

**Memorandum***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***Date:** March 16, 2006**To:** File**From:** Michael Freeman**Subject:** Evaluation of 2005 Vehicle Registration Data for Maryland 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). Maryland DEQ staff has transmitted to TPB staff 2005 raw registration data files. TPB staff has used these raw data to produce a 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 as a flowchart in Attachment 1.0):

- 1) Pre-process registration files and prepare list of vins for decoding:
  - a. Remove all duplicate VIN numbers that might be present in the registration files.
  - b. The registration files for Maryland contain an expiration field that identifies the month and year each particular vehicle registration record expires. Maryland vehicles are registered for a two-year registration period. After reviewing the values in the expiration fields it appears that the registration data was archived in November, 2005. In order to approximate the registration data of July, 2005, MWCOG staff removed registration records with expiration dates not occurring within the 11/05 to 10/07 timeframe. This adjustment will provide a year's worth of vehicle registration records.
  - c. To adjust the year's worth of registrations resulting from the previous step to begin in July, records with expirations occurring after June 2007, with model years of 2005 or 2006 were also removed. This resulted in a list of Vins approximating a snapshot of July 2005 registrations.
  - d. Decode Vins using VinPower 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 categories. 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 decoded list of Vins reflects conditions of July, 2005, 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 Mobile Defaults**

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

- 1) Vehicle Age Distribution
  - a. For LDV and LDT2 vehicle types, the vin decodes tracked closely with mobile defaults for each jurisdiction.
  - b. For vehicle type LDT1, the vin decode age distribution unexpectedly dipped in year 2 and spiked in years 17 and 18.
  - c. For vehicle types LDT3 / LDT4, vin decode age fractions were typically higher in years 2 and 3 and lower in years 10 through 17, compared with mobile defaults for all jurisdictions.
  - d. Generally “Heavy Duty” vehicle categories do not track as well as “Light Duty” vehicle categories among all jurisdictions.
  - e. For the motorcycle category, the mobile default included 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 Maryland data into one set of diesel fractions 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 18. For years 19 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 0.12 in year 20 to 0.38 in year 24.*
- f HDV2B: VIN decoder and Mobile defaults are fairly close with VIN decodes slightly higher in years 1 through 13 and mobile defaults slightly higher in years 14 through 24.*
- g HDV3/HDV4: VIN decodes are lower than Mobile defaults for these categories, particularly in later years.*
- h HDV5/HDV6/HDV7: VIN decodes are higher than Mobile defaults for these categories.*
- i 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

- Aggregate jurisdiction level data to calculate diesel fractions on a Maryland regional level. It is recommended we use VIN decode results for LDV, and all the HD vehicles. For the remaining types LDT and HDBT/HDBS it is recommended we use Mobile 6 defaults.

Summary Recommendation Table

Vehicle Type	Vin Generated		Mobile 6 Defaults	
	RDT (By Jurisdiction)	DSF (By MD 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		

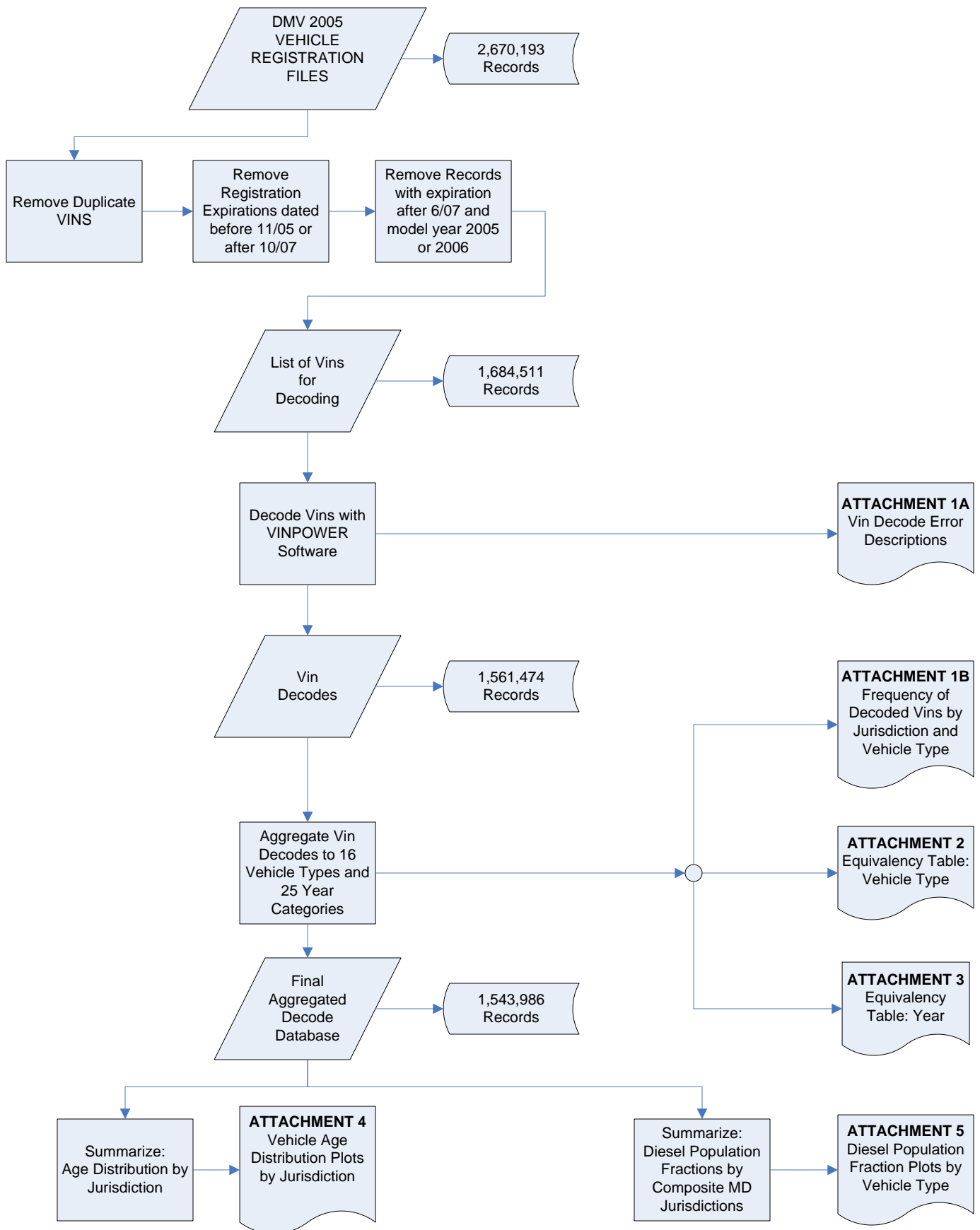
## **LIST OF ATTACHMENTS**

- **ATTACHMENT 1.0:** VIN DECODE PROCESS FLOWCHART
- **ATTACHMENT 1A:** 2005 VEHICLE REGISTRATION DATA VINPOWER DECODE RESULTS
- **ATTACHMENT 1B:** FREQUENCY OF DECODED VINS BY JURISDICTION AND VEHICLE TYPE
- **ATTACHMENT 2:** EQUIVALENCY TABLE: VEHICLE TYPE
- **ATTACHMENT 3:** EQUIVALENCY TABLE: YEAR
- **ATTACHMENT 4A:** COMPARISON OF VEHICLE AGE DISTRIBUTIONS, JURISDICTION = CHLS
- **ATTACHMENT 4B:** COMPARISON OF VEHICLE AGE DISTRIBUTIONS, JURISDICTION = CLVT
- **ATTACHMENT 4C:** COMPARISON OF VEHICLE AGE DISTRIBUTIONS, JURISDICTION = FRED
- **ATTACHMENT 4D:** COMPARISON OF VEHICLE AGE DISTRIBUTIONS, JURISDICTION = MTG
- **ATTACHMENT 4E:** COMPARISON OF VEHICLE AGE DISTRIBUTIONS, JURISDICTION = PG
- **ATTACHMENT 5:** DIESEL SALES FRACTIONS

# ATTACHMENT 1.0

## Vin Decode Process Flowchart

### Maryland Jurisdictions



**2005 Vehicle Registration Data  
VinPower Decode Results**

<b>State</b>	<b>VINS</b>
MD	1,684,511

<b>Error Code</b>	<b>Error Code Description</b>	<b>MD</b>
	No Error - Decoded Successfully	92.7%
1	VIN Number contains illegal characters	0.5%
2	VIN too short to decode (i.e.: < 10 chars)	1.1%
3	VIN Exceeds 17 characters	0.1%
4	Check Digit is bad	1.5%
5	This vehicle is unavailable in the database	2.5%
6	The model year for this vehicle is unavailable	1.1%
7	VIN Decode Error	0.0%
	Error w/o Error Code	0.5%
	<b>TOTAL</b>	<b>100.0%</b>

**FREQUENCY OF DECODED VINS BY JURISDICTION AND VEHICLE TYPE**

Sum of count	source jur						Grand Total
	Vin Decodes						
cog_veh	CHS	CLVT	FRED	MTG	PG		
HDBS	331	217	313	1,178	1,003	3,042	
HDBT	228	92	301	1,011	929	2,561	
HDV2B	3,610	2,925	8,570	13,992	13,198	42,295	
HDV3	898	632	1,727	2,650	2,712	8,619	
HDV4	454	297	832	2,125	2,792	6,500	
HDV5	135	91	301	719	777	2,023	
HDV6	344	197	832	1,374	2,770	5,517	
HDV7	288	131	498	692	1,200	2,809	
HDV8A	494	256	904	1,188	2,460	5,302	
HDV8B	80	92	263	331	555	1,321	
LDT1	712	595	1,272	4,668	3,820	11,067	
LDT2	28,457	20,364	51,915	160,888	126,337	387,961	
LDT3	12,713	9,188	16,839	38,032	44,702	121,474	
LDT4	2,958	1,973	4,507	11,711	12,682	33,831	
LDV	51,977	30,891	84,402	391,552	324,362	883,184	
MC	3,208	2,312	5,289	7,938	7,733	26,480	
<b>Grand Total</b>	<b>106,887</b>	<b>70,253</b>	<b>178,765</b>	<b>640,049</b>	<b>548,032</b>	<b>1,543,986</b>	

% of count	source jur						Grand Total
	Vin Decodes						
cog_veh	CHS	CLVT	FRED	MTG	PG		
HDBS	0.02%	0.01%	0.02%	0.08%	0.06%	0.20%	
HDBT	0.01%	0.01%	0.02%	0.07%	0.06%	0.17%	
HDV2B	0.23%	0.19%	0.56%	0.91%	0.85%	2.74%	
HDV3	0.06%	0.04%	0.11%	0.17%	0.18%	0.56%	
HDV4	0.03%	0.02%	0.05%	0.14%	0.18%	0.42%	
HDV5	0.01%	0.01%	0.02%	0.05%	0.05%	0.13%	
HDV6	0.02%	0.01%	0.05%	0.09%	0.18%	0.36%	
HDV7	0.02%	0.01%	0.03%	0.04%	0.08%	0.18%	
HDV8A	0.03%	0.02%	0.06%	0.08%	0.16%	0.34%	
HDV8B	0.01%	0.01%	0.02%	0.02%	0.04%	0.09%	
LDT1	0.05%	0.04%	0.08%	0.30%	0.25%	0.72%	
LDT2	1.84%	1.32%	3.36%	10.42%	8.18%	25.13%	
LDT3	0.82%	0.60%	1.09%	2.46%	2.90%	7.87%	
LDT4	0.19%	0.13%	0.29%	0.76%	0.82%	2.19%	
LDV	3.37%	2.00%	5.47%	25.36%	21.01%	57.20%	
MC	0.21%	0.15%	0.34%	0.51%	0.50%	1.72%	
<b>Grand Total</b>	<b>6.92%</b>	<b>4.55%</b>	<b>11.58%</b>	<b>41.45%</b>	<b>35.49%</b>	<b>100.00%</b>	



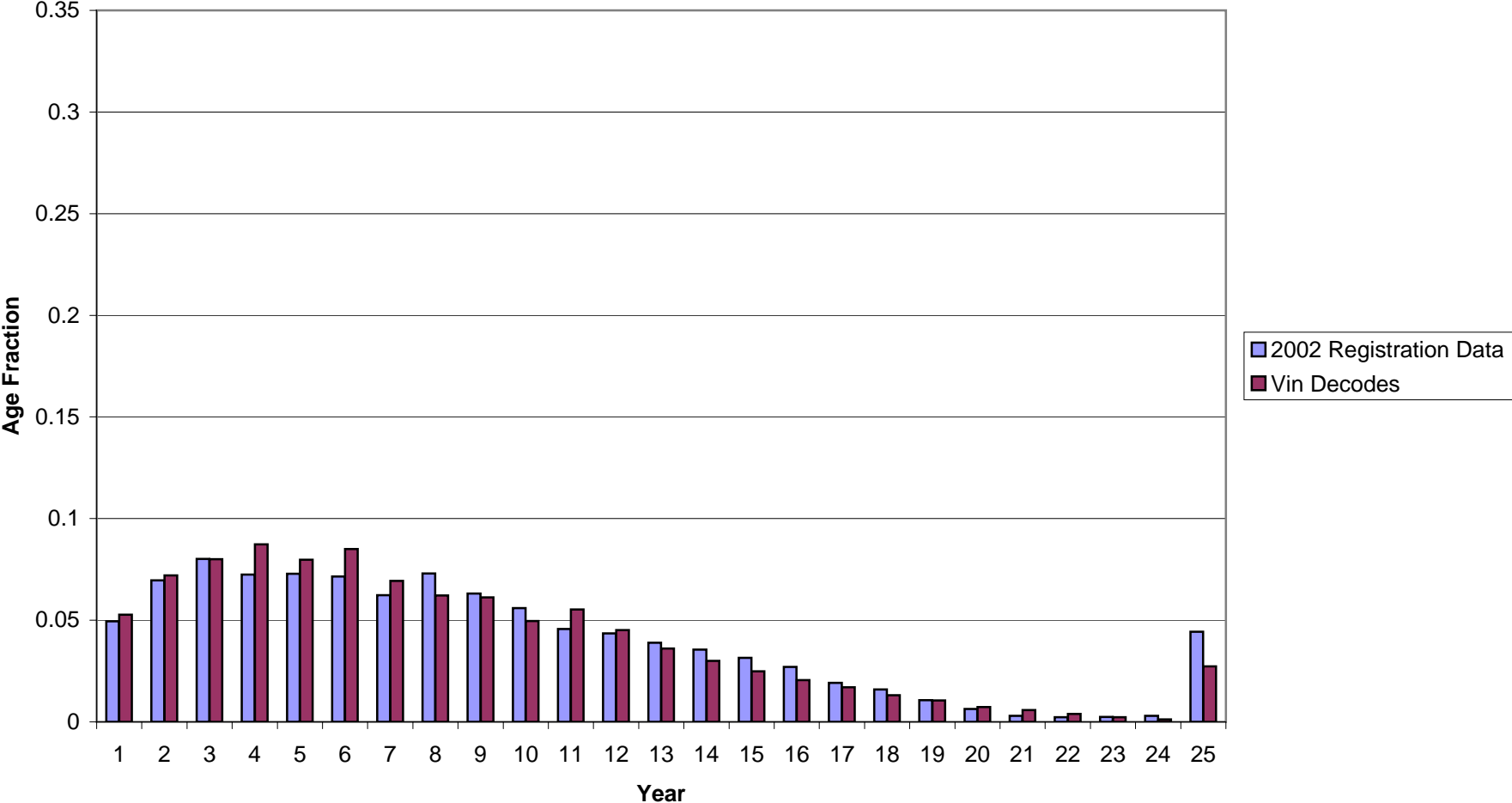
**ATTACHMENT 3  
EQUIVALENCY TABLE - YEAR**

<b>Vehicle Model Year</b>	<b>Mobile 6 Year</b>
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



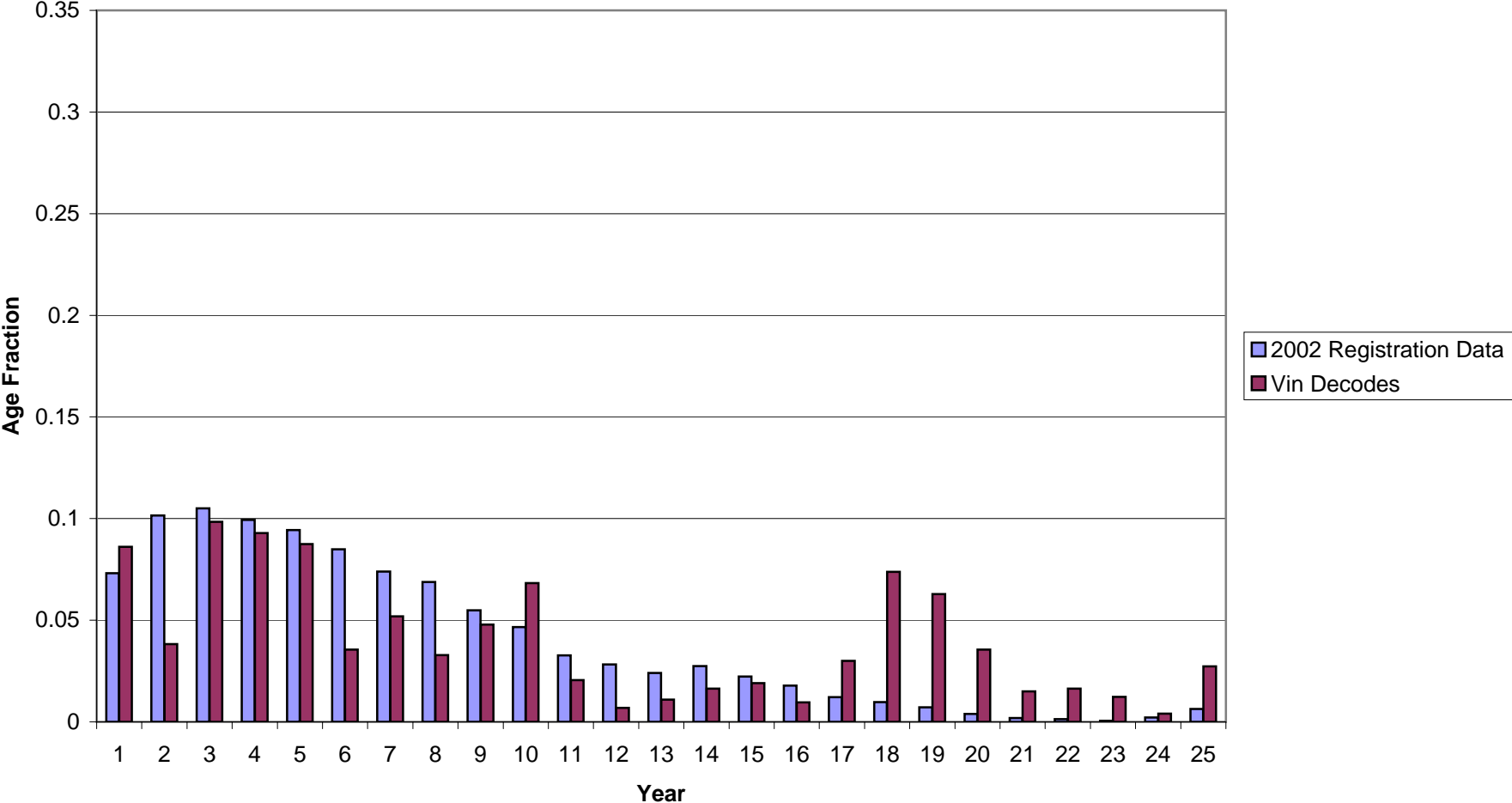
# ATTACHMENT 4A

2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = LDV  
Number of Decoded Vins = 51,977



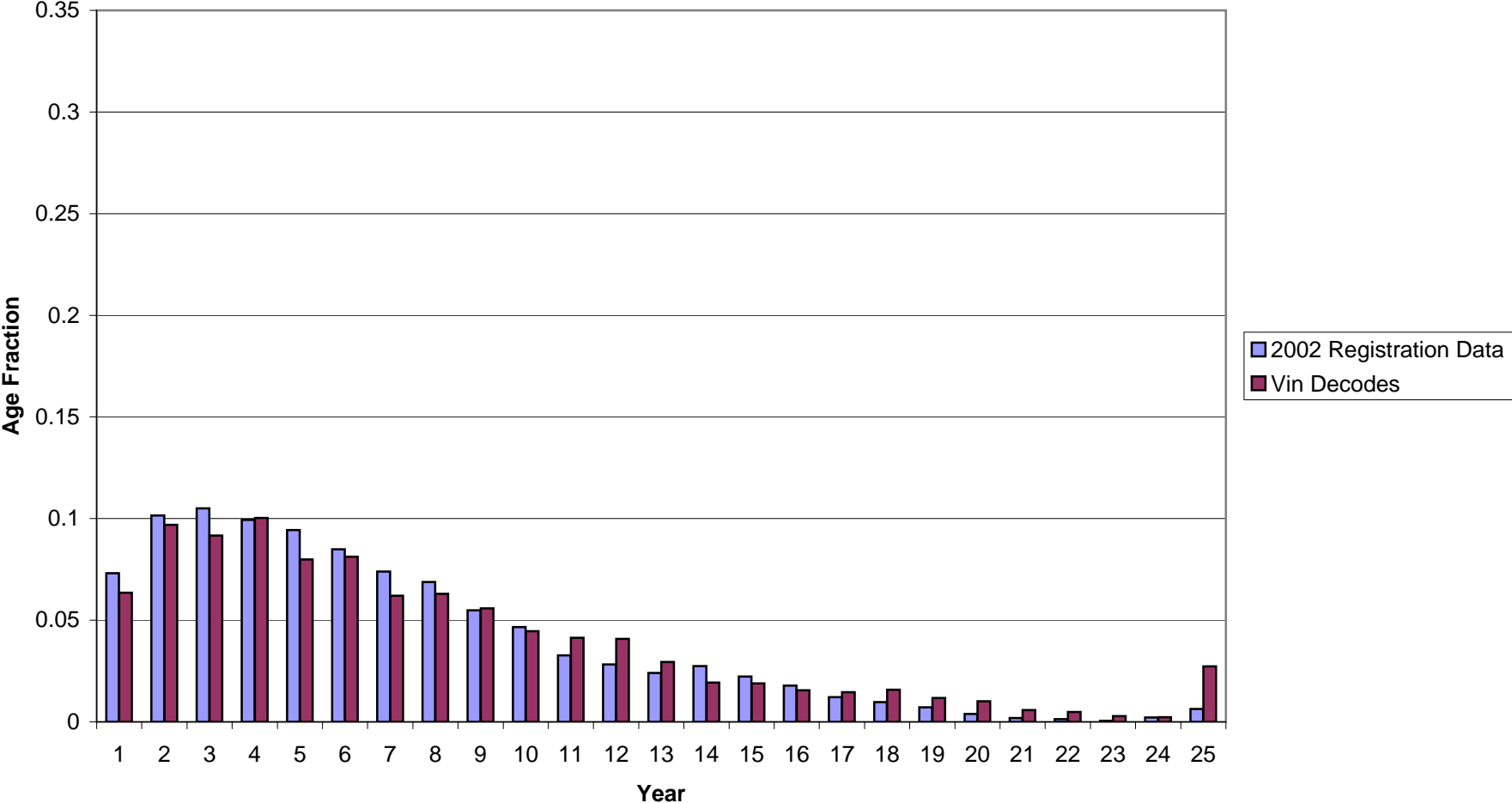
# ATTACHMENT 4A

2005 Age Fractions  
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Vehicle Type = LDT1  
Number of Decoded Vins = 712



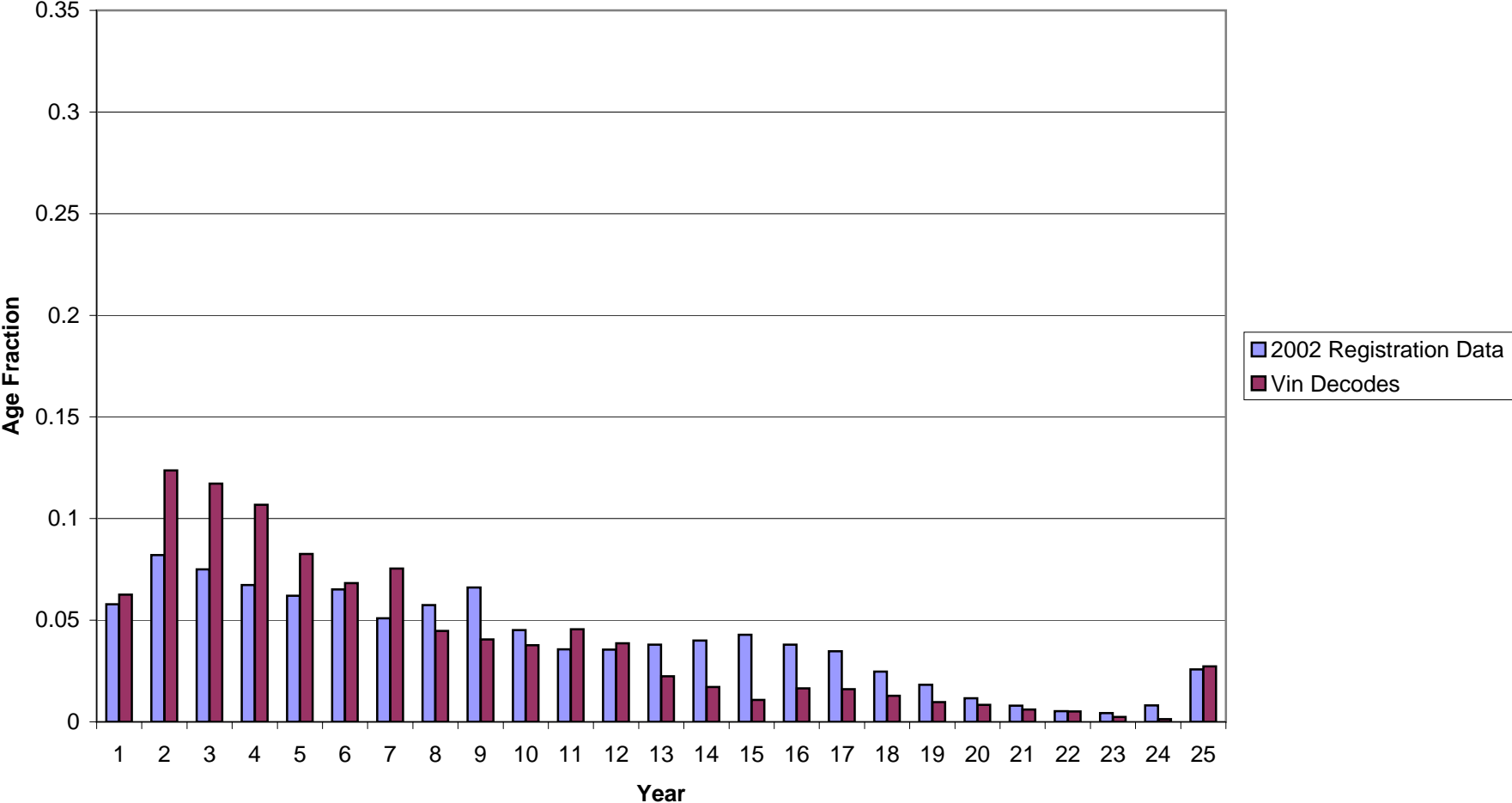
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2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = LDT2  
Number of Decoded Vins = 28,457



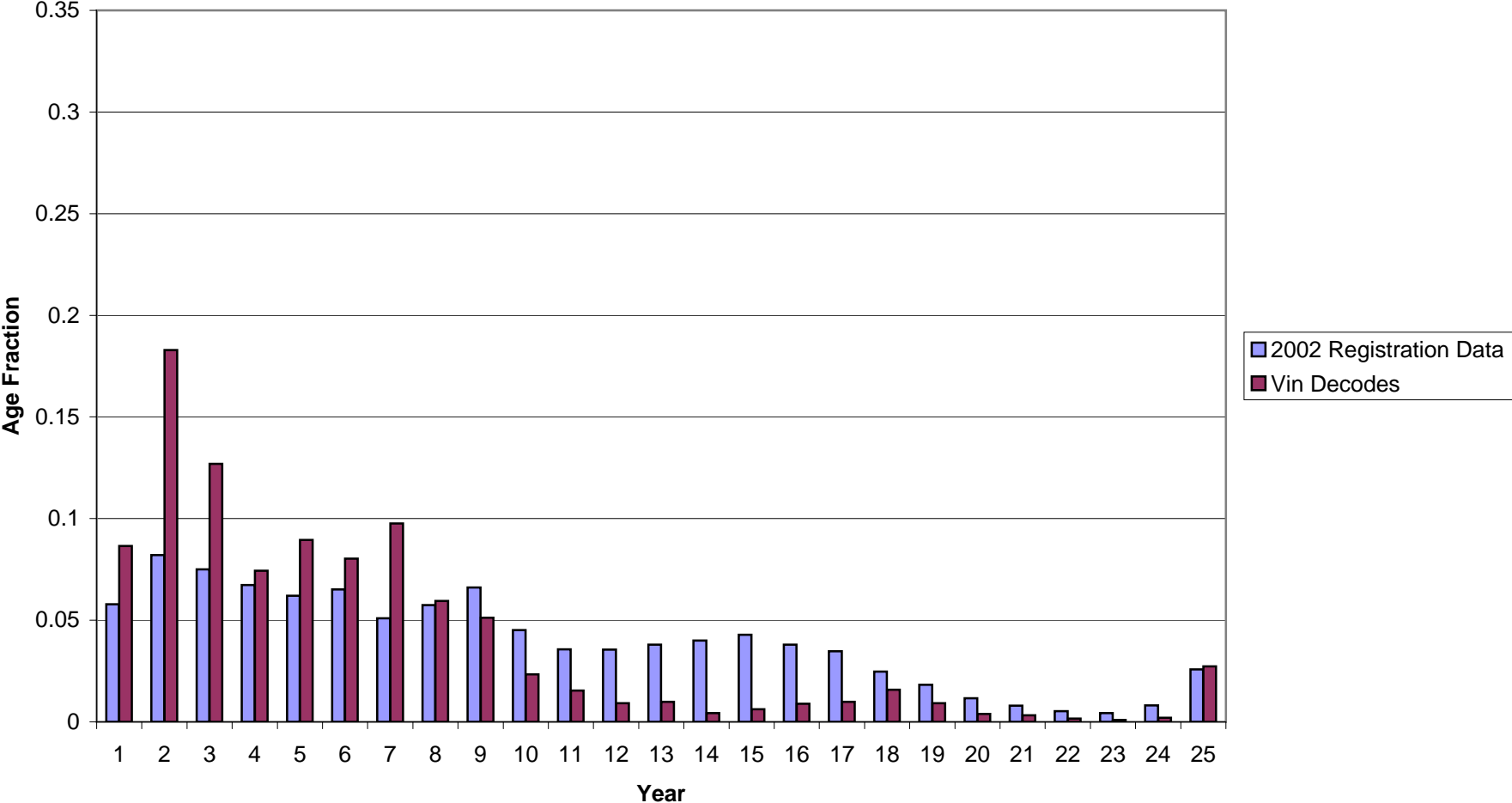
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2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = LDT3  
Number of Decoded Vins = 12,713



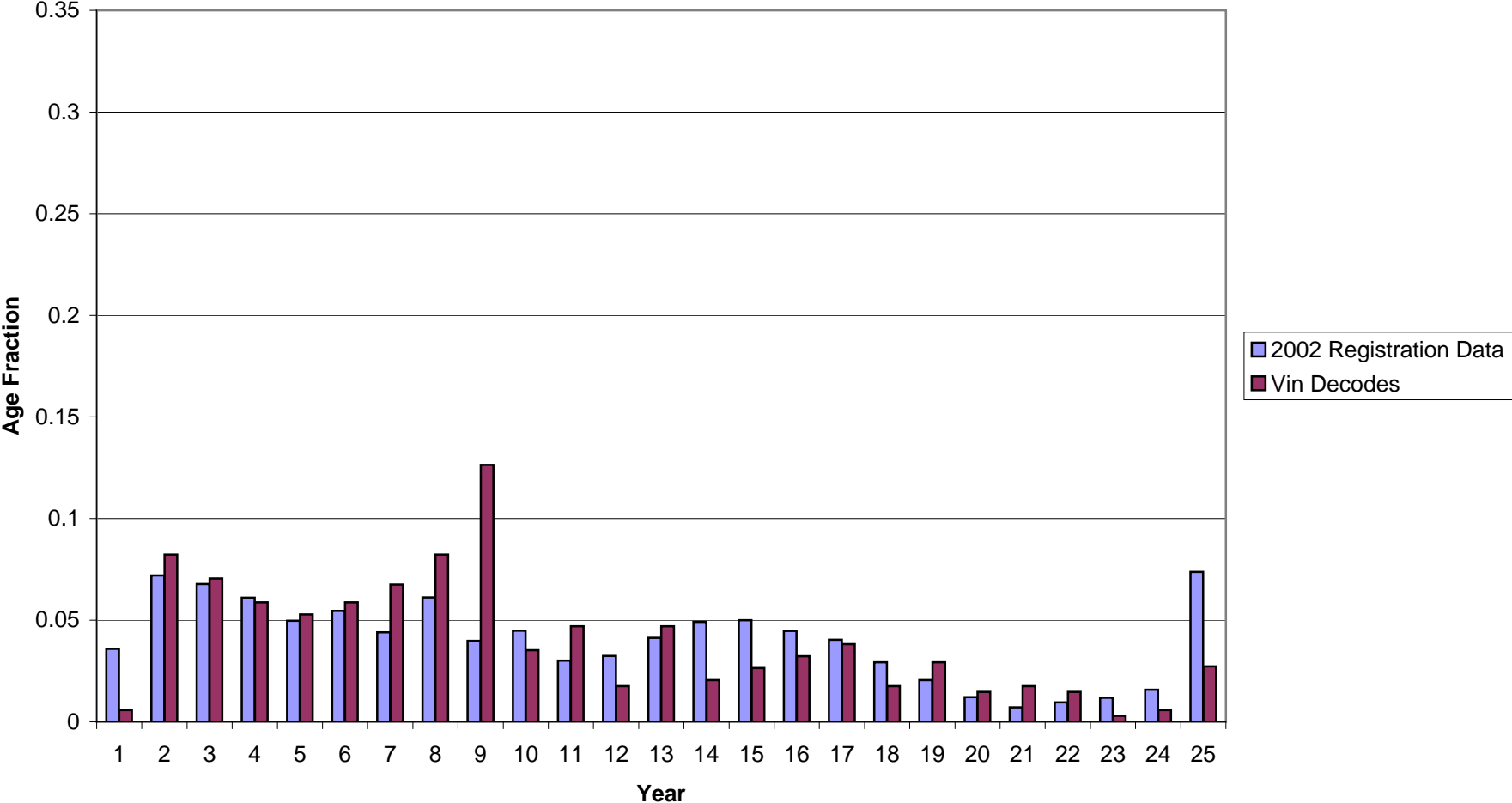
# ATTACHMENT 4A

2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = LDT4  
Number of Decoded Vins = 2,958



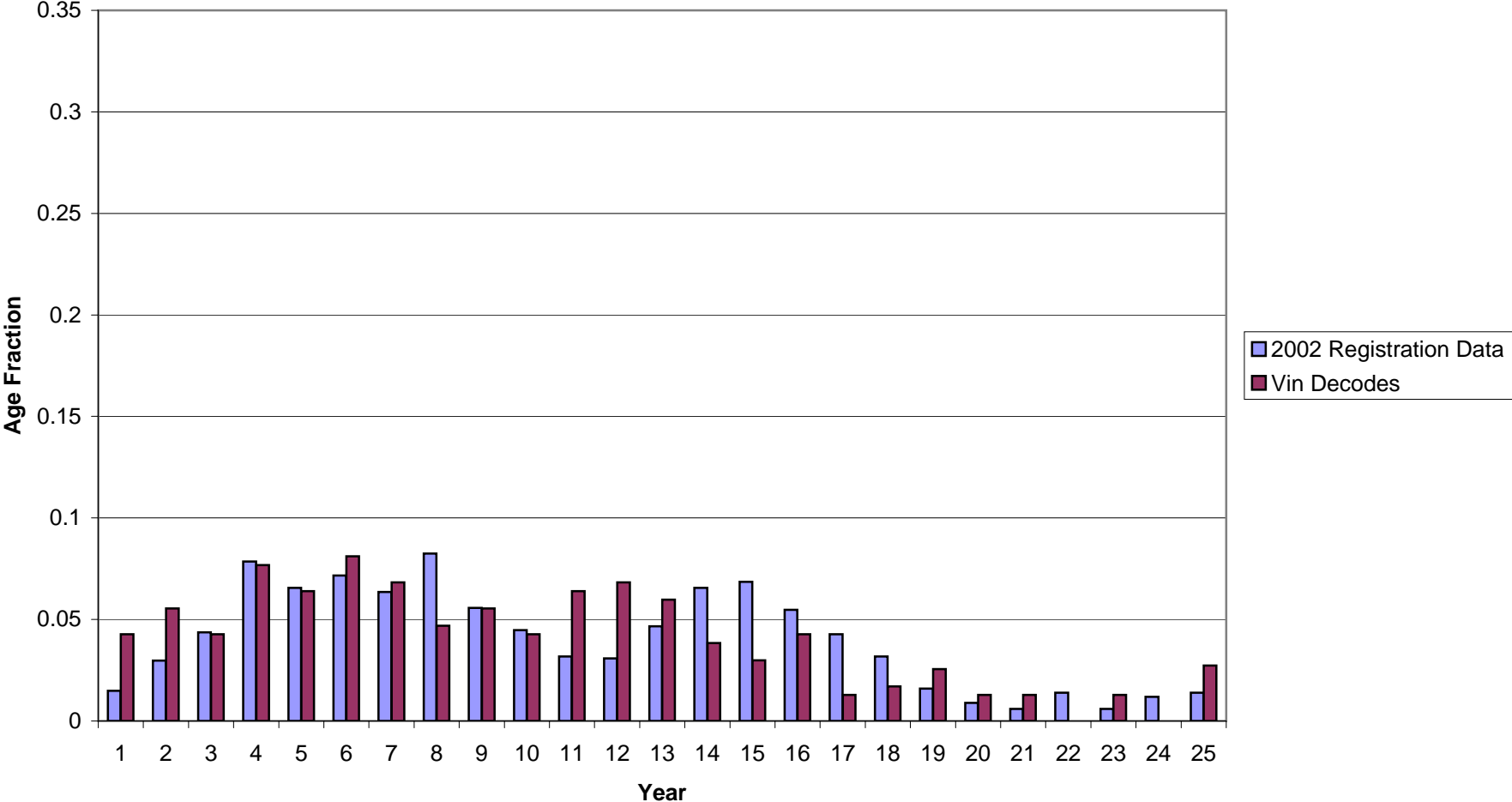
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2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = HDBS  
Number of Decoded Vins = 331



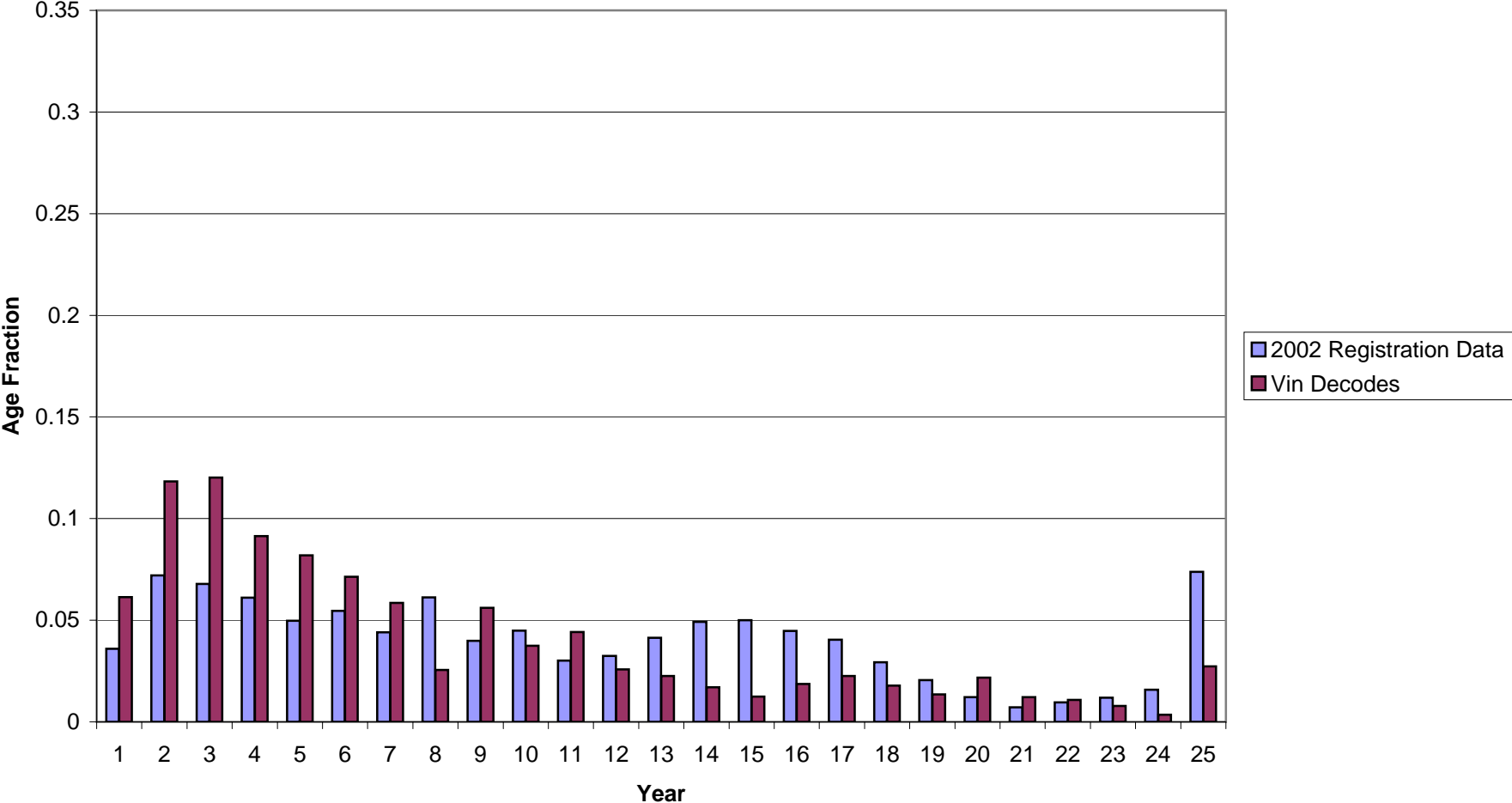
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2005 Age Fractions  
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Vehicle Type = HDBT  
Number of Decoded Vins = 228



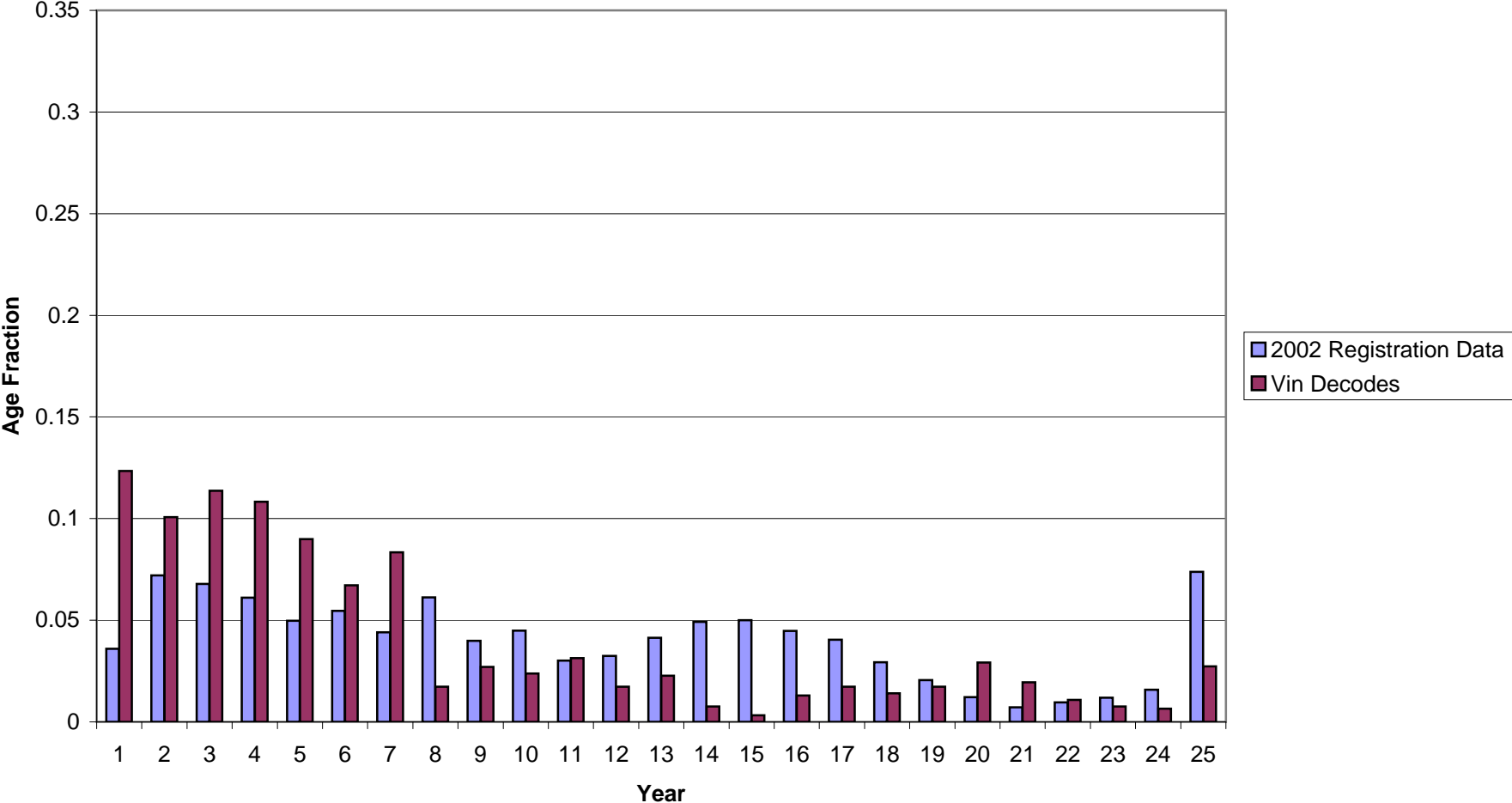
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2005 Age Fractions  
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Vehicle Type = HDV2B  
Number of Decoded Vins = 3,610



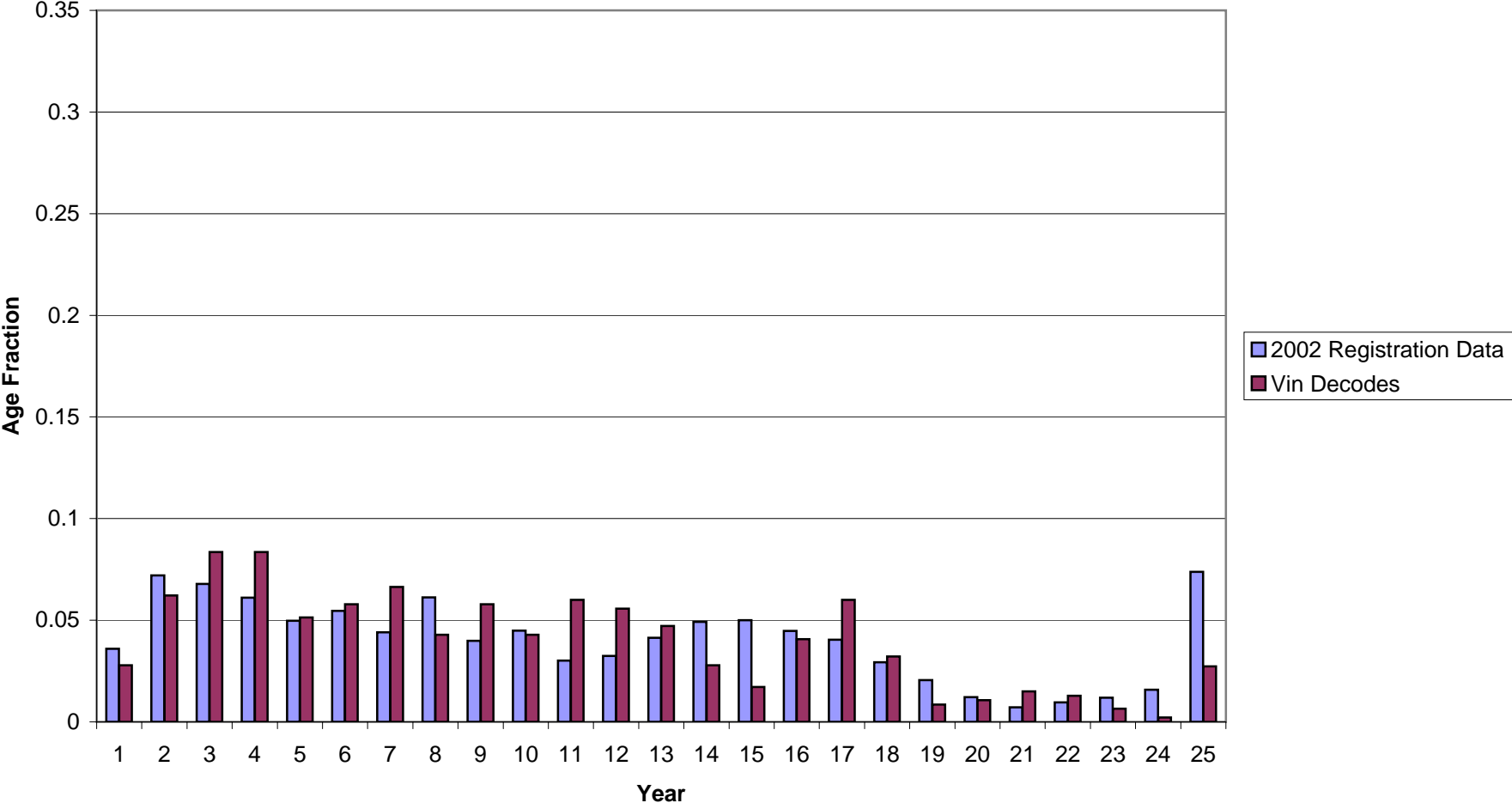


2005 Age Fractions  
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Vehicle Type = HDV3  
Number of Decoded Vins = 898

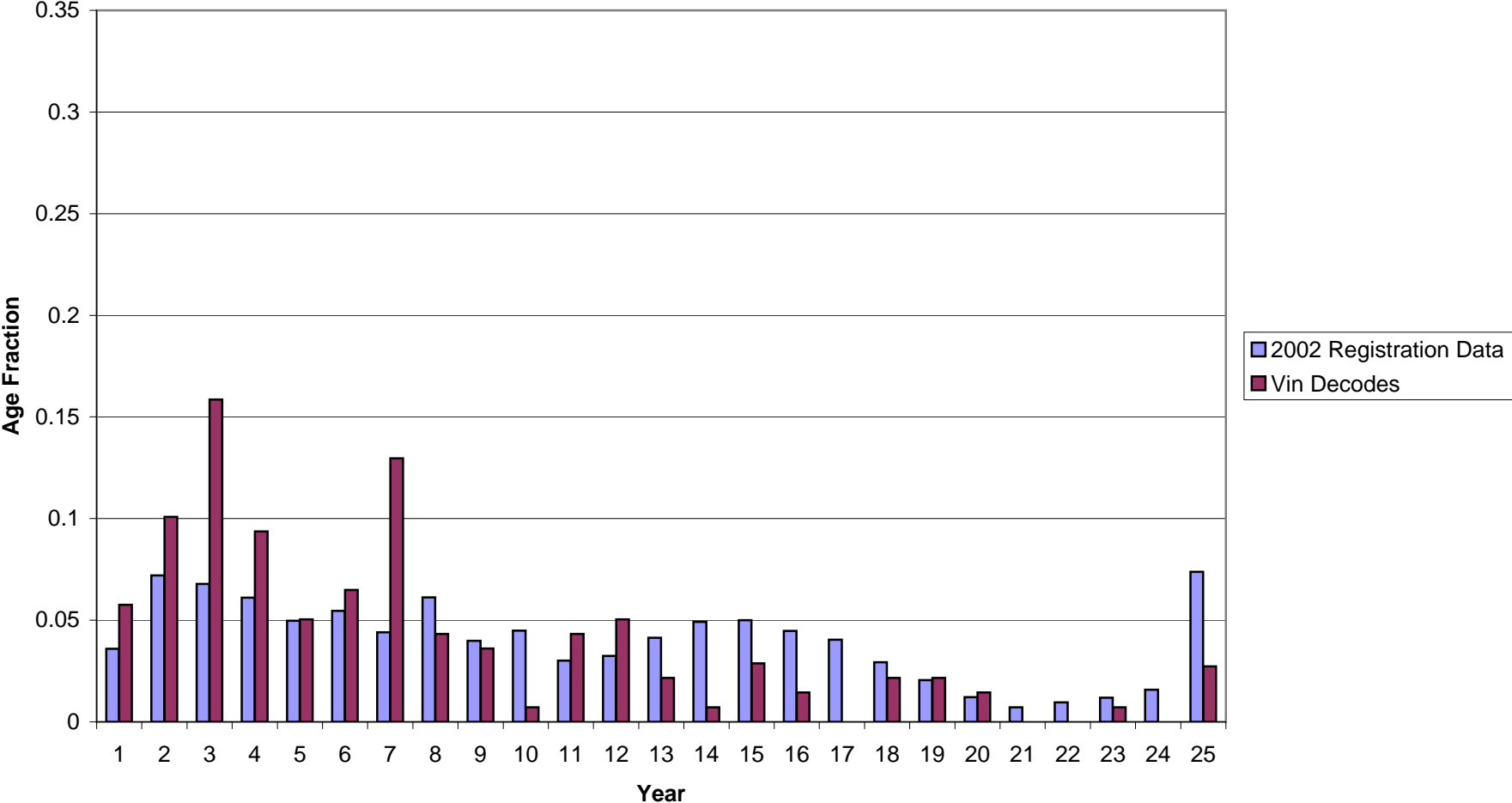


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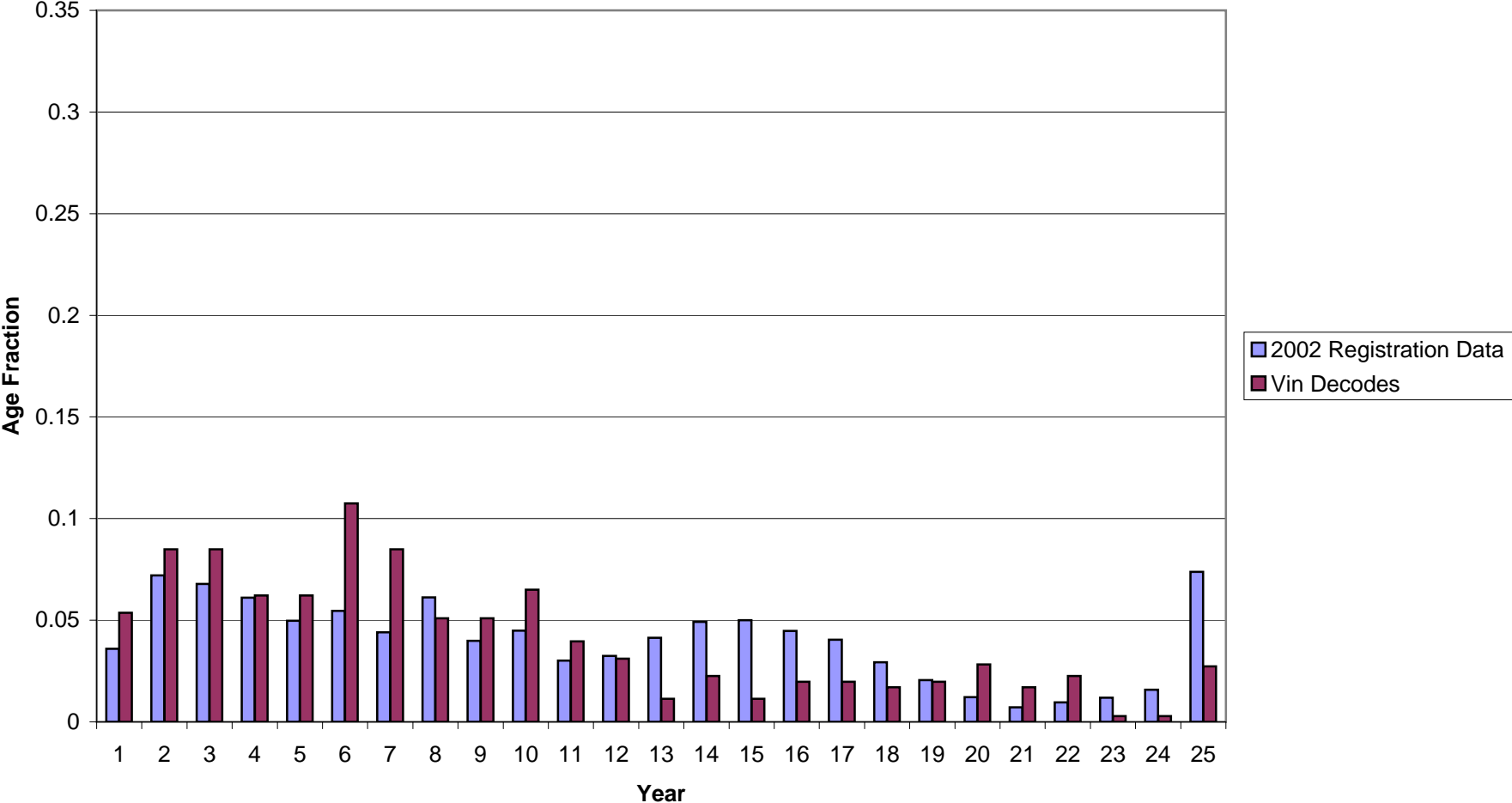
2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = HDV4  
Number of Decoded Vins = 454



2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = HDV5  
Number of Decoded Vins = 135

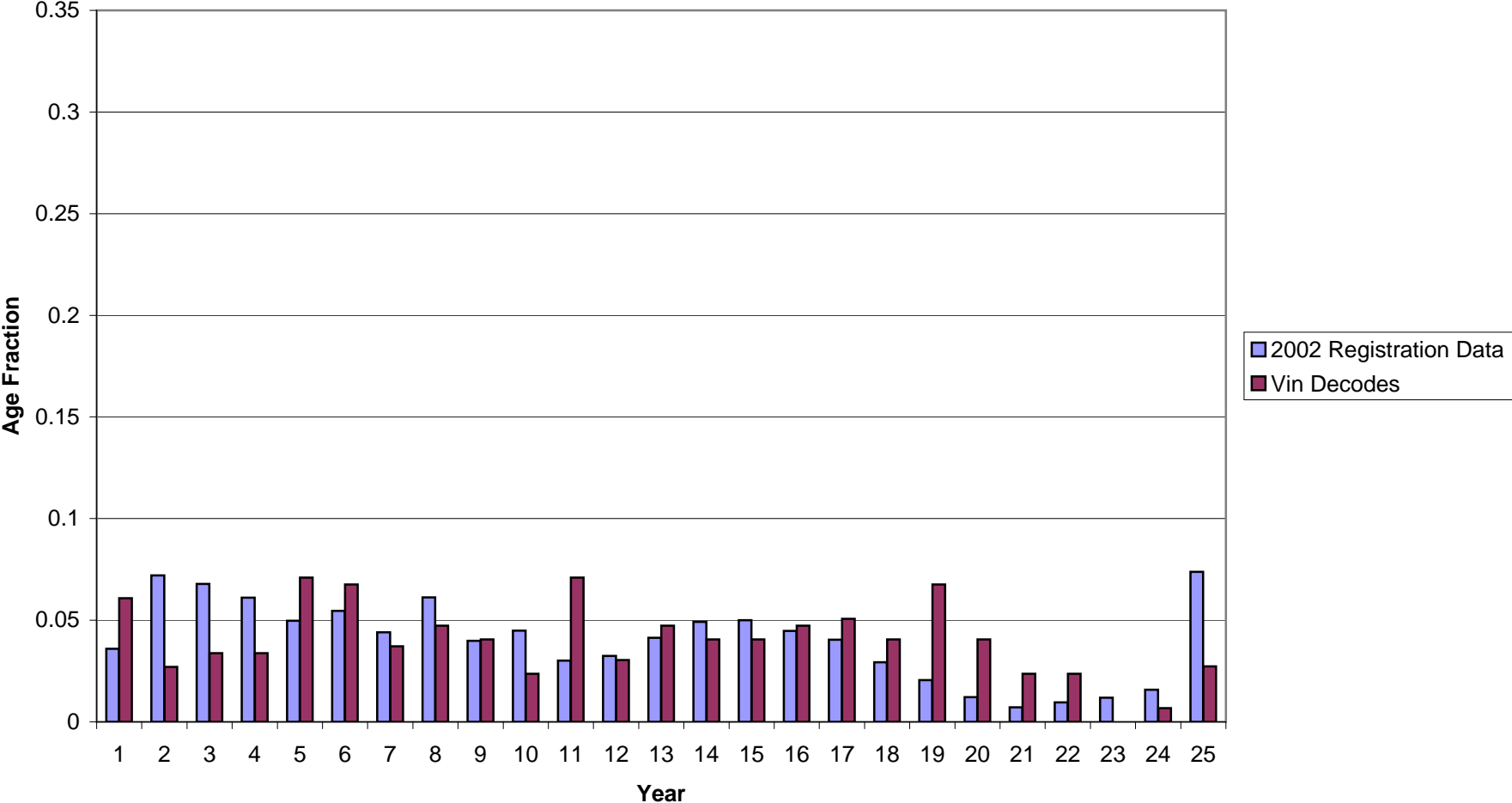


2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = HDV6  
Number of Decoded Vins = 344



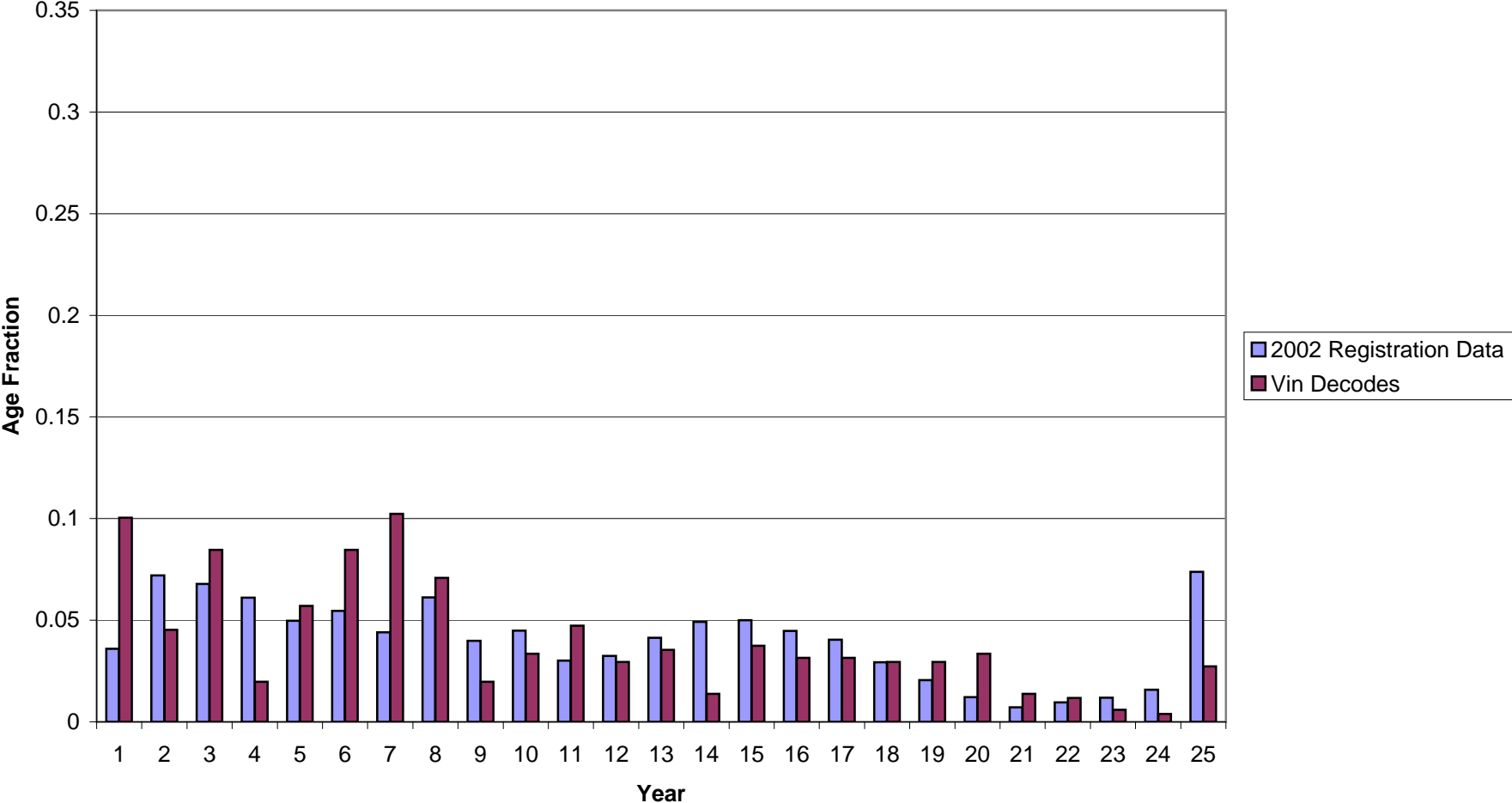
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2005 Age Fractions  
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Vehicle Type = HDV7  
Number of Decoded Vins = 288



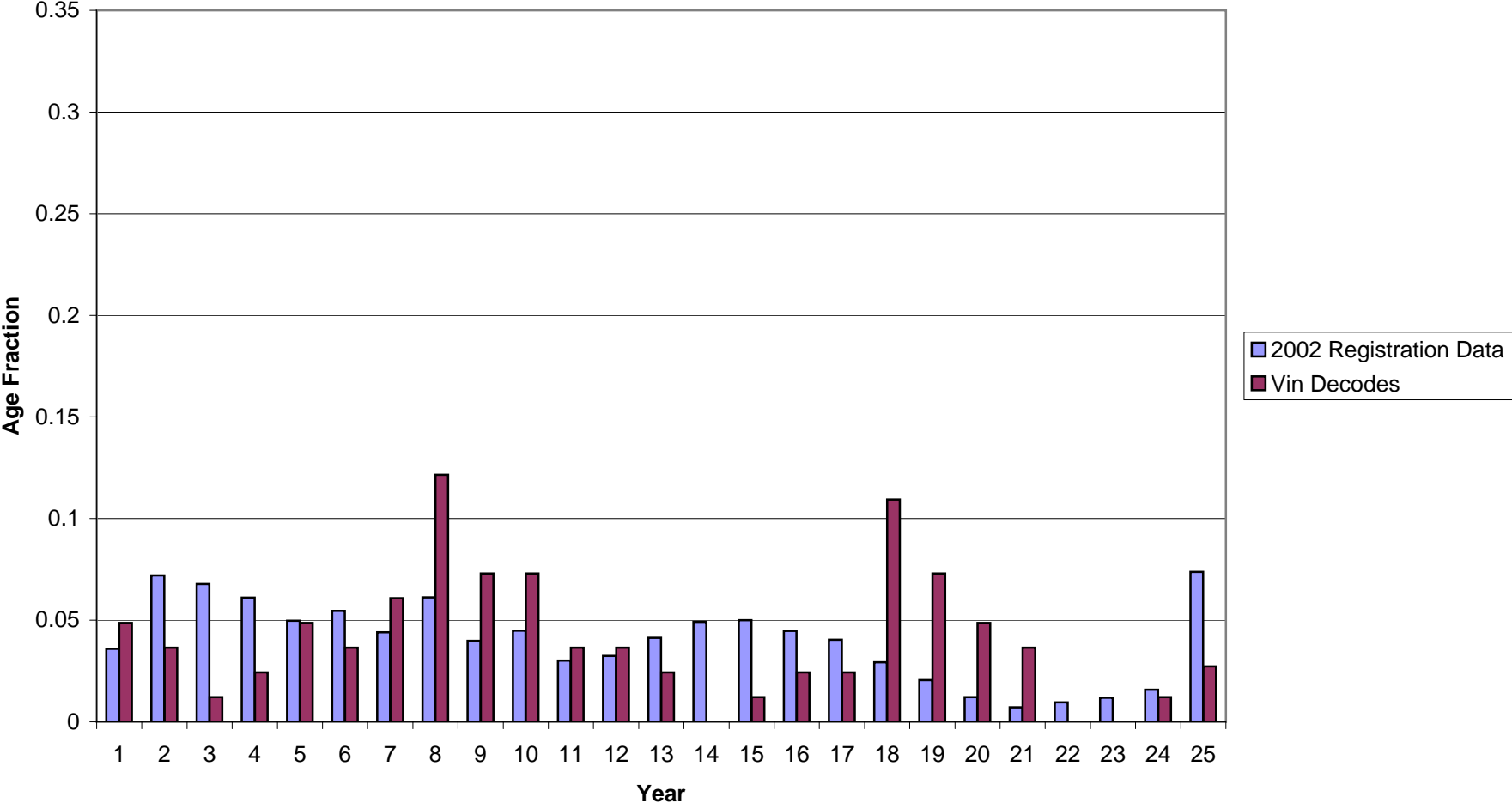
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2005 Age Fractions  
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Vehicle Type = HDV8A  
Number of Decoded Vins = 494



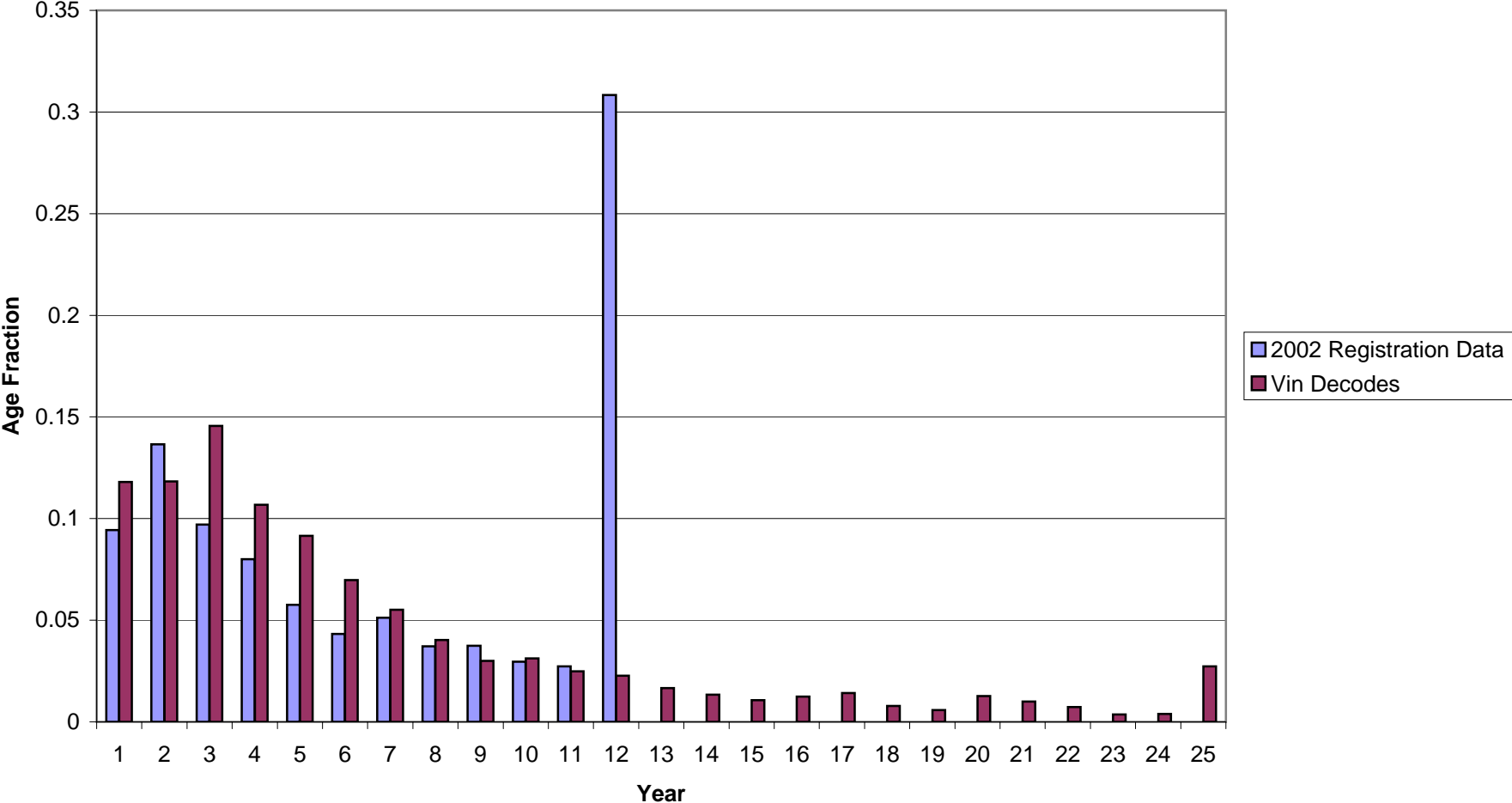
# ATTACHMENT 4A

2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = HDV8B  
Number of Decoded Vins = 80



# ATTACHMENT 4A

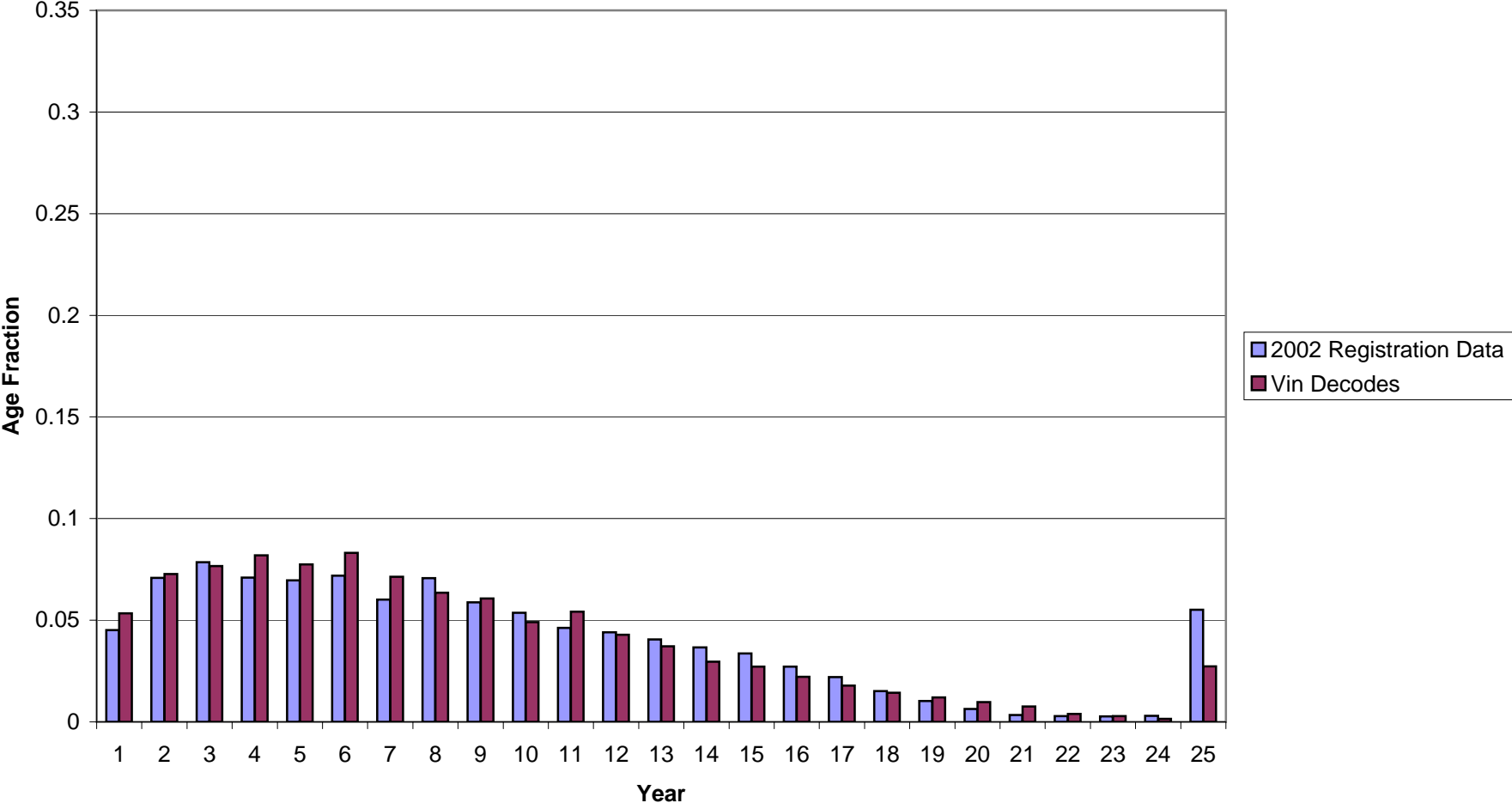
2005 Age Fractions  
Jurisdiction = CHLS  
Vehicle Type = MC  
Number of Decoded Vins = 3,208





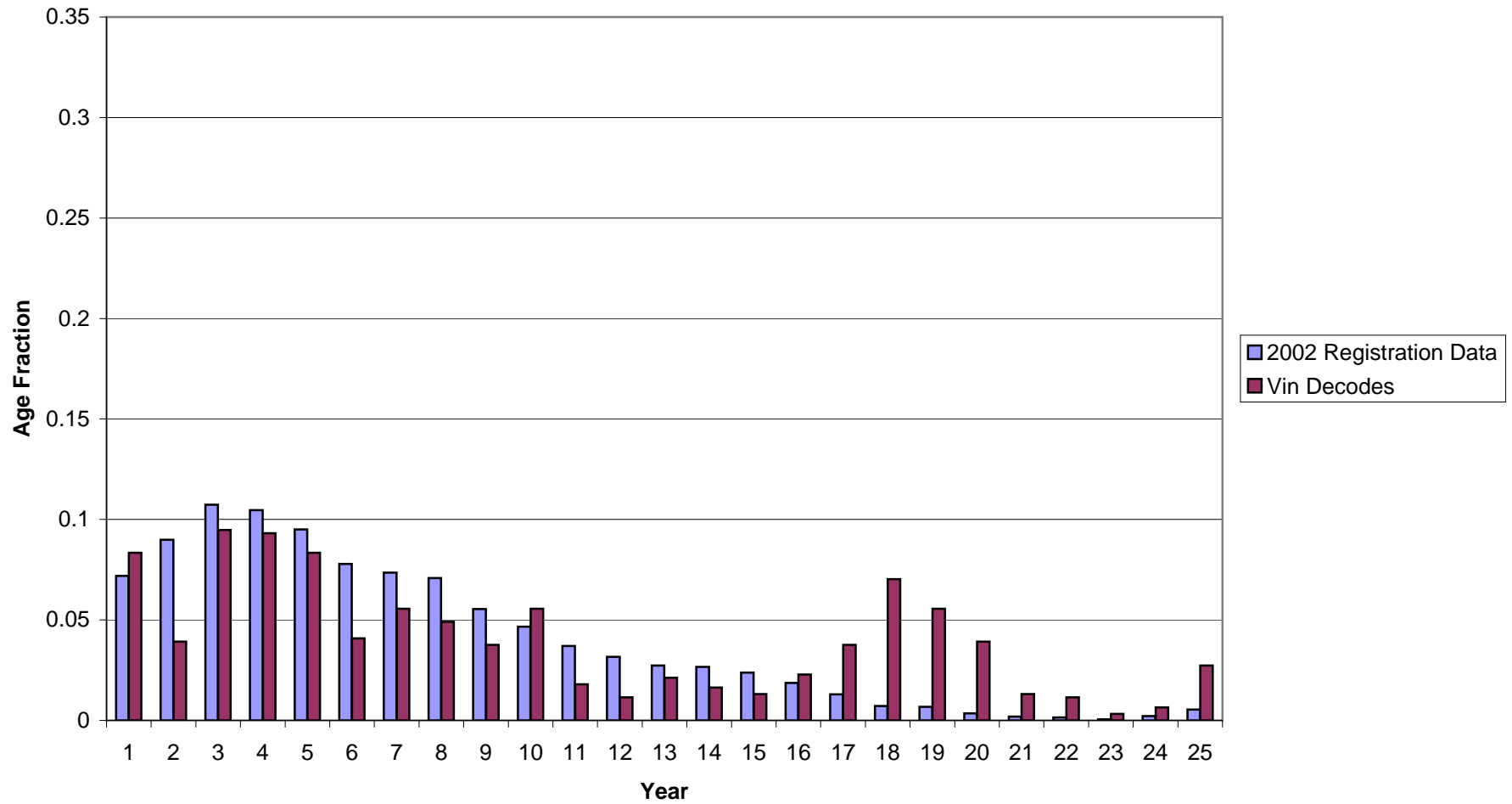
# ATTACHMENT 4B

2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = LDV  
Number of Decoded Vins = 30,891

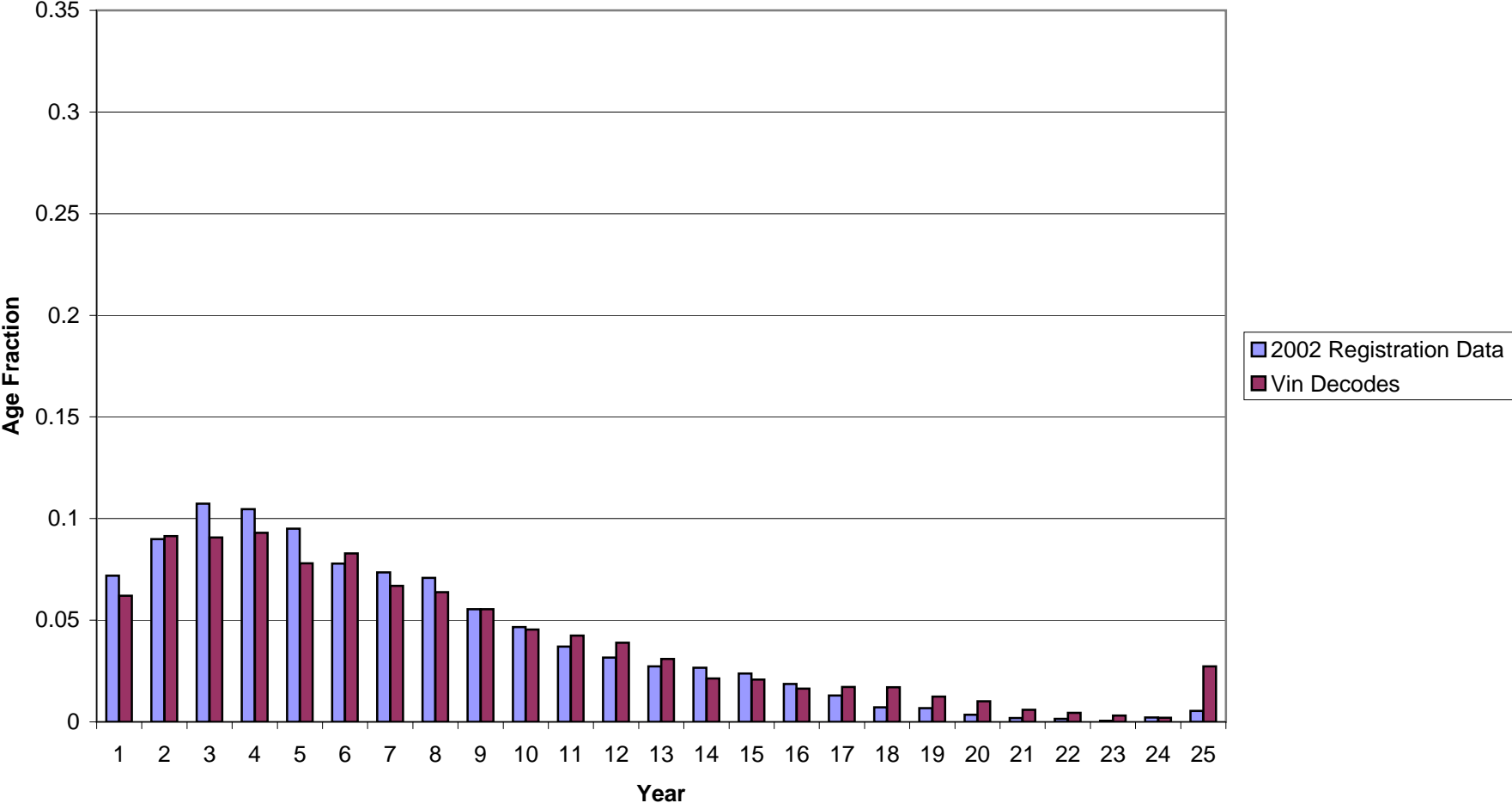


# ATTACHMENT 4B

2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = LDT1  
Number of Decoded Vins = 595

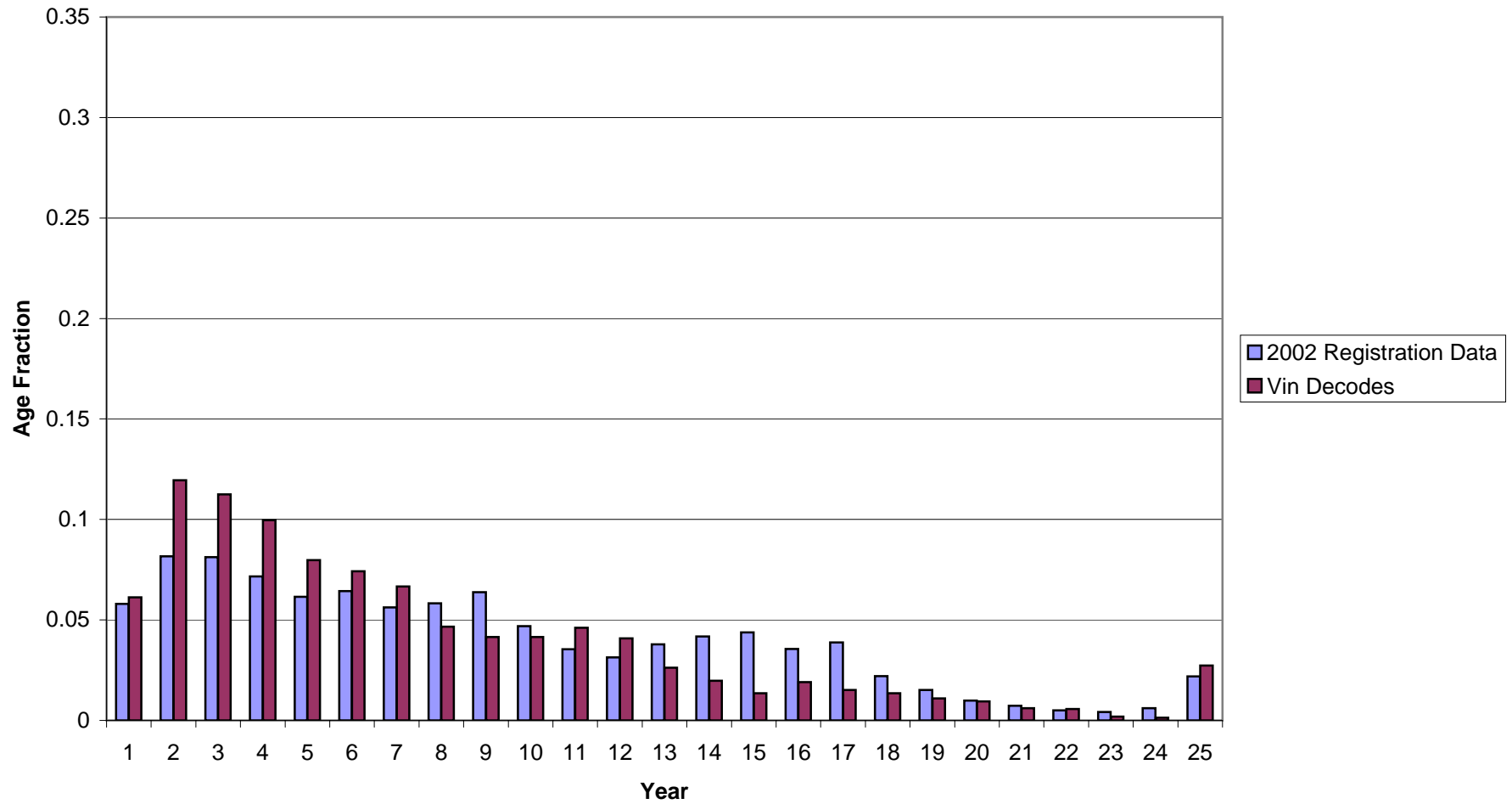


2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = LDT2  
Number of Decoded Vins = 20,364



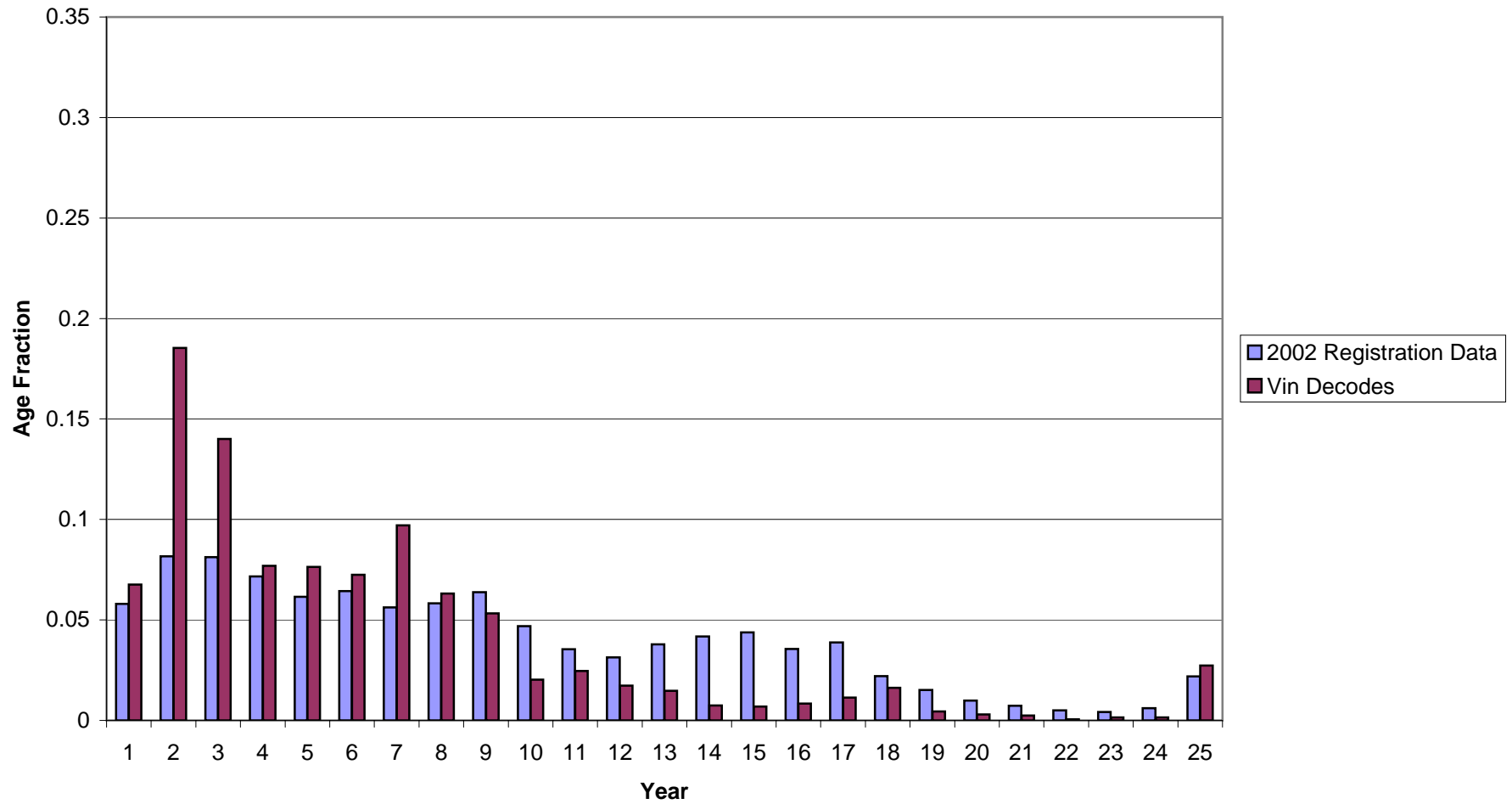
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2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = LDT3  
Number of Decoded Vins = 9,188



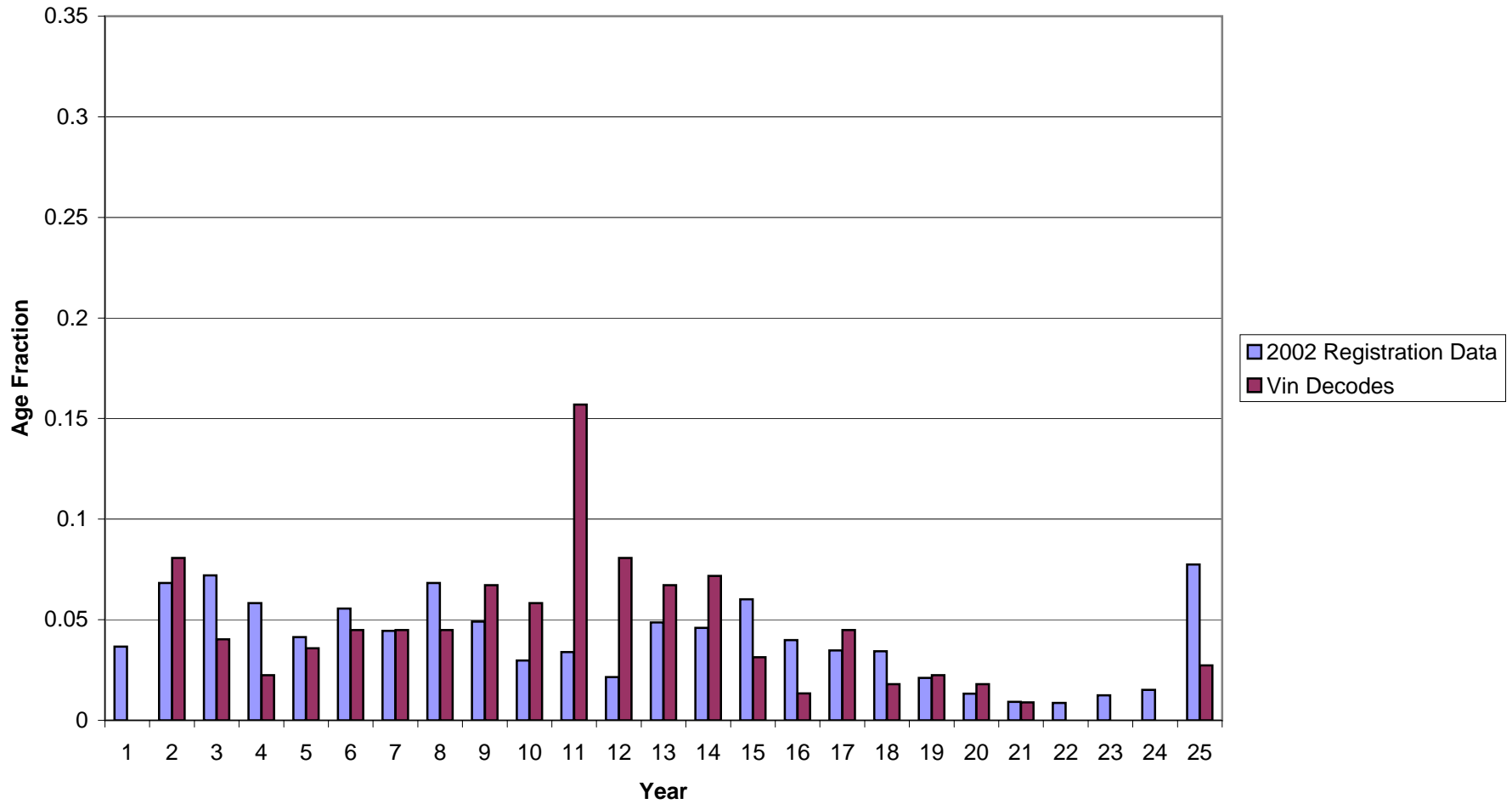
# ATTACHMENT 4B

**2005 Age Fractions**  
**Jurisdiction = CLVT**  
**Vehicle Type = LDT4**  
**Number of Decoded Vins = 1,973**



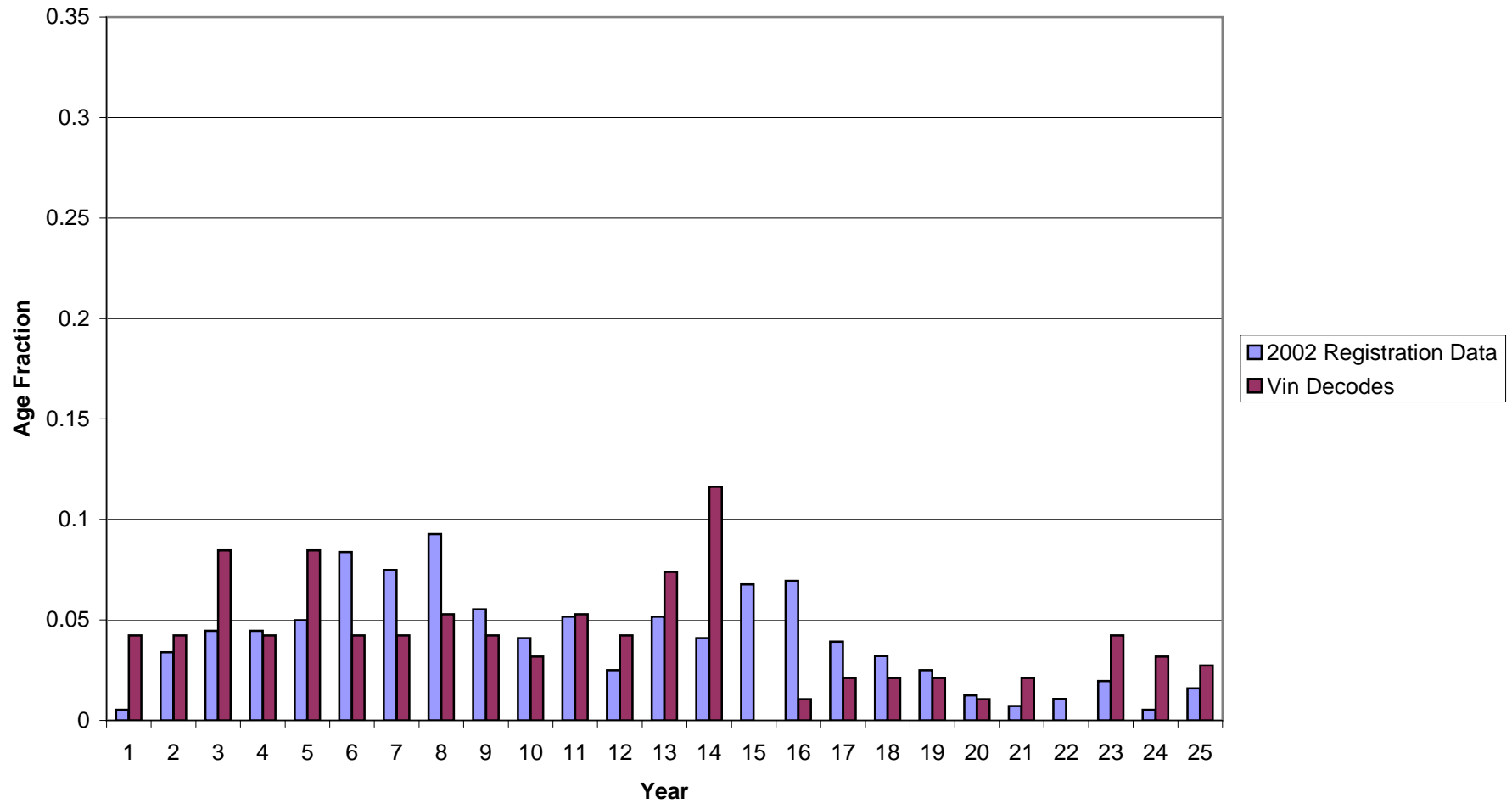
# ATTACHMENT 4B

2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = HDBS  
Number of Decoded Vins = 217



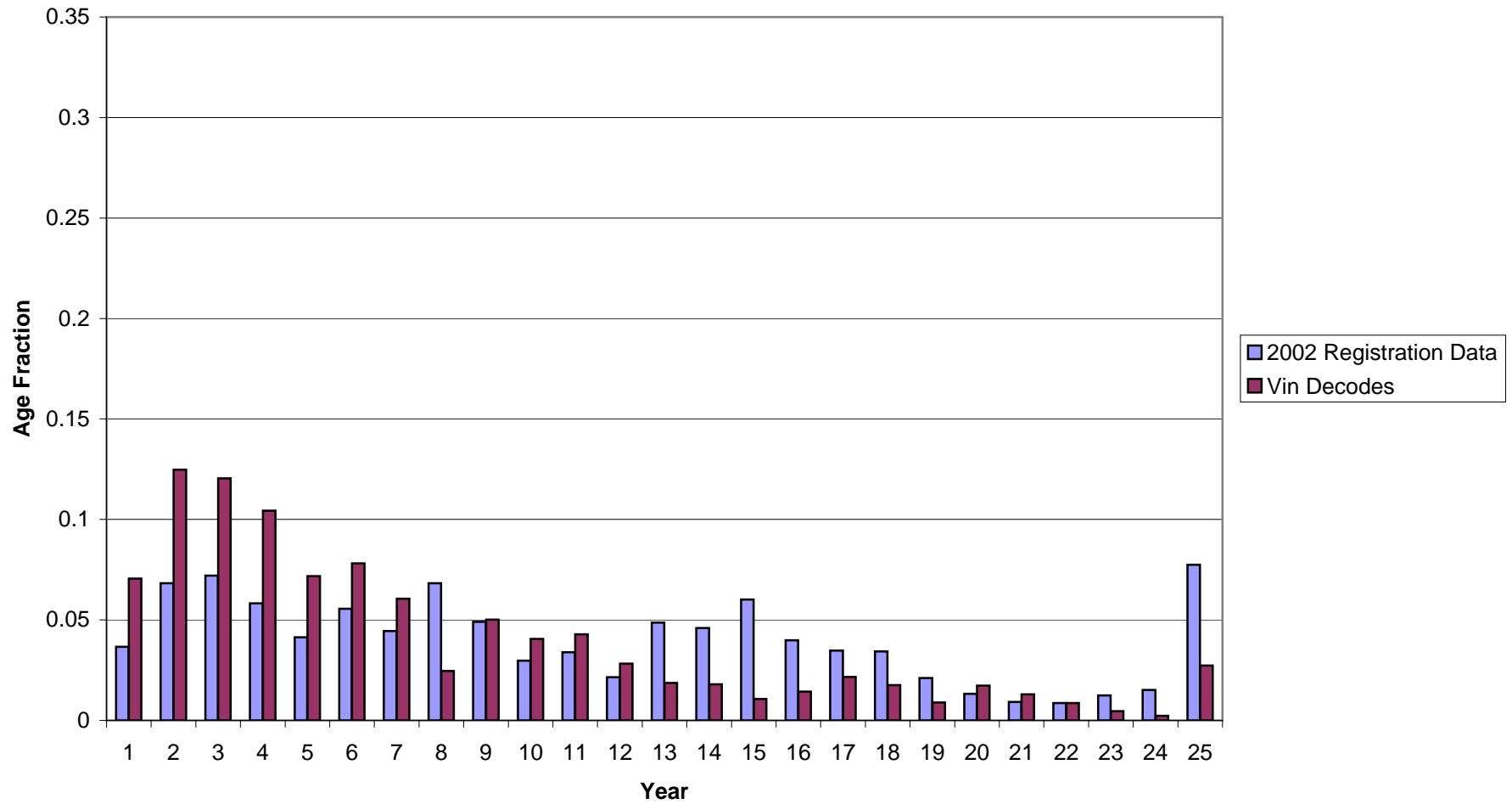
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2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = HDBT  
Number of Decoded Vins = 92



# ATTACHMENT 4B

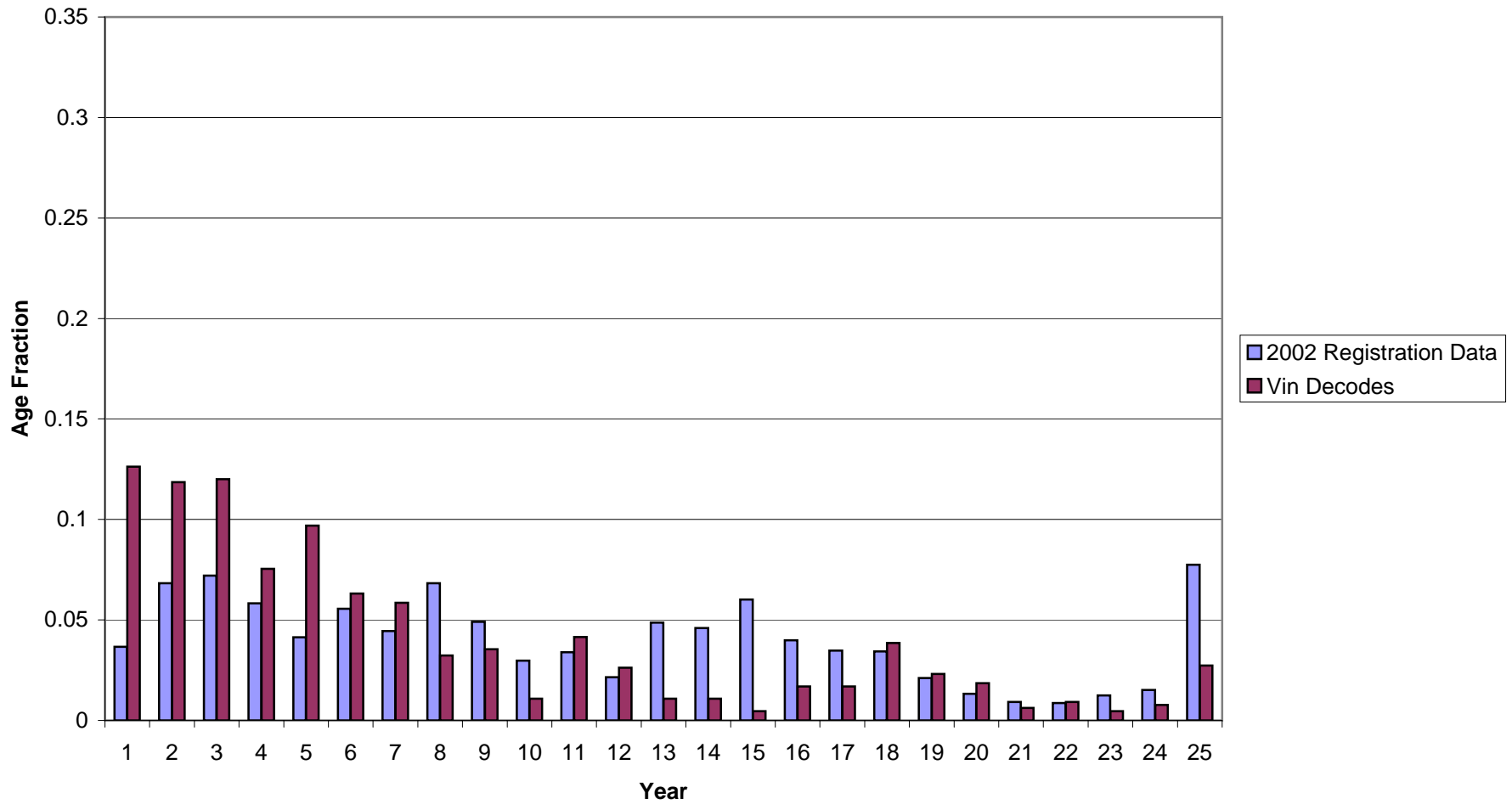
2005 Age Fractions  
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Vehicle Type = HDV2B  
Number of Decoded Vins = 2,925





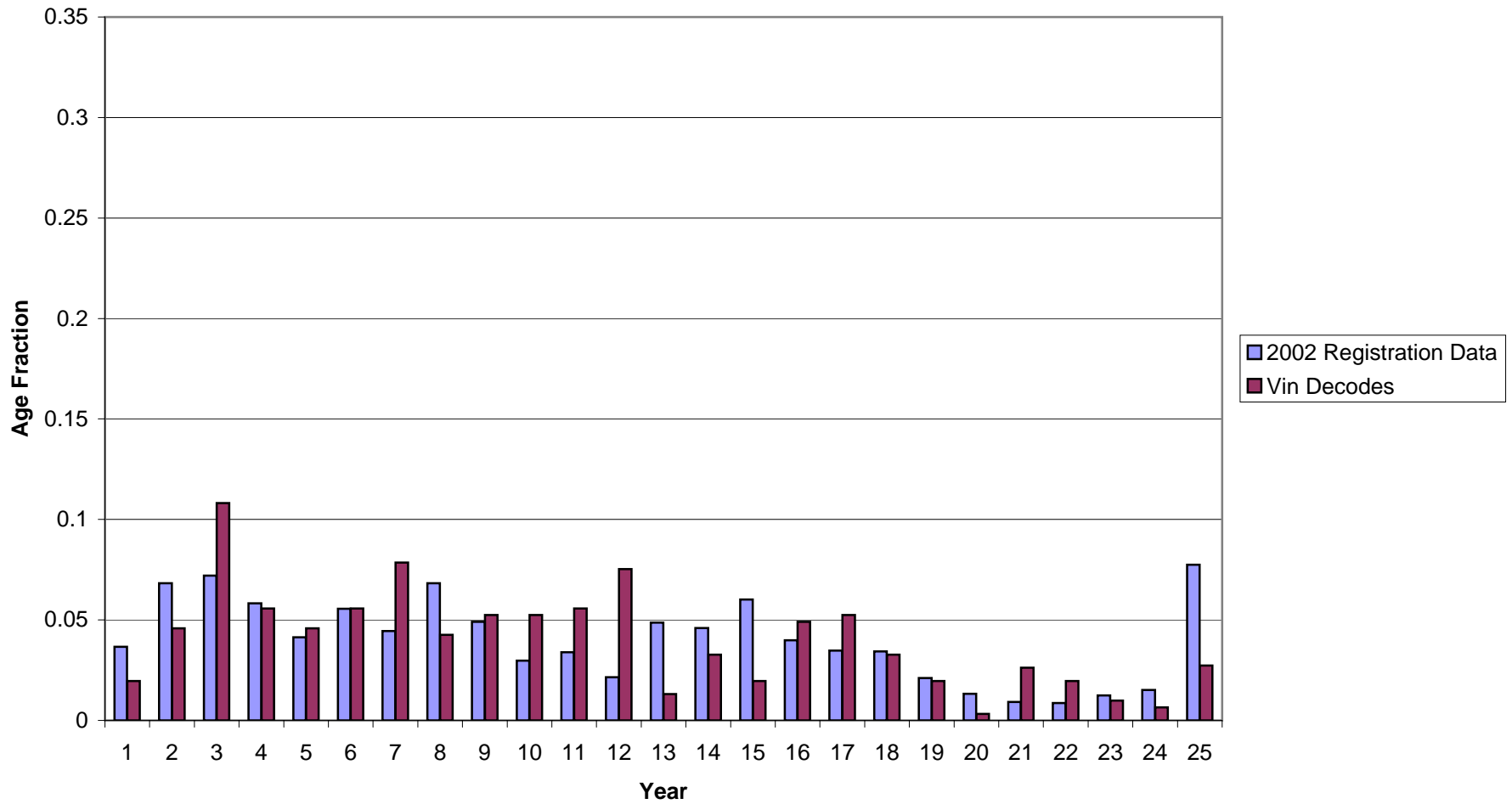
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2005 Age Fractions  
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Vehicle Type = HDV3  
Number of Decoded Vins = 632

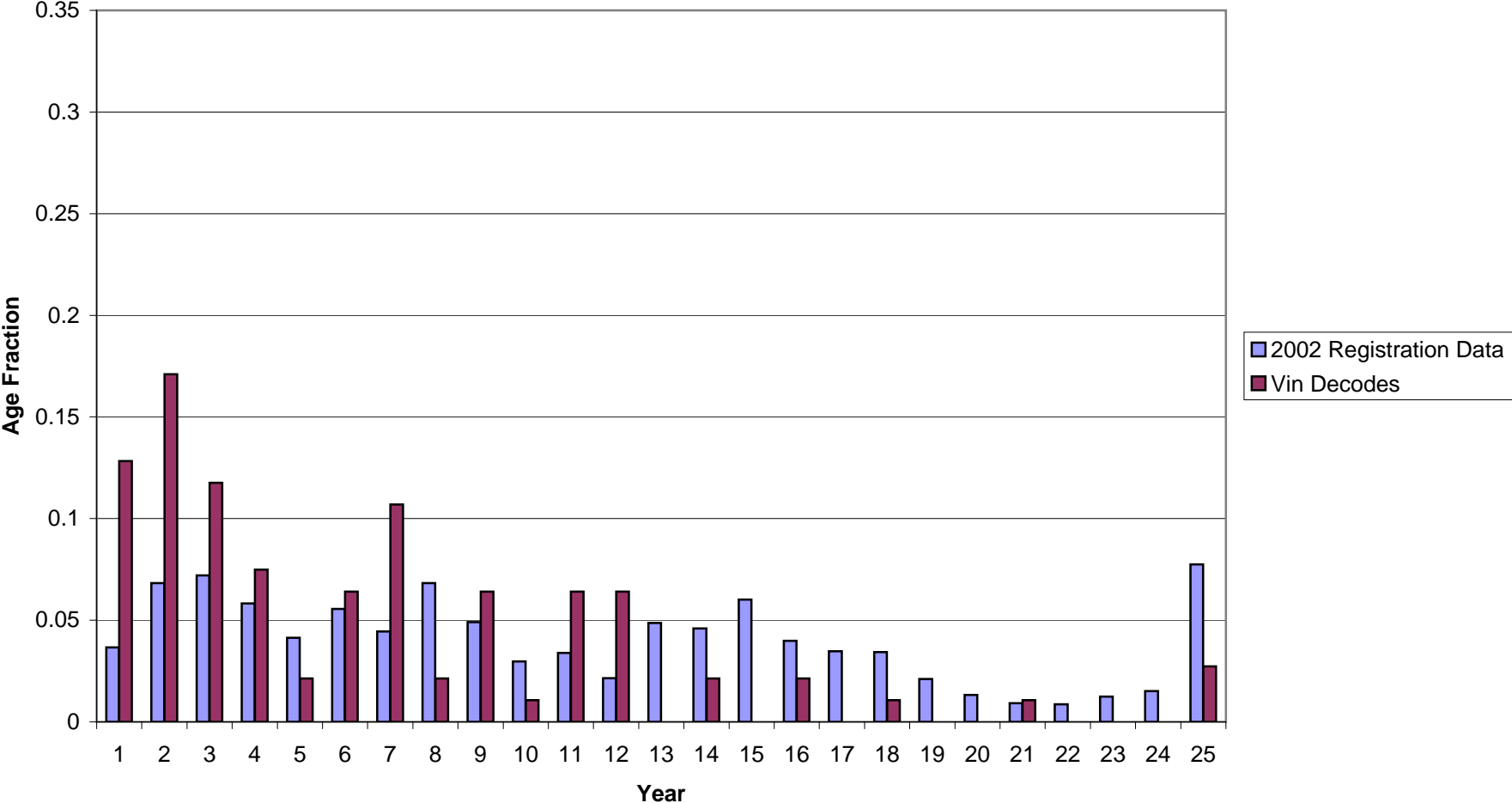


# ATTACHMENT 4B

2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = HDV4  
Number of Decoded Vins = 297

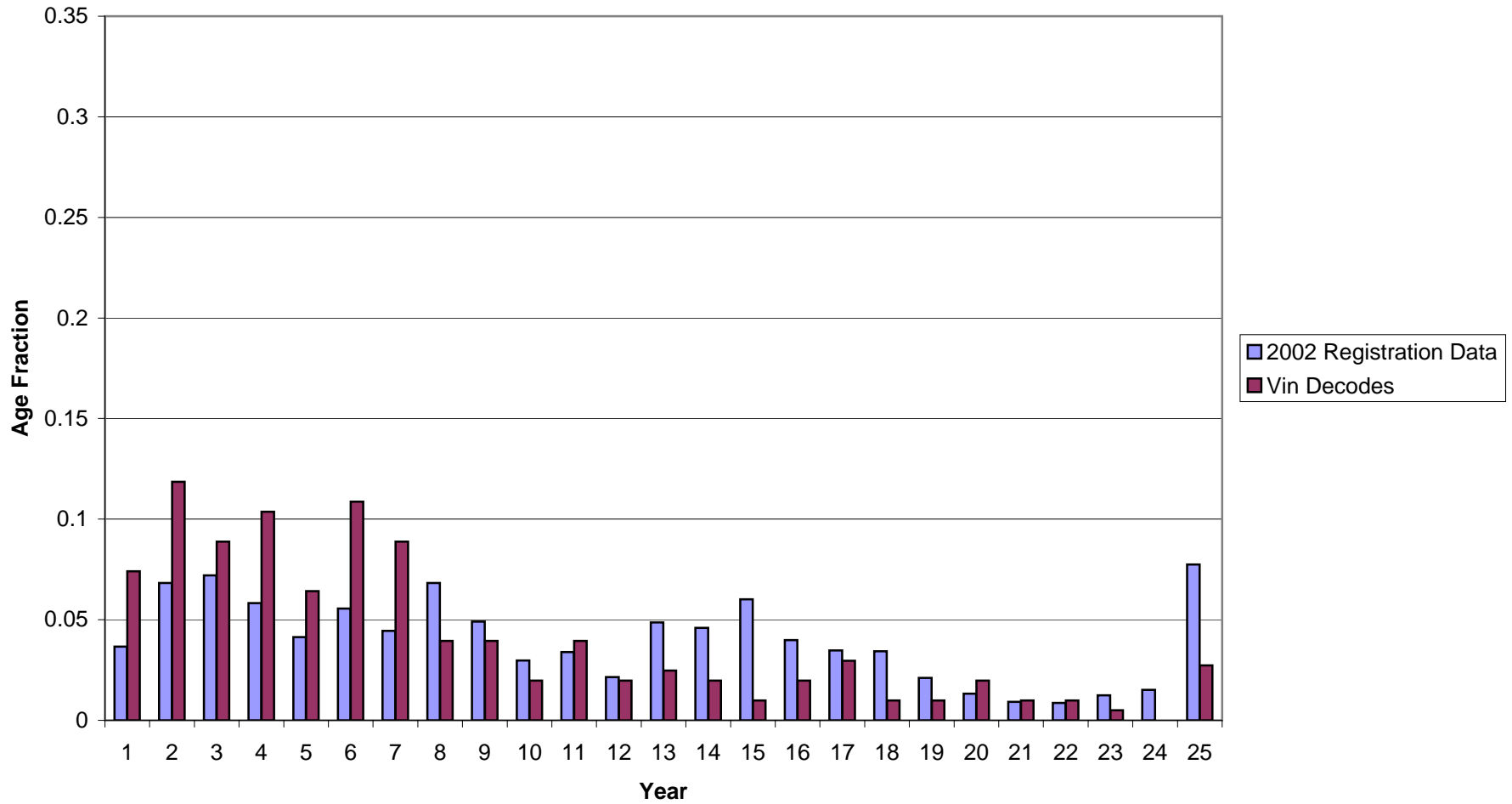


2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = HDV5  
Number of Decoded Vins = 91



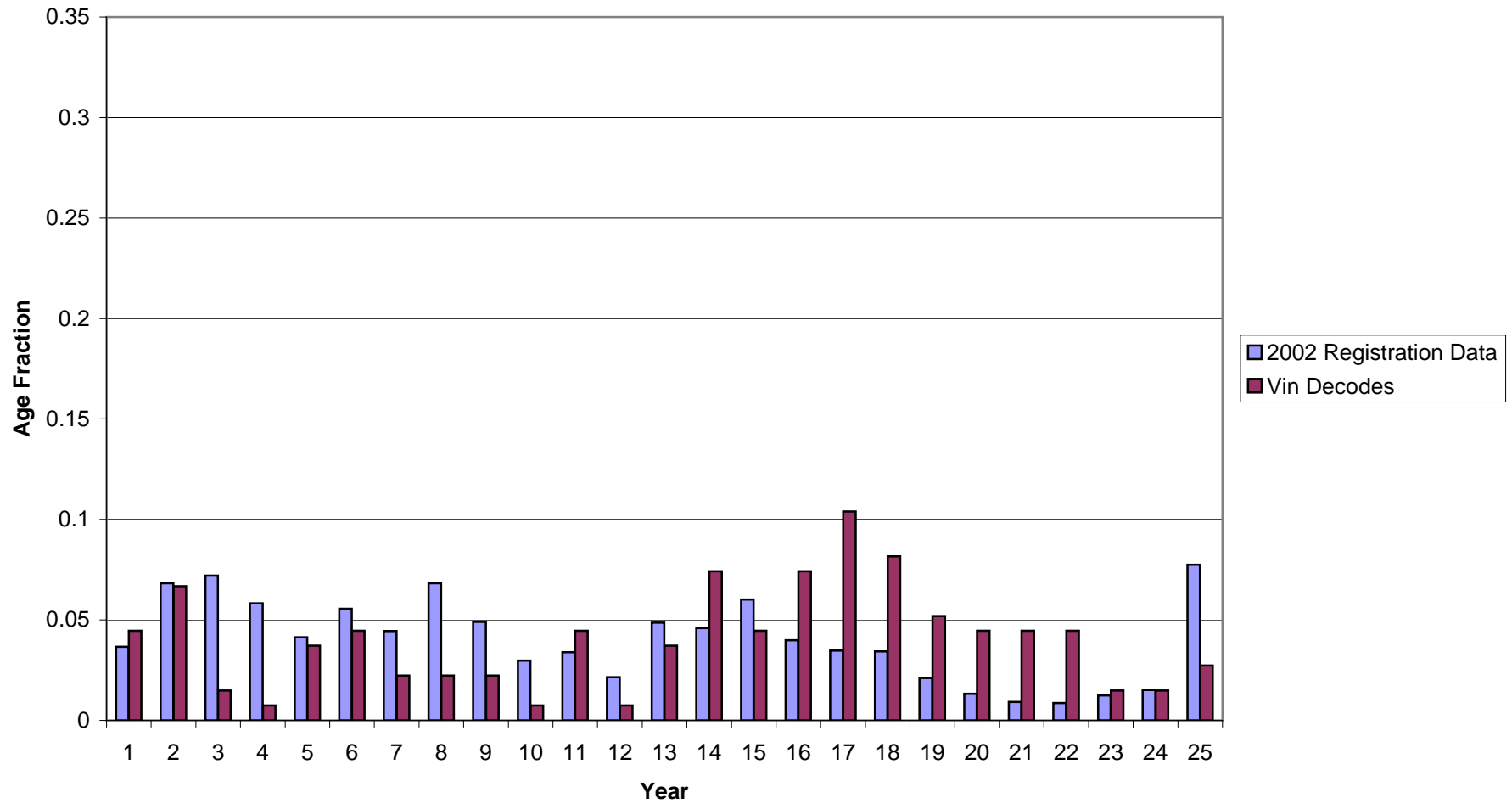
# ATTACHMENT 4B

2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = HDV6  
Number of Decoded Vins = 197



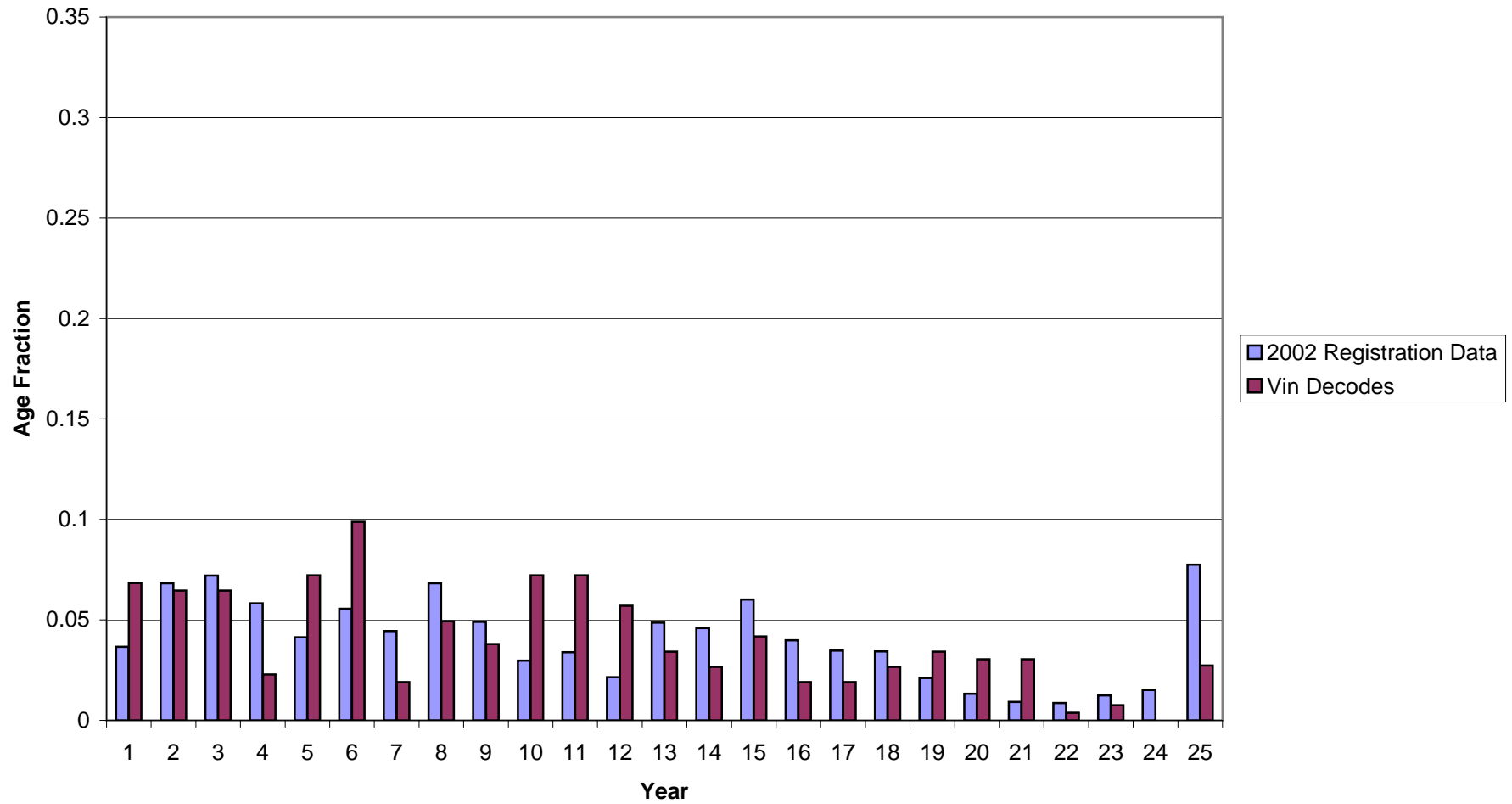
# ATTACHMENT 4B

**2005 Age Fractions**  
**Jurisdiction = CLVT**  
**Vehicle Type = HDV7**  
**Number of Decoded Vins = 131**



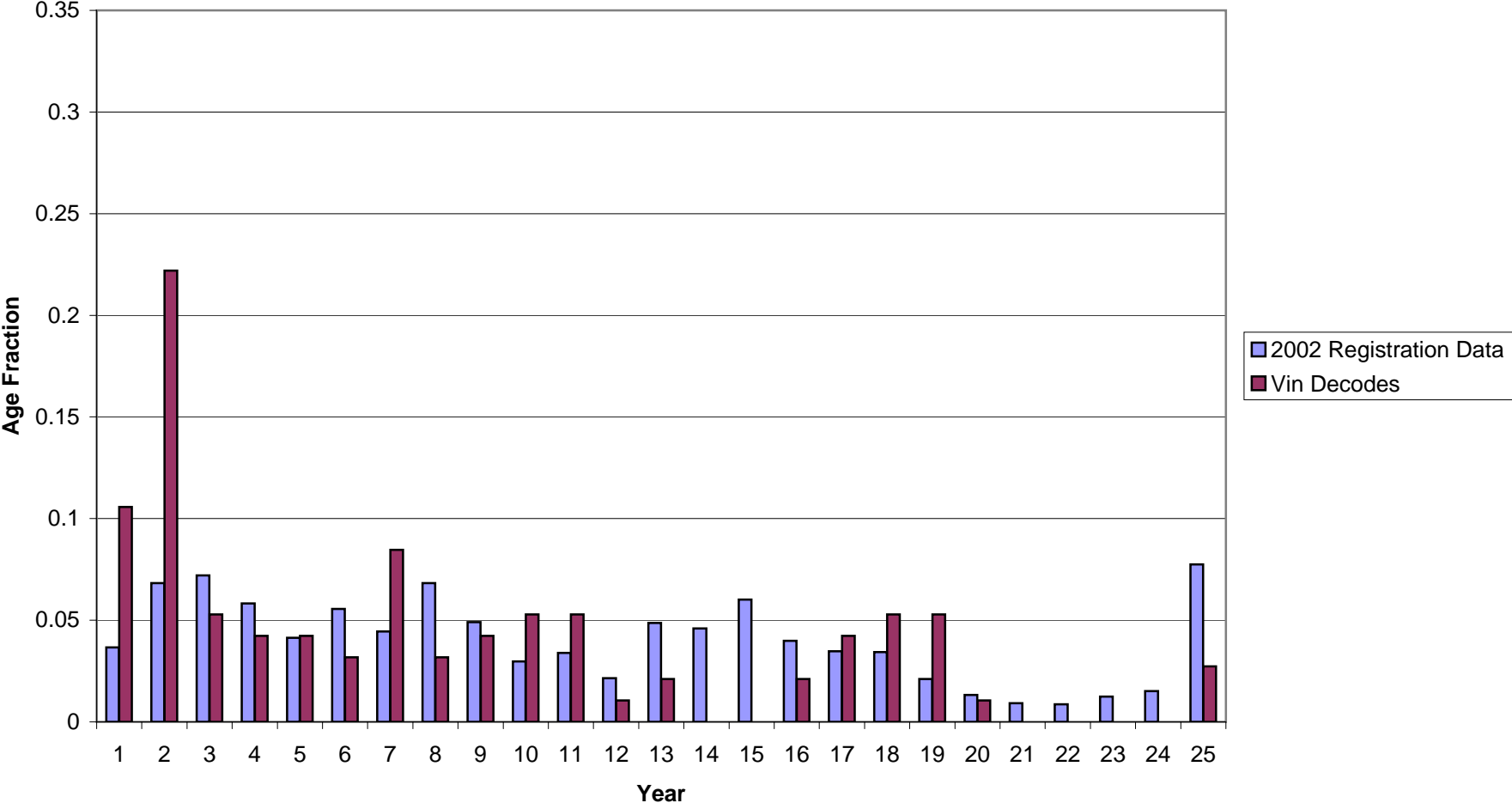
# ATTACHMENT 4B

2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = HDV8A  
Number of Decoded Vins = 256

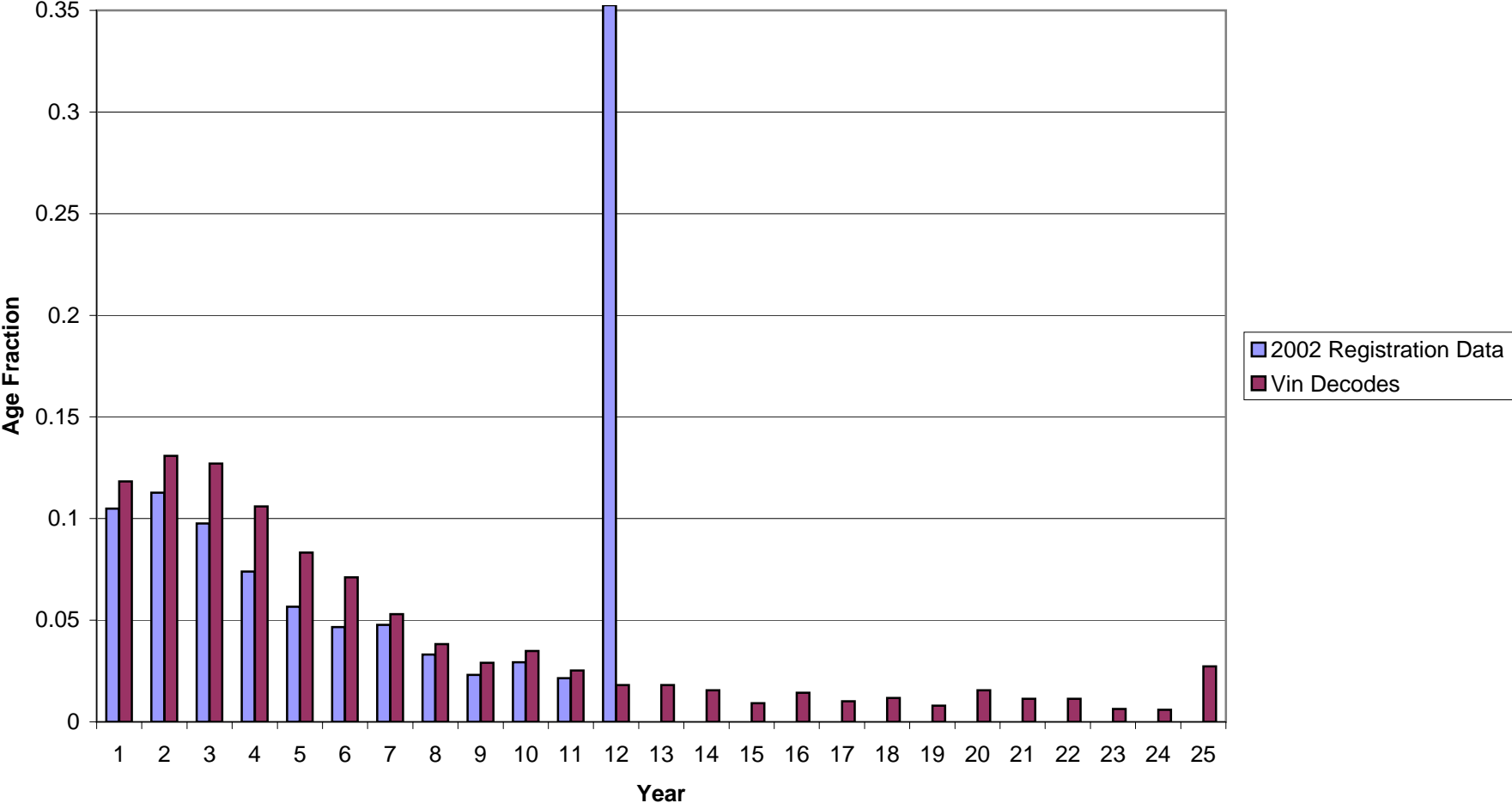


# ATTACHMENT 4B

2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = HDV8B  
Number of Decoded Vins = 92



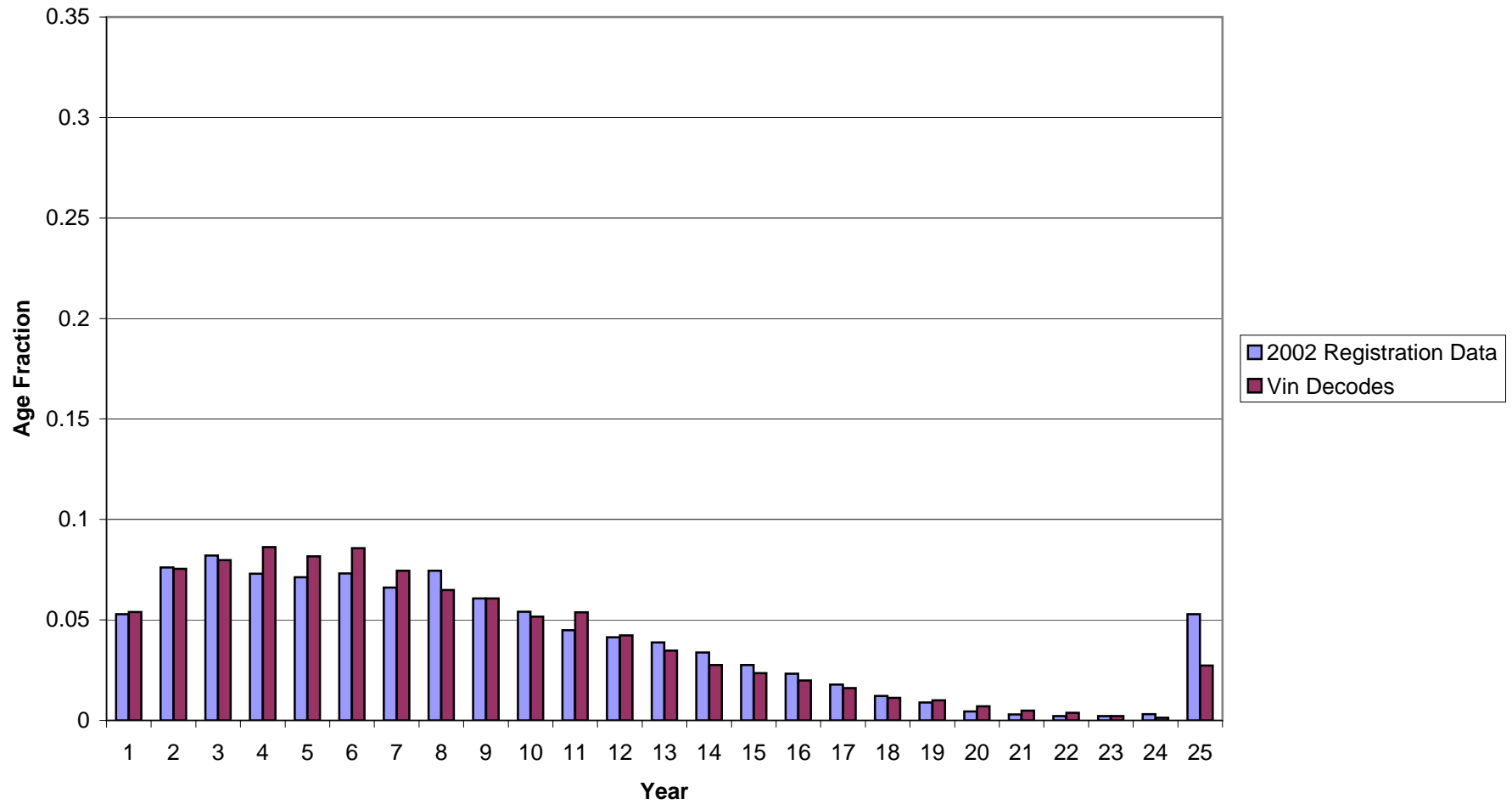
2005 Age Fractions  
Jurisdiction = CLVT  
Vehicle Type = MC  
Number of Decoded Vins = 2,312





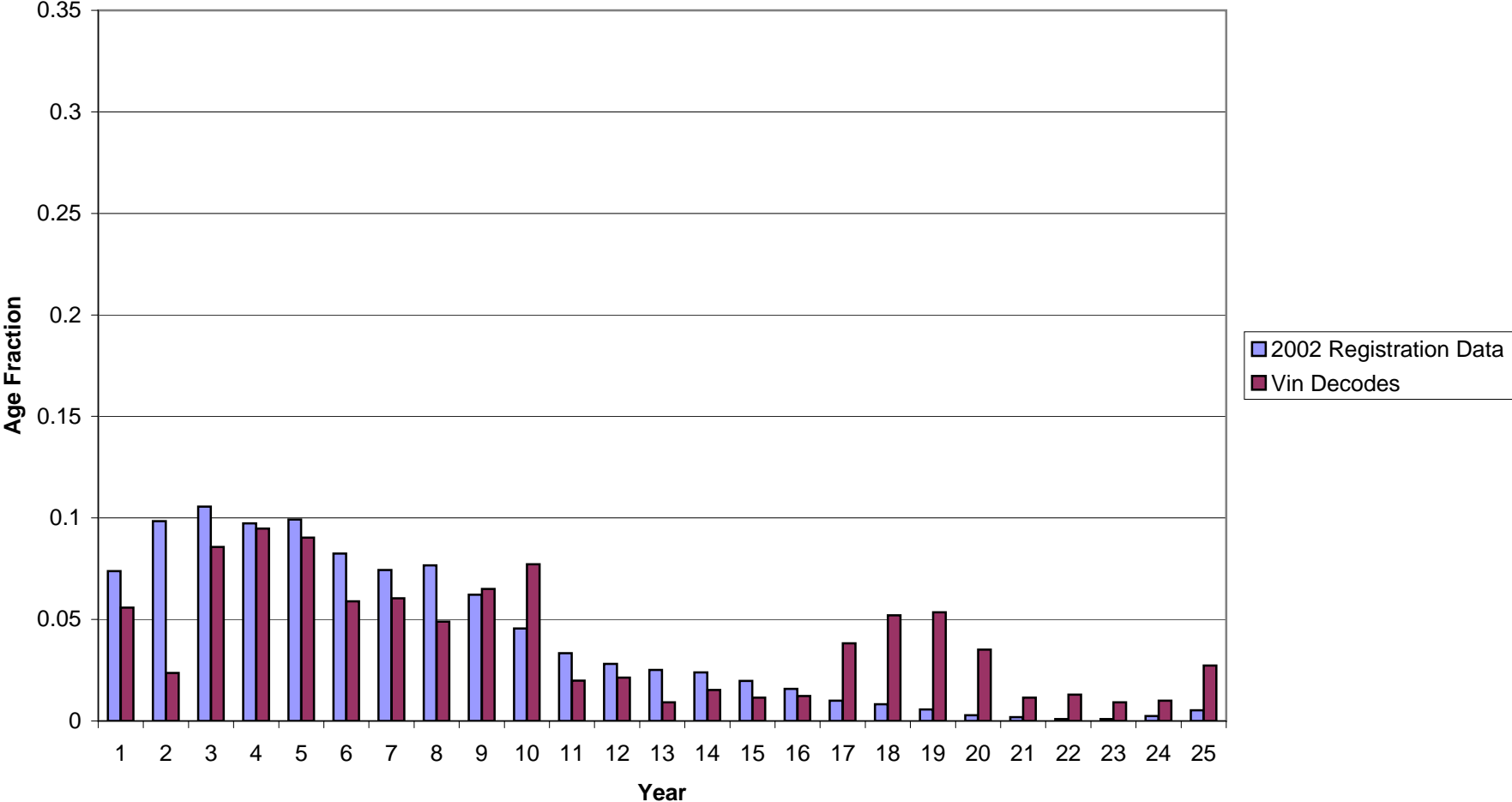
# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = LDV**  
**Number of Decoded Vins = 84,402**



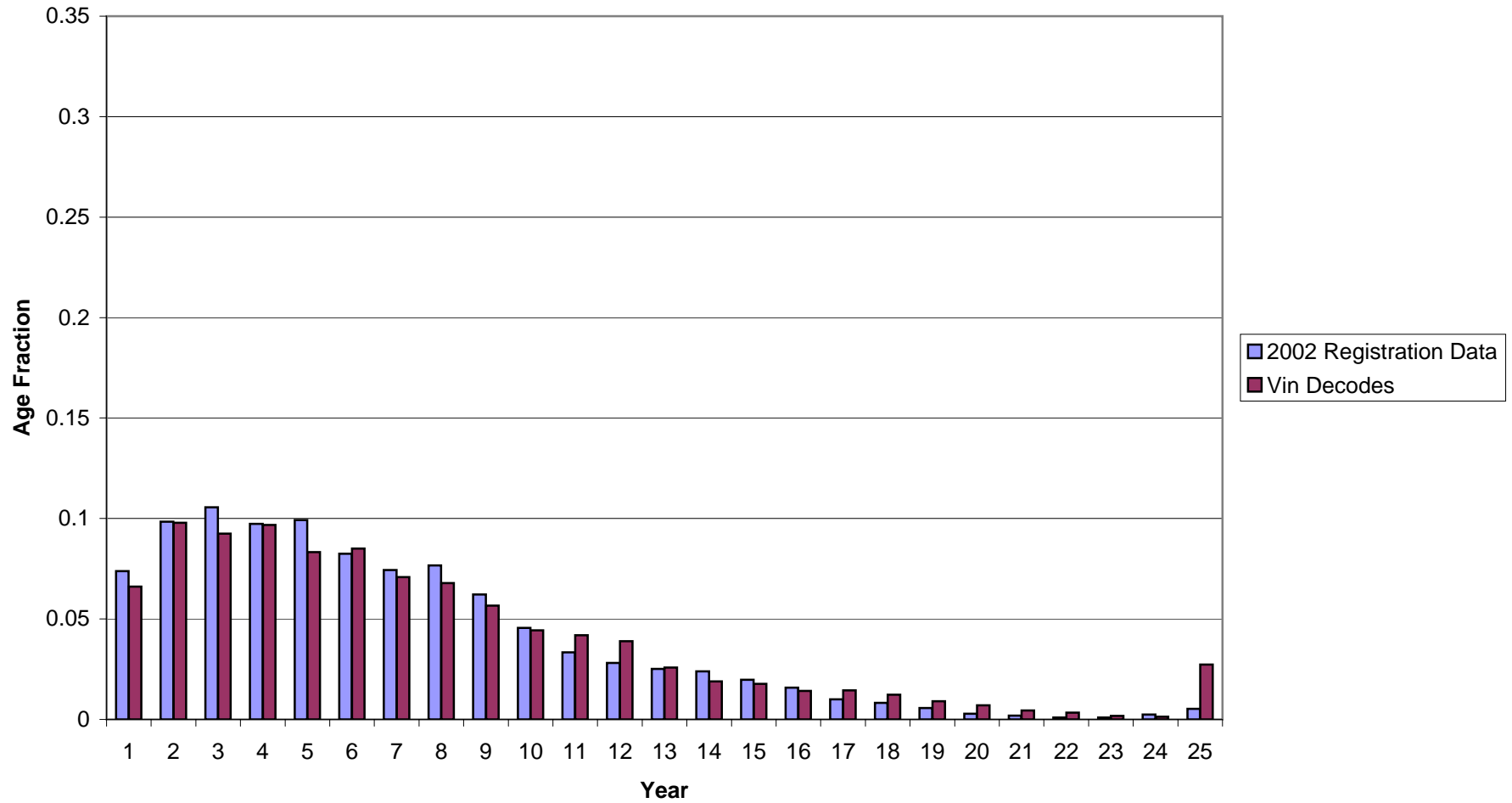
# ATTACHMENT 4C

2005 Age Fractions  
Jurisdiction = FRED  
Vehicle Type = LDT1  
Number of Decoded Vins = 1,272



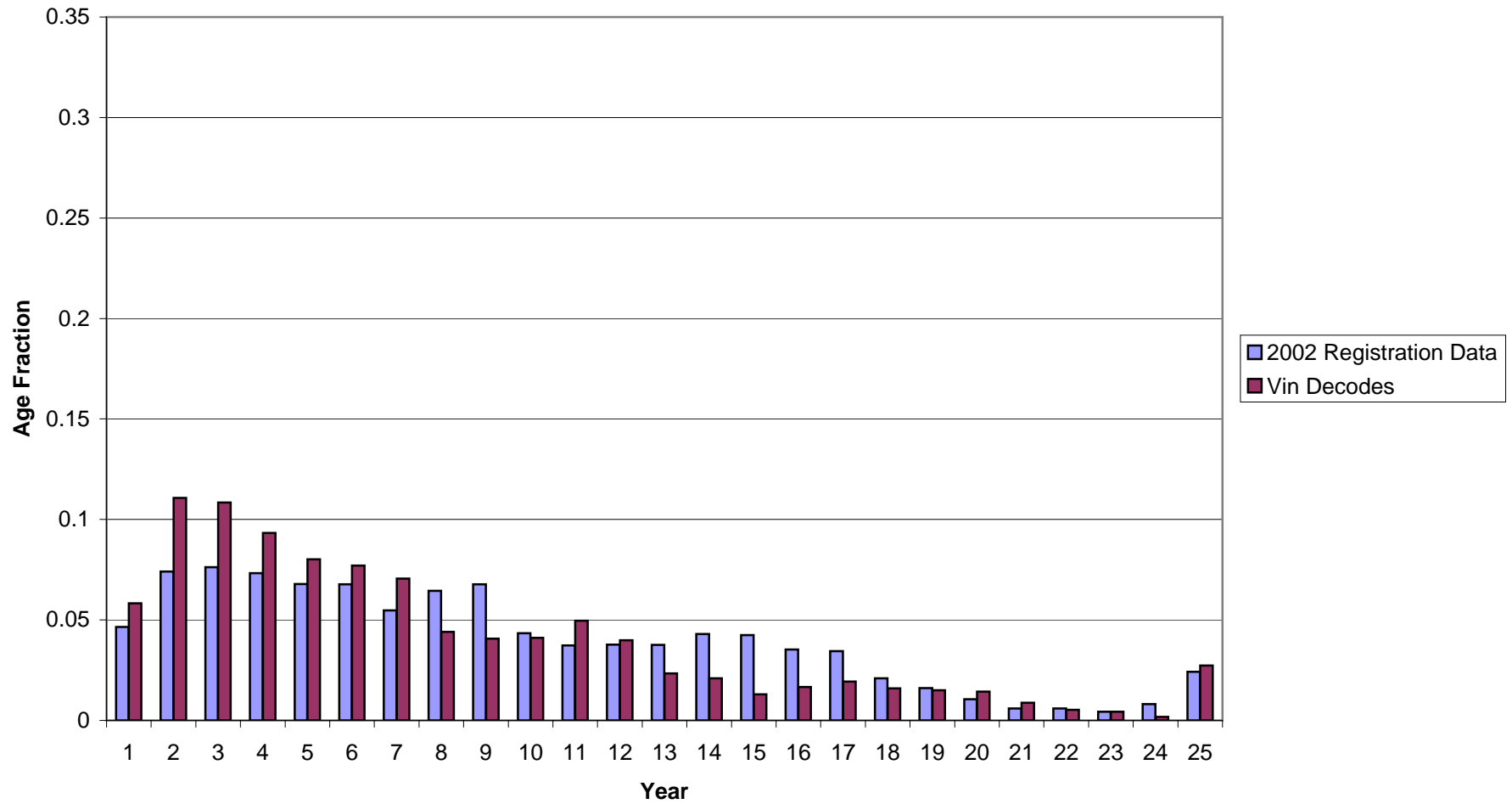
# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = LDT2**  
**Number of Decoded Vins = 51,915**



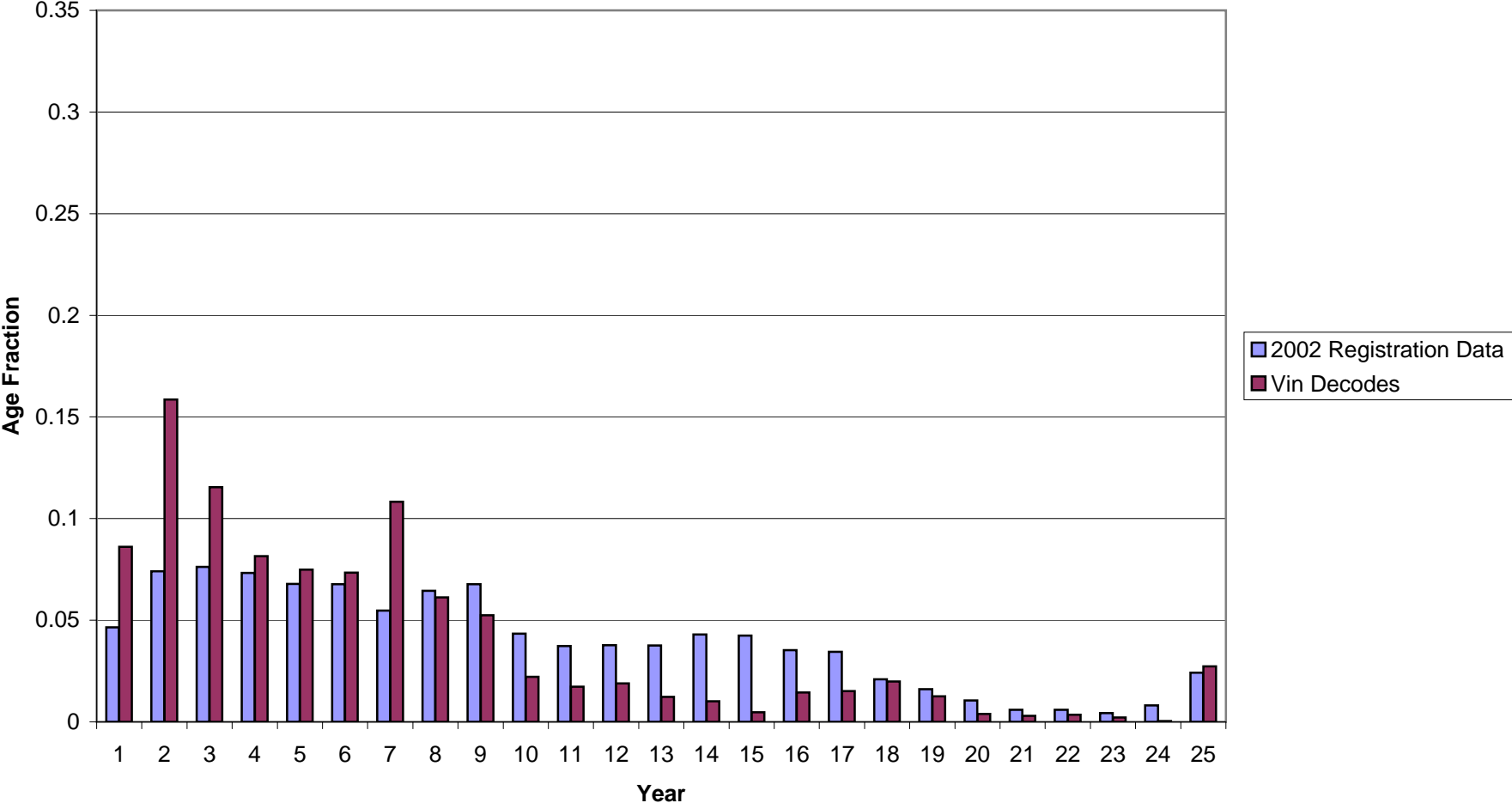
# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = LDT3**  
**Number of Decoded Vins = 16,839**



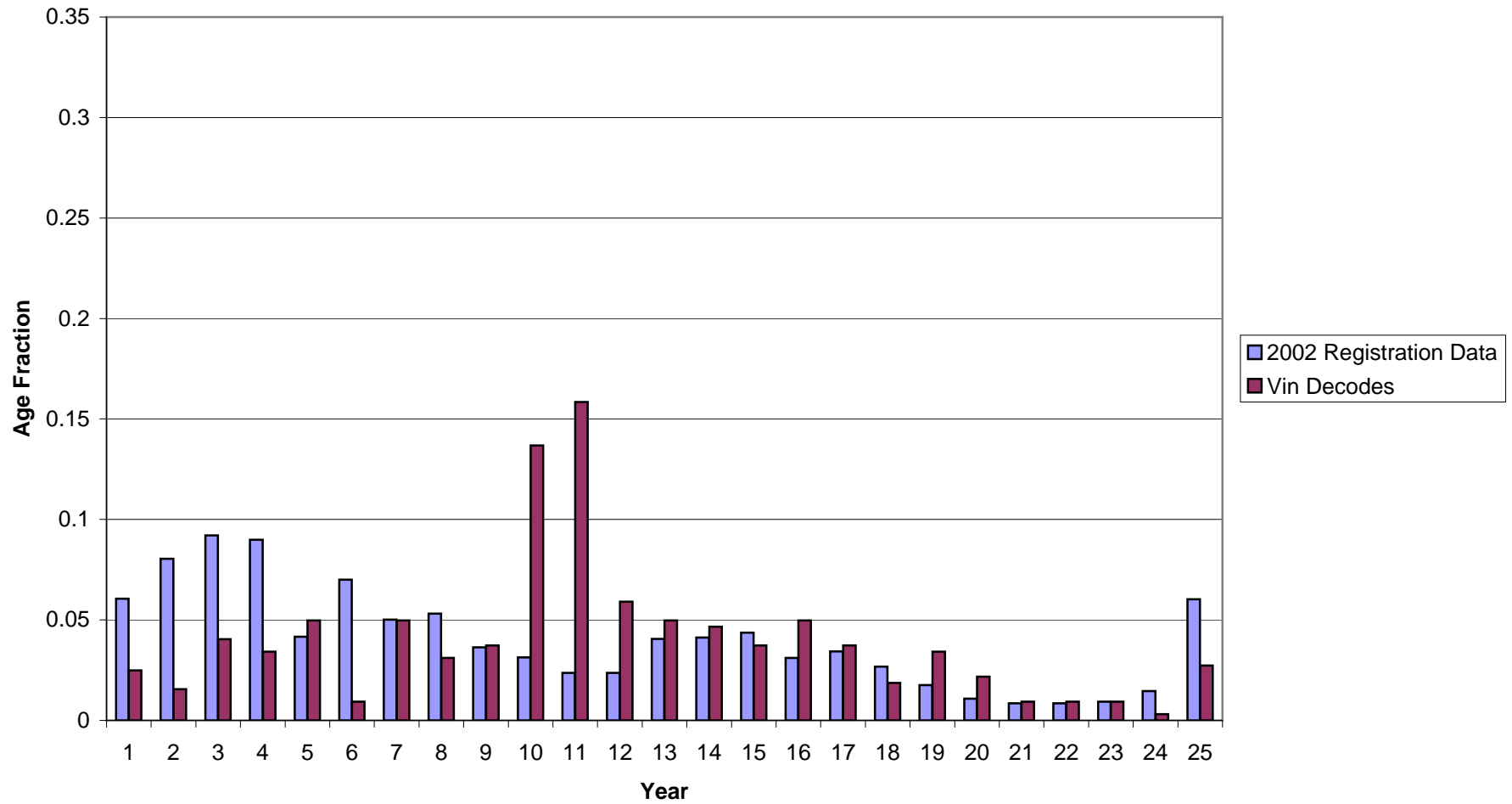
# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = LDT4**  
**Number of Decoded Vins = 4,507**



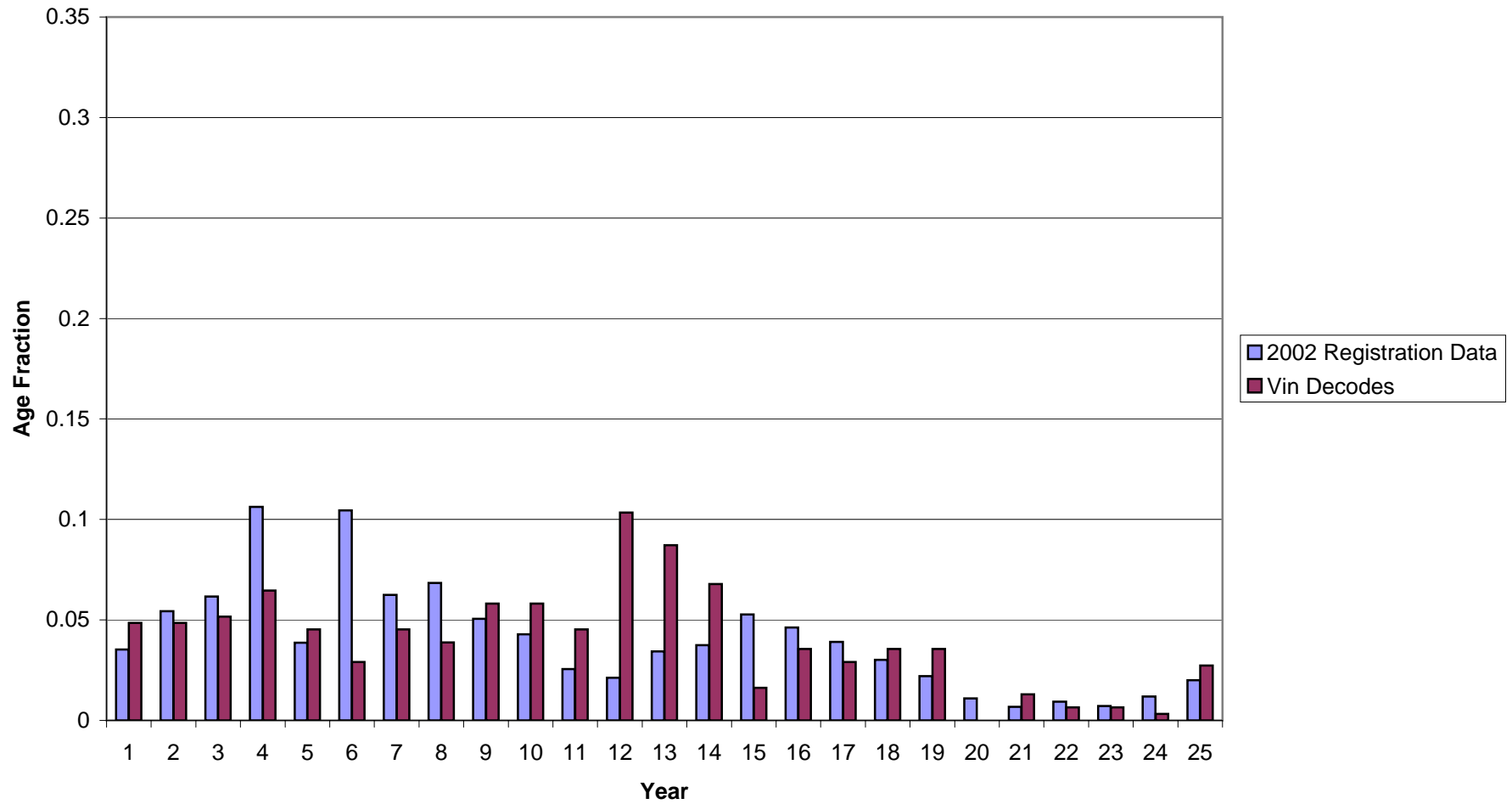
# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = HDBS**  
**Number of Decoded Vins = 313**

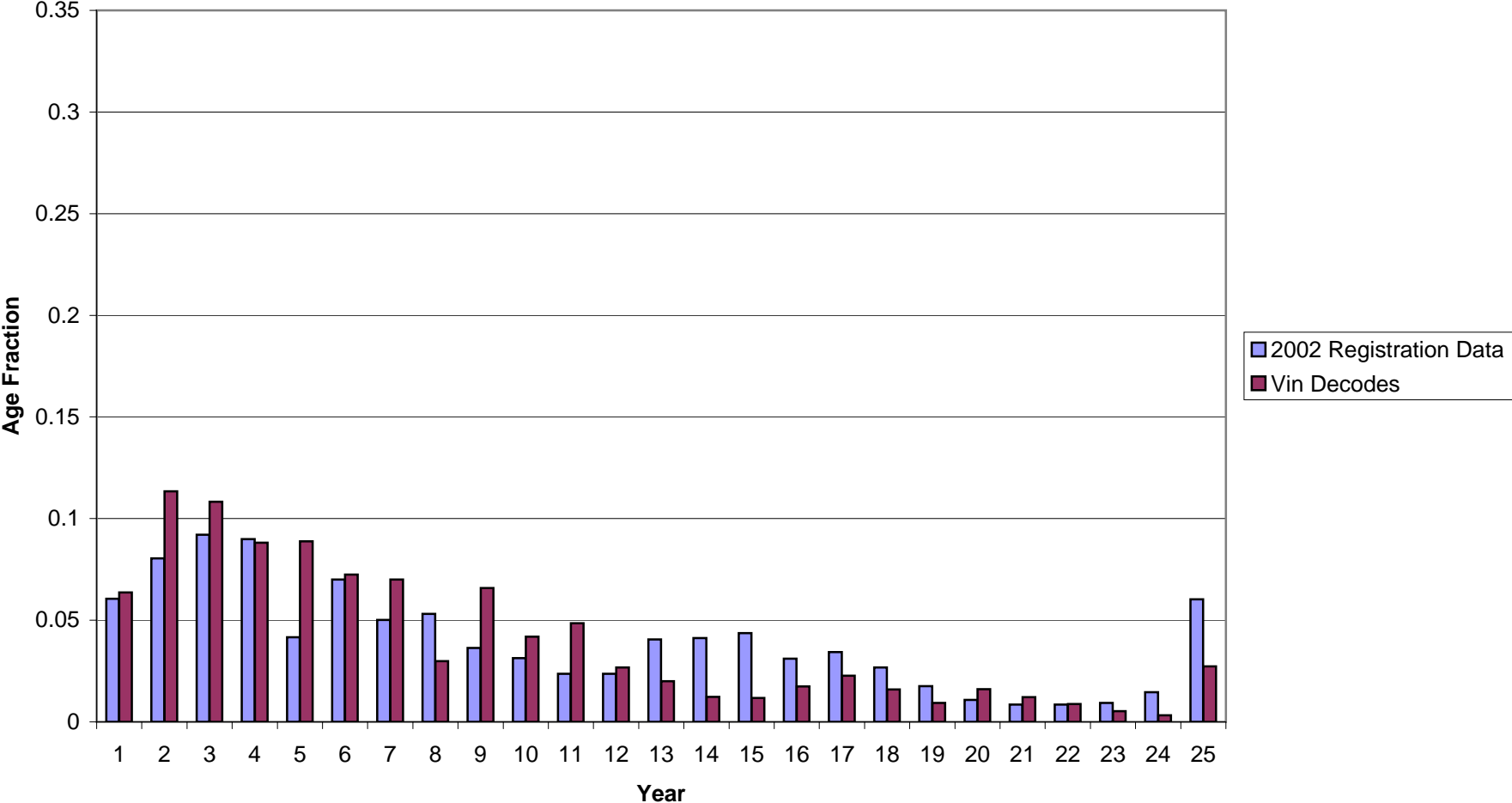


# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = HDBT**  
**Number of Decoded Vins = 301**

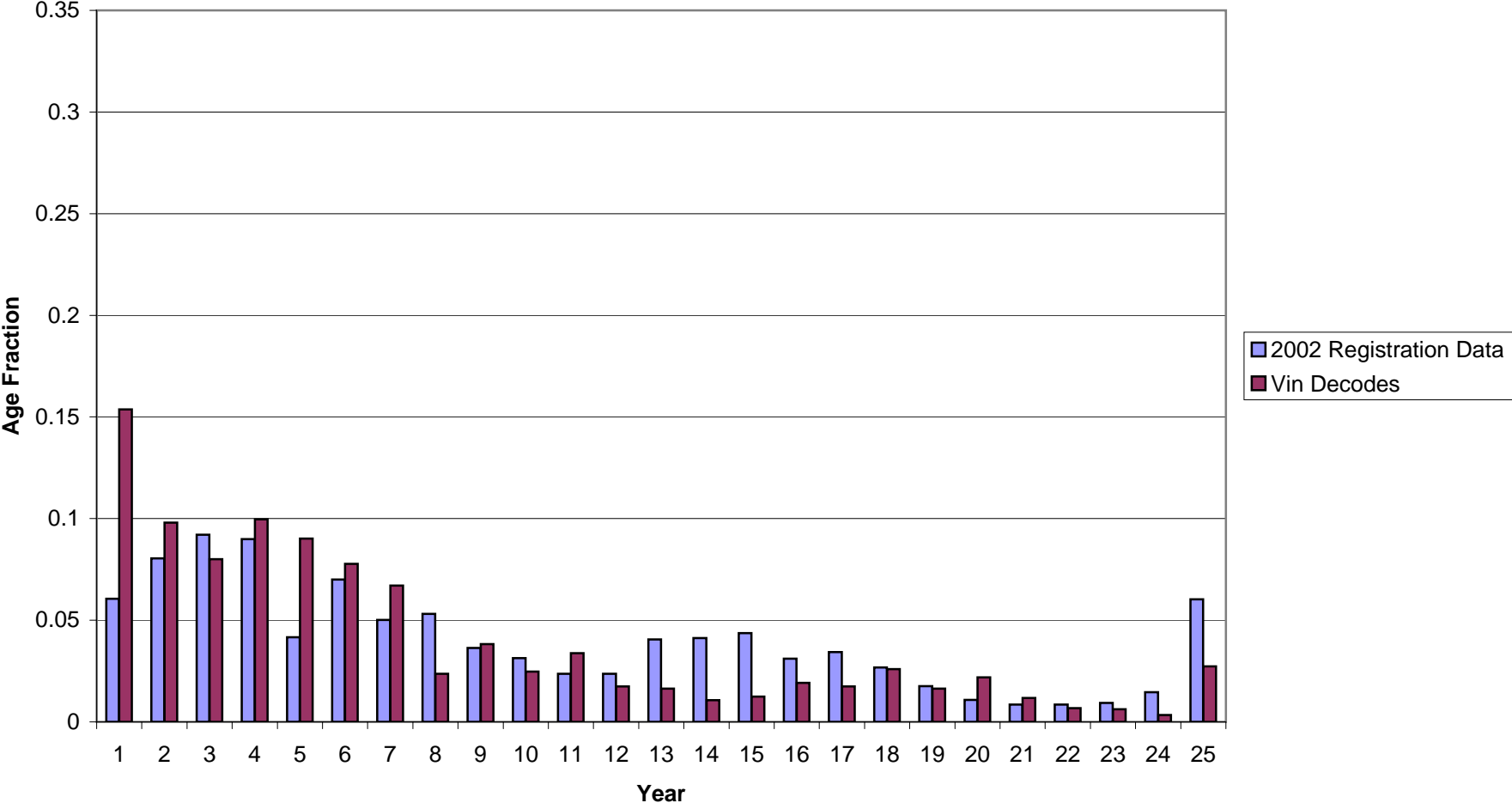


2005 Age Fractions  
Jurisdiction = FRED  
Vehicle Type = HDV2B  
Number of Decoded Vins = 8,570



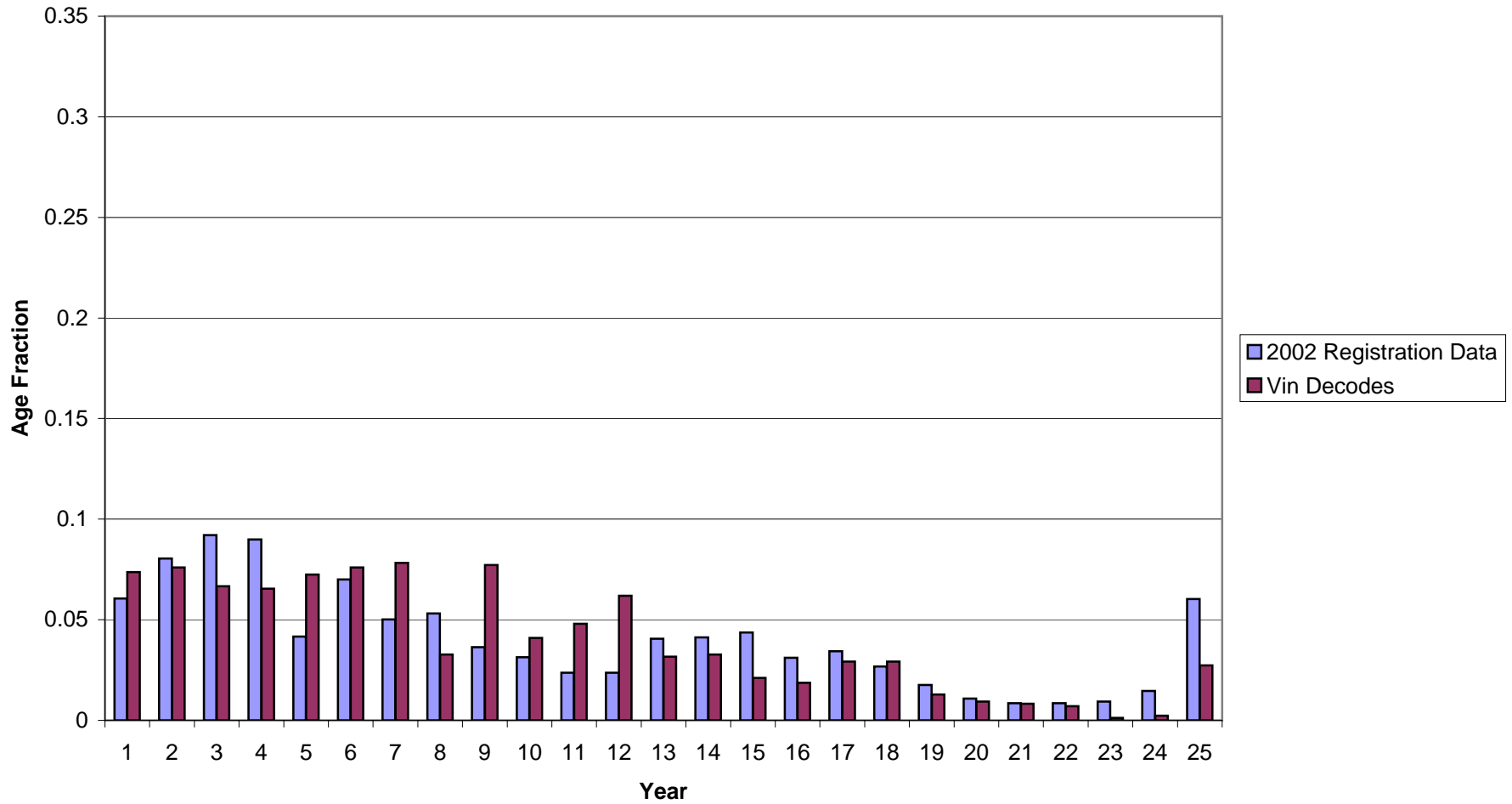


2005 Age Fractions  
Jurisdiction = FRED  
Vehicle Type = HDV3  
Number of Decoded Vins = 1,727



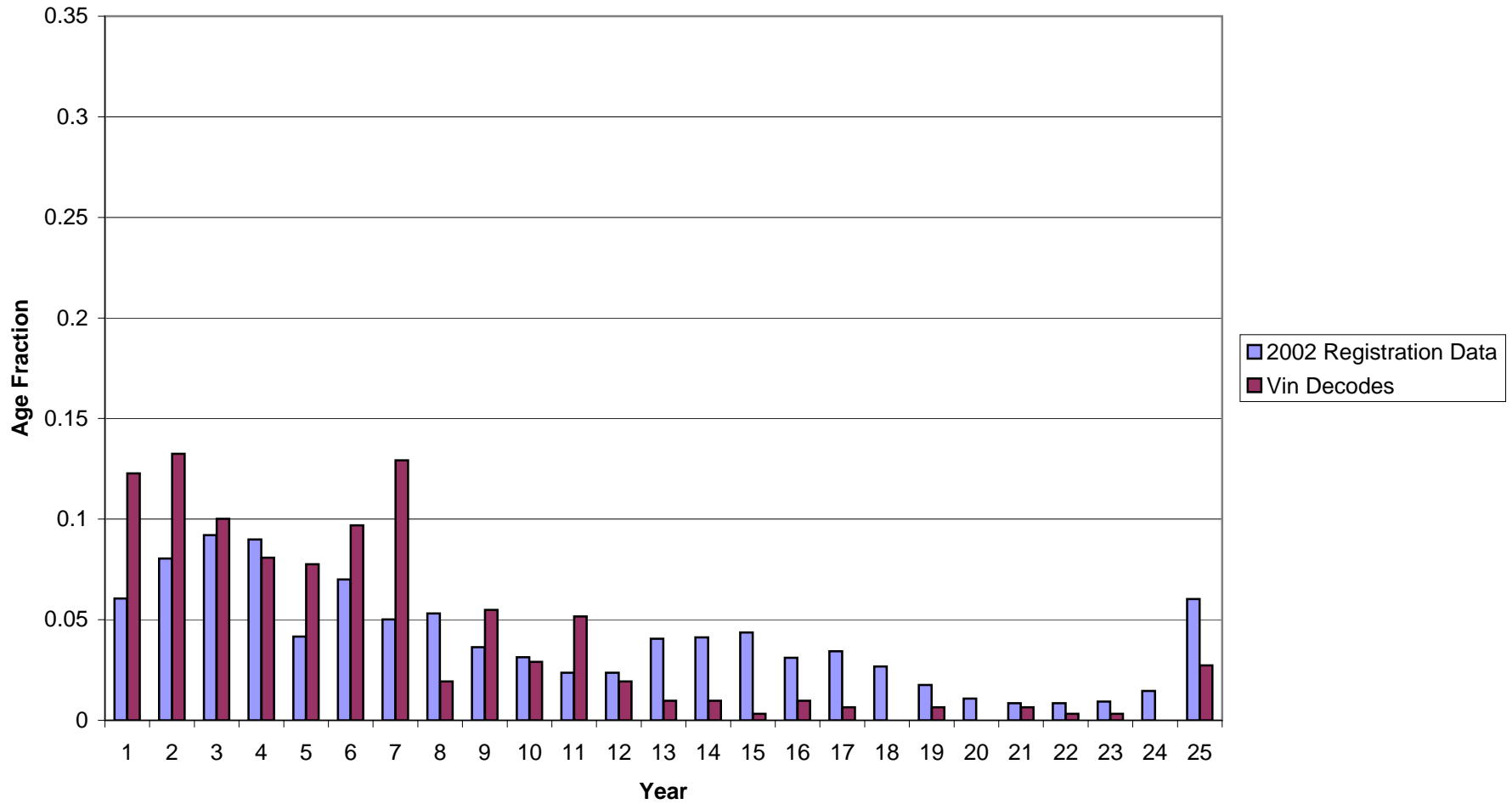
# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = HDV4**  
**Number of Decoded Vins = 832**

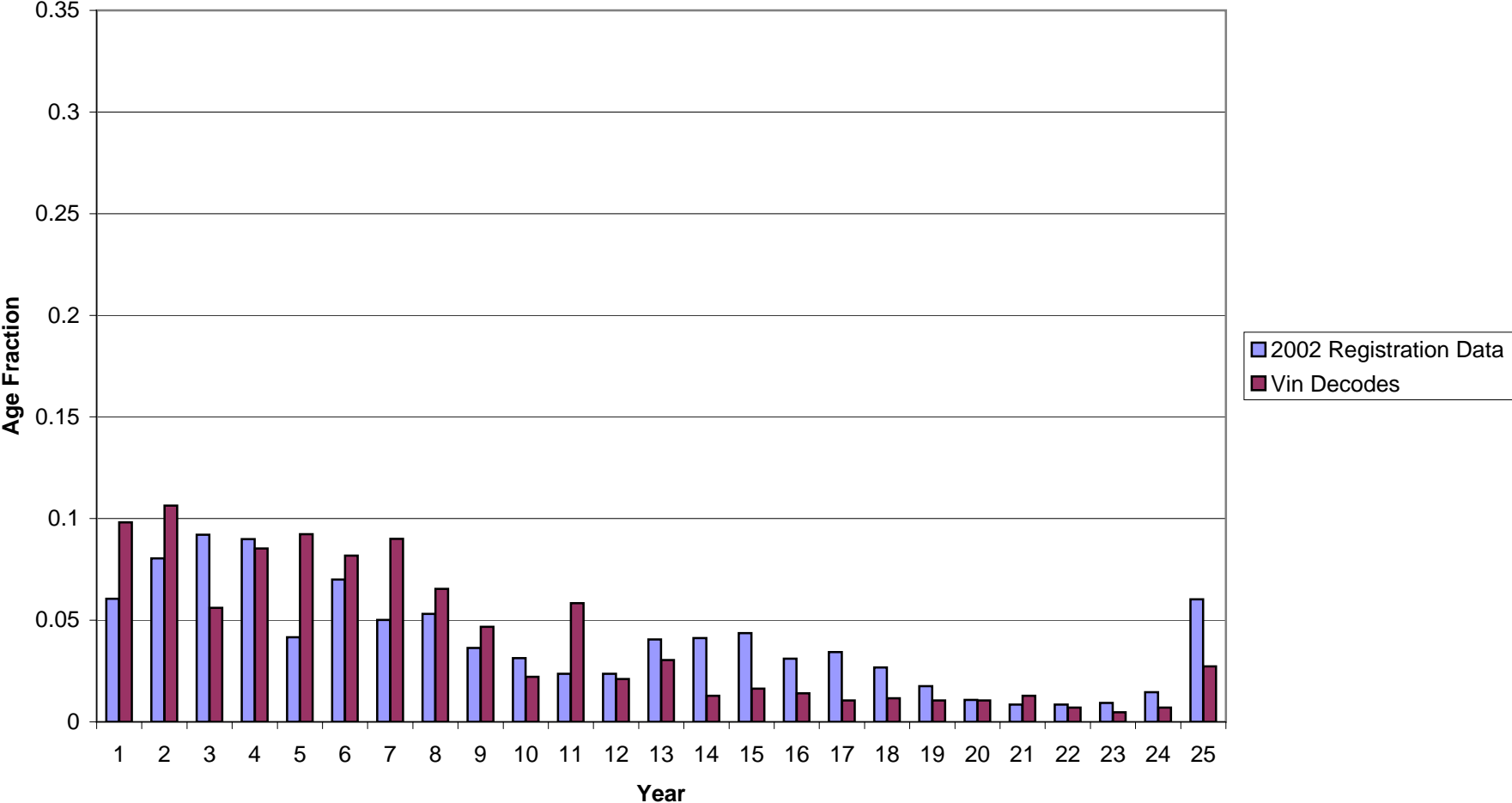


# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = HDV5**  
**Number of Decoded Vins = 301**

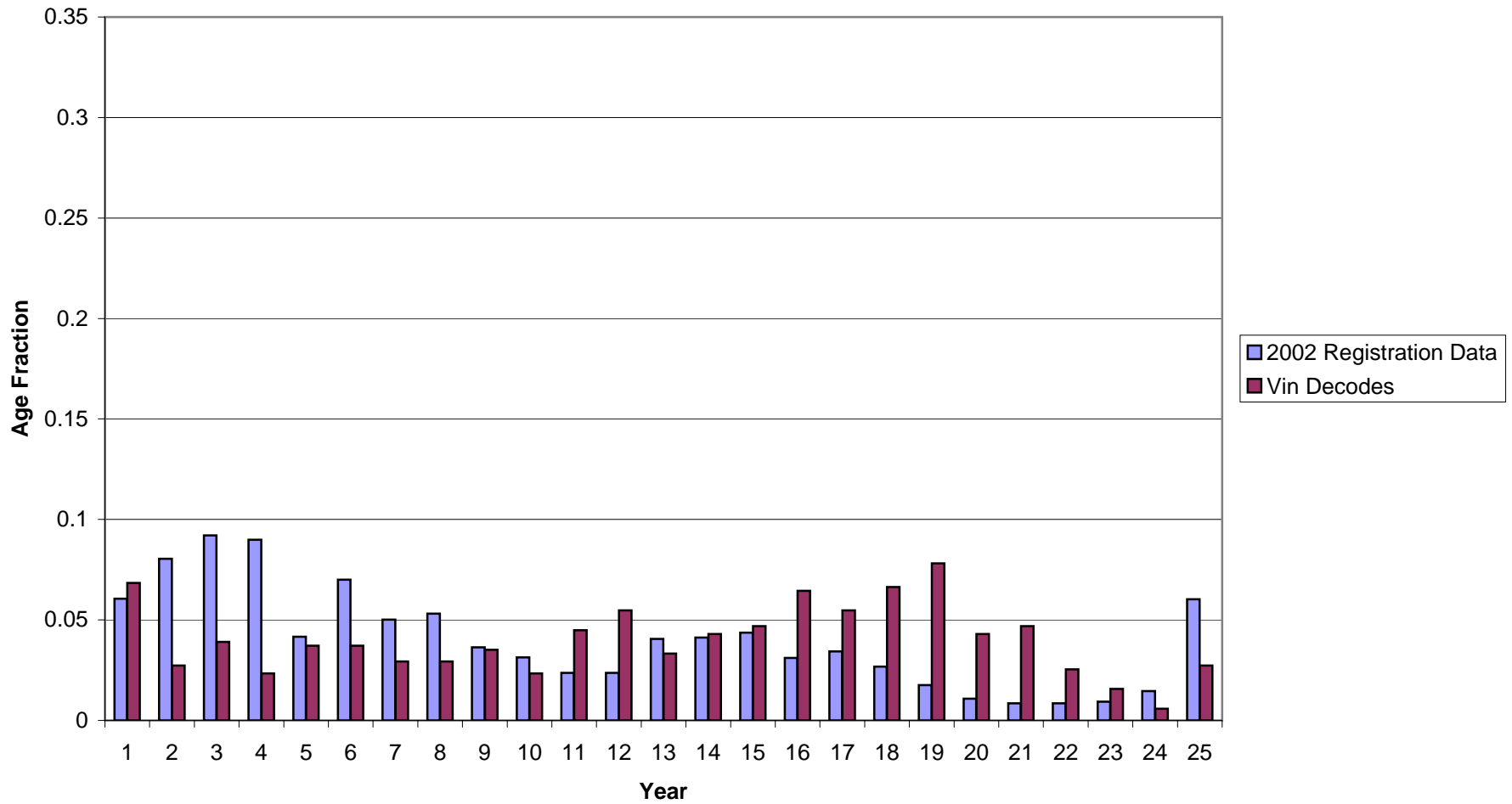


2005 Age Fractions  
Jurisdiction = FRED  
Vehicle Type = HDV6  
Number of Decoded Vins = 832



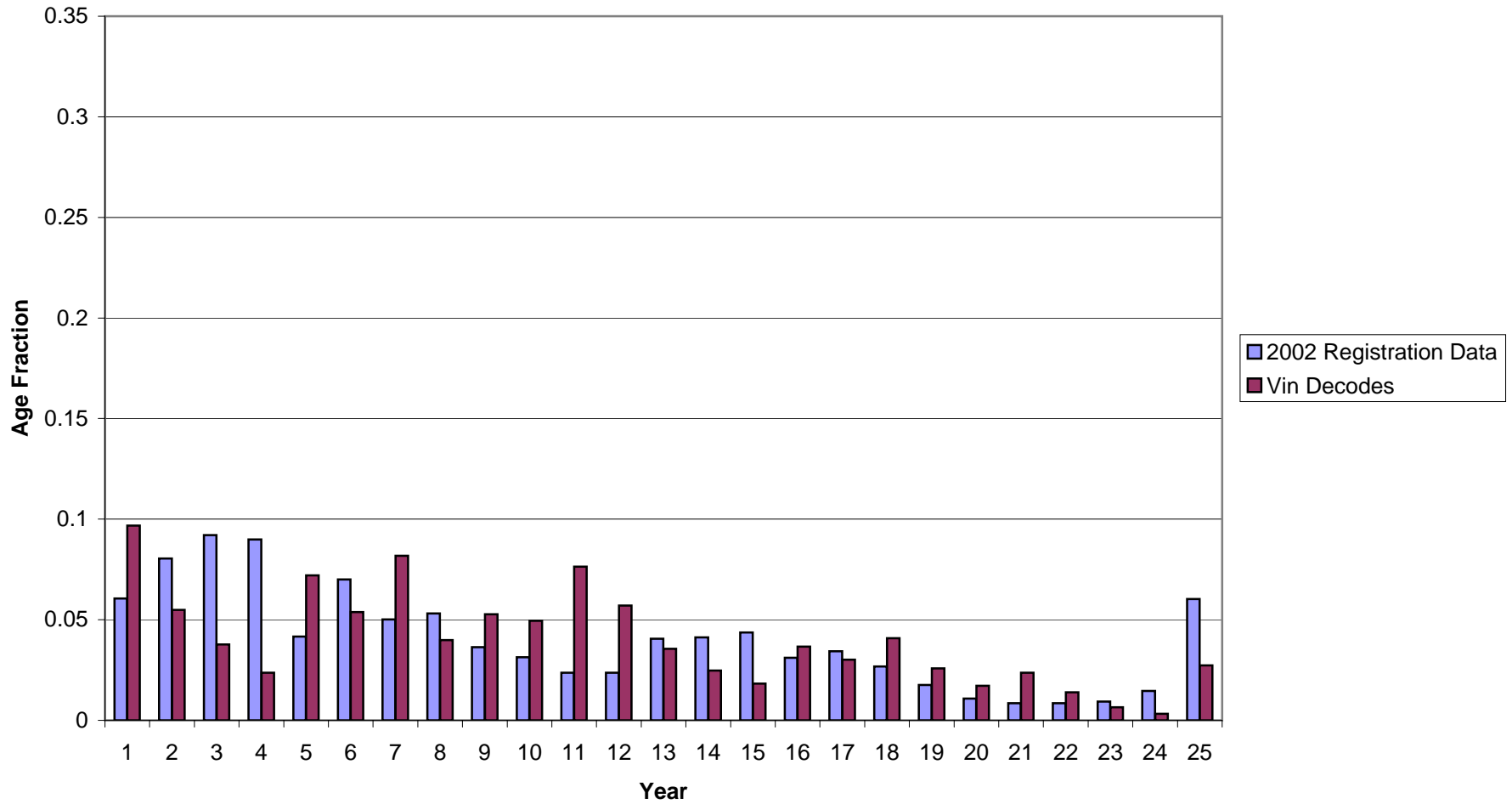
# ATTACHMENT 4C

**2005 Age Fractions**  
**Jurisdiction = FRED**  
**Vehicle Type = HDV7**  
**Number of Decoded Vins = 498**



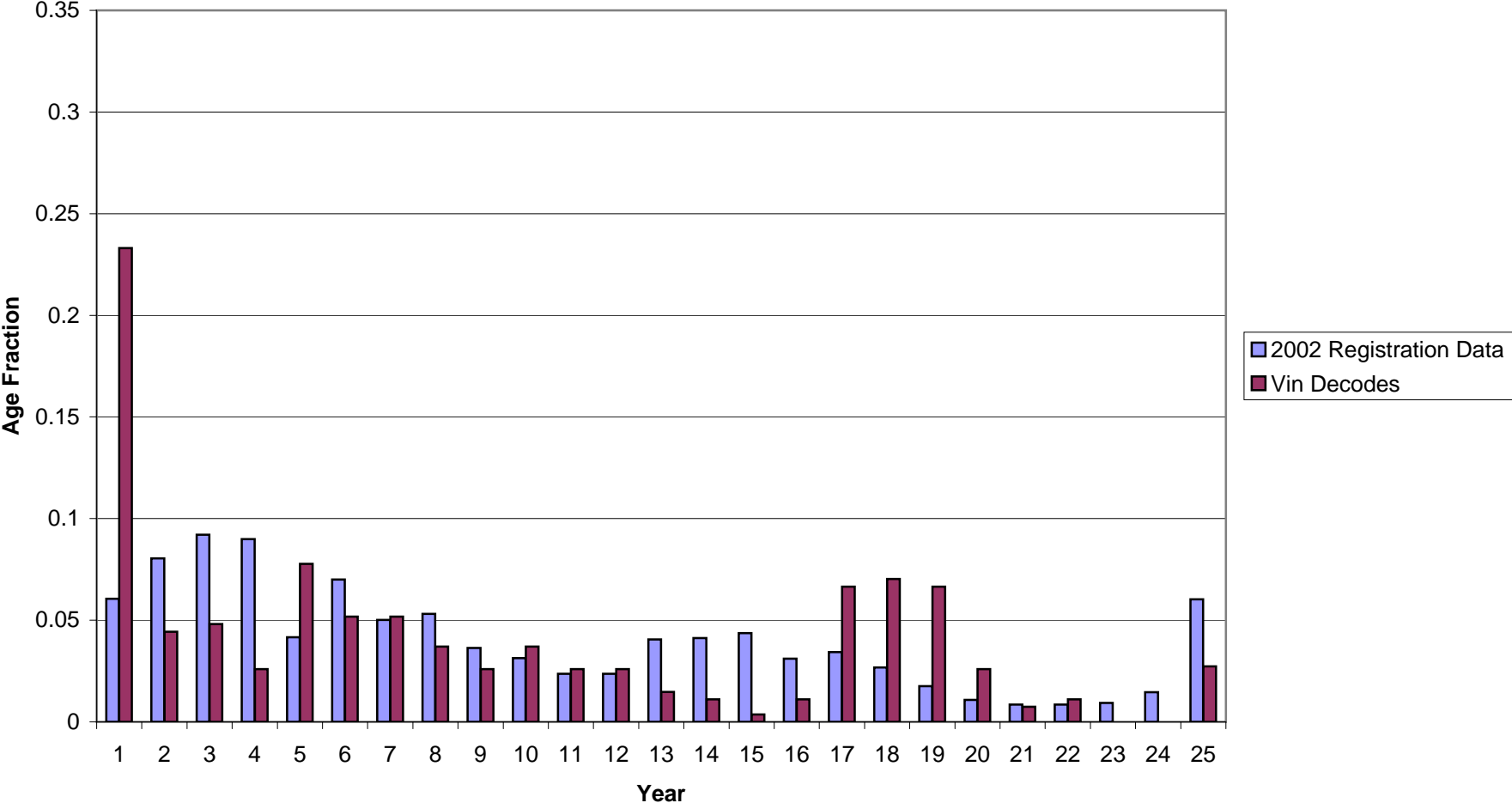
# ATTACHMENT 4C

2005 Age Fractions  
Jurisdiction = FRED  
Vehicle Type = HDV8A  
Number of Decoded Vins = 904



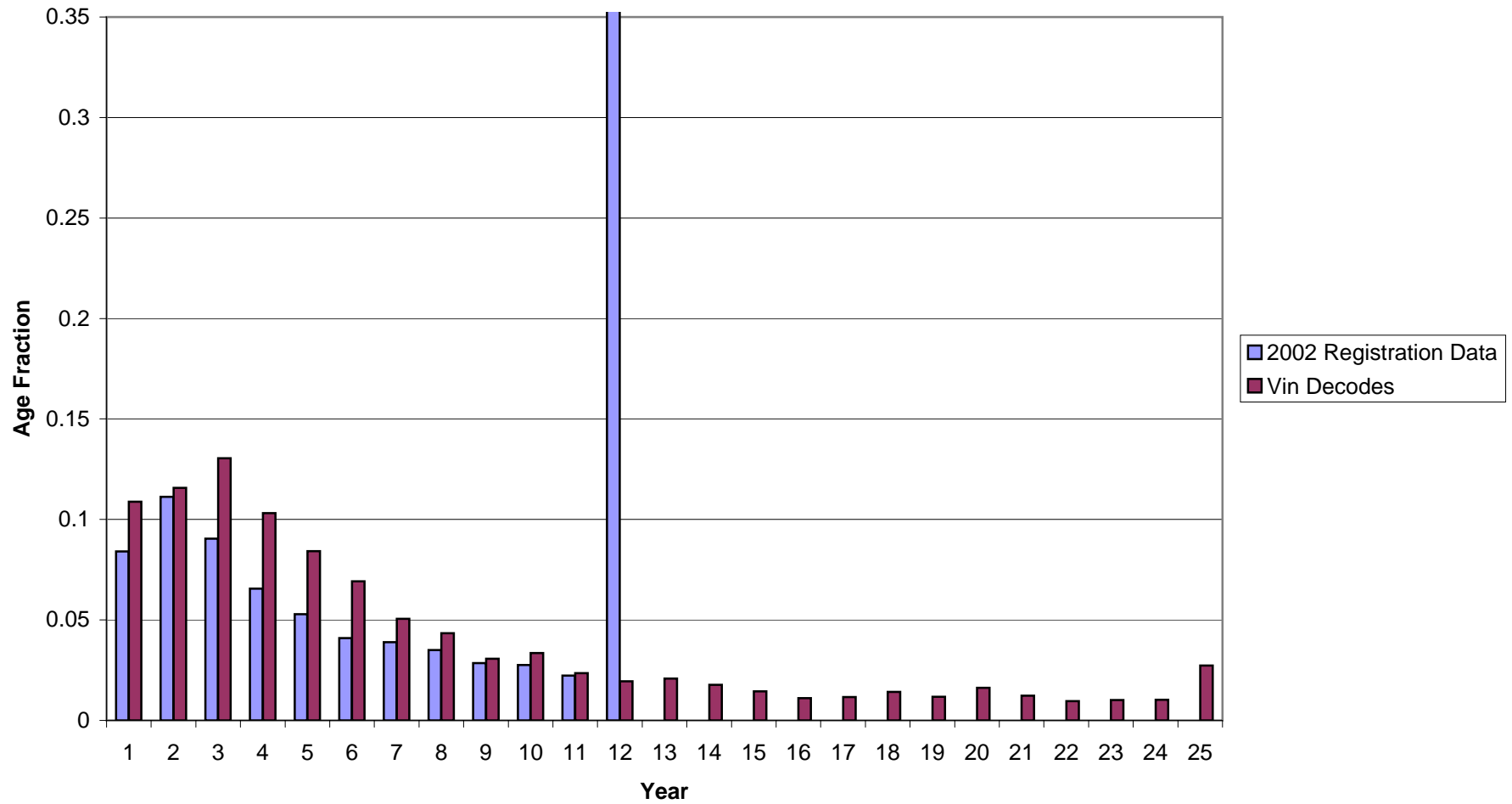
# ATTACHMENT 4C

2005 Age Fractions  
Jurisdiction = FRED  
Vehicle Type = HDV8B  
Number of Decoded Vins = 263



# ATTACHMENT 4C

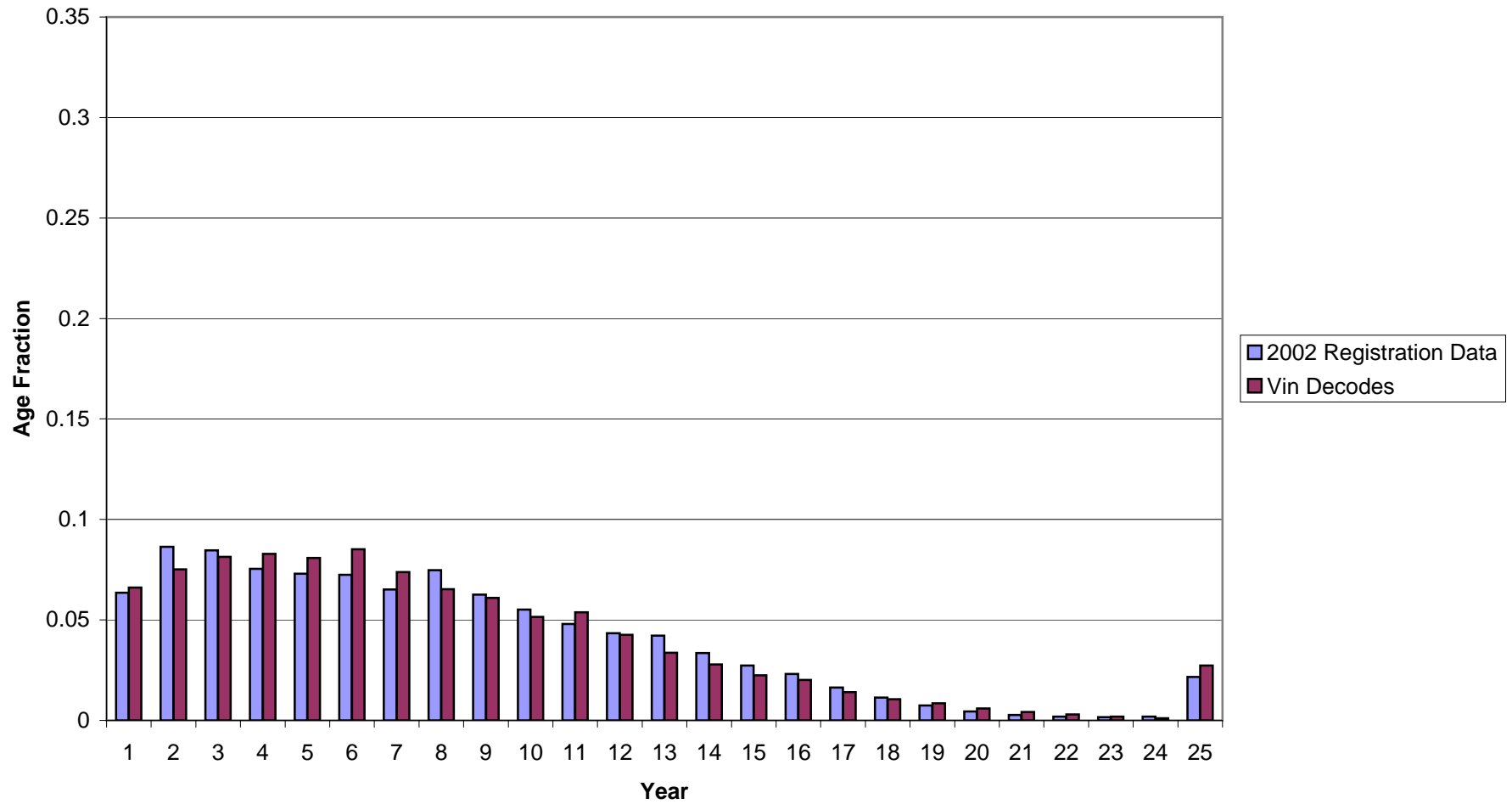
2005 Age Fractions  
Jurisdiction = FRED  
Vehicle Type = MC  
Number of Decoded Vins = 5,289



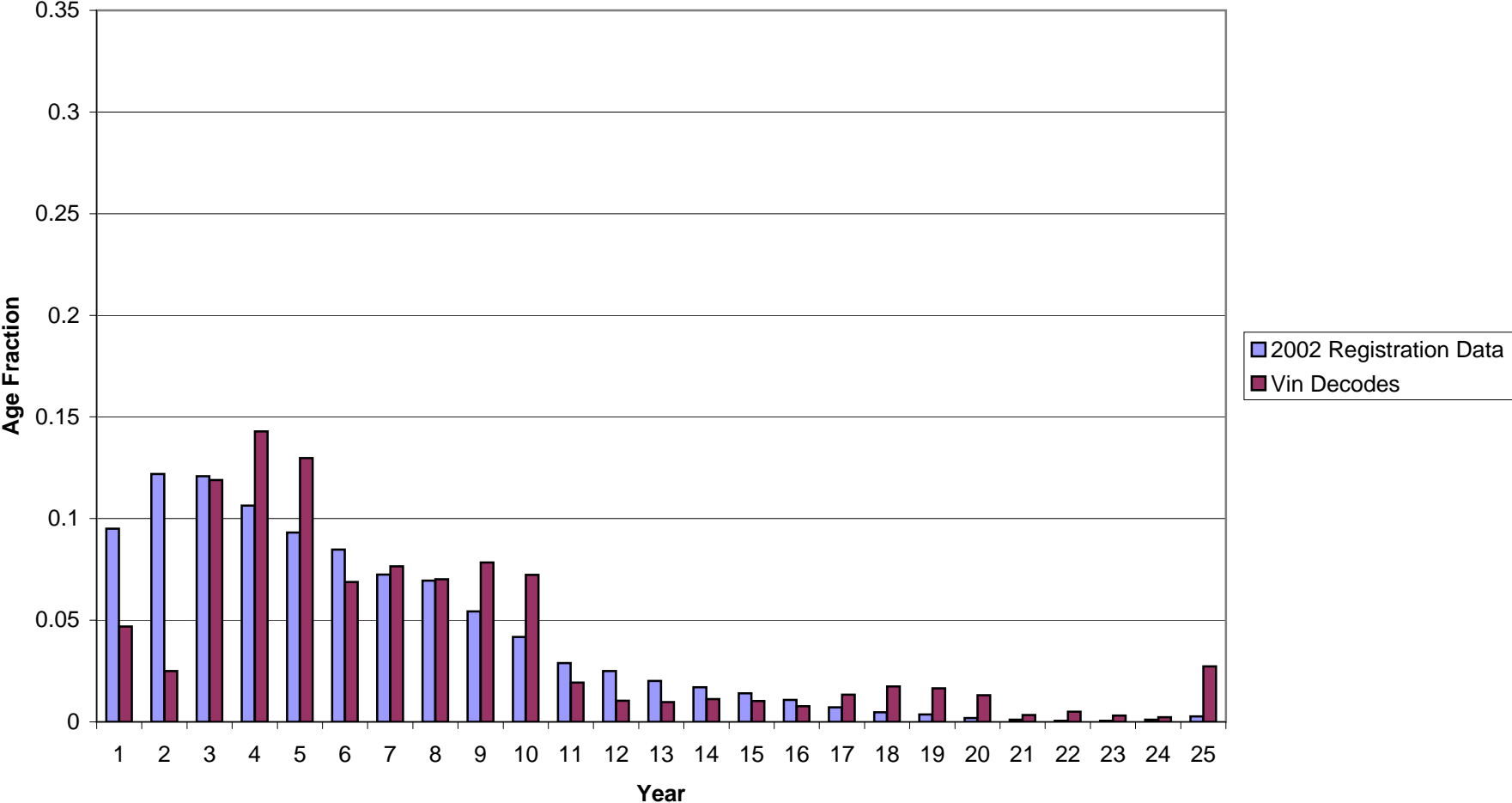


# ATTACHMENT 4D

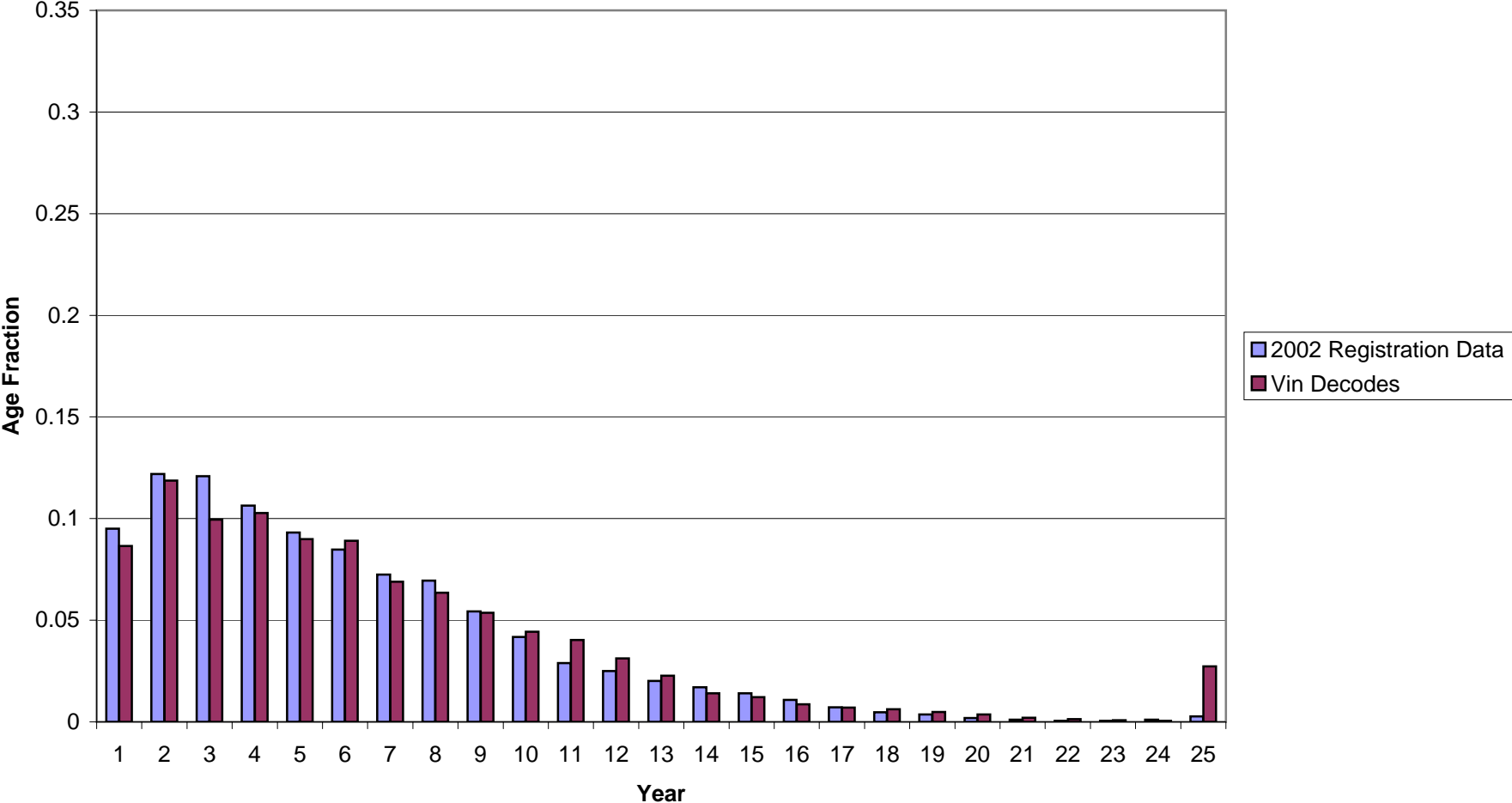
**2005 Age Fractions**  
**Jurisdiction = MTG**  
**Vehicle Type = LDV**  
**Number of Decoded Vins = 391,552**



2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = LDT1  
Number of Decoded Vins = 4,668

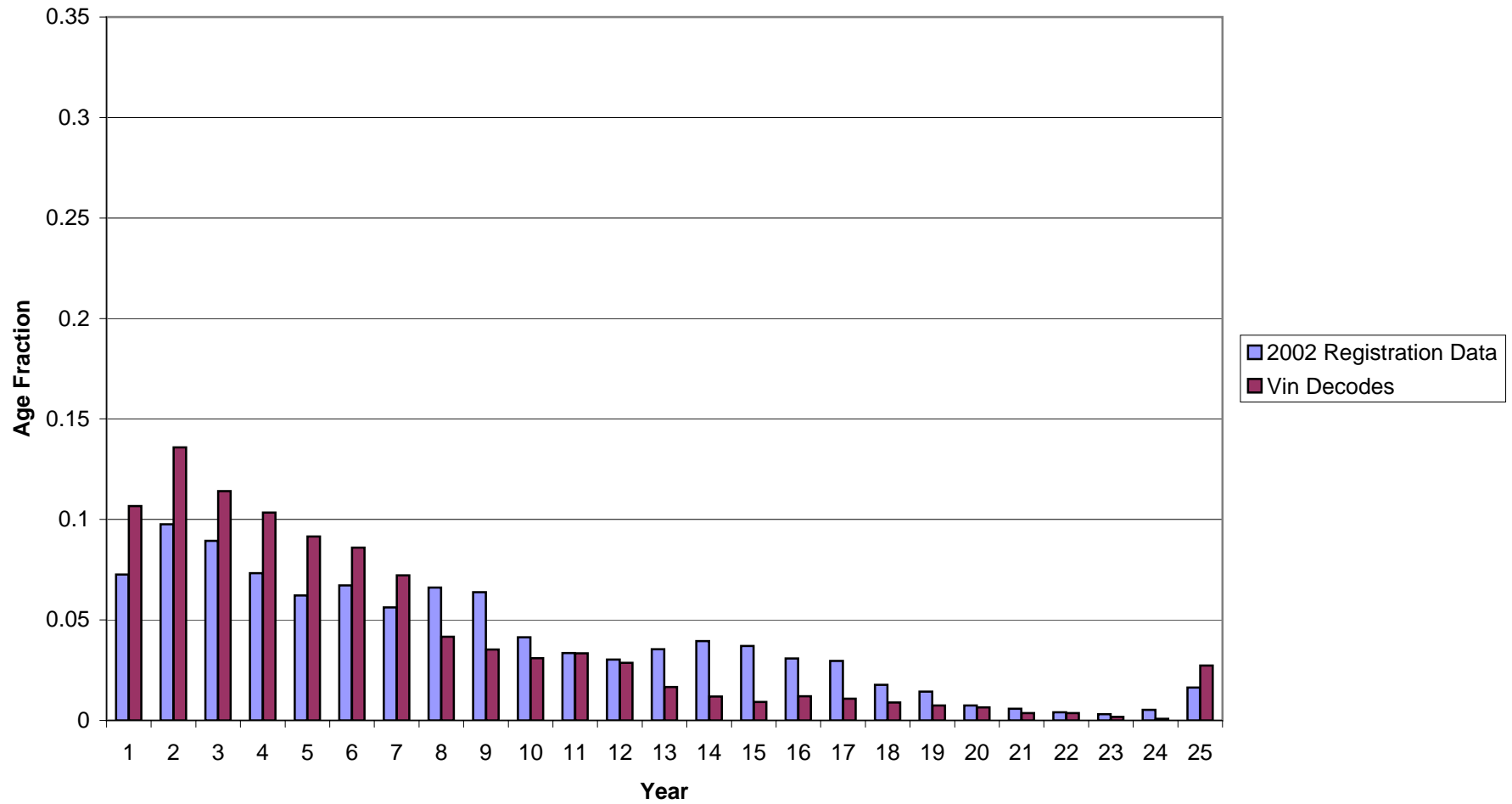


2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = LDT2  
Number of Decoded Vins = 160,888

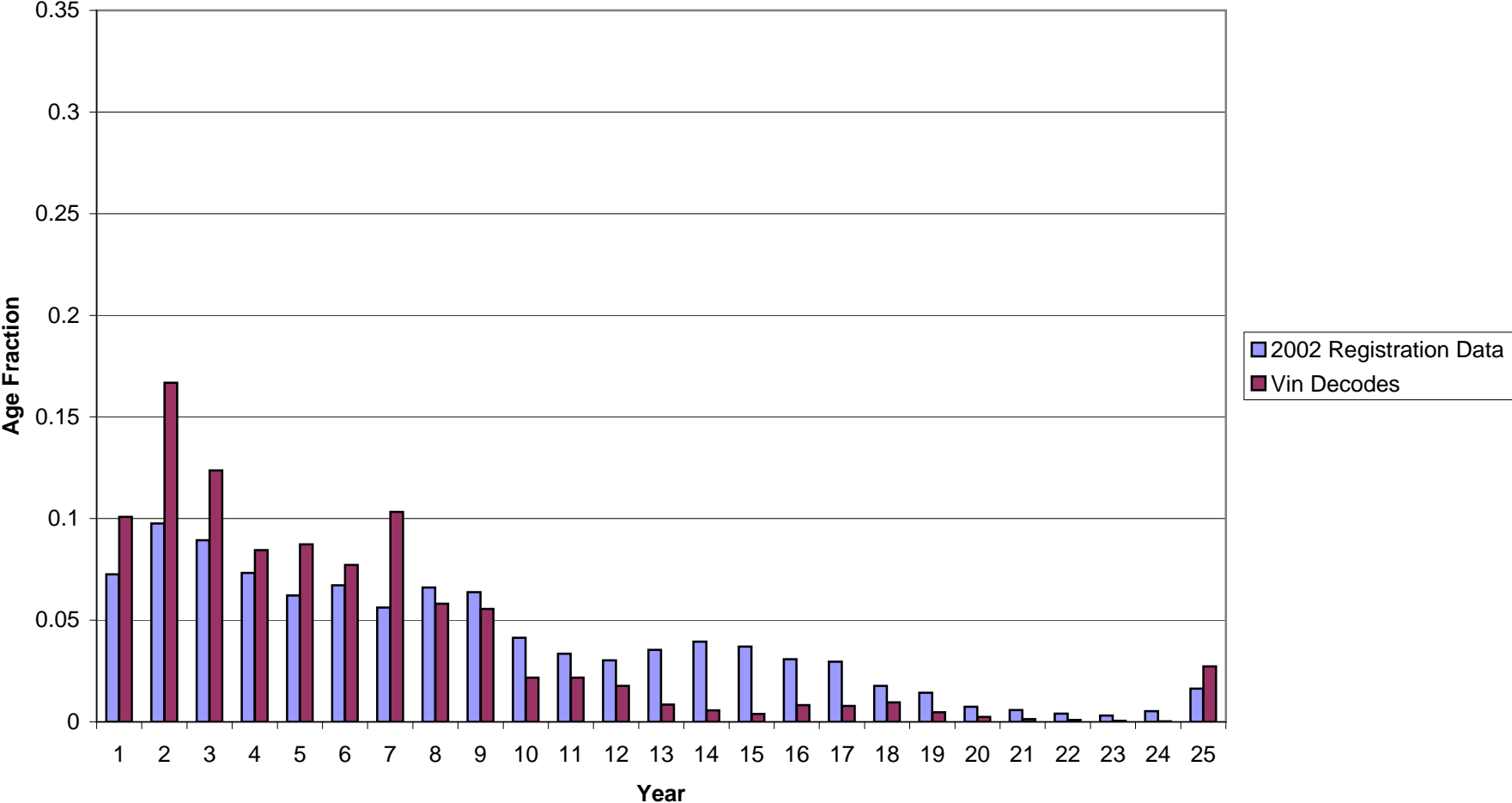


# ATTACHMENT 4D

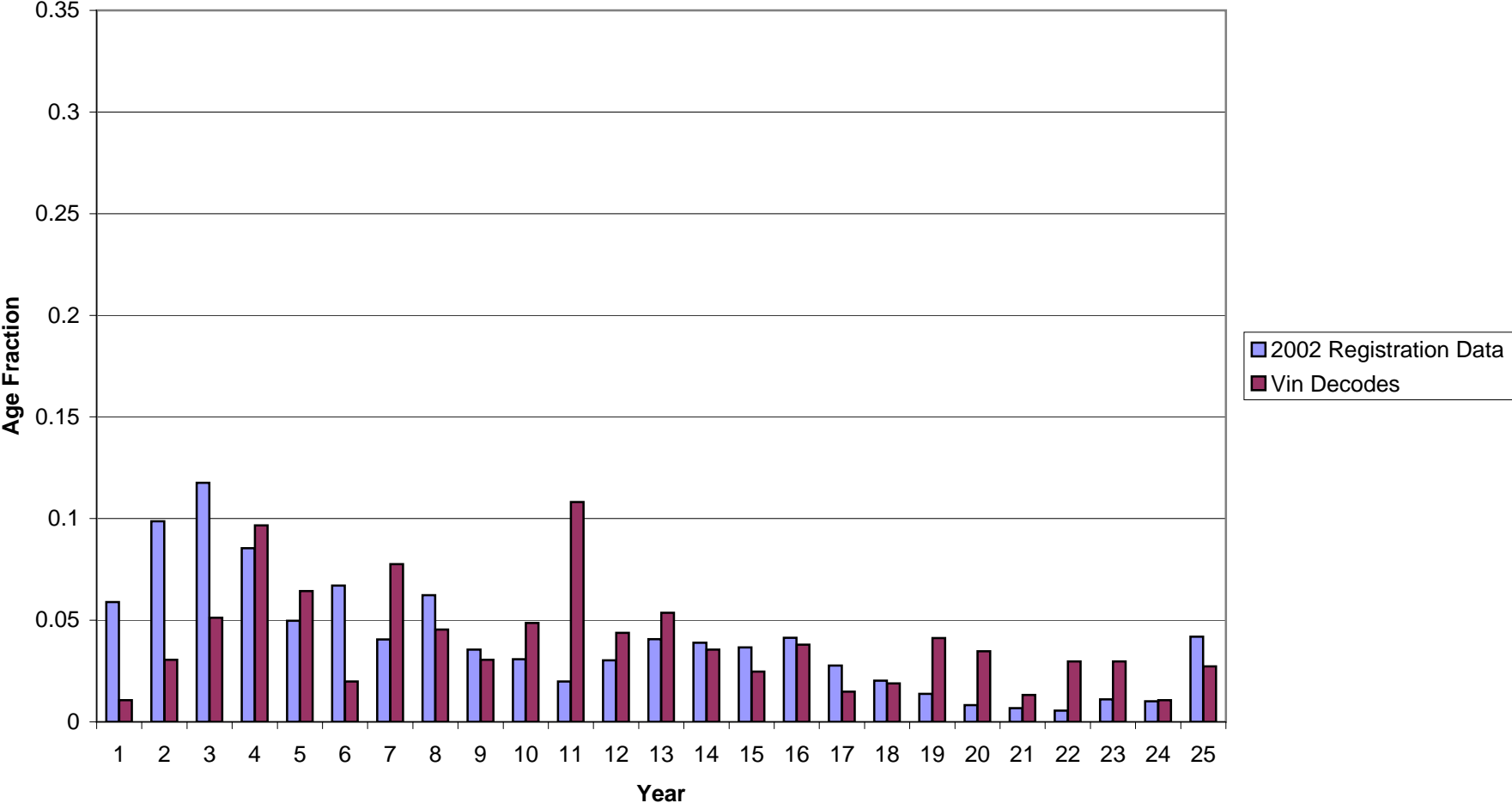
2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = LDT3  
Number of Decoded Vins = 38,032



2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = LDT4  
Number of Decoded Vins = 11,711

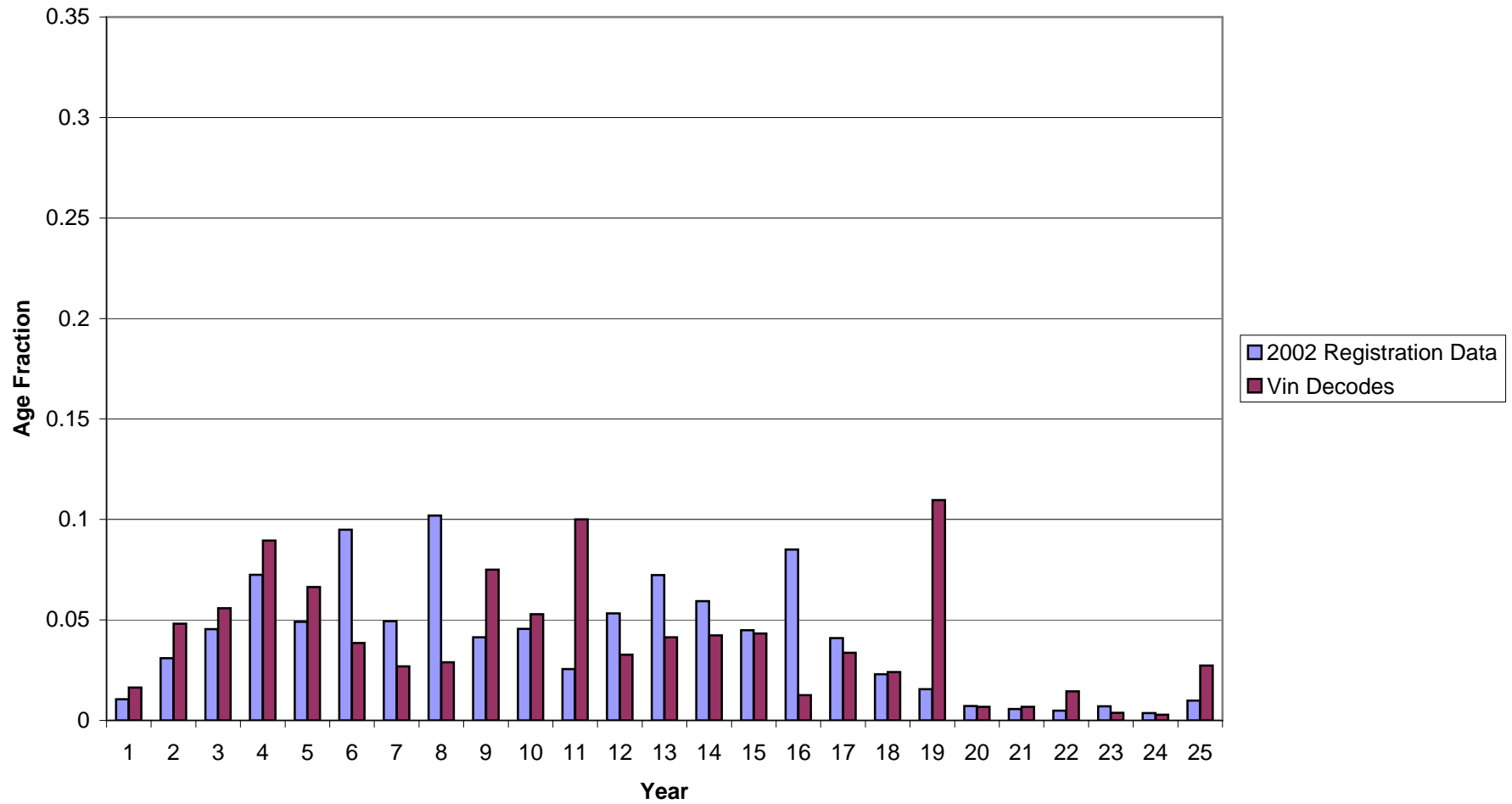


2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDBS  
Number of Decoded Vins = 1,178



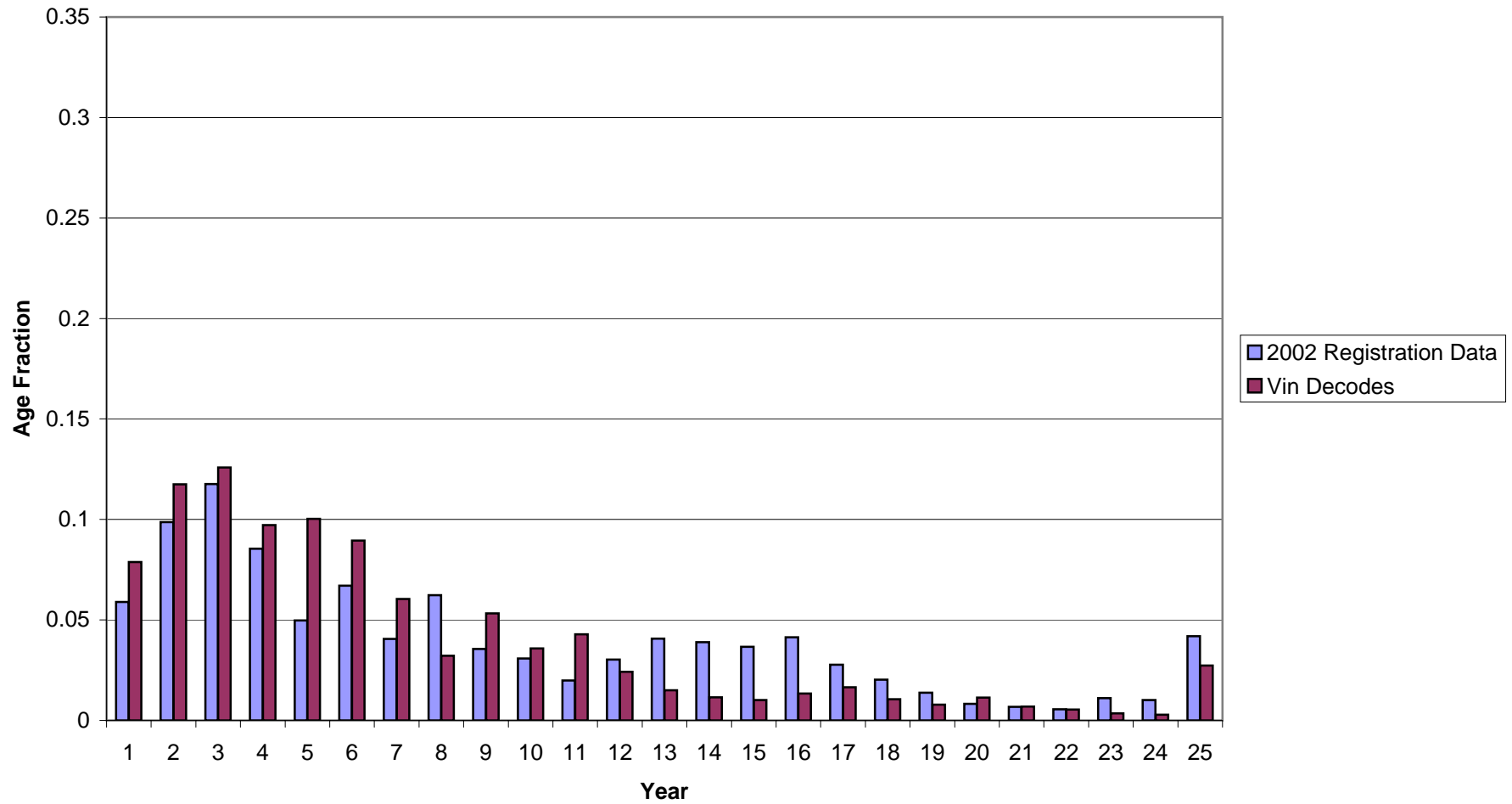
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDBT  
Number of Decoded Vins = 1,011



# ATTACHMENT 4D

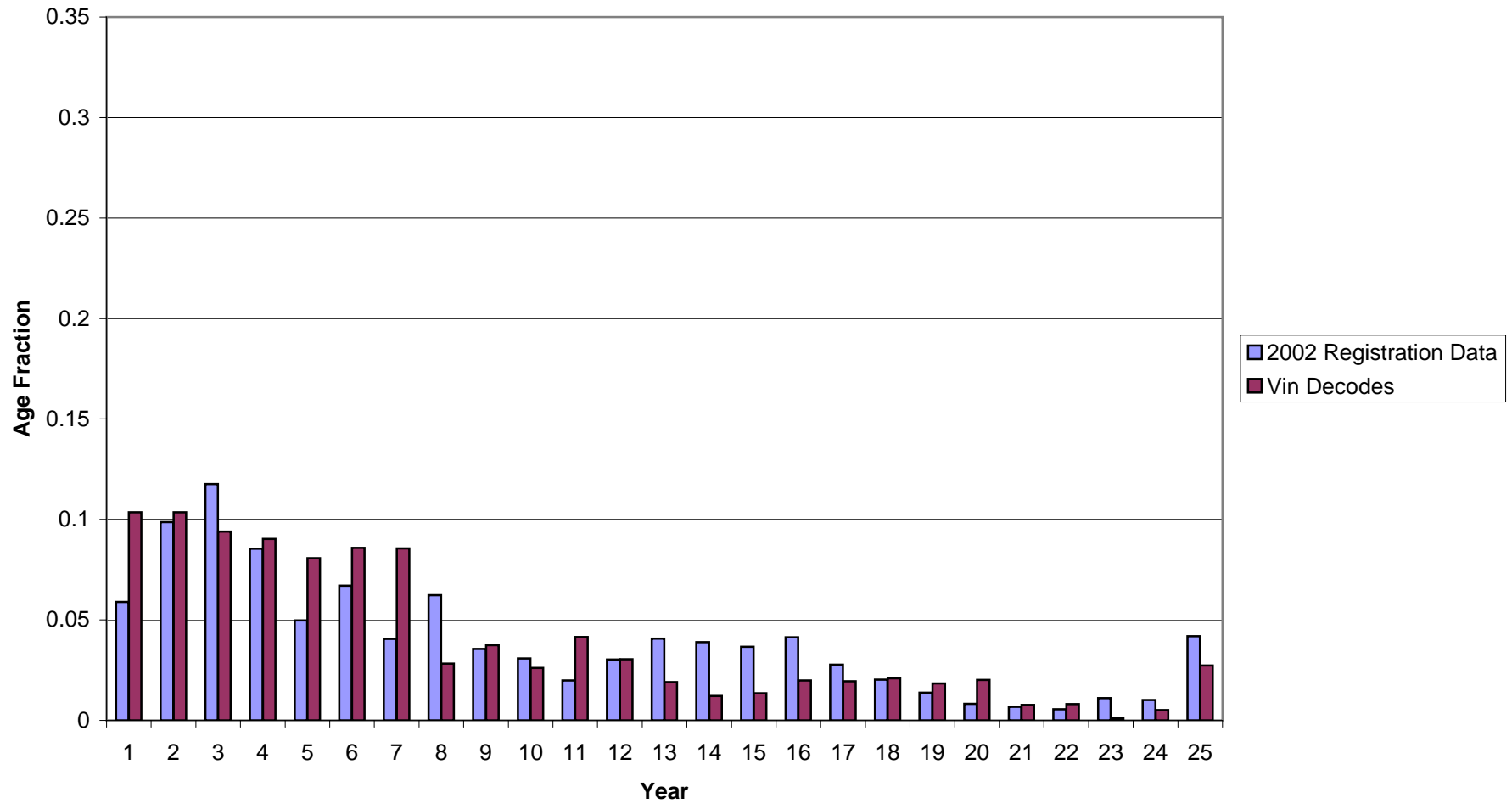
2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV2B  
Number of Decoded Vins = 13,992





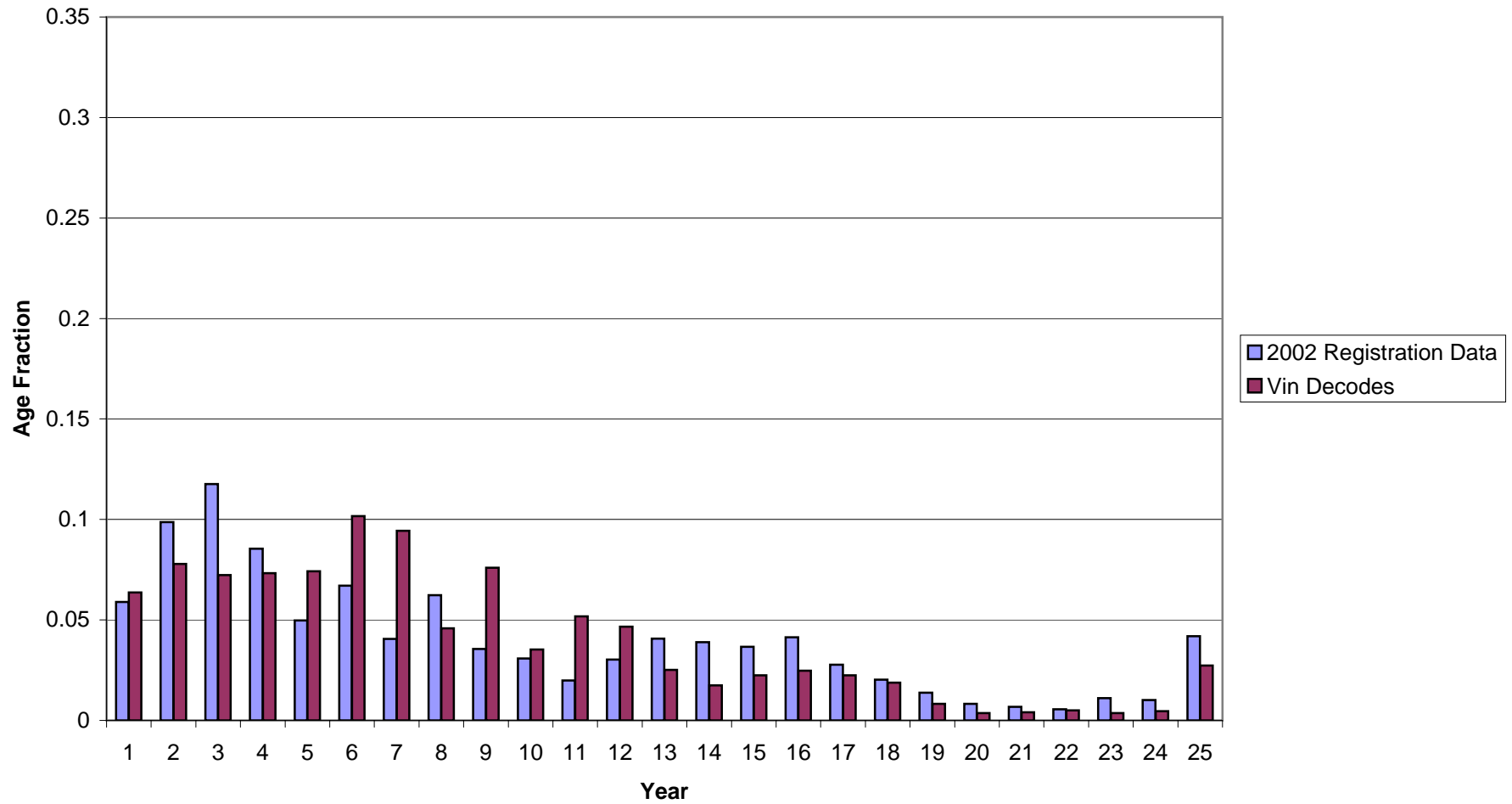
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV3  
Number of Decoded Vins = 2,650



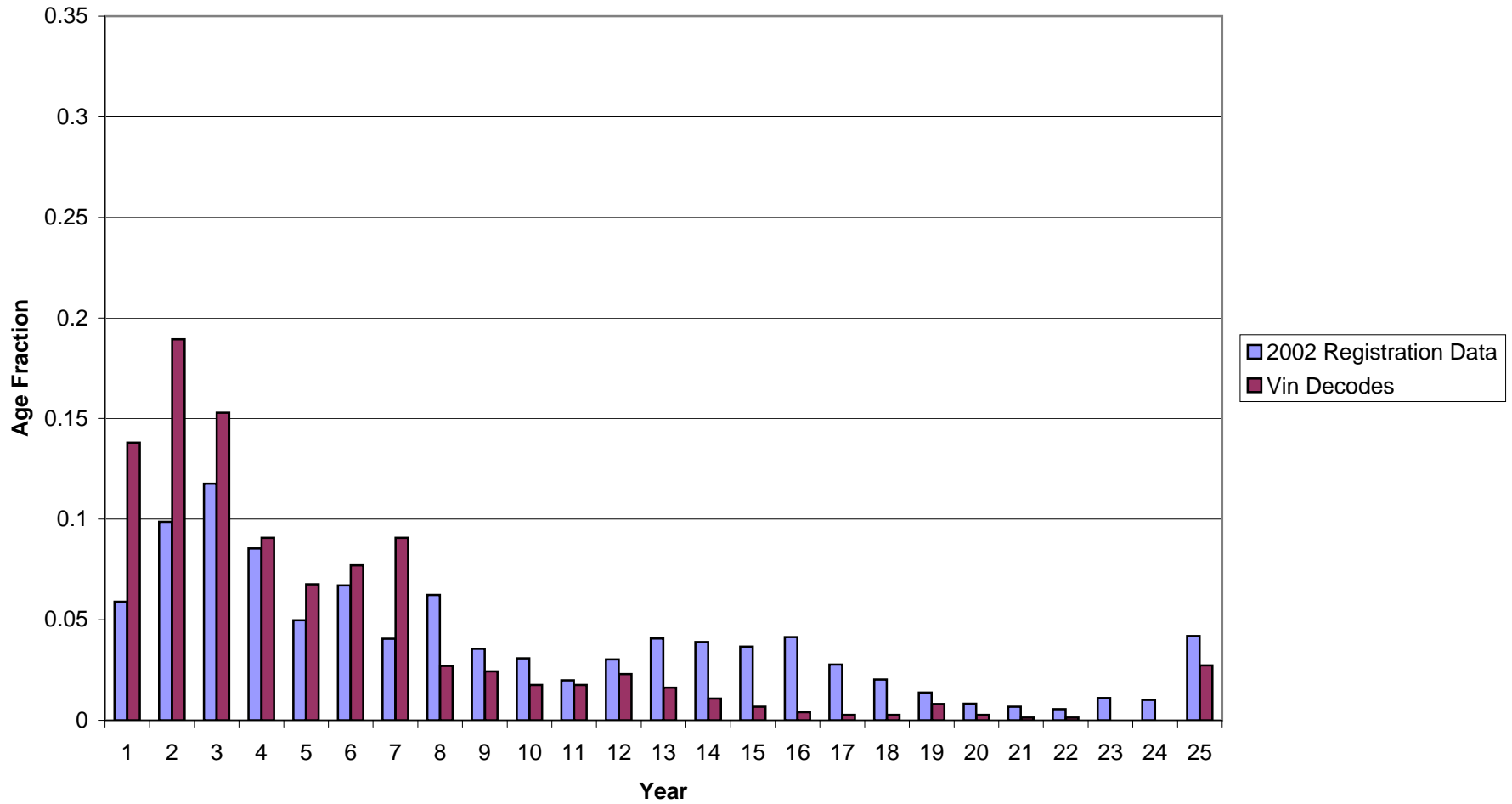
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV4  
Number of Decoded Vins = 2,125



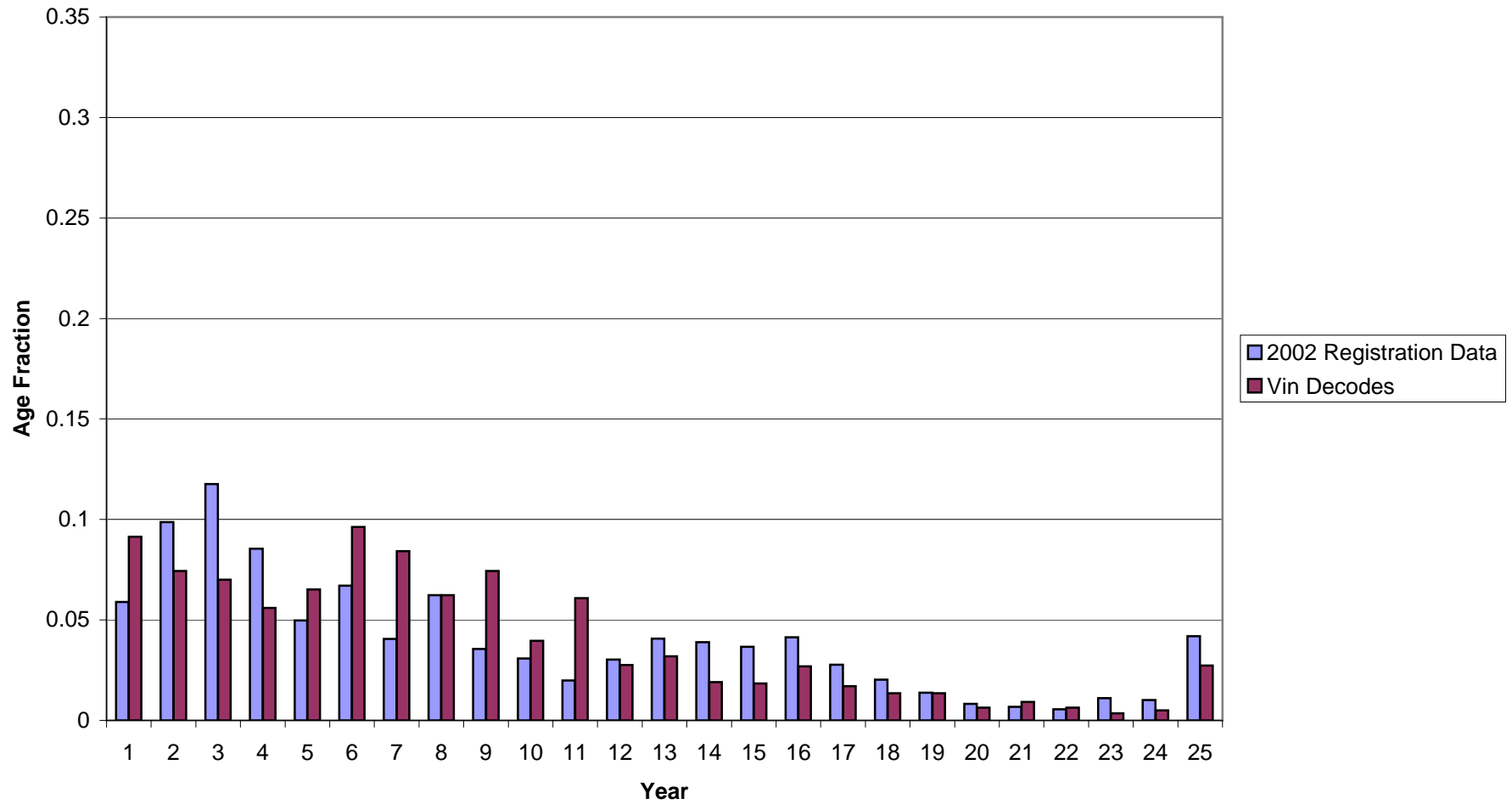
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV5  
Number of Decoded Vins = 719



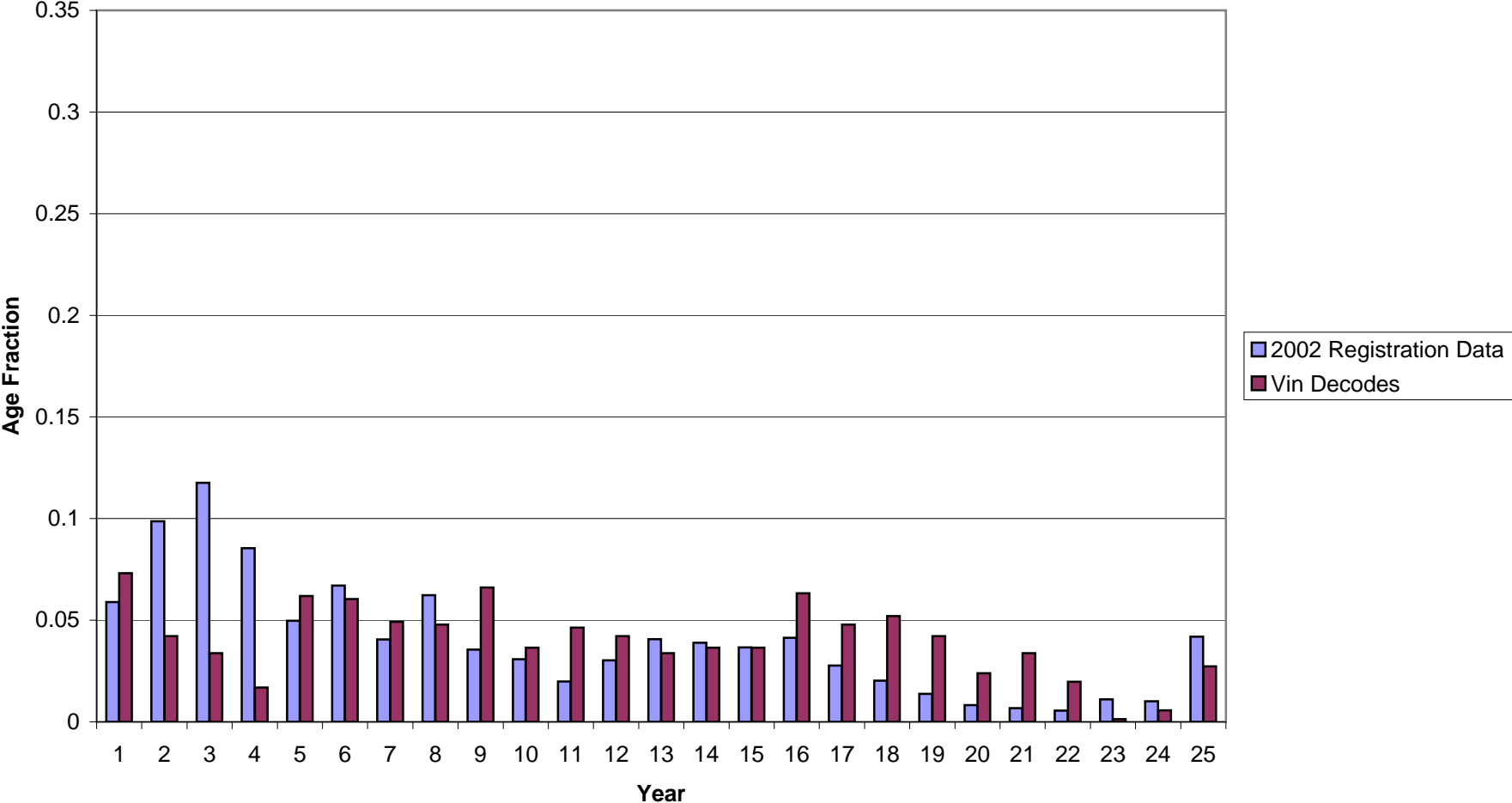
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV6  
Number of Decoded Vins = 1,374



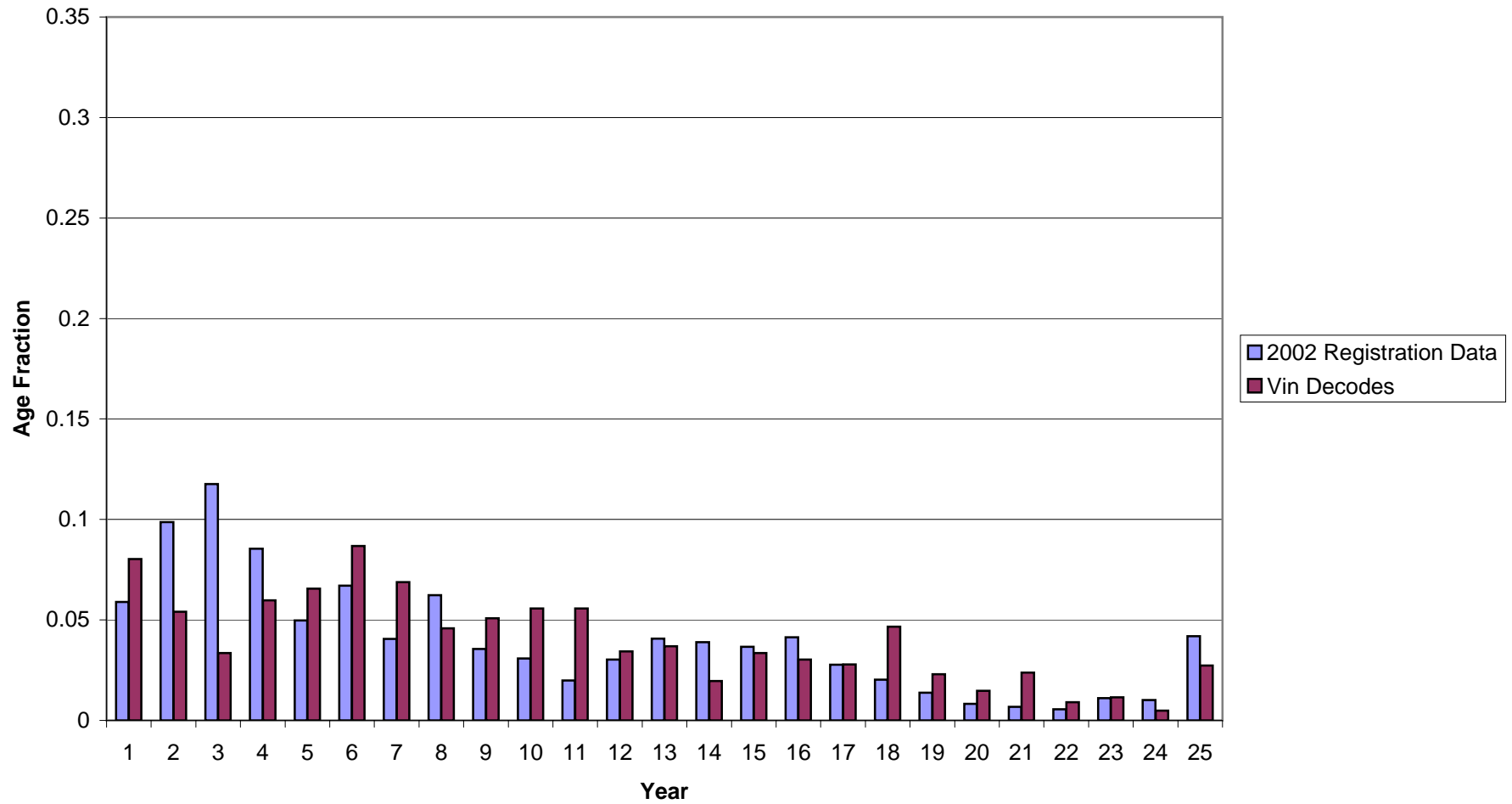
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV7  
Number of Decoded Vins = 692



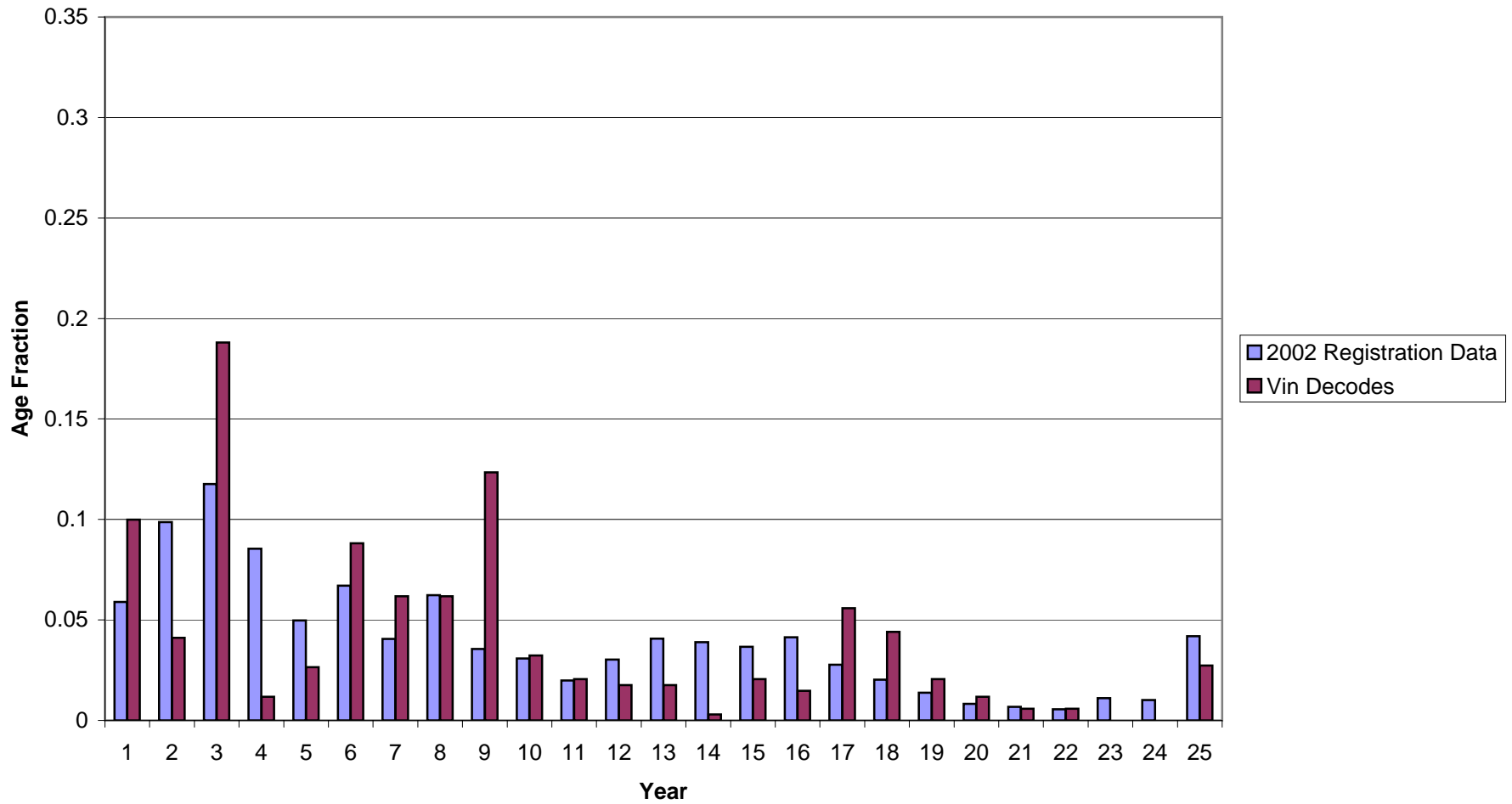
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV8A  
Number of Decoded Vins = 1,188



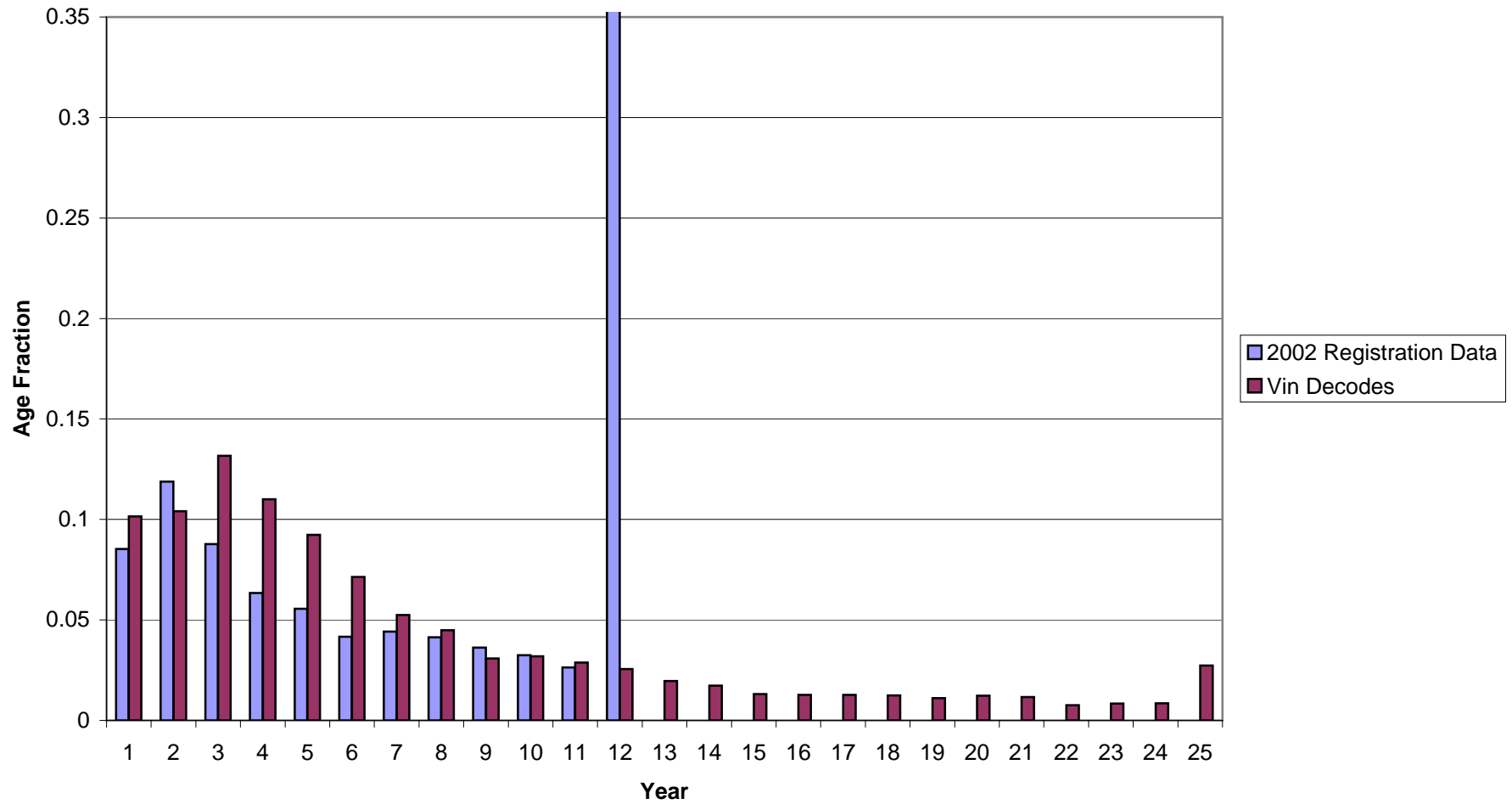
# ATTACHMENT 4D

2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = HDV8B  
Number of Decoded Vins = 331



# ATTACHMENT 4D

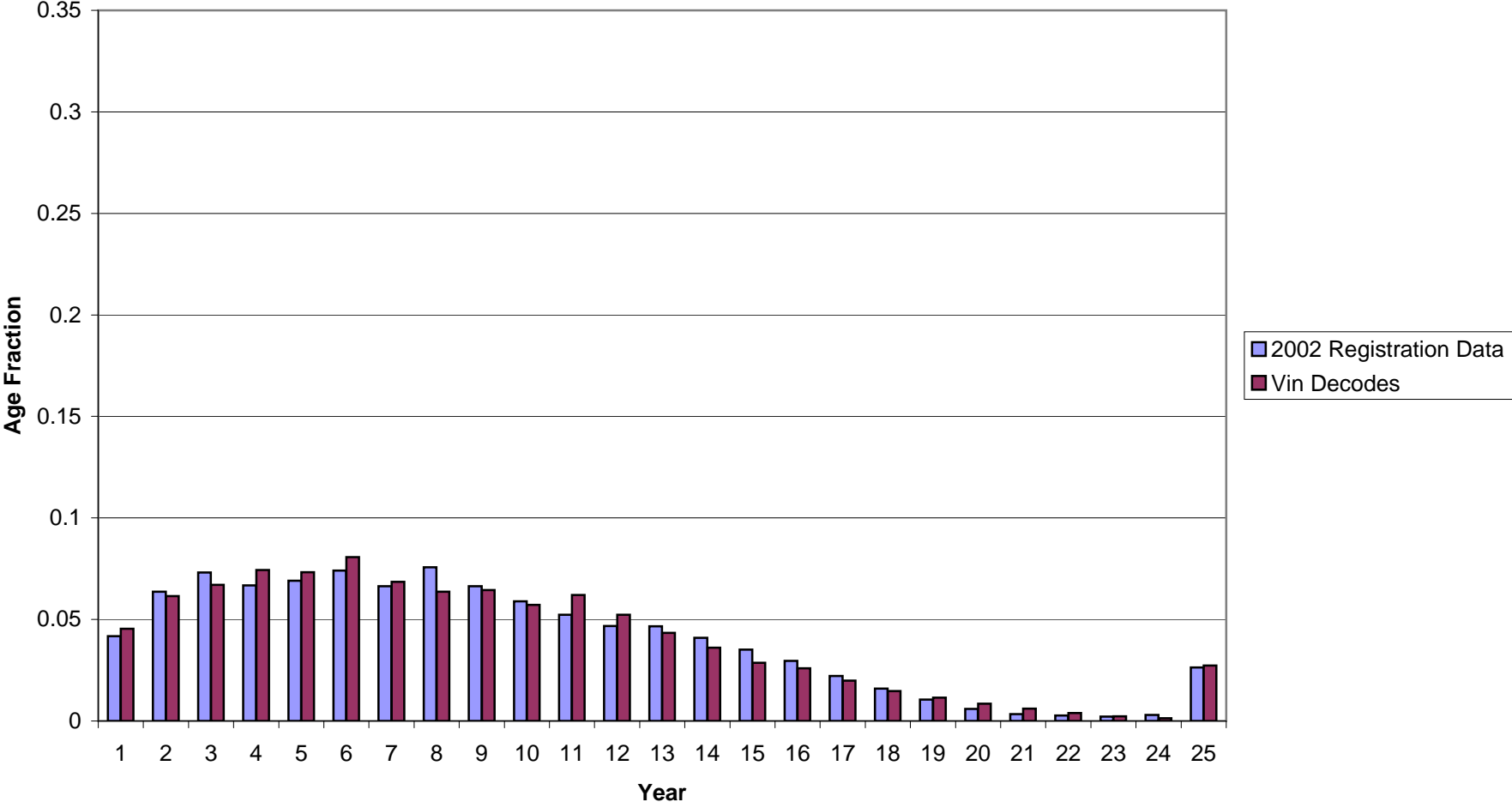
2005 Age Fractions  
Jurisdiction = MTG  
Vehicle Type = MC  
Number of Decoded Vins = 7,938



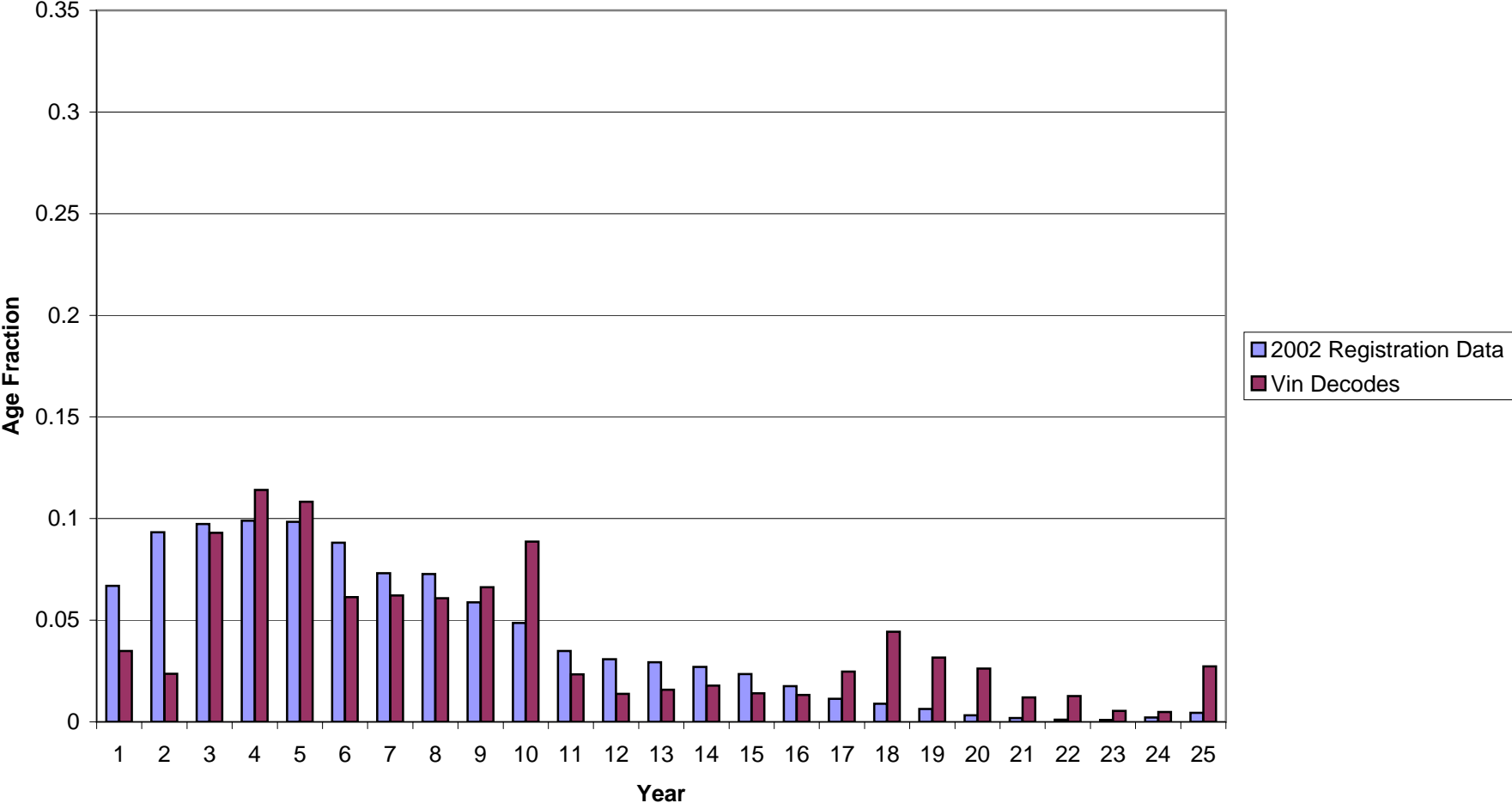


# ATTACHMENT 4E

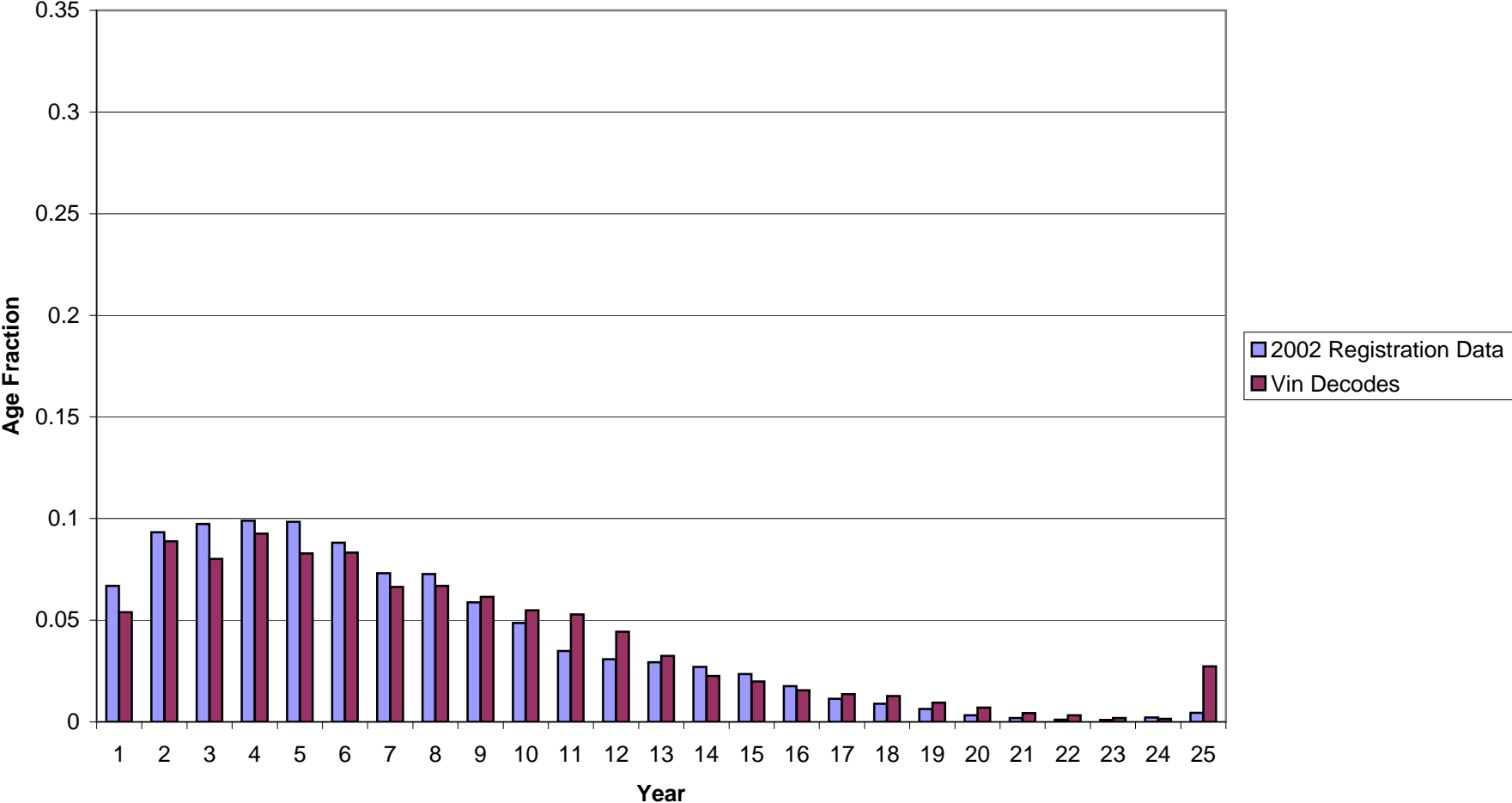
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = LDV  
Number of Decoded Vins = 324,362



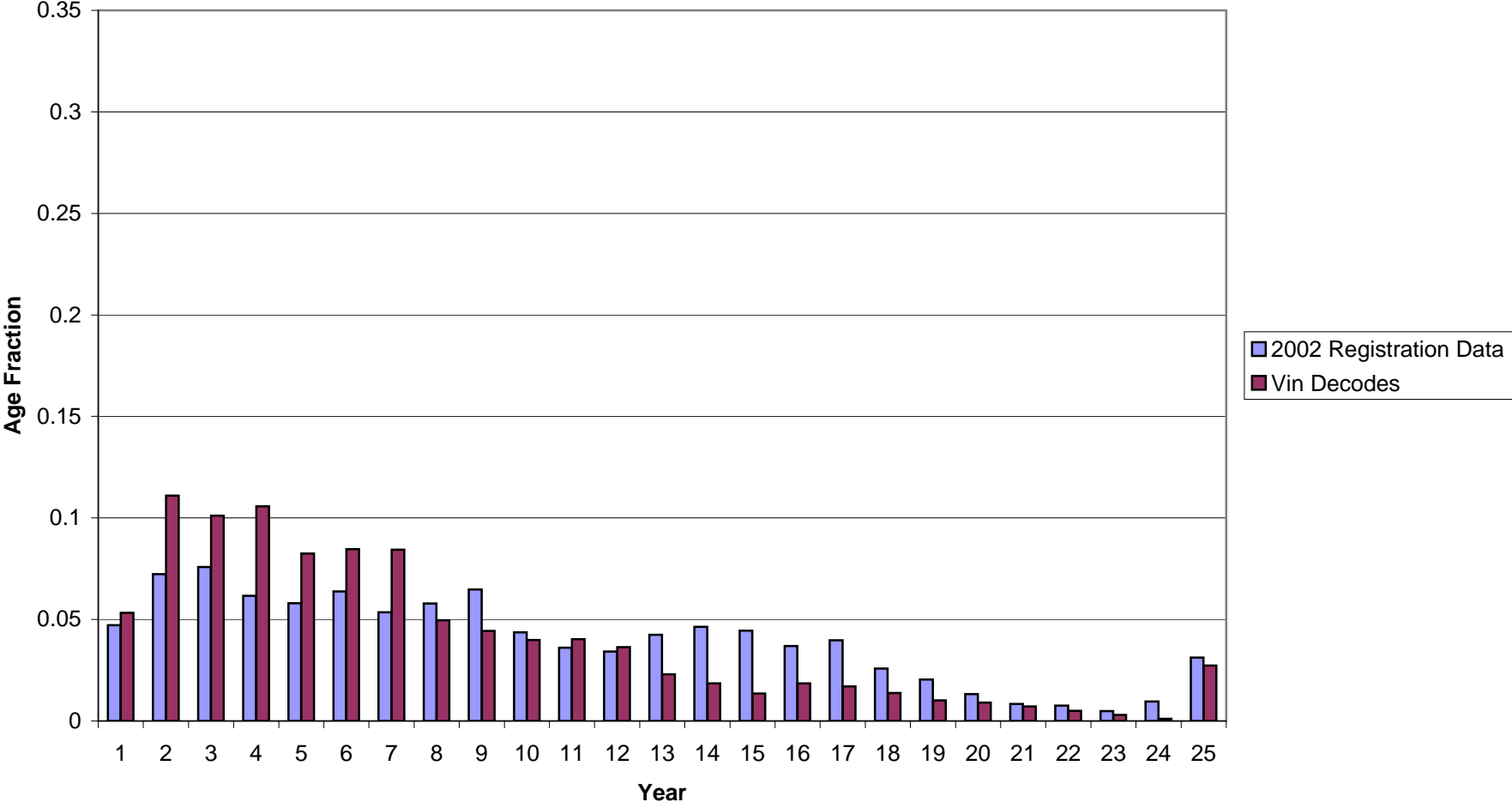
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = LDT1  
Number of Decoded Vins = 3,820



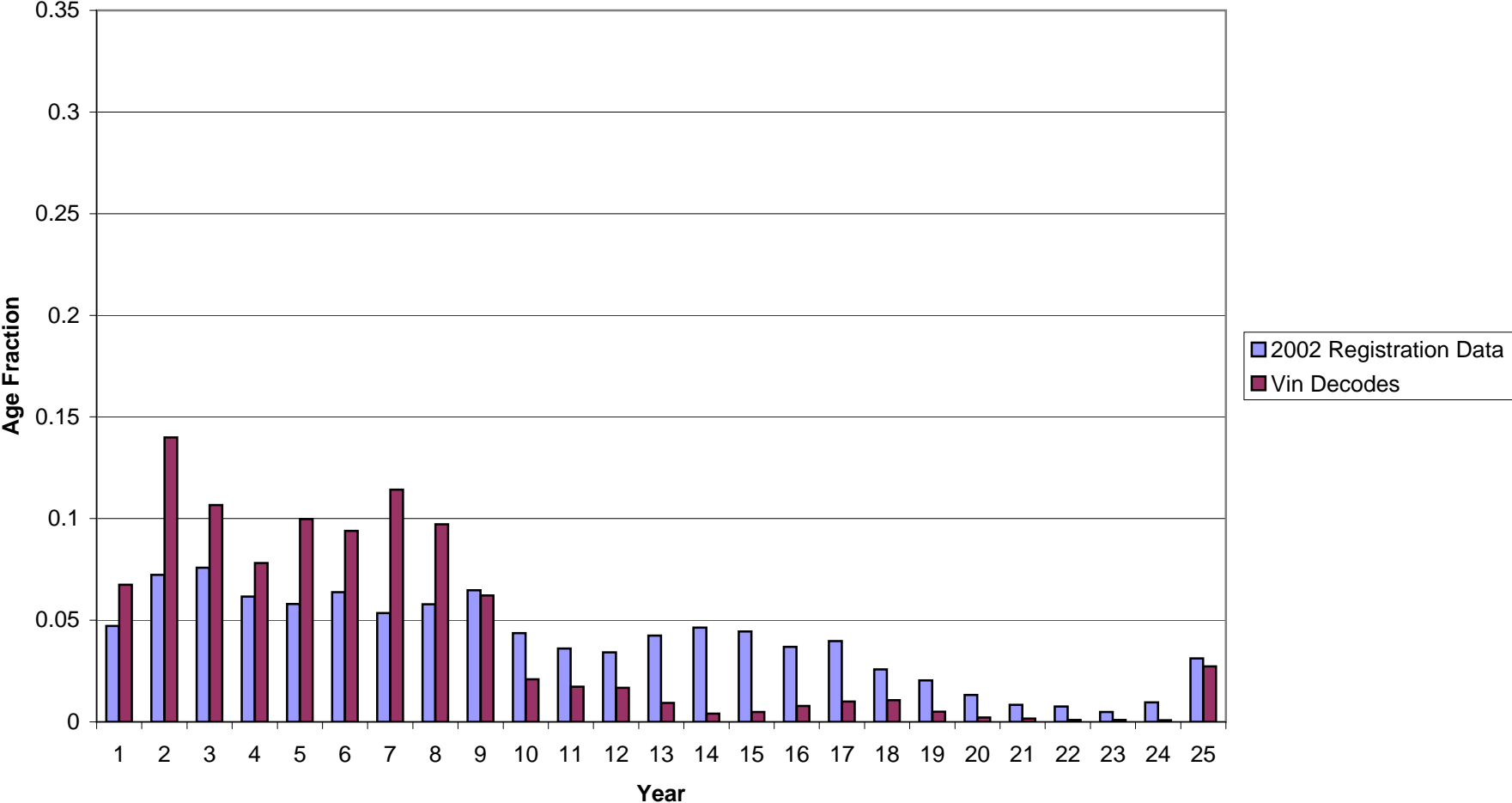
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = LDT2  
Number of Decoded Vins = 126,337



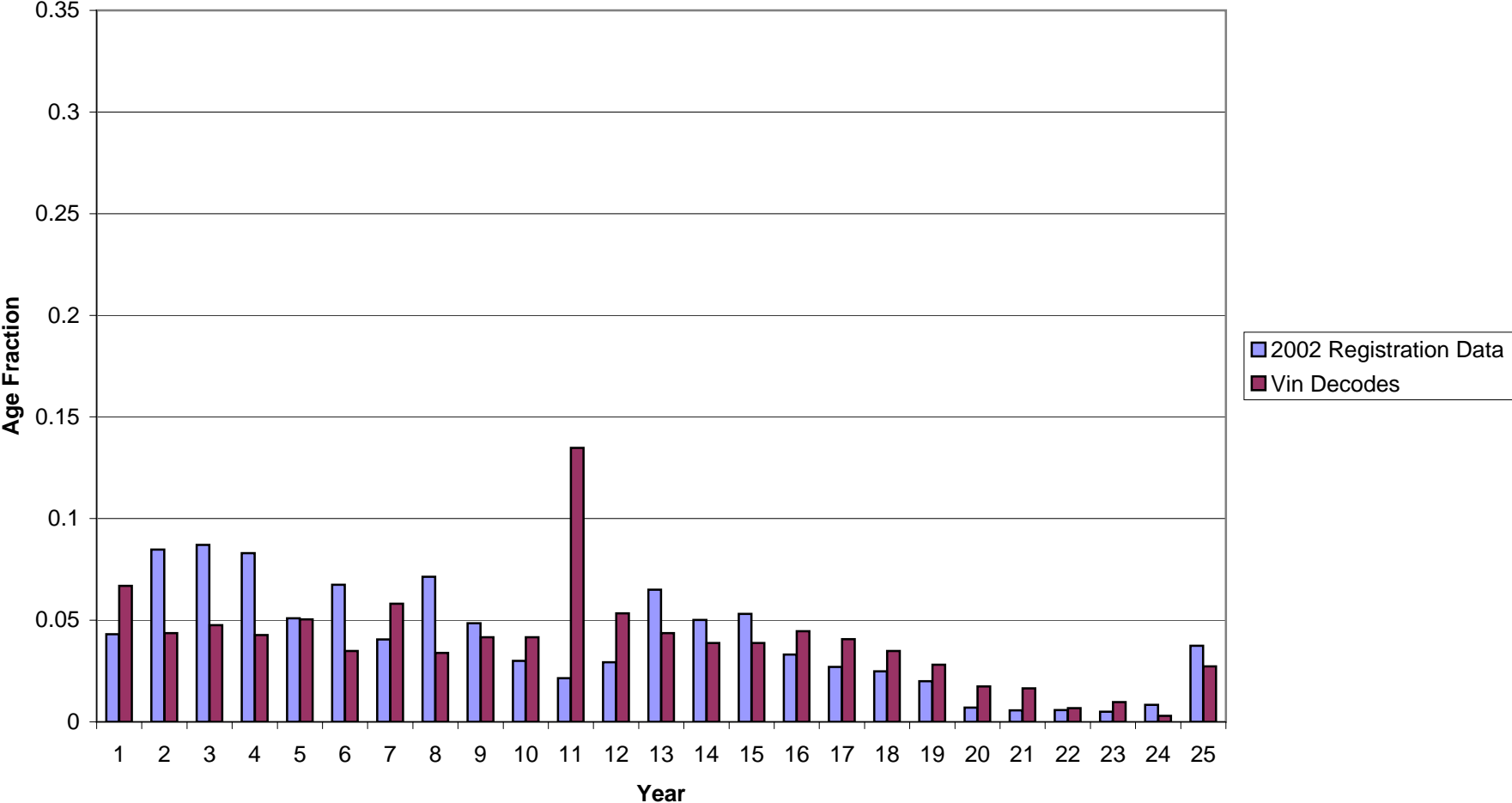
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = LDT3  
Number of Decoded Vins = 44,702



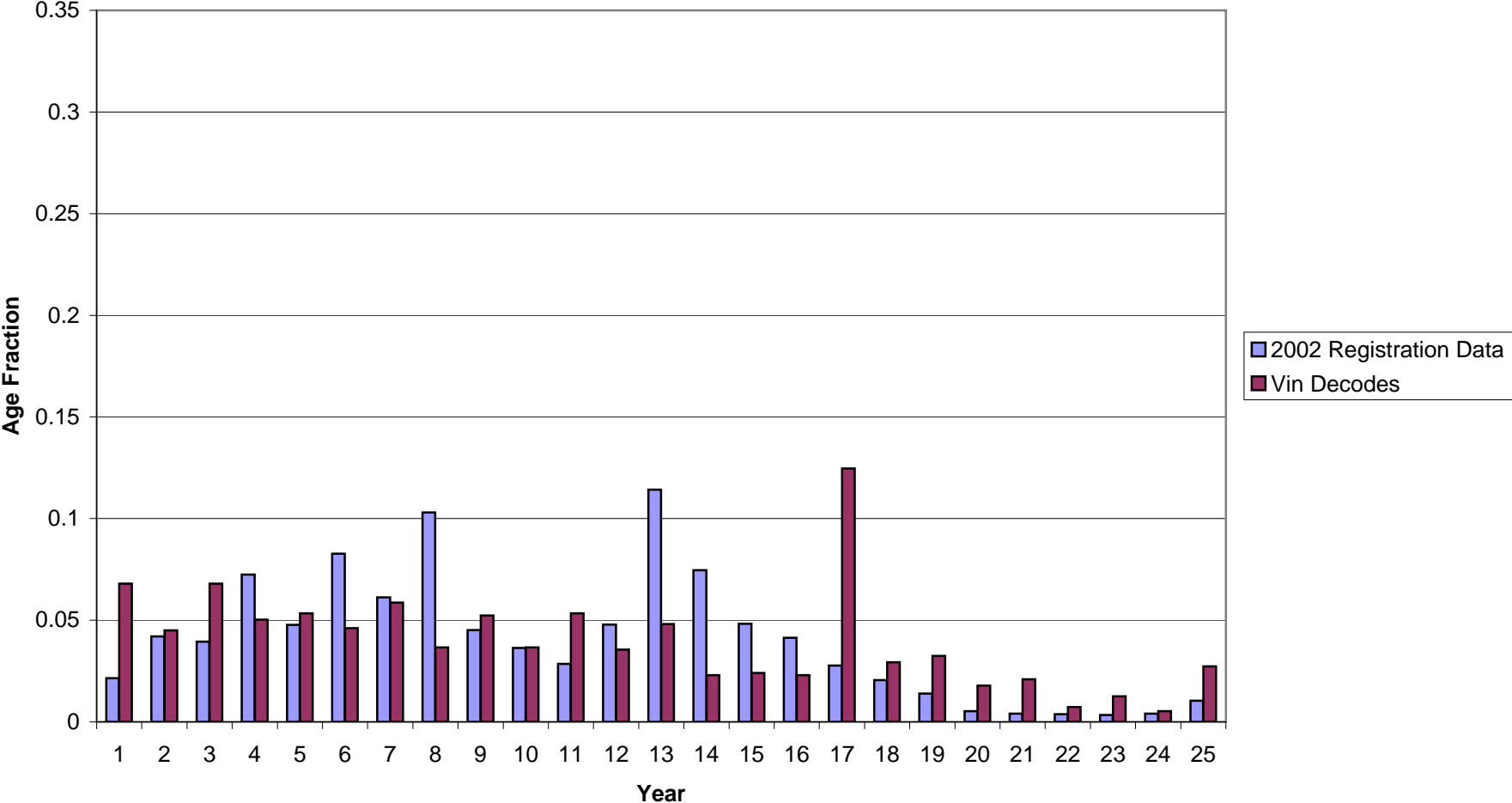
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = LDT4  
Number of Decoded Vins = 12,682



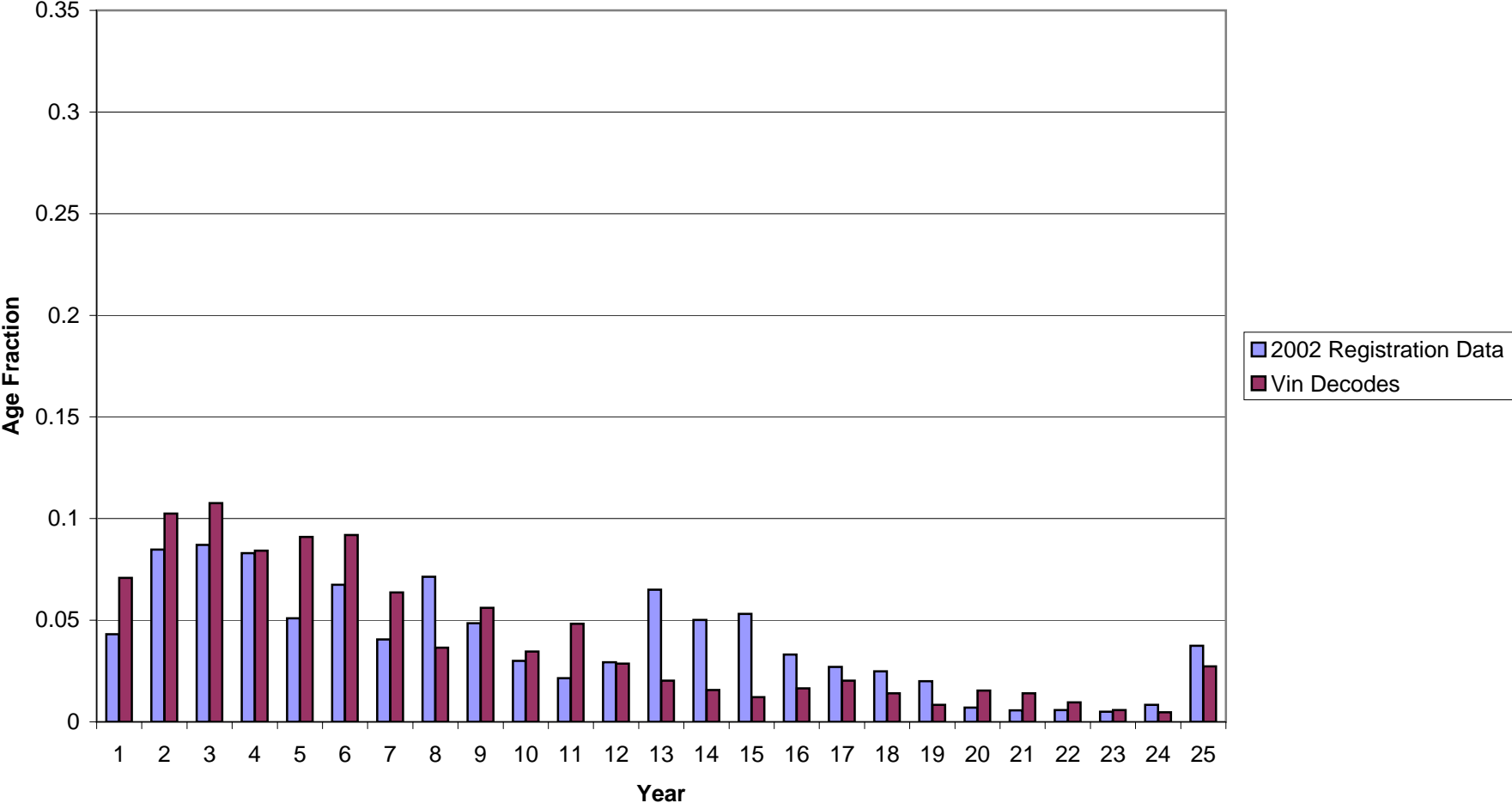
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDBS  
Number of Decoded Vins = 1,003



2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDBT  
Number of Decoded Vins = 929

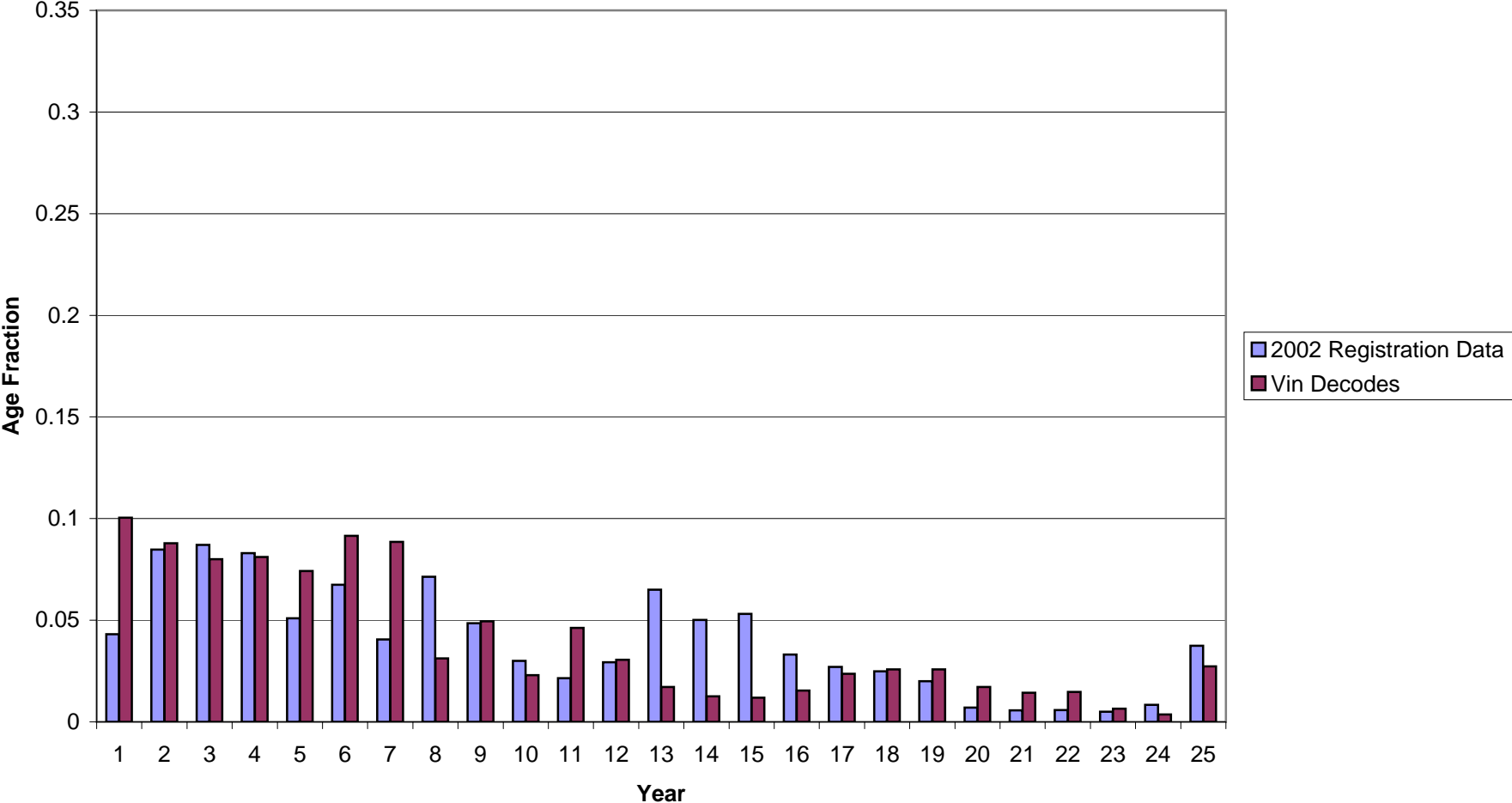


2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV2B  
Number of Decoded Vins = 13,198

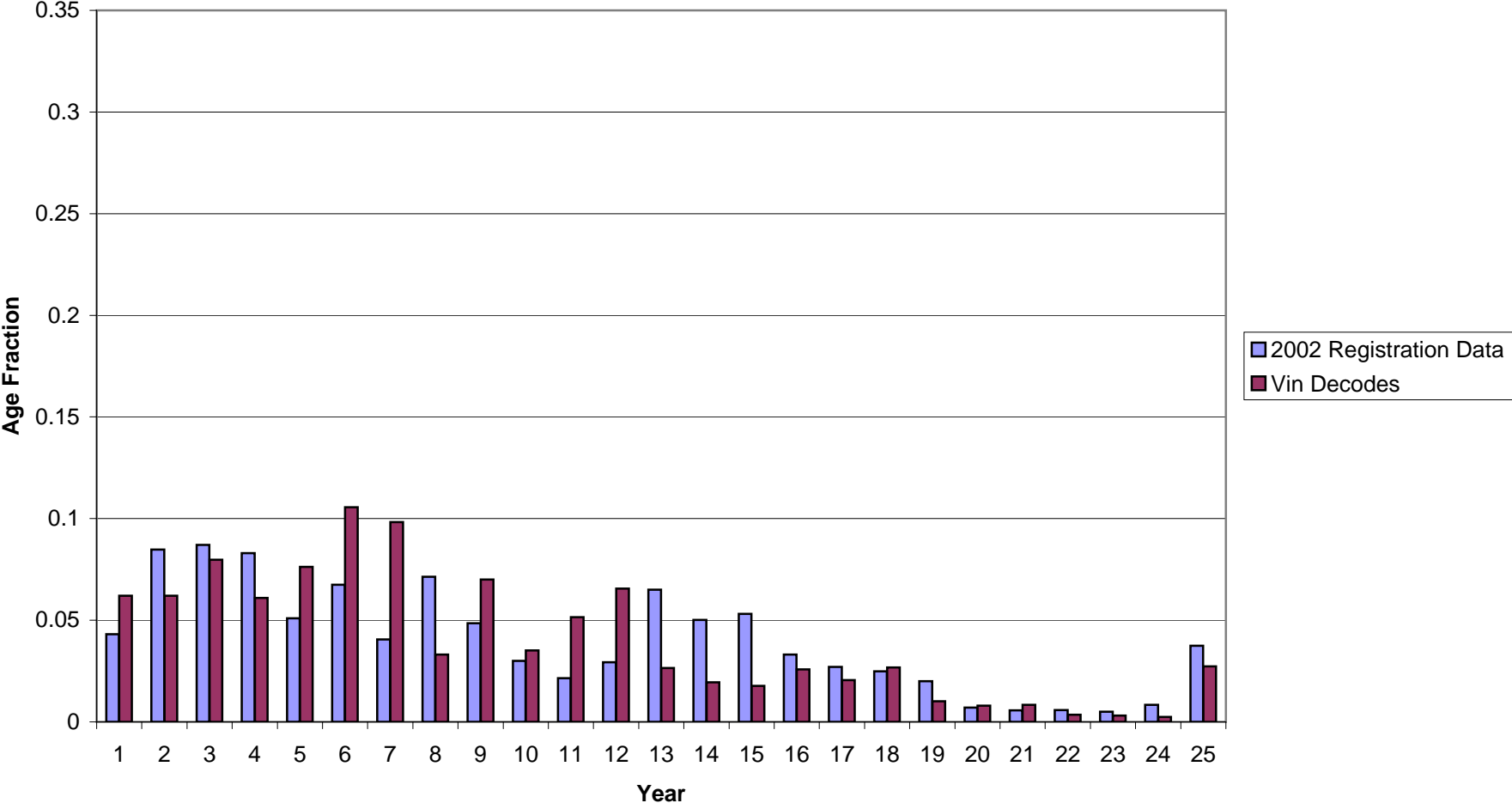




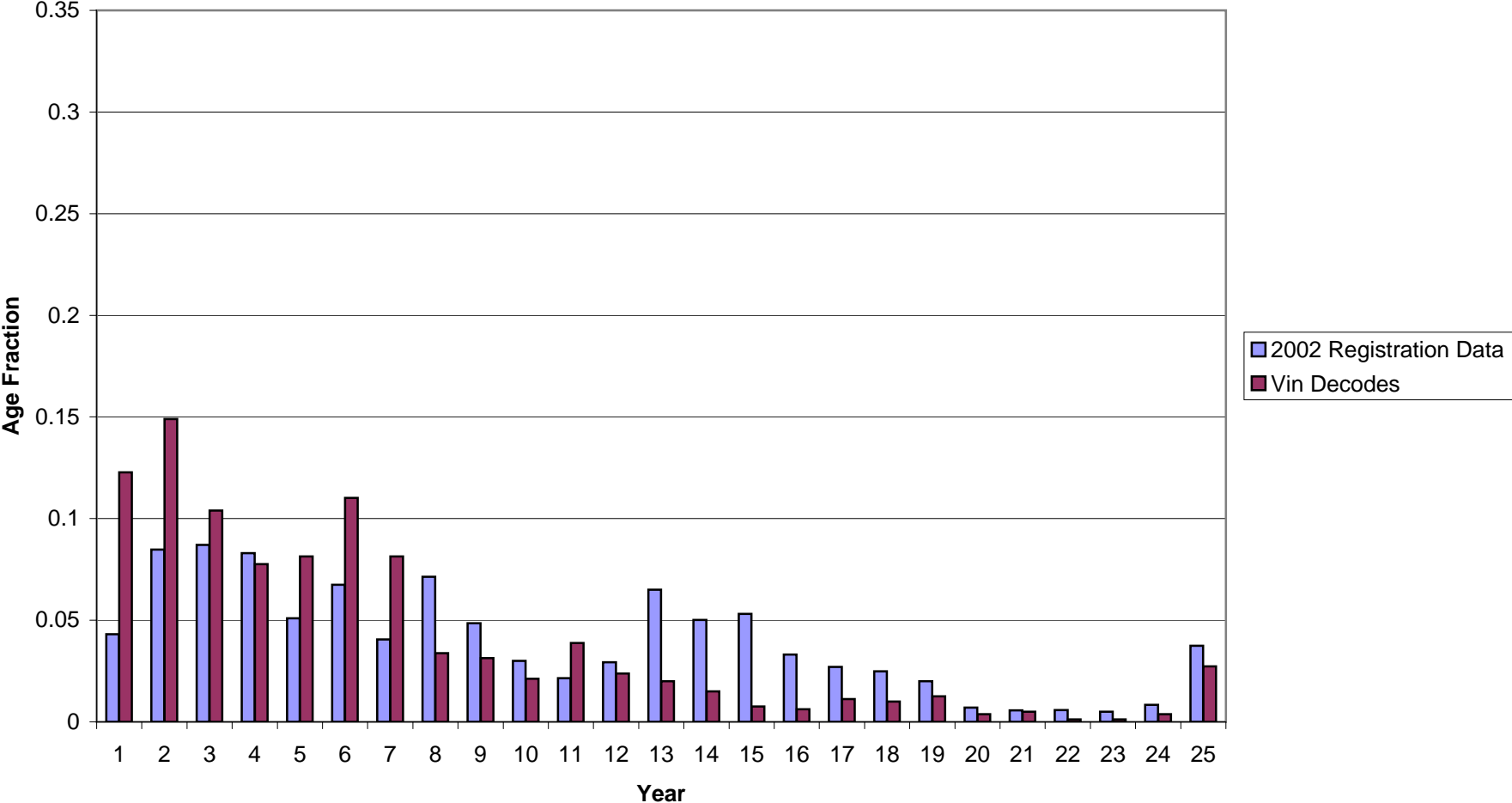
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV3  
Number of Decoded Vins = 2,712



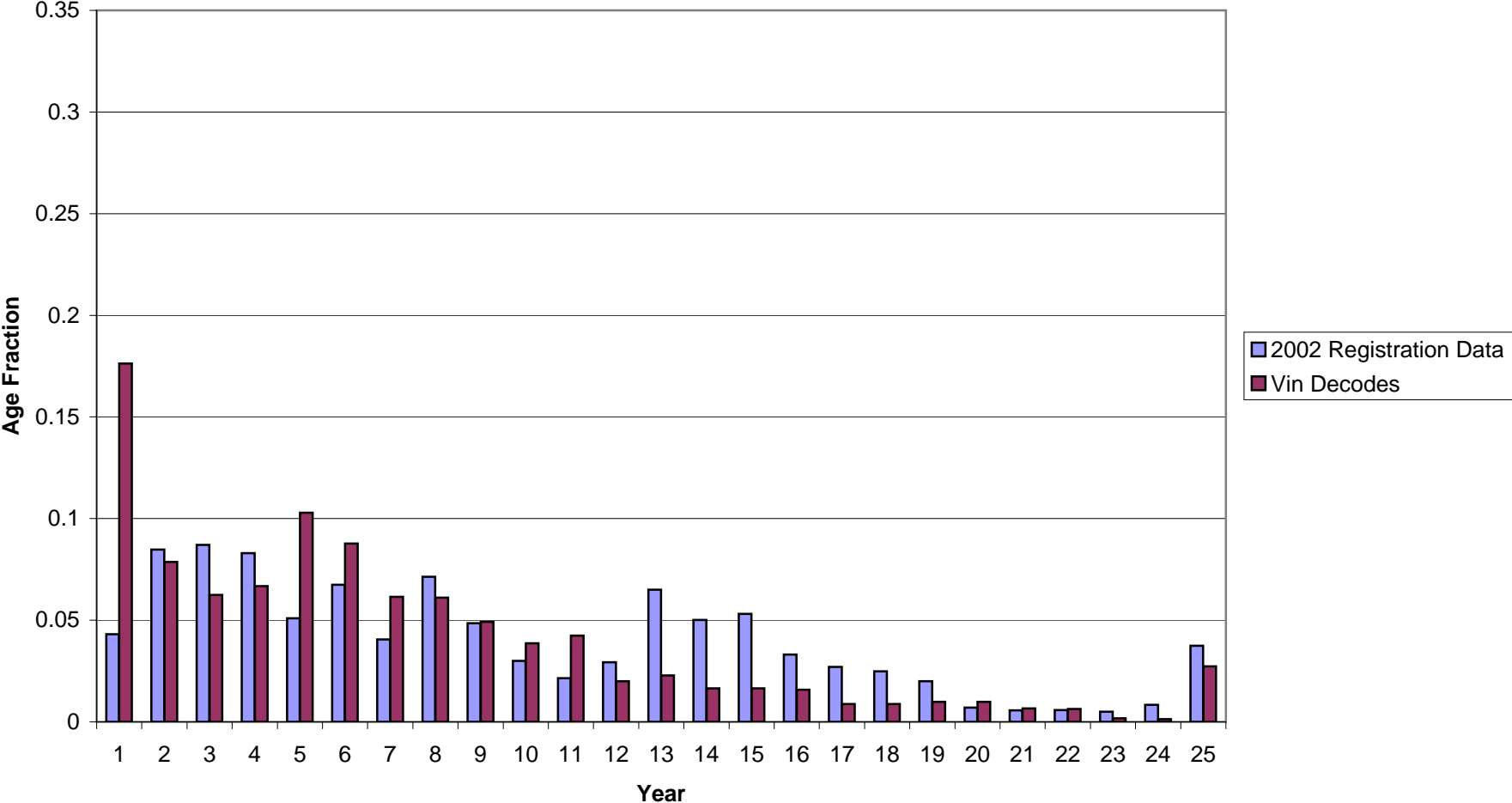
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV4  
Number of Decoded Vins = 2,792



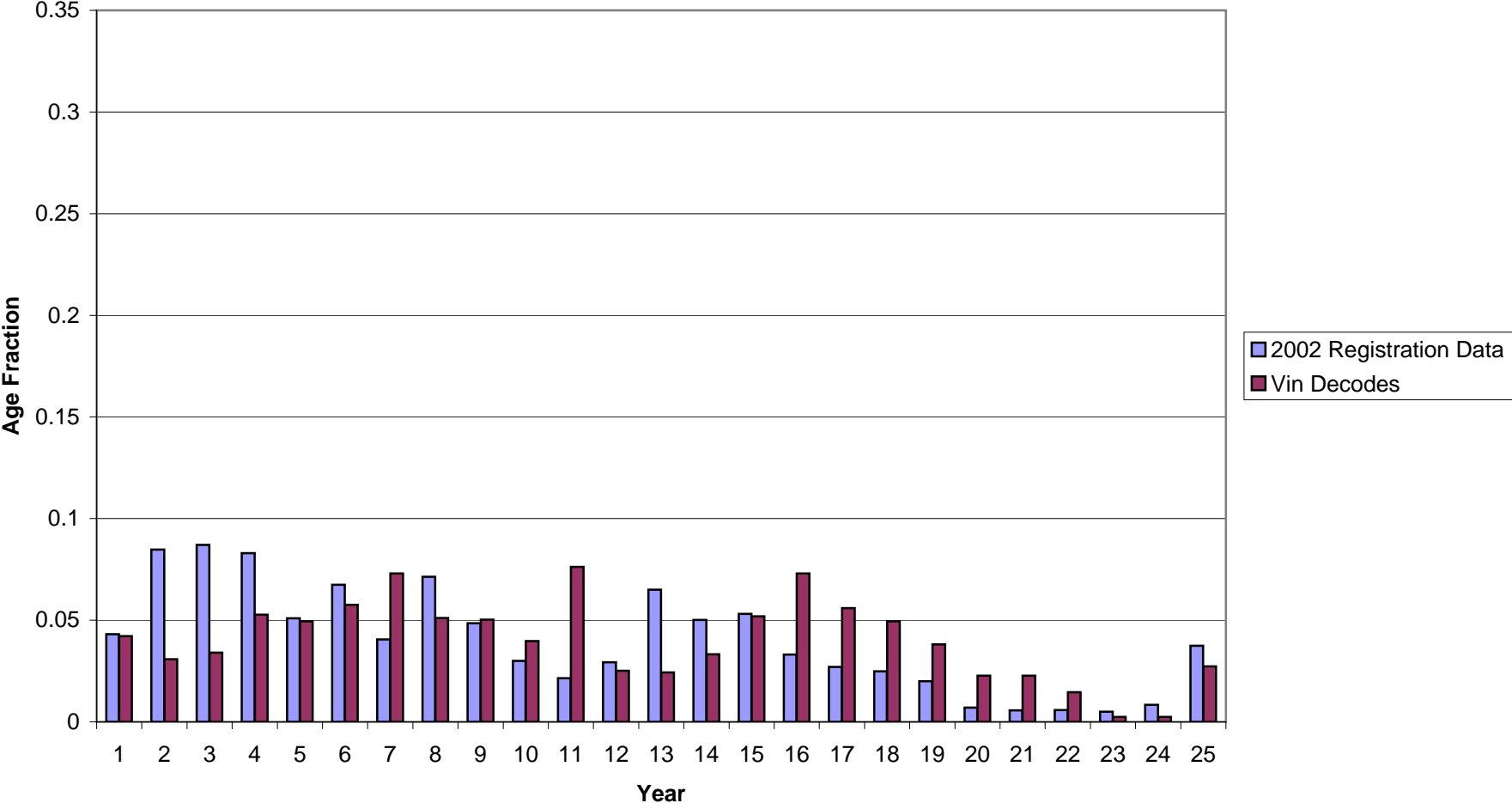
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV5  
Number of Decoded Vins = 777



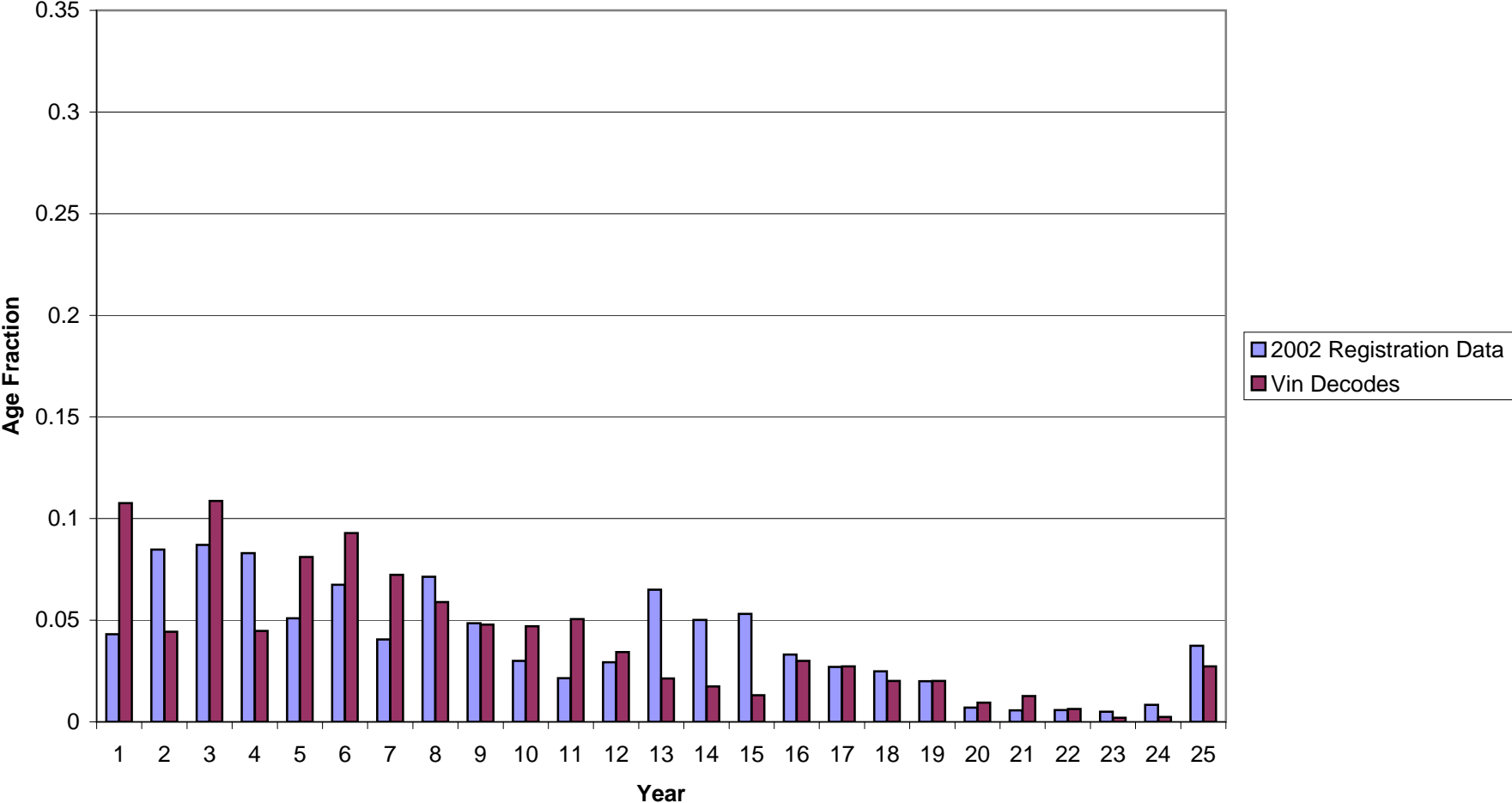
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV6  
Number of Decoded Vins = 2,770



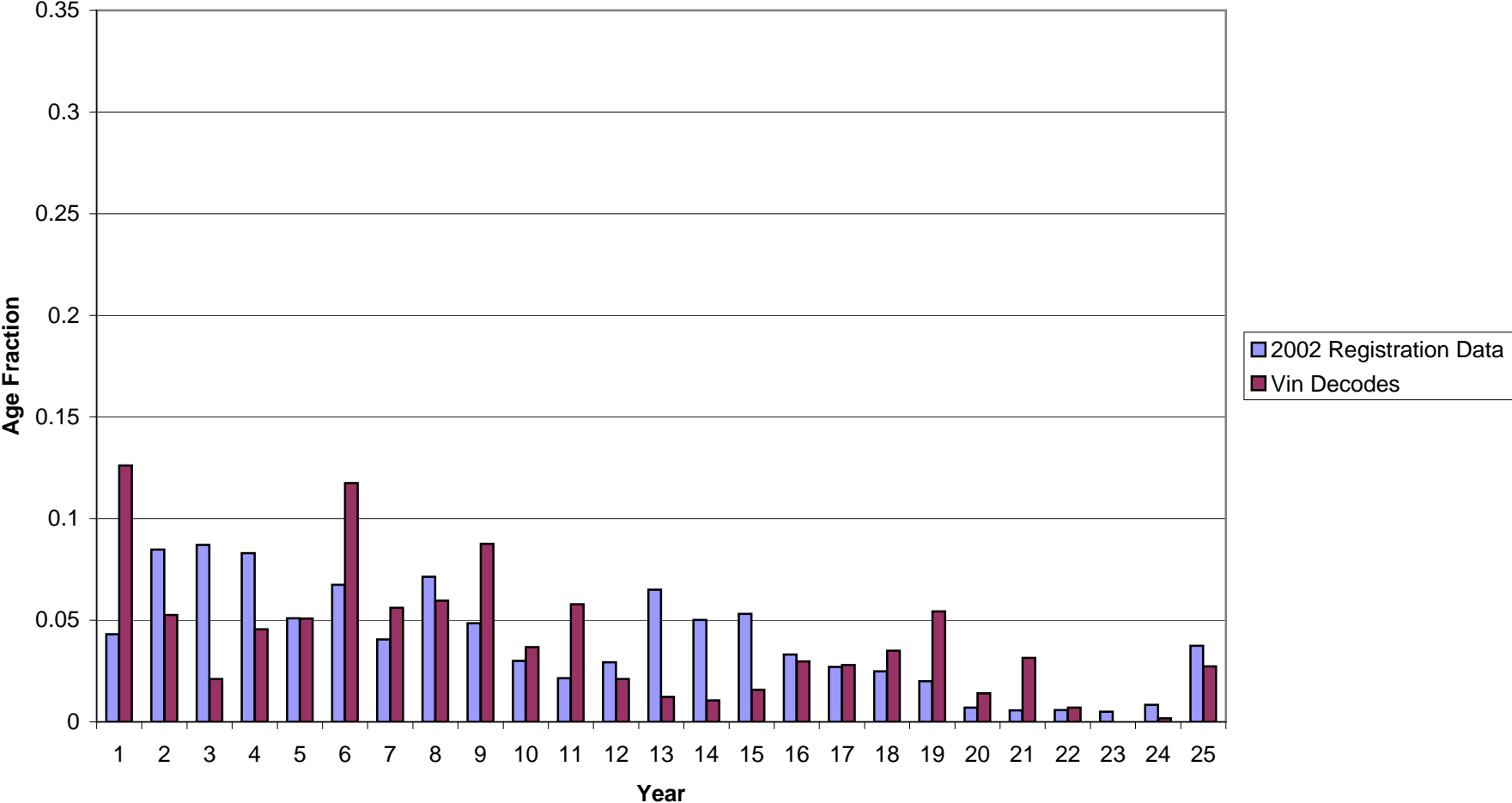
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV7  
Number of Decoded Vins = 1,200



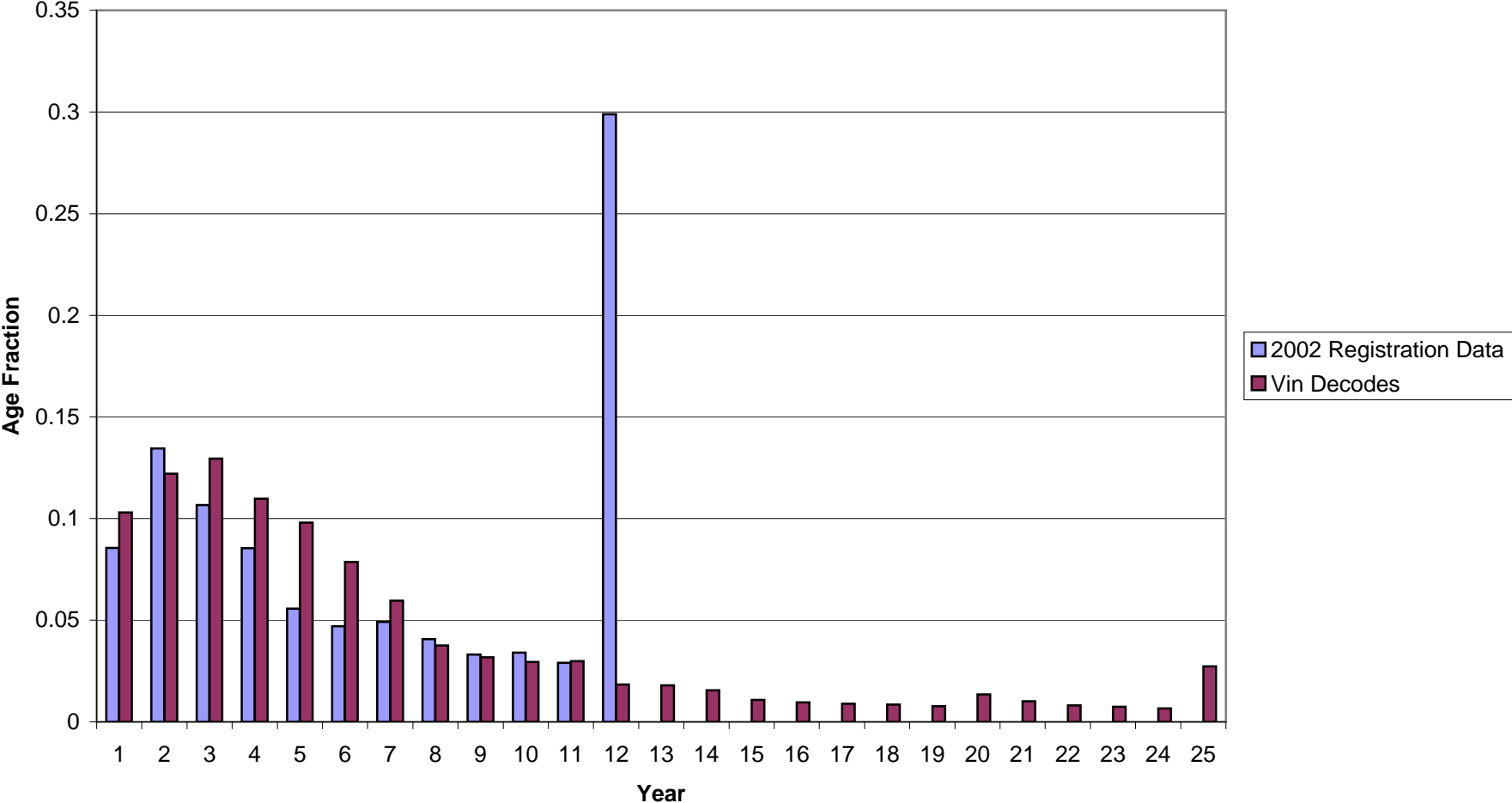
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV8A  
Number of Decoded Vins = 2,460



2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = HDV8B  
Number of Decoded Vins = 555



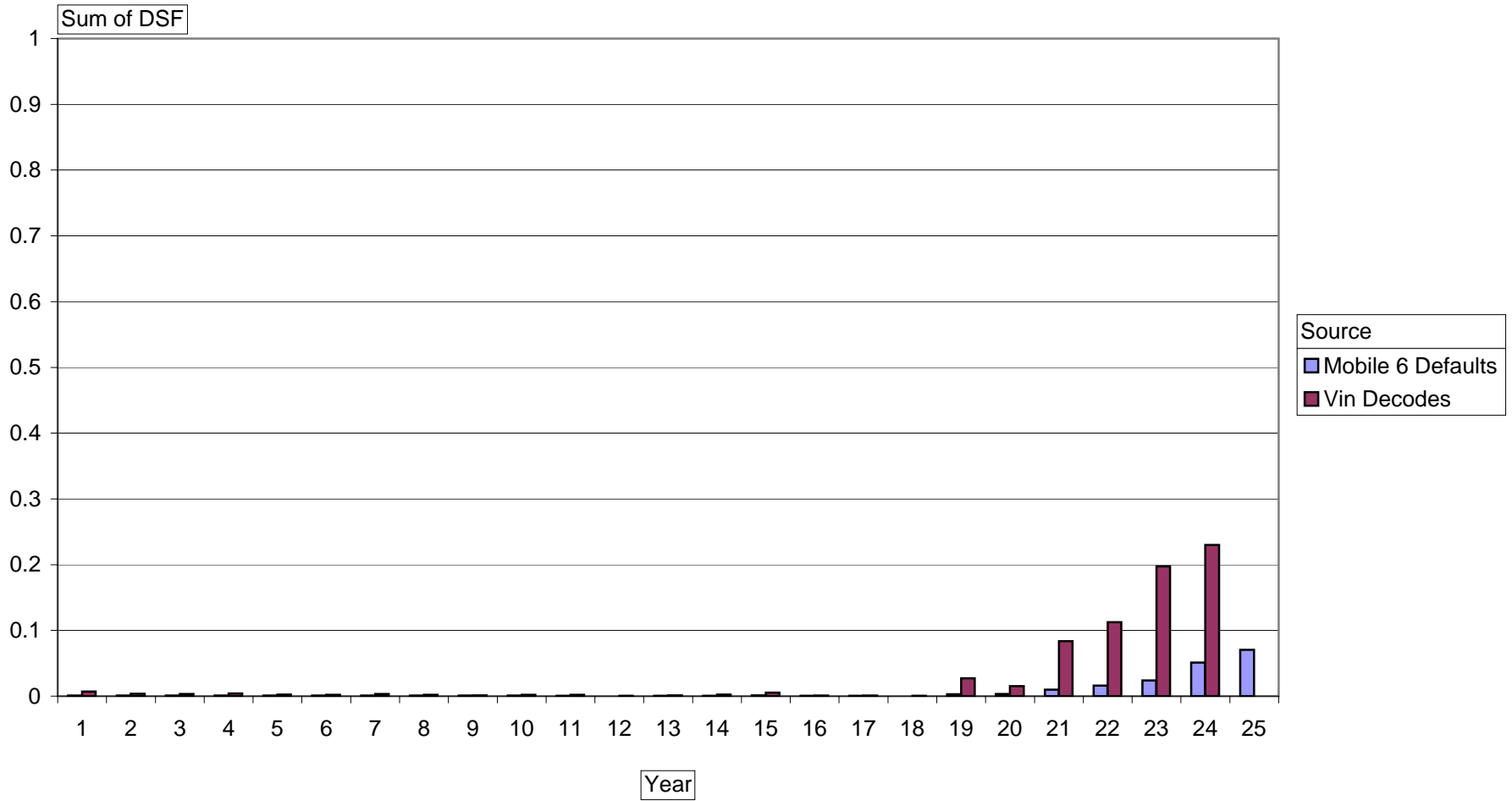
2005 Age Fractions  
Jurisdiction = PG  
Vehicle Type = MC  
Number of Decoded Vins = 7,733





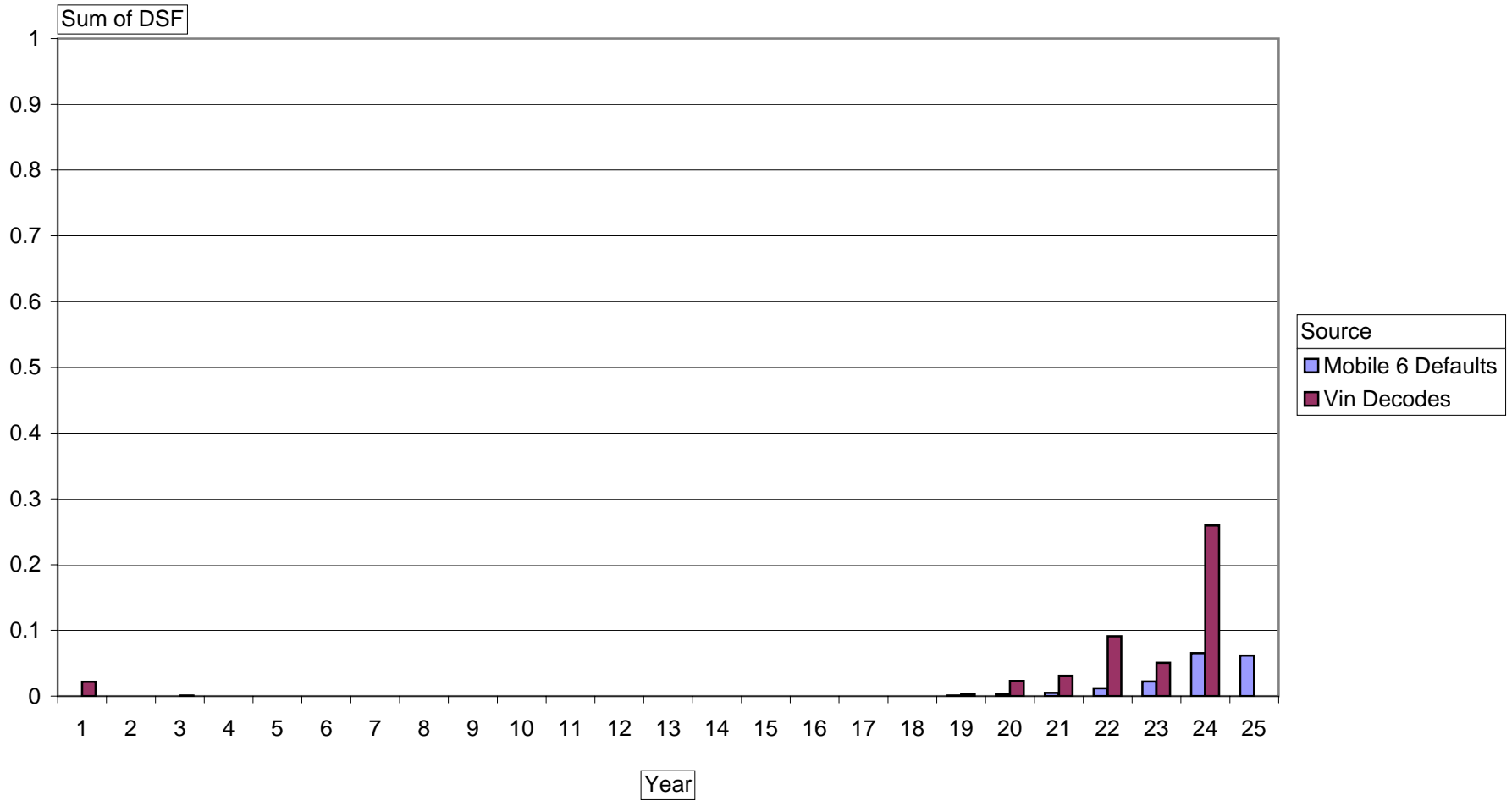
Vehicle Type LDV

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



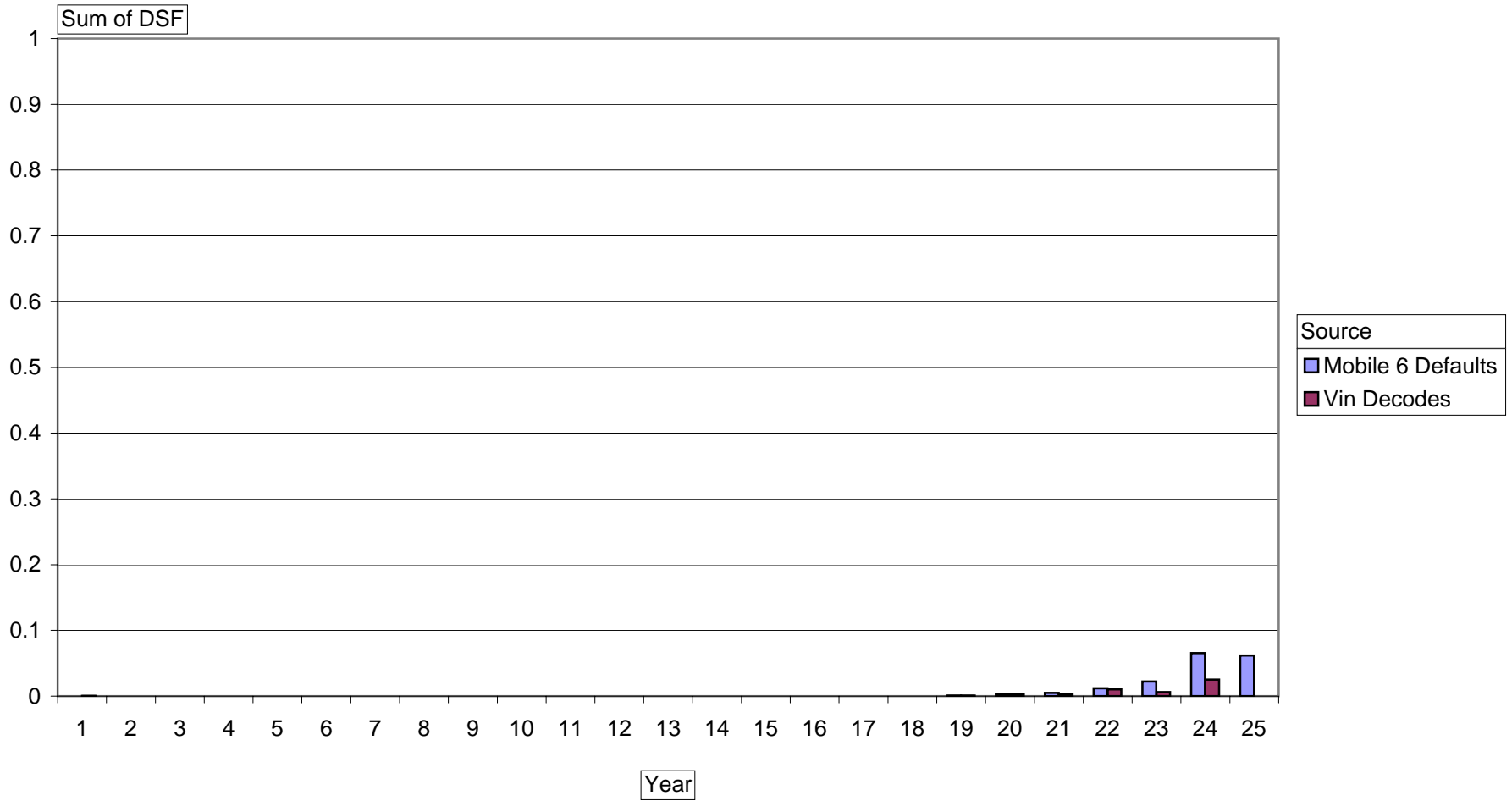
Vehicle Type LDT1

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



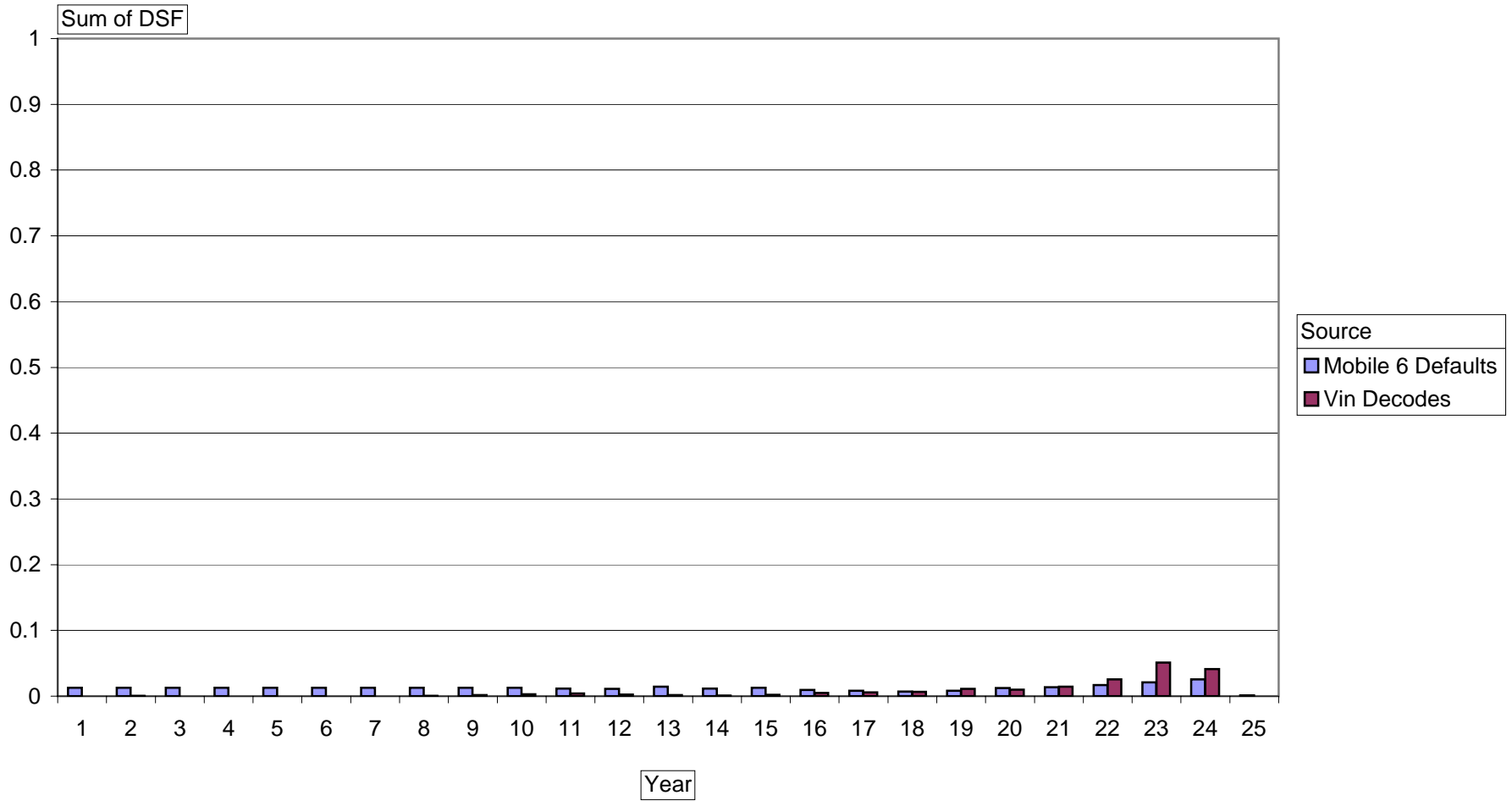
Vehicle Type LDT2

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



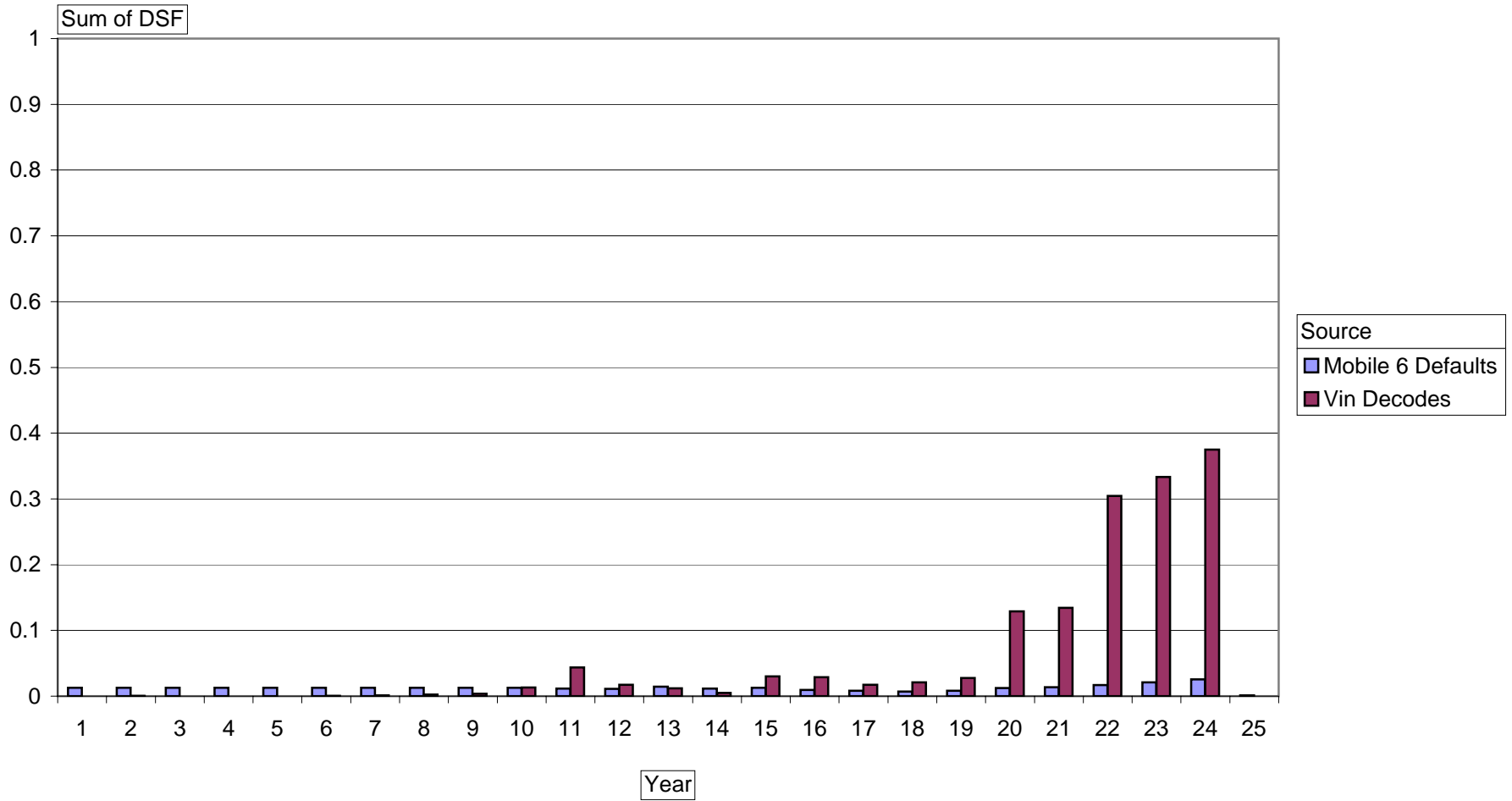
Vehicle Type LDT3

## Diesel Sales Fractions Maryland Jurisdictions Combined (CHLS, CLVT, FRED, MTG, PG)



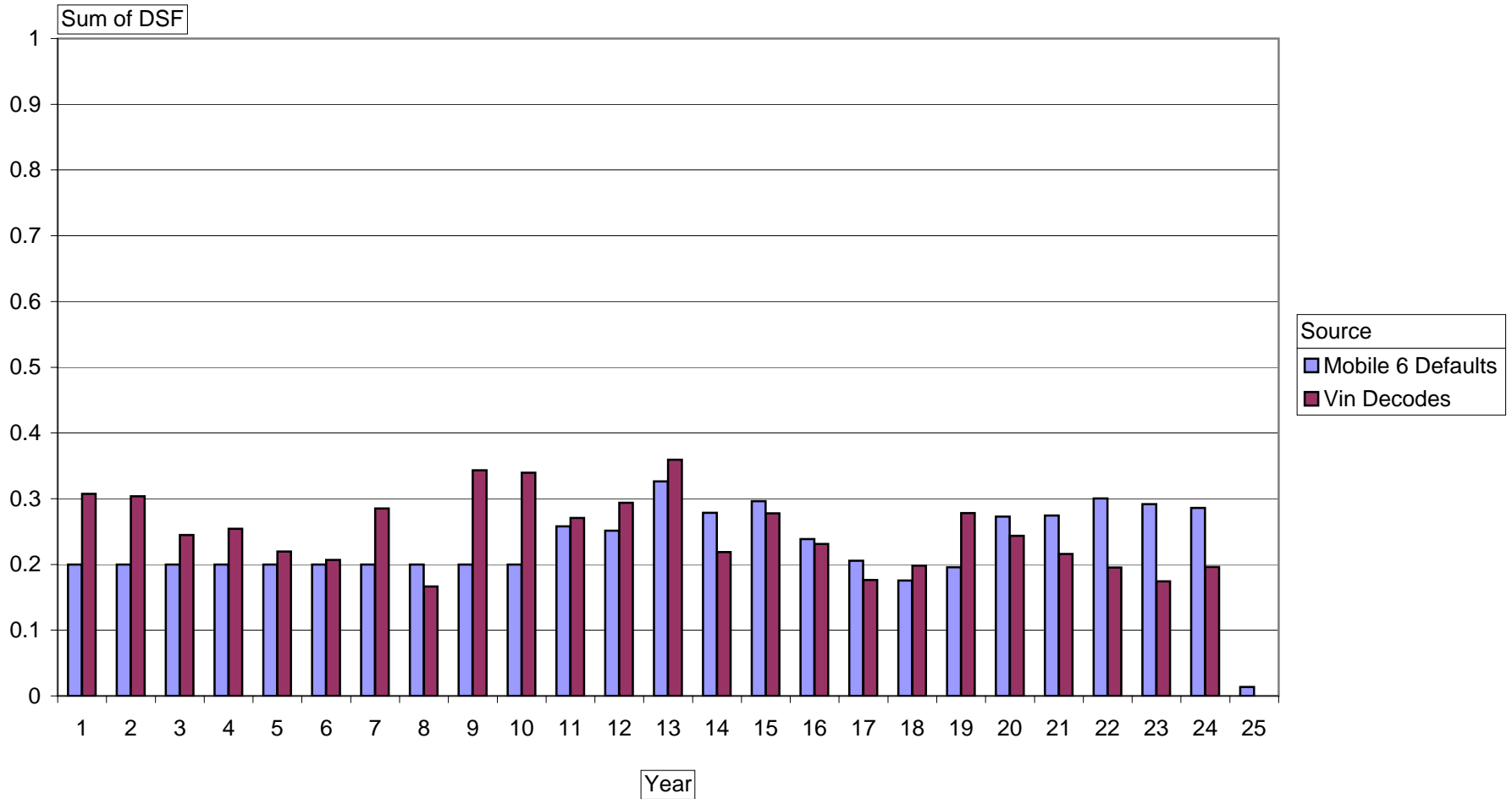
Vehicle Type LDT4

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



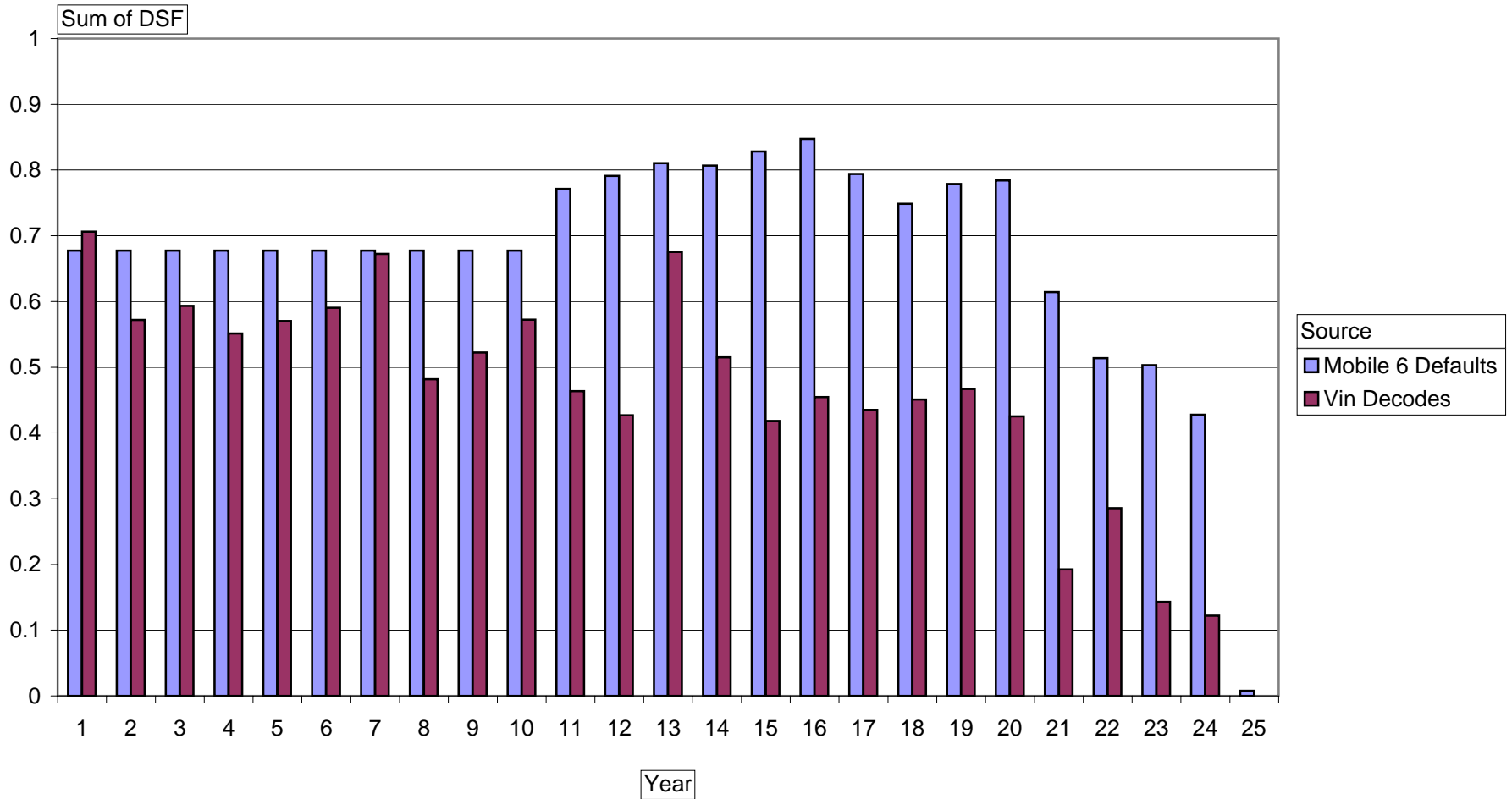
Vehicle Type HDV2B

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



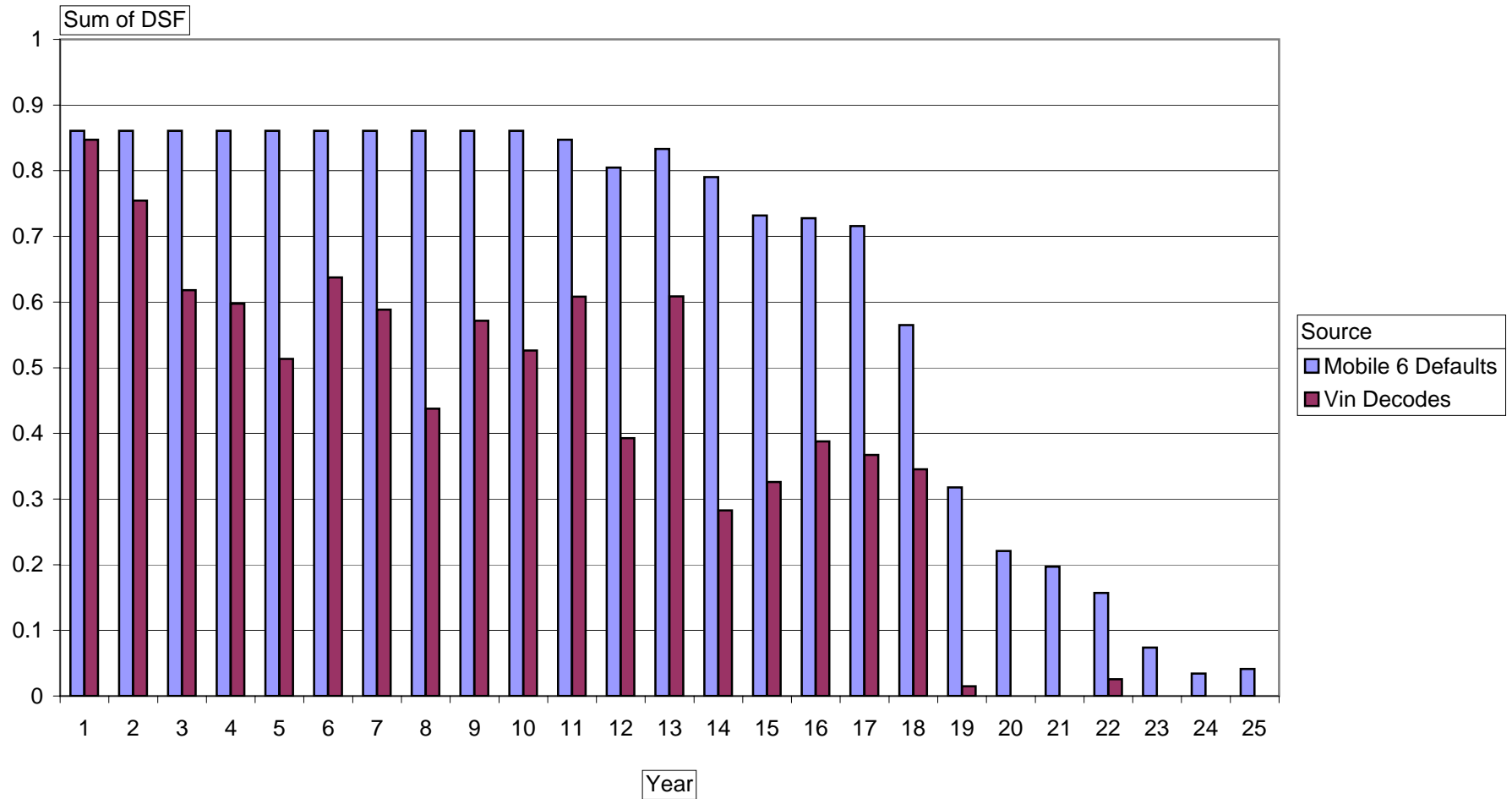
Vehicle Type HDV3

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



Vehicle Type HDV4

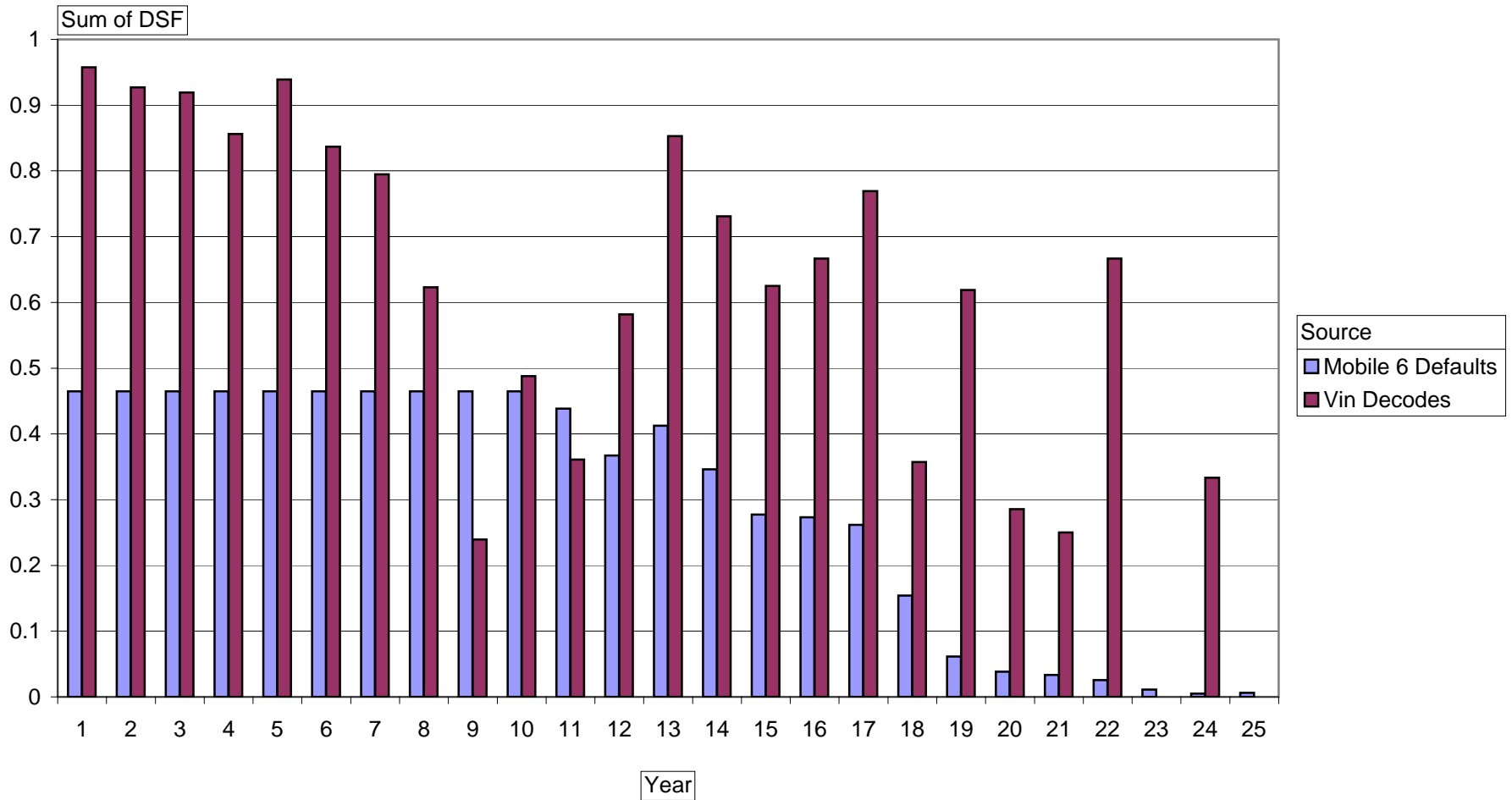
**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**





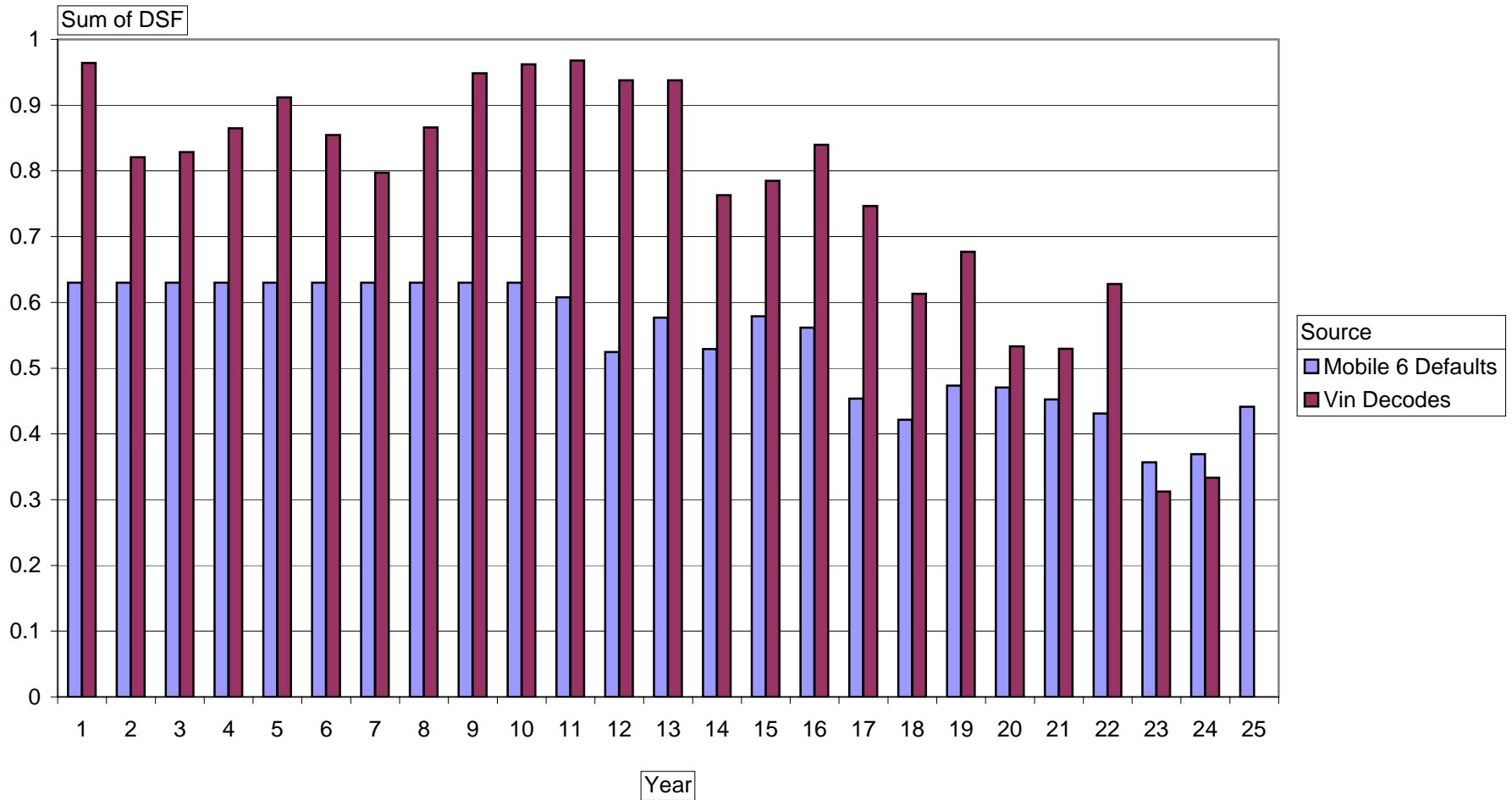
Vehicle Type HDV5

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



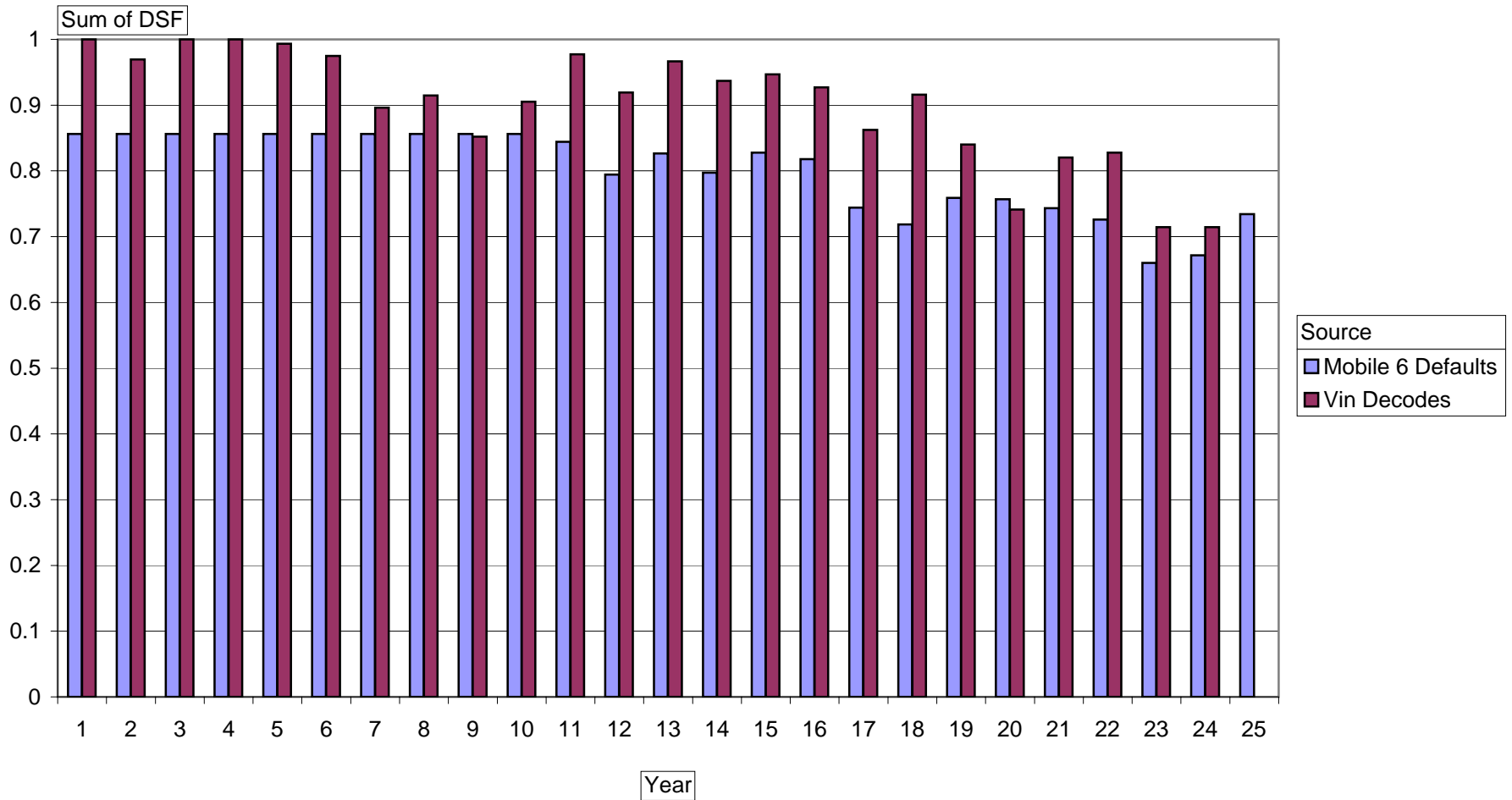
Vehicle Type HDV6

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



Vehicle Type HDV7

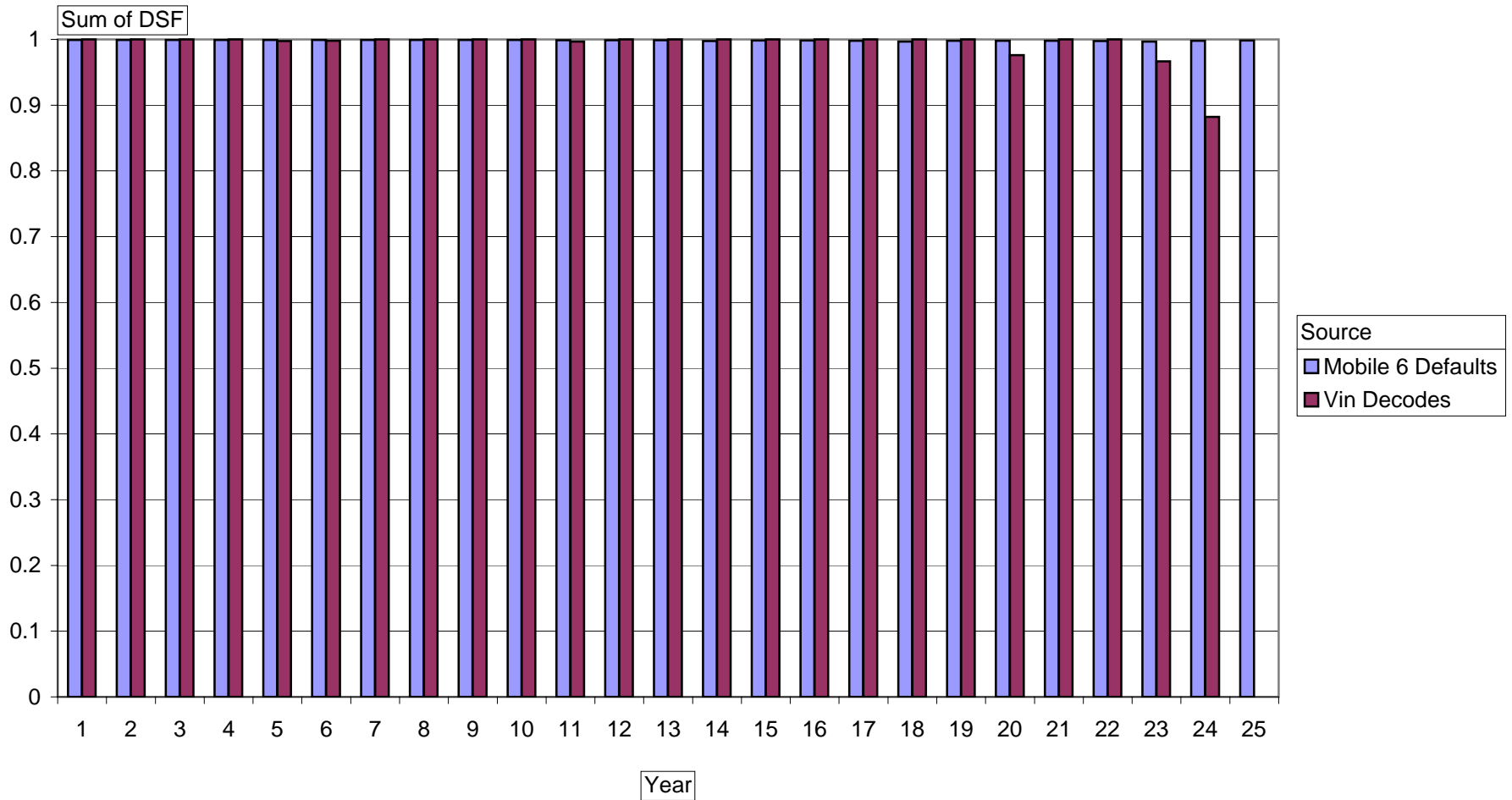
**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



# ATTACHMENT 5

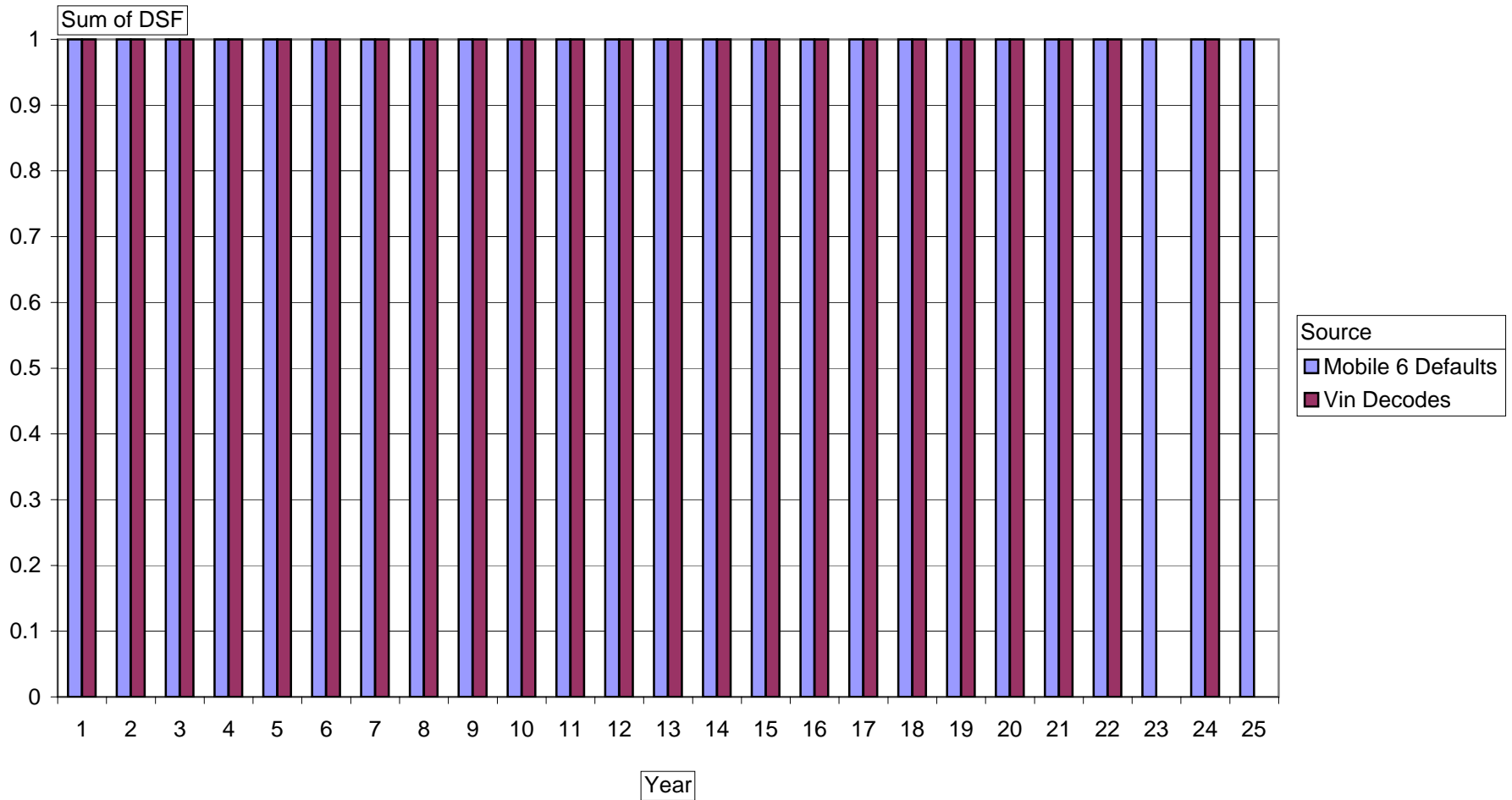
Vehicle Type HDV8A

## Diesel Sales Fractions Maryland Jurisdictions Combined (CHLS, CLVT, FRED, MTG, PG)



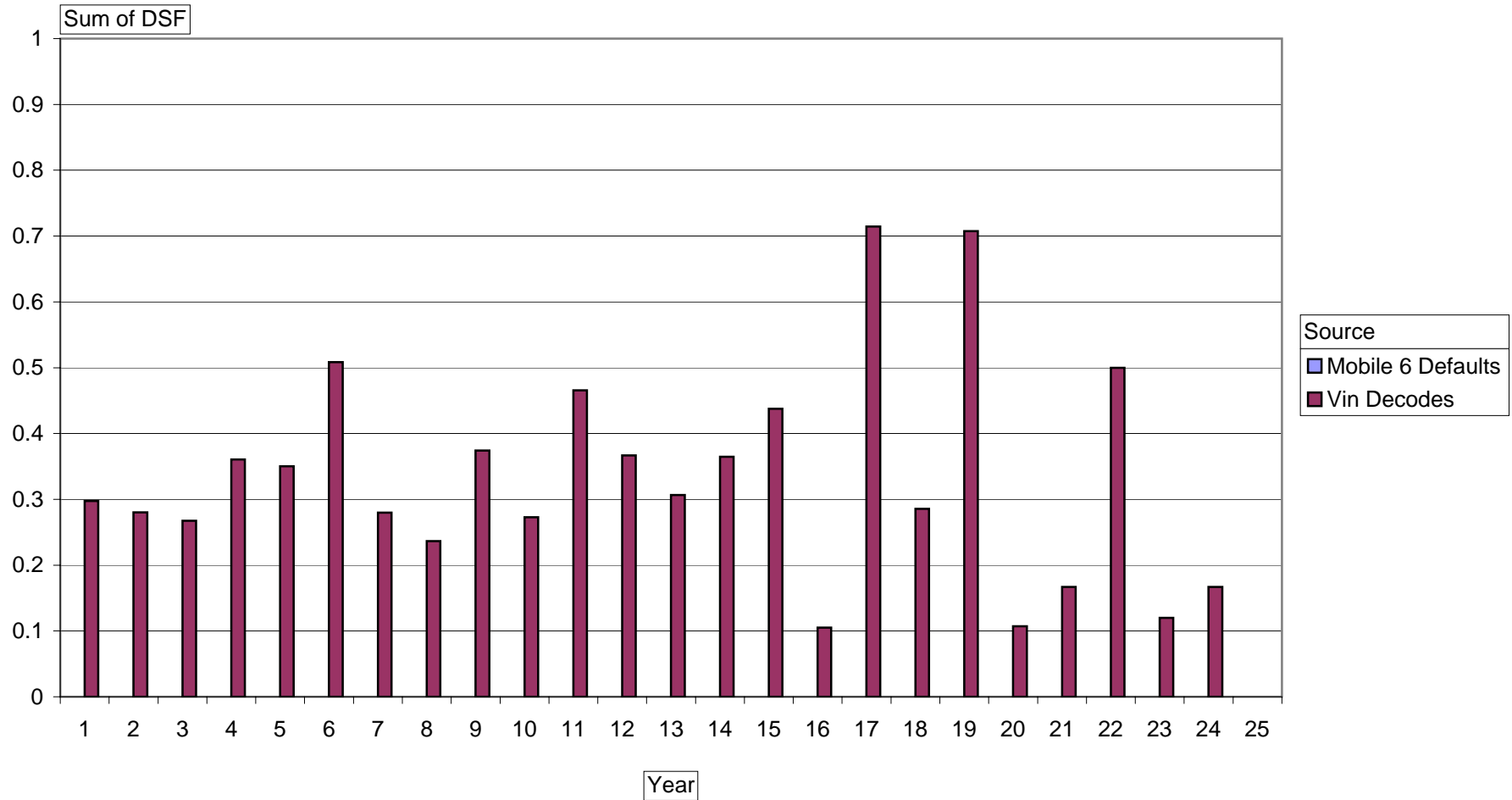
Vehicle Type HDV8B

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



Vehicle Type HDBT

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**



Vehicle Type HDBS

**Diesel Sales Fractions  
Maryland Jurisdictions Combined  
(CHLS, CLVT, FRED, MTG, PG)**

