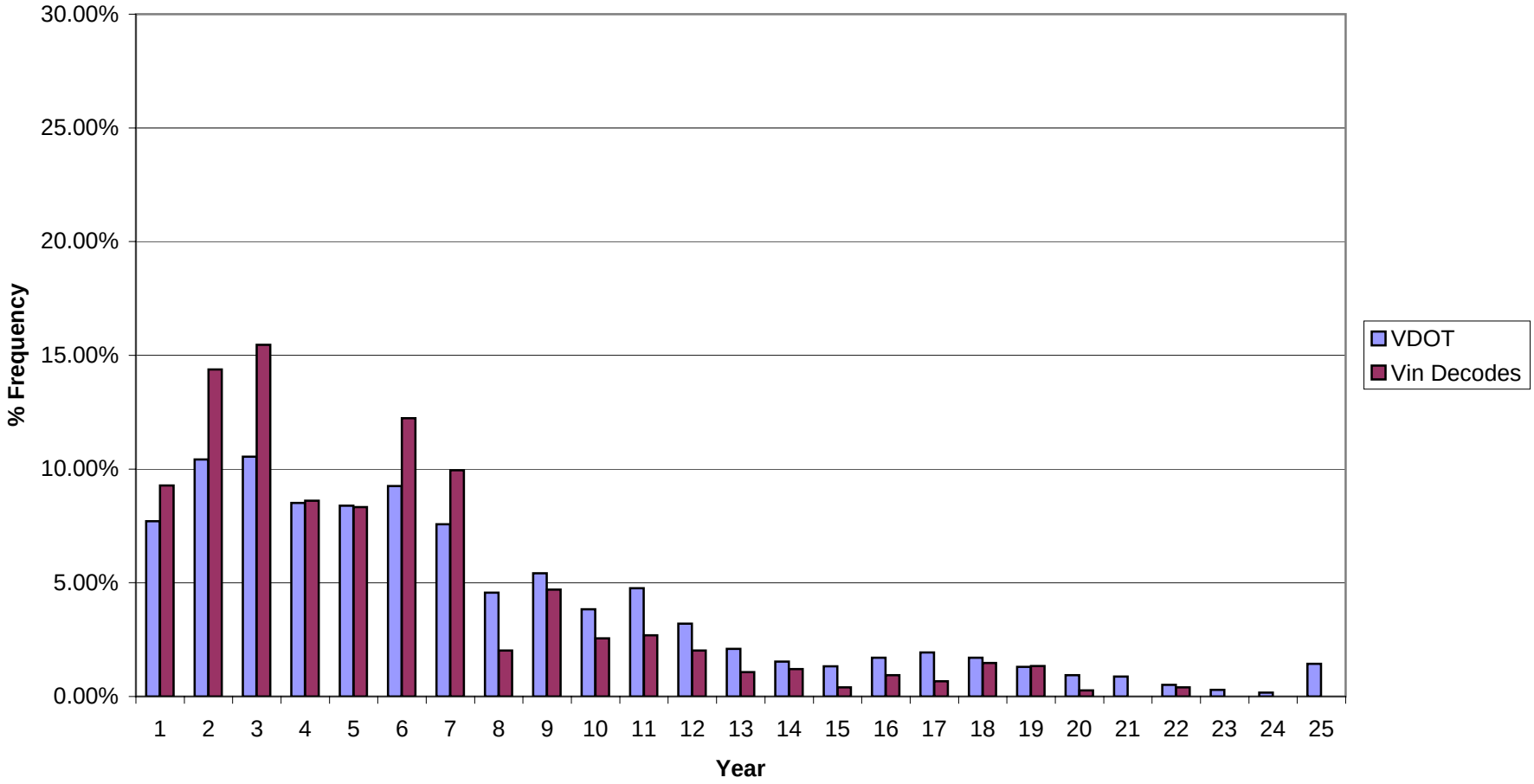
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV3
Number of Decoded Vins = 2,928



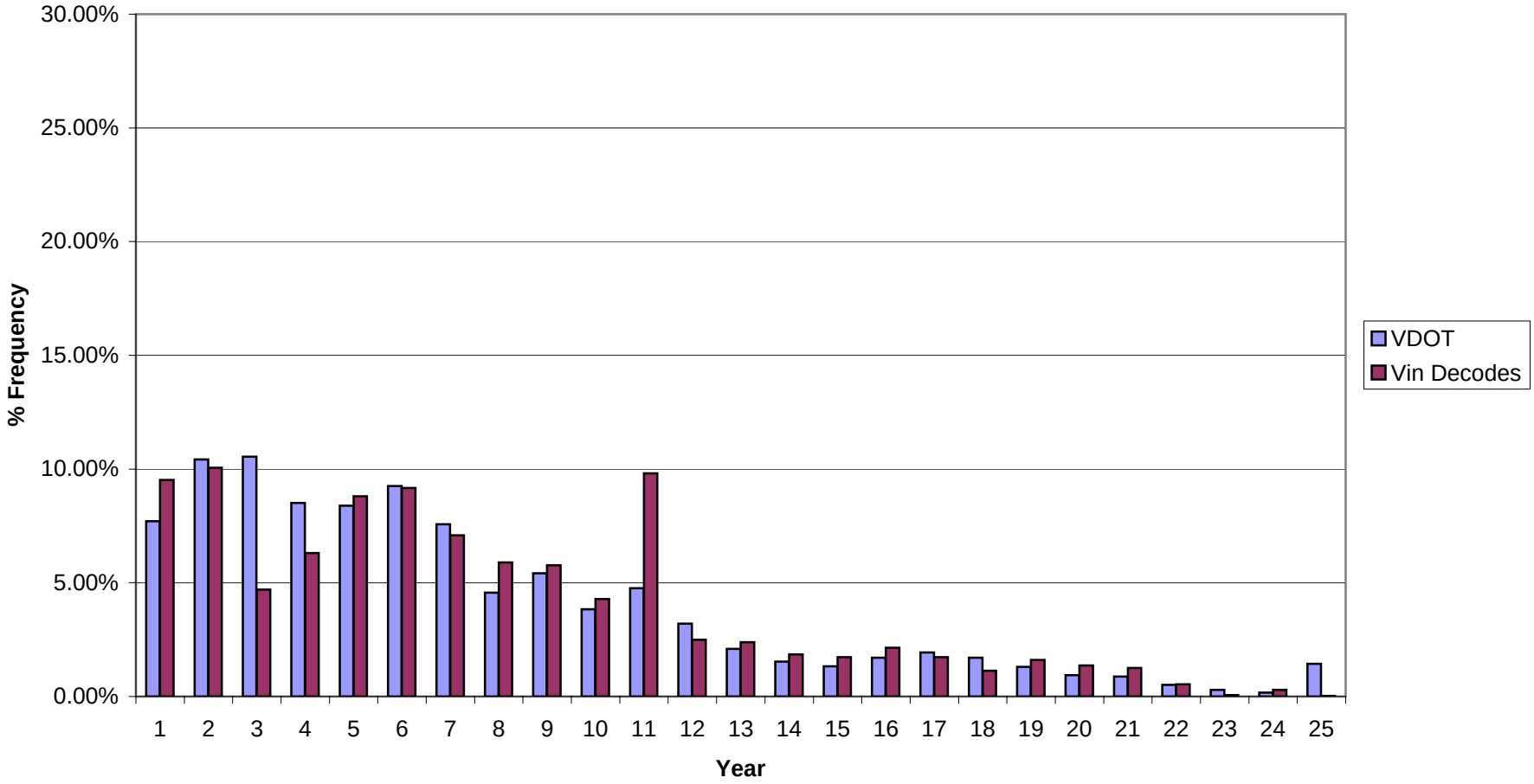
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV4
Number of Decoded Vins = 2,466



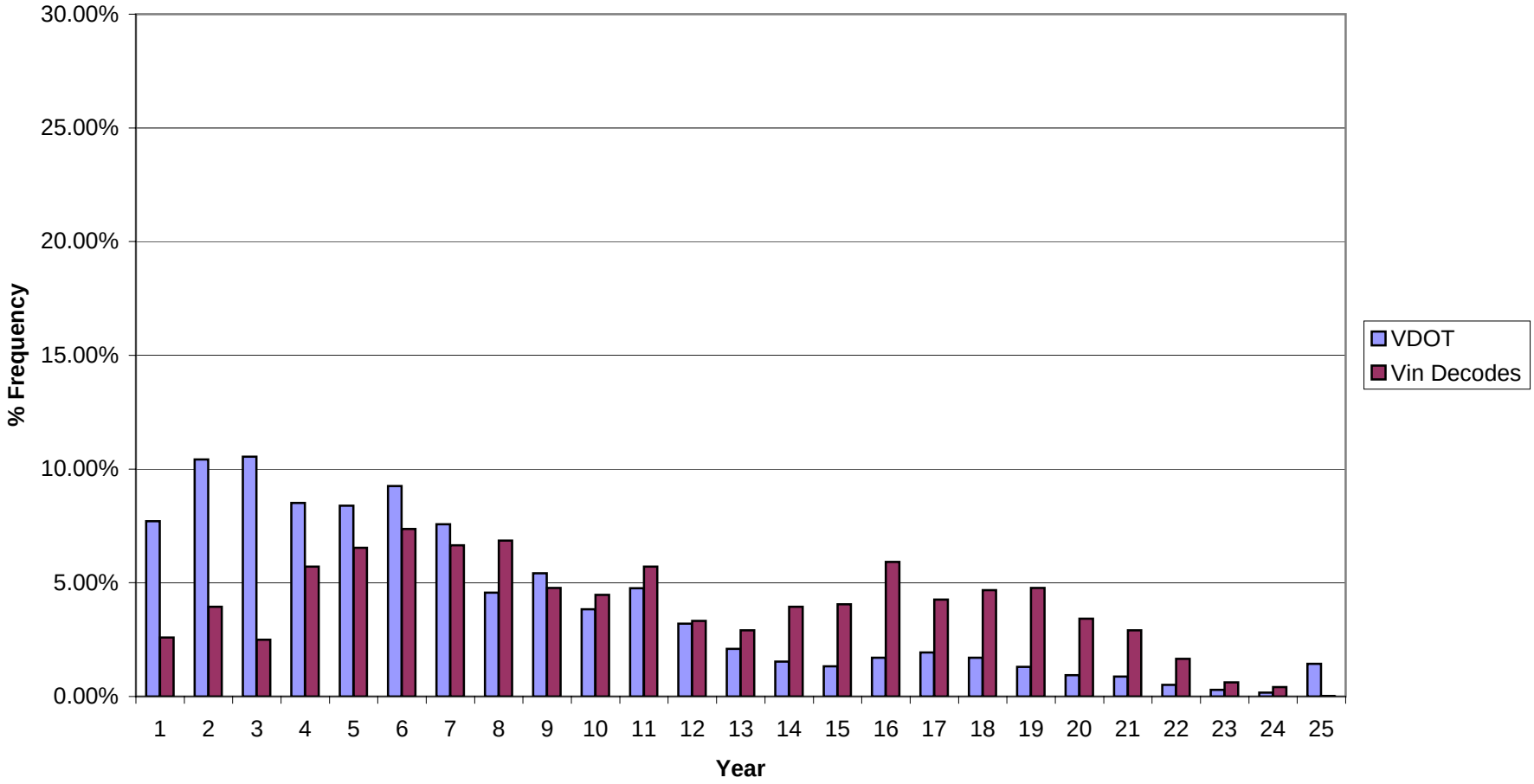
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV5
Number of Decoded Vins = 744



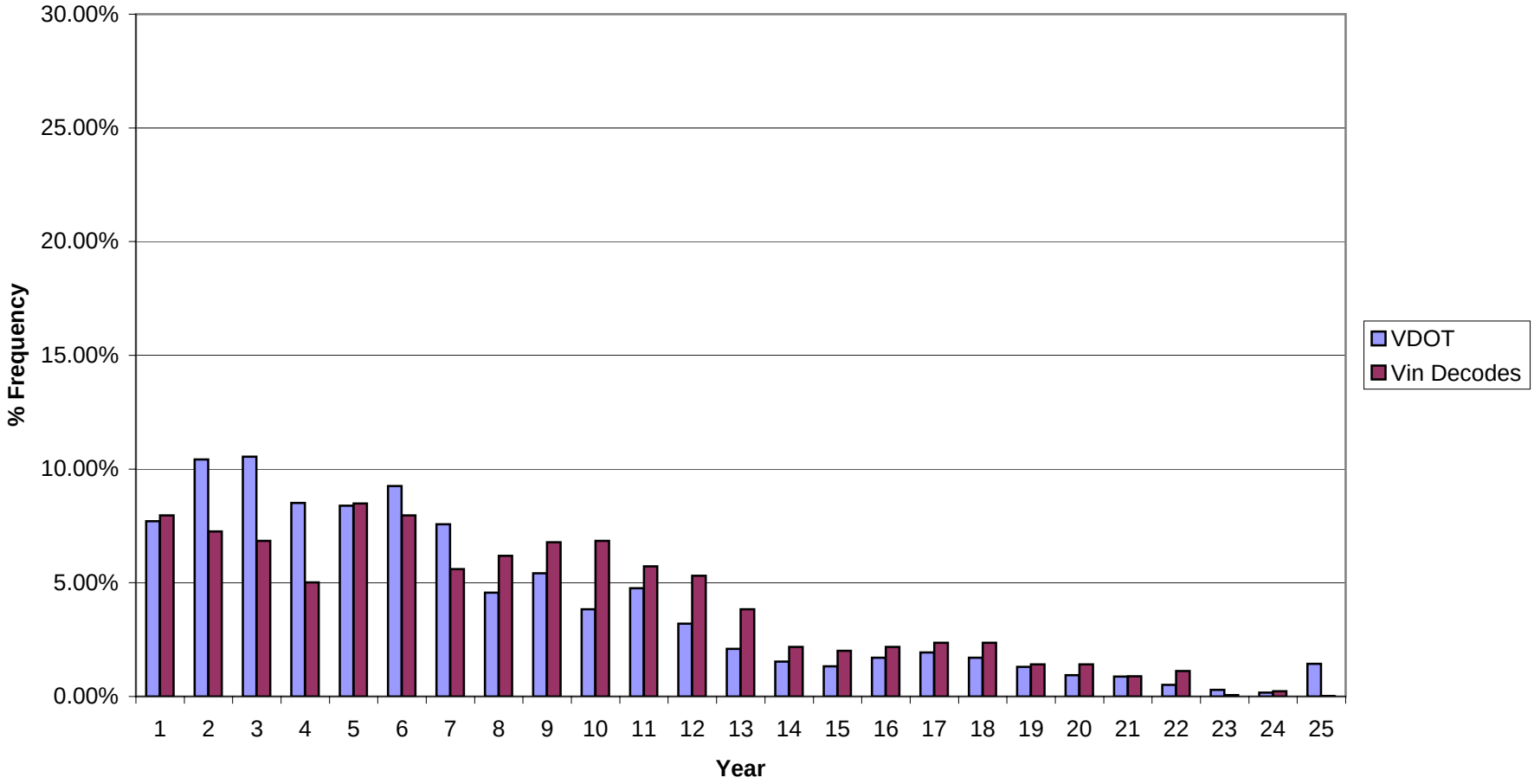
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV6
Number of Decoded Vins = 1,680



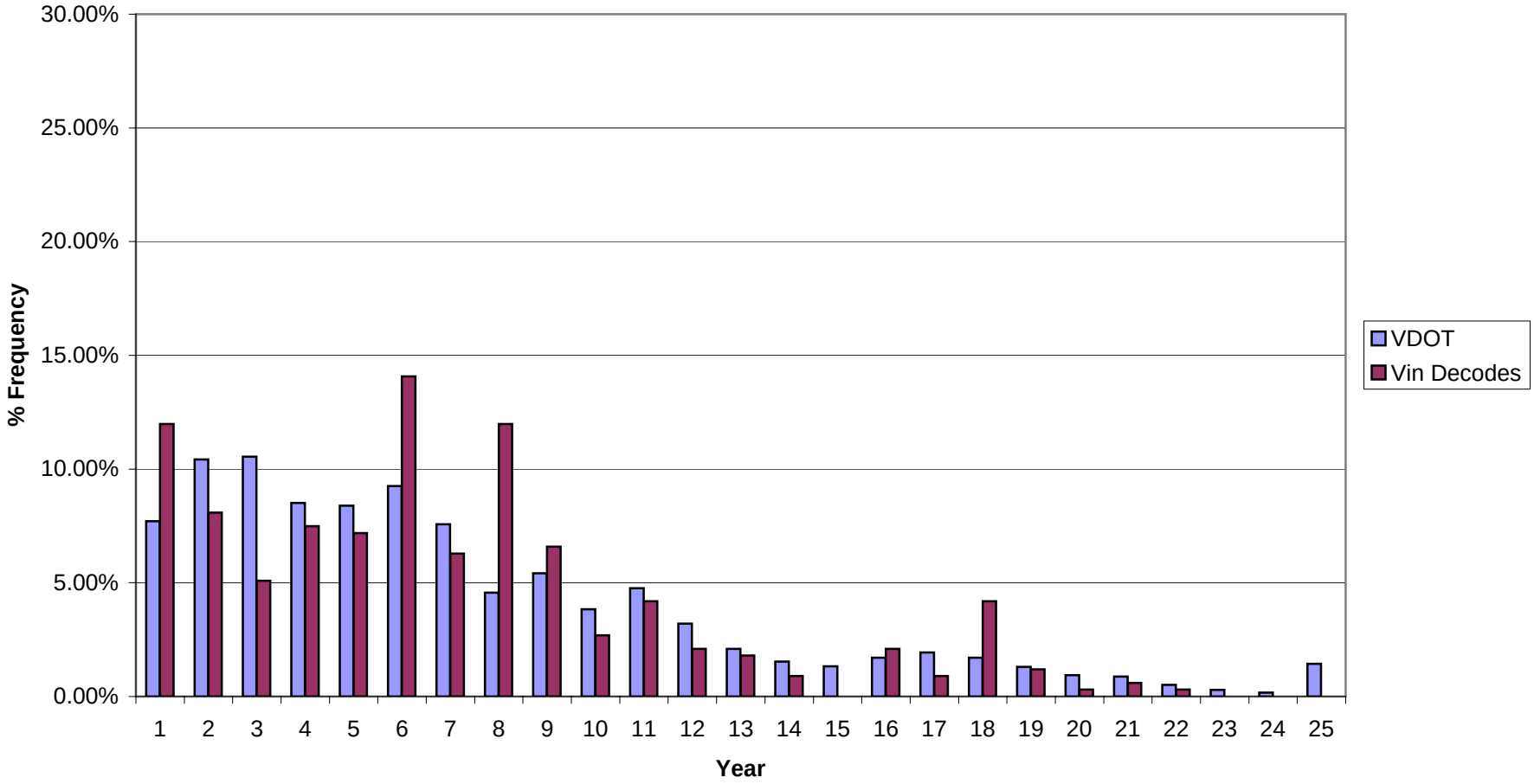
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV7
Number of Decoded Vins = 963



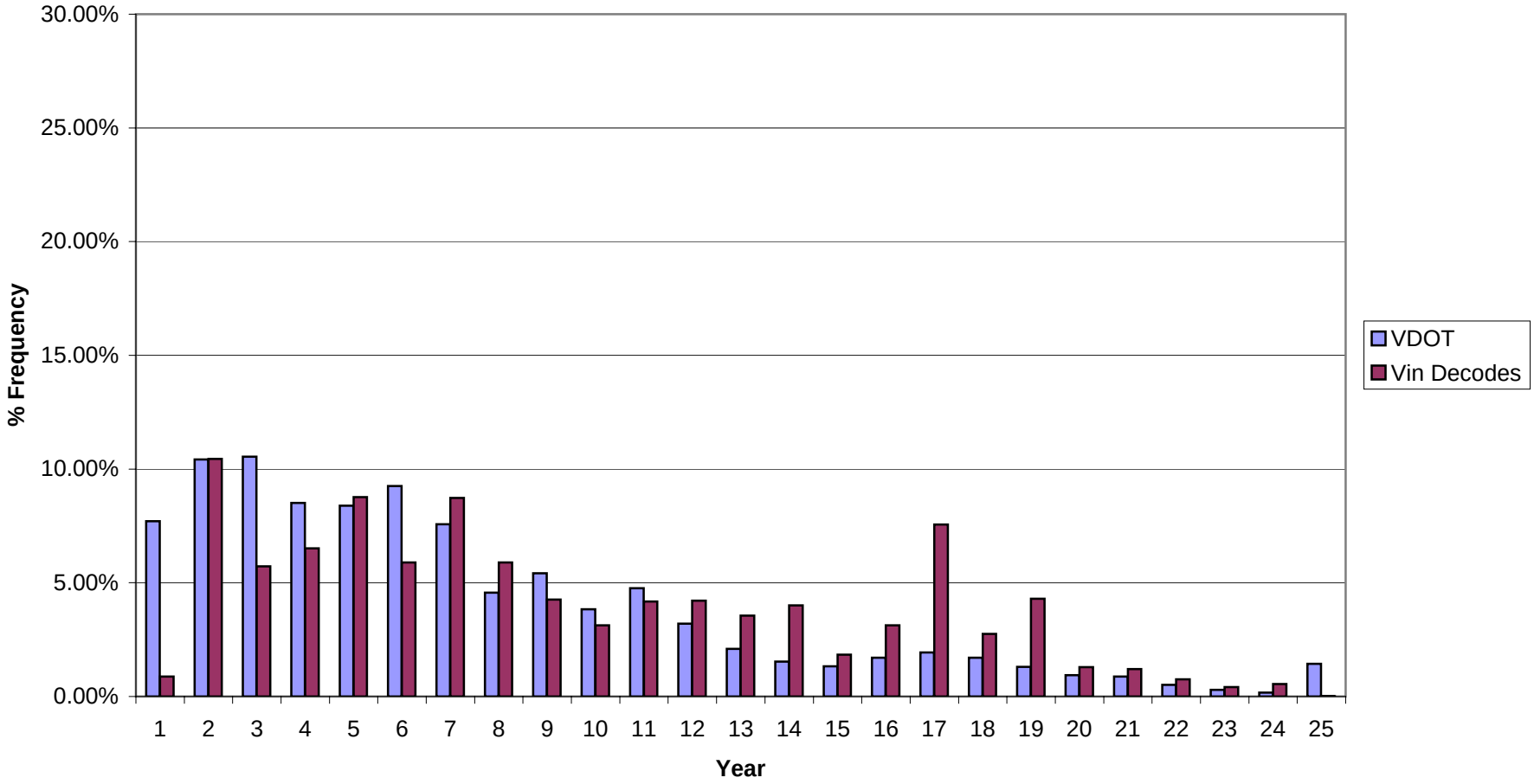
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV8A
Number of Decoded Vins = 1,696



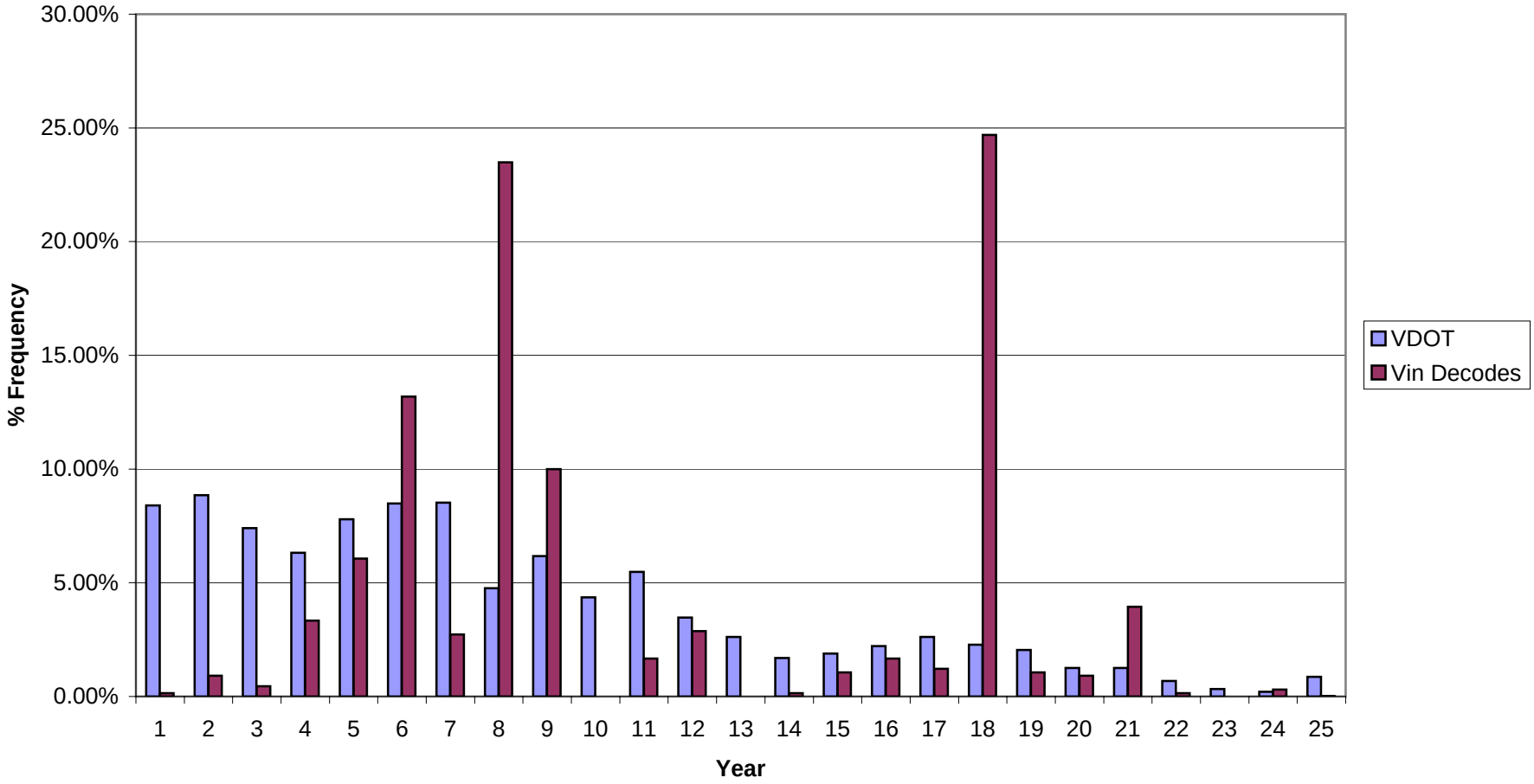
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDV8B
Number of Decoded Vins = 334



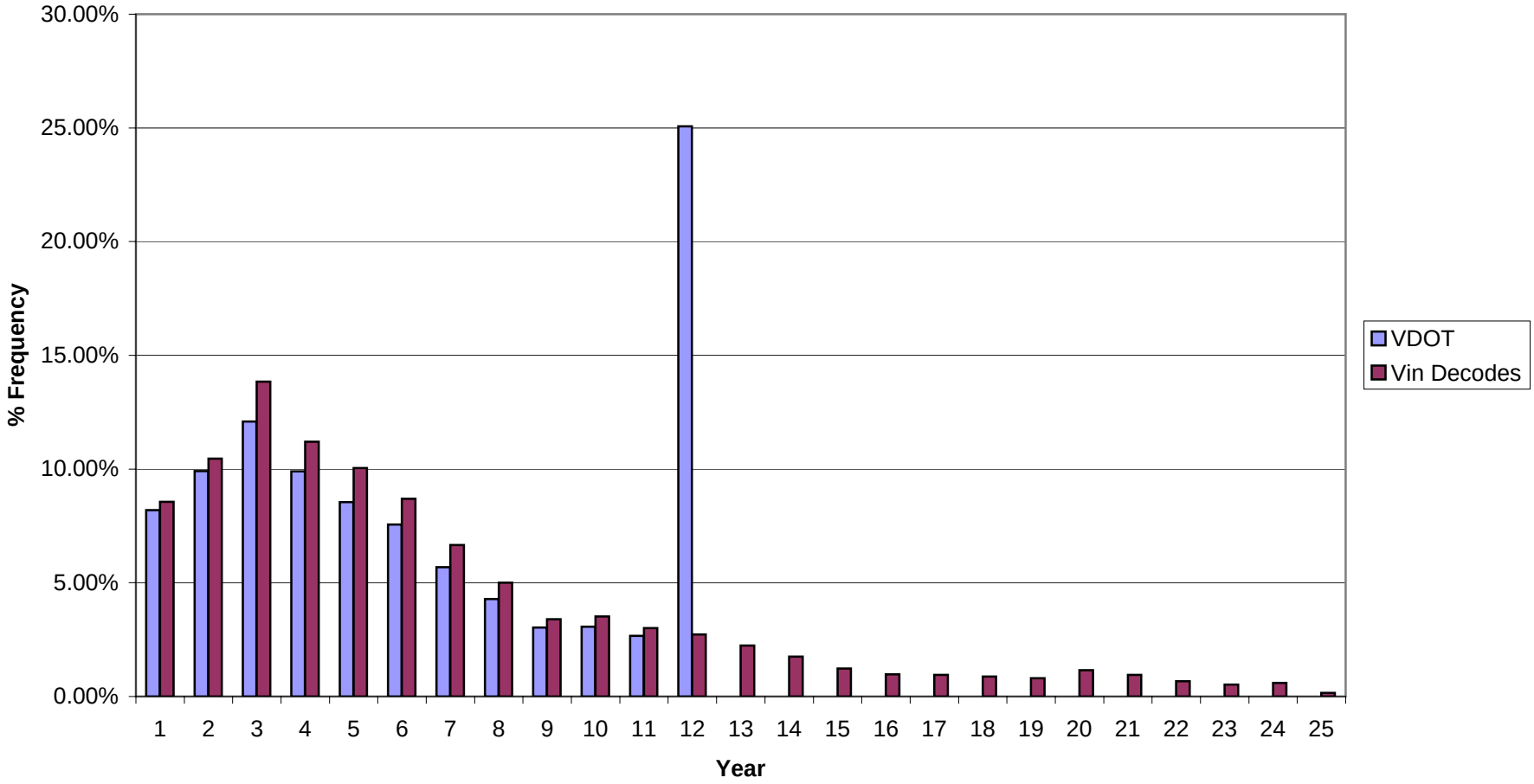
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDBS
Number of Decoded Vins = 1,767



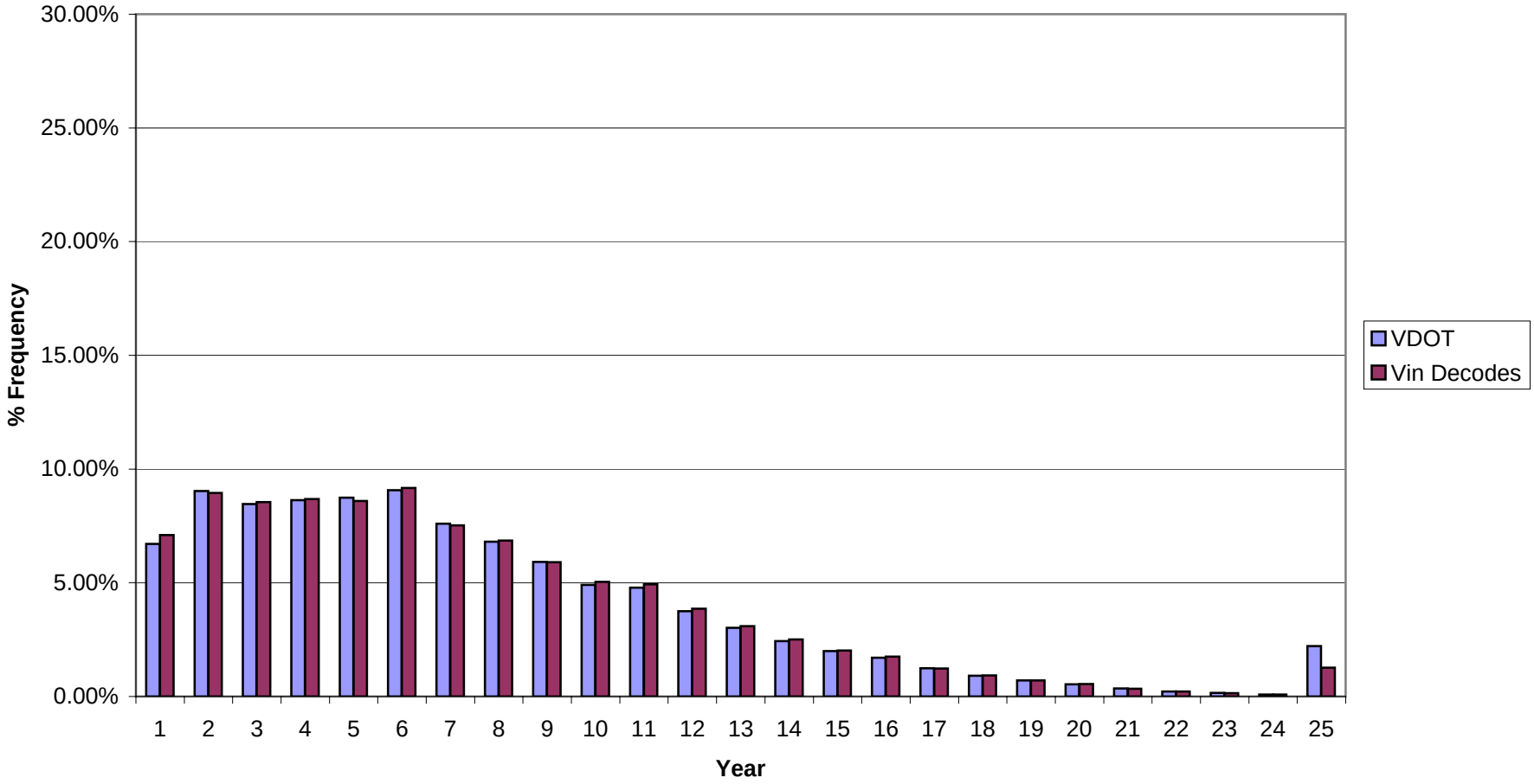
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = HDBT
Number of Decoded Vins = 1,287



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = FFX
Vehicle Type = MC
Number of Decoded Vins = 10,275

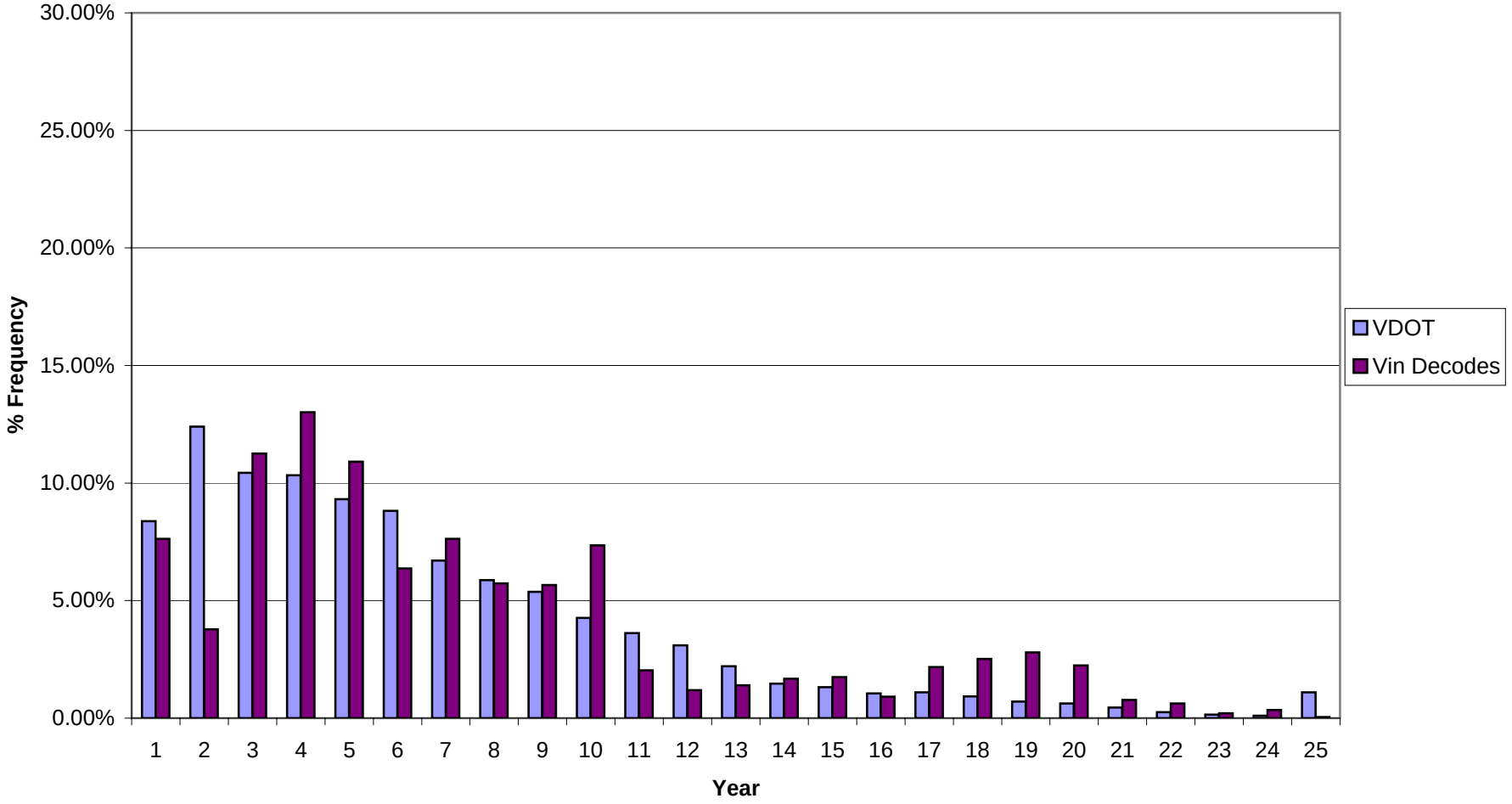


Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = LDV
Number of Decoded Vins = 92,847

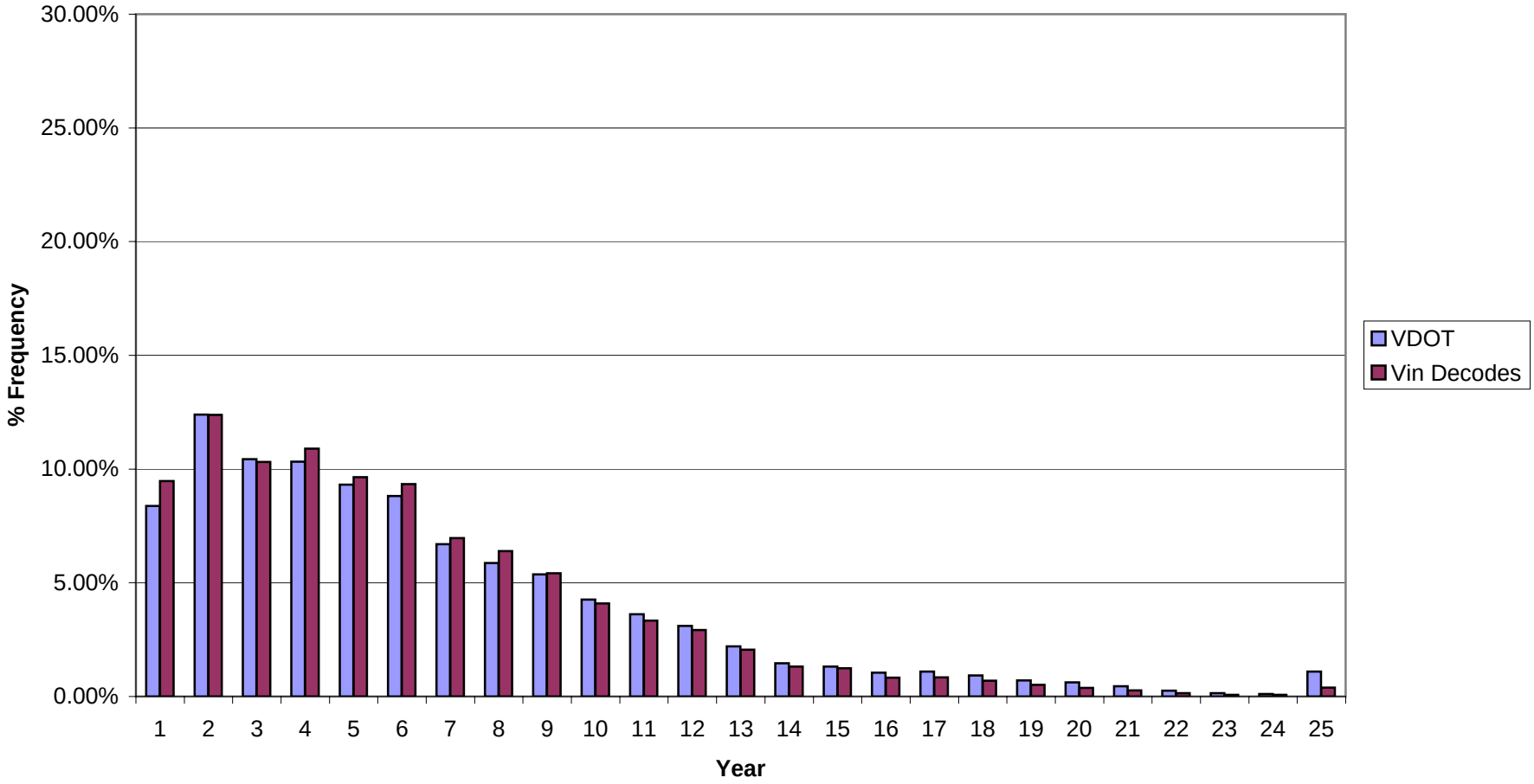


ATTACHMENT 4D

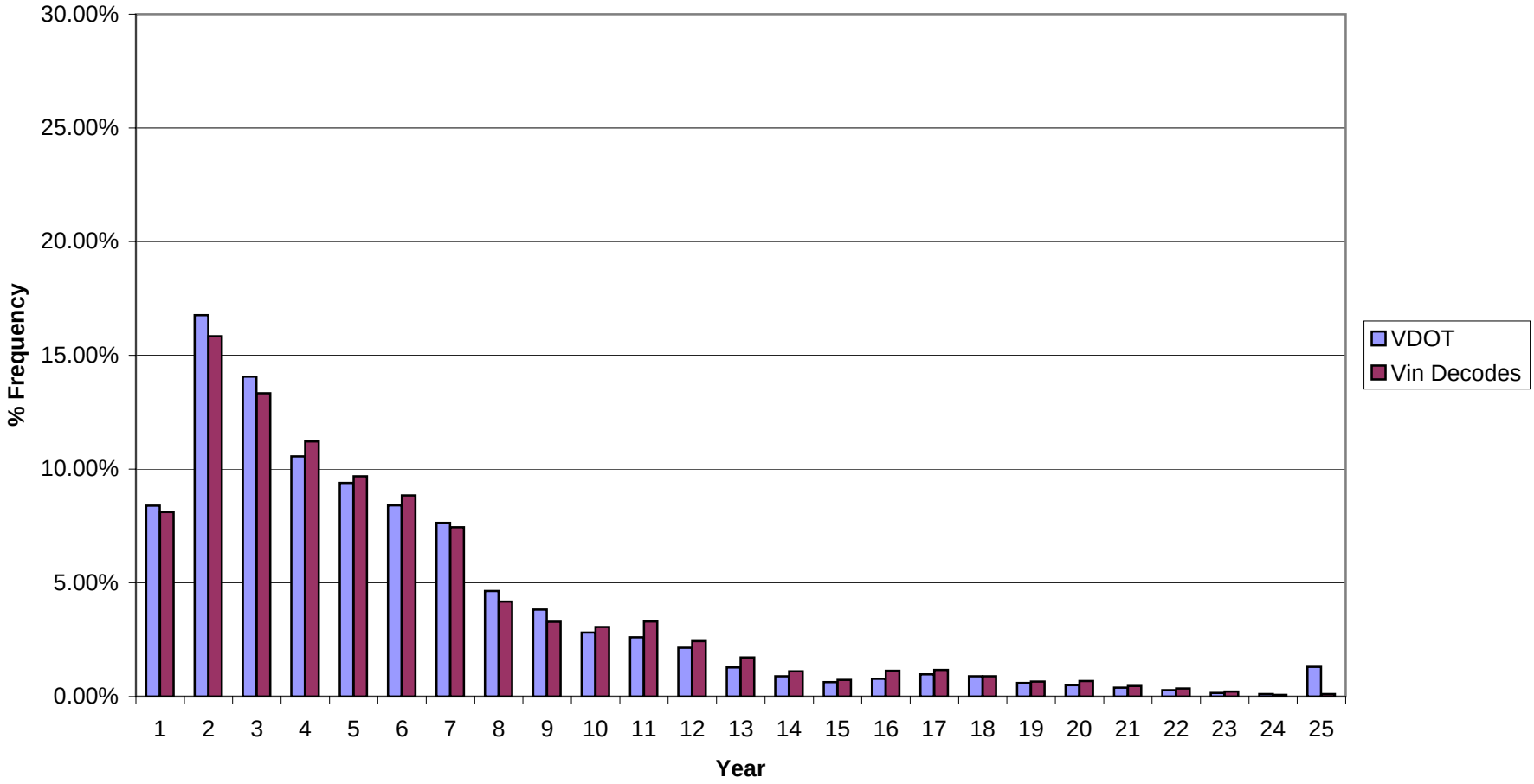
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = LDT1
Number of Decoded Vins = 1,429



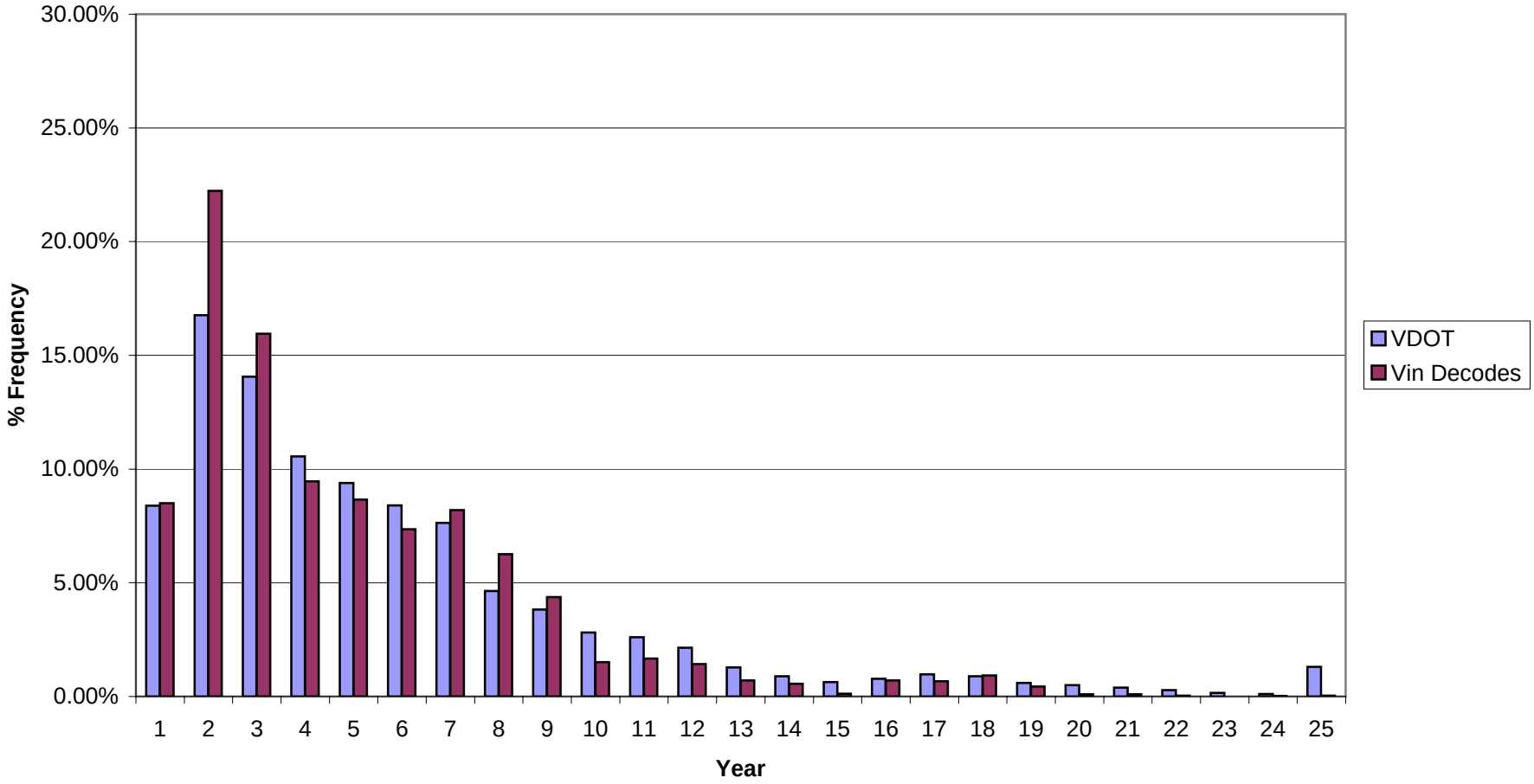
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = LDT2
Number of Decoded Vins = 56,439



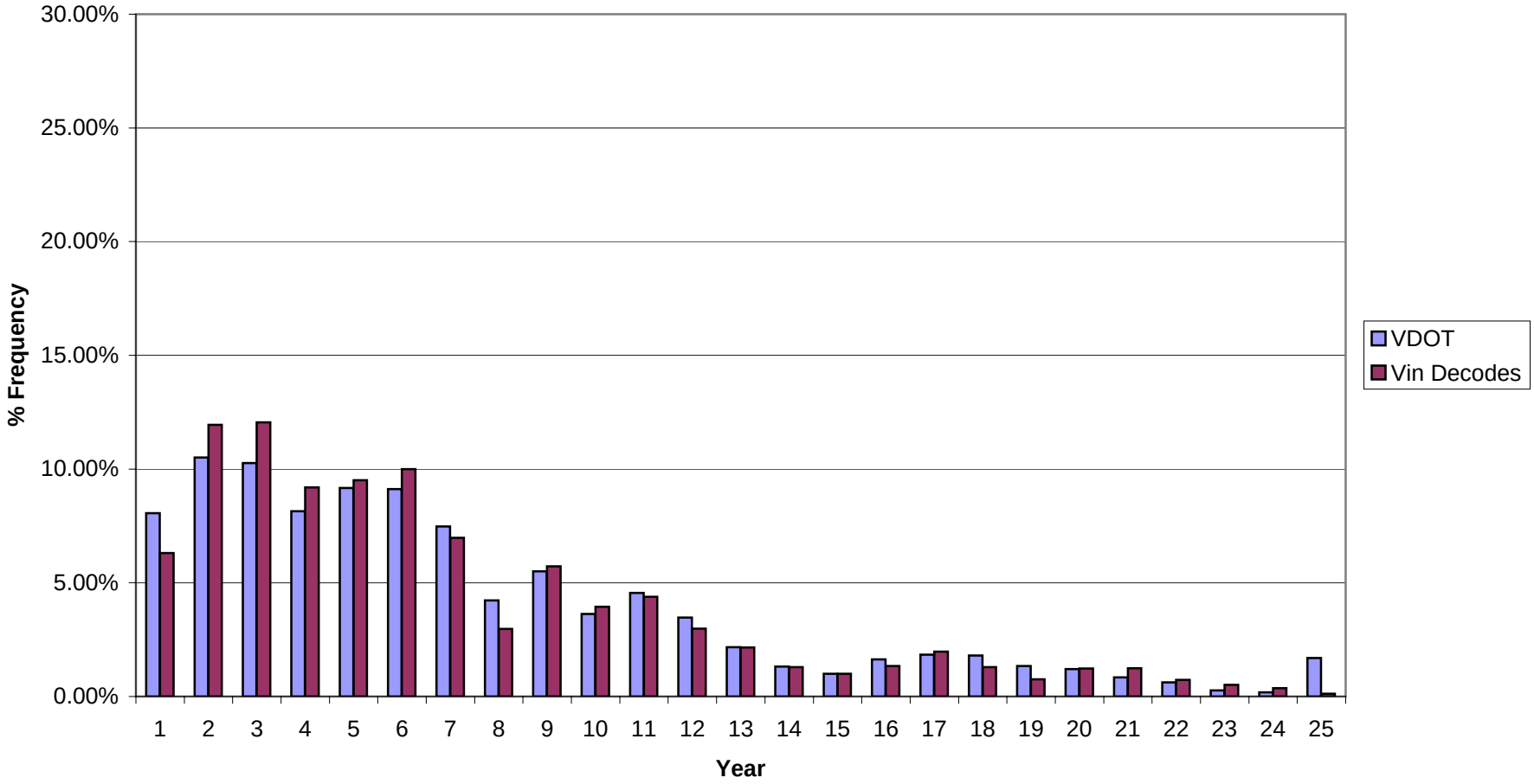
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = LDT3
Number of Decoded Vins = 15,717



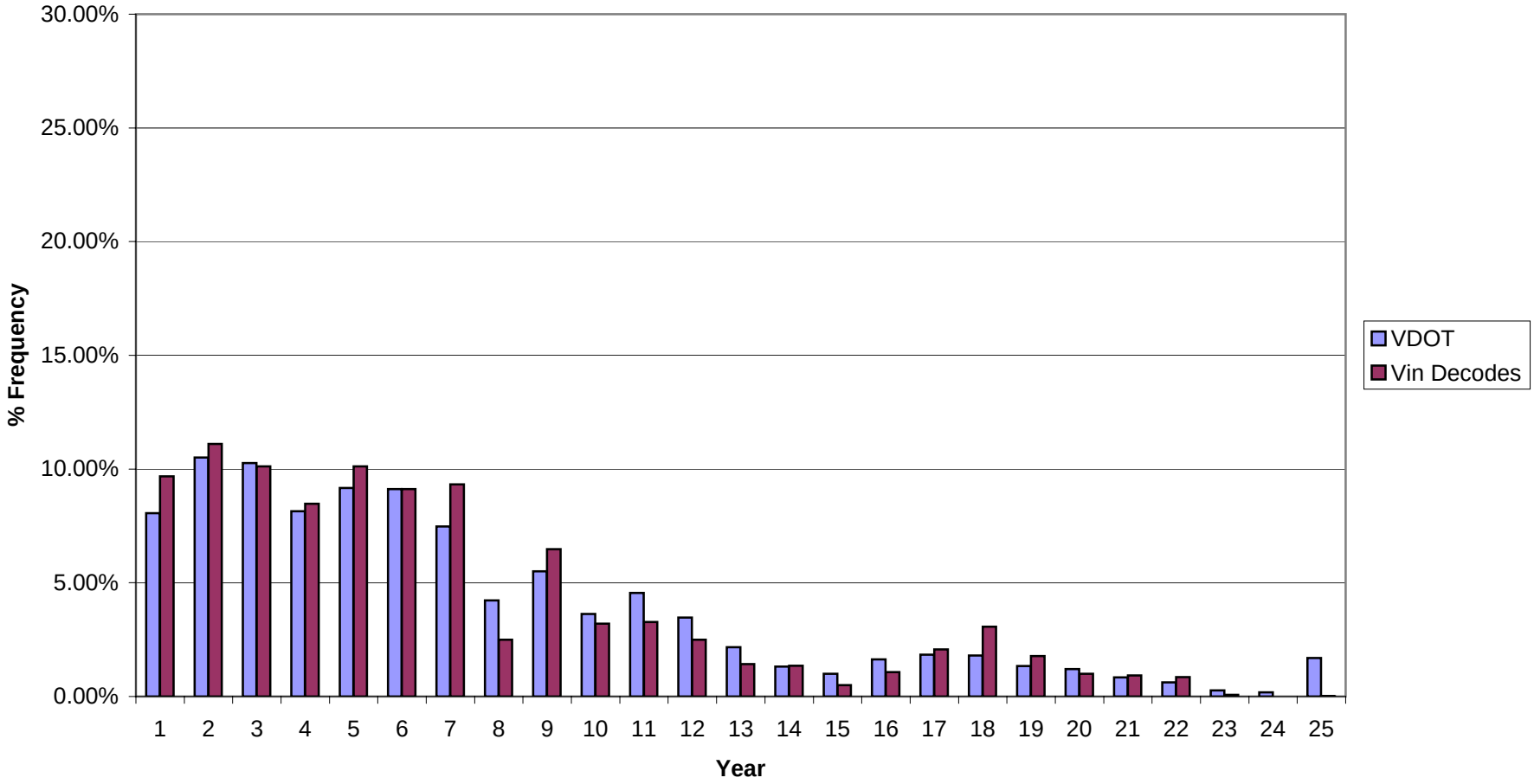
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = LDT4
Number of Decoded Vins = 4,965



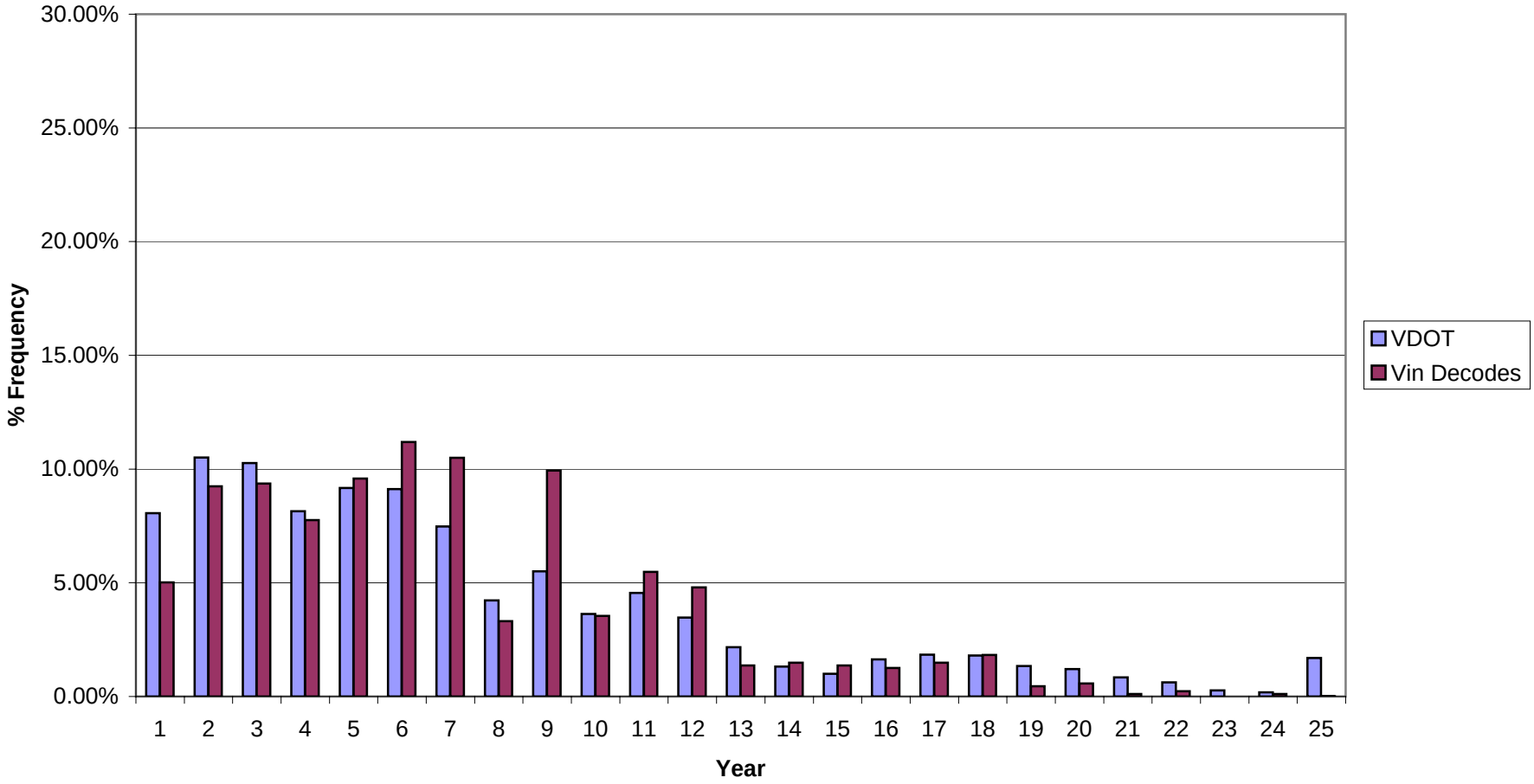
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV2B
Number of Decoded Vins = 6,195



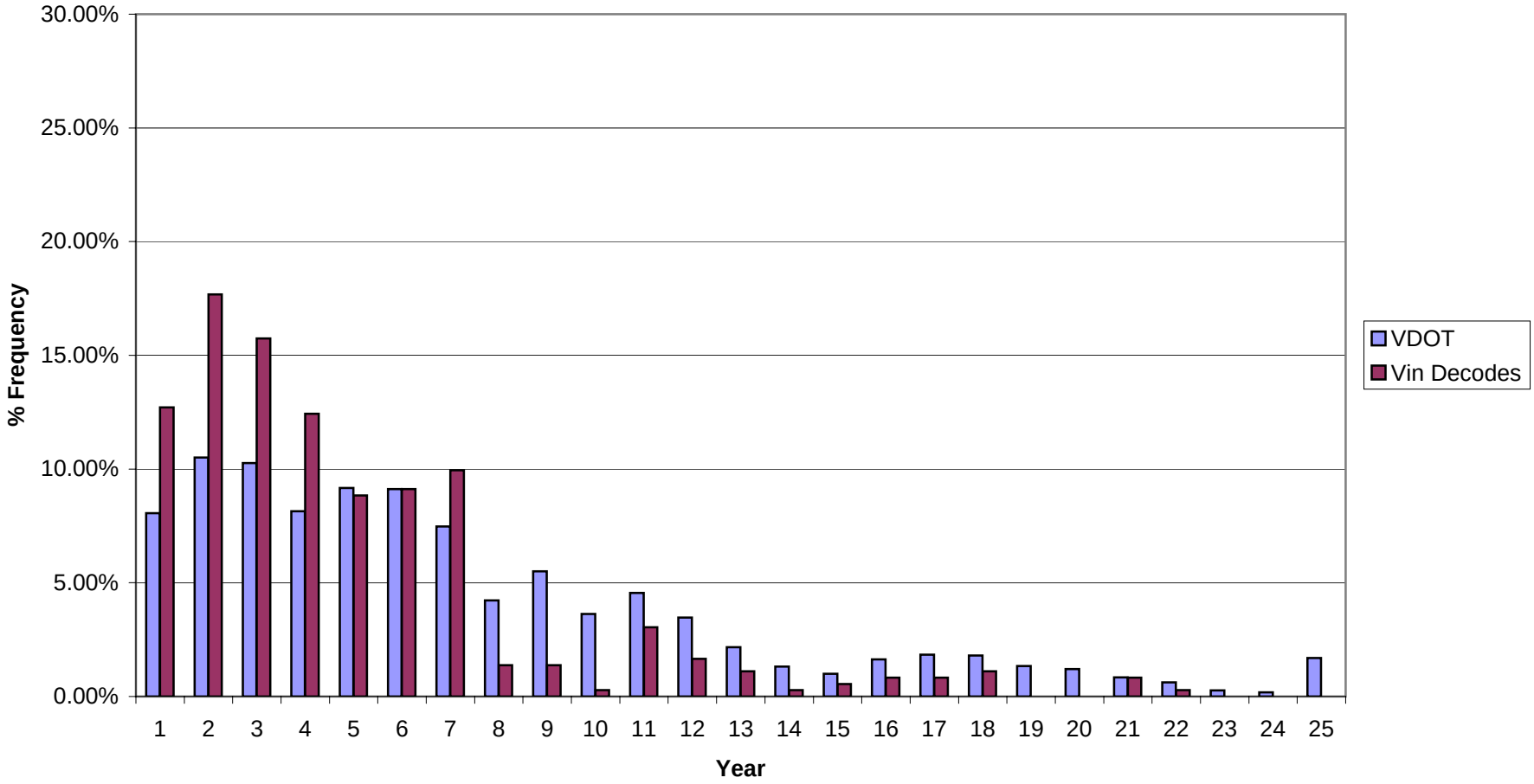
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV3
Number of Decoded Vins = 1,404



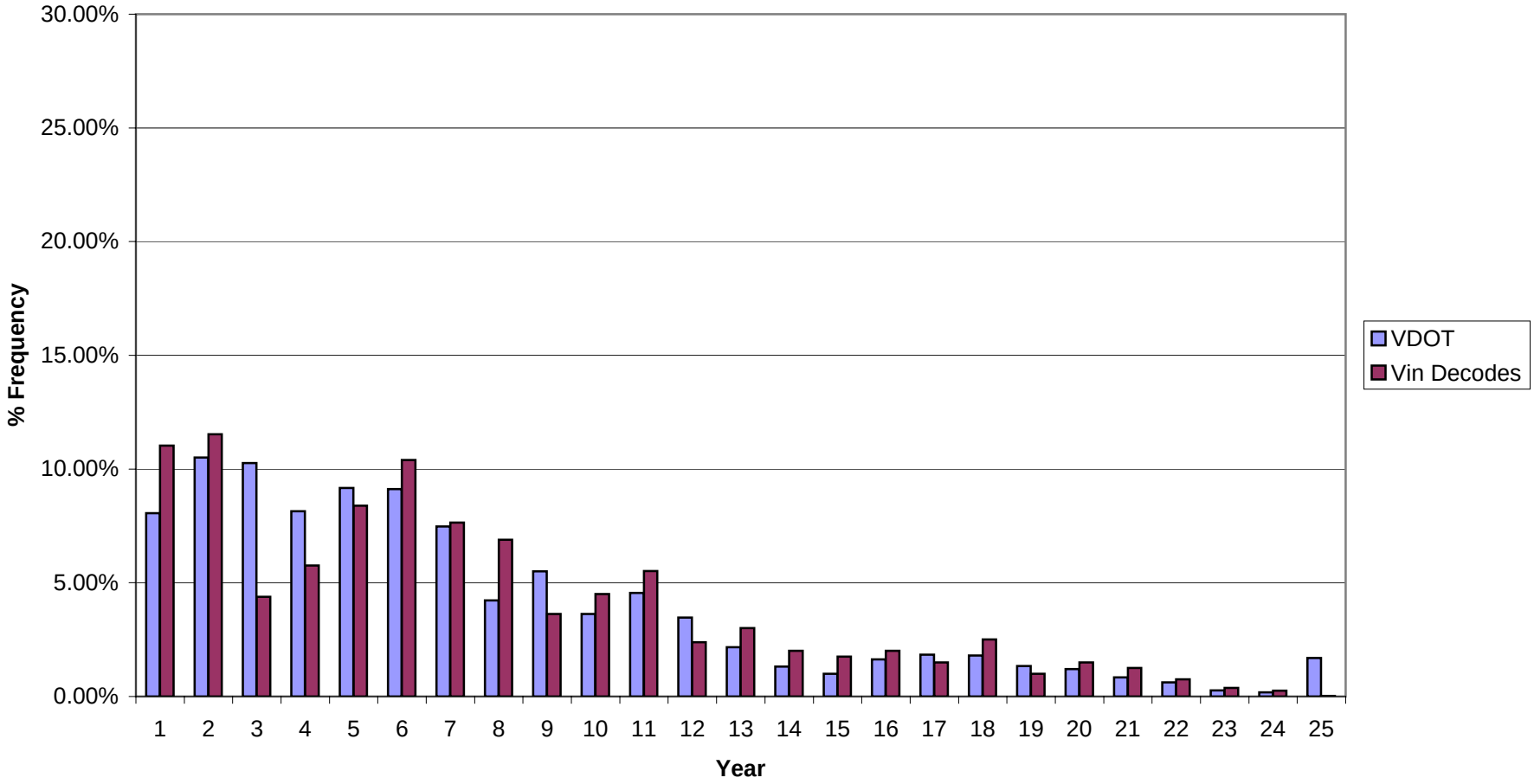
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV4
Number of Decoded Vins = 876



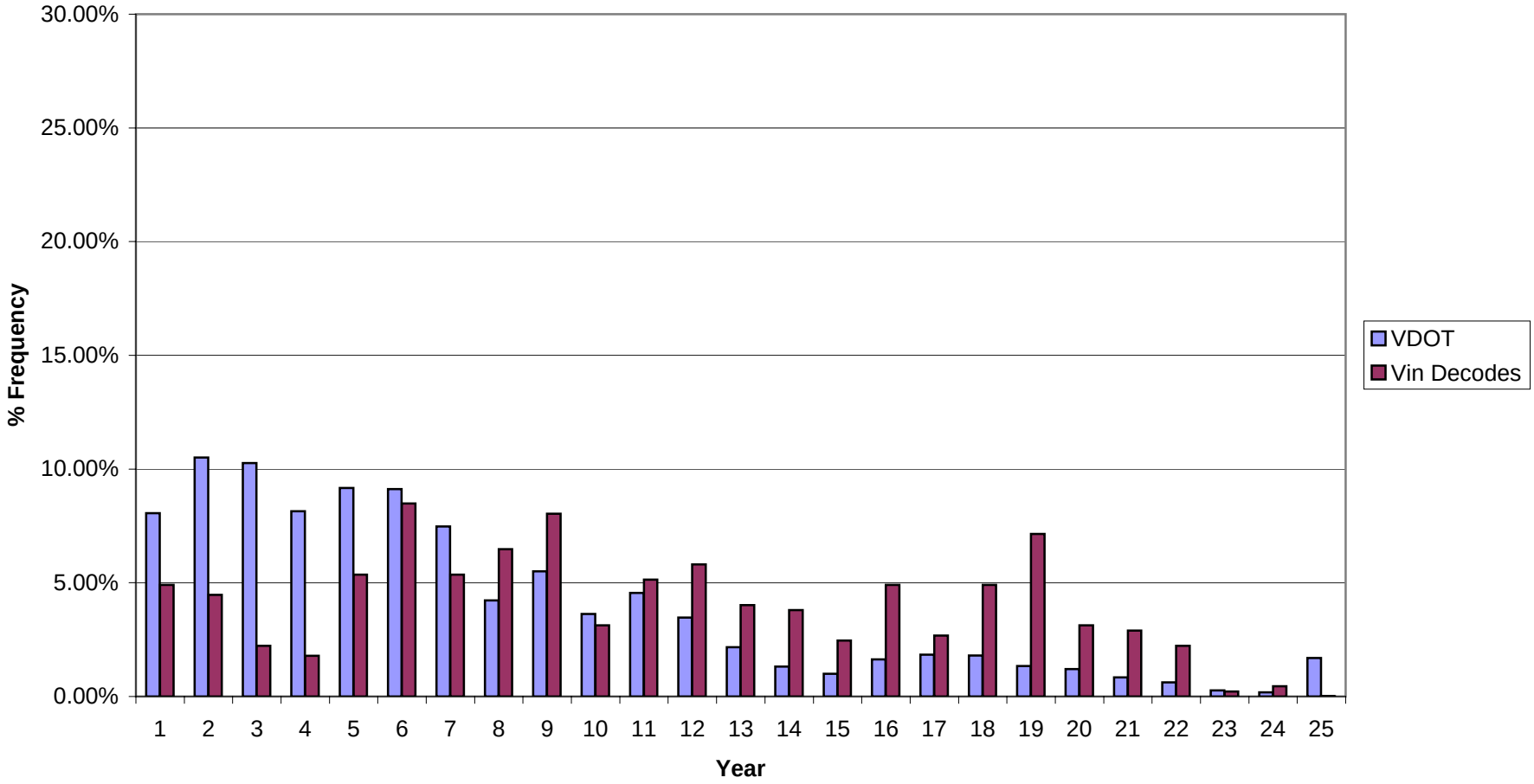
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV5
Number of Decoded Vins = 362



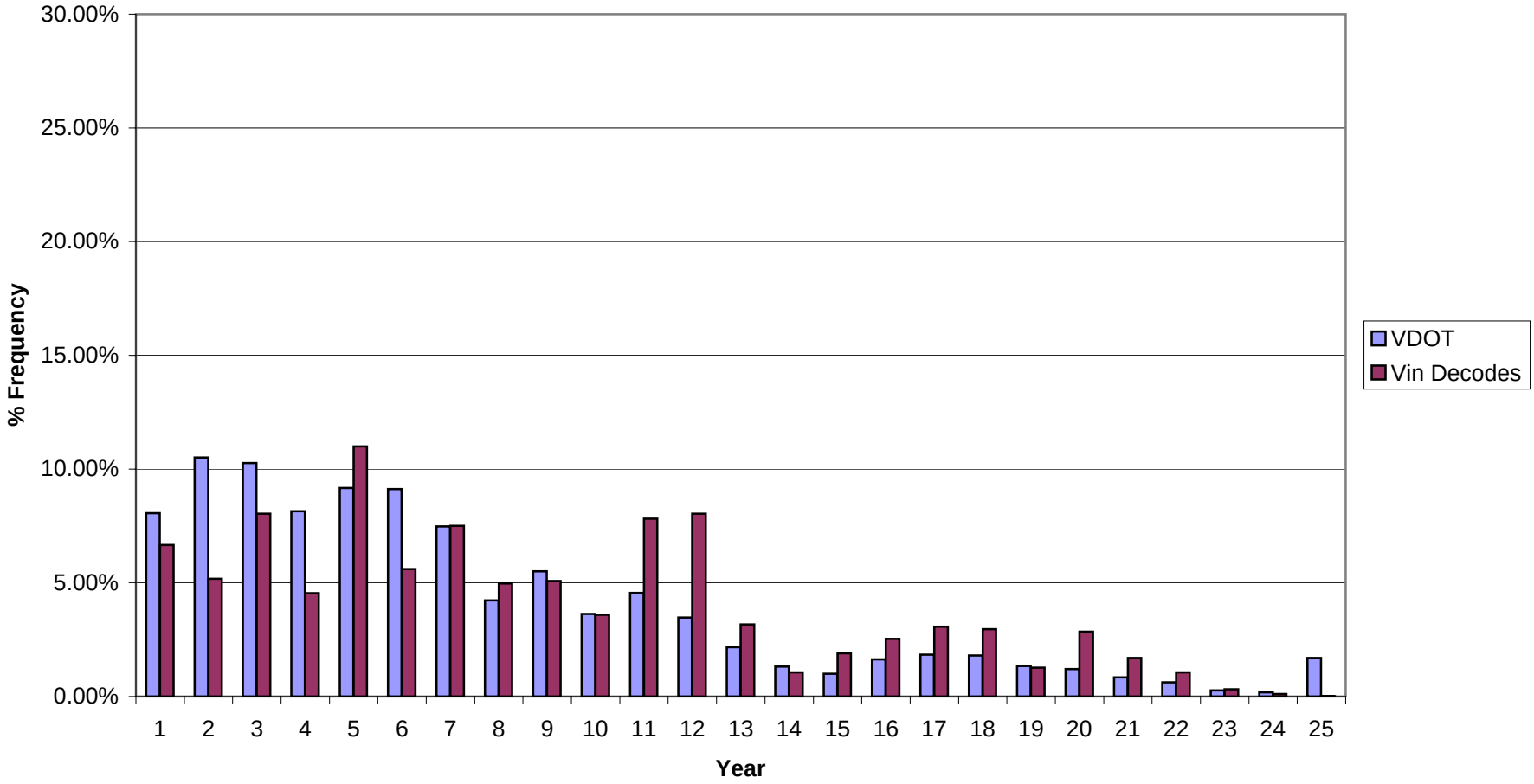
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV6
Number of Decoded Vins = 798



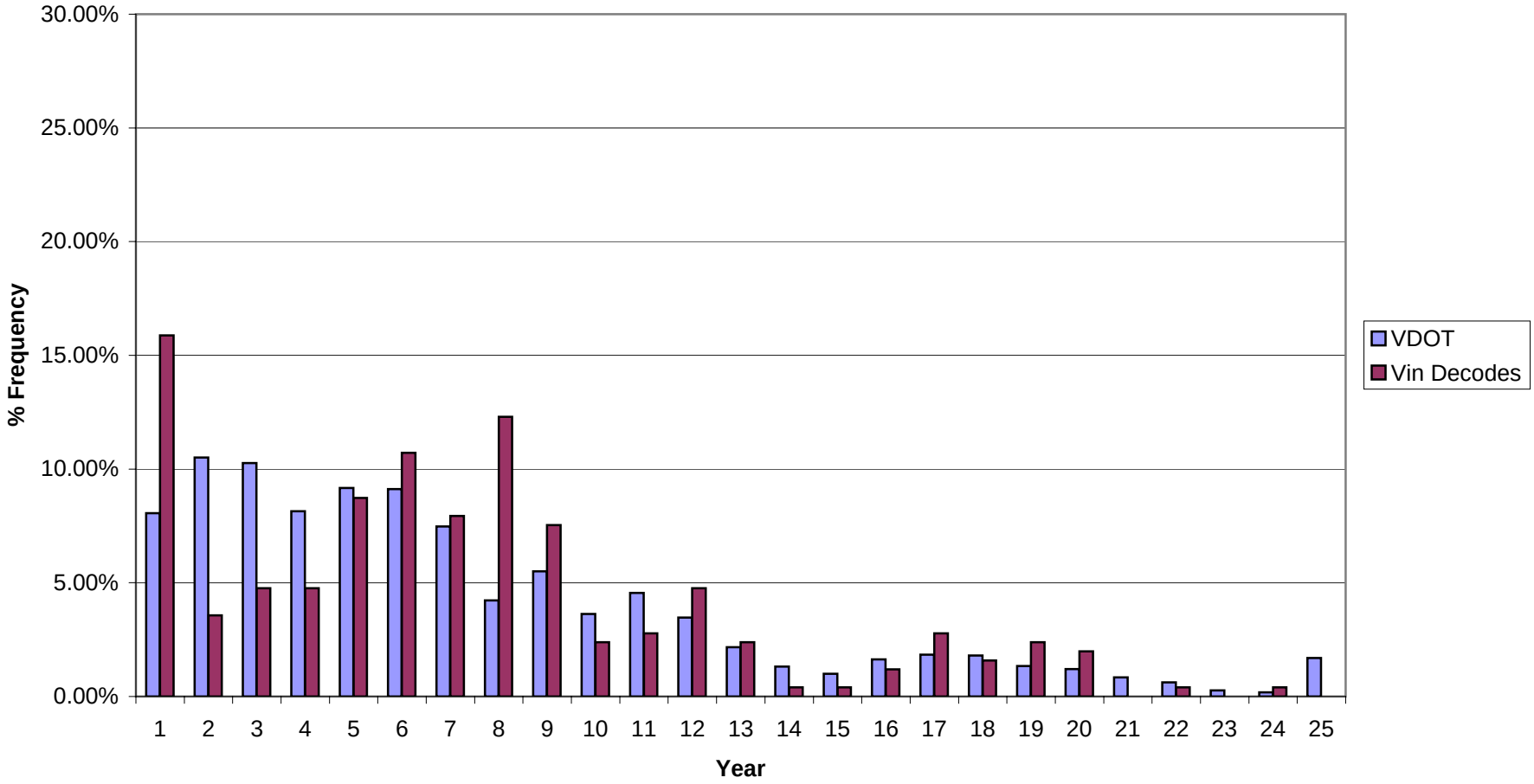
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV7
Number of Decoded Vins = 448



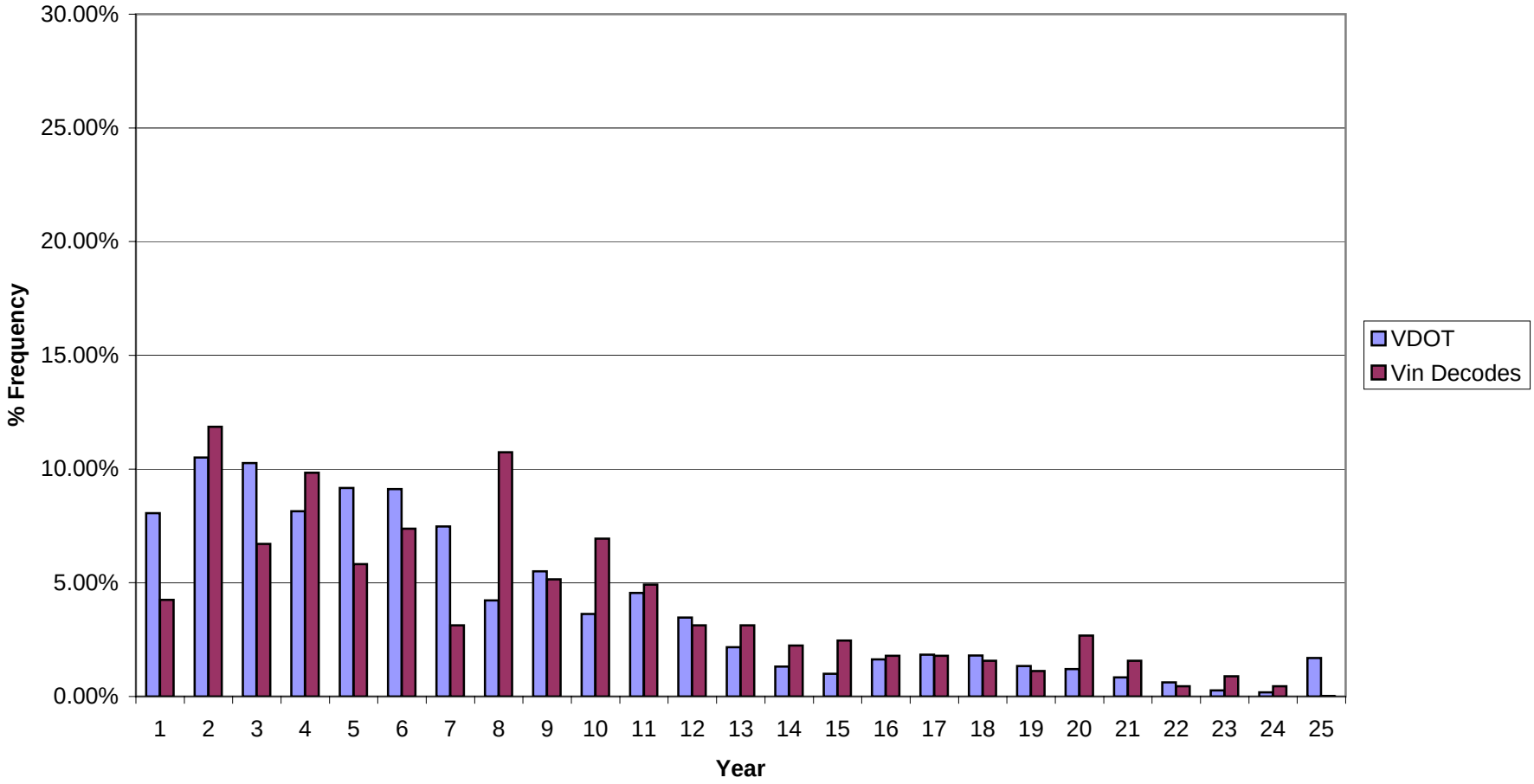
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV8A
Number of Decoded Vins = 946



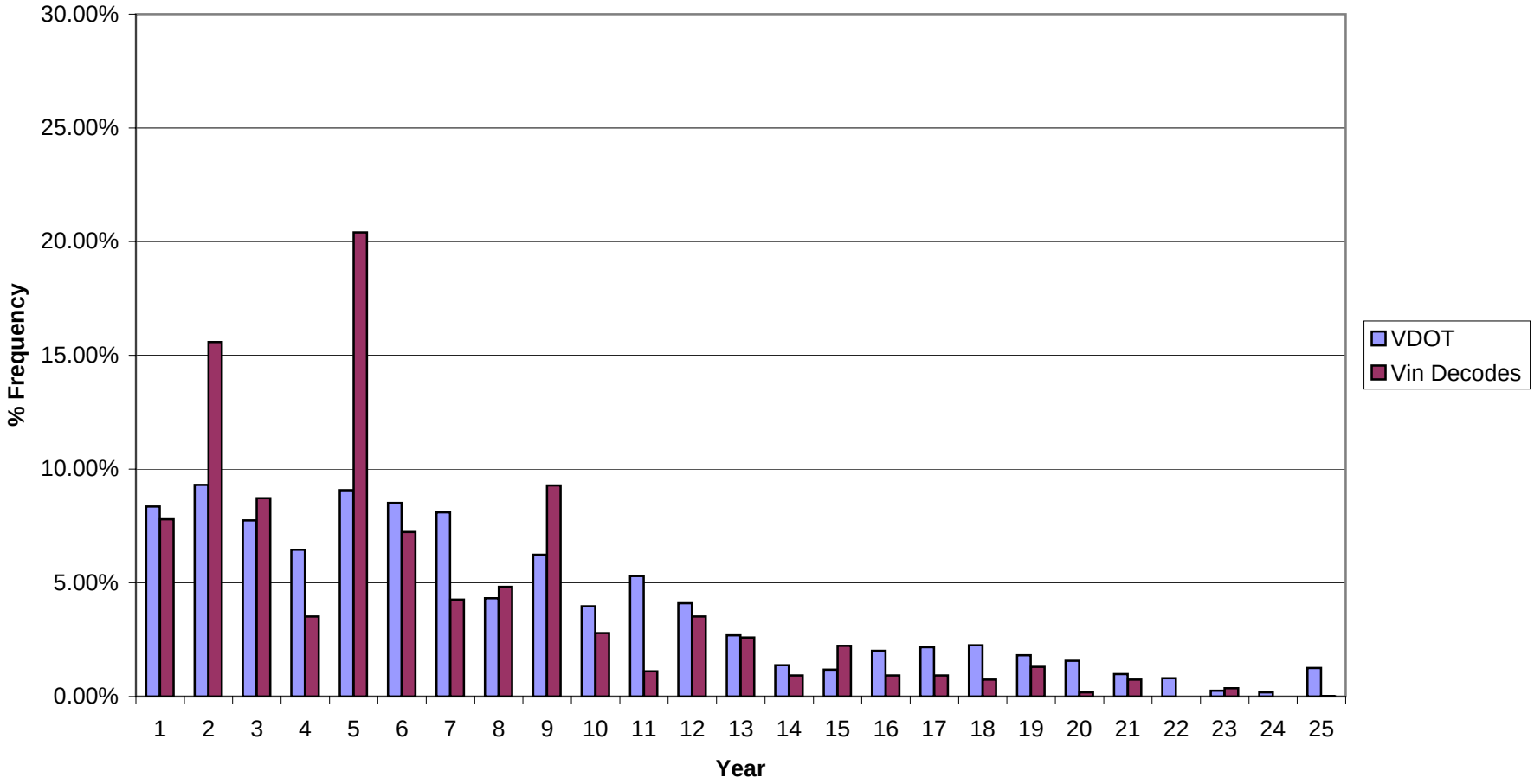
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDV8B
Number of Decoded Vins = 252



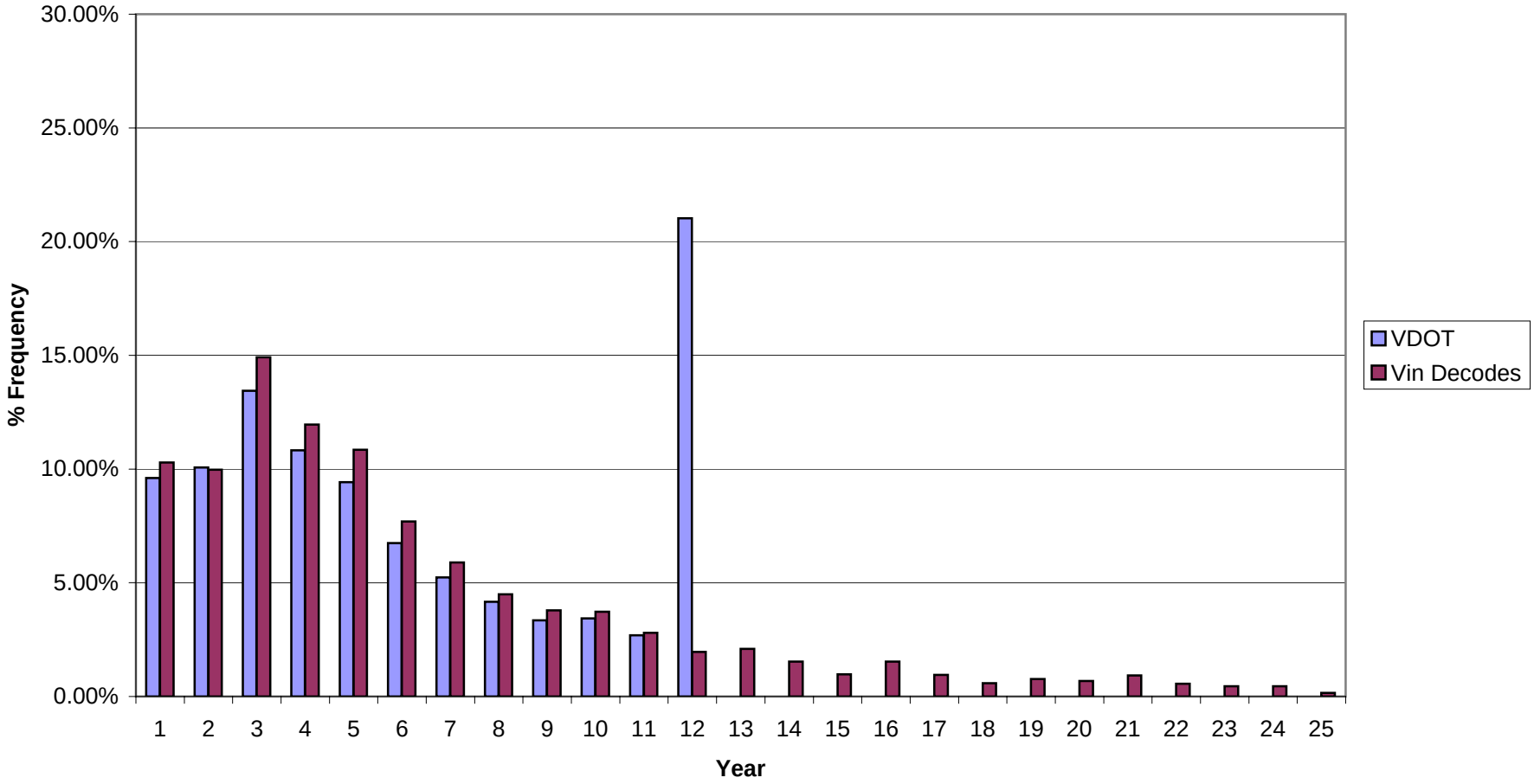
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDBS
Number of Decoded Vins = 447



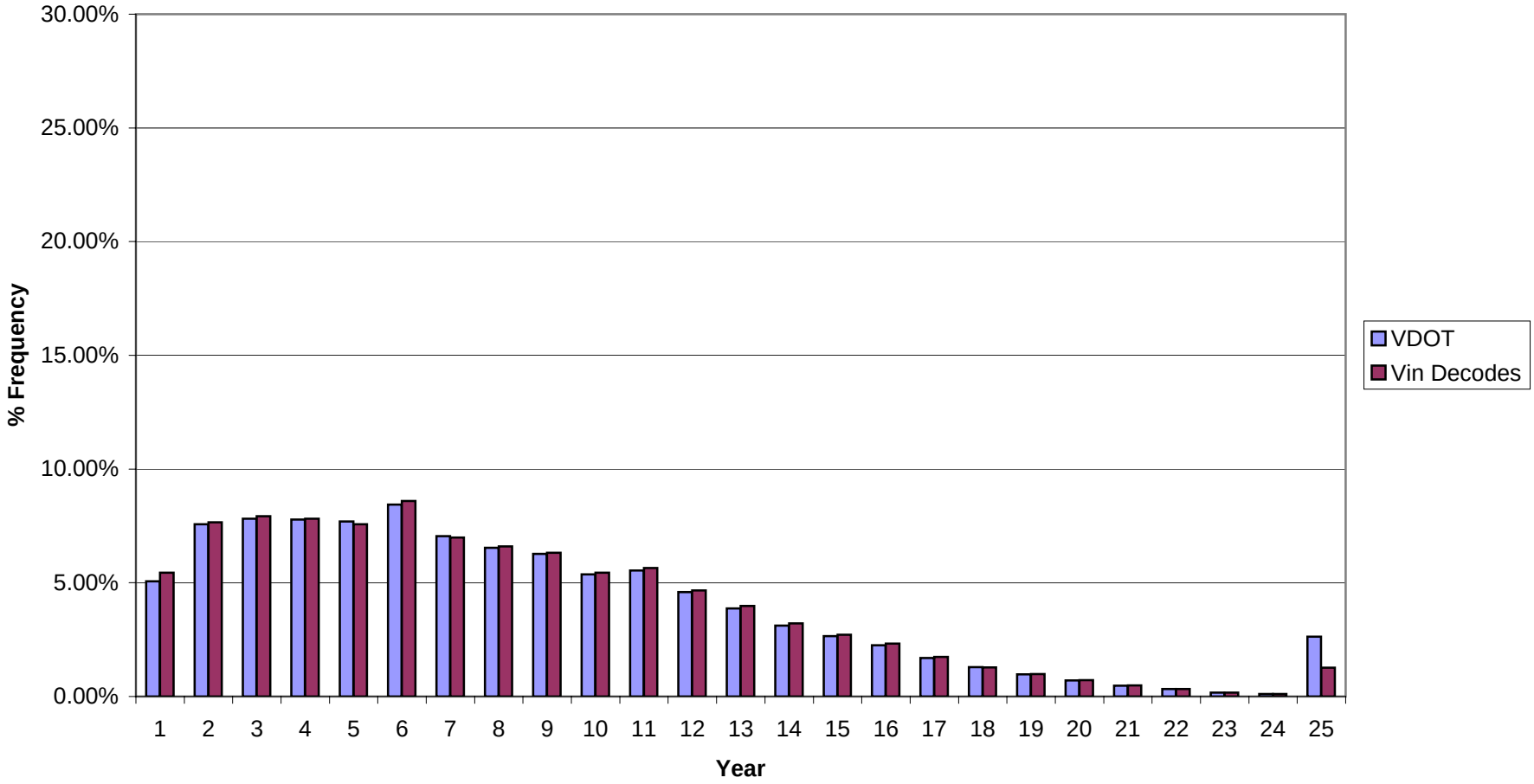
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = HDBT
Number of Decoded Vins = 539



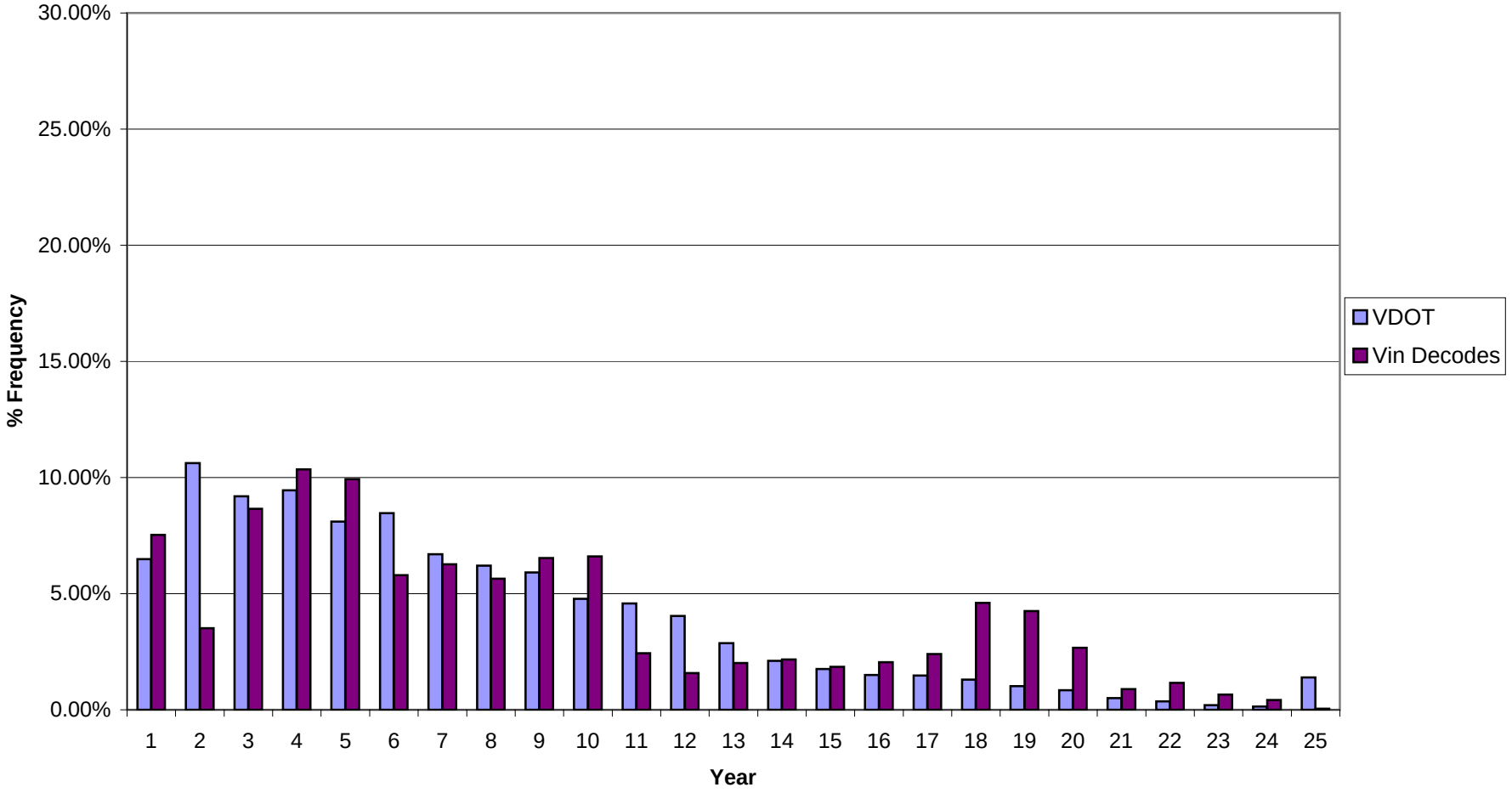
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = LDN
Vehicle Type = MC
Number of Decoded Vins = 3,775



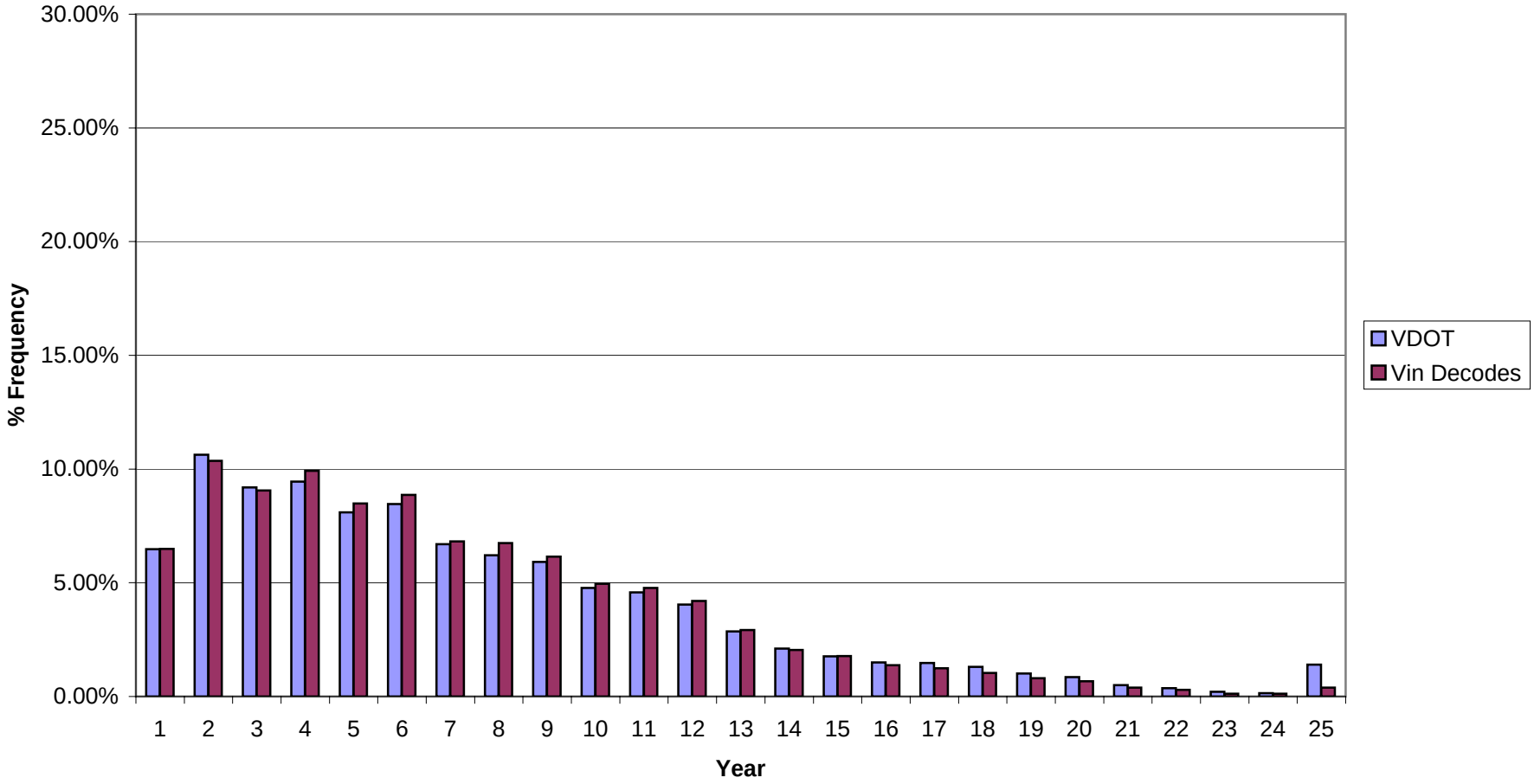
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = LDV
Number of Decoded Vins = 145,737



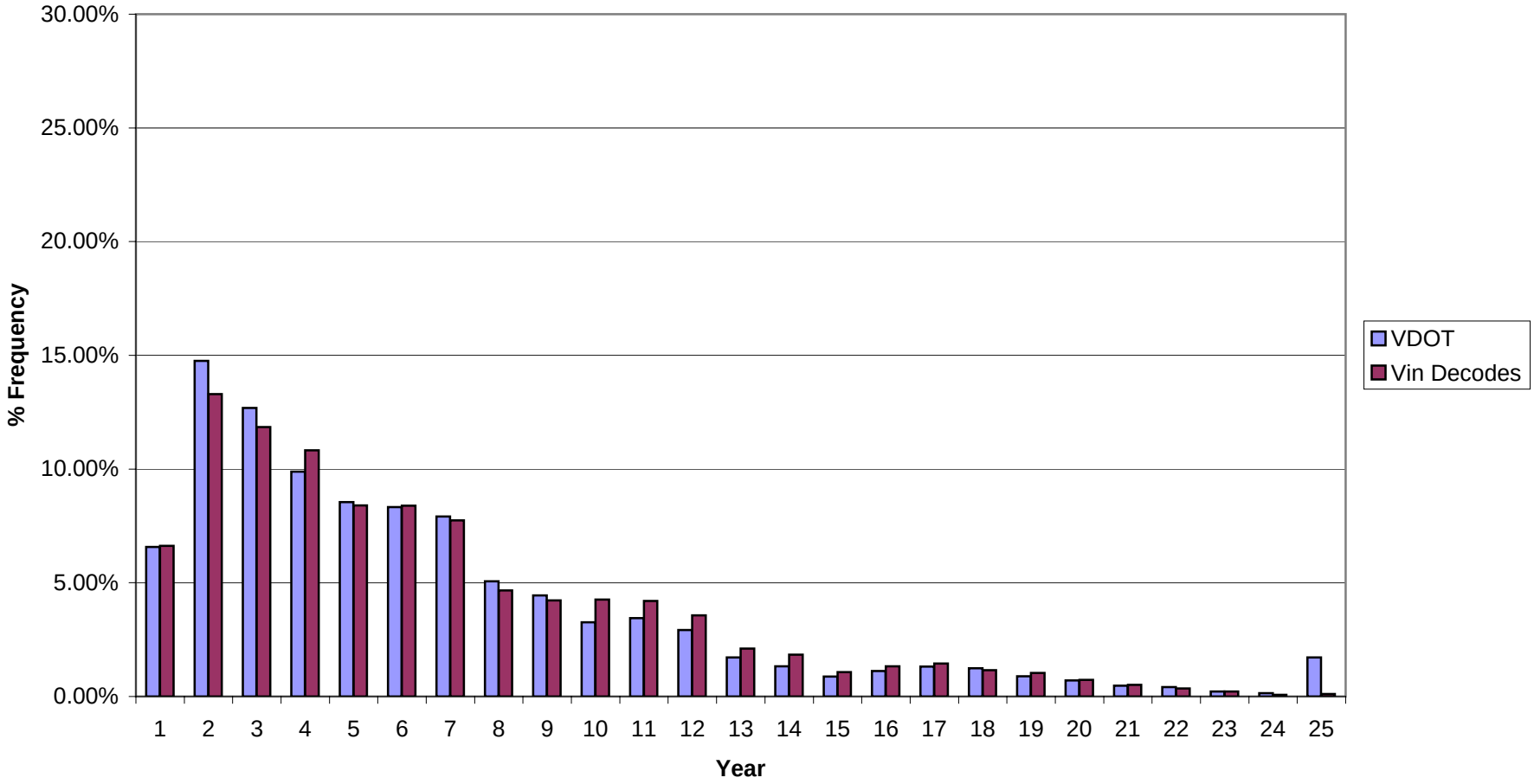
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = LDT1
Number of Decoded Vins = 2,587



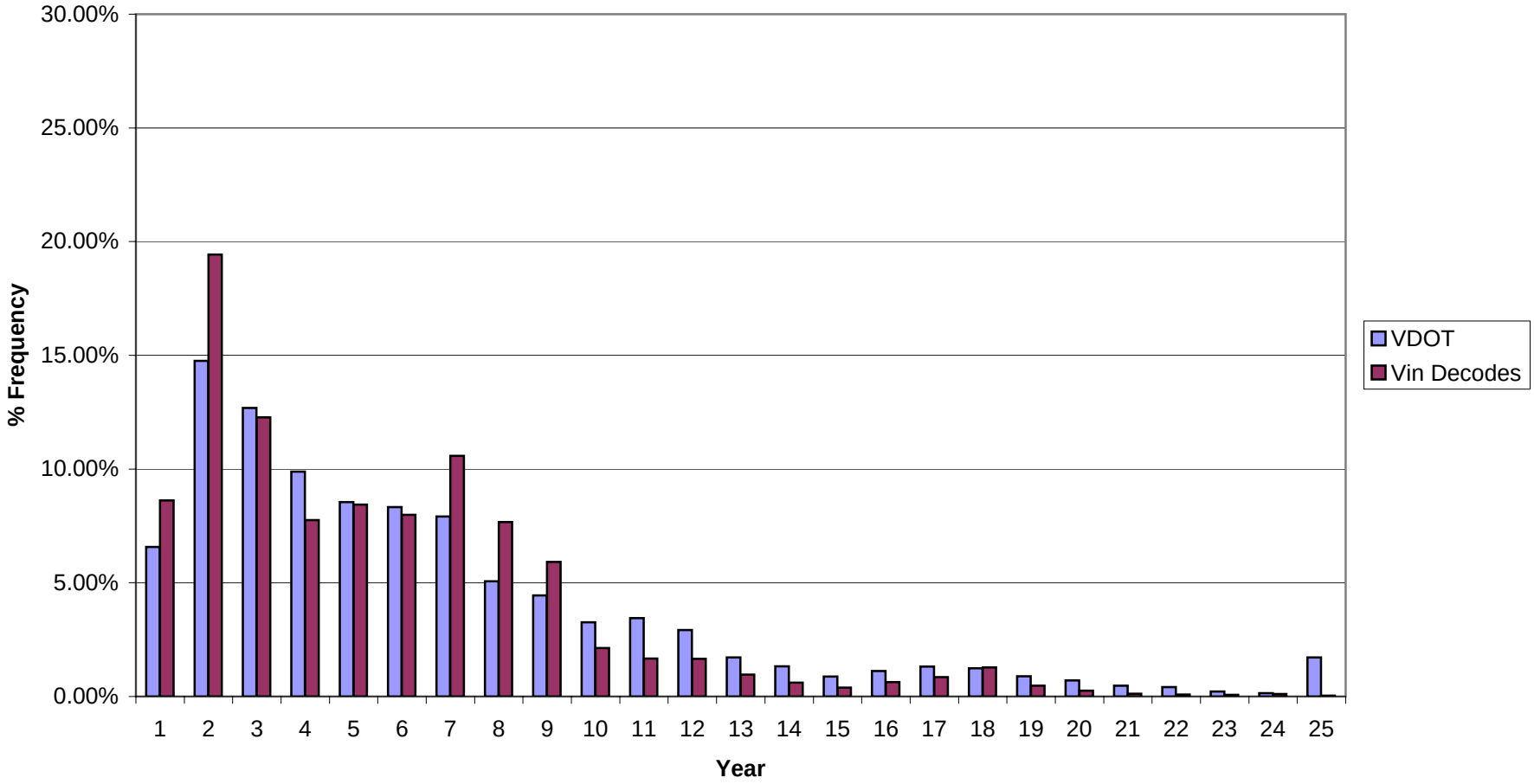
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = LDT2
Number of Decoded Vins = 85,170



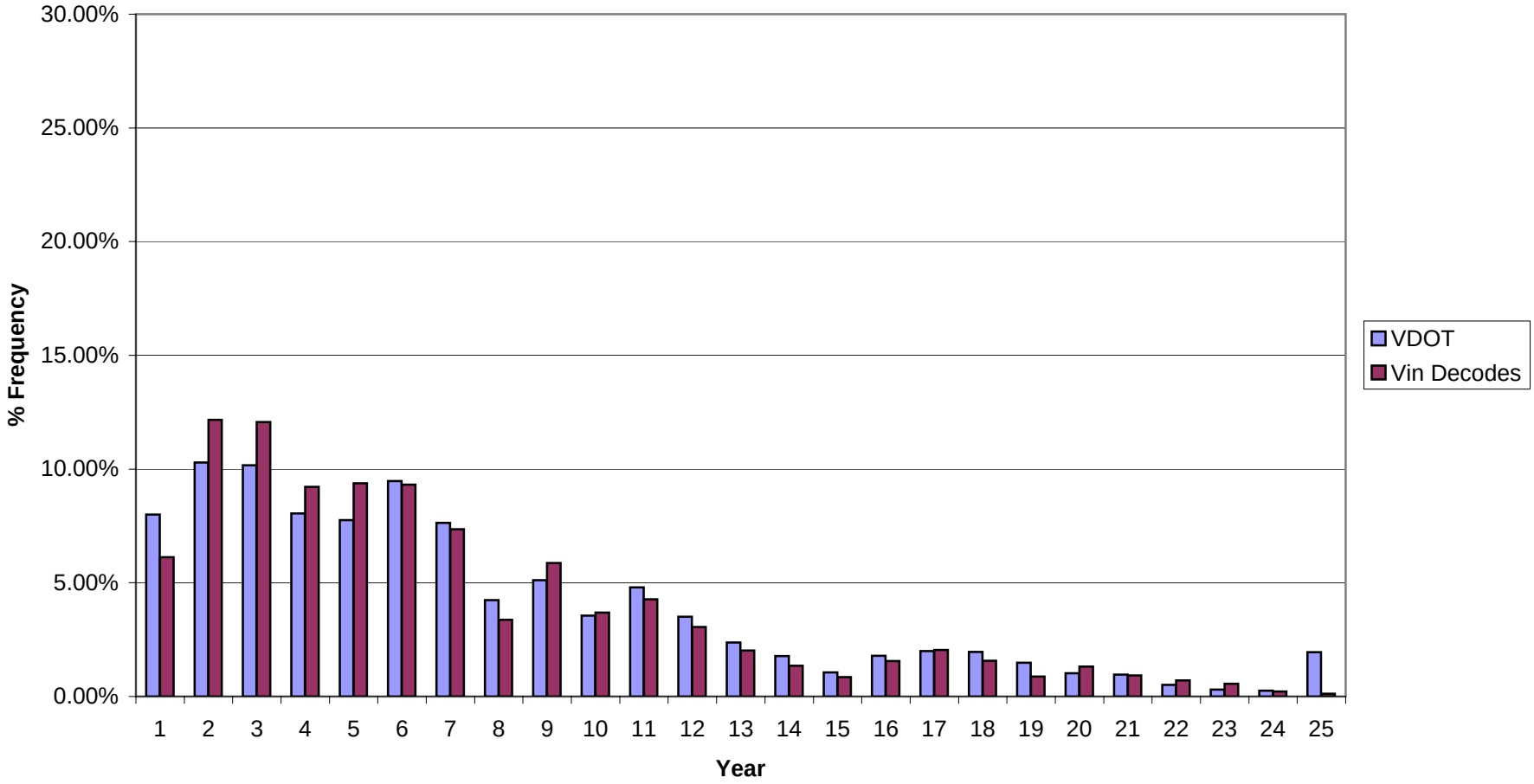
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = LDT3
Number of Decoded Vins = 25,426



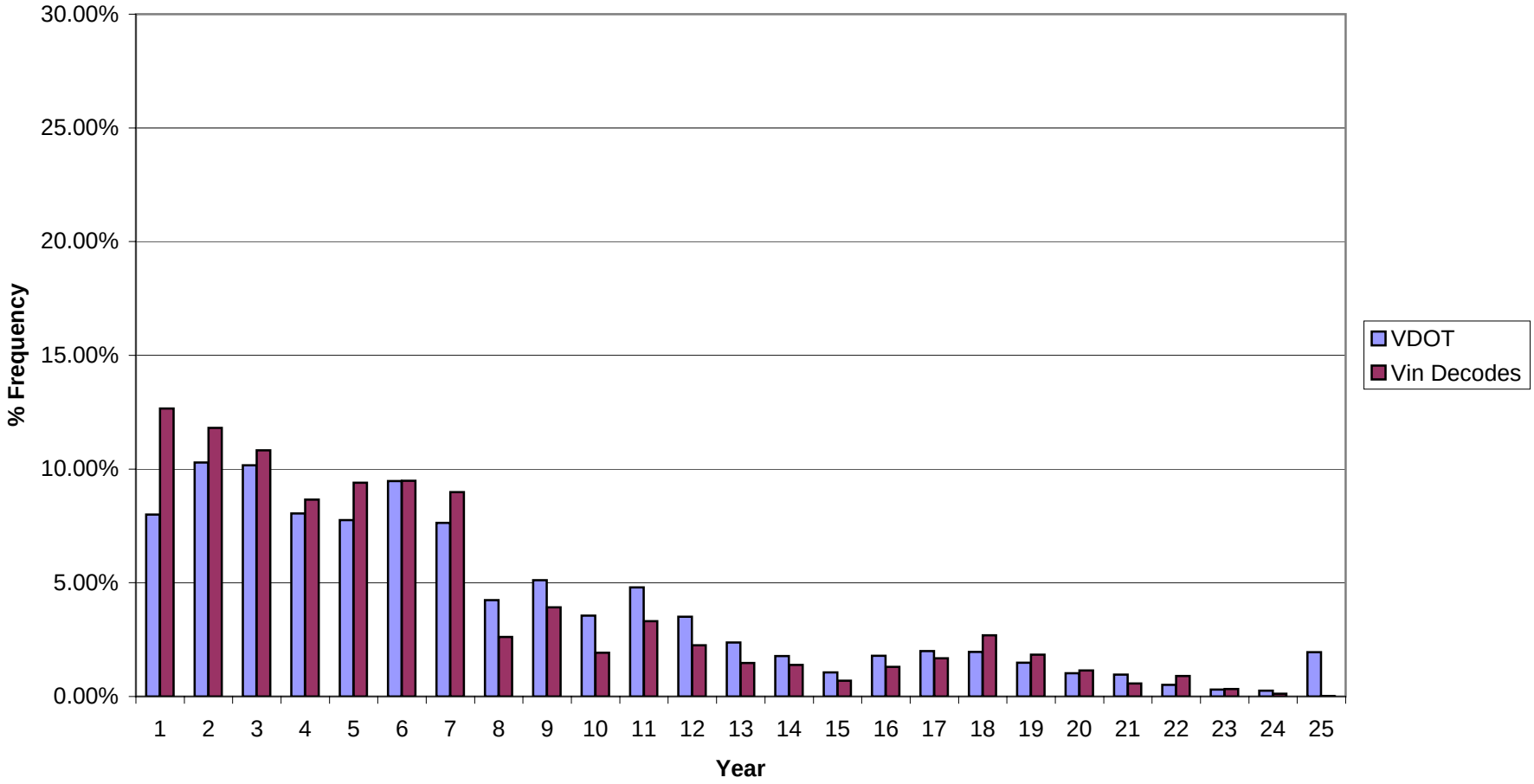
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = LDT4
Number of Decoded Vins = 7,369



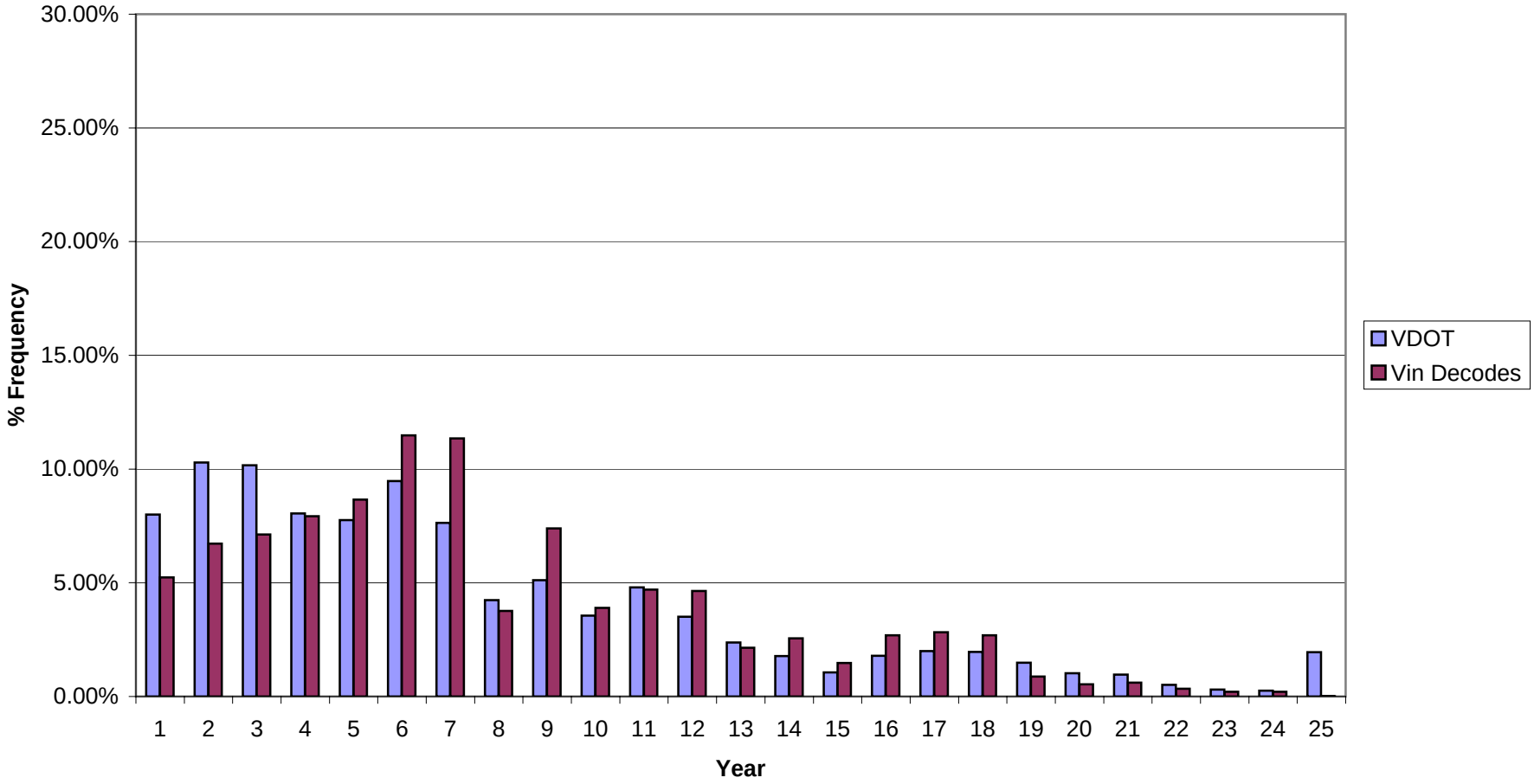
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV2B
Number of Decoded Vins = 9,562



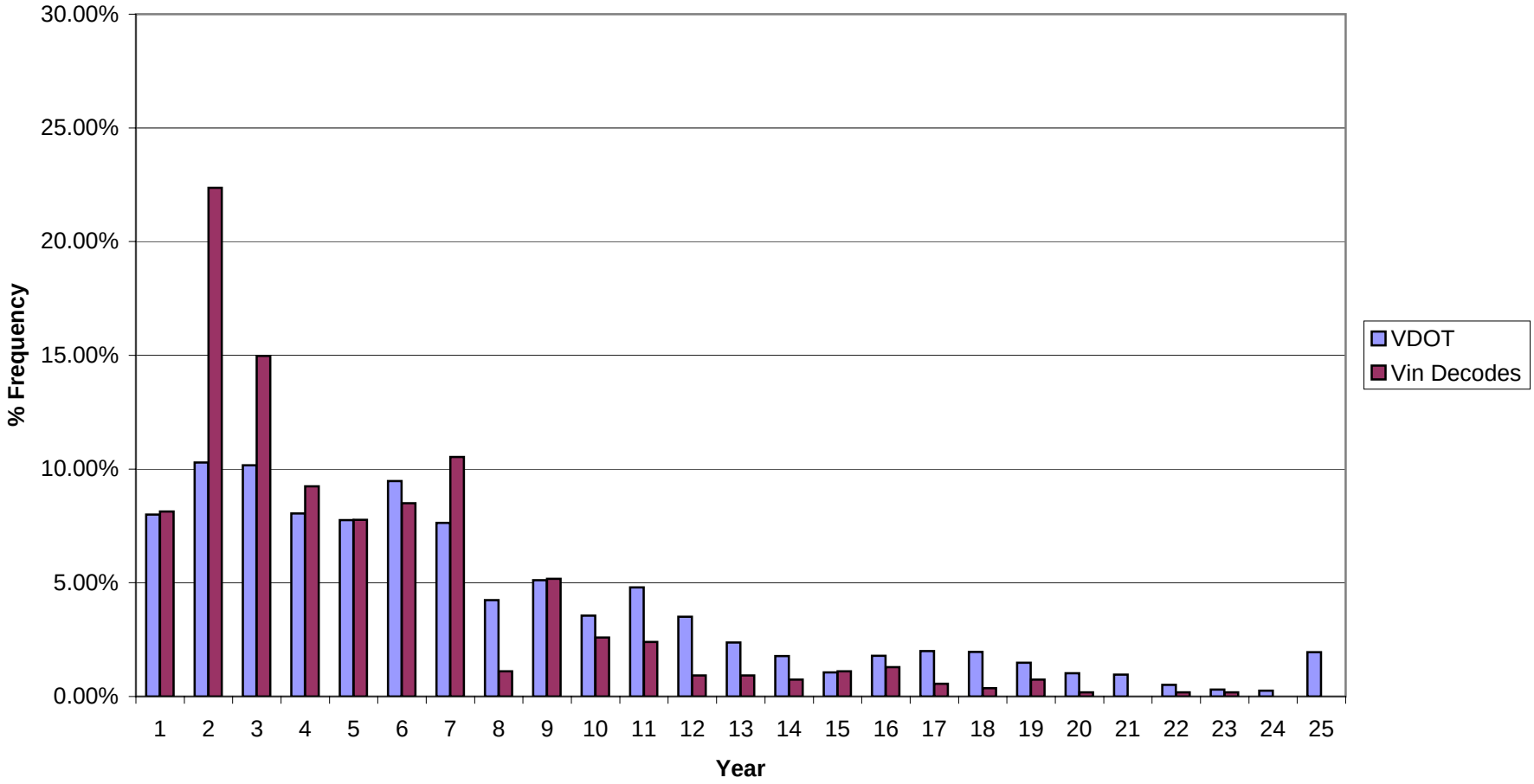
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV3
Number of Decoded Vins = 2,447



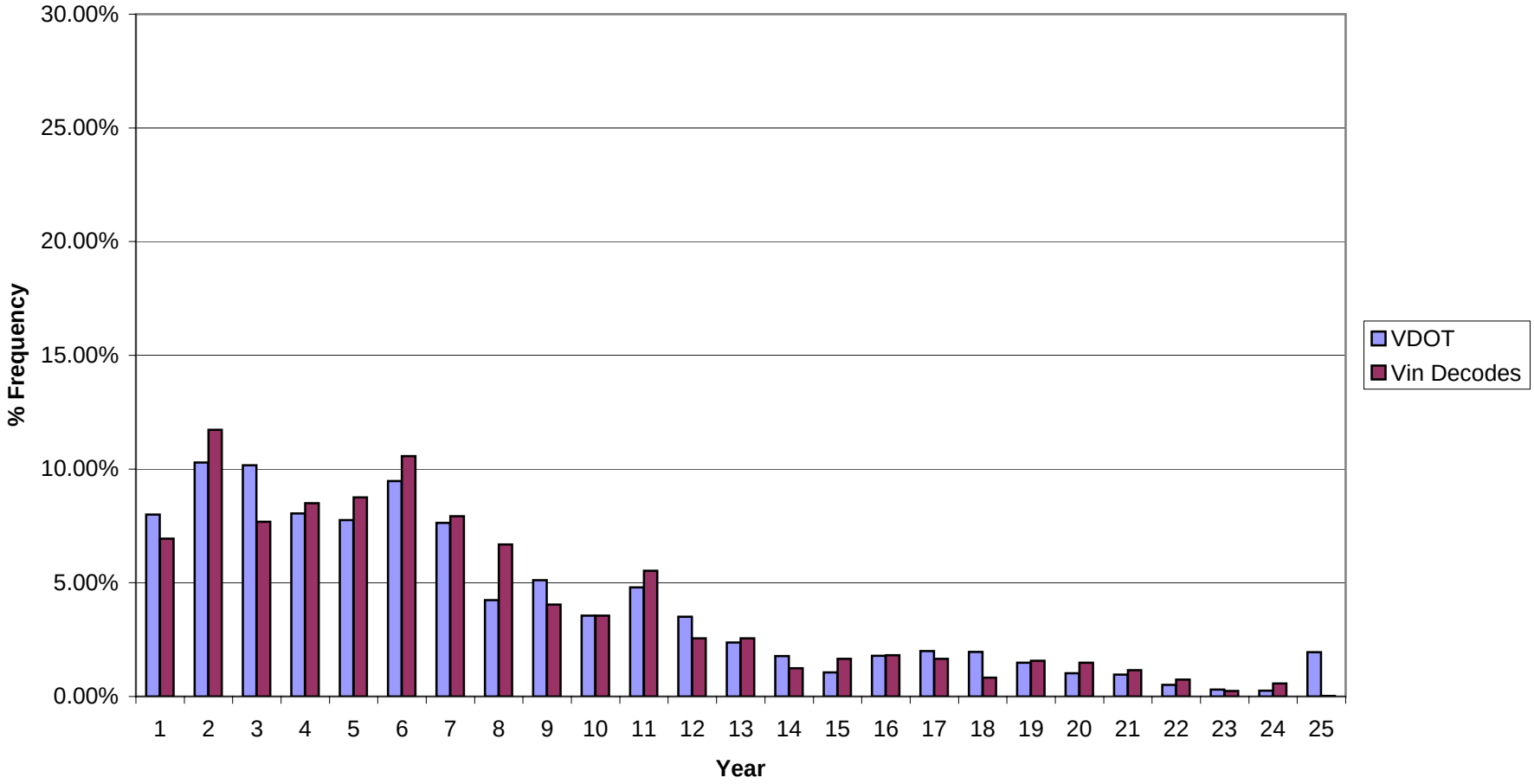
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV4
Number of Decoded Vins = 1,489



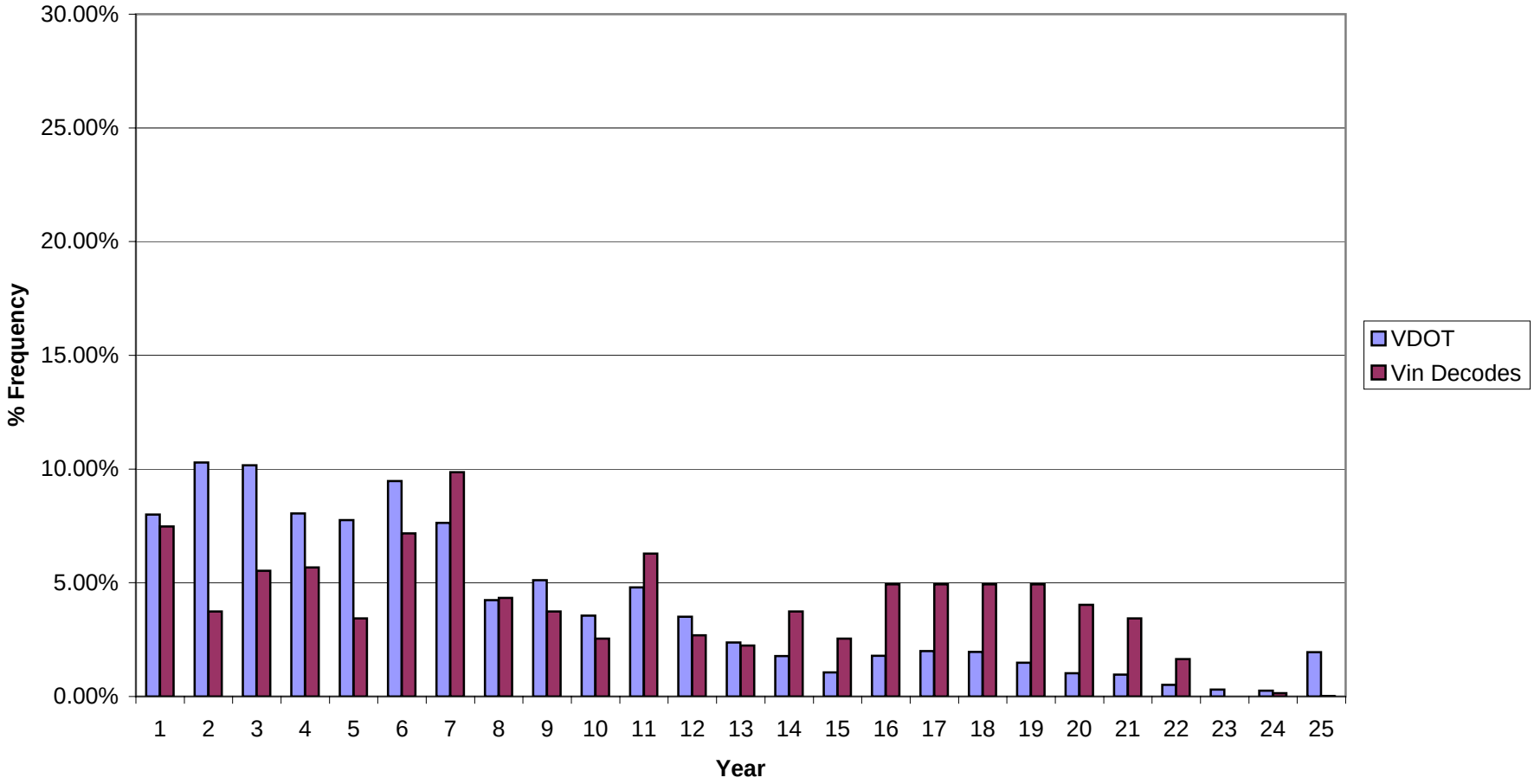
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV5
Number of Decoded Vins = 541



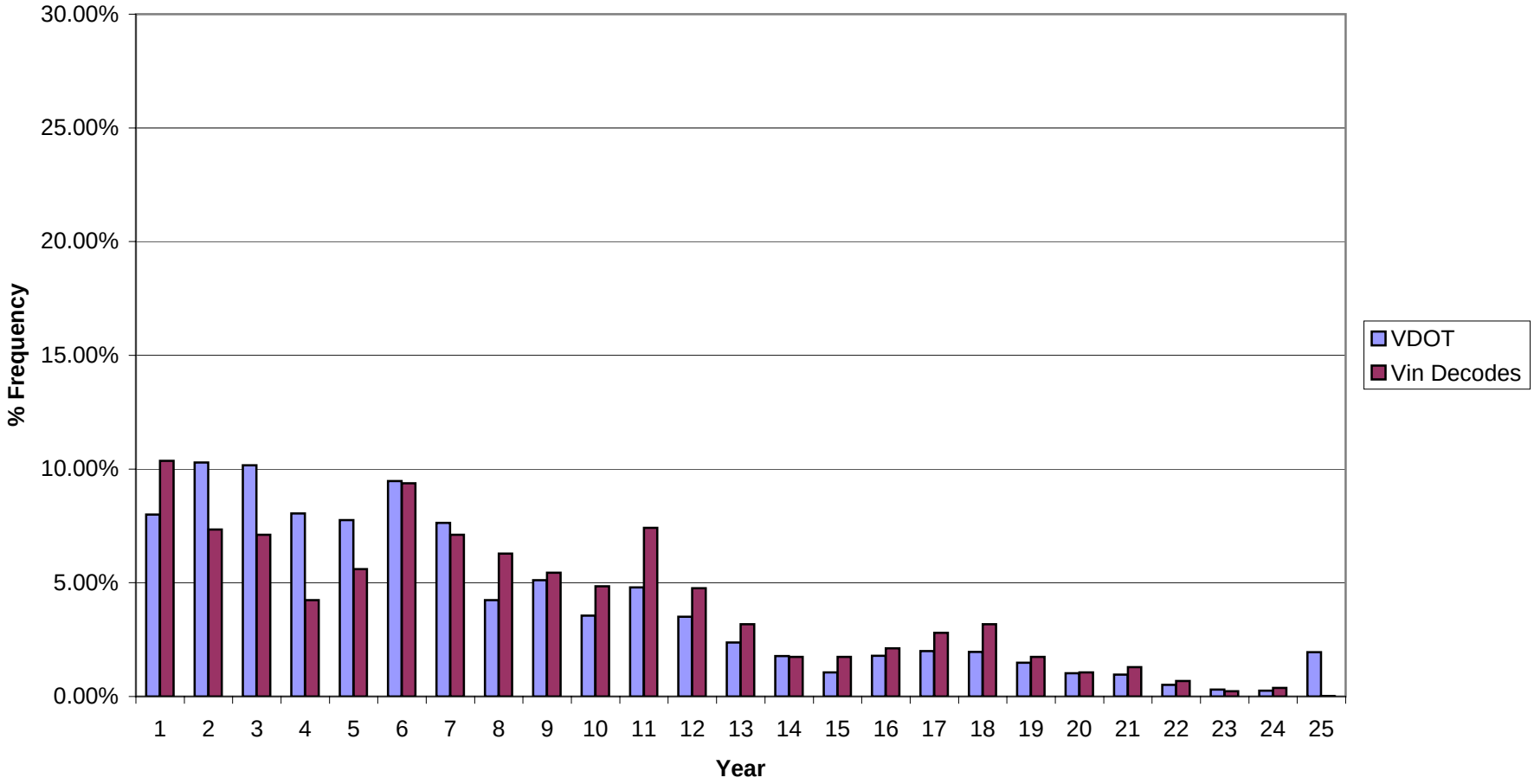
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV6
Number of Decoded Vins = 1,211



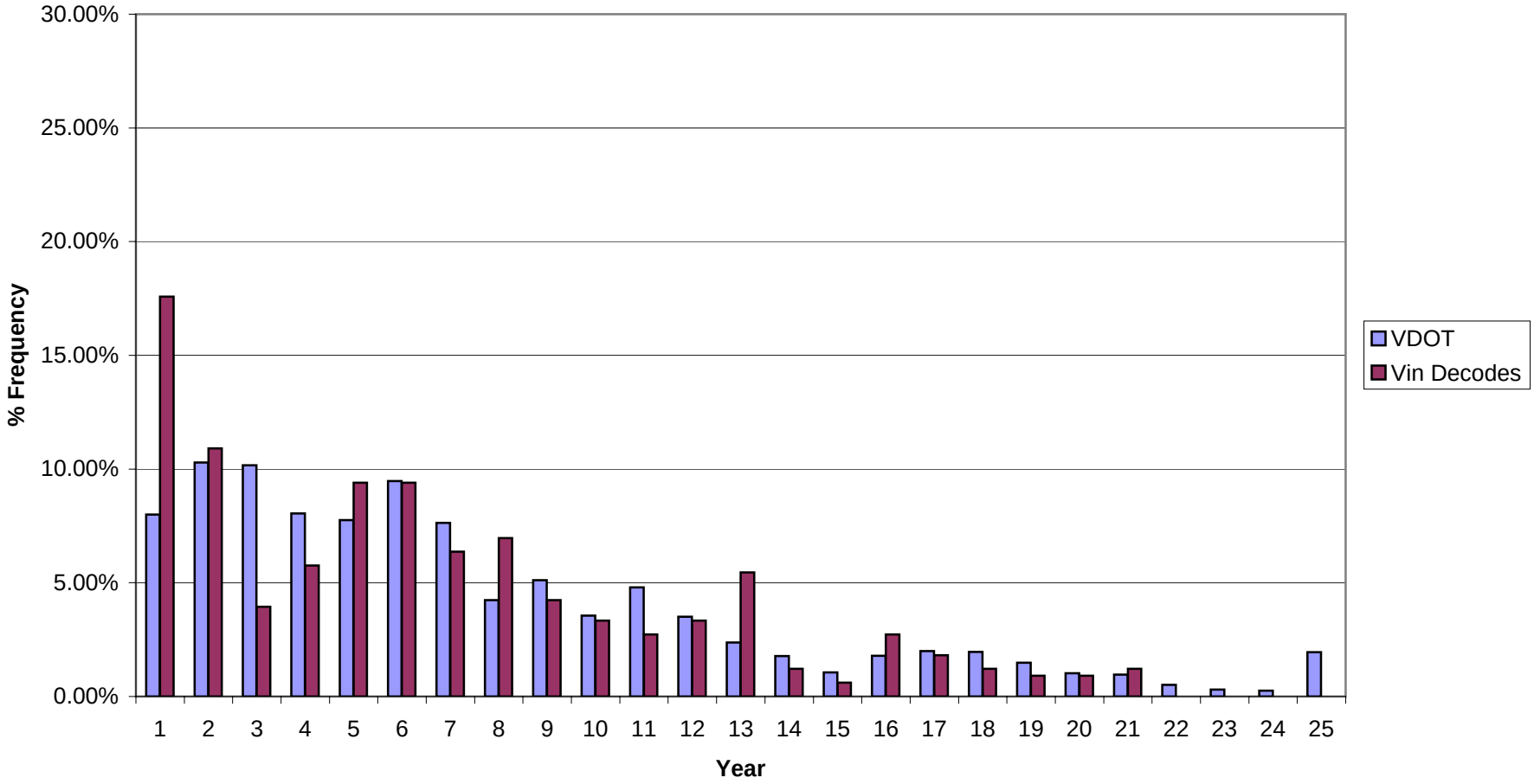
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV7
Number of Decoded Vins = 669



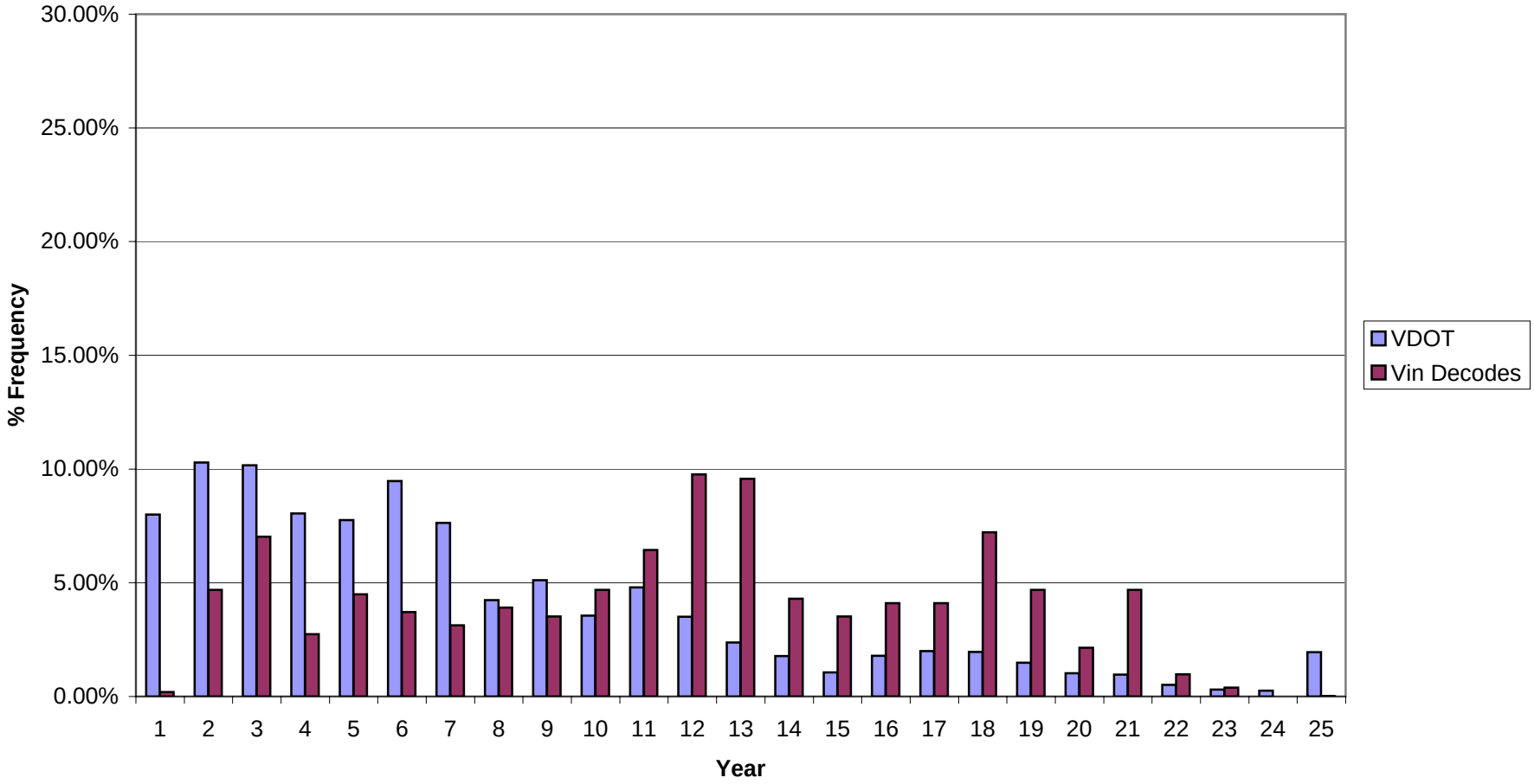
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV8A
Number of Decoded Vins = 1,322



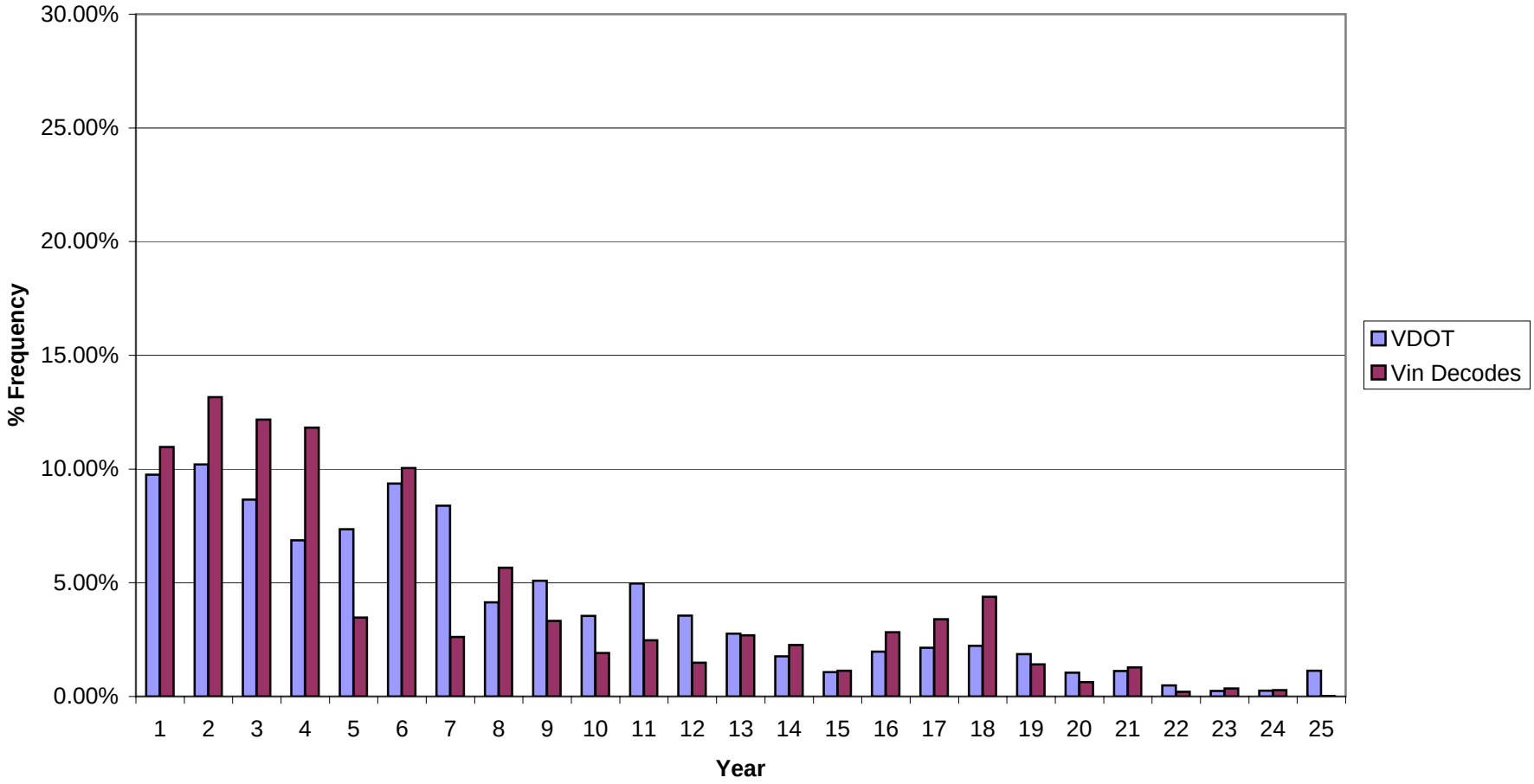
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDV8B
Number of Decoded Vins = 330



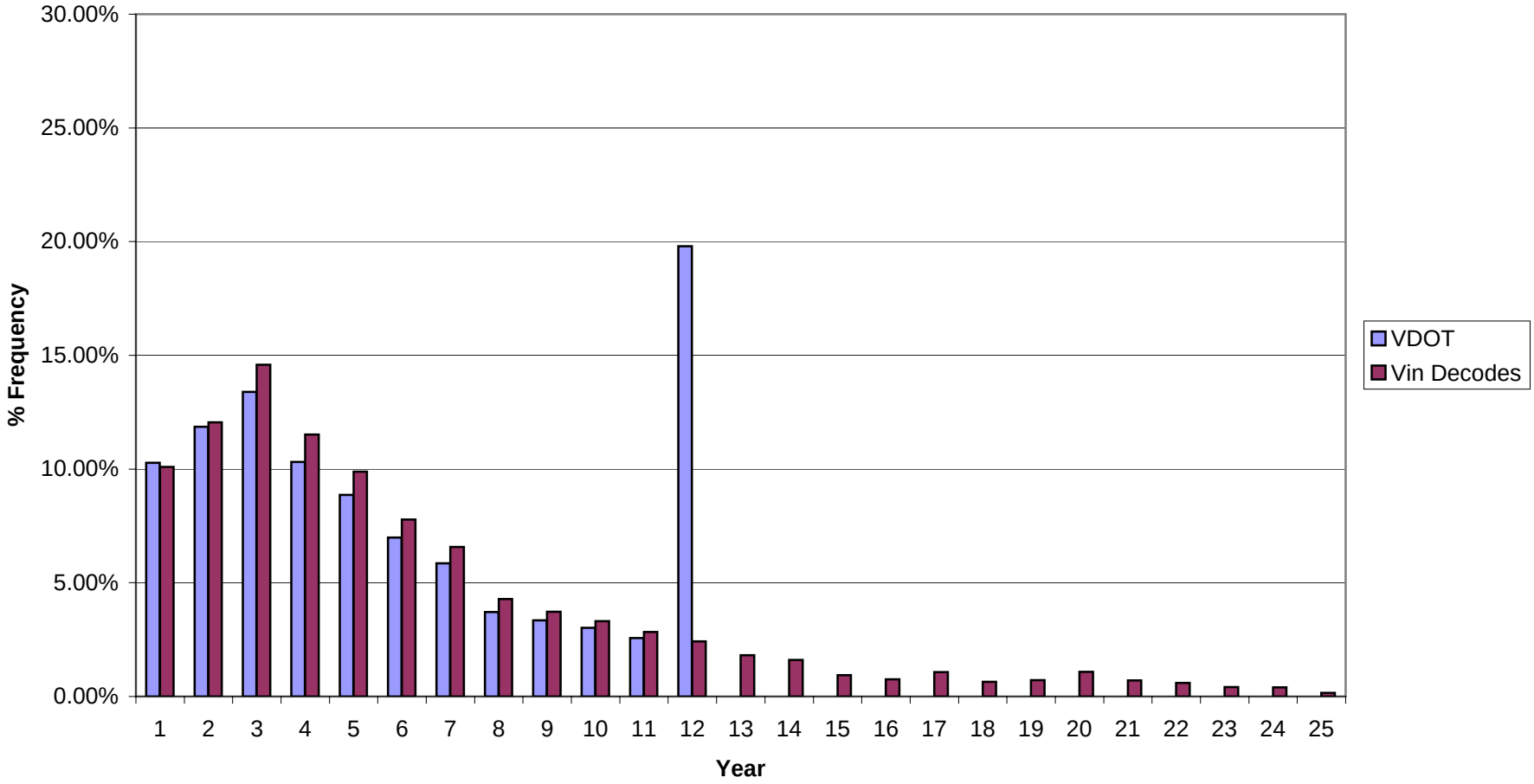
Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDBS
Number of Decoded Vins = 512



Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = HDBT
Number of Decoded Vins = 1,413

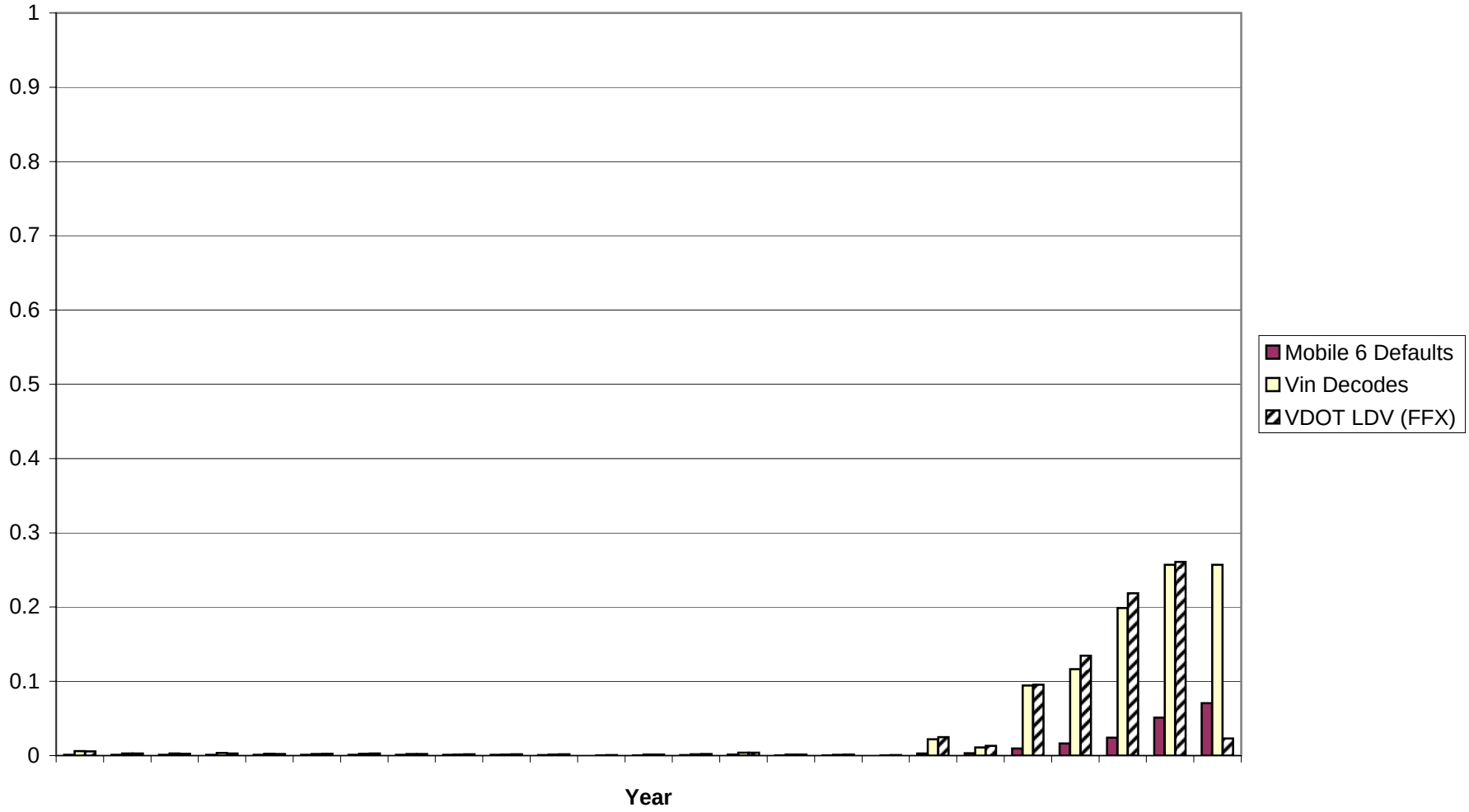


Comparison of Vehicle Age Distributions (VDEQ / VDOT vs. Vin Decodes)
Developed from 2005 Vehicle Registration Data
Jurisdiction = PW
Vehicle Type = MC
Number of Decoded Vins = 6,967



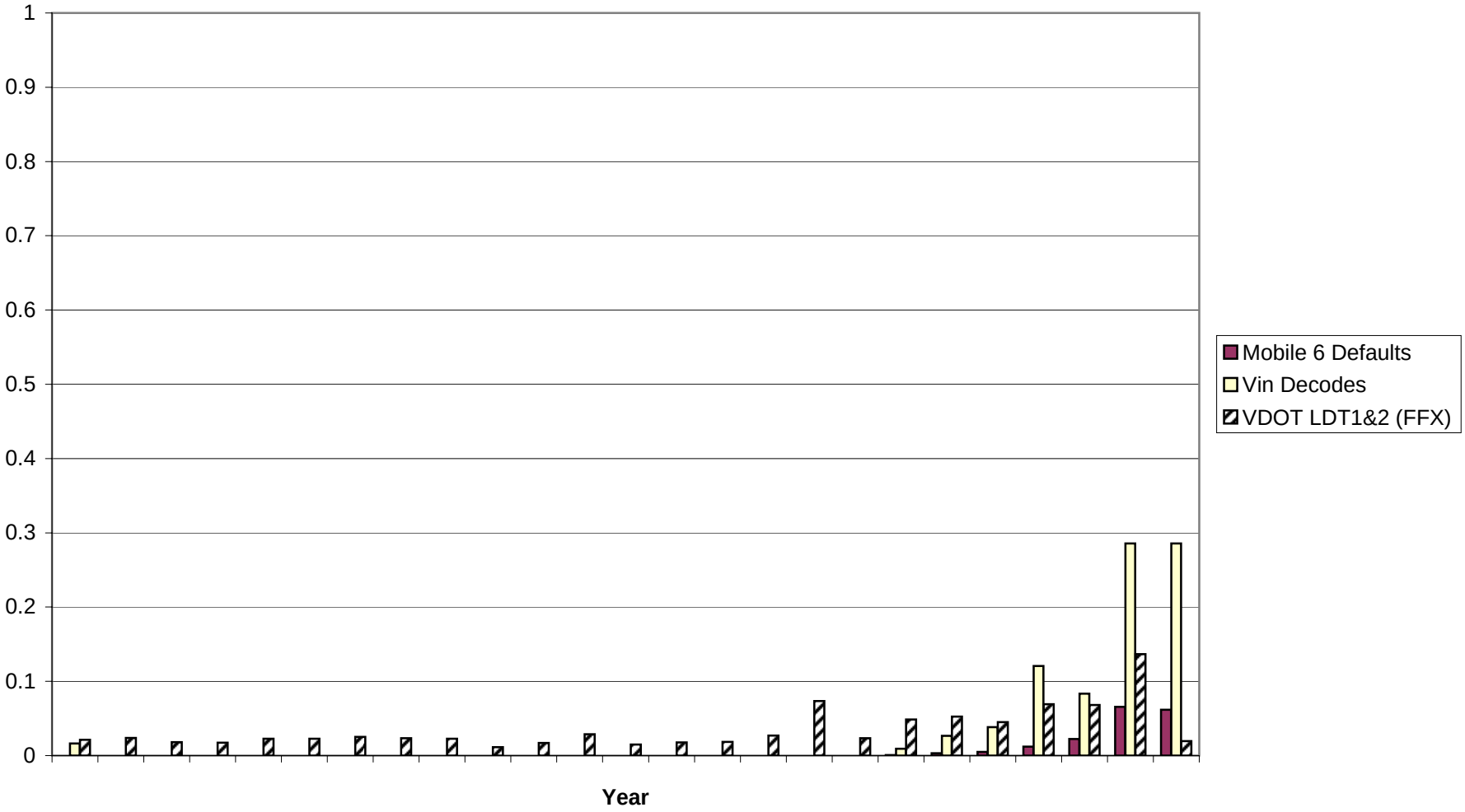
ATTACHMENT 5

Diesel Sales Fractions
Northern Virgina Jurisdictions Combined (FFX only for VDOT Data)
Vehicle Type = LDV



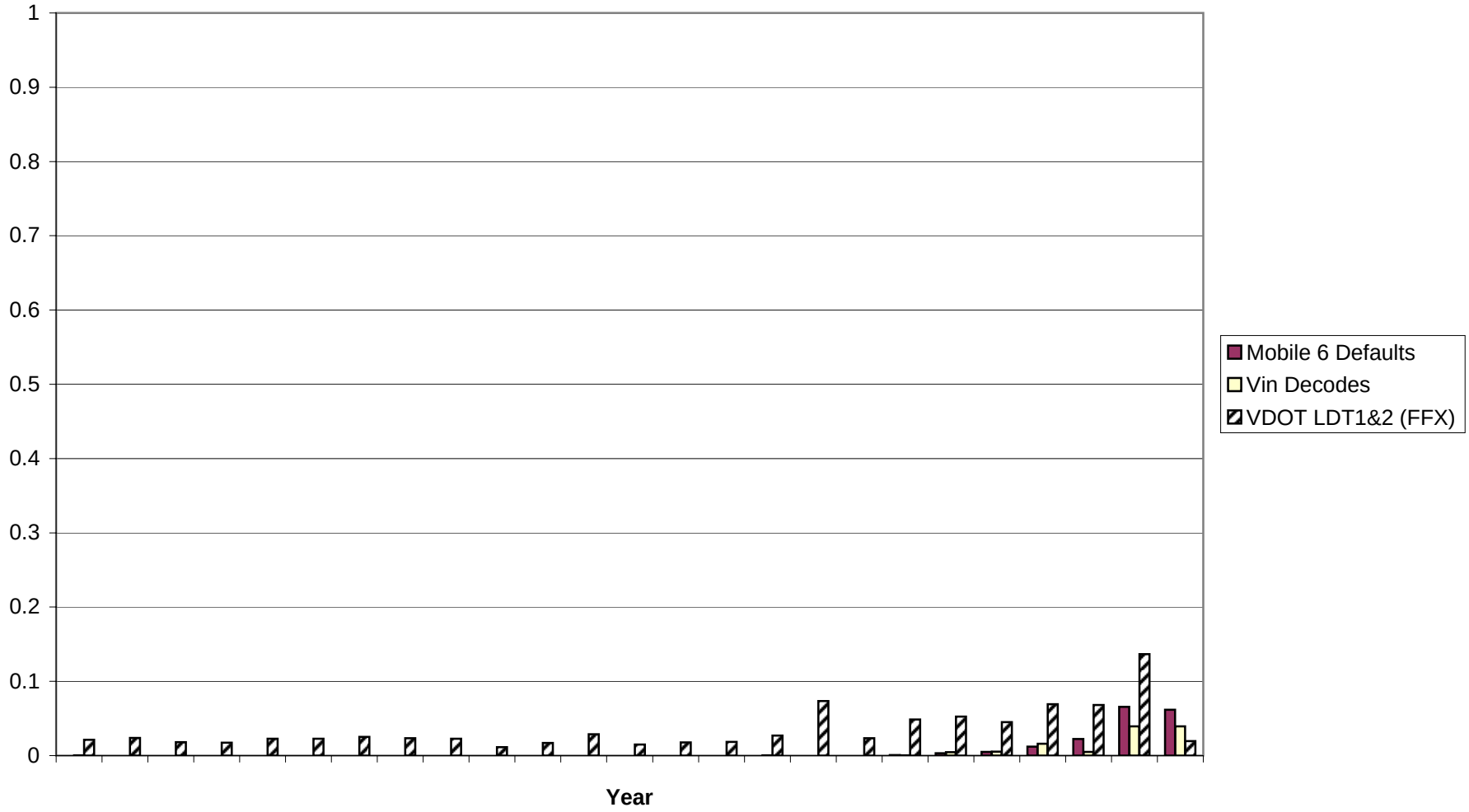
ATTACHMENT 5

Diesel Sales Fractions
Northern Virgina Jurisdictions Combined (FFX only for VDOT Data)
Vehicle Type = LDT1



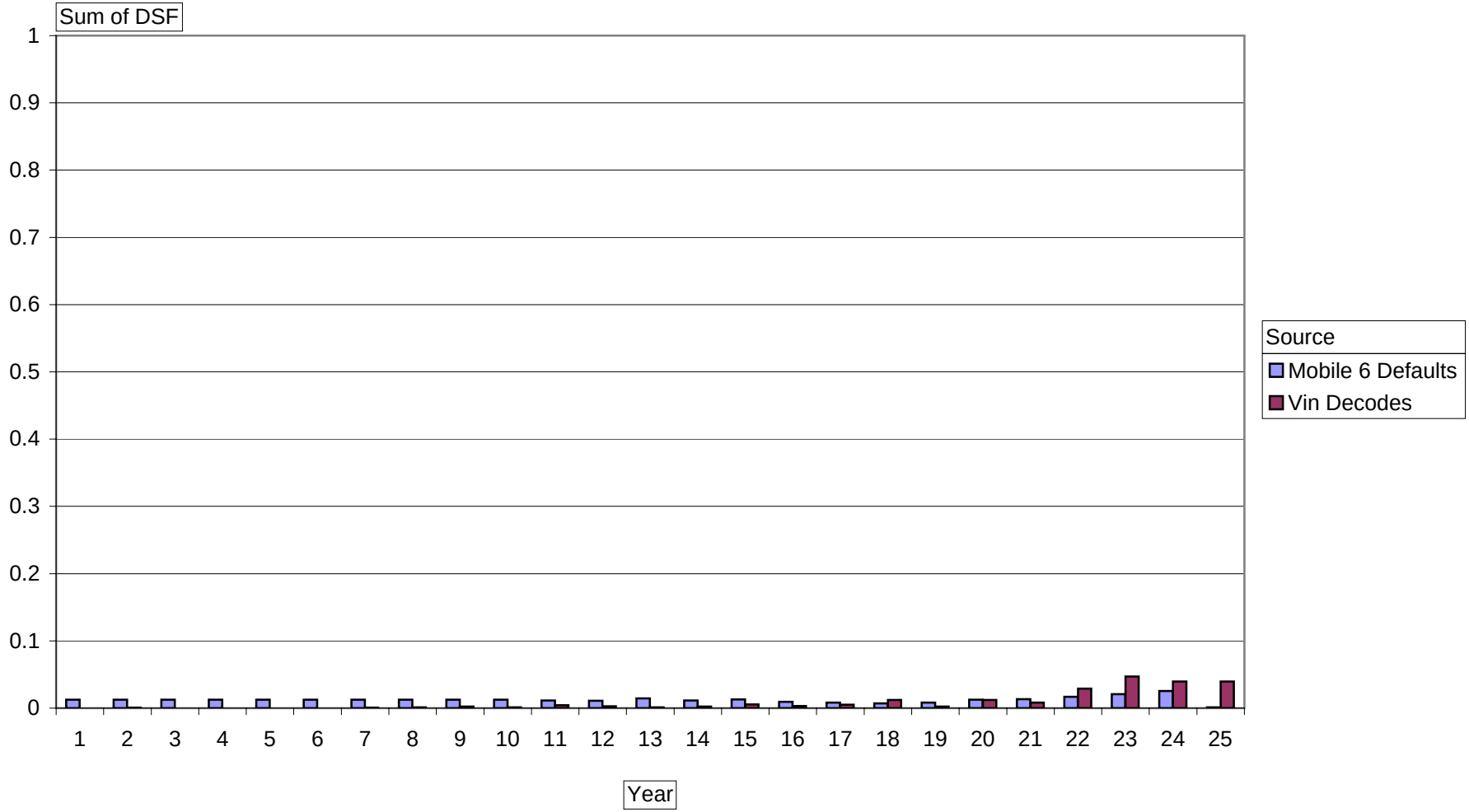
ATTACHMENT 5

Diesel Sales Fractions
Northern Virgina Jurisdictions Combined (FFX only for VDOT Data)
Vehicle Type = LDT2



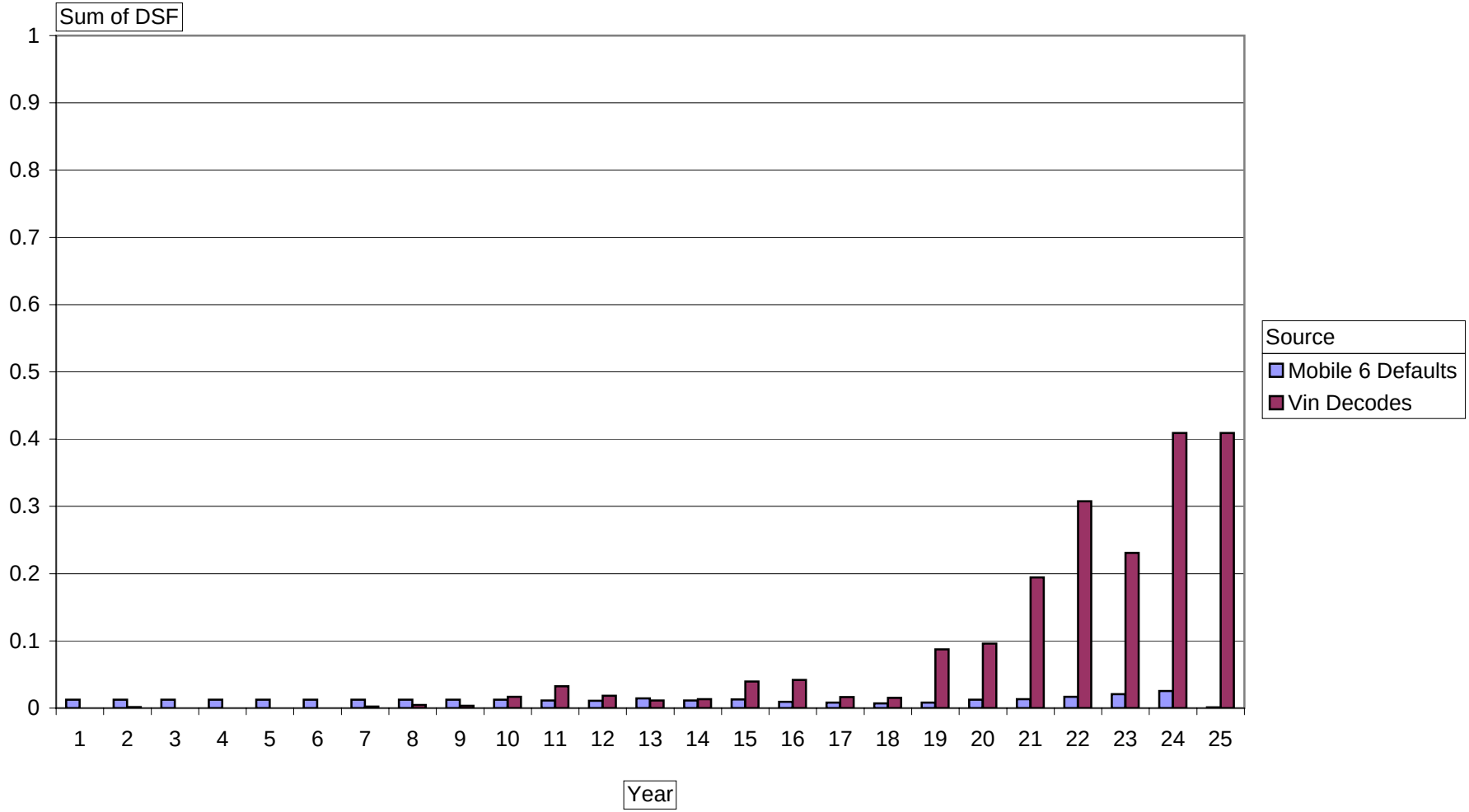
Vehicle Type | LDT3

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



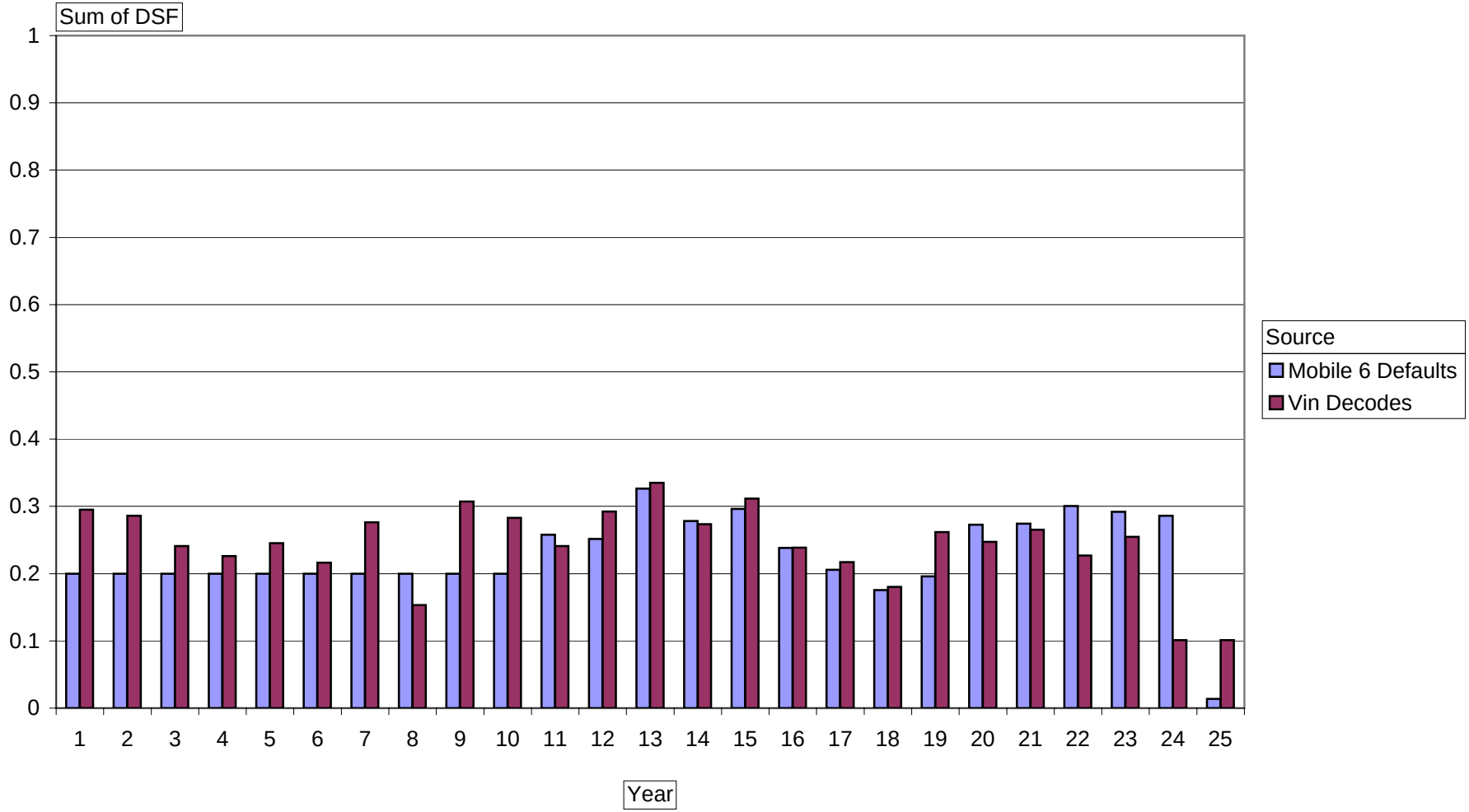
Vehicle Type	LDT4

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



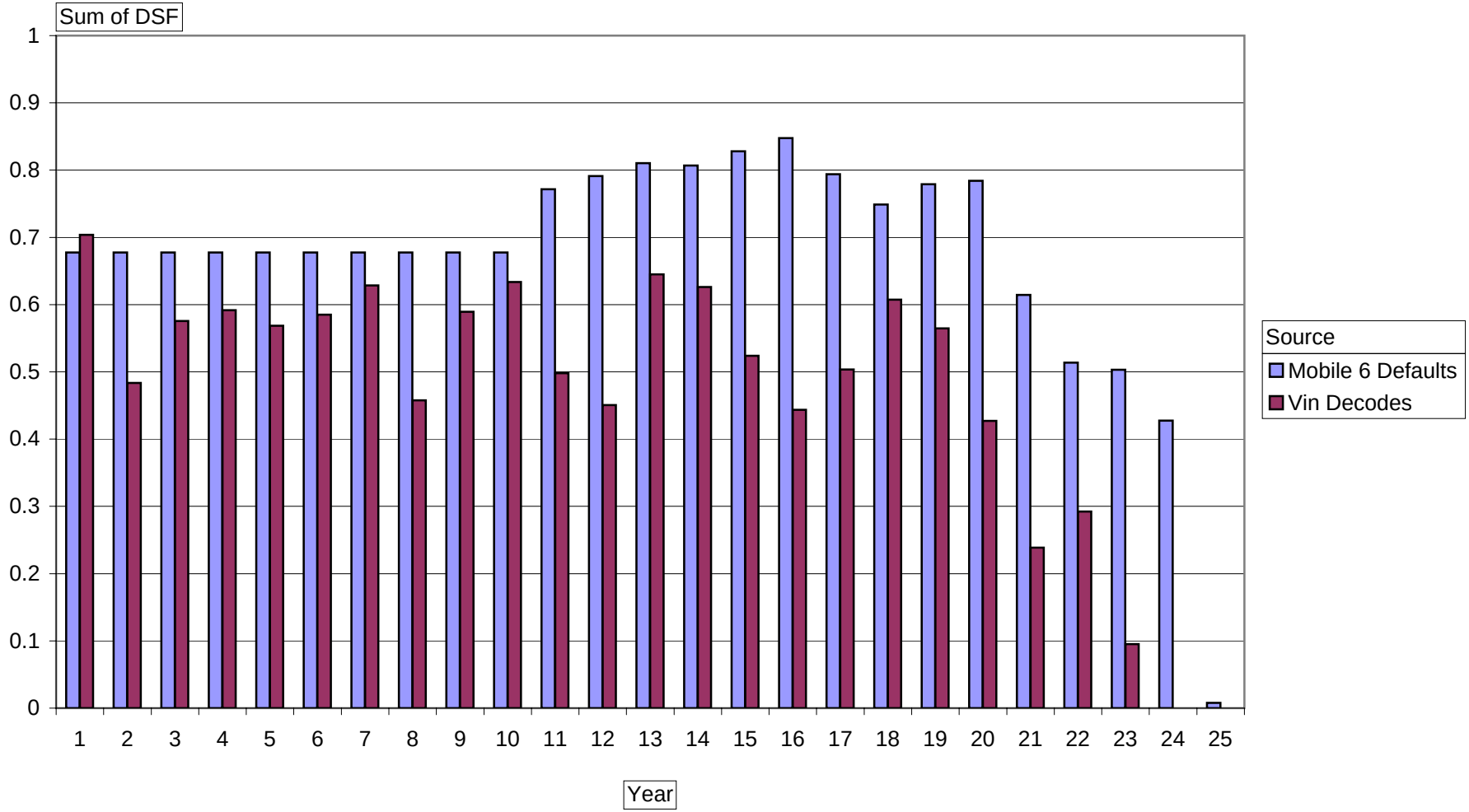
Vehicle Type | HDV2B

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



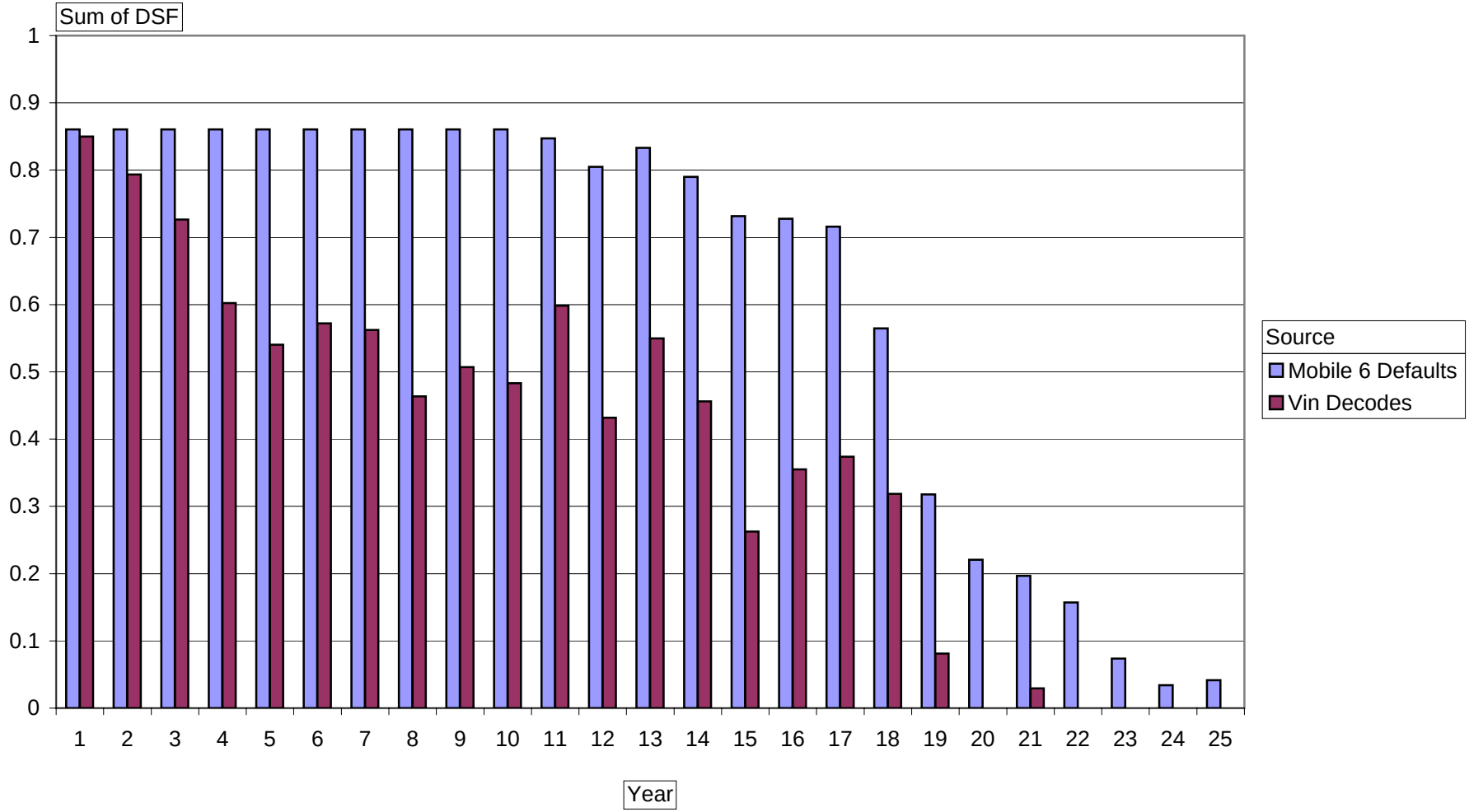
Vehicle Type	HDV3

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



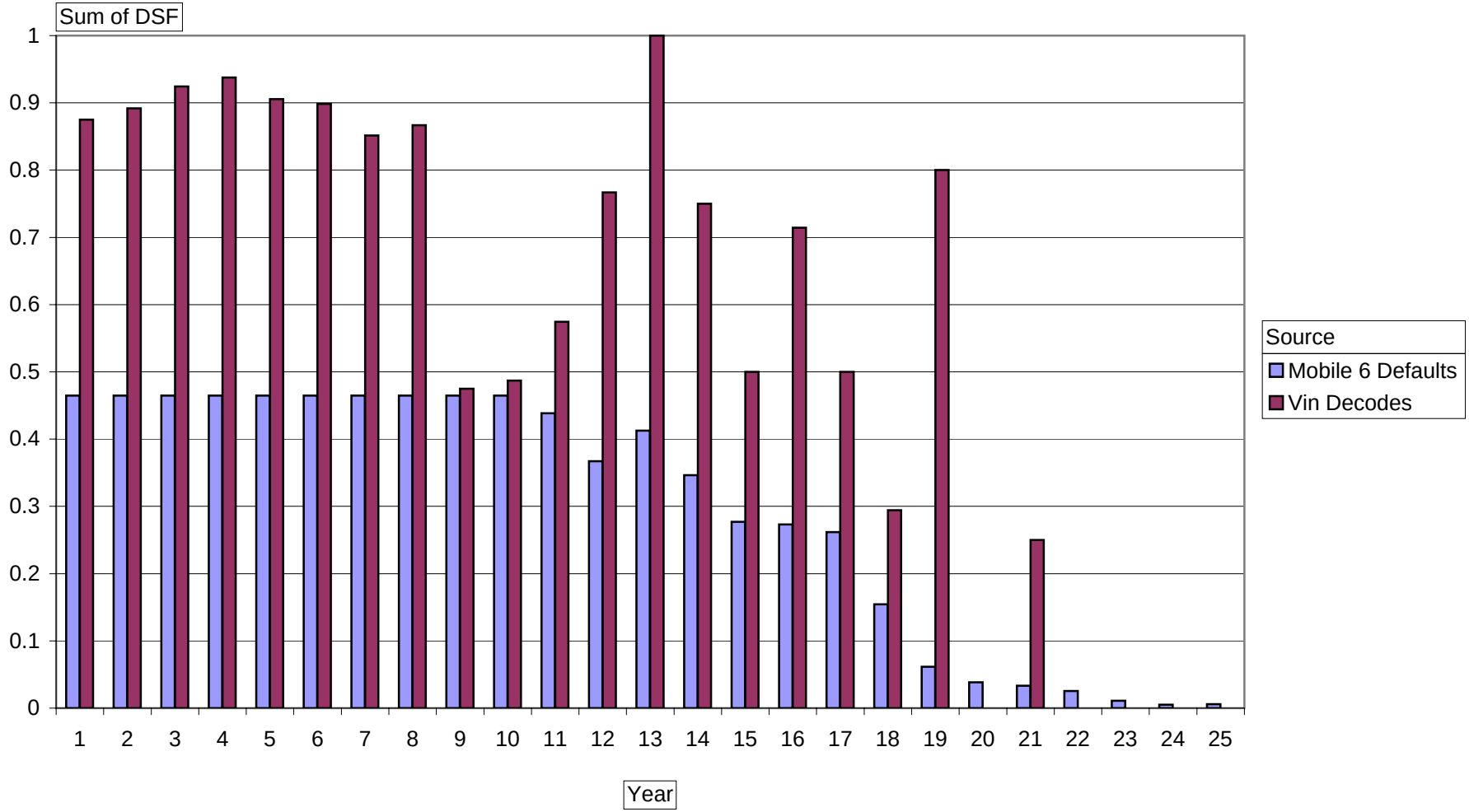
Vehicle Type	HDV4

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



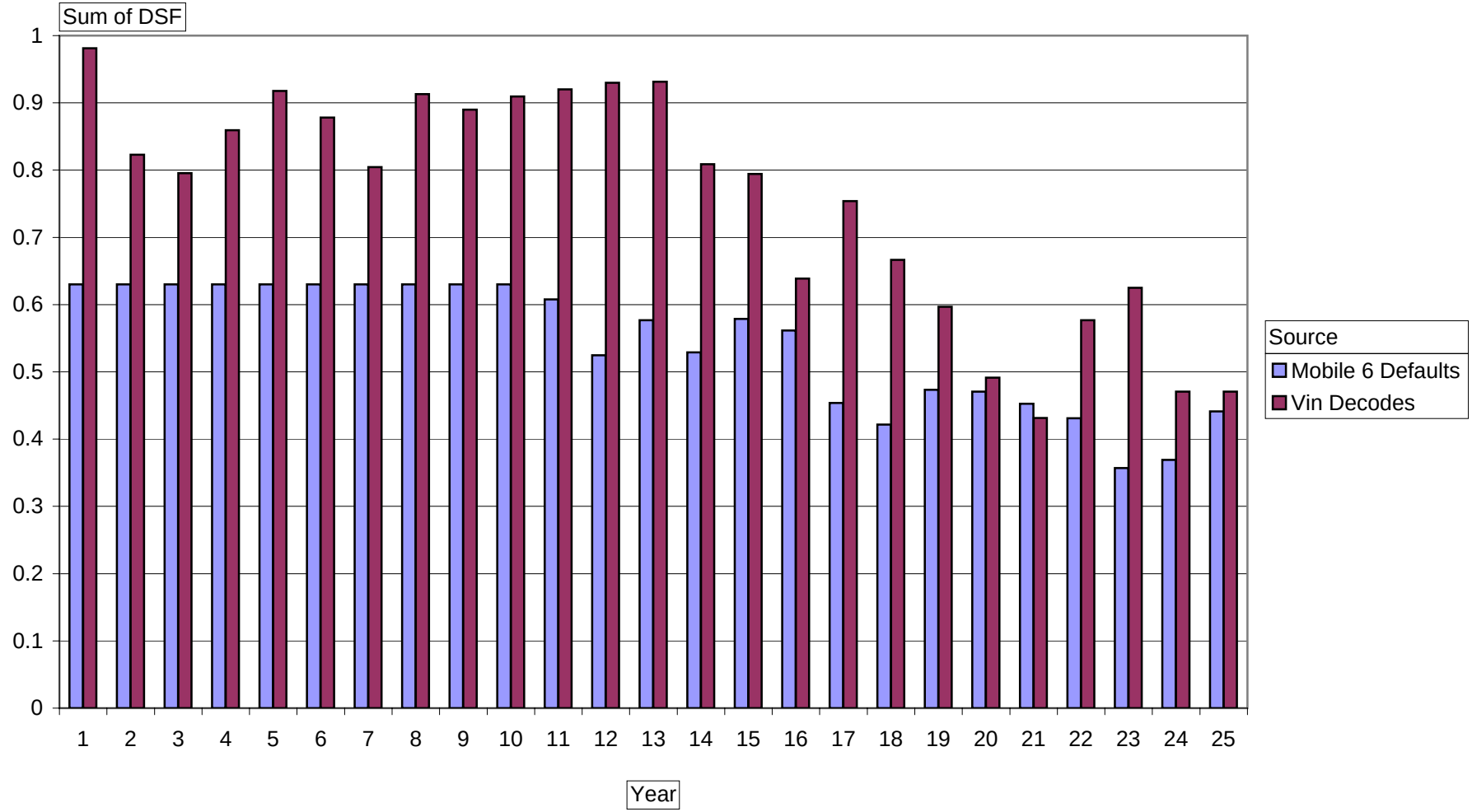
Vehicle Type | HDV5

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



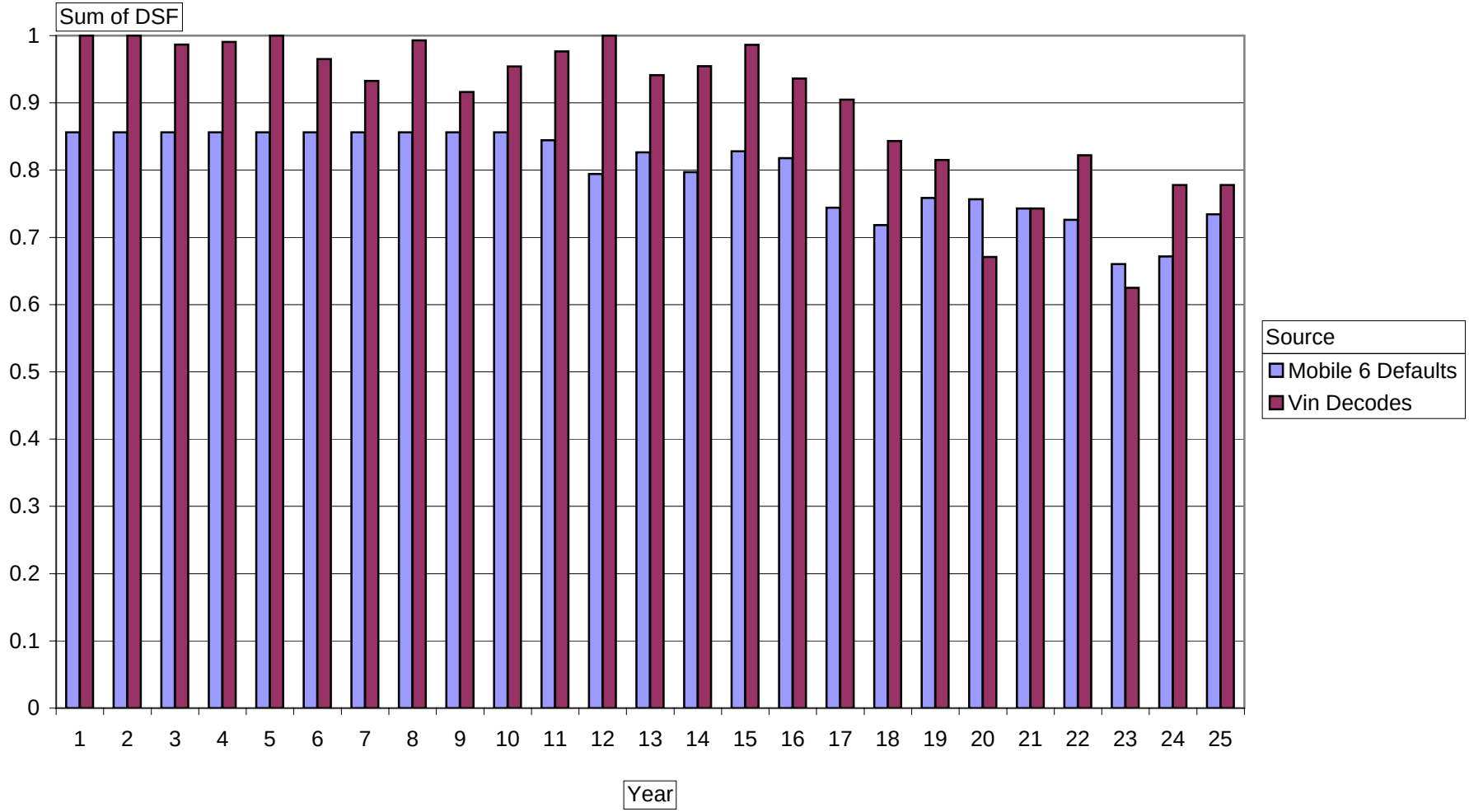
Vehicle Type	HDV6

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



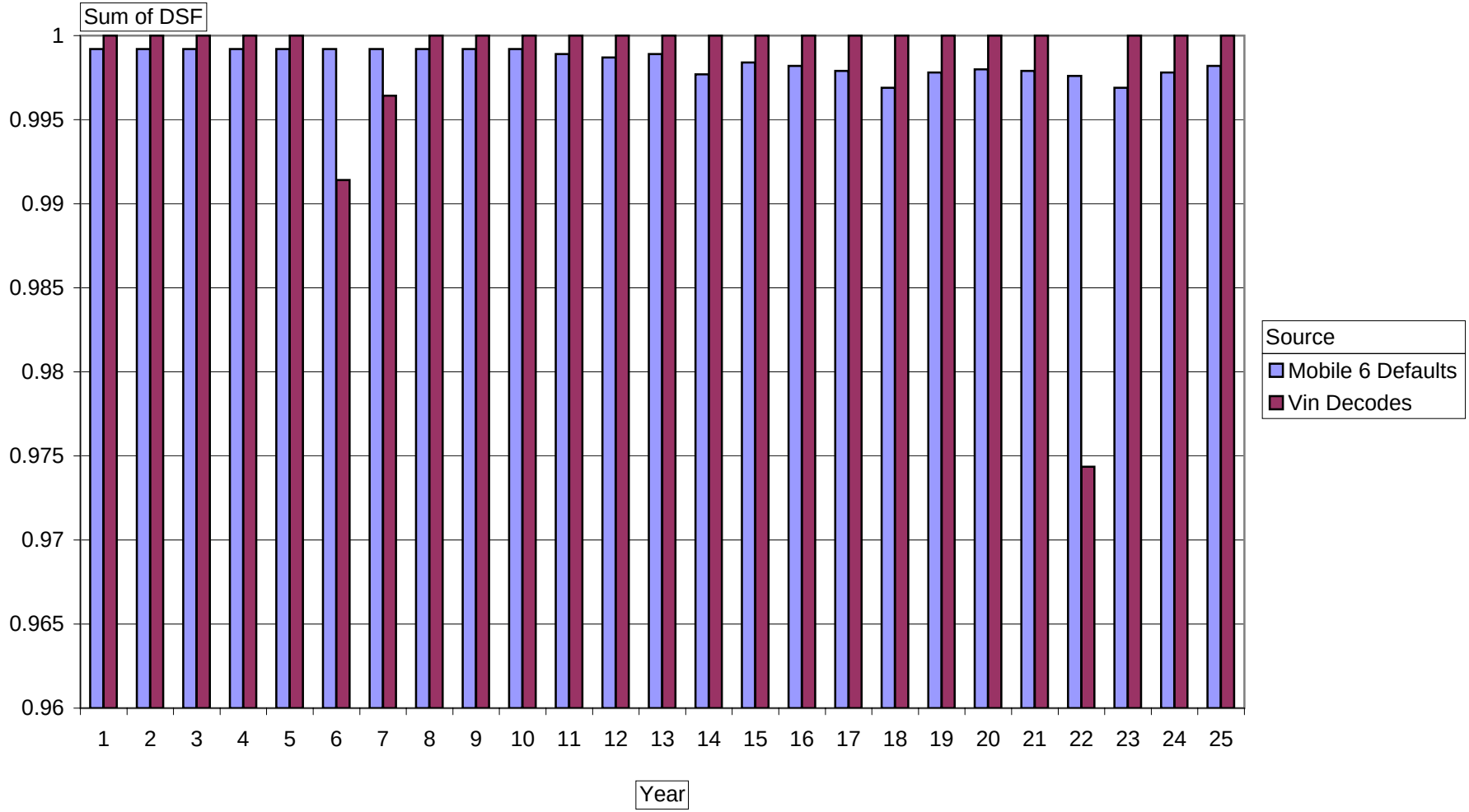
Vehicle Type	HDV7

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



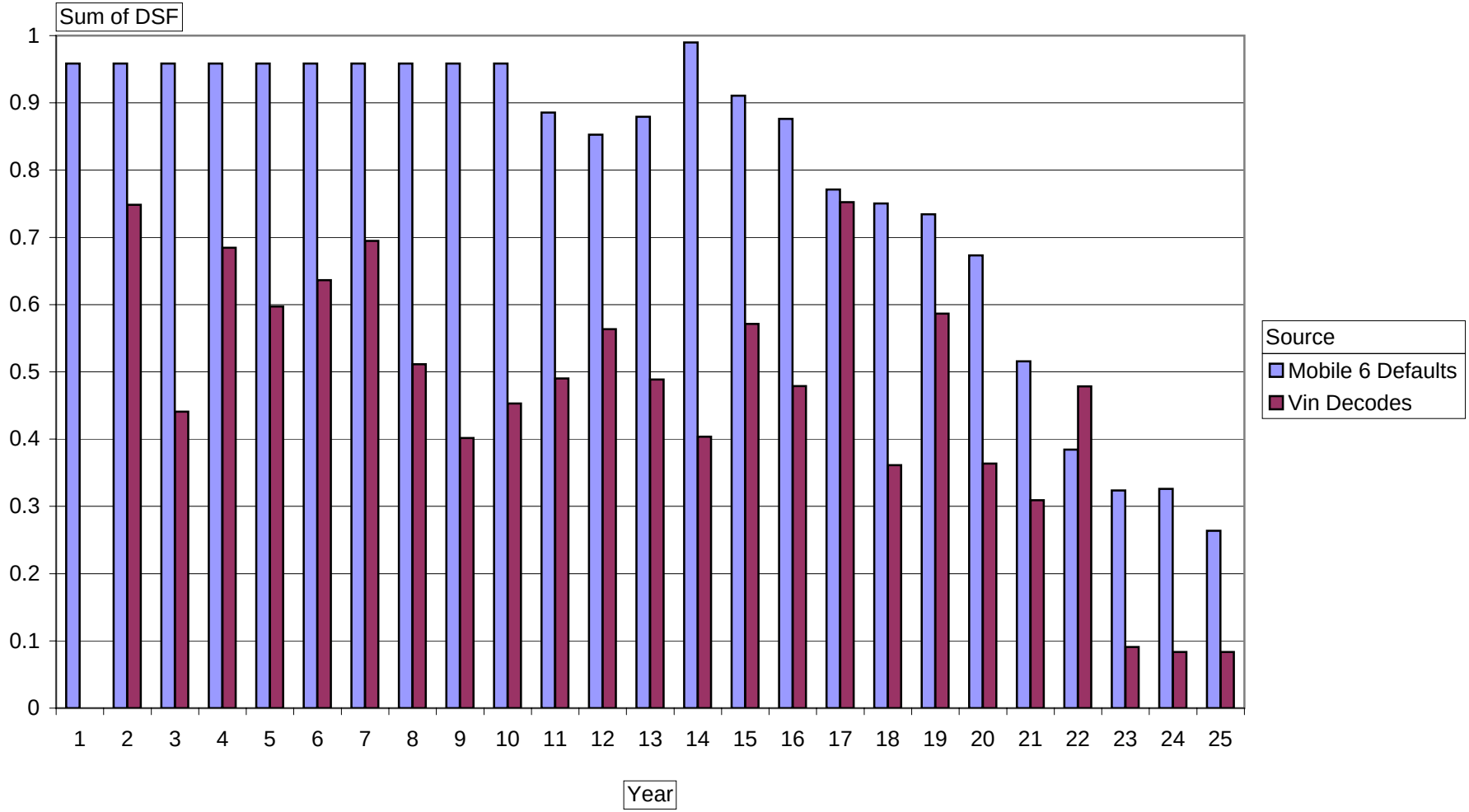
Vehicle Type	HDV8A

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



Vehicle Type	HDBS

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



From: Ponticello, James [mailto:James.Ponticello@VDOT.Virginia.gov]
Sent: Wednesday, March 08, 2006 2:38 PM
To: Daivamani Sivasailam
Subject: VIN results

Siva/Michael,

Thanks for forwarding the VIN decoder results. The results look good and I'd certainly support the use of the VIN decoder (knowing all the skeleton's in the DMV data...) I'd offer the following comments/observations;

1. When you present this, I'd note that "EPA encourages States to work to develop local age distributions for all of the vehicle classes and.....develop tools such as VIN decoders to do this" listed in Section 3.1.1 of the Technical Users Guidance on MOBILE6.2.

2. I'm guessing the air folks might want to see the difference in emission estimates using both methods, or at least the emission factors. Can that be easily done?

3. On page 4 of the memorandum, you compare the DSF values of the VIN decoder and the MOBILE defaults. Can you compare a composite of all NOVA jurisdictions' DSF's to the VIN decoder? I'd be more concerned with that than a comparison to the M6 defaults.

4. Regarding the MC category, M5 and the first version of M6 required all MC's older than 12 years to be put in the 12th year category with zeros for years 13 through 25. However, I didn't see any mention of that in a quick scan of the updated manual. Has DC and MD been providing MC data for all 25 years? I obviously have it if need be.

5. Last, under age distribution recommendations on page 5, for school and transit bus use you recommend use of M6 defaults because bus reg data reflects that busses are purchased infrequently in large numbers with big variations from year to year. Wouldn't that be a good reason to NOT use the M6 defaults, since the local data will reflect the actual variation that exists in our region?

Please forward to Michael Freeman, as I don't have his email in my VDOT Outlook yet.

Thanks

Jim Ponticello

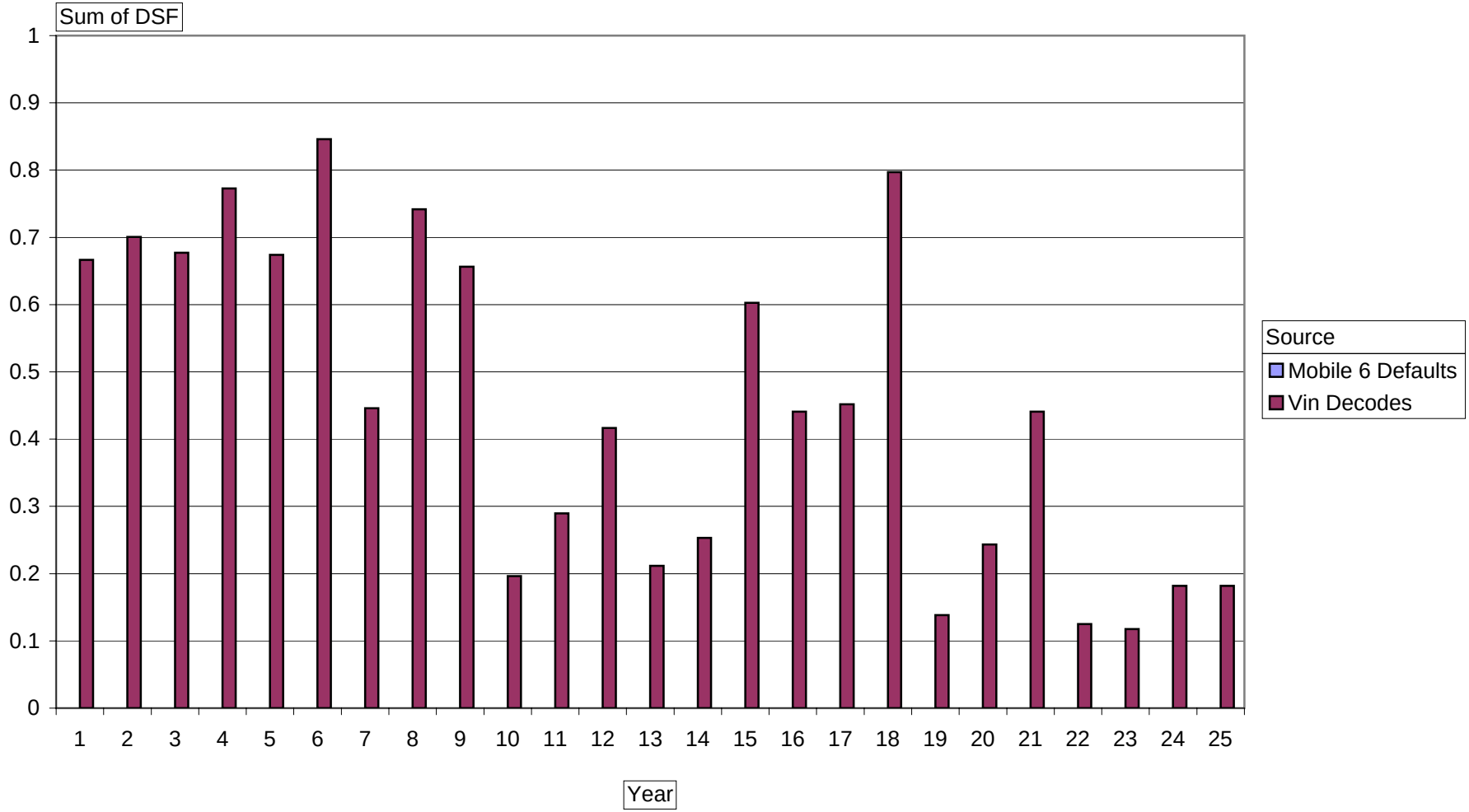
Air Quality Program Manager

VDOT Environmental Division

(804) 371-6769

Vehicle Type	HDBT

Diesel Sales Fractions
Northern Virginia Jurisdictions Combined



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