

SUPPLEMENTAL ONLINE CONTENT

Woolf SH, Schoomaker H. Life expectancy and mortality rates in the United States, 1959-2017. *JAMA*. doi:10.1001/jama.2019.16932

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Joinpoint Chartbook

SUPPLEMENTAL METHODS

RURAL-URBAN CLASSIFICATIONS

Counties were classified as rural or urban based on the 2013 Rural-urban Continuum Codes

RURAL-URBAN CLASSIFICATION SCHEME	
Metropolitan Counties (Urban)	
Code	Description
Large central metro	MSA of 1 million or more population containing the largest principal city
Large fringe metro (suburbs)	MSA of 1 million or more population that do not qualify as large central metro counties
Medium metro	MSA with populations of 250,000-999,999
Small metro	MSA with populations less than 250,000
Nonmetropolitan Counties (Rural)	
Micropolitan	Urban cluster population of 10,000-49,999
Non-core	Nonmetropolitan counties that do not qualify as micropolitan.
MSA = Metropolitan Statistical Areas	

Source: Ingram DD, Franco SJ. 2013 NCHS urban–rural classification scheme for counties. *Vital Health Stat 2* 2014;(166):1-73.

JOINPOINT REGRESSION PROGRAM

The Joinpoint Regression Program, which is most commonly used to track mortality rates, was used in this study to model trends over time in life expectancy and all-cause mortality rates. Below are the model parameters and assumptions used for each analysis. BIC3, a modification of the Bayesian Information Criterion method, models the best fit by penalizing the cost of extra parameters (and with a harsher penalty than the original BIC method). BIC3 yields similar results as produced by the permutation test (PT) option, but with less computation time. The equation for computing the BIC3 for a k-joinpoint model is:

$$BIC3(k) = \ln\{SSE(k)/\#Obs\} + \{PenaltyCoefficient(k) / \#Obs\} * \ln(\#Obs)$$

where SSE(k) is the sum of squared errors of the k-joinpoint regression model, PenaltyCoefficient(k) = 3k + 2 is the penalty coefficient of the k-joinpoint model, and #Obs is the number of observations. The k-joinpoint model with the minimum value of BIC3(k) is selected as the final model.

Source: Joinpoint Help System, Version 4.7.0.0 – February 2019; Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute. Accessed 7-11-19 at <https://surveillance.cancer.gov/help/joinpoint/setting-parameters/method-and-parameters-tab/model-selection-method/bic-3>.

JOINPOINT ANALYSIS PARAMETERS	
Analysis of life expectancy data	
DV	Provided in Data File, life expectancy
IV	Year
Heteroscedastic Errors Option	Homoscedasticity
By Variables	State or nation, depending on run
Log Transformed	Yes

Grid Search Method	2,2,0
Number of Joinpoints	0-7
Autocorrelated Errors Options	Fit an autocorrelated model based on the data
Model Selection Method	BIC3
APC/AAPC/Tau Confidence Intervals	Parametric Method
AAPC Segment Range: Entire Range	2005-2016; 2010-2016
Analysis of mortality rates	
DV	Provided in Data File, age-adjusted mortality
IV	Year
Heteroscedastic Errors Option	Homoscedasticity
By Variables	State or nation, depending on run
Log Transformed	Yes
Grid Search Method	2,2,0
Number of Joinpoints	0-3
Autocorrelated Errors Options	Fit an autocorrelated model based on the data
Model Selection Method	BIC3
APC/AAPC/Tau Confidence Intervals	Parametric Method
AAPC Segment Range: Entire Range	2005-2017; 2010-2017

eTable 2. Age-Specific, All-Cause Mortality Rates, by Age Decile and Year, 1999-2017

Age (yrs)	Age-specific mortality rates (per 100,000), by year																			Relative increase (%)	
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2017 vs 1999	2017 vs 2010
<1	736.0	736.7	687.0	709.5	704.9	695.9	710.2	705.8	702.5	679.0	659.7	623.4	600.1	599.3	594.7	588.0	589.6	583.4	567.0	-23.0	-9.0
1-4	34.2	32.4	33.4	31.4	31.8	30.3	29.9	29.1	29.4	29.3	27.4	26.6	26.3	26.3	25.5	24.0	24.9	25.4	24.3	-29.1	-8.7
5-14	18.6	18.1	17.2	17.4	17.0	16.7	16.3	15.2	15.2	13.9	13.8	12.9	13.2	12.6	13.0	12.8	13.2	13.4	13.6	-27.1	5.4
15-24	79.3	79.9	80.2	80.9	81.1	79.7	80.7	81.4	78.8	74.2	69.8	67.7	67.7	66.4	64.8	65.5	69.5	74.9	74.1	-6.6	9.3
25-34	102.2	101.4	105.6	105.1	105.2	104.1	106.8	109.0	107.2	105.1	104.4	102.9	104.7	105.4	106.1	108.4	116.7	129.0	132.8	29.9	29.0
35-44	198.0	198.9	203.5	204.2	202.6	194.9	194.9	192.0	186.0	181.0	180.0	170.5	172.0	170.7	172.0	175.2	180.1	192.2	195.2	-1.4	14.5
45-54	418.2	425.6	426.7	431.1	433.1	426.9	431.9	427.5	420.3	419.6	418.1	407.1	409.8	405.4	406.1	404.8	404.0	405.5	401.5	-4.0	-1.4
55-64	1005.0	992.2	972.5	948.7	937.3	903.2	898.5	881.3	866.7	867.1	856.7	851.9	849.4	854.2	860.0	870.3	875.3	883.8	885.8	-11.9	4.0
65-74	2457.3	2399.1	2344.2	2300.3	2235.0	2141.0	2109.7	2031.4	1976.0	1958.4	1888.7	1875.1	1846.2	1802.5	1802.1	1786.3	1796.8	1788.6	1790.9	-27.1	-4.5
75-84	5714.5	5666.5	5573.7	5543.8	5451.3	5267.4	5251.8	5096.1	4987.1	4998.1	4820.2	4790.2	4753.1	4674.5	4648.1	4564.2	4579.2	4474.8	4472.6	-21.7	-6.6
85+	15,554.6	15,524.4	15,432.6	15,589.5	15,401.4	14,777.6	14,982.4	14,426.7	14,160.9	14,332.4	13,660.1	13,934.3	13,779.3	13,678.6	13,660.4	13,407.9	13,673.9	13,392.1	13,573.6	-12.7	-2.6

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2017 on CDC WONDER Online Database, released December, 2018.

eTable 3. Increase in Age-Specific Mortality for Selected Causes, by Age Decile, 1999-2017

CAUSE OF DEATH (ICD-10 CODES ¹)	CHANGE MEASURES	CHANGE IN MORTALITY BETWEEN 1999 AND 2017, BY AGE (YRS)											CHANGE IN MORTALITY BETWEEN 2010 AND 2017, BY AGE (YRS)										
		<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
ALL-CAUSE MORTALITY	Baseline mortality rate	736.0	34.2	18.6	79.3	102.2	198.0	418.2	1005.0	2457.3	5714.5	15,554.6	623.4	26.6	12.9	67.7	102.9	170.5	407.1	851.9	1875.1	4790.2	13,934.3
	Absolute increase (per 100,000)	-169.0	-10.0	-5.0	-5.2	30.6	-2.8	-16.7	-119.2	-666.3	-1241.9	-1981.0	-56.4	-2.3	0.7	6.3	29.9	24.7	-5.6	33.9	-84.2	-317.6	-360.7
	Relative increase (%)	-23.0	-29.1	-27.1	-6.6	29.9	-1.4	-4.0	-11.9	-27.1	-21.7	-12.7	-9.0	-8.7	5.4	9.3	29.0	14.5	-1.4	4.0	-4.5	-6.6	-2.6
EXTRANEOUS (EXTERNAL) CAUSES (V01-Y89)	Absolute increase (per 100,000)	10.5	-4.8	-3.3	-1.3	34.2	26.7	34.1	34.7	9.0	12.7	90.9	5.0	-1.1	0.6	7.5	27.3	24.5	16.0	20.7	11.1	11.7	51.6
	Relative increase (%)	31.0	-31.7	-34.8	-2.2	62.0	45.4	64.1	71.9	14.0	9.9	28.6	12.8	-9.7	10.7	14.8	43.8	40.3	22.5	33.4	17.8	9.0	14.4
Accidental drug poisoning (X40-X44)	Absolute increase (per 100,000)	UR	UR	UR	9.0	29.5	25.5	25.4	21.2	5.5	0.6	-0.3	UR	UR	0.0	4.3	19.6	18.4	13.2	12.8	3.8	0.1	-0.6
	Relative increase (%)	UR	UR	UR	409.5	531.4	267.9	350.9	909.2	460.4	35.9	-11.8	UR	UR	-31.7	63.2	126.6	110.1	67.7	119.1	133.2	4.8	-19.2
Accidental alcohol poisoning (X45)	Absolute increase (per 100,000)	UR	UR	UR	0.2	0.6	0.9	1.3	1.2	UR	UR	UR	UR	UR	UR	0.0	0.0	-0.1	0.0	0.2	-0.1	0.3	UR
	Relative increase (%)	UR	UR	UR	253.8	629.7	320.0	564.1	787.1	UR	UR	UR	UR	UR	UR	0.9	5.8	-5.1	-2.3	19.5	-9.5	149.3	UR
Pedestrian/cyclist/motorcyclist accident (V01-V29)	Absolute increase (per 100,000)	UR	-0.5	-0.9	0.3	1.2	0.5	1.8	2.5	1.1	0.3	-1.7	UR	0.0	-0.1	0.3	1.0	0.7	0.8	1.4	0.9	0.7	0.2
	Relative increase (%)	UR	-30.5	-59.5	9.6	34.6	12.5	49.7	73.6	31.9	5.4	-27.0	UR	-2.8	-9.8	9.2	25.6	16.5	16.1	32.0	26.4	15.5	5.7
Other transport accidents (see notes ²) (V80-V99)	Absolute increase (per 100,000)	-0.7	-0.4	-0.6	-3.3	0.4	0.0	0.0	-0.2	-1.9	-1.9	-1.8	0.4	0.1	0.1	0.0	1.1	1.0	0.9	0.9	0.1	0.6	-0.3
	Relative increase (%)	-31.8	-24.5	-33.2	-27.7	5.1	0.3	-0.6	-3.4	-22.9	-15.4	-13.1	37.1	11.5	14.1	0.4	17.4	17.7	17.1	16.9	1.9	5.8	-2.1
Intentional self-harm (suicide) (X60-X84)	Absolute increase (per 100,000)	UR	UR	0.7	4.3	4.8	3.6	6.3	6.8	2.1	-0.1	0.8	UR	UR	0.6	3.9	3.6	2.0	0.7	1.5	1.9	2.3	2.5
	Relative increase (%)	UR	UR	113.4	43.1	37.9	25.0	45.2	55.9	15.9	-0.7	4.1	UR	UR	90.2	37.0	25.5	12.2	3.4	8.6	13.6	14.6	14.0
Assault (homicide) (X85-Y09)	Absolute increase (per 100,000)	-1.1	-0.5	-0.3	-1.6	1.6	1.0	0.8	0.6	-0.5	-0.8	-0.6	-0.2	-0.5	0.2	0.6	1.8	2.2	0.9	0.8	0.1	-0.2	-0.2
	Relative increase (%)	-12.1	-22.8	-25.4	-12.3	15.0	14.8	17.3	20.1	-18.6	-32.9	-24.6	-2.8	-20.2	24.2	5.8	17.2	36.8	21.1	29.5	4.7	-11.2	-11.2
ORGAN DISEASES																							
Infectious and parasitic diseases (A00-B99)	Absolute increase (per 100,000)	-1.7	-0.6	-0.3	-0.6	-5.9	-13.2	-8.3	5.1	1.4	1.5	-14.0	-4.6	-0.1	0.0	-0.3	-0.6	-2.7	-5.3	-1.9	0.7	-11.5	-29.6
	Relative increase (%)	-11.7	-38.7	-52.1	-46.3	-70.0	-71.0	-37.4	21.2	3.0	1.4	-5.2	-25.9	-5.9	-10.9	-28.3	-18.3	-33.0	-27.9	-6.1	1.5	-9.7	-10.5
Misc. infectious diseases (see notes ³) (A00-A99)	Absolute increase (per 100,000)	-0.5	-0.5	-0.1	-0.1	0.2	0.3	1.7	4.3	3.9	6.2	-10.5	-5.6	-0.2	0.0	-0.1	0.2	0.3	0.8	1.8	0.4	-10.5	-32.2
	Relative increase (%)	-4.9	-50.4	-25.1	-24.7	19.2	14.3	30.6	32.1	10.8	6.9	-4.3	-37.1	-31.6	-6.3	-13.0	16.3	13.2	12.4	11.1	1.1	-9.8	-12.0
Neoplasms (C00-D48)	Absolute increase (per 100,000)	-0.8	-0.8	-0.5	-1.3	-2.1	-10.7	-35.4	-102.3	-263.7	-275.7	-206.2	-0.3	-0.2	-0.2	-0.5	-0.9	-2.3	-19.2	-27.1	-100.0	-145.9	-132.9
	Relative increase (%)	-25.1	-26.4	-18.1	-28.6	-20.2	-28.3	-27.4	-27.0	-31.3	-20.1	-10.9	-10.8	-7.4	-8.2	-13.6	-10.0	-7.7	-17.0	-8.9	-14.8	-11.8	-7.3
Liver cancer (C22)	Absolute increase (per 100,000)	UR	UR	UR	-0.1	0.0	-0.2	0.3	9.7	10.0	10.4	12.1	UR	UR	0.0	0.0	0.0	0.1	-1.2	2.5	6.7	3.5	3.9
	Relative increase (%)	UR	UR	UR	-56.3	25.0	-16.1	6.9	110.0	52.5	37.3	39.7	UR	UR	4.9	-31.6	10.7	7.8	-21.3	15.8	30.4	10.0	10.1

eTable 3. Increase in Age-Specific Mortality for Selected Causes, by Age Decile, 1999-2017 (Continued)

CAUSE OF DEATH (ICD-10 CODES ¹)	CHANGE MEASURES	CHANGE IN MORTALITY BETWEEN 1999 AND 2017, BY AGE (YRS)											CHANGE IN MORTALITY BETWEEN 2010 AND 2017, BY AGE (YRS)										
		<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Endocrine/nutritional/metabolic diseases (E00-E88)	Absolute increase (per 100,000)	-2.2	-0.1	0.0	0.0	1.0	2.2	5.0	3.8	-10.7	-22.6	-48.6	-0.1	0.0	0.0	0.1	0.5	1.5	3.9	6.8	10.5	11.8	32.1
	Relative increase (%)	-31.7	-14.8	-8.0	-3.2	38.0	34.1	29.0	8.1	-9.7	-9.9	-9.2	-1.5	3.1	-0.1	8.7	16.6	20.3	21.6	15.6	11.8	6.0	7.1
Diabetes mellitus (E10-E14)	Absolute increase (per 100,000)	UR	UR	0.0	0.2	0.4	0.9	2.2	-2.8	-19.9	-37.2	-54.8	UR	UR	0.0	0.2	0.3	0.8	2.7	3.5	4.3	-3.3	-23.1
	Relative increase (%)	UR	UR	5.6	43.1	25.3	20.3	16.8	-7.2	-21.7	-20.9	-17.3	UR	UR	30.6	51.6	23.0	19.0	21.3	10.9	6.3	-2.3	-8.1
Obesity and other hyperalimentation (E65-E68)	Absolute increase (per 100,000)	UR	UR	UR	0.0	0.5	1.1	1.8	2.9	3.5	3.1	2.2	UR	UR	UR	0.0	0.1	0.4	0.7	0.8	1.3	1.4	1.3
	Relative increase (%)	UR	UR	UR	9.7	105.4	106.4	106.4	136.7	149.7	144.9	156.9	UR	UR	UR	-7.6	17.4	24.8	24.6	20.0	28.6	37.5	54.2
Metabolic disorders (E70-E88)	Absolute increase (per 100,000)	-1.6	-0.1	-0.1	-0.2	0.1	0.2	0.9	3.0	4.8	11.0	-2.7	-0.2	0.1	0.0	-0.1	0.0	0.2	0.5	1.9	3.2	8.0	12.6
	Relative increase (%)	-29.0	-12.3	-18.2	-29.8	19.6	26.4	52.5	64.4	39.5	33.1	-2.1	-5.3	10.0	-10.1	-14.7	3.1	19.3	19.9	31.6	23.1	22.1	11.0
Mental and behavioral disorders (F01-F99)	Absolute increase (per 100,000)	UR	UR	UR	-0.1	0.7	-0.8	1.7	6.7	17.7	118.2	772.6	UR	UR	UR	0.1	1.2	1.4	1.7	3.9	1.7	-27.5	-78.0
	Relative increase (%)	UR	UR	UR	-9.8	39.0	-15.1	23.3	84.0	110.7	145.3	149.9	UR	UR	UR	25.4	82.4	47.2	23.7	35.3	5.3	-12.1	-5.7
Organic mental disorders (e.g., vascular dementia) (F01-F09)	Absolute increase (per 100,000)	UR	UR	UR	UR	UR	UR	0.2	2.0	15.4	120.6	783.9	UR	UR	UR	UR	UR	UR	-0.1	-0.4	-1.3	-28.0	-76.2
	Relative increase (%)	UR	UR	UR	UR	UR	UR	127.5	190.9	169.2	169.2	159.3	UR	UR	UR	UR	UR	UR	-29.0	-12.8	-5.2	-12.7	-5.6
Mental/behavioral disorders due to psychoactive substance use (F10-F19)	Absolute increase (per 100,000)	UR	UR	UR	-0.1	0.7	-0.7	1.4	4.4	2.1	-0.6	-0.2	UR	UR	UR	0.1	1.2	1.4	1.9	4.1	2.6	0.8	0.2
	Relative increase (%)	UR	UR	UR	-13.7	46.9	-15.1	21.5	68.4	38.2	-11.7	-5.7	UR	UR	UR	45.2	100.1	56.4	30.3	61.1	54.2	21.1	7.1
Diseases of the nervous system (G00-G98)	Absolute increase (per 100,000)	-5.2	-1.0	-0.2	0.0	0.9	0.8	2.1	8.6	25.2	172.2	931.4	-2.4	-0.2	0.1	0.0	0.5	0.4	0.8	4.6	16.7	88.7	480.7
	Relative increase (%)	-44.9	-44.2	-12.4	0.3	45.5	19.9	25.0	48.3	44.1	73.5	117.8	-26.9	-16.0	6.7	-2.0	18.7	9.9	8.7	20.7	25.5	27.9	38.7
Inflammatory diseases and systemic atrophies (G00-G14)	Absolute increase (per 100,000)	-3.8	-0.4	-0.1	-0.1	0.1	-0.1	0.2	1.0	-1.2	-0.6	-0.8	-1.6	-0.2	0.0	0.0	0.1	-0.1	-0.1	0.2	-1.3	-1.7	-1.2
	Relative increase (%)	-62.8	-64.0	-31.7	-32.2	17.7	-6.5	7.6	20.5	-10.7	-4.1	-7.0	-42.0	-44.6	-3.6	-21.8	27.4	-11.1	-3.0	3.1	-11.3	-10.4	-10.1
Other degenerative diseases (e.g., Alzheimer's) (G30-G31)	Absolute increase (per 100,000)	-0.8	UR	0.0	UR	UR	0.0	0.1	2.2	14.3	129.1	833.8	-1.2	UR	UR	UR	UR	0.0	0.0	1.7	9.9	65.8	425.4
	Relative increase (%)	-7.0	UR	-5.3	UR	UR	16.4	35.9	87.8	76.7	97.8	137.1	-10.1	UR	UR	UR	UR	6.0	0.2	57.7	43.0	33.7	41.8
Episodic/paroxysmal disorders (e.g., epilepsy) (G40-G47)	Absolute increase (per 100,000)	UR	0.0	0.1	0.2	0.2	0.1	0.4	0.9	0.9	2.0	1.1	UR	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.4	1.3	2.5
	Relative increase (%)	UR	22.9	75.5	64.9	34.9	21.3	57.4	102.8	61.1	84.3	15.6	UR	15.8	69.2	40.8	29.4	29.1	24.9	25.3	23.4	41.7	48.1
Cerebral palsy and other paralytic syndromes (G80-G83)	Absolute increase (per 100,000)	UR	-0.3	0.0	0.2	0.3	0.2	0.3	0.5	0.4	-0.7	-2.1	UR	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.3	-0.1	0.2
	Relative increase (%)	UR	-58.6	-7.7	27.0	76.7	61.8	62.5	67.7	23.7	-24.1	-40.8	UR	-10.2	5.1	-6.1	12.4	18.7	20.3	10.8	16.0	-5.3	5.2

eTable 3. Increase in Age-Specific Mortality for Selected Causes, by Age Decile, 1999-2017 (Continued)

CAUSE OF DEATH (ICD-10 CODES ¹)	CHANGE MEASURES	CHANGE IN MORTALITY BETWEEN 1999 AND 2017, BY AGE (YRS)											CHANGE IN MORTALITY BETWEEN 2010 AND 2017, BY AGE (YRS)										
		<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Diseases of the circulatory system (I00-I99)	Absolute increase (per 100,000)	-6.2	-0.3	-0.2	-0.8	0.7	-5.2	-19.8	-89.9	-382.5	-1087.1	-2957.0	-1.5	-0.1	0.0	-0.3	0.4	-0.1	-4.3	7.5	-21.4	-180.3	-431.5
	Relative increase (%)	-35.1	-19.6	-17.9	-21.7	6.8	-13.6	-16.9	-27.3	-42.9	-43.8	-36.0	-11.3	-7.3	3.4	-11.0	4.2	-0.3	-4.2	3.2	-4.0	-11.4	-7.6
Hypertensive diseases (I10-I15)	Absolute increase (per 100,000)	UR	UR	UR	0.1	0.7	2.4	6.7	12.9	13.0	24.0	177.4	UR	UR	UR	0.0	0.3	1.0	2.0	7.3	10.5	18.5	100.3
	Relative increase (%)	UR	UR	UR	53.0	95.6	77.3	85.0	74.5	35.3	24.0	48.5	UR	UR	UR	30.1	23.5	22.4	15.8	32.0	26.8	17.6	22.6
Pulmonary heart disease/diseases of pulmonary circulation (I26-I28)	Absolute increase (per 100,000)	-3.6	UR	0.0	-0.2	-0.1	0.0	-0.1	-0.6	-2.9	-2.0	13.2	-0.1	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.7	1.8	8.9
	Relative increase (%)	-62.0	UR	-28.9	-45.3	-8.6	-0.2	-2.1	-9.3	-19.5	-6.6	22.2	-4.3	-24.6	4.1	-11.1	8.3	11.4	12.1	10.8	6.3	6.9	14.0
Other heart disease (e.g., arrhythmias, heart failure) (I30-I51)	Absolute increase (per 100,000)	-2.2	-0.4	-0.2	-0.5	0.3	-0.5	0.3	-2.0	-21.7	-43.1	16.8	-0.6	-0.2	0.0	-0.3	0.3	0.4	0.9	6.4	10.0	6.0	96.6
	Relative increase (%)	-30.6	-42.3	-35.6	-24.3	9.6	-6.4	1.8	-4.4	-17.5	-11.7	1.2	-10.0	-20.2	-6.3	-17.3	8.2	5.4	5.0	17.1	10.8	1.9	7.0
Diseases of the respiratory system (J00-J98)	Absolute increase (per 100,000)	-7.0	-0.4	0.0	-0.2	-0.1	-0.6	1.9	0.6	-49.8	-107.4	-315.0	-3.4	-0.1	0.1	0.1	0.0	0.3	0.7	10.6	-7.3	-26.2	-17.6
	Relative increase (%)	-38.4	-20.3	-1.2	-11.6	-5.5	-9.2	11.1	0.8	-19.5	-16.0	-18.2	-23.4	-5.6	14.6	6.0	0.6	6.6	3.7	17.4	-3.4	-4.4	-1.2
Chronic lower respiratory diseases (J40-J47)	Absolute increase (per 100,000)	UR	-0.2	0.0	-0.1	-0.1	-0.2	0.9	-3.1	-43.5	-50.3	54.6	UR	-0.1	0.0	0.1	0.1	0.0	-0.5	5.4	-12.6	-22.3	9.9
	Relative increase (%)	UR	-44.9	-4.2	-19.6	-10.8	-11.7	10.3	-6.4	-24.5	-12.6	8.5	UR	-38.2	0.6	27.3	10.5	1.0	-5.2	13.9	-8.6	-6.0	1.4
Lung diseases due to external agents (J60-J70)	Absolute increase (per 100,000)	UR	UR	UR	0.0	0.0	0.0	0.6	1.3	-0.4	-7.9	-32.7	UR	UR	UR	0.0	0.0	0.1	0.3	1.1	1.3	-3.6	-8.1
	Relative increase (%)	UR	UR	UR	13.8	4.4	5.2	70.1	46.3	-3.6	-17.4	-18.0	UR	UR	UR	0.8	26.3	15.0	25.8	37.1	14.1	-8.6	-5.2
Other respiratory diseases (J96-J98)	Absolute increase (per 100,000)	0.0	0.1	0.0	0.1	0.1	0.2	0.7	1.8	3.1	8.1	20.1	-1.3	-0.1	0.0	0.0	0.0	0.2	0.5	1.7	2.6	7.4	20.0
	Relative increase (%)	-1.4	62.5	8.2	101.1	37.4	81.8	75.7	64.9	37.9	38.3	36.4	-28.3	-12.7	-0.1	13.5	18.6	64.3	56.2	60.5	29.7	34.4	36.2
Diseases of the digestive system (K00-K92)	Absolute increase (per 100,000)	-8.9	-0.4	-0.1	-0.1	1.1	-0.6	1.9	9.9	-8.1	-29.9	-103.5	-0.9	-0.1	0.0	-0.1	0.9	1.2	-0.5	5.9	5.2	-4.4	-19.1
	Relative increase (%)	-67.4	-52.5	-30.3	-9.4	47.1	-5.1	6.6	21.6	-9.5	-17.7	-23.7	-17.1	-18.4	10.4	-13.2	35.3	12.4	-1.6	11.8	7.3	-3.1	-5.4
Alcoholic liver disease (K70)	Absolute increase (per 100,000)	UR	UR	UR	UR	1.0	0.7	3.3	7.3	2.9	1.0	0.7	UR	UR	UR	UR	0.7	1.2	1.5	4.9	3.2	1.6	1.2
	Relative increase (%)	UR	UR	UR	UR	157.6	14.3	31.4	60.9	27.5	15.6	23.5	UR	UR	UR	UR	80.4	28.7	12.4	34.3	31.7	27.9	54.2
Diseases of the genitourinary system (N00-N98)	Absolute increase (per 100,000)	-2.5	UR	UR	-0.1	0.0	0.3	1.7	2.8	-1.2	-10.1	-70.9	-0.6	UR	UR	0.0	0.0	0.0	0.6	1.0	-1.4	-13.9	-62.0
	Relative increase (%)	-49.3	UR	UR	-23.9	-2.6	13.4	33.0	18.4	-2.5	-7.0	-15.0	-19.7	UR	UR	-15.9	2.5	-0.1	10.5	6.0	-2.9	-9.4	-13.4
Renal failure (N17-N19)	Absolute increase (per 100,000)	-2.4	UR	UR	0.0	0.0	0.1	1.2	1.6	-2.3	-1.1	-2.6	-0.7	UR	UR	0.0	0.0	0.0	0.5	0.4	-2.0	-8.4	-16.5
	Relative increase (%)	-56.8	UR	UR	-30.4	-7.1	8.5	30.9	13.7	-6.3	-1.2	-1.0	-26.9	UR	UR	-24.0	-0.8	-0.4	11.3	3.4	-5.5	-8.2	-5.9
Pregnancy, childbirth and the puerperium (O00-O99)	Absolute increase (per 100,000)	UR	UR	UR	0.1	0.7	0.5	UR	UR	UR	UR	UR	UR	UR	UR	0.0	0.2	0.3	0.3	UR	UR	UR	UR
	Relative increase (%)	UR	UR	UR	54.9	150.7	199.0	UR	UR	UR	UR	UR	UR	UR	UR	4.0	26.4	47.8	218.6	UR	UR	UR	UR

¹ ICD-10 = International Classification of Diseases, 10th edition.

² Includes land, water, air, space, and other transport accidents (V80-V99).

³ Includes intestinal, tuberculosis, zoonotic and other bacterial, sexually transmitted, spirochaetal, chlamydial, rickettsioses, central nervous system, arthropod-borne, and viral hemorrhagic diseases (A00-A99).

UR = Unreliable data due to small death counts. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2017 on CDC WONDER Online Database, released December, 2018.

eTable 4. Age-Adjusted Mortality Rates by Year for Selected Causes, Adults Aged 25-64 Years, 1999-2017

CAUSE OF DEATH (ICD-10 CODES ¹)	AGE-ADJUSTED MORTALITY RATES (PER 100,000), US ADULTS AGES 25-64 YEARS																				RELATIVE INCREASE (%)	
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2017 vs 1999	2017 vs 2010	
ALL-CAUSE MORTALITY	365.4	365.3	364.8	362.0	360.2	350.1	351.4	347.0	340.3	338.1	335.5	328.5	329.7	329.1	330.9	333.9	338.2	347.0	348.2	-4.7	6.0	
EXTRANEOUS (EXTERNAL) CAUSES (V01-Y89)	54.6	55.0	56.8	59.6	60.6	61.4	63.4	65.7	66.4	65.4	63.7	64.1	66.2	66.8	67.3	69.1	74.1	82.2	86.5	58.4	34.9	
Accidental drug poisoning (X40-X44)	6.7	6.9	7.5	9.5	10.4	11.2	12.6	14.6	15.1	15.3	15.6	16.1	17.7	17.7	19.0	20.5	23.3	29.0	32.5	386.5	101.8	
Accidental alcohol poisoning (X45)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.7	1.1	1.1	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.1	452.1	-2.0	
Pedestrian/cyclist/motorcyclist accident (V01-V29)	3.7	3.9	4.1	4.2	4.3	4.5	4.7	4.9	4.9	4.8	4.3	4.3	4.4	4.6	4.4	4.3	4.8	5.1	5.2	37.7	21.0	
Other transport accidents (see notes) ² (V80-V99)	6.5	6.5	6.2	5.7	5.7	5.8	6.0	6.1	6.0	5.7	5.4	5.5	5.3	5.7	5.9	6.0	6.4	6.6	6.5	0.8	17.3	
Intentional self-harm (suicide) (X60-X84)	13.4	13.4	14.0	14.5	14.4	14.7	14.5	14.9	15.5	15.9	16.1	16.6	16.9	17.2	17.1	17.5	17.8	17.9	18.6	38.3	11.8	
Assault (homicide) (X85-Y09)	6.6	6.6	6.7	6.9	6.9	6.8	7.0	7.1	7.0	6.8	6.4	6.1	6.1	6.3	6.1	6.1	6.8	7.5	7.6	15.8	24.9	
ORGAN DISEASES																						
Infectious and parasitic diseases (A00-B99)	17.8	17.5	17.4	17.9	17.8	17.3	16.9	16.3	15.8	15.2	14.6	13.5	13.3	12.8	12.8	12.6	12.1	11.6	10.8	-39.2	-20.1	
Misc. infectious diseases (see notes) ³ (A00-A99)	4.6	4.7	4.8	5.0	5.2	5.2	5.1	5.1	5.3	5.5	5.5	5.3	5.5	5.4	5.7	5.9	6.0	6.0	5.9	28.4	11.9	
Neoplasms (C00-D48)	111.7	110.2	108.7	106.2	104.0	100.7	99.4	97.4	95.3	93.6	93.1	91.9	90.5	89.6	88.0	87.2	85.4	83.9	81.5	-27.1	-11.4	
Liver cancer (C22)	2.9	3.1	3.1	3.2	3.4	3.6	3.7	3.8	3.9	4.1	4.3	4.4	4.7	4.8	4.9	4.9	4.8	4.7	4.5	56.6	3.0	
Endocrine/nutritional/metabolic diseases (E00-E88)	15.0	15.3	15.5	16.0	16.1	15.7	16.1	15.9	15.5	15.2	15.3	15.1	15.9	15.7	16.2	16.6	17.2	17.4	17.8	19.3	18.4	
Diabetes mellitus (E10-E14)	11.5	11.5	11.6	11.8	11.9	11.5	11.5	11.3	10.9	10.6	10.5	10.4	10.9	10.6	11.0	11.1	11.6	11.6	12.0	4.2	15.3	
Obesity and other hyperalimentation (E65-E68)	1.3	1.5	1.5	1.8	1.8	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.7	2.8	2.7	114.0	23.1	
Metabolic disorders (E70-E88)	1.7	1.8	1.8	1.9	1.9	1.8	1.9	2.0	1.9	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.4	2.4	2.5	51.2	24.5	
Mental and behavioral disorders (F01-F99)	5.2	5.3	5.4	5.7	5.9	6.0	6.3	6.6	5.0	4.9	4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.5	6.8	29.4	37.4	
Organic mental disorders (e.g., vascular dementia) (F01-F09)	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.7	0.6	0.6	0.6	164.6	-20.5	
Mental/behavioral disorders due to psychoactive substance use (F10-F19)	4.7	4.7	4.8	5.0	5.2	5.3	5.4	5.5	4.0	3.8	3.7	3.8	3.9	4.0	4.3	4.5	4.9	5.4	5.7	22.4	49.3	
Diseases of the nervous system (G00-G98)	7.0	7.4	7.4	7.6	7.7	7.6	8.0	8.0	8.0	8.1	8.3	8.2	8.2	8.4	8.7	8.7	8.9	9.1	9.5	35.8	15.1	
Inflammatory diseases, systemic atrophies (G00-G14)	1.8	2.0	1.9	2.0	2.0	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	10.3	1.4	
Other degenerative diseases (e.g., Alzheimer's) (G30-G31)	0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.7	0.7	0.8	0.7	0.8	0.9	0.9	79.6	42.9	
Episodic/paroxysmal disorders (e.g., epilepsy) (G40-G47)	0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.7	0.9	0.8	0.8	0.9	0.8	0.9	0.9	1.0	1.0	52.1	26.7	
Cerebral palsy and other paralytic syndromes (G80-G83)	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.9	64.3	13.3	
Diseases of the circulatory system (I00-I99)	100.2	98.5	95.4	94.5	92.7	88.6	87.5	85.3	82.6	81.4	79.5	78.2	77.4	77.1	77.3	77.7	78.1	78.9	78.5	-21.7	0.3	
Hypertensive diseases (I10-I15)	6.1	6.3	6.6	7.2	7.8	7.9	7.8	8.1	8.1	8.7	8.9	8.8	9.0	9.2	9.7	10.1	10.4	10.8	11.0	78.9	24.2	
Pulmonary heart disease/diseases of pulmonary circulation (I26-I28)	2.8	2.8	2.8	2.8	2.8	2.6	2.6	2.4	2.2	2.3	2.4	2.4	2.4	2.3	2.4	2.4	2.6	2.6	2.6	-4.6	12.4	
Other heart disease (e.g., arrhythmias, heart failure) (I30-I51)	16.1	15.5	15.4	15.5	15.2	14.7	14.9	14.7	14.5	14.3	14.2	14.2	14.1	14.0	14.5	14.8	15.2	15.7	15.7	-1.9	10.7	
Diseases of the respiratory system (J00-J98)	18.9	18.8	18.4	18.1	18.3	17.3	18.1	17.0	17.0	18.1	19.4	17.3	18.1	17.5	18.8	19.7	18.7	19.4	19.3	2.3	12.0	
Chronic lower respiratory diseases (J40-J47)	11.0	10.5	10.5	10.3	10.4	9.7	10.2	9.6	9.7	10.2	10.1	9.8	10.0	10.0	10.3	10.3	10.5	10.6	10.6	-3.7	7.9	
Lung diseases due to external agents (J60-J70)	0.9	0.9	0.9	0.9	1.0	0.9	1.0	0.9	0.9	0.9	1.0	0.9	1.0	1.1	1.1	1.1	1.2	1.2	1.2	41.8	27.7	
Other respiratory diseases (J96-J98)	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.4	67.7	54.6	
Diseases of the digestive system (K00-K92)	19.3	19.4	19.6	19.5	19.6	19.0	18.9	19.0	19.4	19.7	19.8	20.0	20.5	20.8	21.1	21.3	21.8	21.6	21.5	11.7	7.4	
Alcoholic liver disease (K70)	6.4	6.4	6.4	6.1	6.2	6.2	6.2	6.1	6.7	6.8	7.0	7.1	7.4	7.6	7.8	8.2	8.8	8.9	8.9	40.6	25.5	
Diseases of the genitourinary system (N00-N98)	4.7	4.8	5.0	5.0	5.3	5.3	5.2	5.4	5.3	5.3	5.3	5.3	4.9	5.0	5.1	5.1	5.5	5.6	5.6	20.9	6.1	
Renal failure (N17-N19)	3.6	3.8	3.9	4.0	4.2	4.2	4.1	4.2	4.0	4.1	4.1	4.0	3.8	3.8	3.9	3.9	4.1	4.2	4.2	16.2	4.9	
Pregnancy, childbirth and the puerperium (O00-O99)	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.6	0.6	0.6	0.7	0.7	0.7	197.3	59.9	

¹ ICD-10 = International Classification of Diseases, 10th edition.

² Includes land, water, air, space, and other transport accidents (V80-V99).

³ Includes intestinal, tuberculosis, zoonotic and other bacterial, sexually transmitted, spirochetal, chlamydial, rickettsioses, central nervous system, arthropod-borne, and viral hemorrhagic diseases (A00-A99).

Notes: No statistically significant increases by race-ethnicity were reported at the broad categorical level for Neoplasms (C00-D48), Certain infectious and parasitic diseases (A00-B99), and Diseases of the musculoskeletal system and connective tissue (M00-M99). Data were suppressed (unreliable) by race-ethnicity for H00-H57 (Diseases of the eye and adnexa), H60-H93 (Diseases of the ear and mastoid process), P00-P96 (Certain conditions originating in the perinatal period), and U00-U99 (Codes for special purposes). Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2017 on CDC WONDER Online Database, released December, 2018.

eTable 5. Cause-Specific Contributions (in Years) to Changes in Non-Hispanic White Life Expectancy Between 1990–1992 and 2014–2016, by Geographic Setting and Sex

	Large central metro		Large metro suburb		Small/medium metro		Nonmetro	
	Cause	Contribution (yrs)	Cause	Contribution (yrs)	Cause	Contribution (yrs)	Cause	Contribution (yrs)
Males								
	Circulatory disease	2.59	Circulatory disease	2.53	Circulatory disease	2.31	Circulatory disease	2.09
	HIV/AIDS	0.86	Lung cancer	0.61	Lung cancer	0.58	Lung cancer	0.48
	All other	0.82	All other	0.59	All other	0.35	All other	0.30
	Lung cancer	0.64	Screenable cancers	0.36	Screenable cancers	0.30	Screenable cancers	0.24
	Screenable cancers	0.32	HIV/AIDS	0.27	Influenza/pneumonia	0.21	Influenza/pneumonia	0.19
	Influenza/pneumonia	0.25	Influenza/pneumonia	0.21	HIV/AIDS	0.19	HIV/AIDS	0.09
	Homicide	0.24	Respiratory disease	0.06	Symptoms/ill-defined	0.07	Symptoms/ill-defined	0.05
	Respiratory disease	0.14	Homicide	0.06	Respiratory disease	0.04	Homicide	0.04
	Symptoms/ill-defined	0.10	Symptoms/ill-defined	0.06	Homicide	0.03	Respiratory disease	-0.05
	Suicide	0.01	Diabetes	-0.02	Diabetes	-0.07	Alcohol-related causes	-0.07
	Alcohol-related causes	-0.01	Alcohol-related causes	-0.06	Alcohol-related causes	-0.10	Diabetes	-0.11
	Diabetes	-0.04	Suicide	-0.09	Suicide	-0.12	Suicide	-0.14
	Mental/nervous system	-0.35	Mental/nervous system	-0.41	Mental/nervous system	-0.41	Mental/nervous system	-0.37
	Drug overdose	-0.46	Drug overdose	-0.71	Drug overdose	-0.57	Drug overdose	-0.47
Females								
	Circulatory disease	2.58	Circulatory disease	2.37	Circulatory disease	2.14	Circulatory disease	1.84
	All other	0.52	Screenable cancers	0.49	Screenable cancers	0.39	Screenable cancers	0.32
	Screenable cancers	0.47	All other	0.40	Influenza/pneumonia	0.22	Influenza/pneumonia	0.18
	Influenza/pneumonia	0.28	Influenza/pneumonia	0.24	Lung cancer	0.09	Homicide	0.01
	Lung cancer	0.26	Lung cancer	0.18	All other	0.09	Diabetes	0.00
	HIV/AIDS	0.07	Diabetes	0.07	Diabetes	0.03	HIV/AIDS	0.00
	Homicide	0.06	HIV/AIDS	0.03	Homicide	0.02	Symptoms/ill-defined	-0.02
	Diabetes	0.03	Homicide	0.02	HIV/AIDS	0.01	Lung cancer	-0.05
	Symptoms/ill-defined	0.02	Symptoms/ill-defined	0.00	Symptoms/ill-defined	0.01	Alcohol-related causes	-0.07
	Suicide	-0.02	Alcohol-related causes	-0.05	Alcohol-related causes	-0.08	Suicide	-0.09
	Alcohol-related causes	-0.04	Suicide	-0.06	Suicide	-0.08	All other	-0.15
	Respiratory disease	-0.09	Respiratory disease	-0.20	Respiratory disease	-0.28	Drug overdose	-0.35
	Drug overdose	-0.26	Drug overdose	-0.36	Drug overdose	-0.36	Respiratory disease	-0.47
	Mental/nervous system	-0.88	Mental/nervous system	-0.91	Mental/nervous system	-0.97	Mental/nervous system	-0.94

Notes: Negative values indicate contributions to reductions in life expectancy; positive values indicate contributions to increases in life expectancy between 1990–1992 and 2014–2016. *Mental and nervous system disorders* = all disorders of the nervous system, including Alzheimer's disease. *Screenable cancers* = breast, prostate, colorectal, and cervical cancers. Source: Adapted from Elo et al. Trends in non-Hispanic white mortality in the United States by metropolitan-nonmetropolitan status and region, 1990–2016. *Pop Dev Rev.* 2019.

eTable 6. Estimated Excess Deaths from Increasing Cause-Specific Mortality Rates, Selected Causes, Adults Aged 25-64 Years, by Race-Ethnicity, 1999-2016

Racial-ethnic group	Causes of death (estimated sum of excess midlife deaths, 1999-2016)	
	External causes	Organ diseases and other
Non-Hispanic (NH) American Indian and Alaskan Native	Drug overdoses (370); suicide (176); alcohol poisoning (104); falls, drowning, fires ¹ (43); homicide (19)	Alcoholic liver disease (254); hypertensive diseases (134) and other heart disease ² (57); colorectal cancer (52); liver cancer (45); diabetes (38); viral hepatitis (29); misc. nervous system disorders ³ (24); mental/behavioral disorders involving psychoactive substances (6)
Non-Hispanic Asian/Pacific Islander	Drug overdoses (258); suicide (73)	Hypertensive diseases (93); alcoholic liver disease (68); brain/central nervous system cancer (61); mental/behavioral disorders involving psychoactive substances (16)
Non-Hispanic Black/African American	Drug overdoses (3,187); homicide (1,005); suicide (213); pedestrian, cyclist, motorcycle injuries (265), misc. land/other transport accidents ⁴ (264)	Hypertensive diseases (725); obesity (545); liver cancer (430); misc. nervous system disorders ³ (268); metabolic disorders (216); misc. respiratory system disorders ⁵ (212); organic mental disorders (119); cerebral palsy (109); Alzheimer's/degenerative disorders (42); lung diseases due to external agents (4)
Non-Hispanic White	Drug overdoses (33,003); suicide (8,300); alcohol poisoning (1,146); pedestrian, cyclist, motorcycle injury (1,404); falls, drownings, fires ¹ (768); misc. land/other transport accidents ⁴ (561); other forms of accidental poisoning ⁶ (410)	Hypertensive diseases (5,318) and other heart disease ² (916); alcoholic liver disease (3,901); mental/behavioral disorders involving psychoactive substances (2,493); misc. infectious diseases ⁷ (2,149); liver cancer (1,931); misc. respiratory system disorders ⁵ (1,709); obesity (1,616); misc. nervous system disorders ³ (1,084); diabetes (879); renal failure (865); metabolic disorders (858); chronic lower respiratory diseases (835); lung diseases due to external agents (542); Alzheimer's and degenerative disorders (498); organic mental disorders (442); epilepsy/episodic, paroxysmal disorders (401); other urinary system diseases (385); venous/lymphatic diseases (376); inflammatory neurologic diseases ⁸ (353); cerebral palsy (346); cancer of lip/oral cavity/pharynx (215); extrapyramidal and movement disorders (189); pancreatic cancer (188); misc. peripheral neurologic diseases ⁹ (177); miscellaneous endocrine disorders ¹⁰ (154); pulmonary heart disease (93);
Hispanic/Latino	Drug overdoses (1,777); suicide (426); alcohol poisoning (224); pedestrian, cyclist, motorcycle injury (114); misc. land/other transport accidents ⁴ (32)	Liver cancer (333); obesity (193); alcoholic liver disease (131); metabolic disorders (110); misc. nervous system disorders ³ (99); Alzheimer's/degenerative disorders (62); epilepsy/episodic, paroxysmal disorders (56); organic mental disorders (42); misc. respiratory system disorders ⁵ (40); misc. peripheral neurologic diseases ⁹ (39)

Adapted from: Woolf et al. *BMJ*. 2018;362:k3096. Table presents a partial list: see original paper for a complete list of excess death estimates by race-ethnicity and definitions of causes of death.

¹ Includes deaths from submersion, smoke, and flames

² Arrhythmias, cardiomyopathy, heart failure, cardiac arrest, myocarditis, and valvular and pericardial disease

³ Disorders of autonomic nervous system, hydrocephalus, toxic encephalopathy, and other disorders of nervous system, not elsewhere classified

⁴ Accidents involving other land, water transport, air/space, and other/unspecified transport

⁵ Respiratory failure, not elsewhere classified, and other respiratory disorders

⁶ Accidental poisoning by organic solvents, halogenated hydrocarbons, other gases and vapors, pesticides, and unspecified chemicals and noxious substances

⁷ Intestinal infections, tuberculosis, and zoonotic and other bacterial, sexually transmitted, spirochetal, chlamydial, rickettsial, central nervous system, arthropod borne, and viral hemorrhagic infections

⁸ Inflammatory diseases (e.g., meningitis, encephalitis) and systemic atrophies (e.g., Huntington's disease) affecting the central nervous system

⁹ Nerve/nerve root/plexus disorders, polyneuropathies, and other disorders of the peripheral nervous system, diseases of myoneural junction and muscle

¹⁰ Disorders of thyroid and other endocrine glands, malnutrition, and disorders of glucose regulation and pancreatic internal secretion


eTable 7. Mortality Trends, Adults Aged 25-64 Years, for US, Census Divisions, and States (1999-2017)

	Relative increase, 2017 vs 2010 (%; 95% CI)	Long-term trends (AAPC†, 95% CI)			Recent trend		
		1999-2017	2005-17	2010-17	Years	APC‡ (95% CI)	Change in slope (%)
United States	6.01 (5.63 to 6.39)	-0.25 (-0.55 to 0.04)	0.00 (-0.41 to 0.41)	0.85 (0.14 to 1.55)	2013-17	1.51 (1.08 to 1.93)	1.52 (-0.08 to 3.12)
Div 1: New England	13.01 (11.00 to 15.02)	-0.03 (-0.50 to 0.45)	0.61 (0.36 to 0.86)	1.79 (1.47 to 2.10)	2012-17	2.93 (2.43 to 3.43)	3.90 (3.39 to 4.41)
Connecticut	9.02 (4.99 to 13.05)	-0.60 (-1.05 to -0.16)	0.18 (-0.46 to 0.82)	1.27 (0.30 to 2.25)	2014-17	3.16 (0.88 to 5.49)	3.22 (1.09 to 5.36)
Maine	20.66 (14.11 to 27.21)	0.77 (0.36 to 1.19)	1.36 (0.77 to 1.95)	2.62 (1.63 to 3.63)	2013-17	4.94 (3.01 to 6.91)	5.21 (3.50 to 6.92)
Massachusetts	12.15 (9.15 to 15.14)	-0.13 (-0.66 to 0.41)	0.39 (0.13 to 0.65)	1.69 (1.36 to 2.02)	2012-17	2.95 (2.42 to 3.48)	4.31 (3.77 to 4.85)
New Hampshire	23.35 (16.12 to 30.58)	0.74 (-0.37 to 1.87)	1.54 (-0.13 to 3.24)	3.27 (0.39 to 6.25)	2015-17	2.01 (-4.50 to 8.96)	-4.76 (-12.70 to 3.17)
Rhode Island	5.09 (-1.69 to 11.87)	0.00 (-0.71 to 0.71)	0.37 (0.01 to 0.73)	0.85 (0.40 to 1.31)	2012-17	1.32 (0.60 to 2.04)	1.62 (0.88 to 2.36)
Vermont	19.92 (9.66 to 30.18)	0.37 (-0.23 to 0.98)	1.09 (0.32 to 1.86)	2.64 (1.26 to 4.03)	2010-17	2.64 (1.26 to 4.03)	3.65 (2.28 to 5.01)
Div 2: Middle Atlantic	6.36 (5.26 to 7.46)	-0.77 (-1.20 to -0.33)	-0.19 (-0.81 to 0.44)	0.87 (-0.11 to 1.85)	2014-17	2.78 (0.74 to 4.87)	3.29 (1.22 to 5.36)
New Jersey	7.57 (5.13 to 10.00)	-0.91 (-1.68 to -0.13)	-0.19 (-1.32 to 0.95)	1.10 (-0.78 to 3.01)	2015-17	5.09 (-1.74 to 12.39)	5.42 (-0.65 to 11.50)
New York	0.12 (-1.44 to 1.69)	-1.25 (-1.90 to -0.59)	-0.79 (-1.06 to -0.53)	-0.05 (-0.42 to 0.32)	2012-17	0.67 (0.07 to 1.27)	2.51 (1.93 to 3.09)
Pennsylvania	14.37 (12.39 to 16.34)	0.14 (-0.22 to 0.50)	0.70 (0.18 to 1.23)	1.91 (1.01 to 2.83)	2014-17	4.20 (2.71 to 5.70)	3.87 (2.10 to 5.65)
Div 3: East North Central	11.57 (10.56 to 12.57)	0.14 (-0.18 to 0.47)	0.61 (0.14 to 1.10)	1.63 (0.81 to 2.46)	2014-17	2.91 (1.59 to 4.24)	2.18 (0.57 to 3.79)
Illinois	4.73 (2.83 to 6.63)	-0.81 (-0.97 to -0.64)	-0.40 (-0.62 to -0.17)	0.49 (0.11 to 0.86)	2012-17	1.34 (0.77 to 1.92)	2.97 (2.43 to 3.50)
Indiana	14.82 (12.17 to 17.47)	0.56 (0.23 to 0.90)	1.07 (0.60 to 1.55)	1.79 (1.05 to 2.53)	2014-17	2.99 (1.25 to 4.75)	2.05 (0.44 to 3.66)
Michigan	6.37 (4.33 to 8.41)	-0.03 (-0.22 to 0.15)	0.45 (0.24 to 0.66)	0.99 (0.70 to 1.28)	2012-17	1.52 (1.07 to 1.96)	1.81 (1.37 to 2.26)
Ohio	21.58 (19.50 to 23.66)	0.95 (0.63 to 1.28)	1.52 (1.04 to 2.00)	2.75 (1.93 to 3.58)	2014-17	4.90 (3.55 to 6.26)	3.62 (2.03 to 5.22)
Wisconsin	9.59 (6.49 to 12.68)	-0.06 (-0.28 to 0.16)	0.38 (0.11 to 0.66)	1.34 (0.85 to 1.83)	2010-17	1.34 (0.85 to 1.83)	2.28 (1.78 to 2.77)
Div 4: West North Central	7.70 (6.16 to 9.24)	0.07 (-0.08 to 0.22)	0.38 (0.19 to 0.56)	1.03 (0.70 to 1.36)	2010-17	1.03 (0.70 to 1.36)	1.56 (1.22 to 1.89)
Iowa	6.40 (2.33 to 10.47)	0.47 (0.02 to 0.91)	0.63 (-0.01 to 1.28)	0.99 (-0.10 to 2.09)	2014-17	2.13 (-0.65 to 4.98)	1.97 (-0.56 to 4.49)
Kansas	7.68 (3.62 to 11.74)	0.19 (-0.58 to 0.96)	0.23 (-0.89 to 1.36)	0.82 (0.51 to 1.14)	2008-17	0.82 (0.51 to 1.14)	2.37 (-2.05 to 6.79)
Minnesota	7.10 (3.74 to 10.45)	-0.27 (-0.55 to 0.01)	0.23 (-0.16 to 0.62)	0.80 (0.21 to 1.40)	2014-17	2.04 (0.58 to 3.51)	2.13 (0.80 to 3.46)
Missouri	7.83 (5.24 to 10.41)	0.24 (0.06 to 0.42)	0.52 (0.29 to 0.75)	1.13 (0.74 to 1.51)	2011-17	1.37 (0.88 to 1.86)	1.68 (1.22 to 2.14)
Nebraska	7.76 (2.30 to 13.22)	-0.04 (-0.46 to 0.39)	0.30 (-0.24 to 0.84)	1.02 (0.06 to 1.99)	2010-17	1.02 (0.06 to 1.99)	1.73 (0.76 to 2.69)
North Dakota	12.74 (3.41 to 22.07)	0.45 (-0.09 to 0.99)	1.21 (0.71 to 1.71)	1.42 (0.83 to 2.01)	2006-17	1.42 (0.84 to 2.01)	2.48 (1.27 to 3.70)
South Dakota	15.53 (7.13 to 23.94)	0.27 (-1.25 to 1.82)	0.47 (-1.75 to 2.74)	1.89 (1.32 to 2.46)	2008-17	1.89 (1.32 to 2.46)	5.60 (-3.24 to 14.43)
Div 5: South Atlantic	5.51 (4.71 to 6.32)	-0.33 (-0.73 to 0.06)	-0.07 (-0.63 to 0.50)	0.90 (-0.06 to 1.87)	2014-17	2.33 (1.32 to 3.34)	2.04 (-0.19 to 4.28)
Delaware	6.93 (0.23 to 13.63)	0.01 (-0.91 to 0.93)	0.26 (-1.10 to 1.64)	0.79 (-1.53 to 3.17)	2015-17	4.05 (-4.83 to 13.76)	4.46 (-3.69 to 12.61)
Florida	3.94 (2.51 to 5.38)	-0.33 (-0.51 to -0.15)	-0.18 (-0.37 to 0.02)	0.69 (0.38 to 1.00)	2013-17	2.28 (1.68 to 2.89)	3.65 (3.11 to 4.19)
Georgia	1.44 (-0.46 to 3.34)	-0.56 (-0.82 to -0.30)	-0.43 (-0.75 to -0.12)	0.37 (0.05 to 0.70)	2012-17	0.90 (0.52 to 1.28)	1.83 (0.97 to 2.69)
Maryland	10.95 (8.09 to 13.81)	-0.50 (-1.35 to 0.36)	-0.07 (-1.33 to 1.21)	1.58 (-0.49 to 3.69)	2014-17	4.20 (1.99 to 6.45)	3.69 (-1.10 to 8.48)
North Carolina	7.02 (4.98 to 9.07)	-0.32 (-0.69 to 0.06)	-0.03 (-0.57 to 0.51)	1.05 (0.32 to 1.79)	2014-17	1.95 (0.70 to 3.22)	1.55 (0.10 to 3.01)
South Carolina	4.10 (1.46 to 6.74)	-0.28 (-0.46 to -0.11)	0.07 (-0.17 to 0.31)	0.83 (0.43 to 1.23)	2012-17	1.56 (0.95 to 2.17)	2.53 (1.97 to 3.10)
Virginia	6.58 (4.17 to 8.99)	-0.50 (-0.62 to -0.38)	-0.08 (-0.25 to 0.08)	0.82 (0.55 to 1.10)	2012-17	1.70 (1.27 to 2.13)	3.03 (2.63 to 3.42)
West Virginia	22.97 (18.31 to 27.62)	1.66 (1.27 to 2.04)	1.96 (1.40 to 2.52)	2.62 (1.67 to 3.57)	2014-17	4.75 (2.32 to 7.24)	3.60 (1.45 to 5.75)
Div 6: East South Central	8.83 (7.49 to 10.16)	0.50 (0.29 to 0.72)	0.58 (0.38 to 0.78)	1.34 (1.06 to 1.63)	2010-17	1.34 (1.06 to 1.63)	1.82 (1.42 to 2.23)
Alabama	6.18 (3.61 to 8.74)	0.42 (0.21 to 0.62)	0.28 (0.01 to 0.55)	0.95 (0.70 to 1.20)	2010-17	0.95 (0.70 to 1.20)	1.59 (0.98 to 2.20)
Kentucky	14.74 (11.84 to 17.65)	1.16 (0.66 to 1.65)	1.56 (1.14 to 1.97)	2.23 (1.67 to 2.78)	2013-17	3.14 (2.06 to 4.23)	2.08 (1.09 to 3.07)
Mississippi	6.35 (3.14 to 9.55)	0.22 (-0.32 to 0.77)	0.20 (-0.59 to 1.01)	1.06 (0.80 to 1.33)	2009-17	1.06 (0.80 to 1.33)	3.14 (-0.01 to 6.29)
Tennessee	8.30 (6.00 to 10.60)	0.38 (0.15 to 0.60)	0.37 (0.17 to 0.56)	1.07 (0.84 to 1.30)	2009-17	1.07 (0.84 to 1.30)	2.09 (1.61 to 2.57)
Div 7: West South Central	1.92 (0.92 to 2.93)	-0.27 (-0.49 to -0.06)	-0.30 (-0.48 to -0.12)	0.21 (-0.06 to 0.47)	2011-17	0.41 (0.06 to 0.75)	1.41 (1.05 to 1.77)
Arkansas	8.29 (4.86 to 11.73)	0.52 (-0.08 to 1.12)	0.54 (-0.34 to 1.43)	0.99 (0.39 to 1.60)	2011-17	1.32 (0.86 to 1.77)	2.23 (-1.21 to 5.68)
Louisiana	6.16 (3.48 to 8.85)	-0.08 (-0.50 to 0.33)	-0.38 (-0.98 to 0.23)	0.78 (-0.23 to 1.80)	2014-17	0.25 (-0.80 to 1.32)	-1.98 (-4.32 to 0.36)
Oklahoma	4.86 (1.94 to 7.79)	0.56 (0.47 to 0.65)	0.56 (0.47 to 0.65)	0.56 (0.47 to 0.65)	NA	NA	NA
Texas	0.46 (-0.79 to 1.72)	-0.50 (-0.73 to -0.26)	-0.50 (-0.67 to -0.33)	0.00 (-0.26 to 0.26)	2011-17	0.19 (-0.14 to 0.53)	1.38 (1.04 to 1.73)
Div 8: Mountain	6.04 (4.59 to 7.49)	-0.04 (-0.22 to 0.13)	0.08 (-0.09 to 0.24)	0.94 (0.71 to 1.17)	2010-17	0.94 (0.71 to 1.17)	2.07 (1.74 to 2.40)
Arizona	6.24 (3.57 to 8.90)	-0.31 (-0.9 to 0.28)	-0.15 (-1.01 to 0.72)	0.98 (0.66 to 1.30)	2009-17	0.98 (0.66 to 1.30)	3.94 (0.56 to 7.33)
Colorado	5.98 (2.81 to 9.15)	-0.10 (-0.87 to 0.67)	0.10 (-0.44 to 0.65)	0.56 (-0.04 to 1.16)	2013-17	1.10 (-0.06 to 2.27)	1.24 (0.16 to 2.33)
Idaho	5.53 (-0.18 to 11.23)	0.25 (-0.92 to 1.43)	0.46 (-0.16 to 1.08)	0.73 (0.39 to 1.07)	2006-17	0.73 (0.39 to 1.07)	3.26 (-3.36 to 9.88)
Montana	9.78 (2.82 to 16.74)	0.44 (0.01 to 0.88)	0.71 (0.16 to 1.26)	1.28 (0.30 to 2.27)	2010-17	1.28 (0.30 to 2.27)	1.36 (0.37 to 2.34)
Nevada	1.46 (-2.18 to 5.10)	-0.68 (-0.93 to -0.42)	-0.62 (-0.96 to -0.28)	0.28 (-0.03 to 0.60)	2010-17	0.28 (-0.03 to 0.60)	2.18 (1.41 to 2.95)
New Mexico	17.50 (12.62 to 22.38)	0.97 (0.60 to 1.33)	1.32 (0.83 to 1.80)	2.07 (1.28 to 2.87)	2011-17	2.38 (1.37 to 3.40)	2.08 (1.13 to 3.04)
Utah	3.97 (-0.63 to 8.57)	-0.02 (-0.33 to 0.29)	0.20 (-0.20 to 0.61)	0.68 (0.02 to 1.35)	2011-17	0.87 (0.03 to 1.73)	1.34 (0.53 to 2.15)
Wyoming	-0.76 (-8.96 to 7.43)	0.10 (-0.10 to 0.31)	0.10 (-0.10 to 0.31)	0.10 (-0.10 to 0.31)	NA	NA	NA
Div 9: Pacific	0.46 (-0.52 to 1.44)	-0.82 (-1.03 to -0.62)	-0.80 (-1.00 to -0.61)	-0.14 (-0.41 to 0.14)	2011-17	0.13 (-0.23 to 0.49)	1.87 (1.48 to 2.27)
Alaska	12.00 (3.82 to 20.18)	0.57 (-0.62 to 1.78)	1.27 (0.92 to 1.62)	1.27 (0.92 to 1.62)	2005-17	1.27 (0.92 to 1.62)	5.53 (-0.90 to 11.95)
California	-0.90 (-2.04 to 0.24)	-1.10 (-1.36 to -0.84)	-1.13 (-1.51 to -0.76)	-0.18 (-0.44 to 0.09)	2010-17	-0.18 (-0.44 to 0.09)	2.68 (1.61 to 3.75)
Hawaii	7.68 (1.38 to 13.97)	-0.20 (-0.51 to 0.11)	0.04 (-0.35 to 0.44)	0.58 (-0.12 to 1.28)	2010-17	0.58 (-0.12 to 1.28)	1.28 (0.57 to 1.98)
Oregon	1.22 (-2.12 to 4.55)	-0.25 (-0.83 to 0.33)	-0.41 (-1.20 to 0.38)	-0.05 (-1.38 to 1.31)	2015-17	-1.23 (-5.74 to 3.49)	-2.01 (-6.17 to 2.16)
Washington	4.05 (1.38 to 6.72)	-0.35 (-0.58 to -0.13)	-0.15 (-0.46 to 0.17)	0.30 (-0.21 to 0.82)	2012-17	0.73 (-0.06 to 1.53)	1.50 (0.77 to 2.24)

† Table presents the relative increase in mortality rates between 1999 and 2017, the slopes modeled by the Joinpoint Regression Program, and 95% confidence intervals for these estimates. Slopes presented here include the average annual percent change (AAPC) for three time periods—1999-2017, 2005-2017, and 2010-2017—and the annual percent change (APC) for the most recent linear trend in the joinpoint model. NA = not applicable; joinpoint plotted a single trend line for 1999-2017; thus, no last segment. Mortality rates obtained from CDC WONDER.

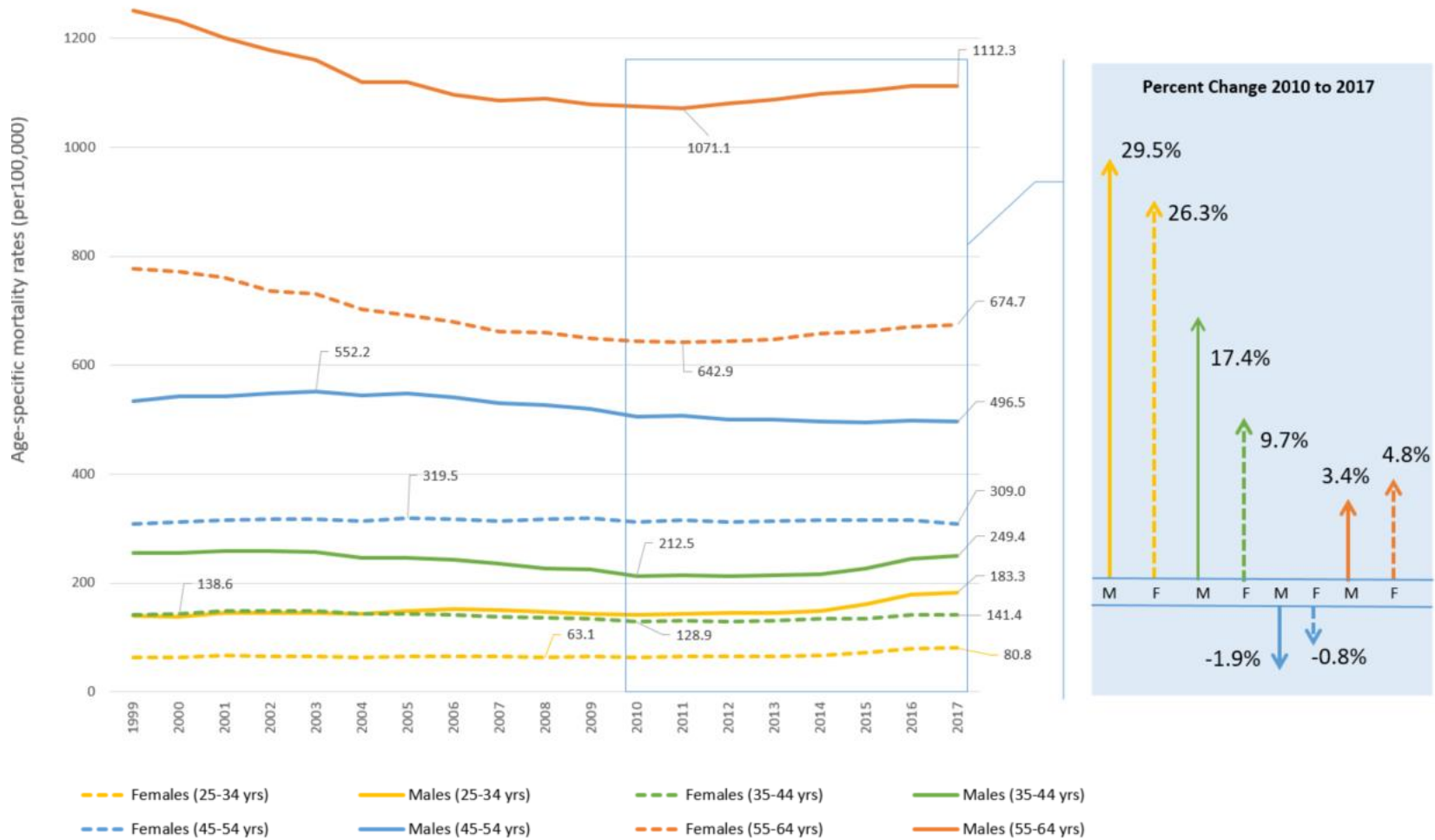
eTable 8. Years of Potential Exposure to Causes of Increasing Mortality Among Adults Aged 25-64 Years During 2000-2016

COHORTS (5-YEAR)												Years of increasing mortality, ages 25-64 years			
1940-44	1945-49	1950-54	1955-59	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-09	2010-14	2015-19
0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64			
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64		
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	
			0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
				0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
					0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
						0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
							0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
								0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39
									0-4	5-9	10-14	15-19	20-24	25-29	30-34
										0-4	5-9	10-14	15-19	20-24	25-29
											0-4	5-9	10-14	15-19	20-24
												0-4	5-9	10-14	15-19
													0-4	5-9	10-14
														0-4	5-9
															0-4

 Childhood (ages 0-14 years)

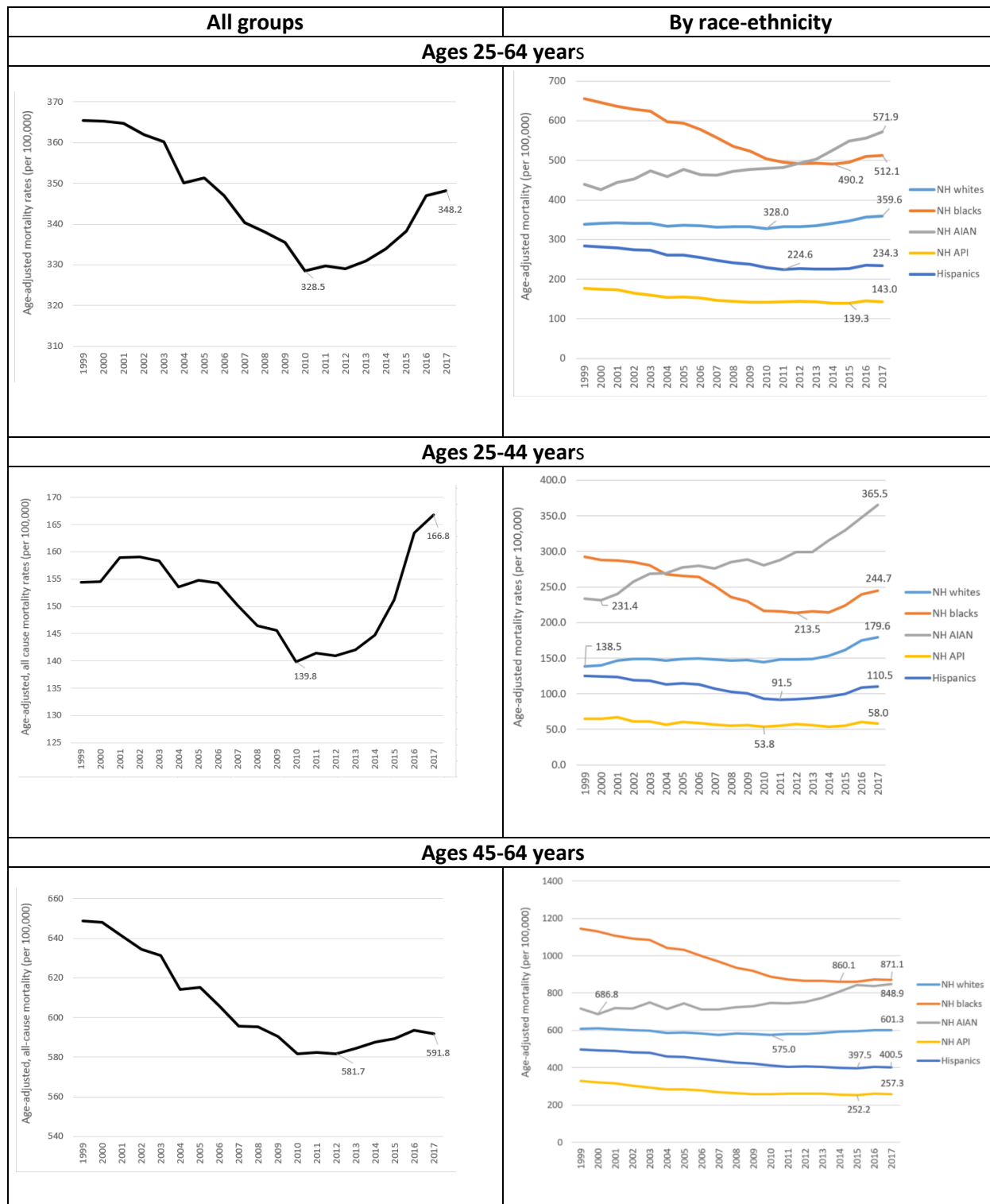
Notes: The nomogram provides a visual representation of when, and for how long, a cohort could have been exposed to a proposed cause to explain increasing midlife mortality during 2000-2019. Whereas period effects, such as the introduction of Oxycontin in 1996, could produce increases in mortality across cohorts, attributing the cause to childhood exposures would require analysis of conditions that existed some period of time earlier, depending on the cohort. As shown in the first row, for the mortality rates of adults ages 60-64 years to have increased during 2000-2004 because of childhood exposures (at ages 0-14 years), those exposures would have presumably occurred during 1940-1954. The last row shows that childhood exposures would have occurred in 1990-2004 to explain an increase in mortality among adults ages 25-29 years during 2015-2019.

eFigure 1. Age-Specific Mortality Rates for US Adults Aged 25-64 Years, by Age Group and Sex, 1999-2017

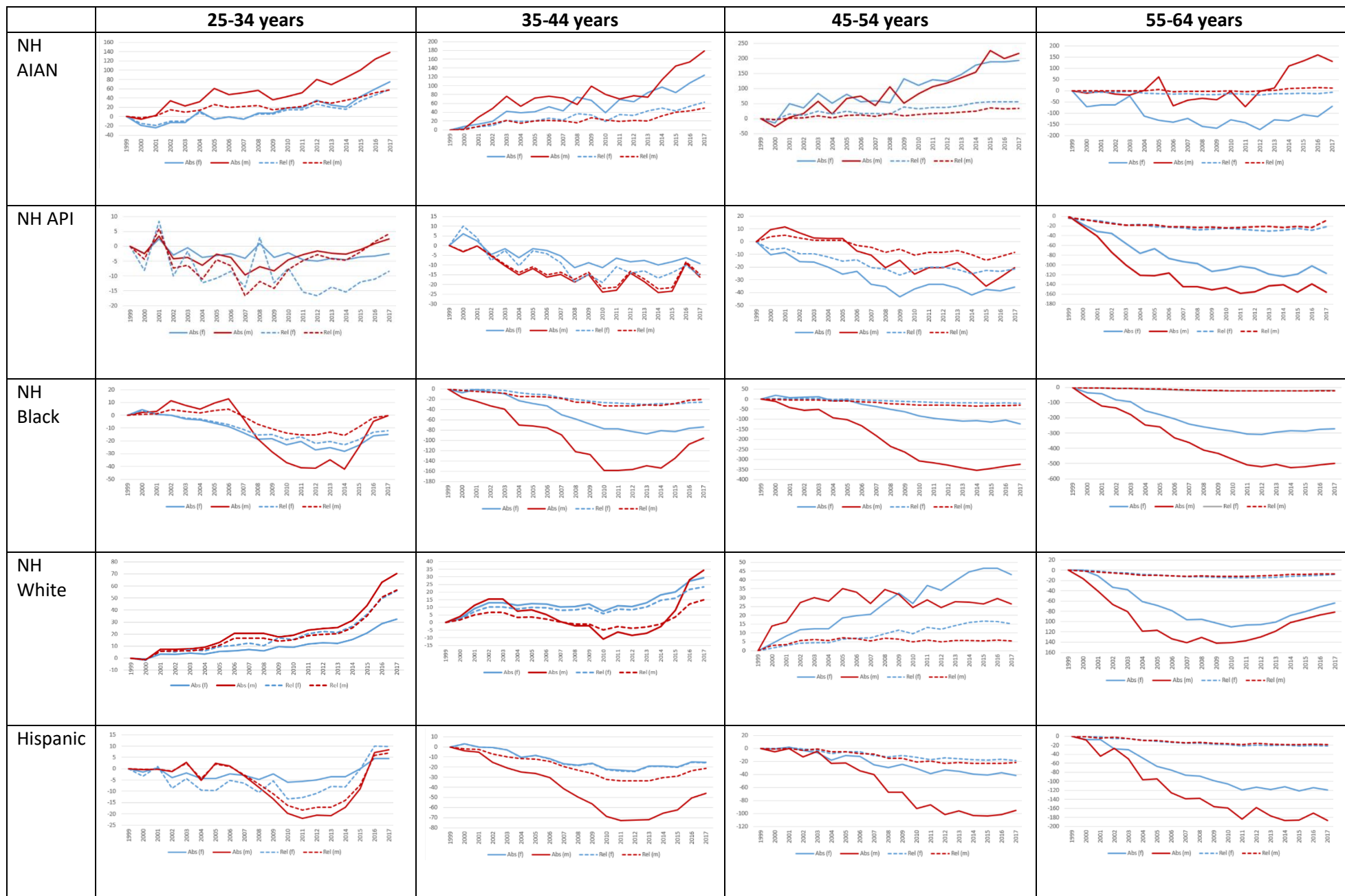


Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2017 on CDC WONDER Online Database, released December, 2018.

eFigure 2. Age-Adjusted All-Cause Mortality Rates Among US Adults Aged 25-64 years—Including Young (Aged 25-44 Years) and Middle-Aged (Aged 45-64 Years) Adults, in Aggregate and by Race-Ethnicity, 1999-2017



eFigure 3. Age-Specific Mortality Rates, by Race and Age, 1999-2017

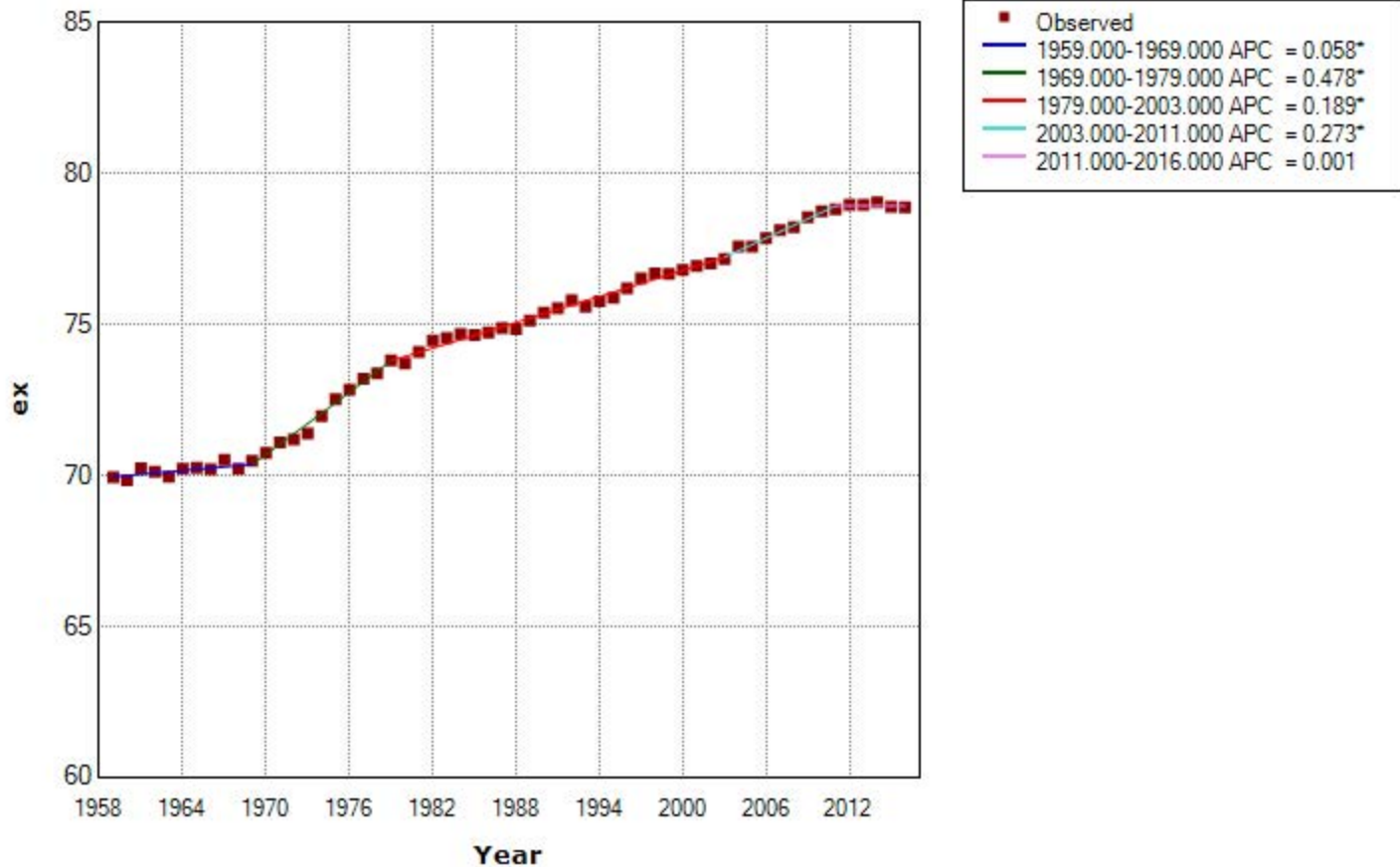


Graphs plots absolute (*Abs*) and relative (*Rel*) changes in mortality rates relative to 1999 baseline mortality. AIAN = American Indians and Alaskan Natives; API = Asians and Pacific Islanders; NH = Non-Hispanic. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2017 on CDC WONDER Online Database, released December, 2018.

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2017 on CDC WONDER Online Database, released December, 2018.

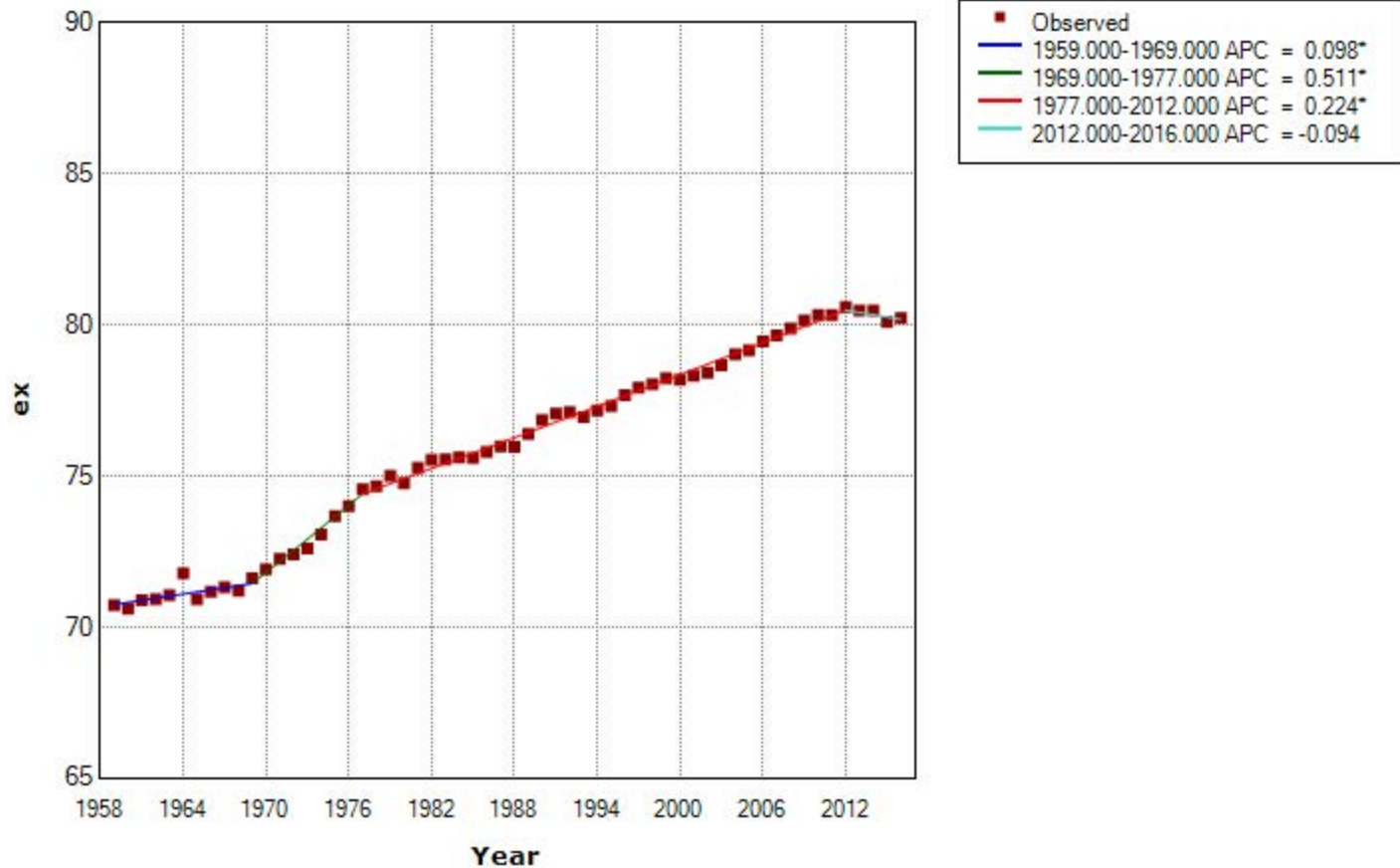
JOINPOINT CHARTBOOK

USA: 4 Joinpoints



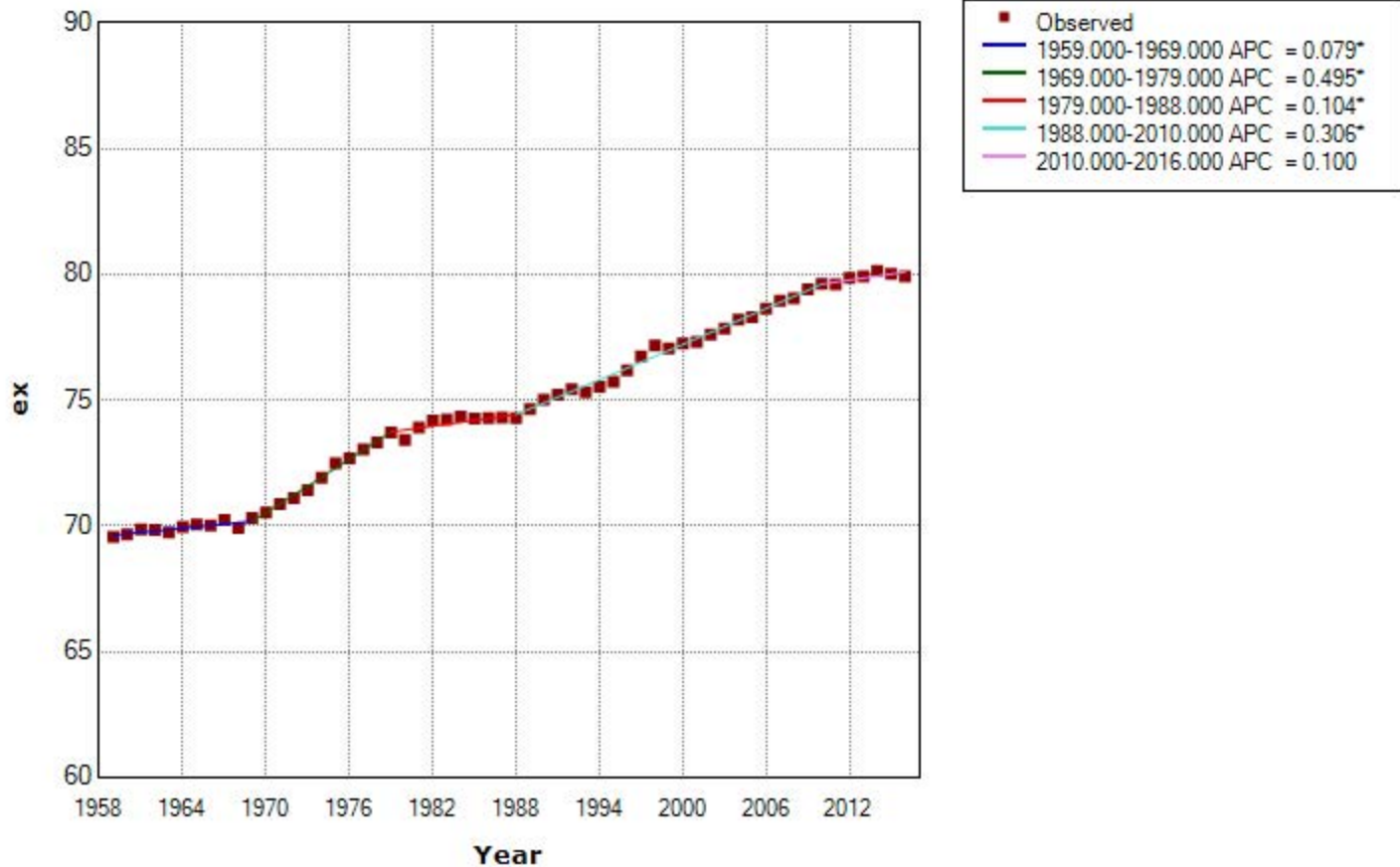
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 4 Joinpoints.

Div1: 3 Joinpoints



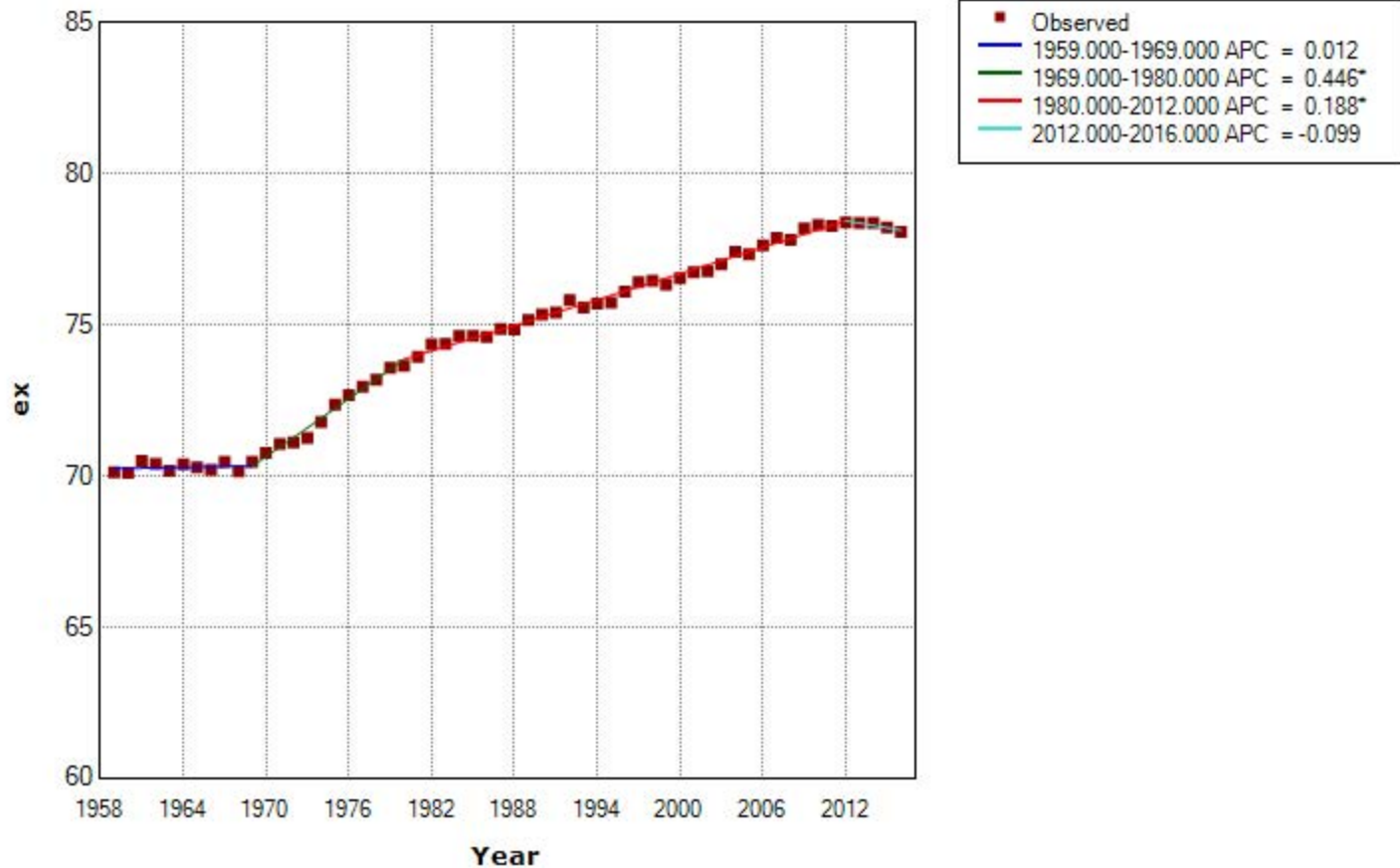
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Div2: 4 Joinpoints



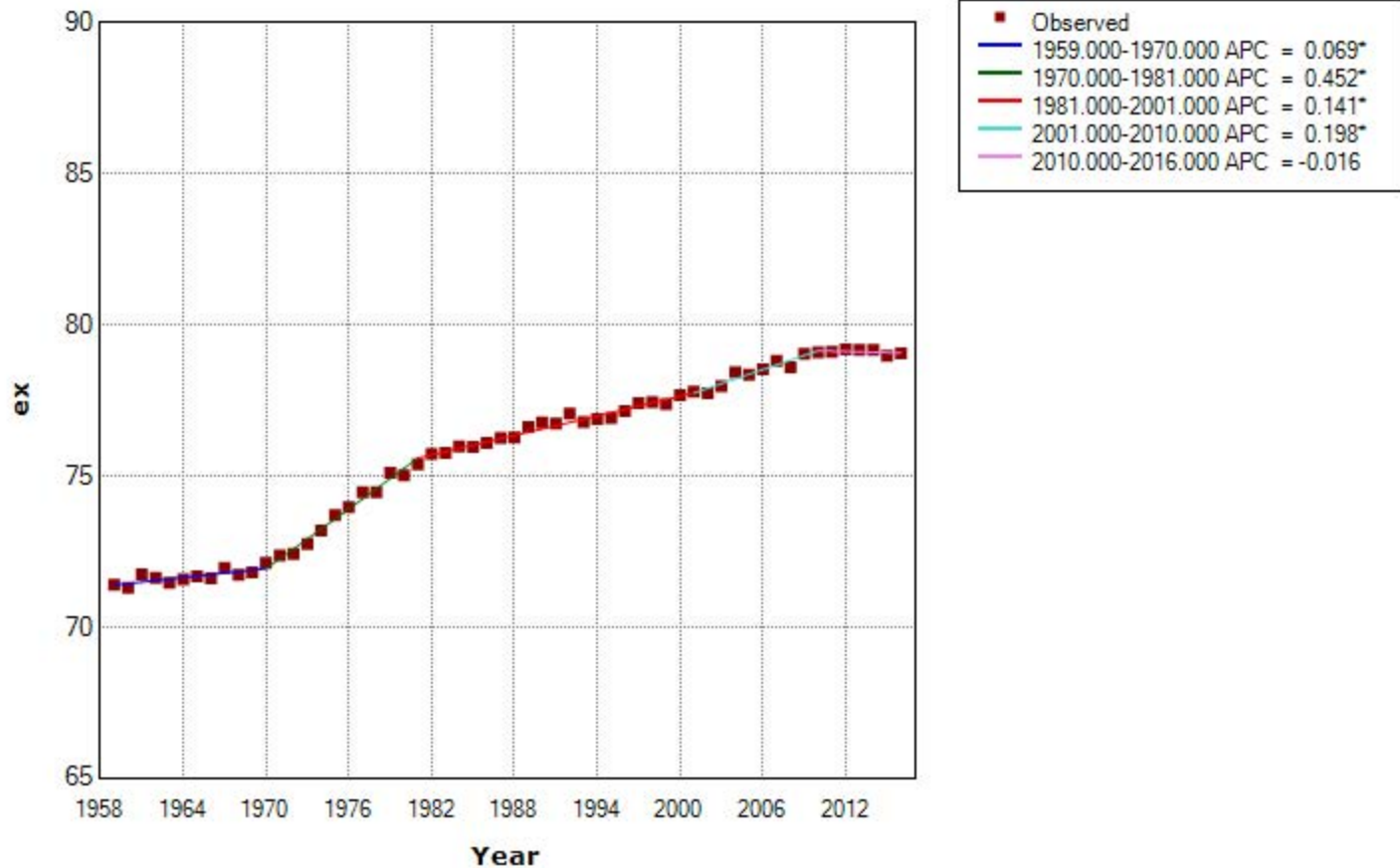
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Final Selected Model: 4 Joinpoints.

Div3: 3 Joinpoints



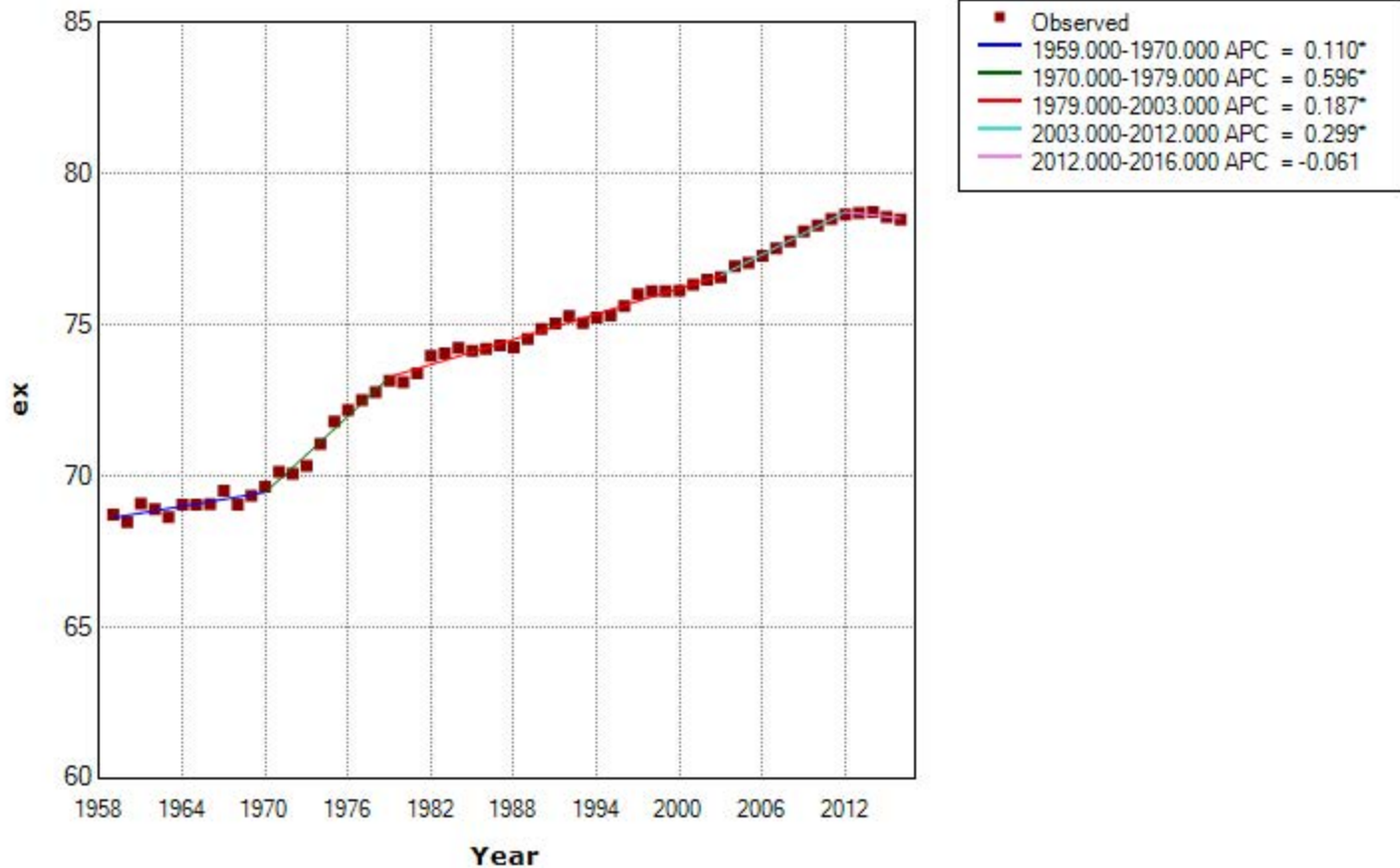
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Div4: 4 Joinpoints



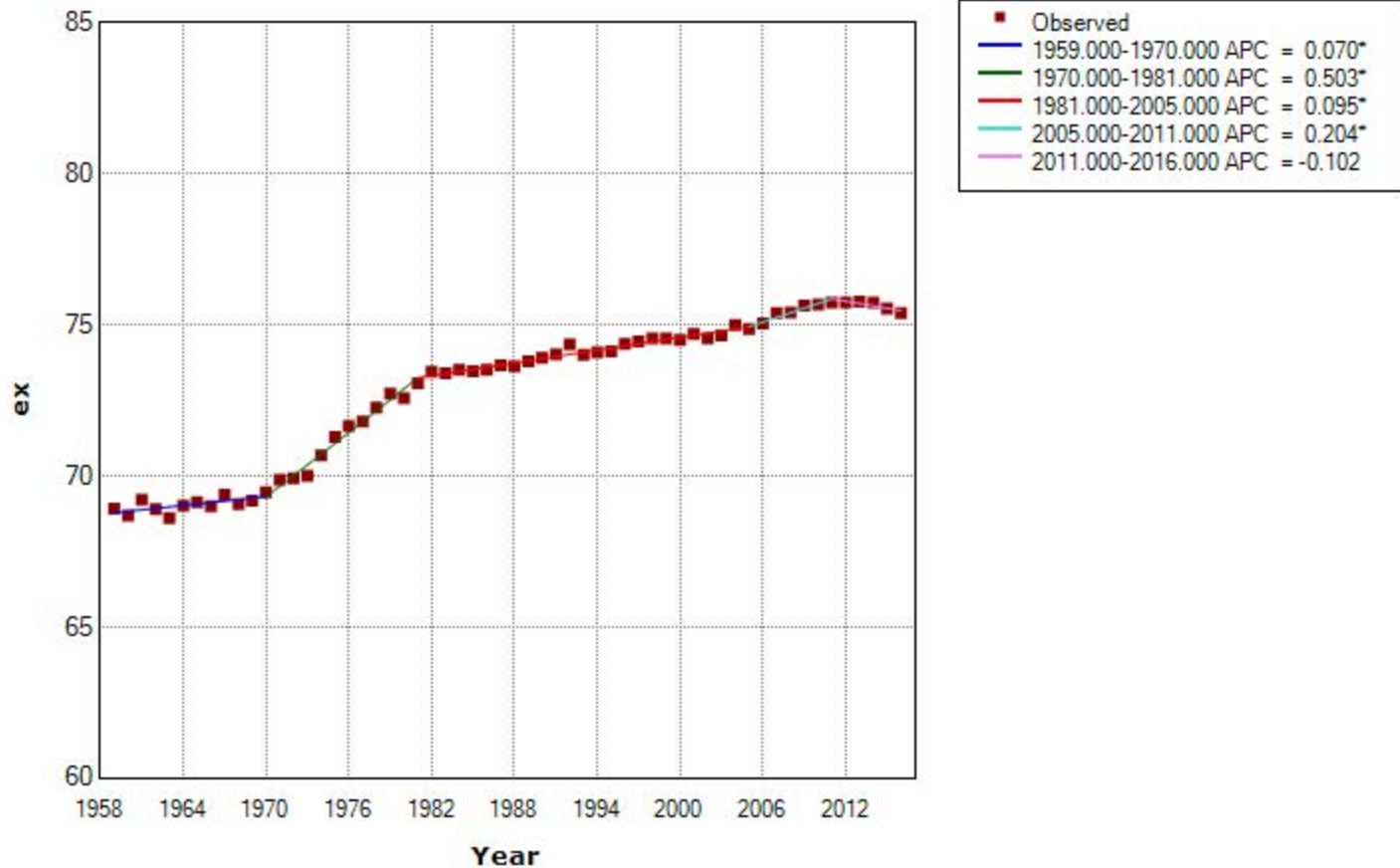
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Final Selected Model: 4 Joinpoints.

Div5: 4 Joinpoints



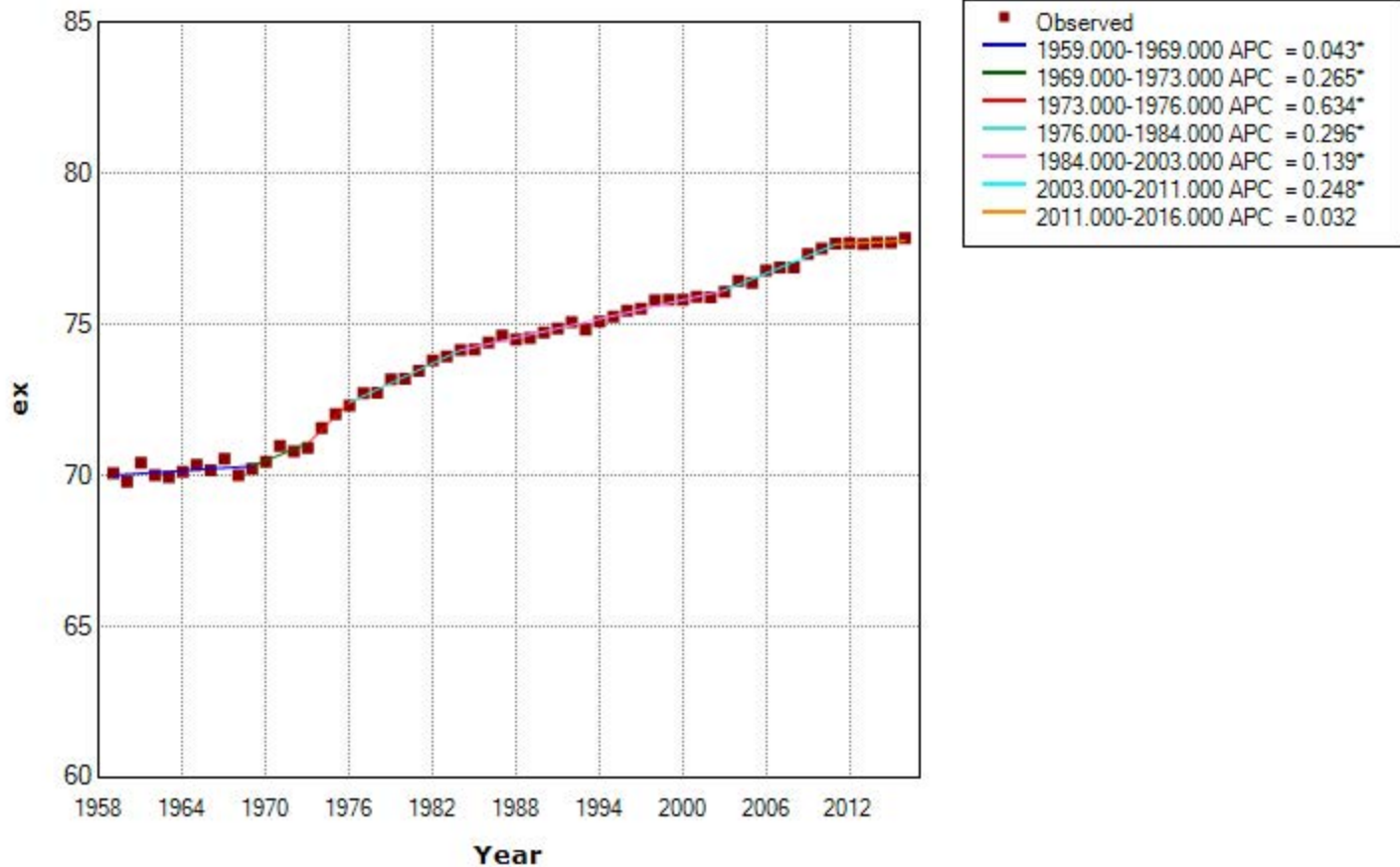
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 4 Joinpoints.

Div6: 4 Joinpoints



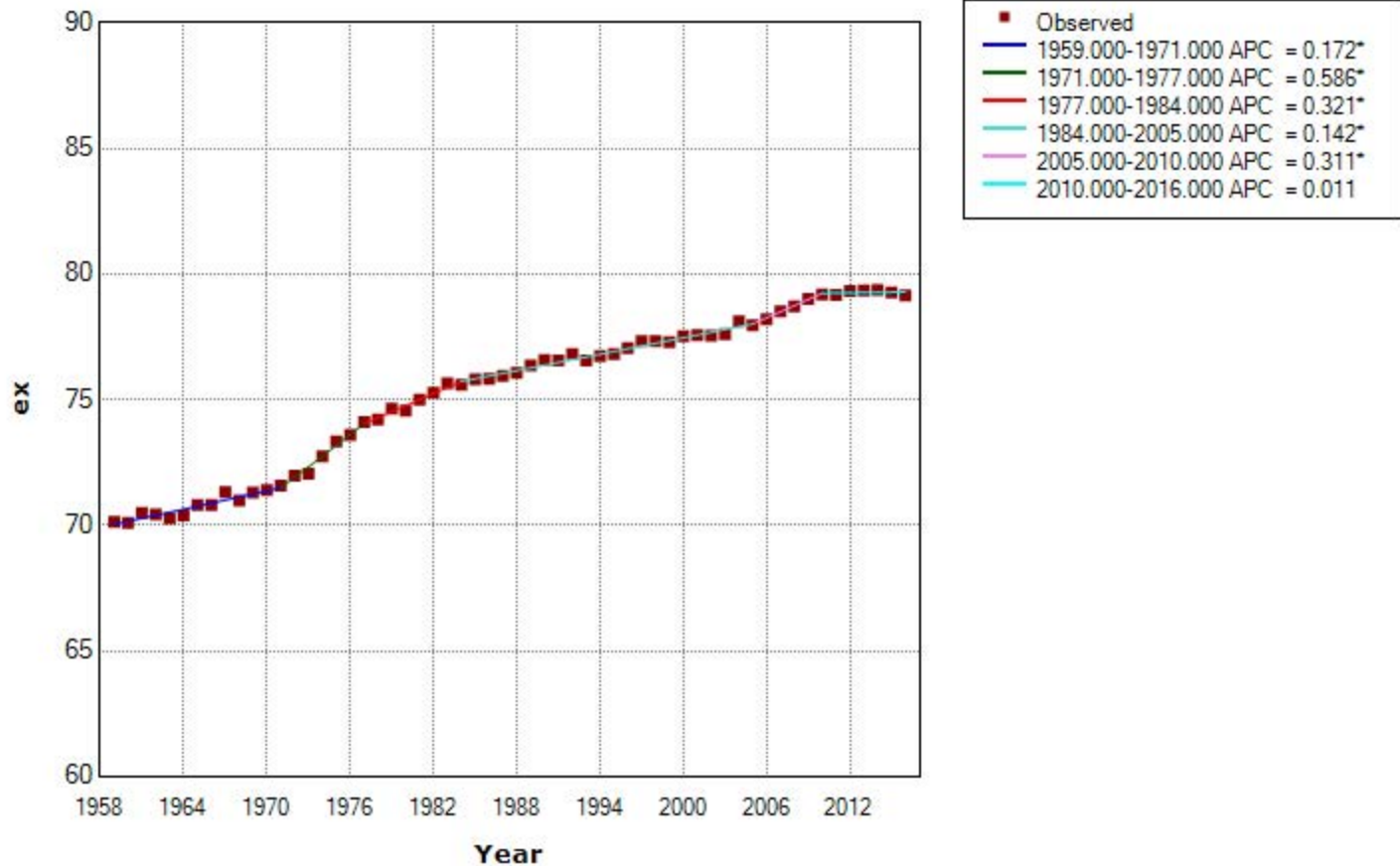
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 4 Joinpoints.

Div7: 6 Joinpoints



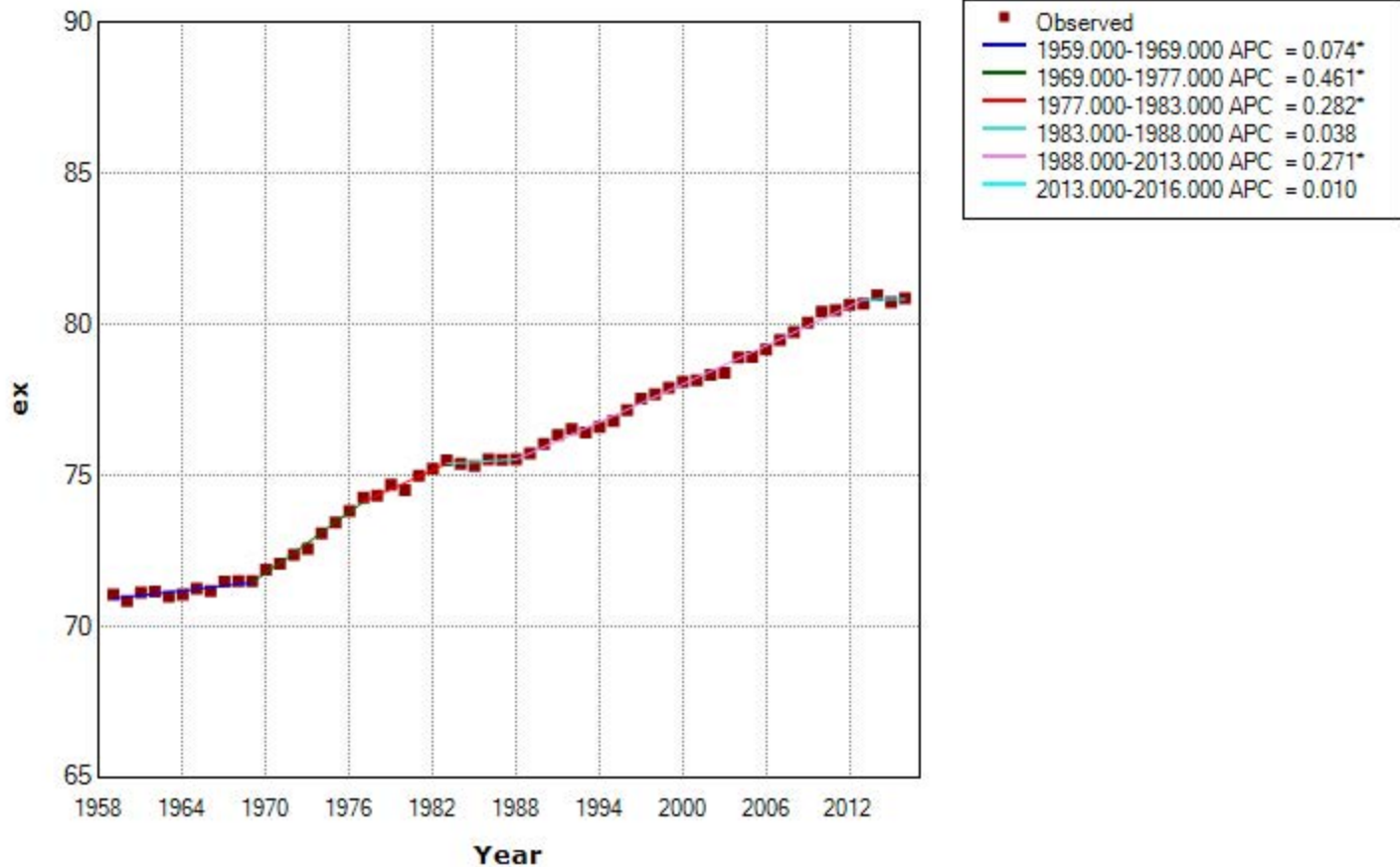
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 6 Joinpoints.

Div8: 5 Joinpoints



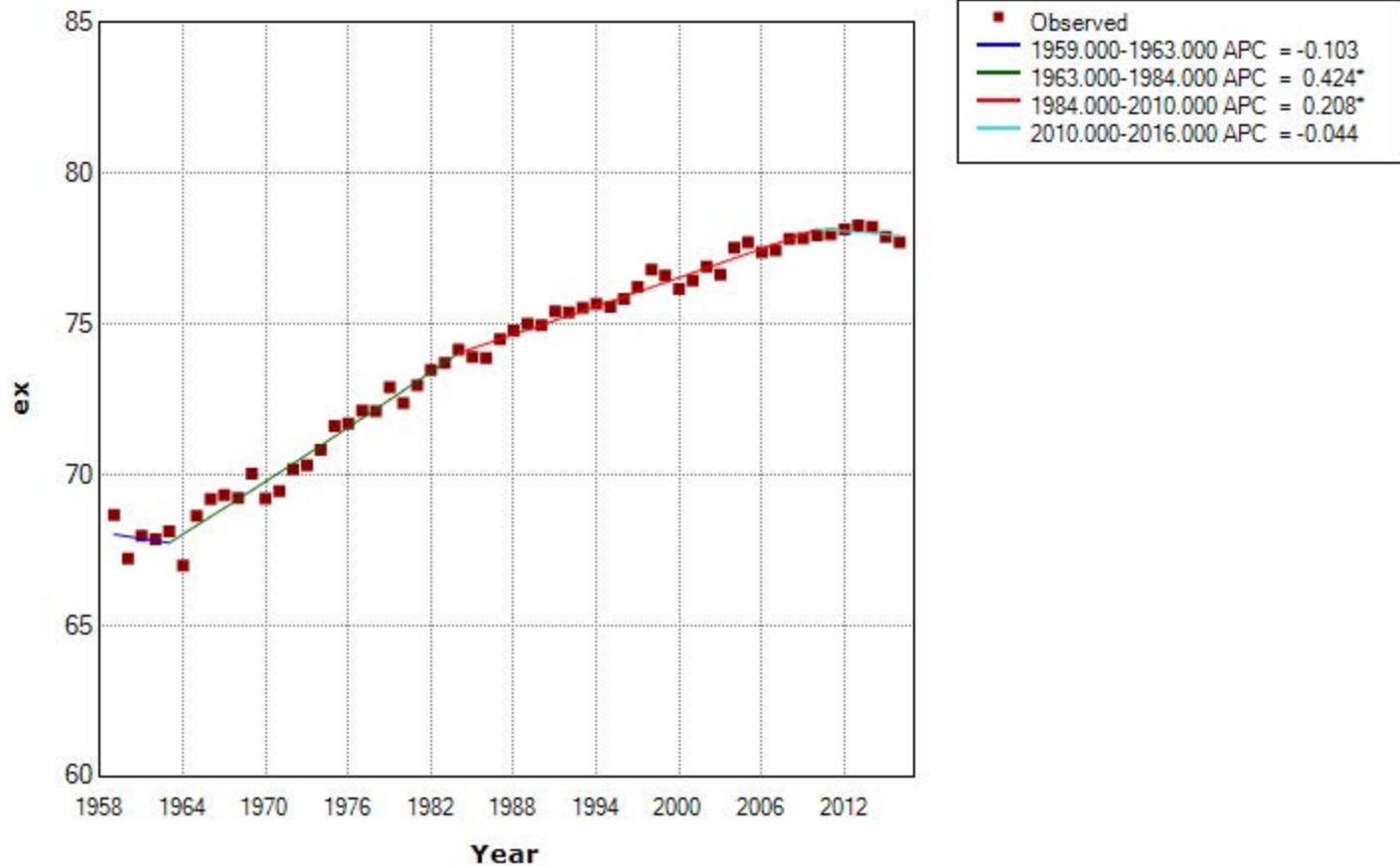
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 5 Joinpoints.

Div9: 5 Joinpoints



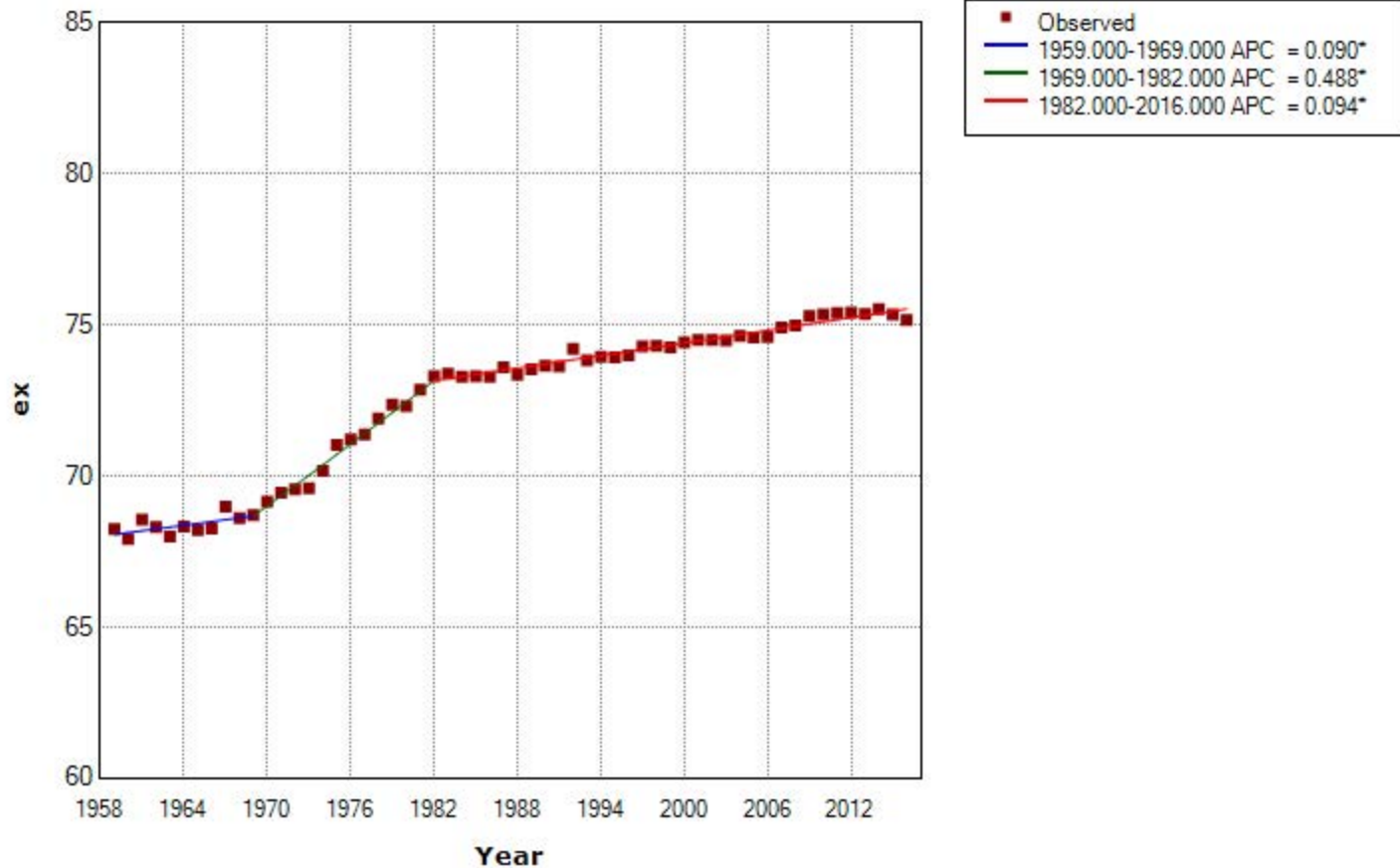
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 5 Joinpoints.

AK: 3 Joinpoints



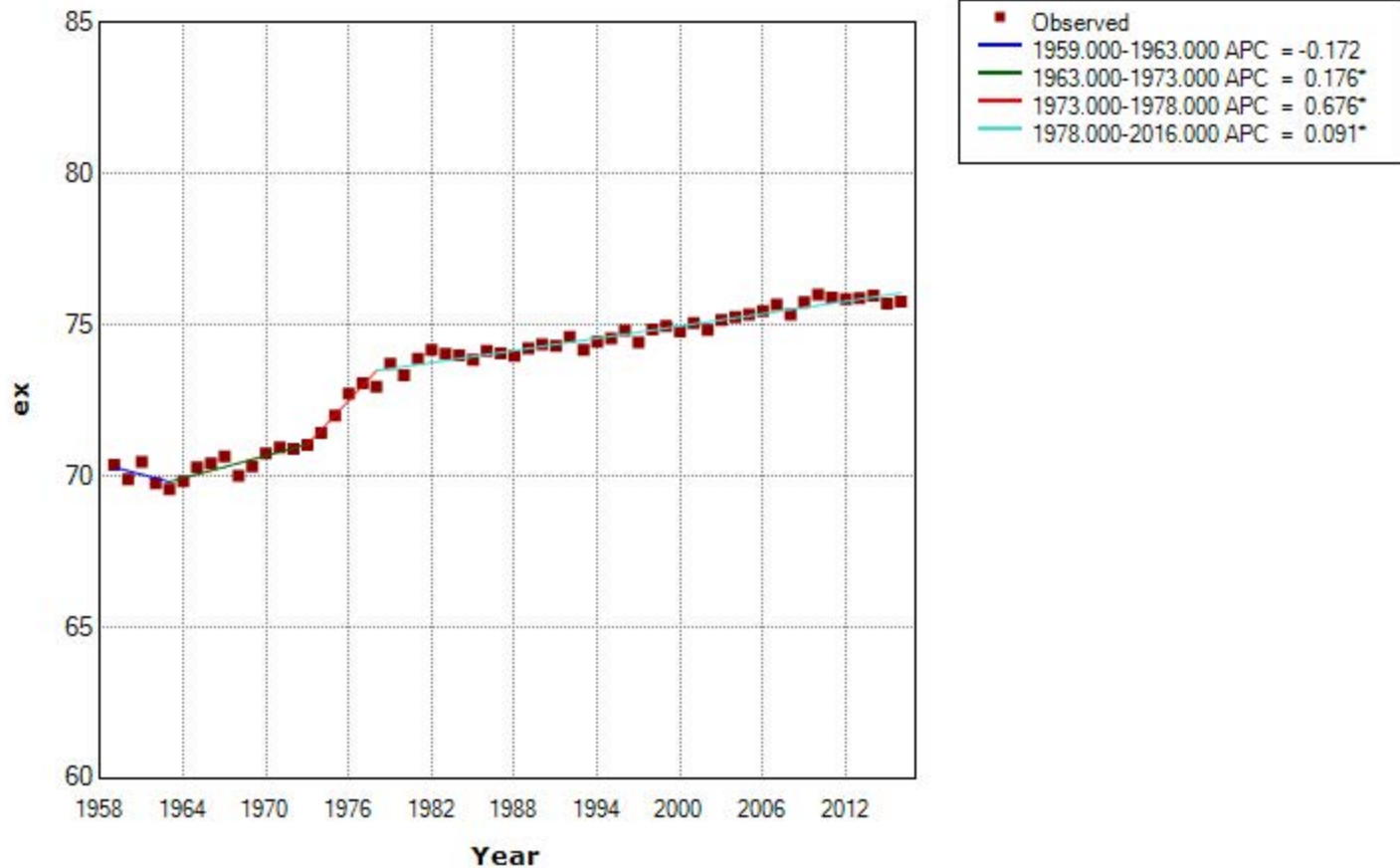
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

AL: 2 Joinpoints



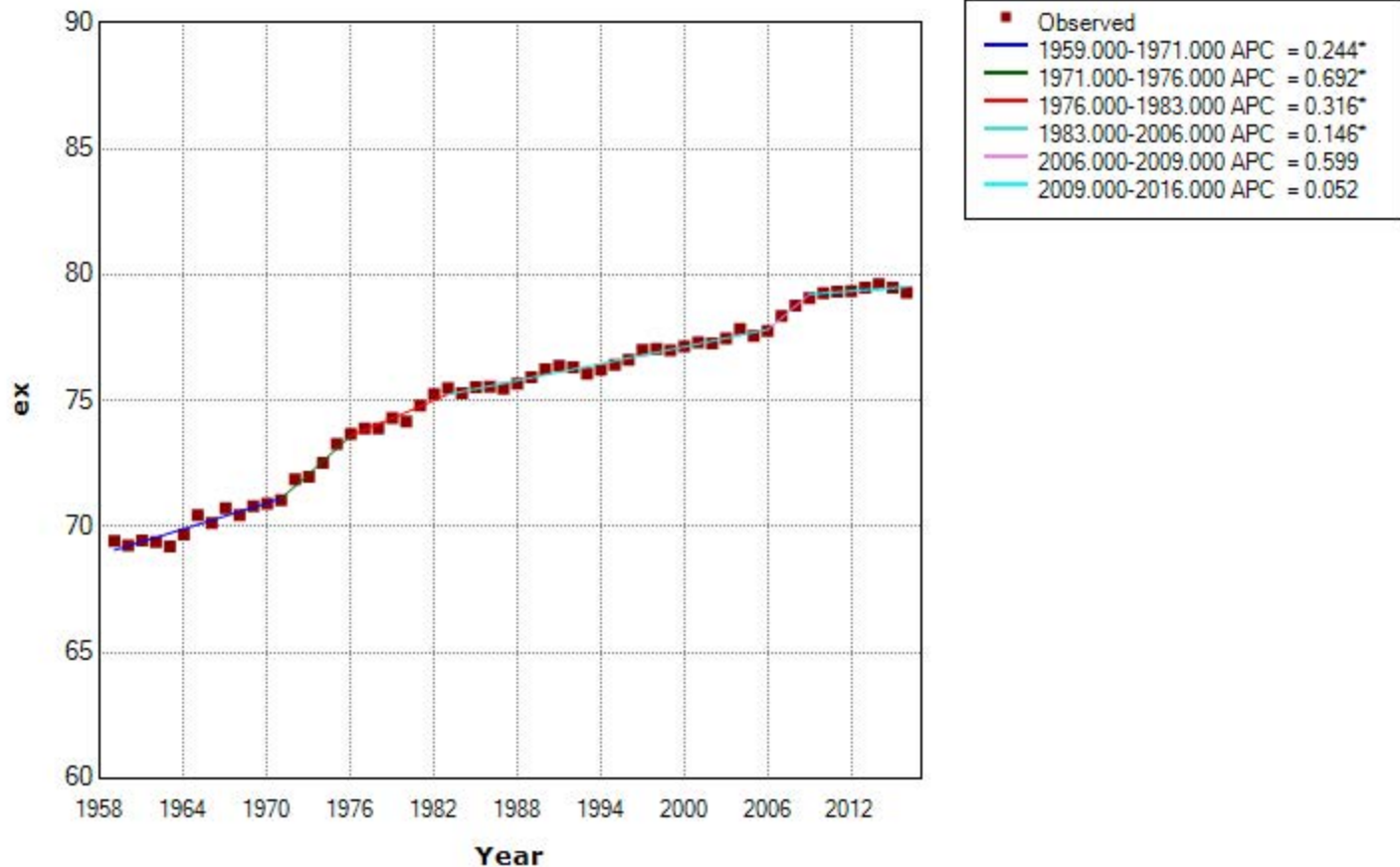
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

AR: 3 Joinpoints



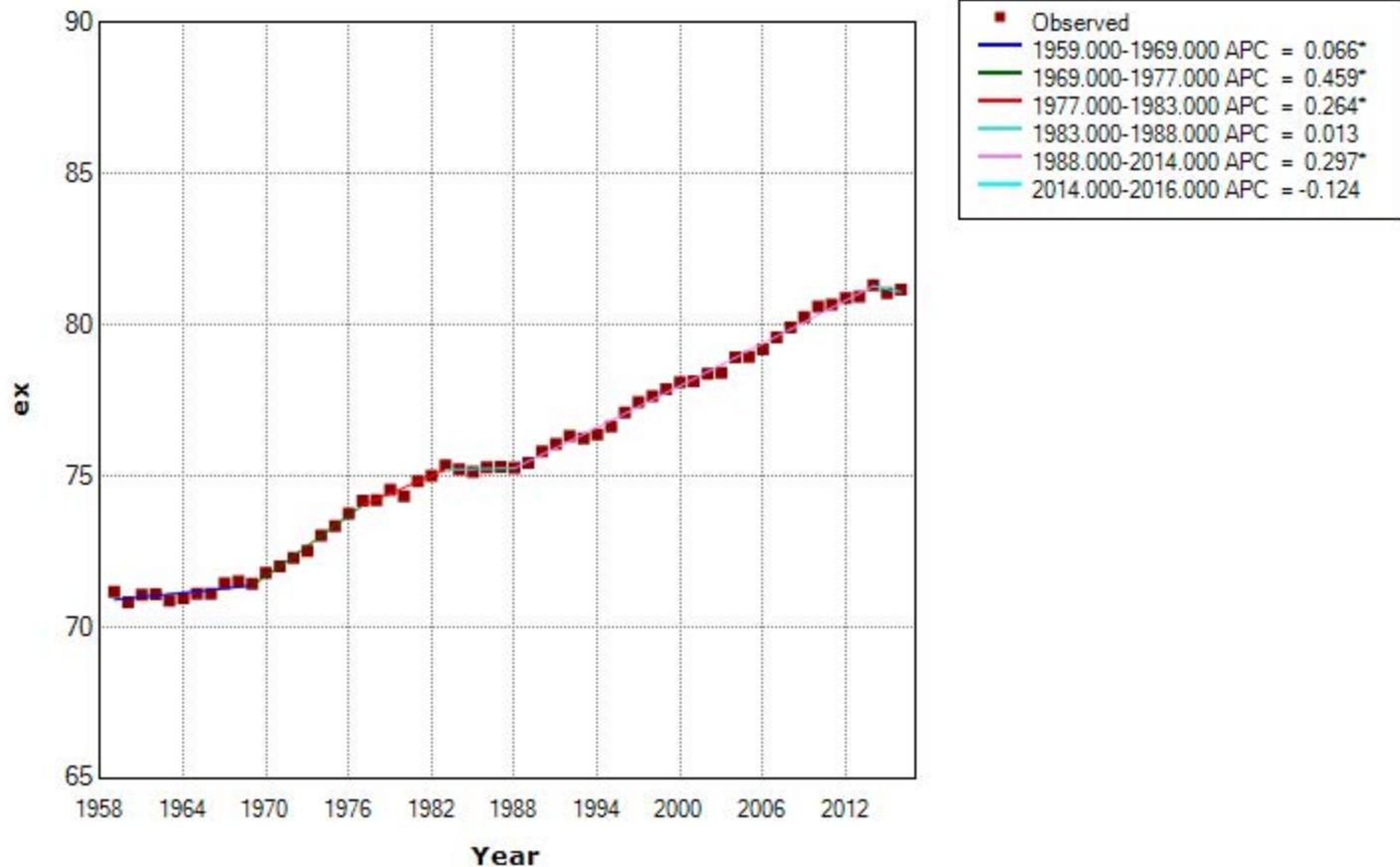
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

AZ: 5 Joinpoints



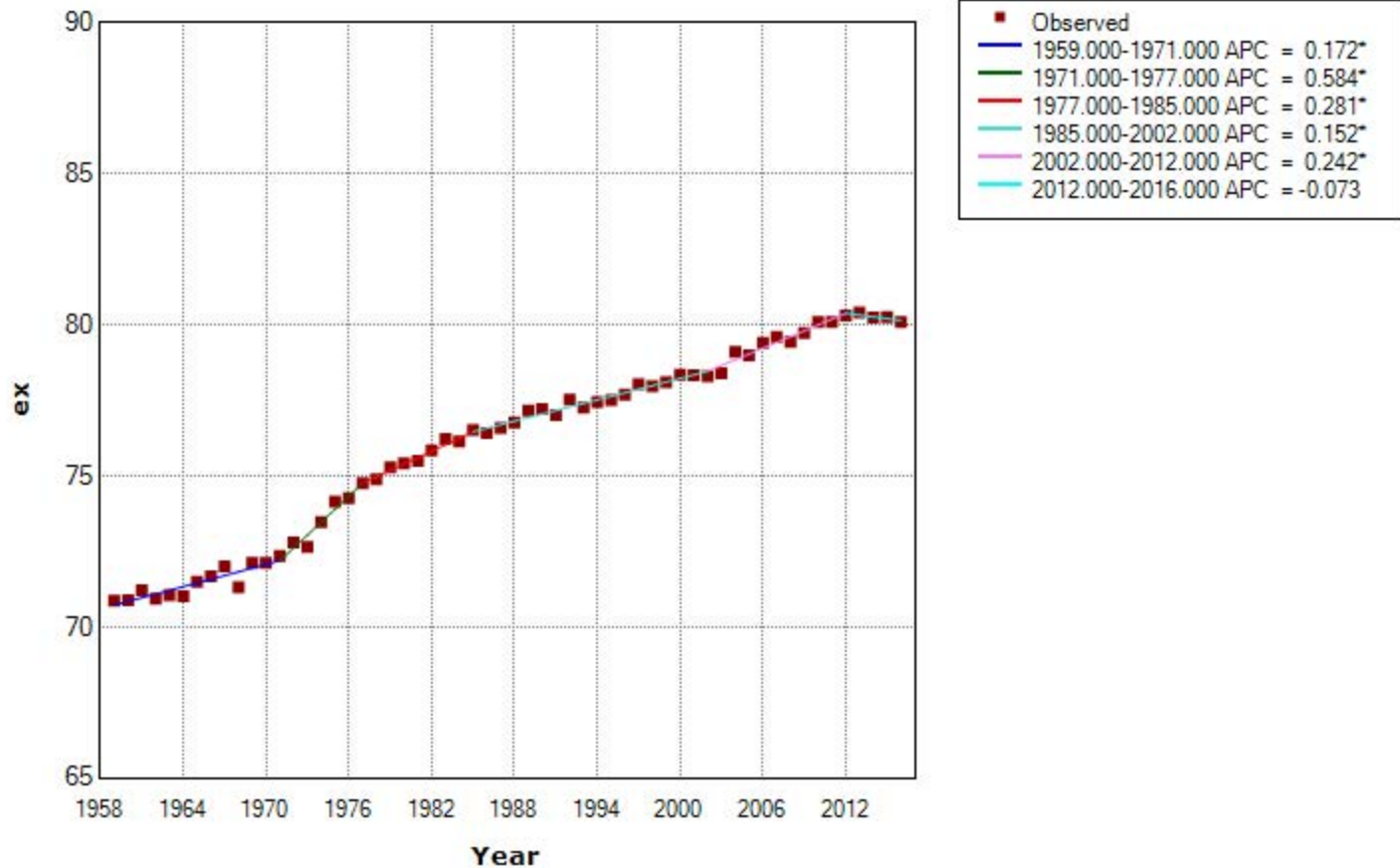
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 5 Joinpoints.

CA: 5 Joinpoints



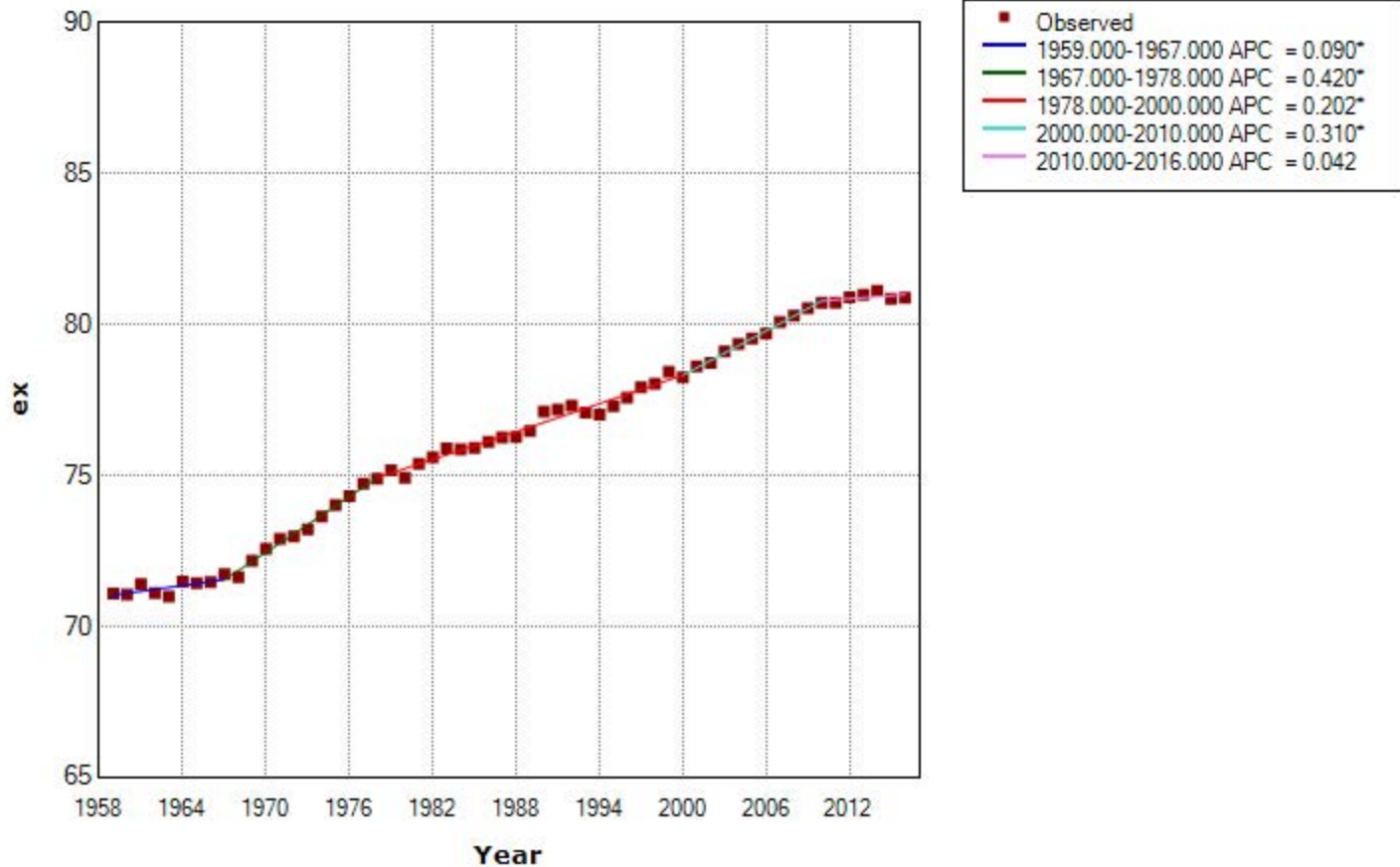
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Final Selected Model: 5 Joinpoints.

CO: 5 Joinpoints



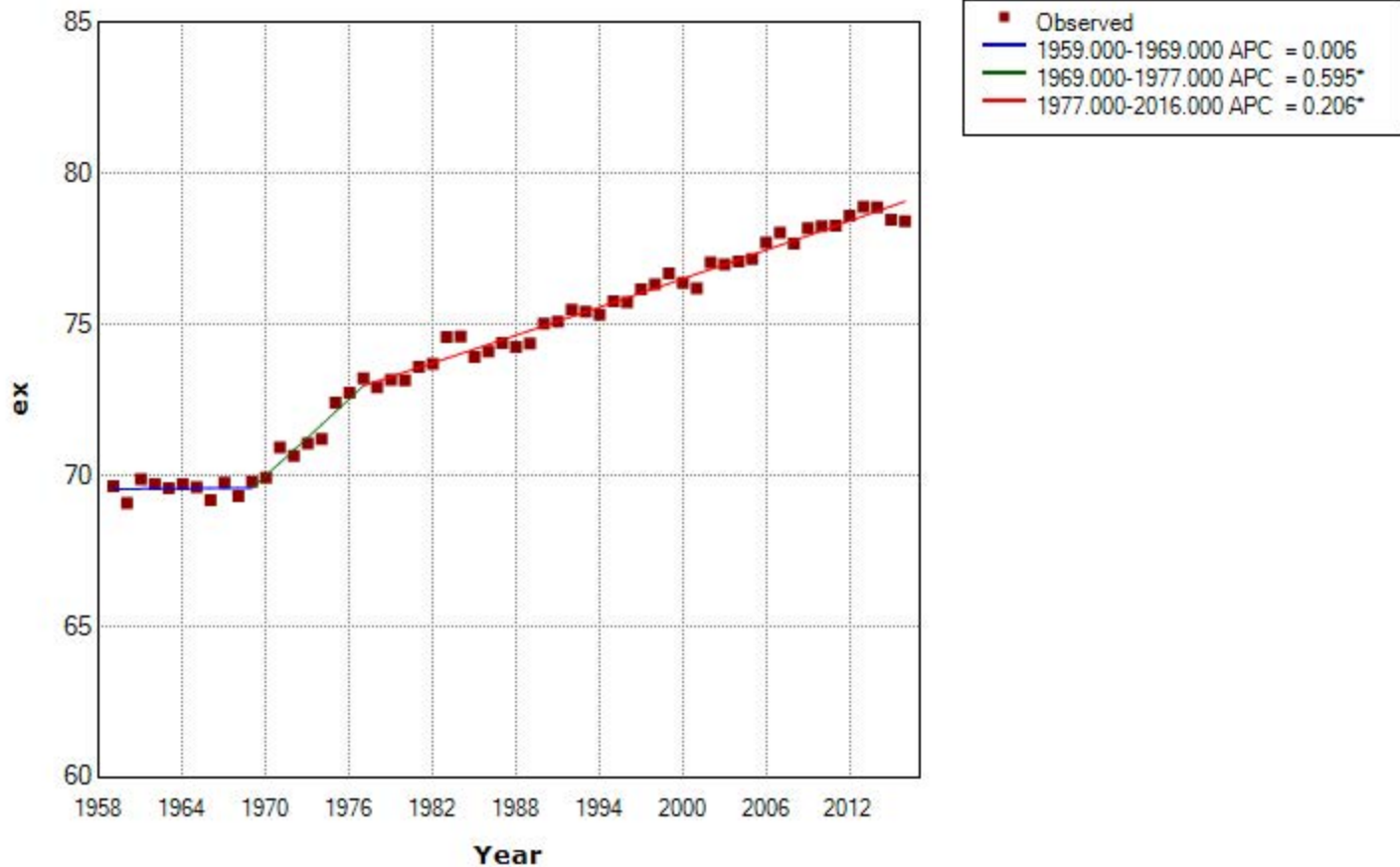
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 5 Joinpoints.

CT: 4 Joinpoints



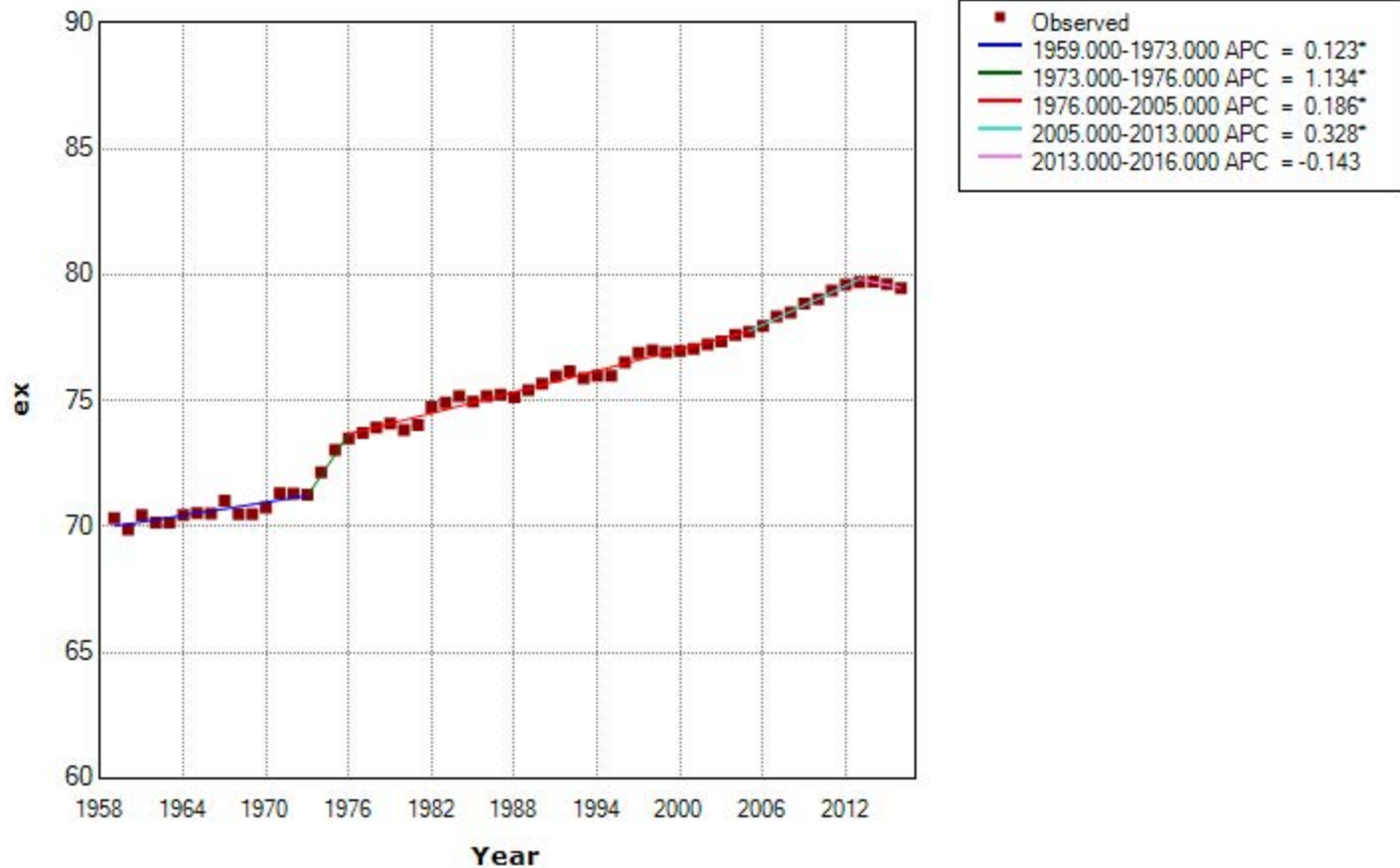
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Final Selected Model: 4 Joinpoints.

DE: 2 Joinpoints



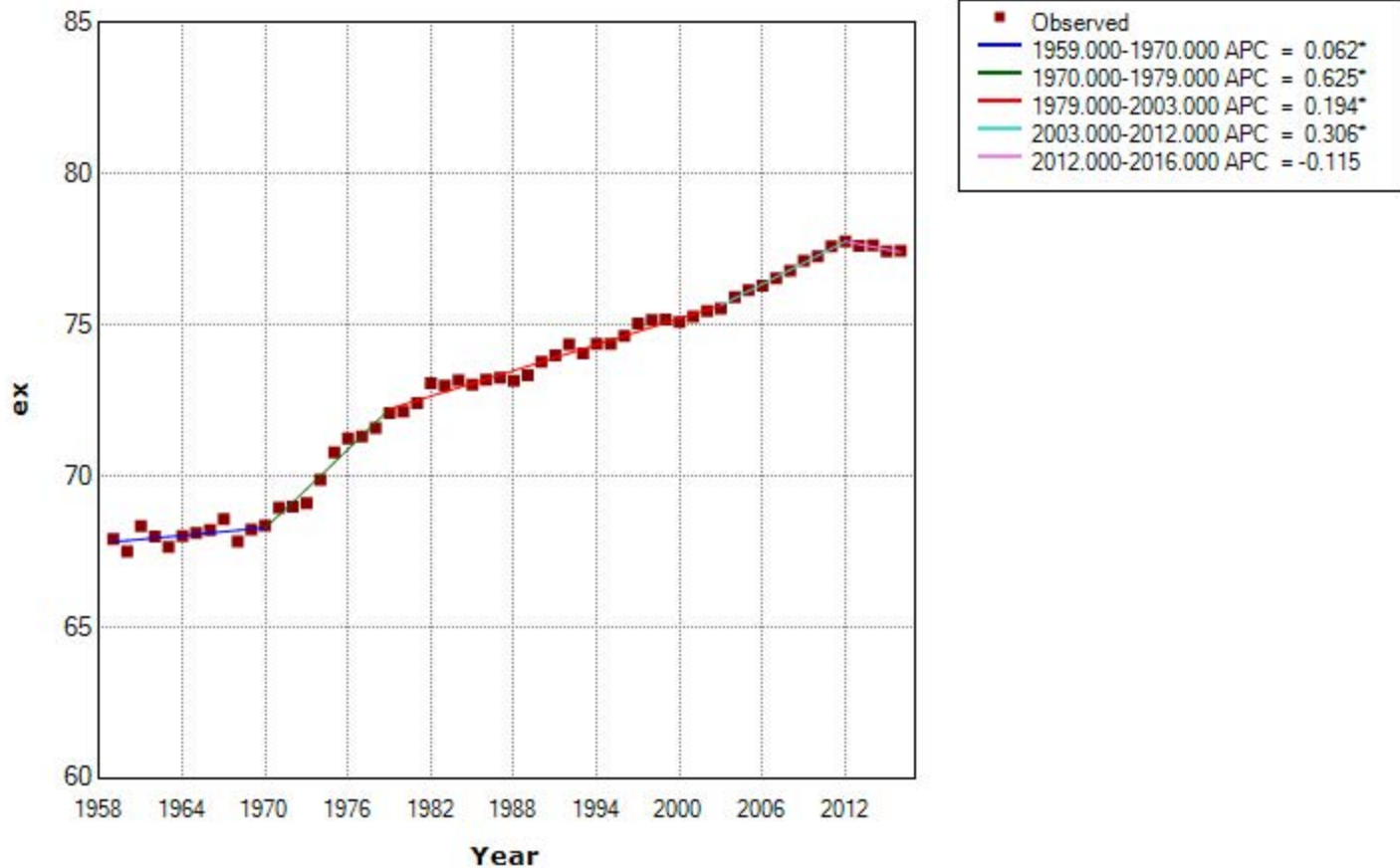
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

FL: 4 Joinpoints



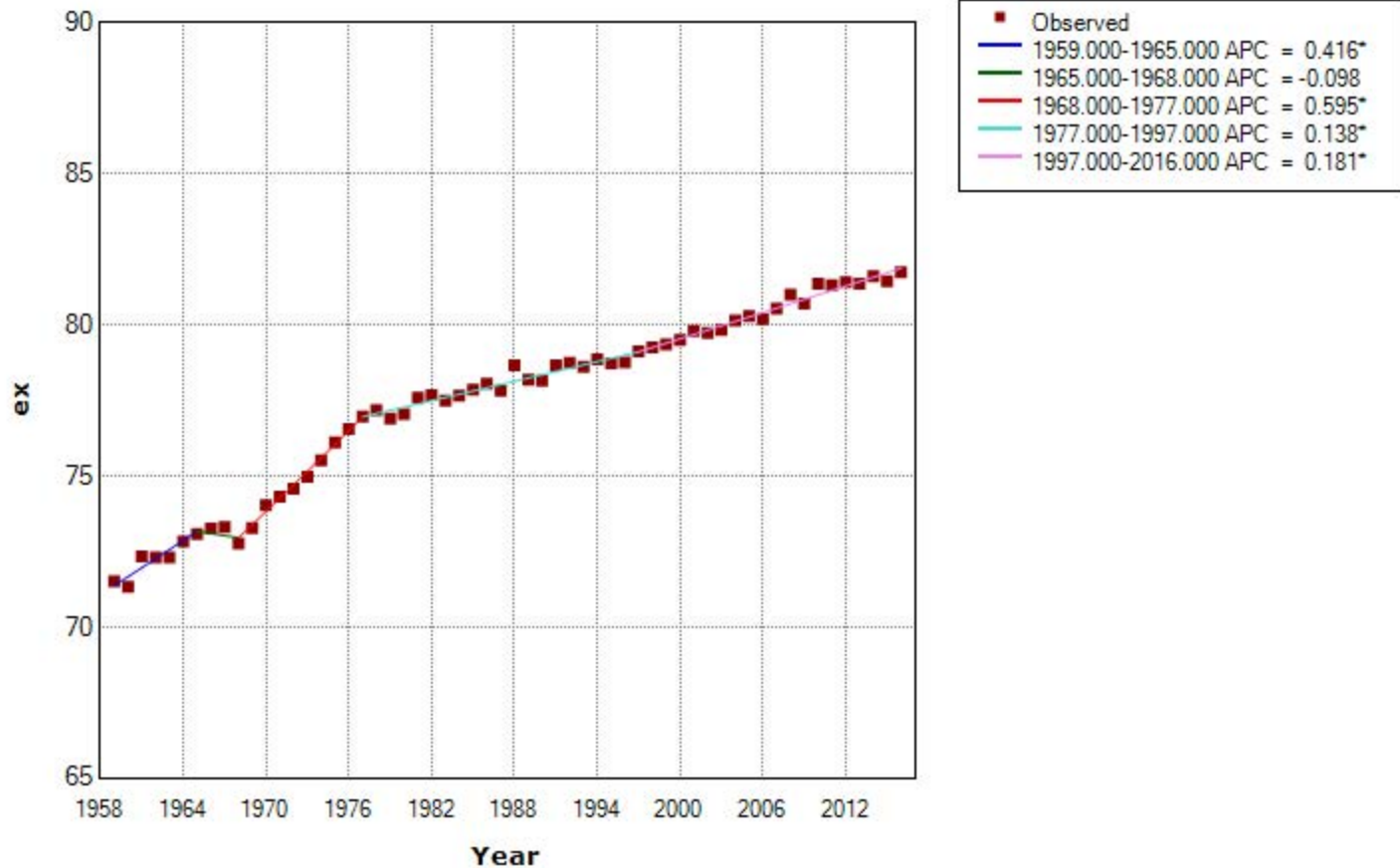
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Final Selected Model: 4 Joinpoints.

GA: 4 Joinpoints



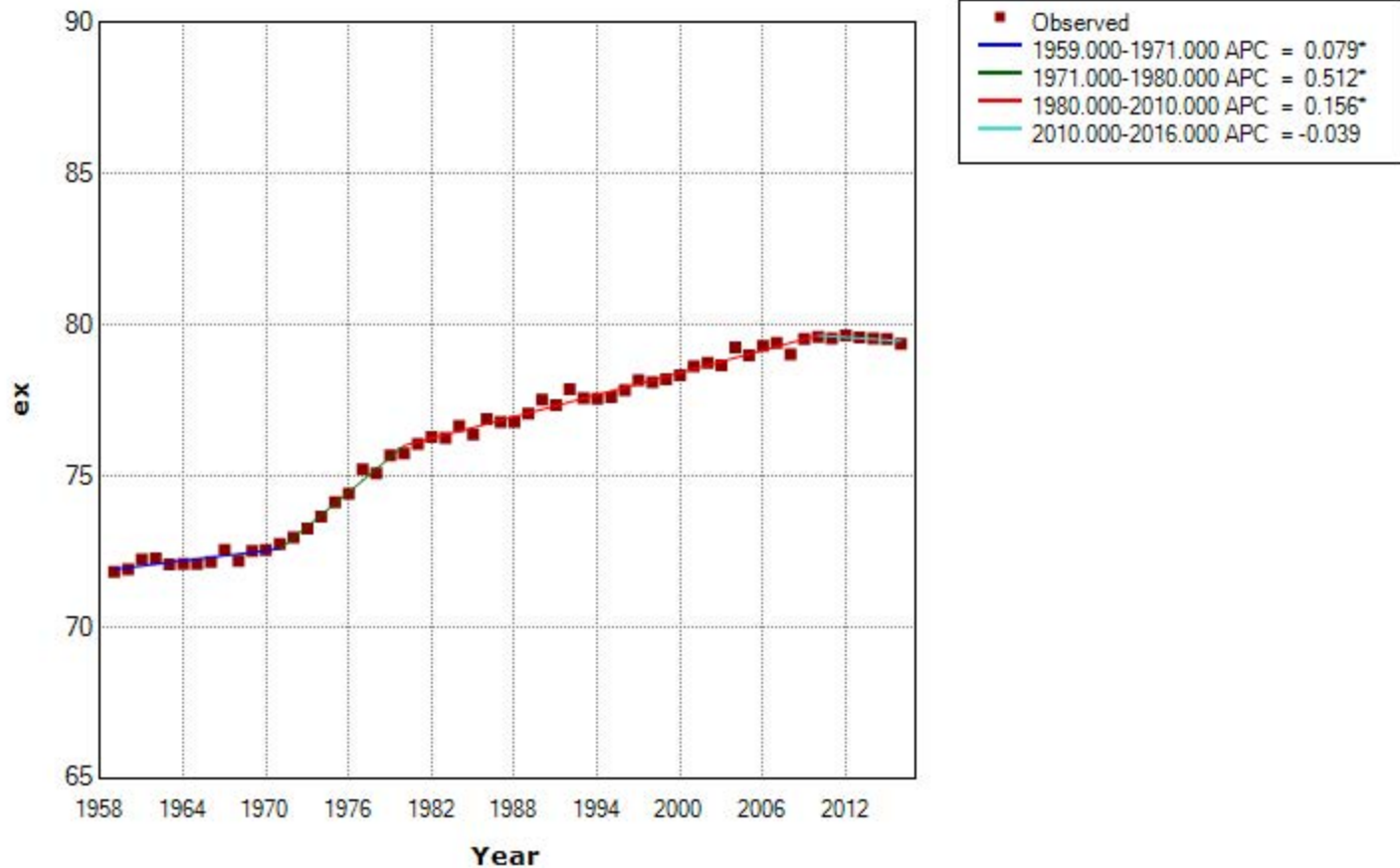
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Final Selected Model: 4 Joinpoints.

HI: 4 Joinpoints



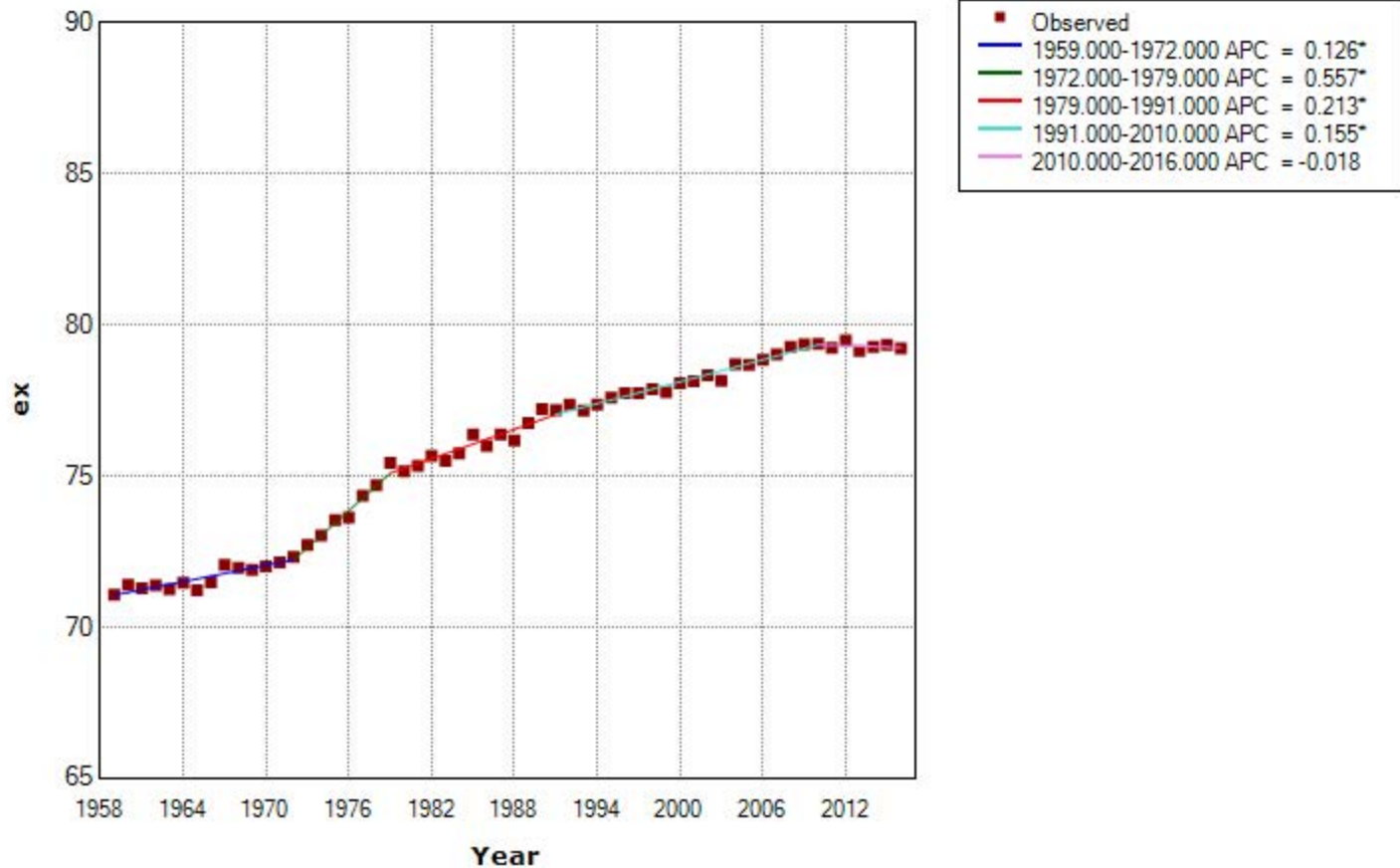
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Final Selected Model: 4 Joinpoints.

IA: 3 Joinpoints



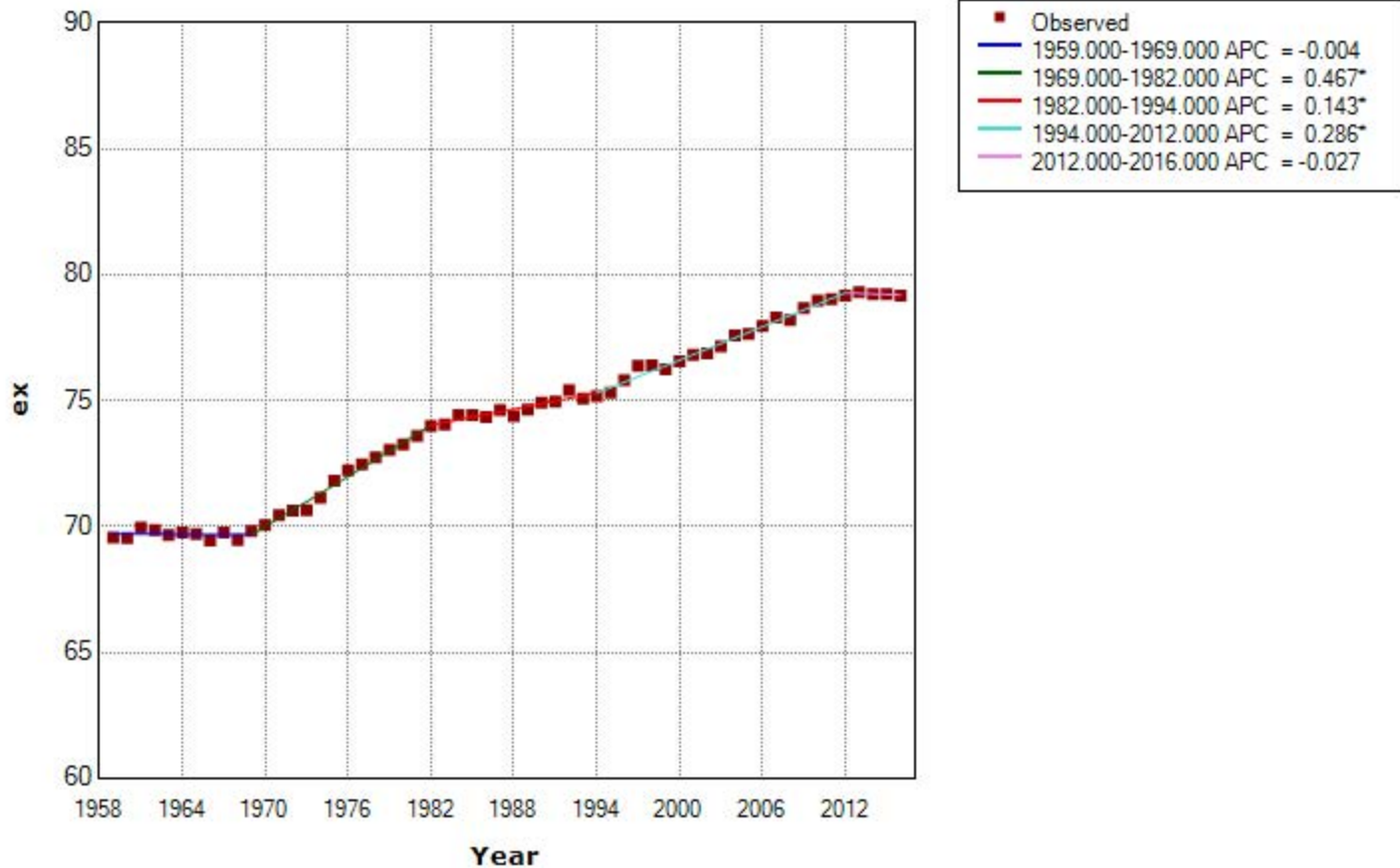
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Final Selected Model: 3 Joinpoints.

ID: 4 Joinpoints



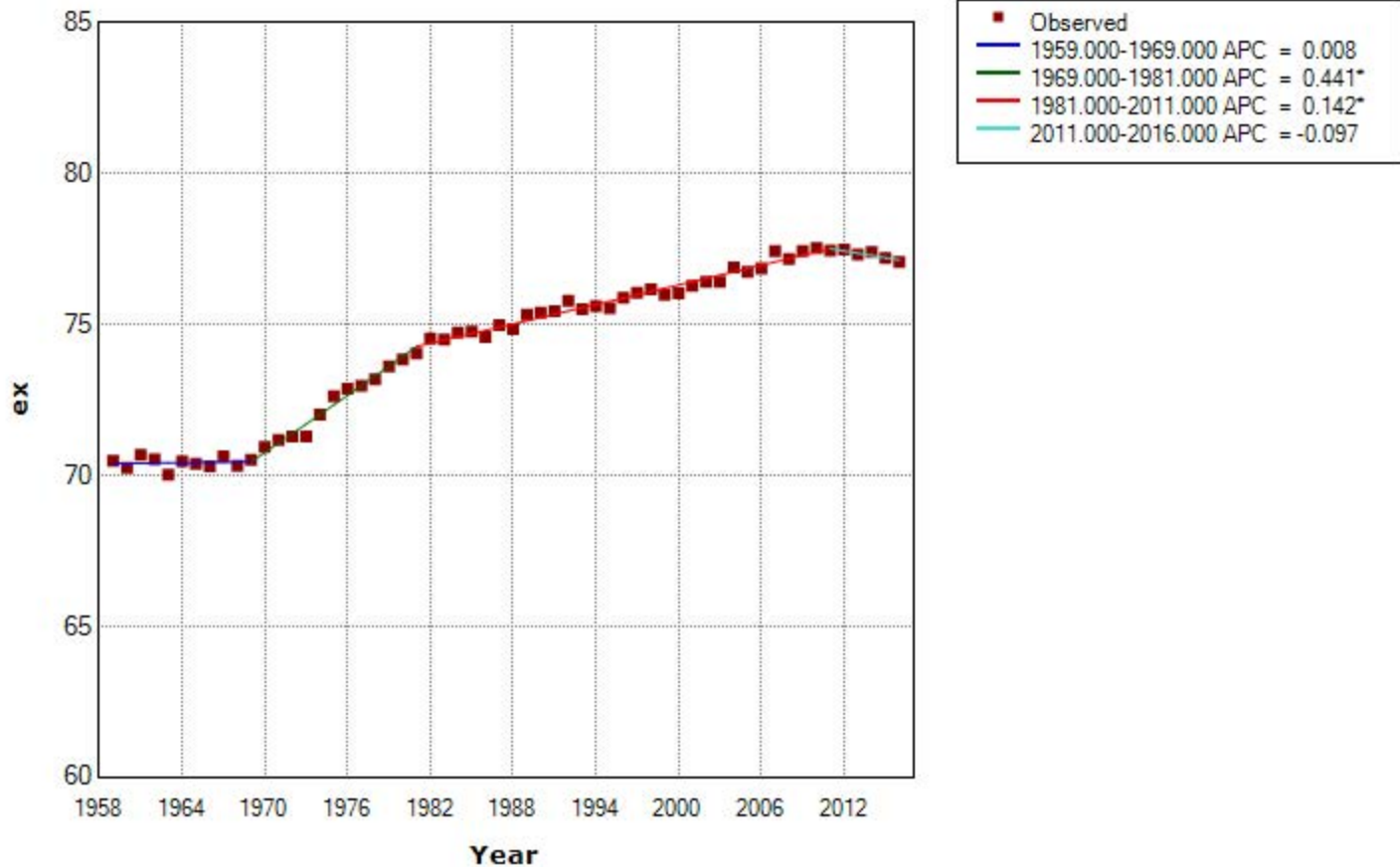
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Final Selected Model: 4 Joinpoints.

IL: 4 Joinpoints



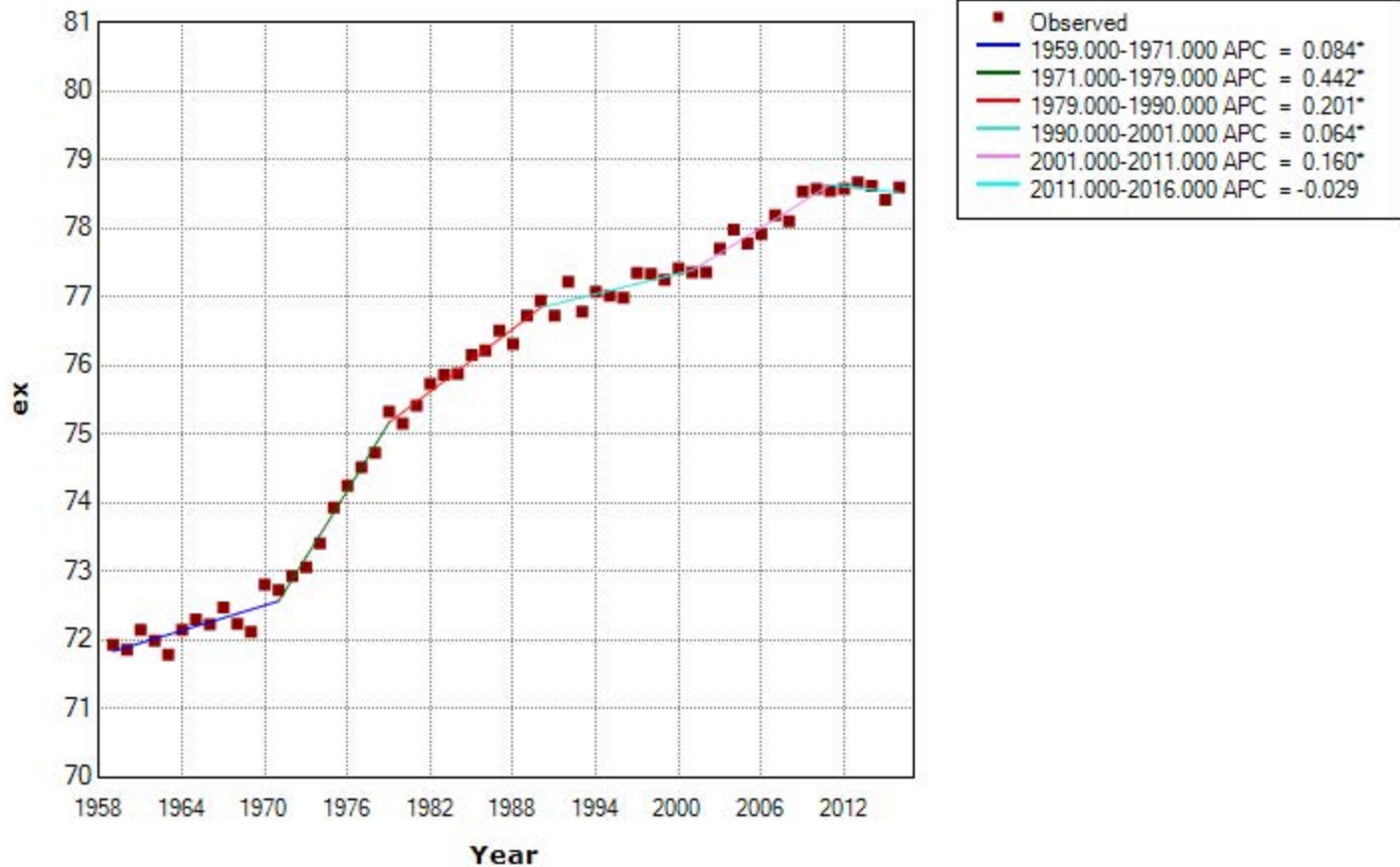
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Final Selected Model: 4 Joinpoints.

IN: 3 Joinpoints



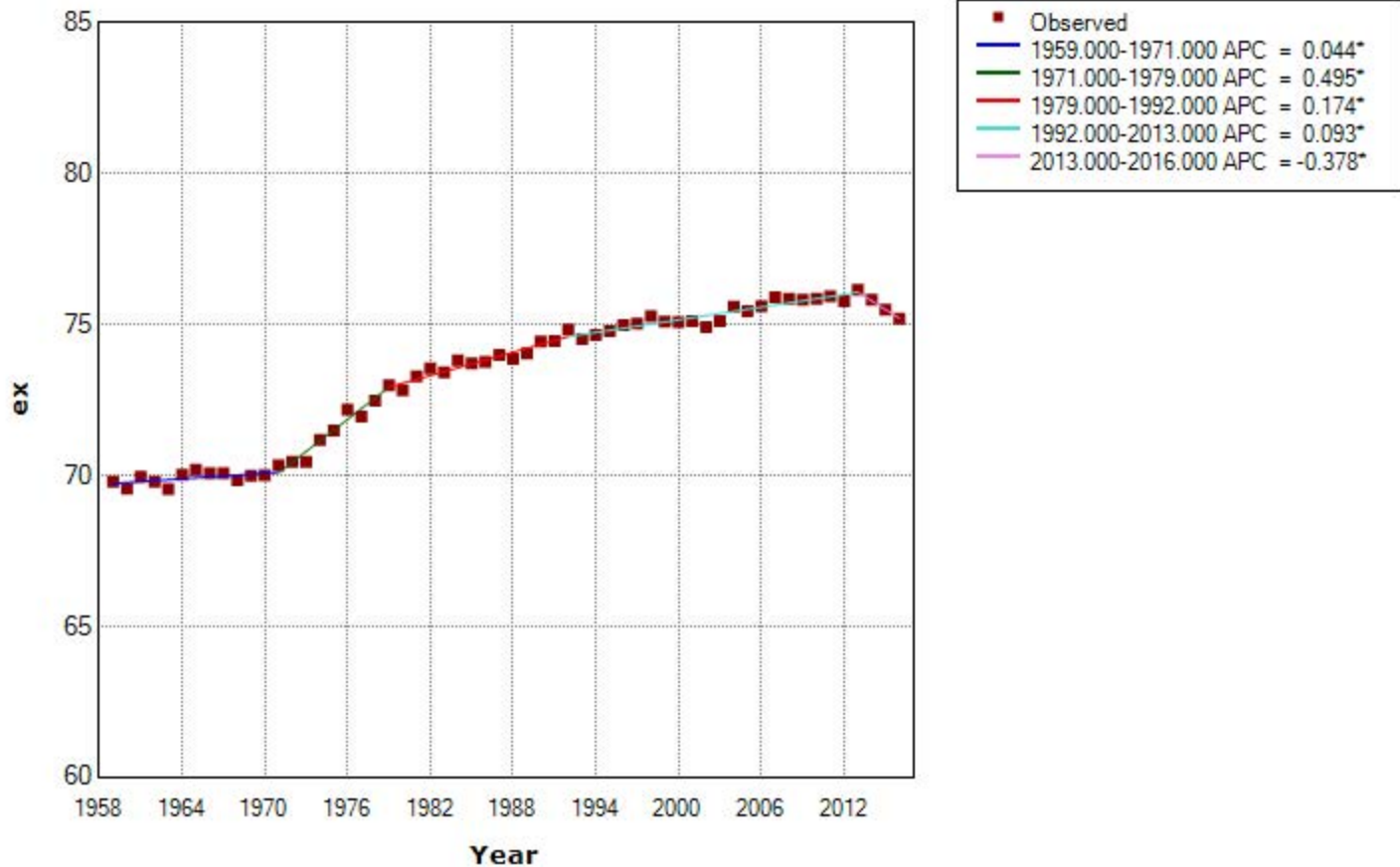
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Final Selected Model: 3 Joinpoints.

KS: 5 Joinpoints



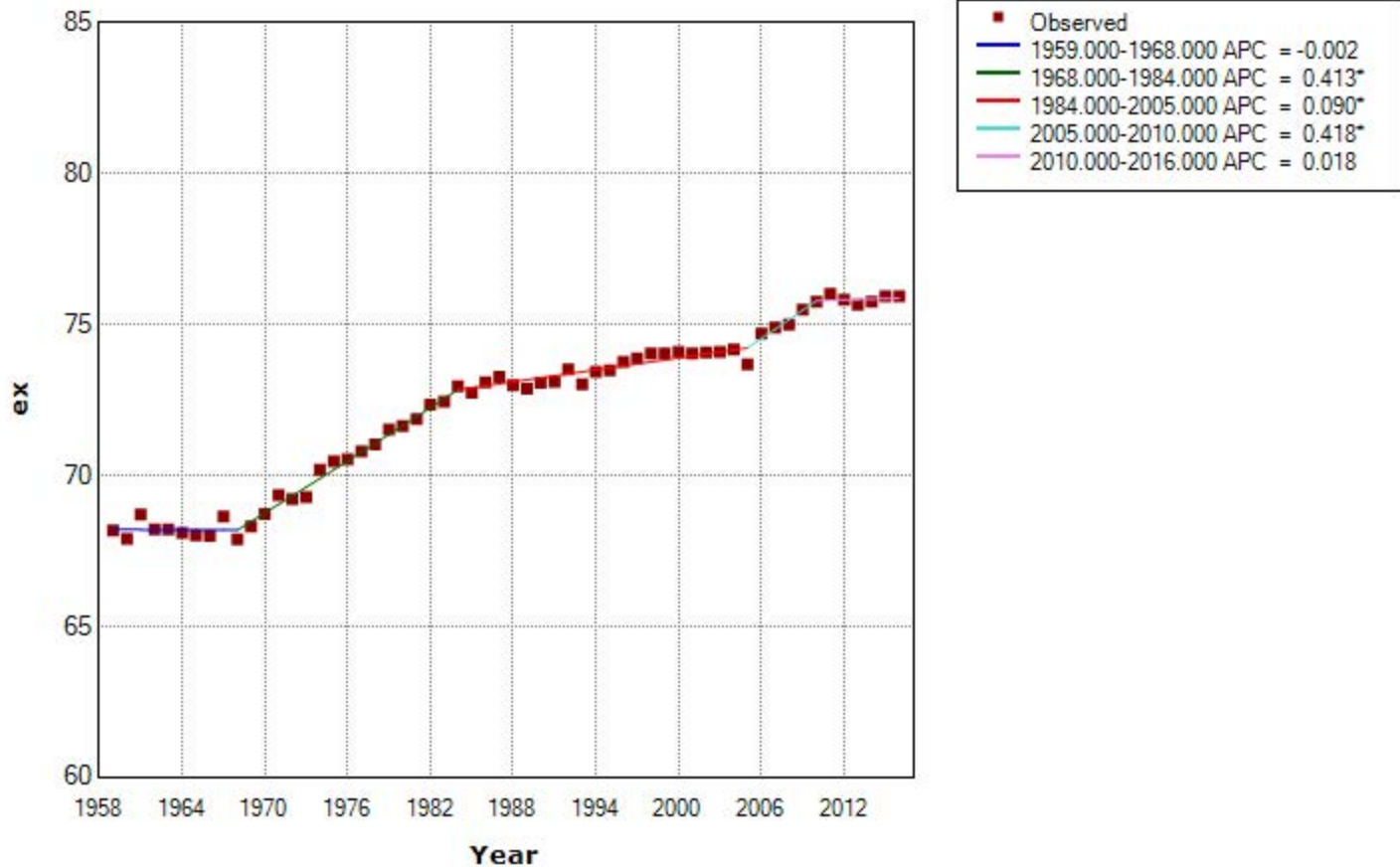
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Final Selected Model: 5 Joinpoints.

KY: 4 Joinpoints



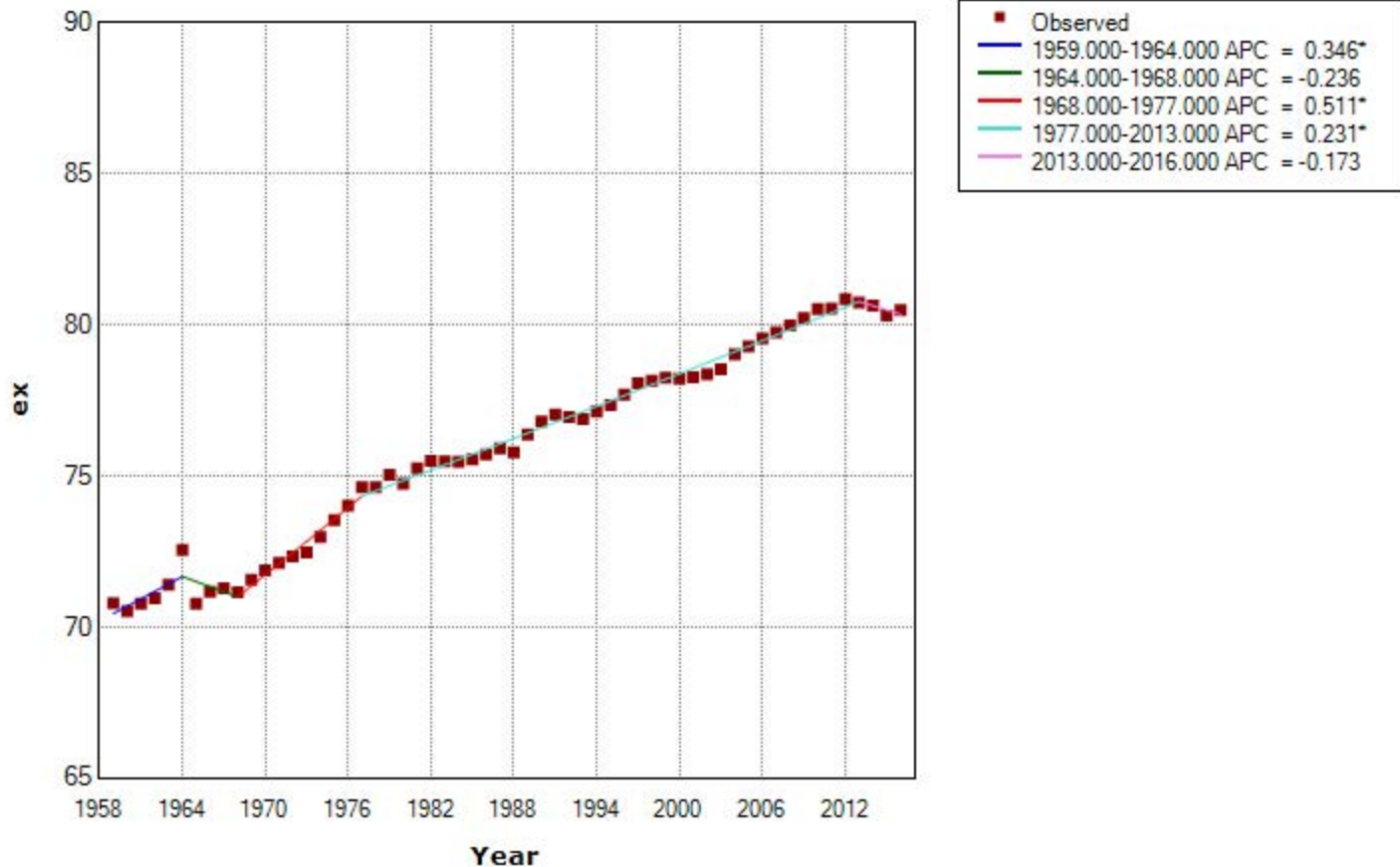
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Final Selected Model: 4 Joinpoints.

LA: 4 Joinpoints



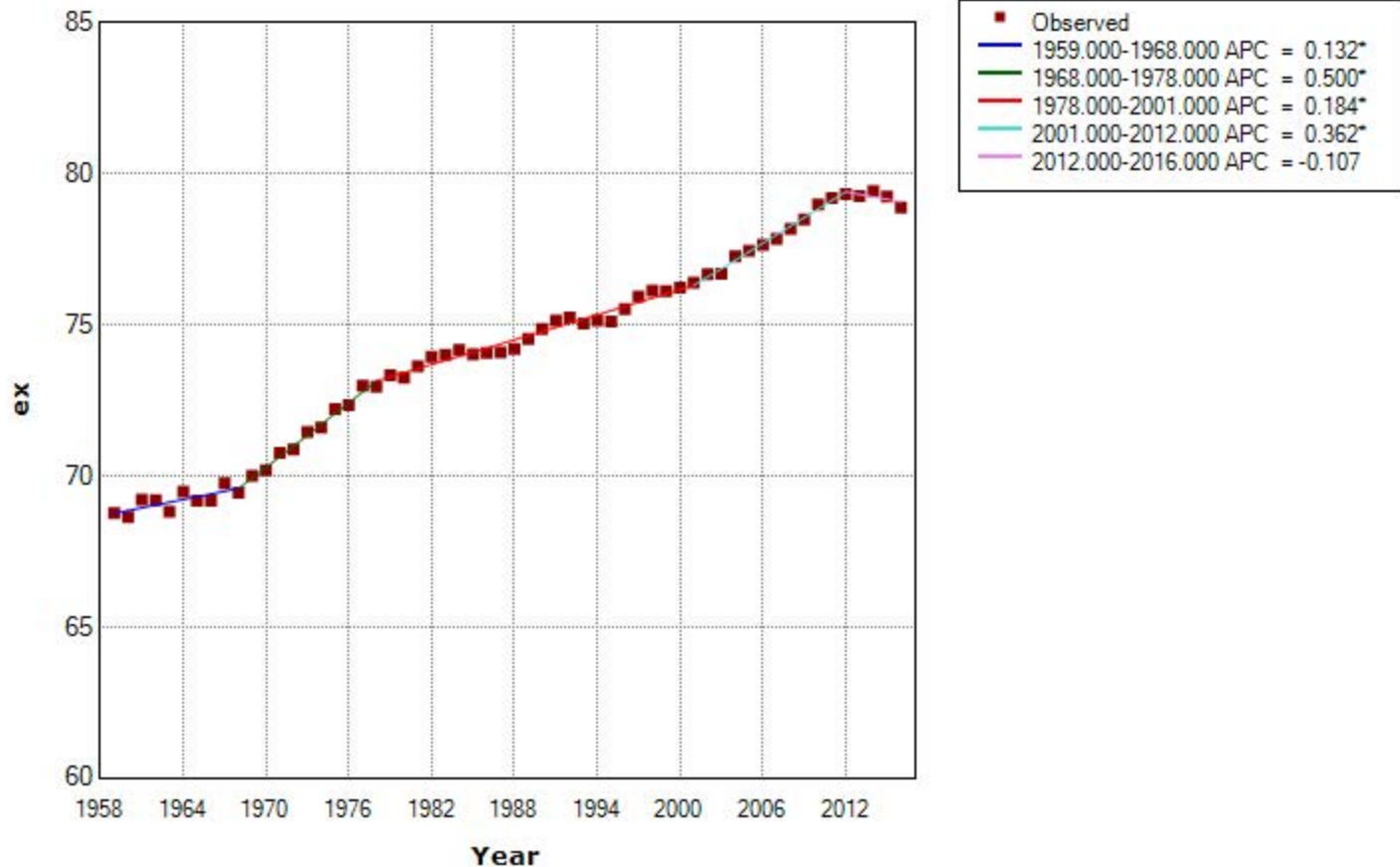
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Final Selected Model: 4 Joinpoints.

MA: 4 Joinpoints



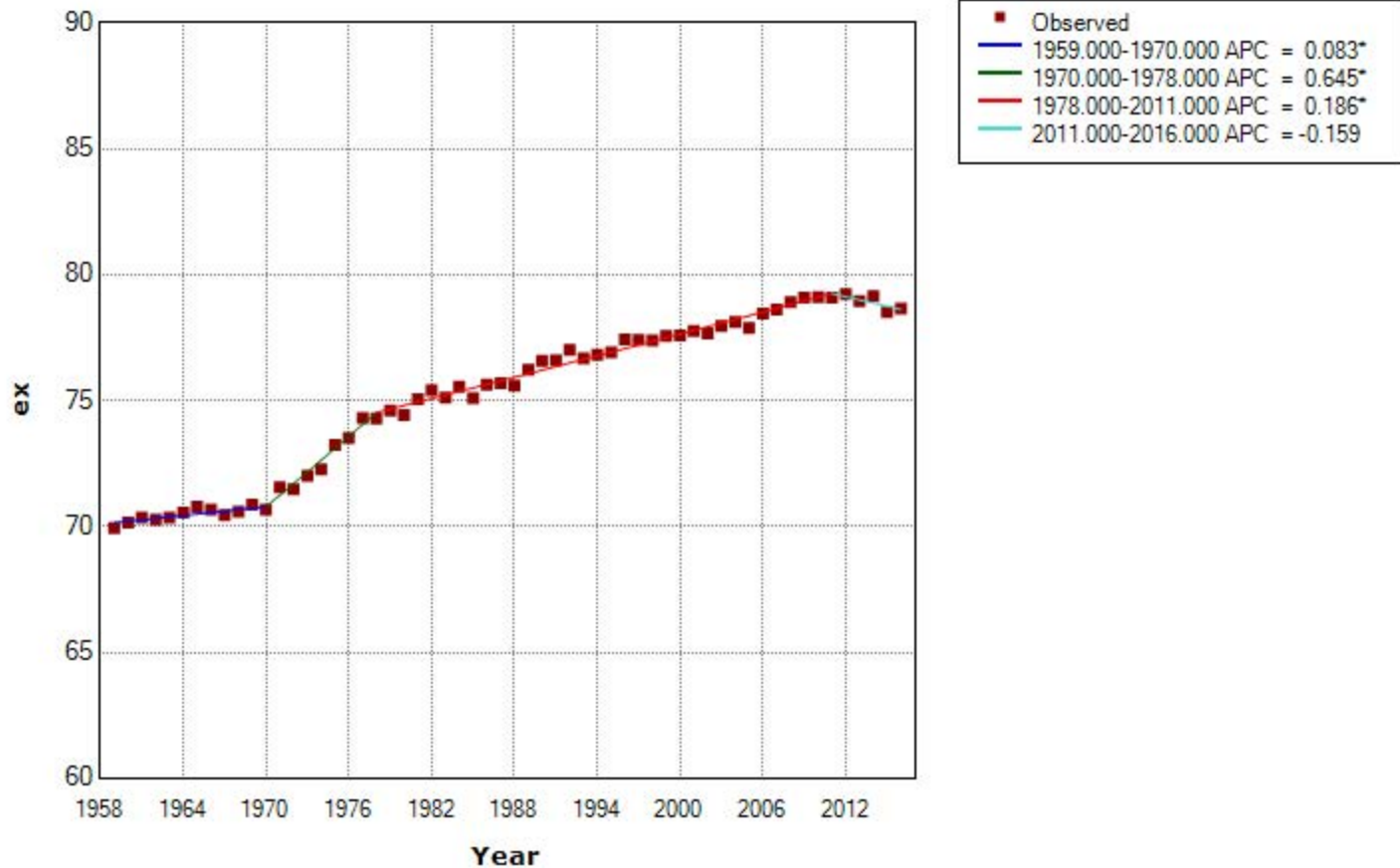
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Final Selected Model: 4 Joinpoints.

MD: 4 Joinpoints



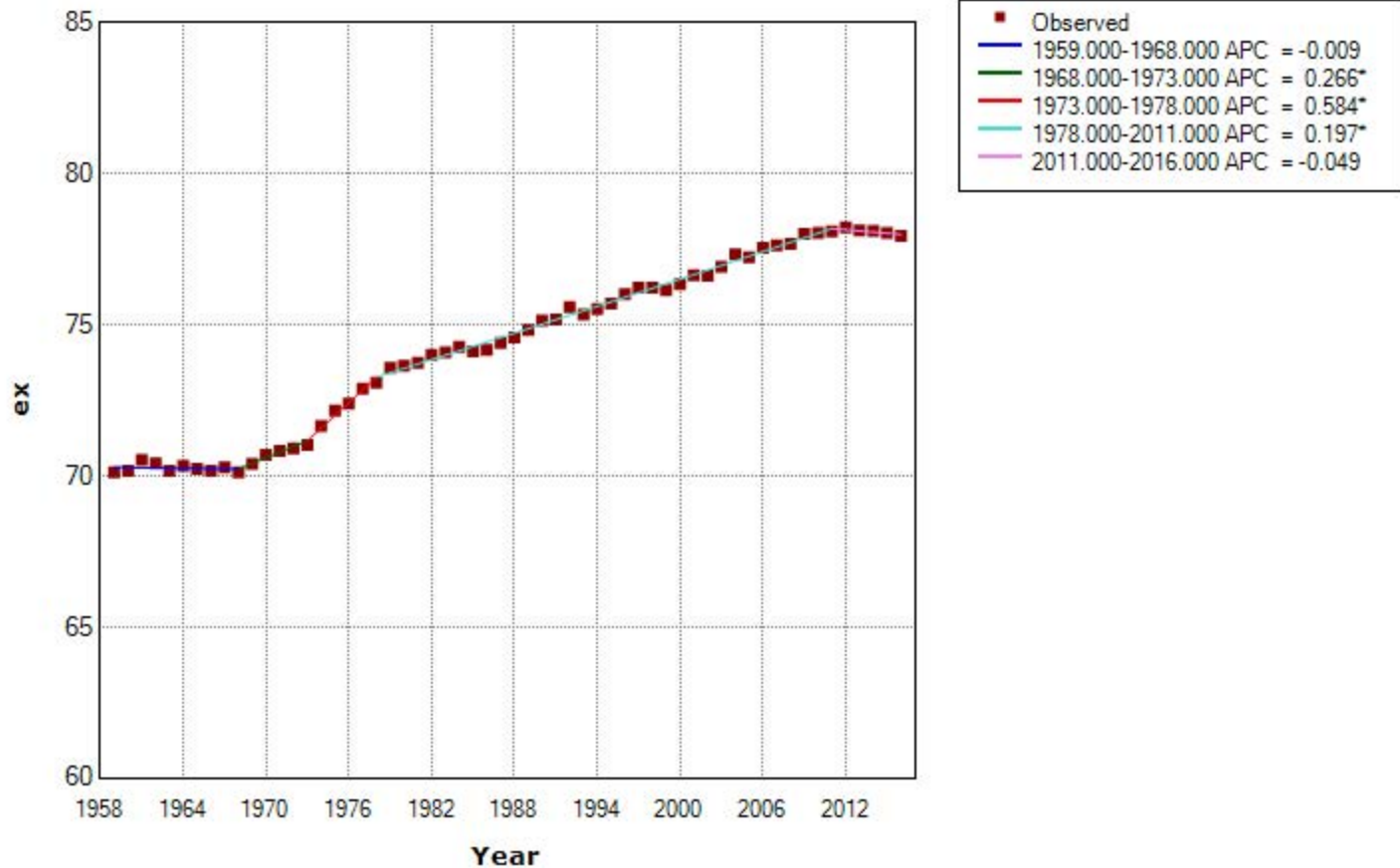
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Final Selected Model: 4 Joinpoints.

ME: 3 Joinpoints



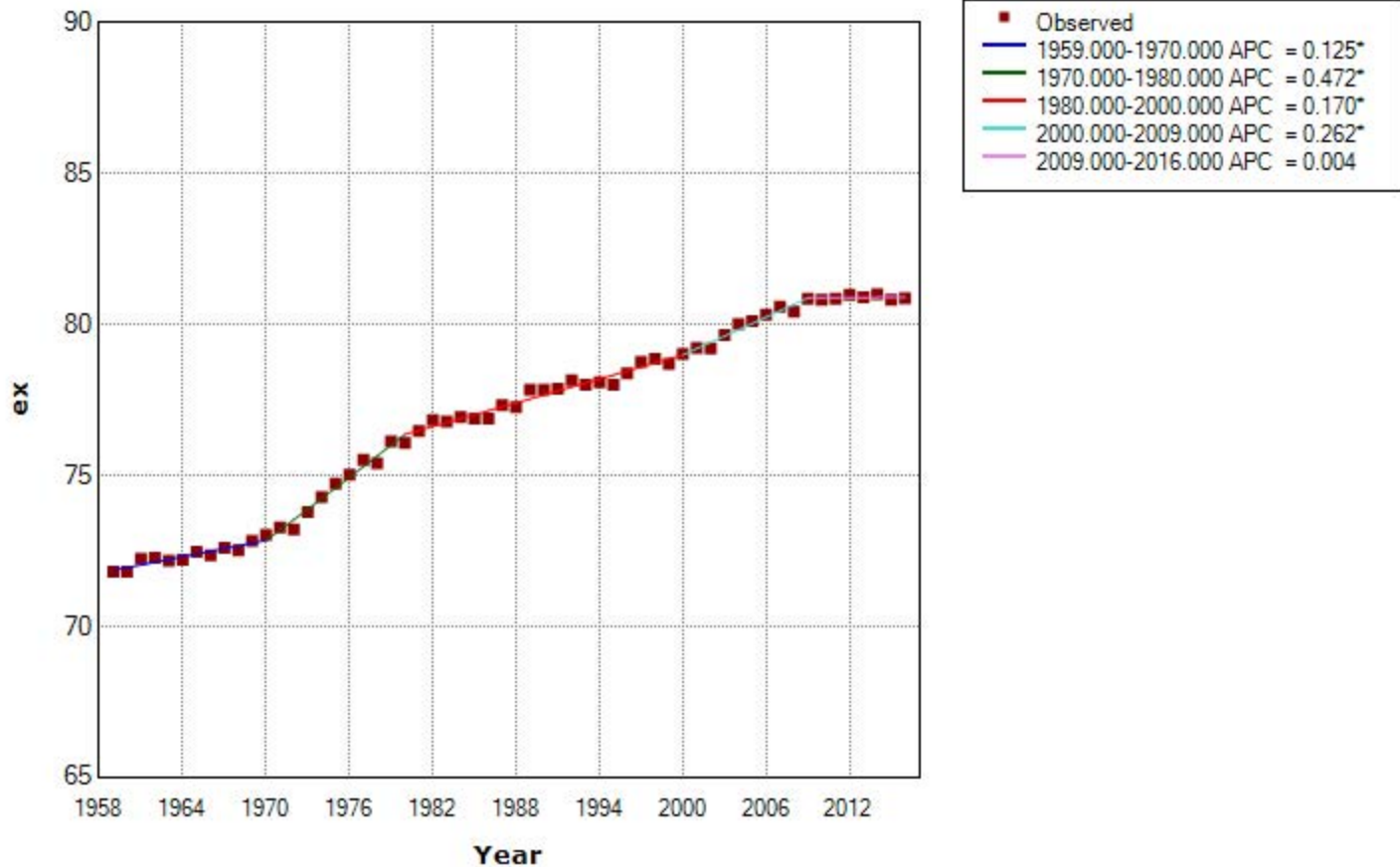
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Final Selected Model: 3 Joinpoints.

MI: 4 Joinpoints



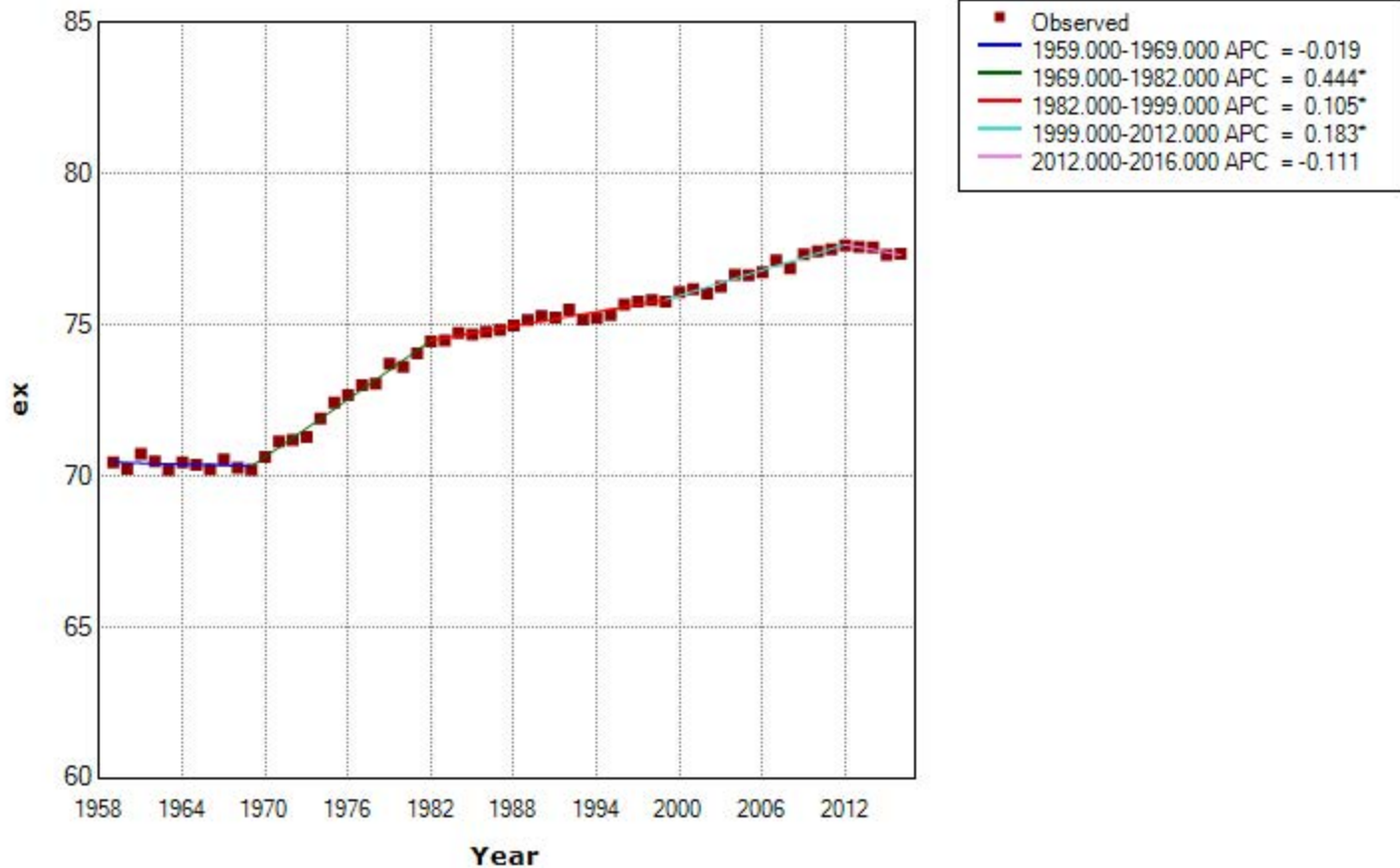
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Final Selected Model: 4 Joinpoints.

MN: 4 Joinpoints



* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 4 Joinpoints.

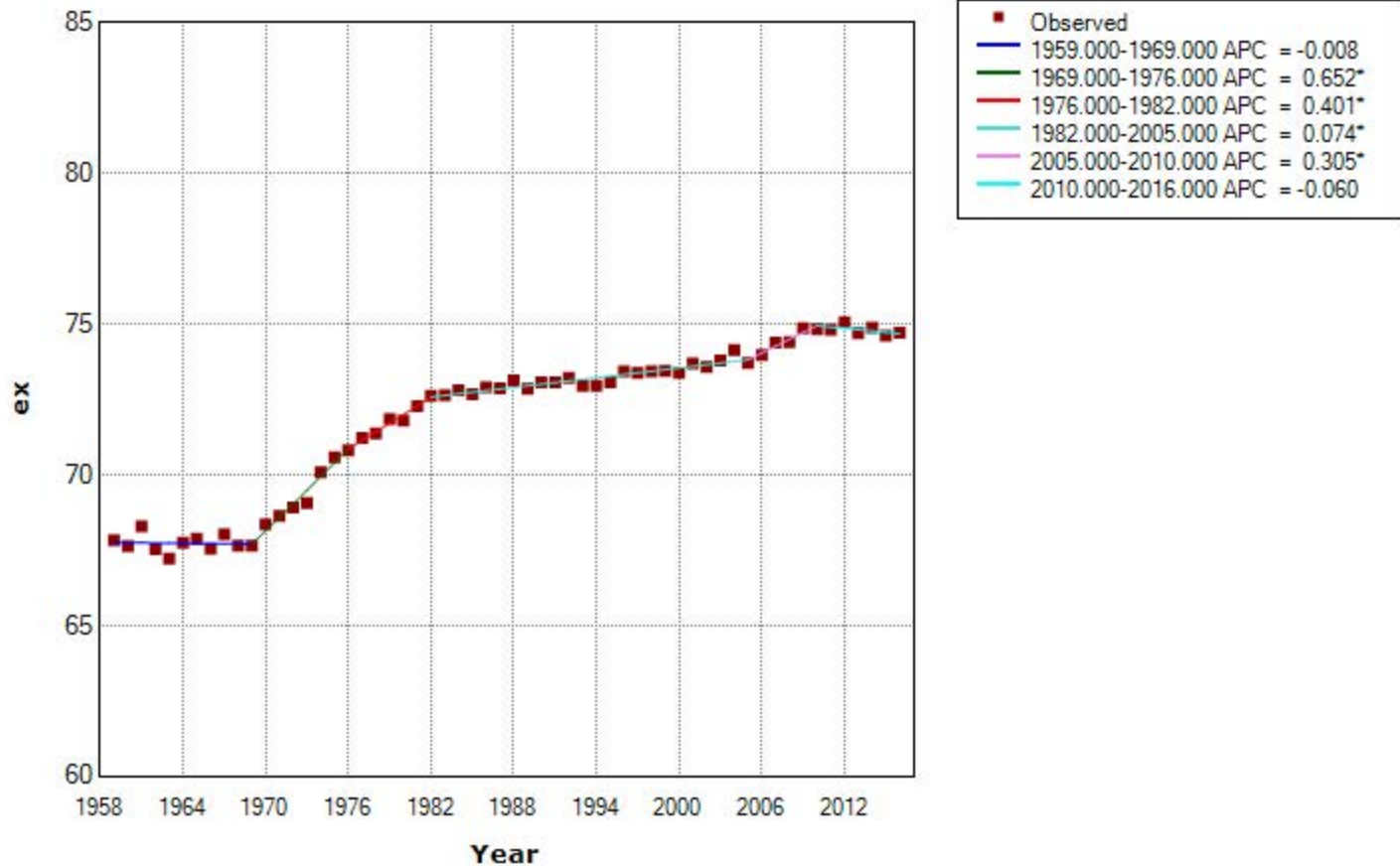
MO: 4 Joinpoints



* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.

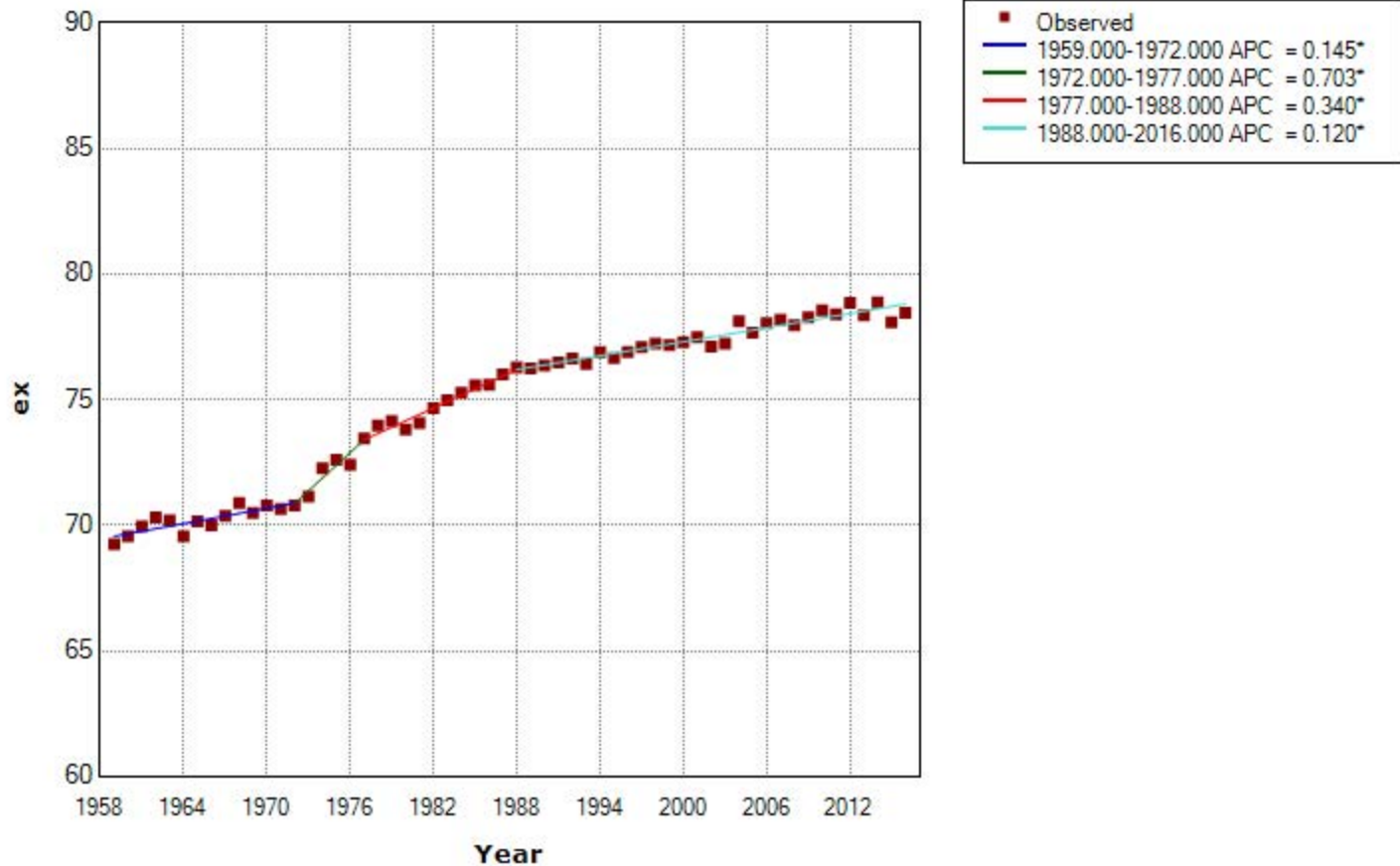
Final Selected Model: 4 Joinpoints.

MS: 5 Joinpoints



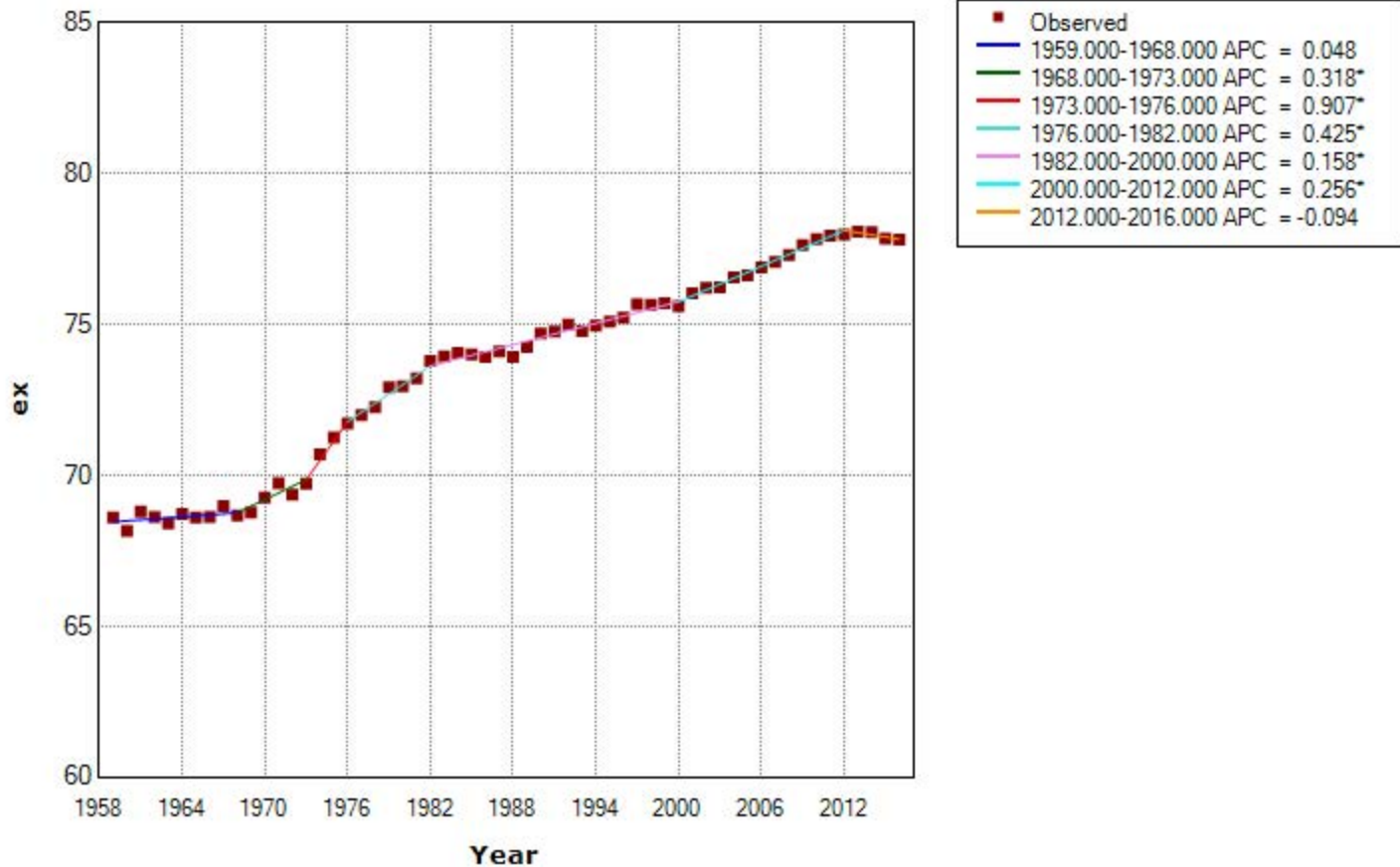
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Final Selected Model: 5 Joinpoints.

MT: 3 Joinpoints



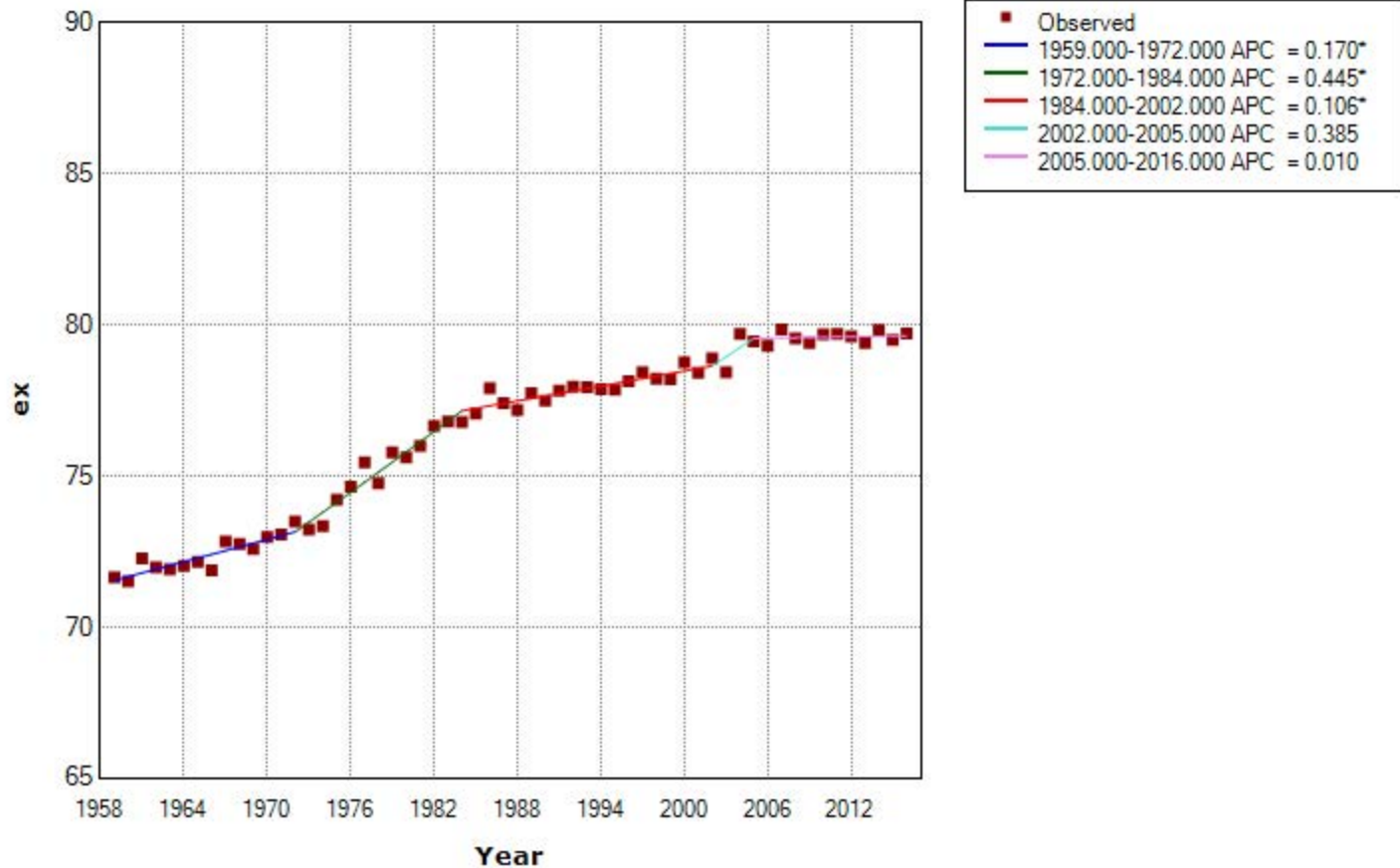
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

NC: 6 Joinpoints



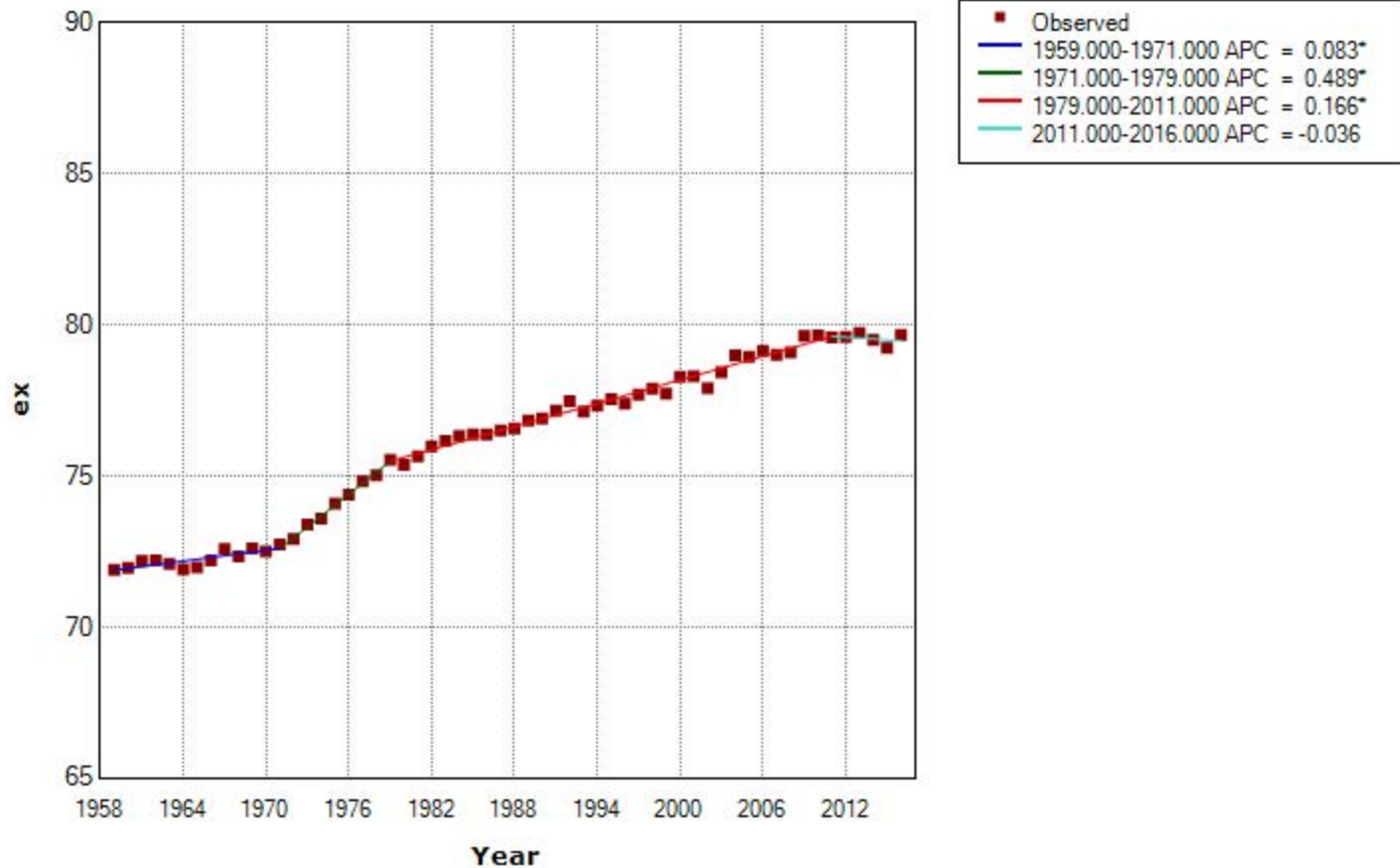
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Final Selected Model: 6 Joinpoints.

ND: 4 Joinpoints



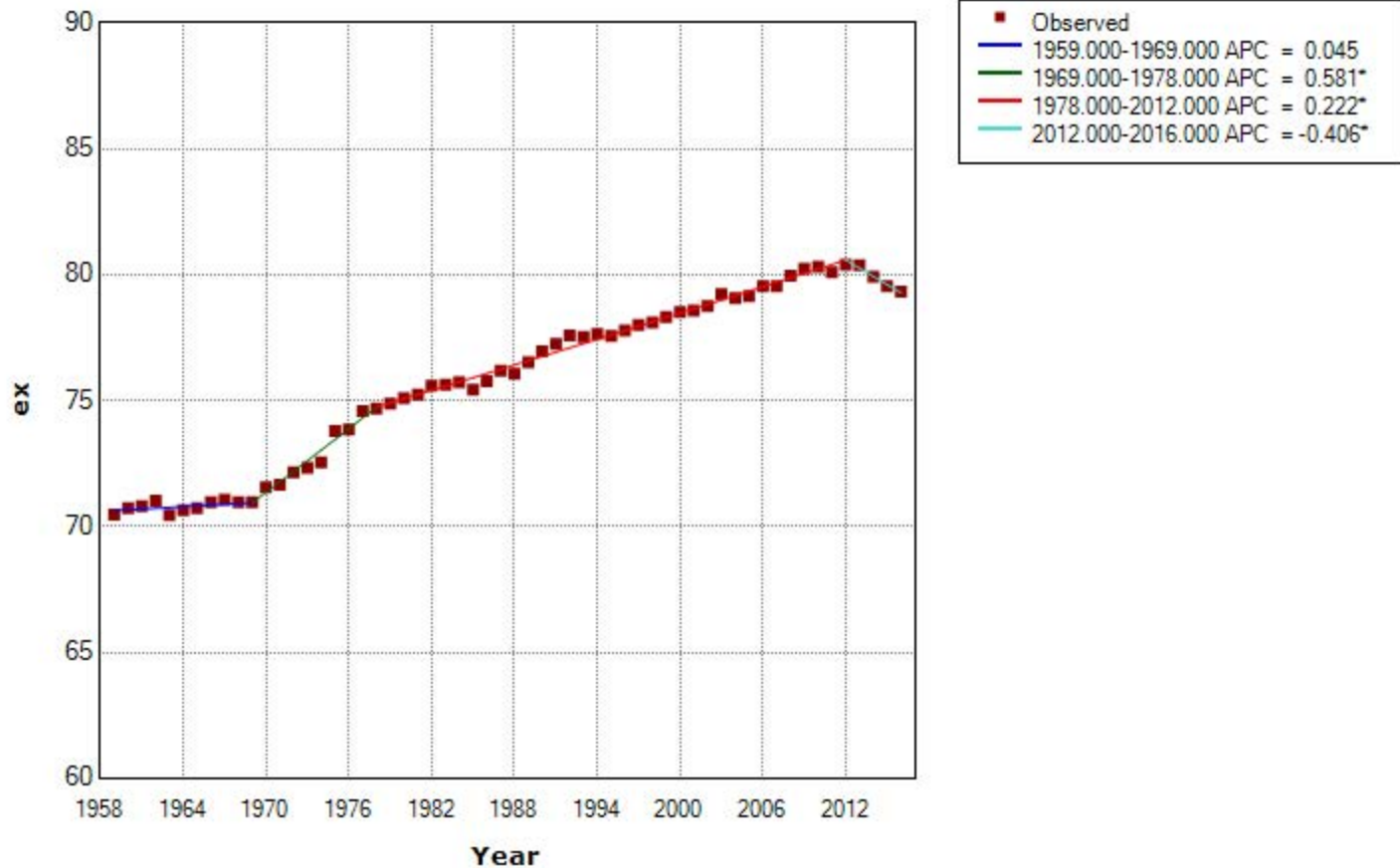
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NE: 3 Joinpoints



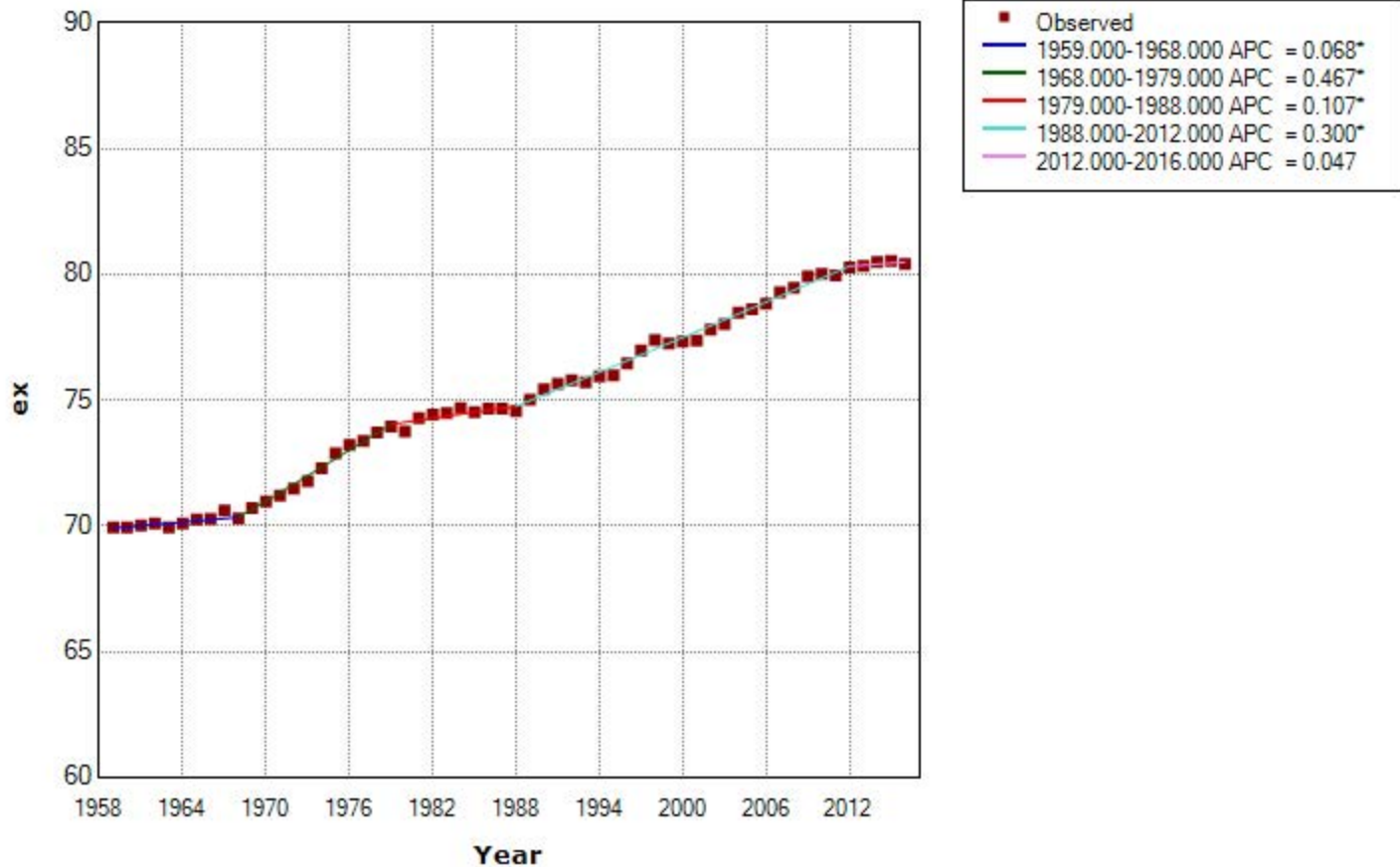
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NH: 3 Joinpoints



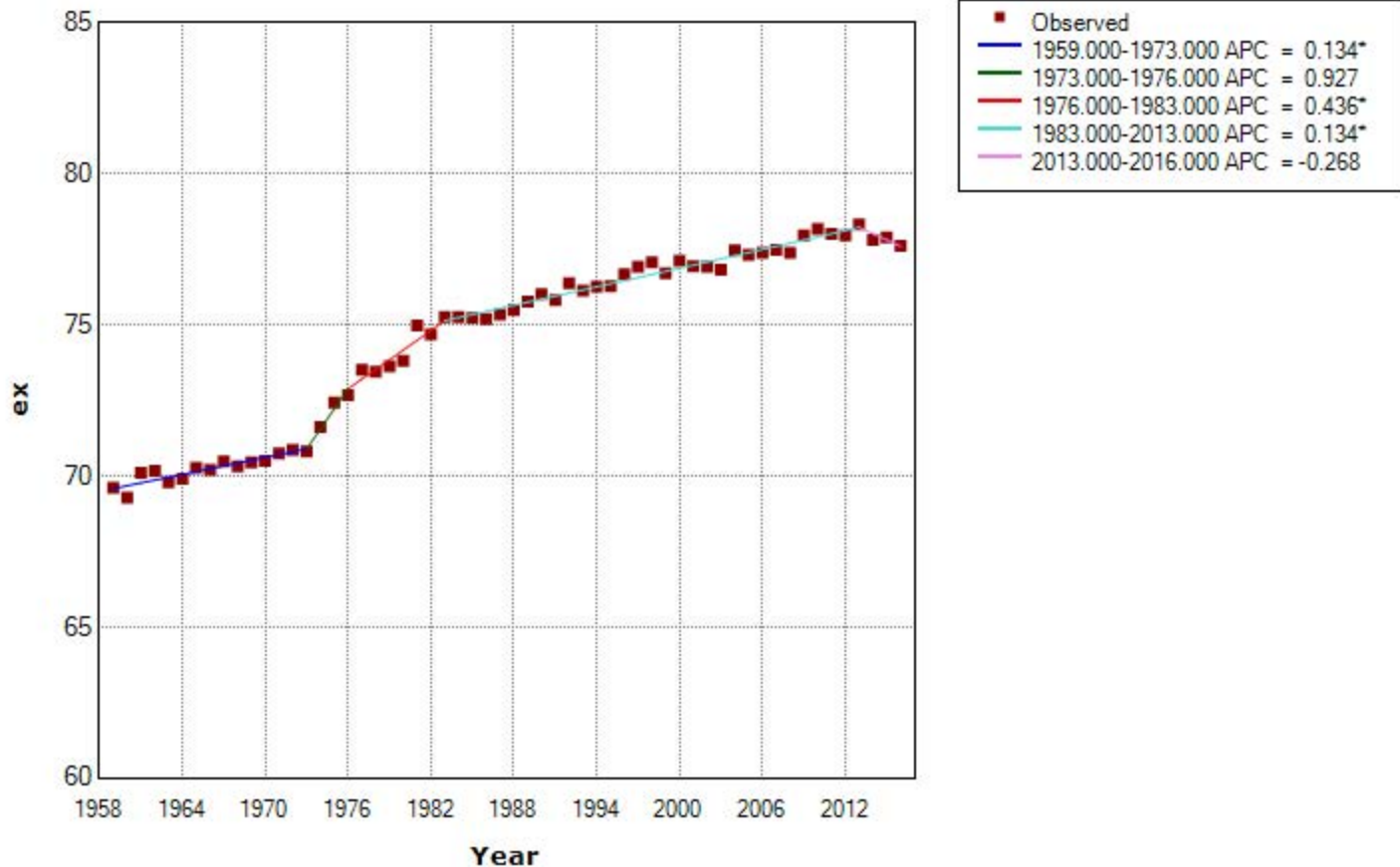
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NJ: 4 Joinpoints



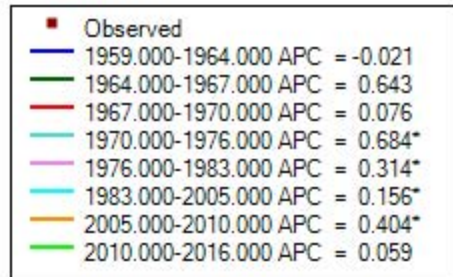
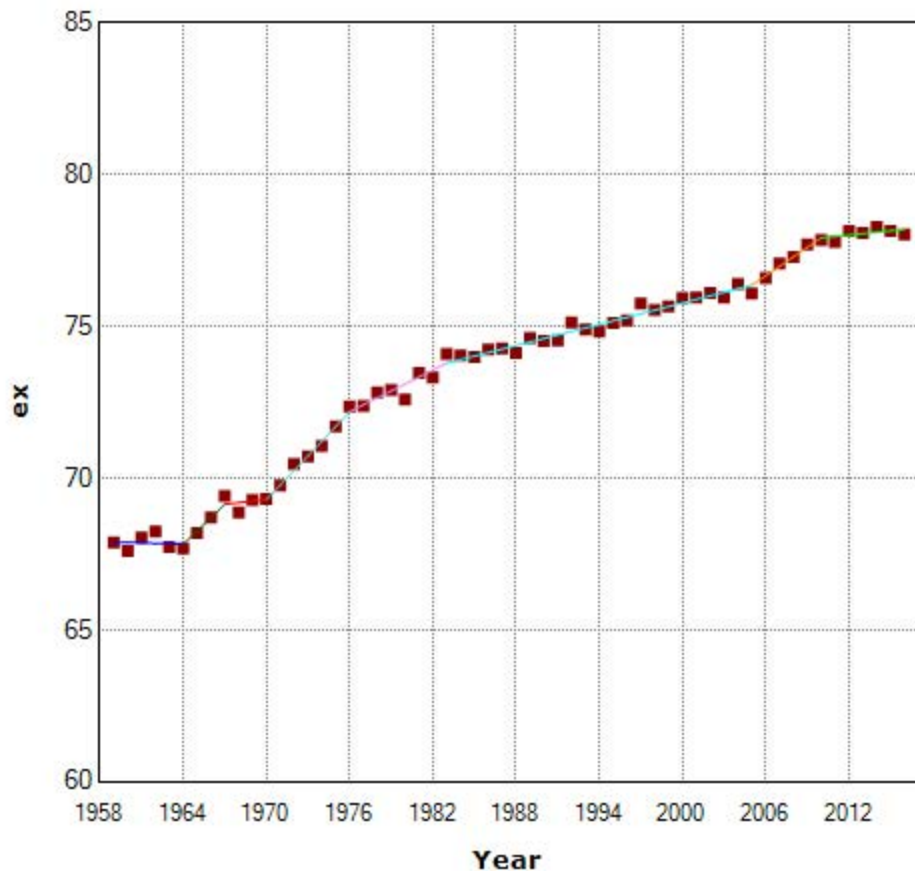
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Final Selected Model: 4 Joinpoints.

NM: 4 Joinpoints



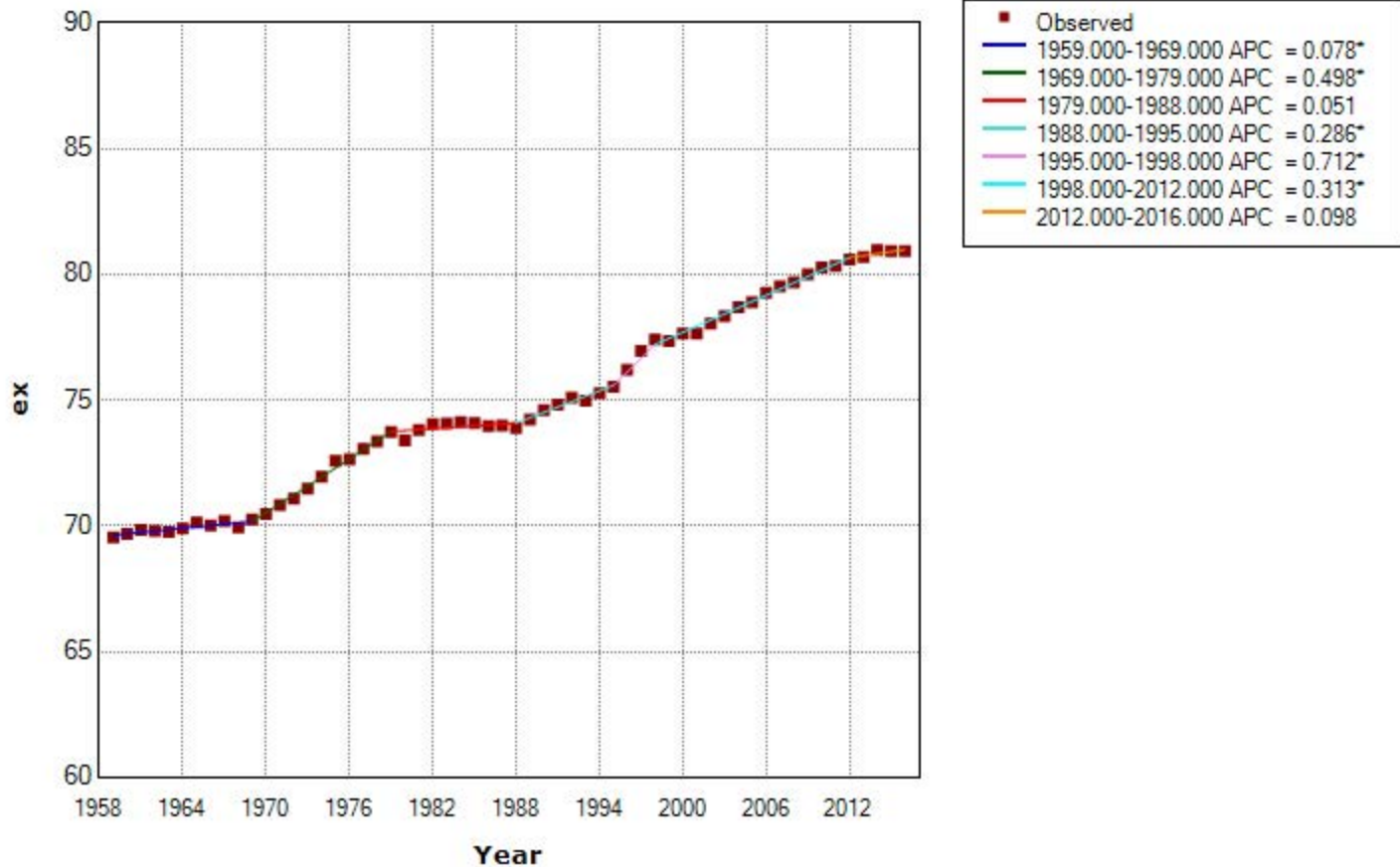
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Final Selected Model: 4 Joinpoints.

NV: 7 Joinpoints



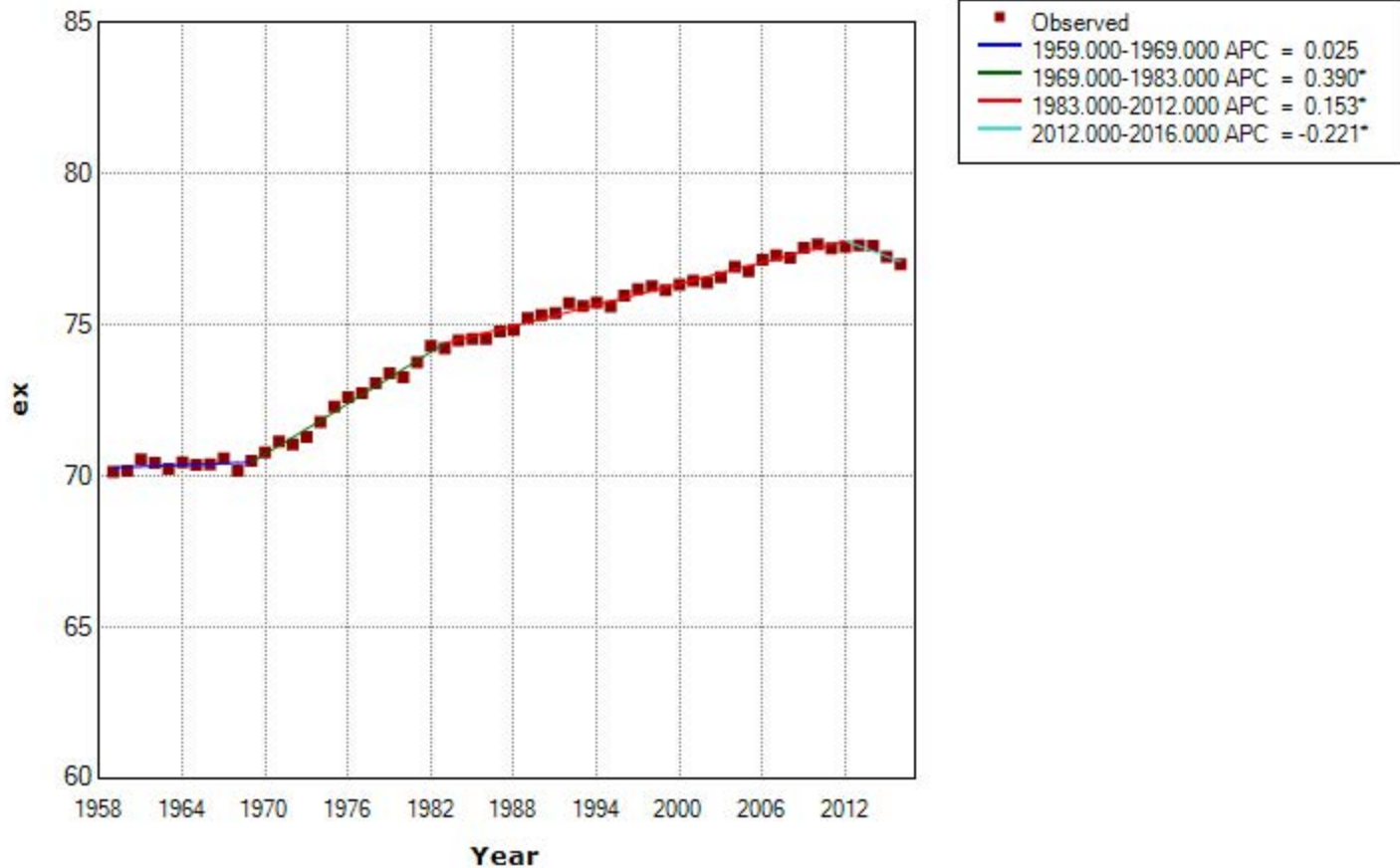
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 Final Selected Model: 7 Joinpoints.

NY: 6 Joinpoints



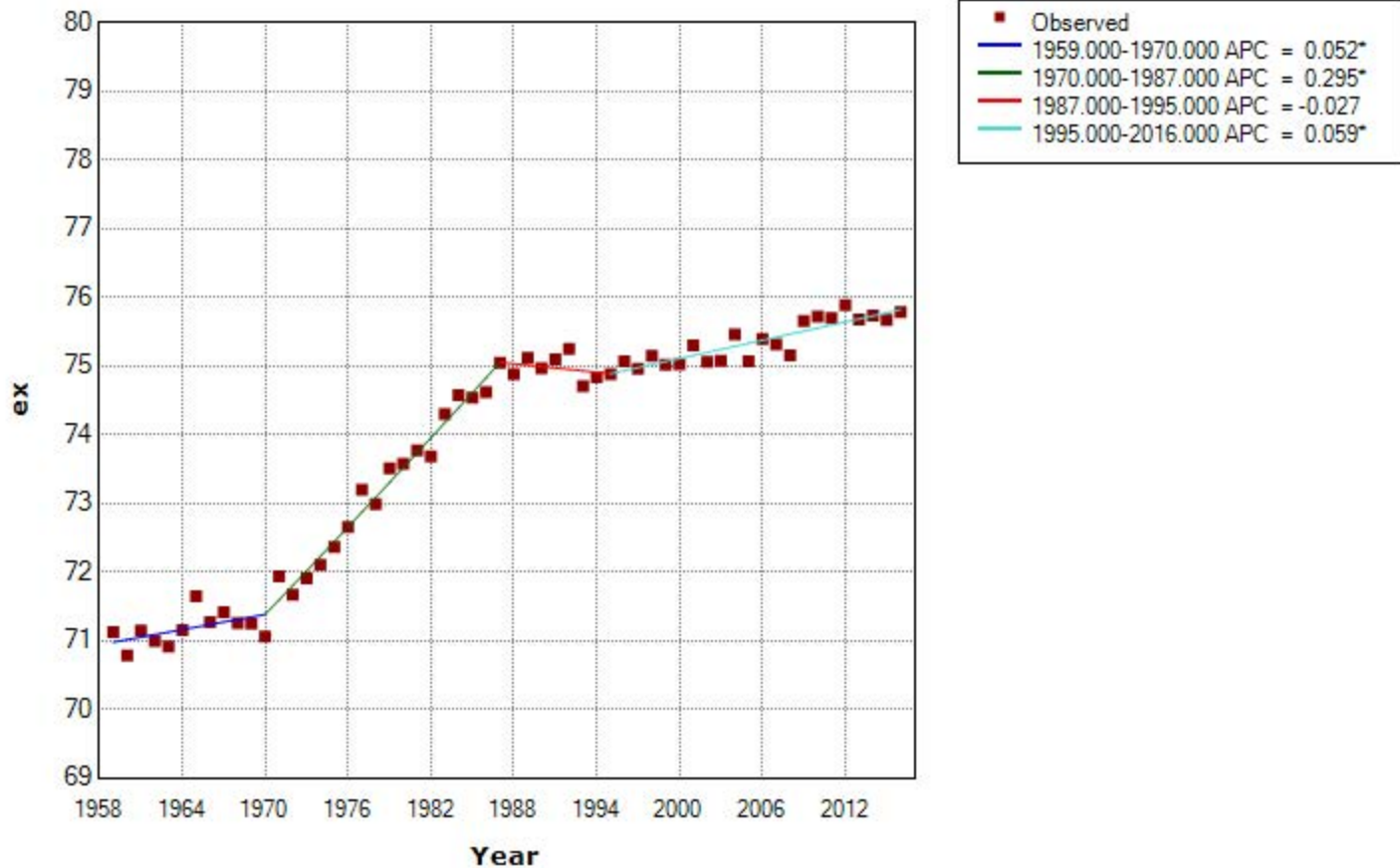
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Final Selected Model: 6 Joinpoints.

OH: 3 Joinpoints



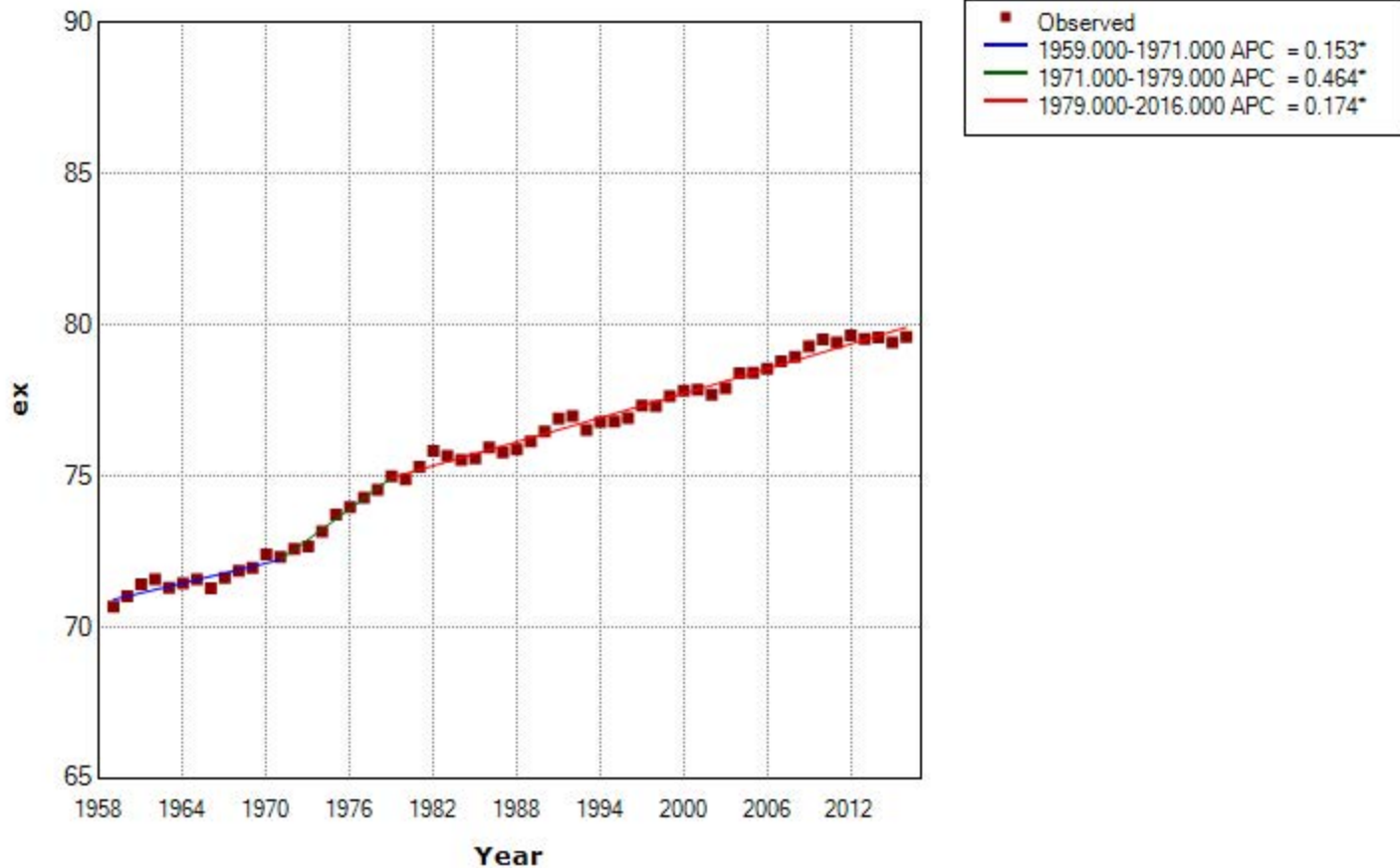
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Final Selected Model: 3 Joinpoints.

OK: 3 Joinpoints



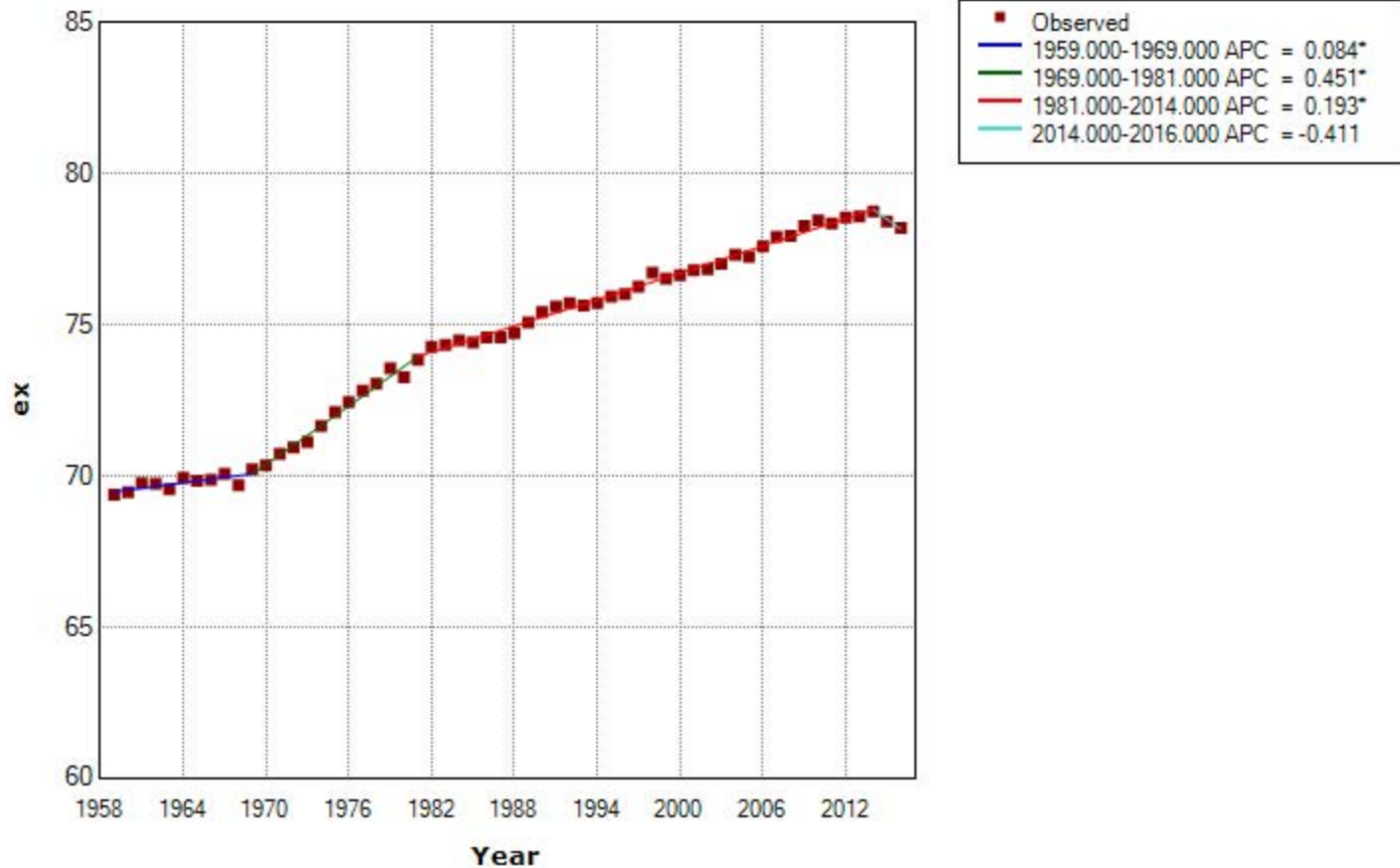
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

OR: 2 Joinpoints



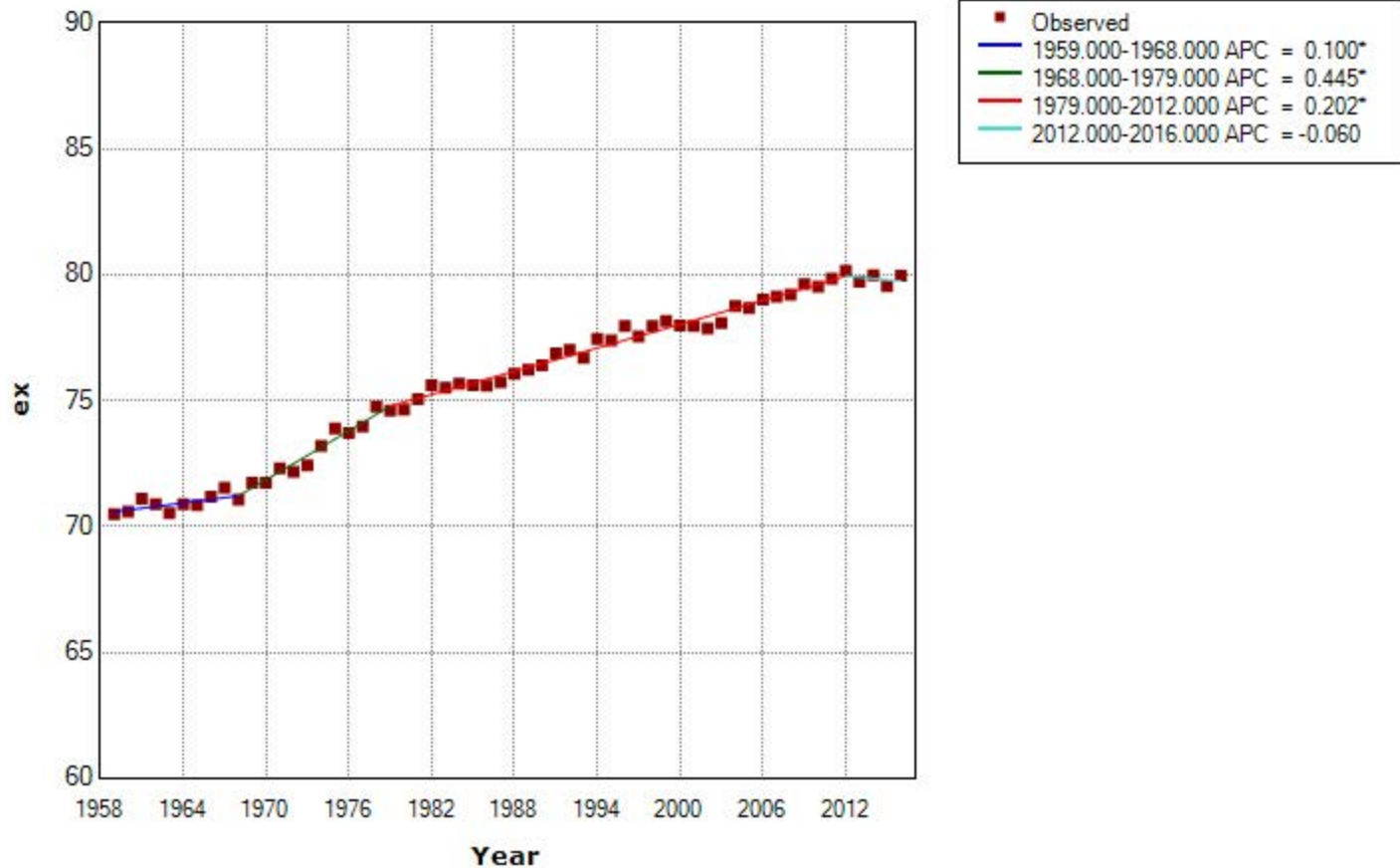
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Final Selected Model: 2 Joinpoints.

PA: 3 Joinpoints



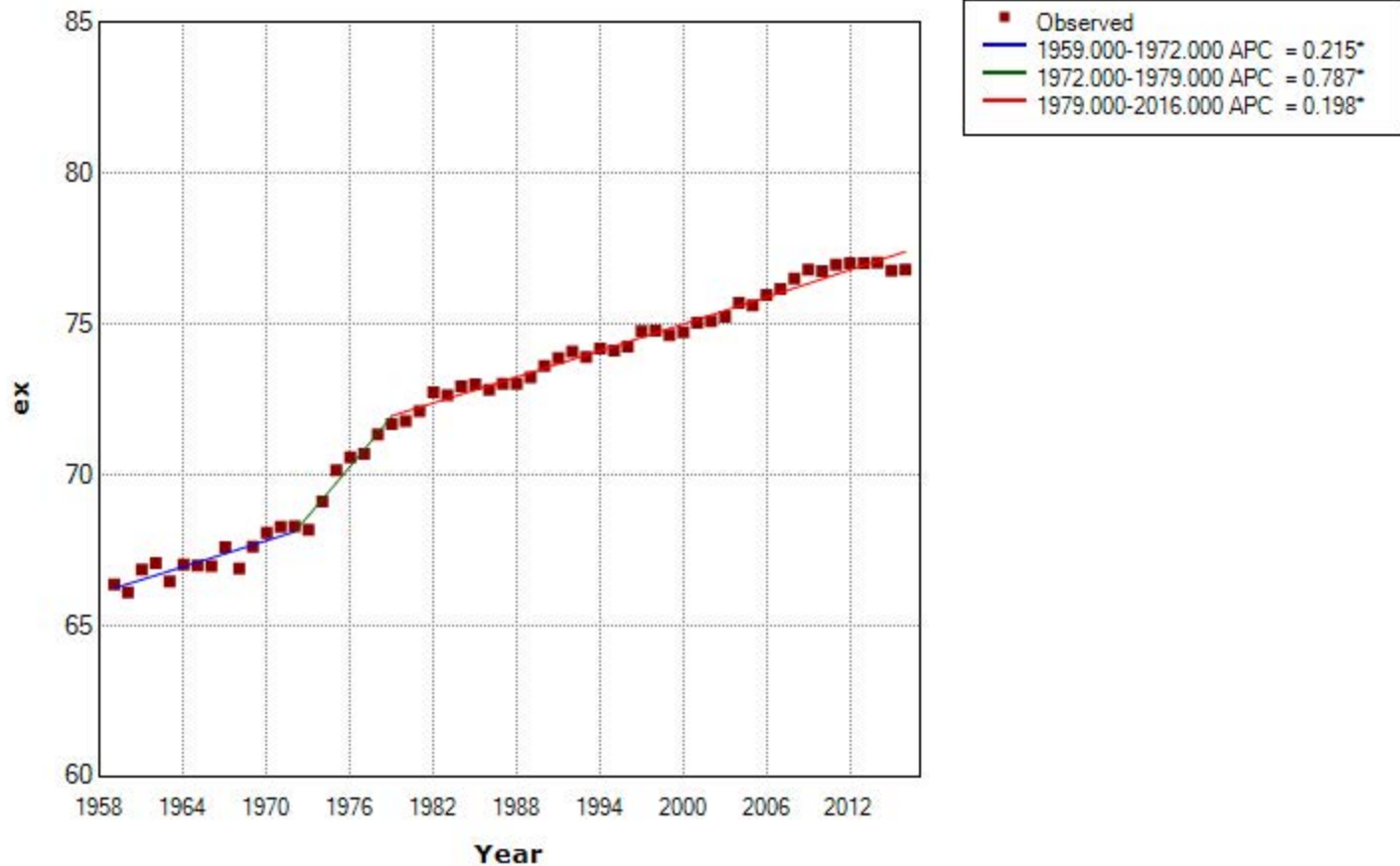
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Final Selected Model: 3 Joinpoints.

RI: 3 Joinpoints



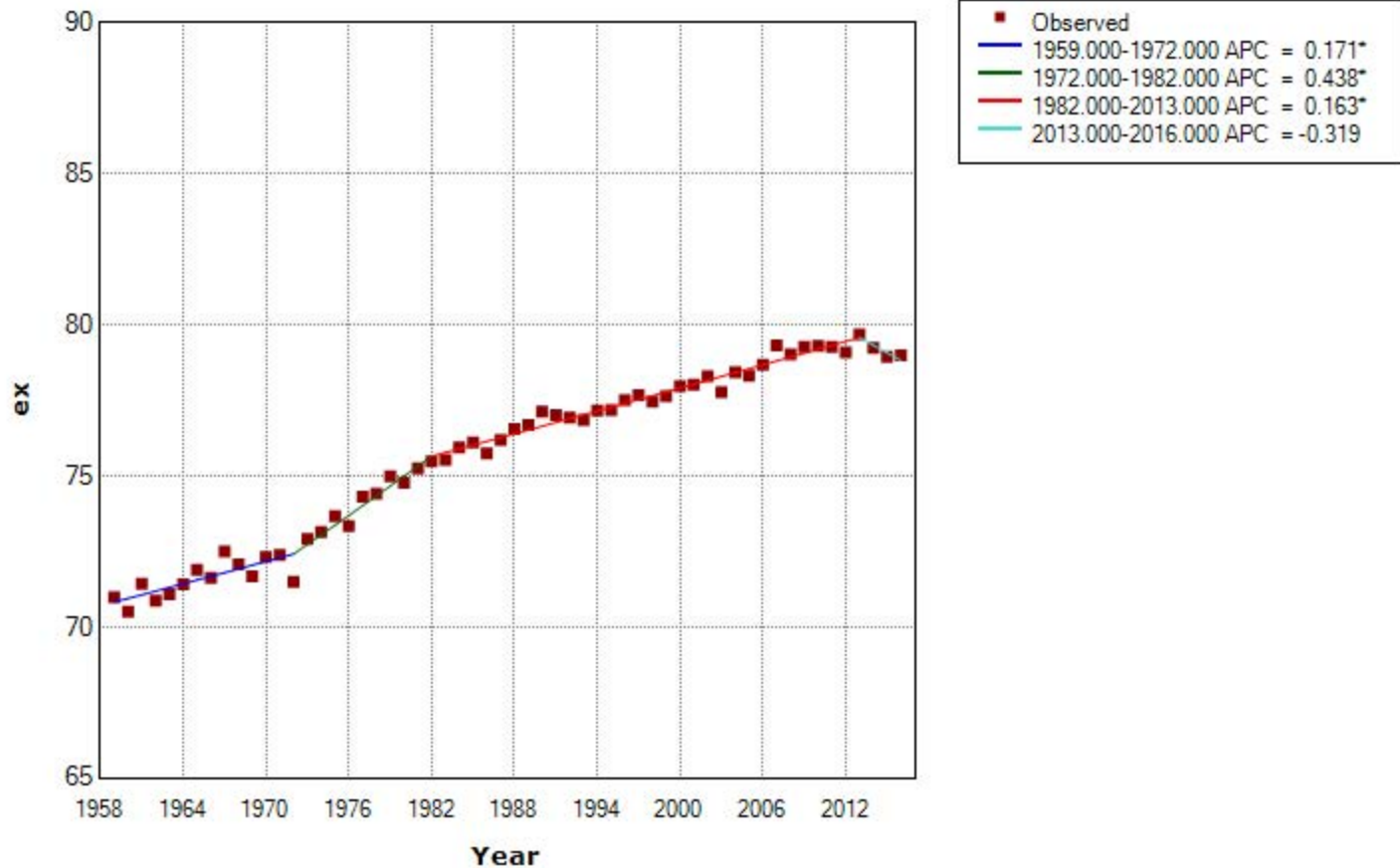
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

SC: 2 Joinpoints



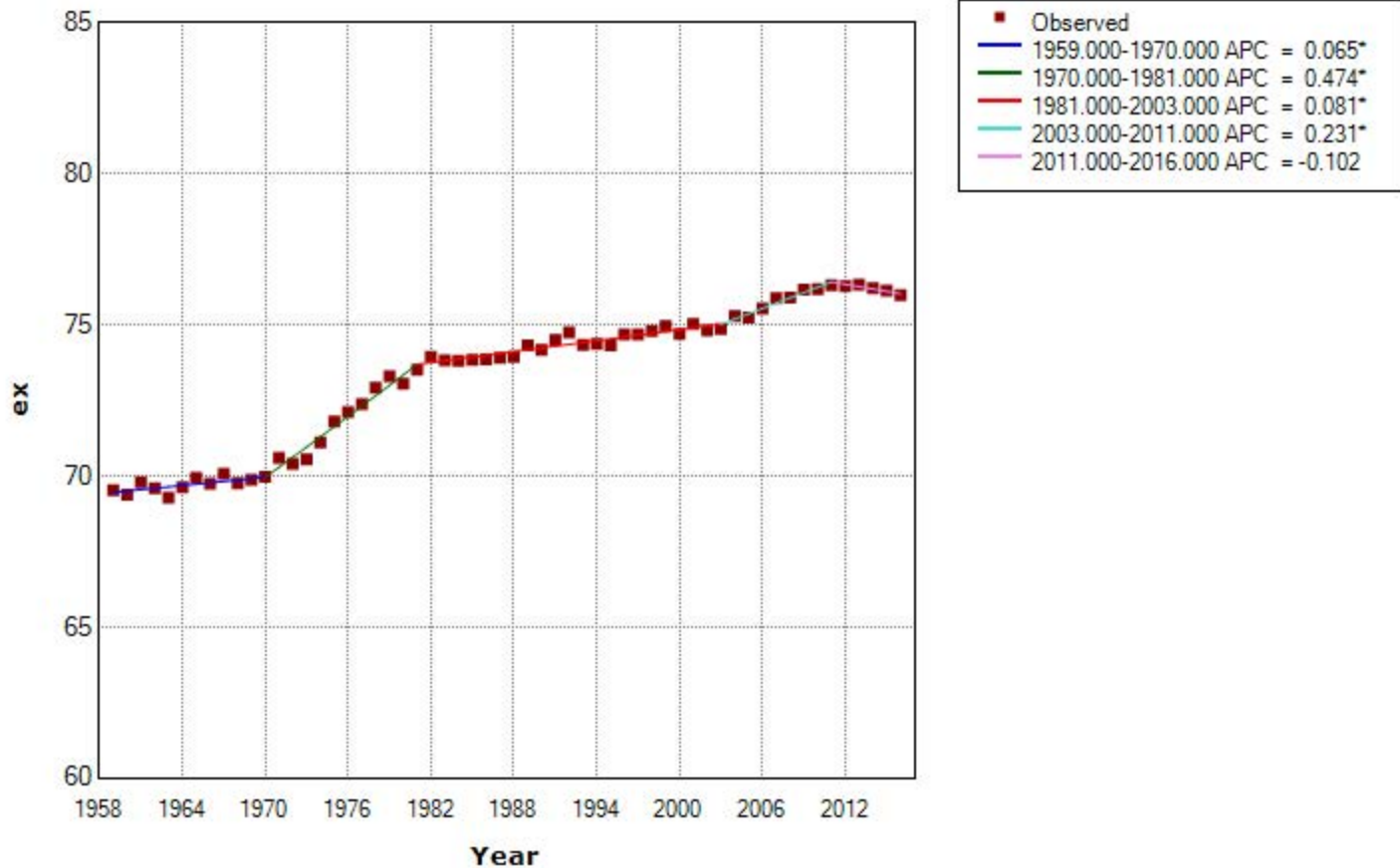
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Final Selected Model: 2 Joinpoints.

SD: 3 Joinpoints



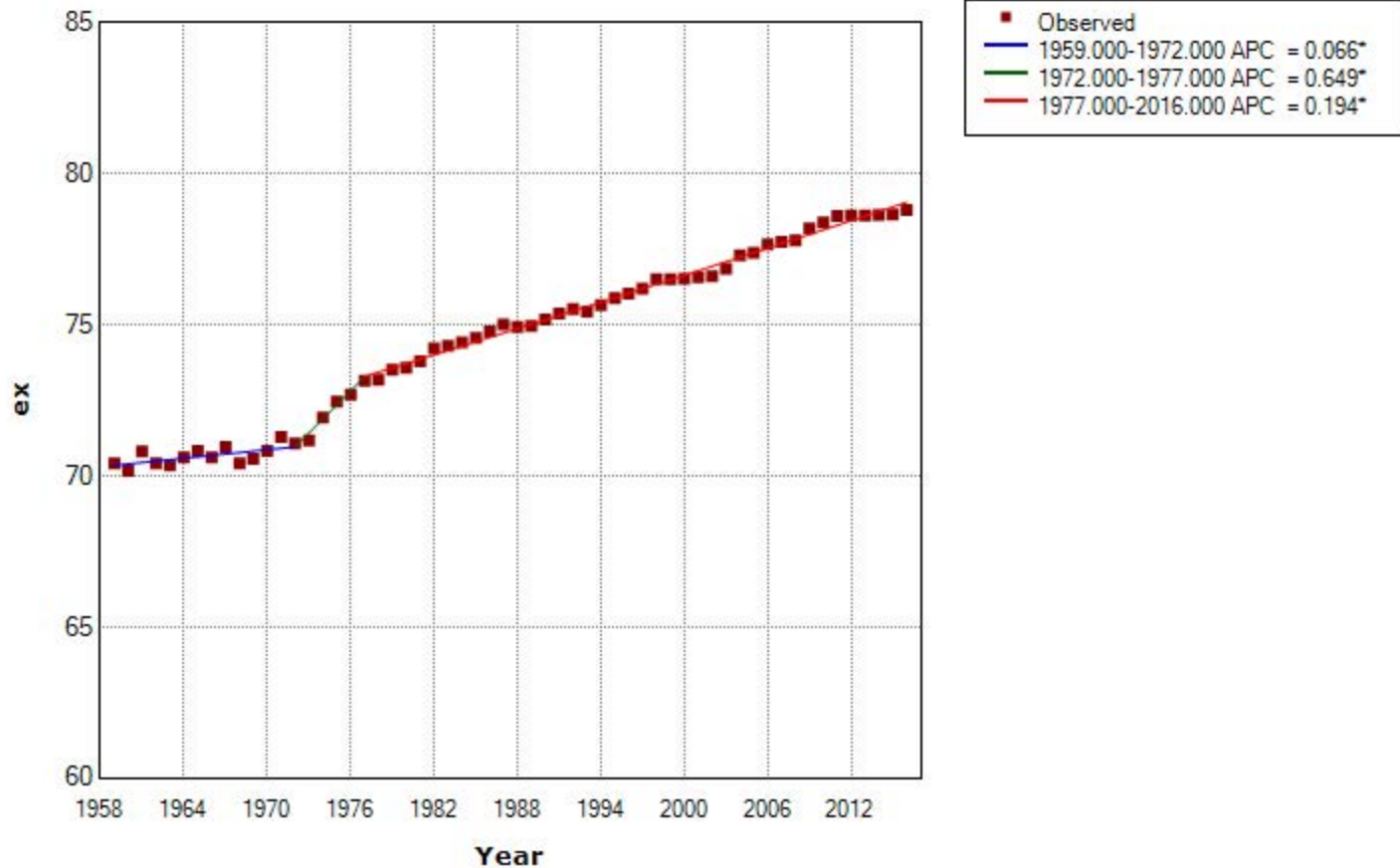
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

TN: 4 Joinpoints



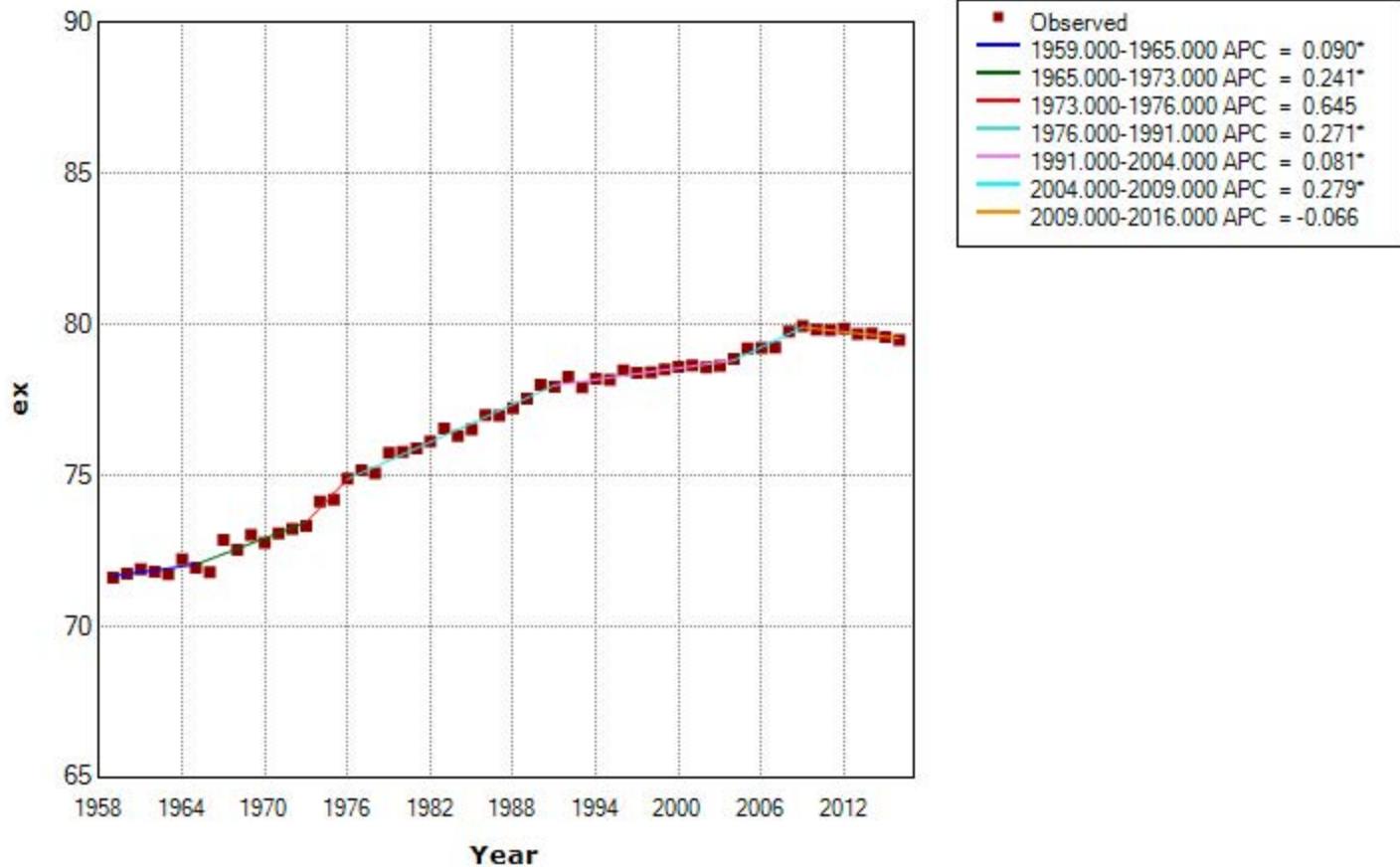
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Final Selected Model: 4 Joinpoints.

TX: 2 Joinpoints



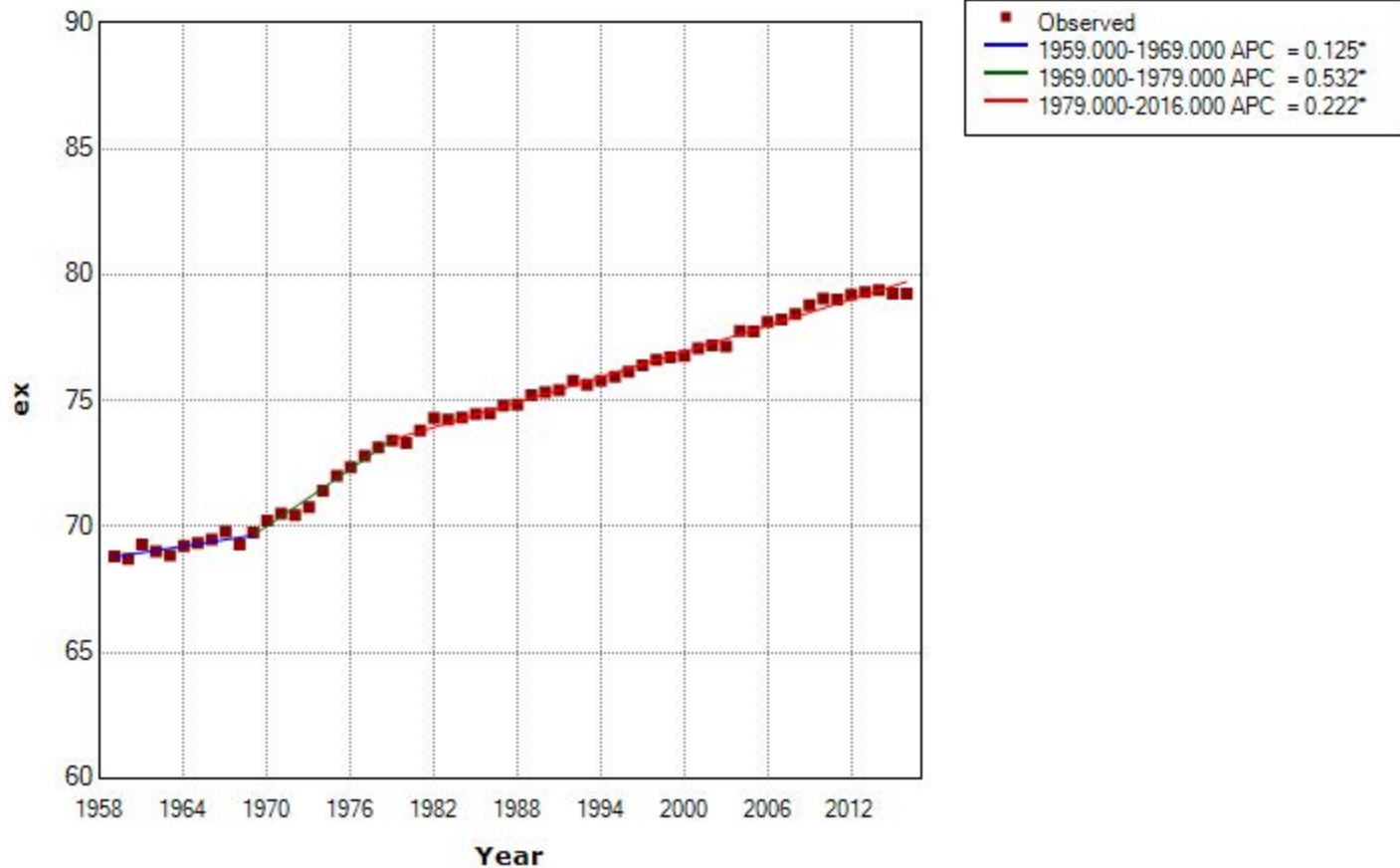
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Final Selected Model: 2 Joinpoints.

UT: 6 Joinpoints



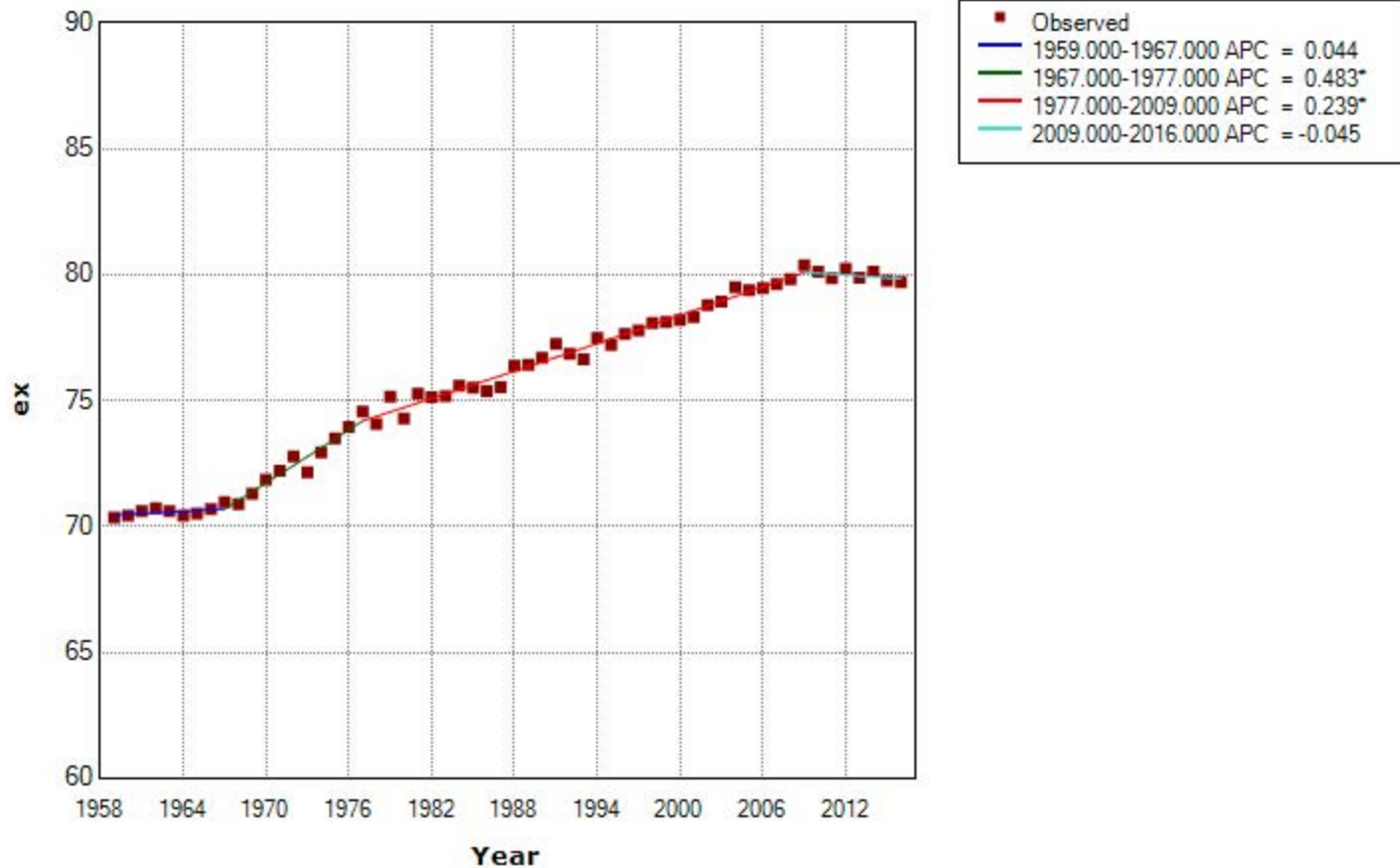
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 6 Joinpoints.

VA: 2 Joinpoints



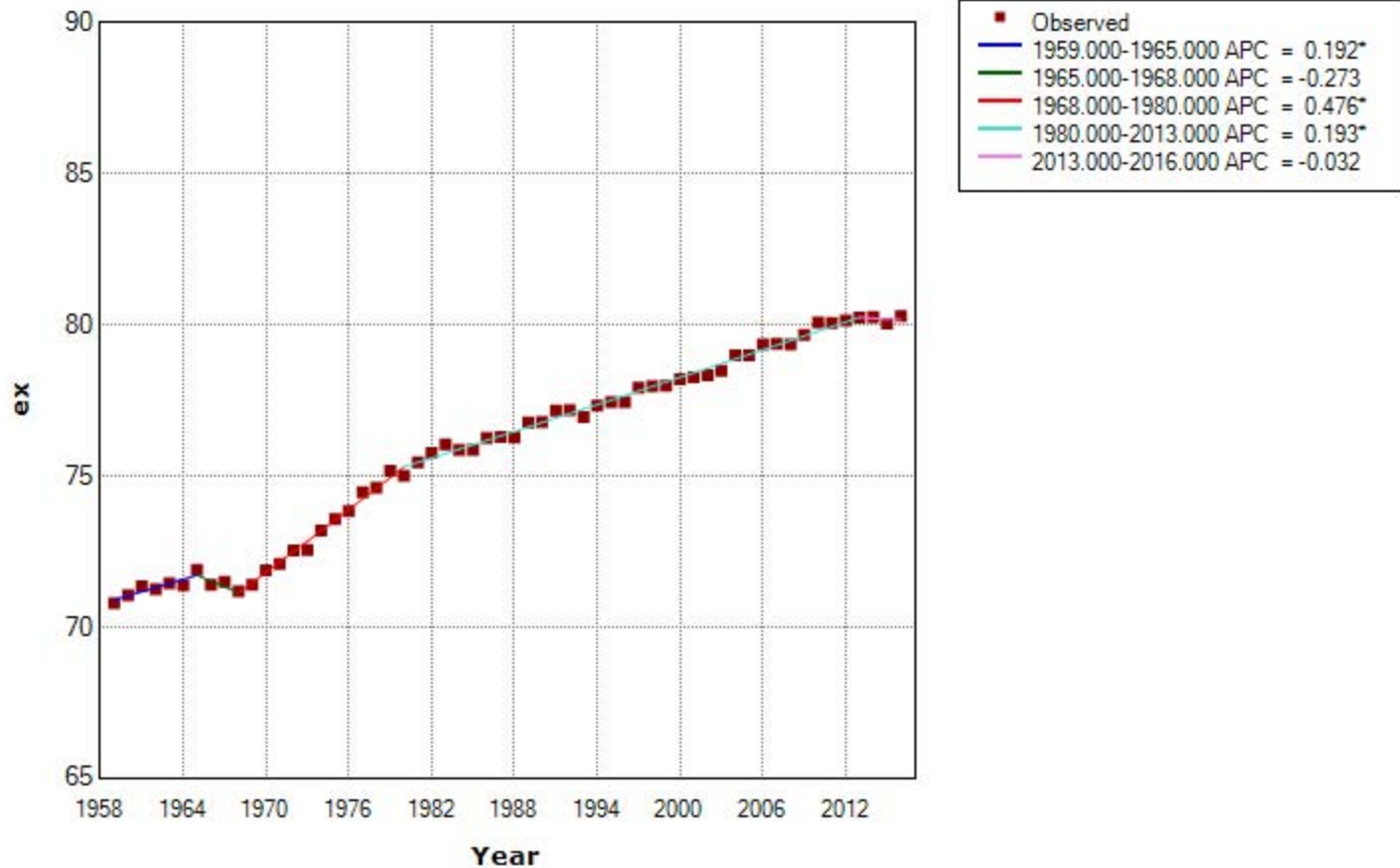
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Final Selected Model: 2 Joinpoints.

VT: 3 Joinpoints



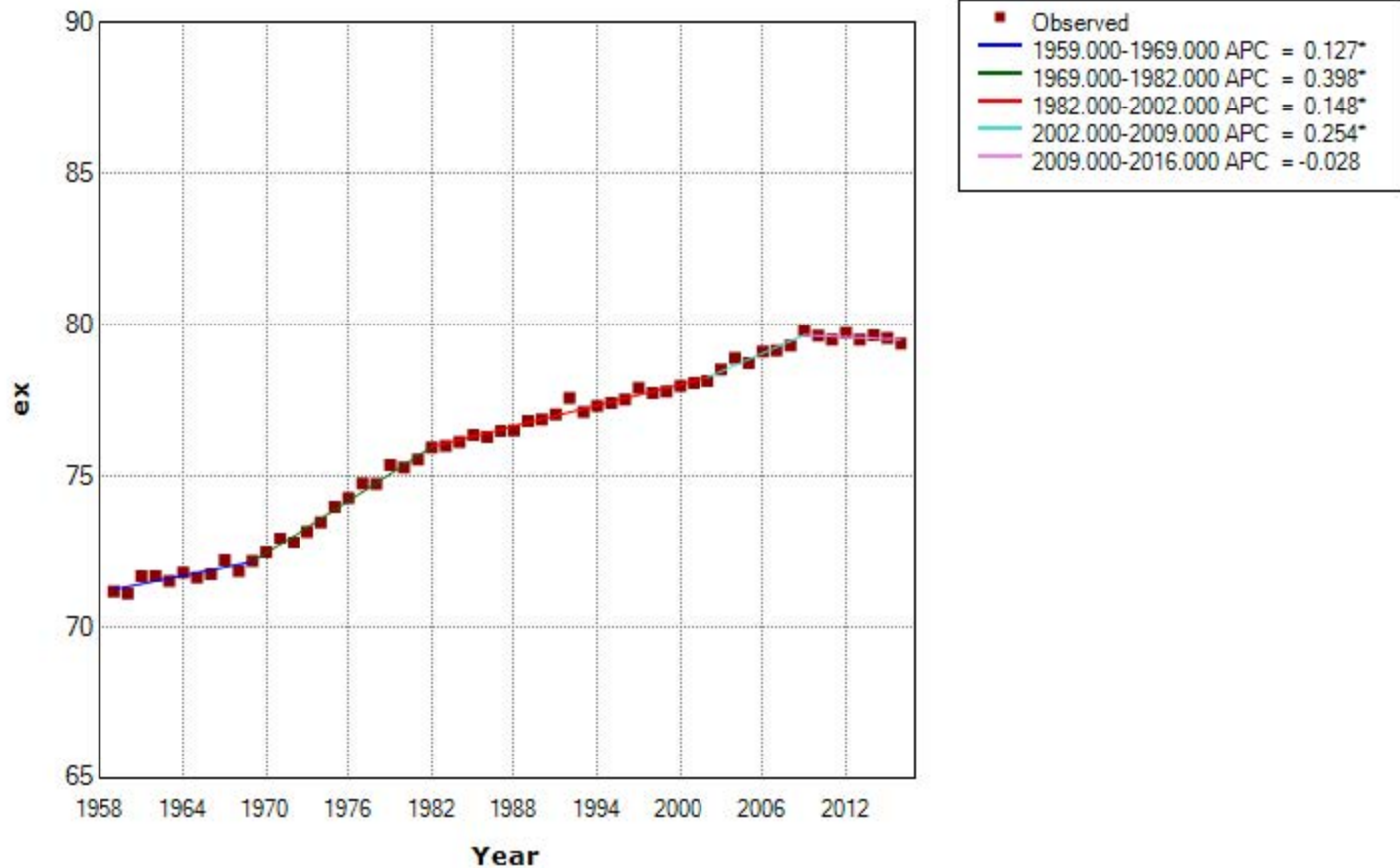
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

WA: 4 Joinpoints



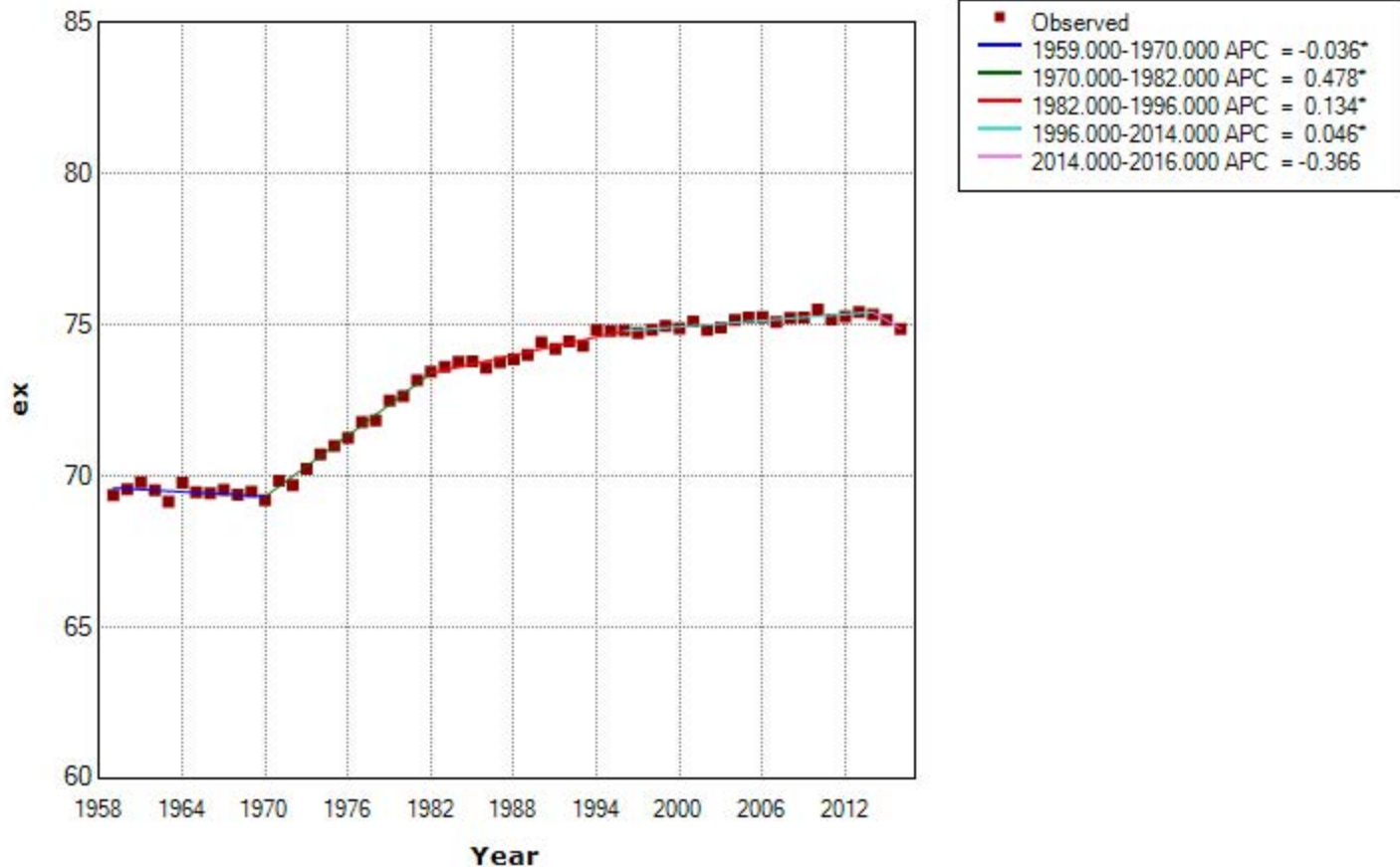
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 4 Joinpoints.

WI: 4 Joinpoints



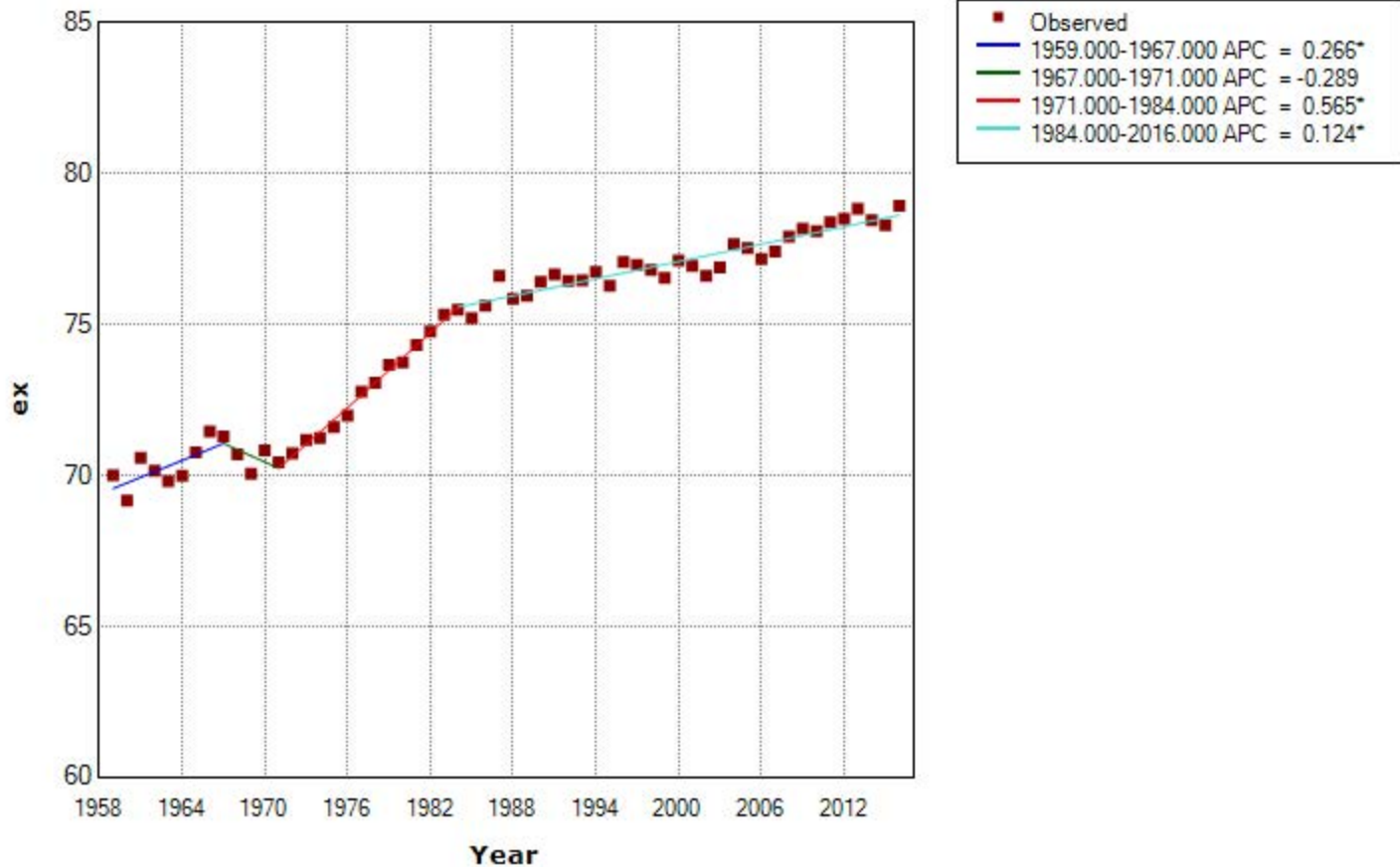
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 4 Joinpoints.

WV: 4 Joinpoints



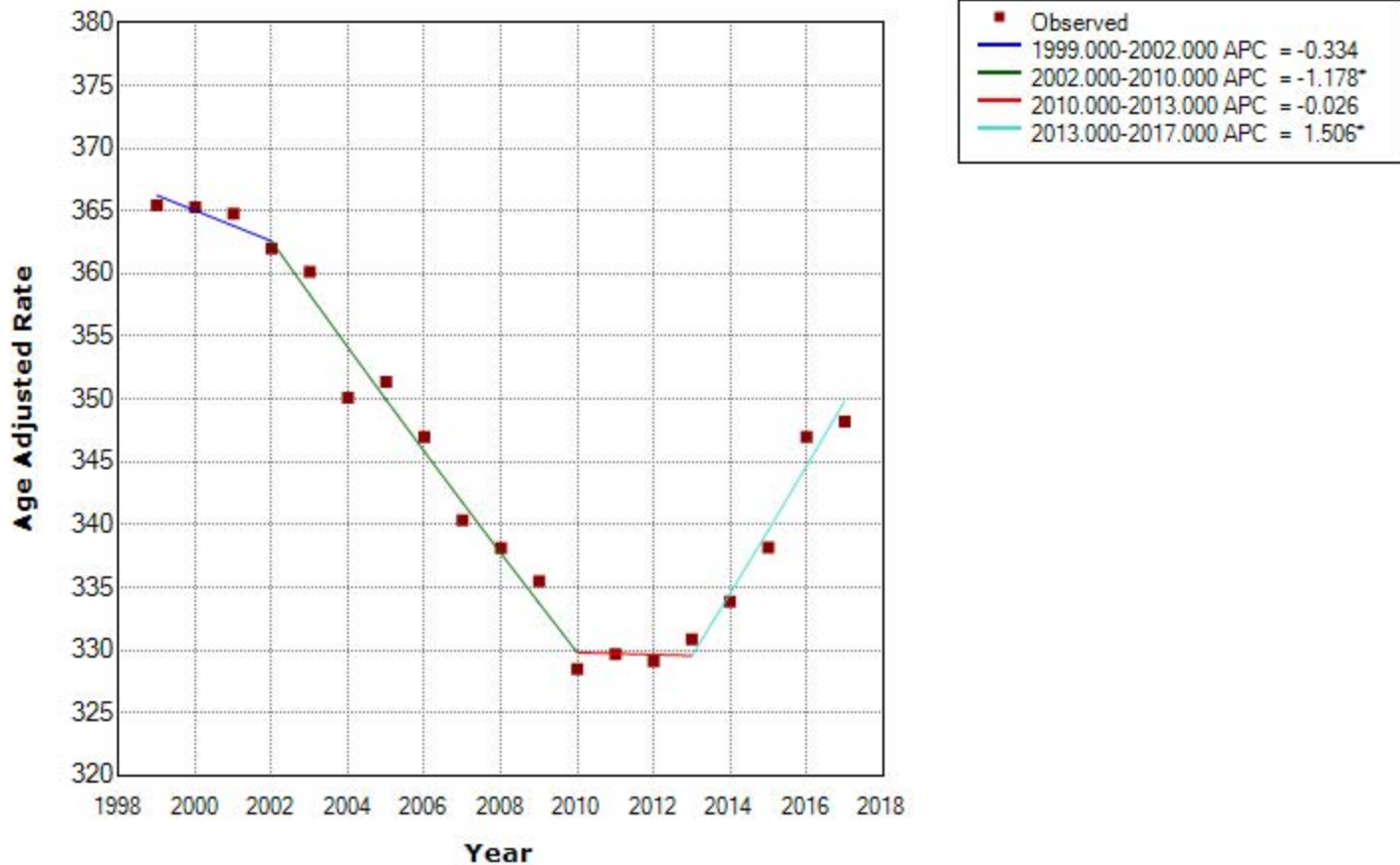
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 4 Joinpoints.

WY: 3 Joinpoints



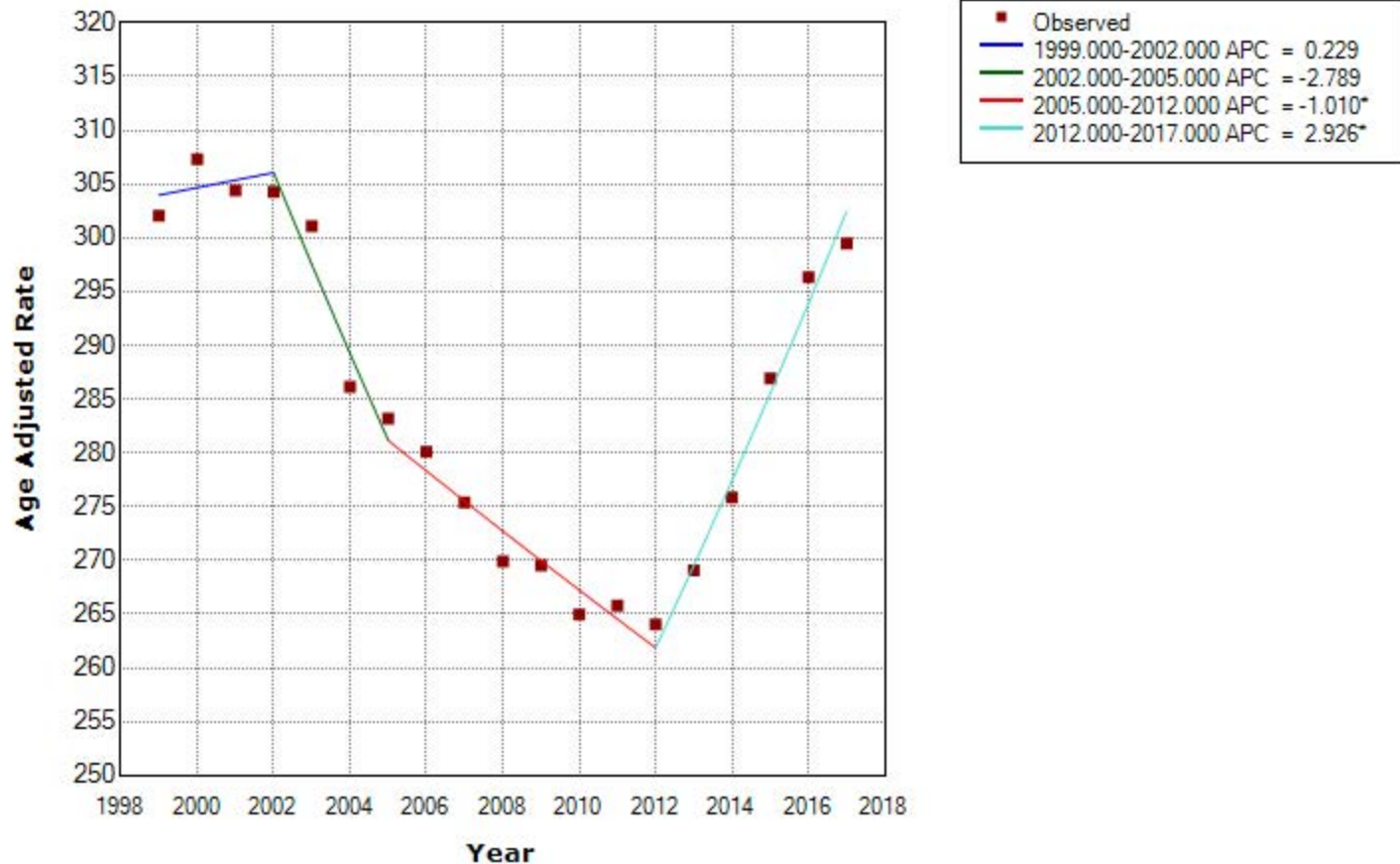
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

USA: 3 Joinpoints



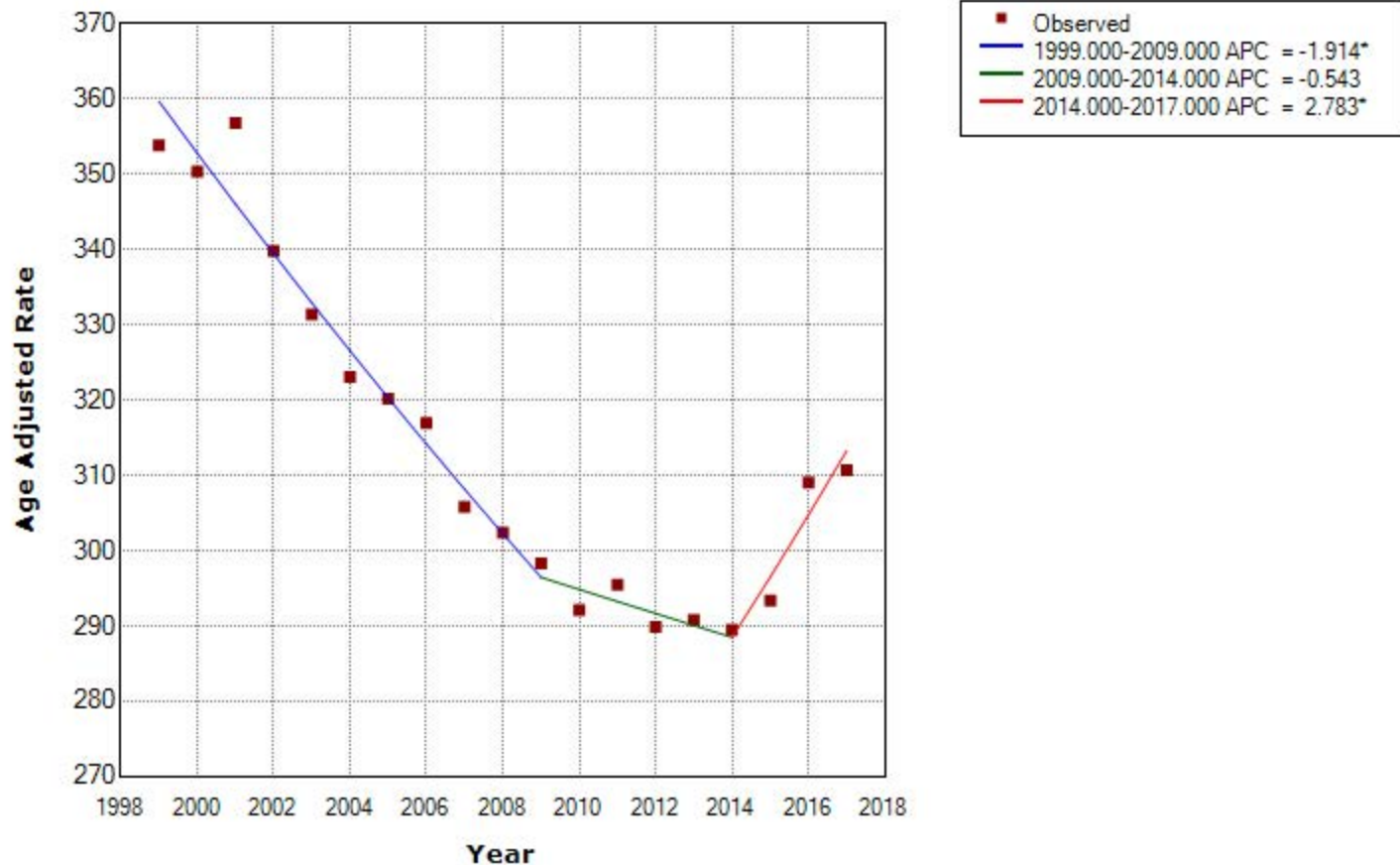
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Division 1: New England: 3 Joinpoints



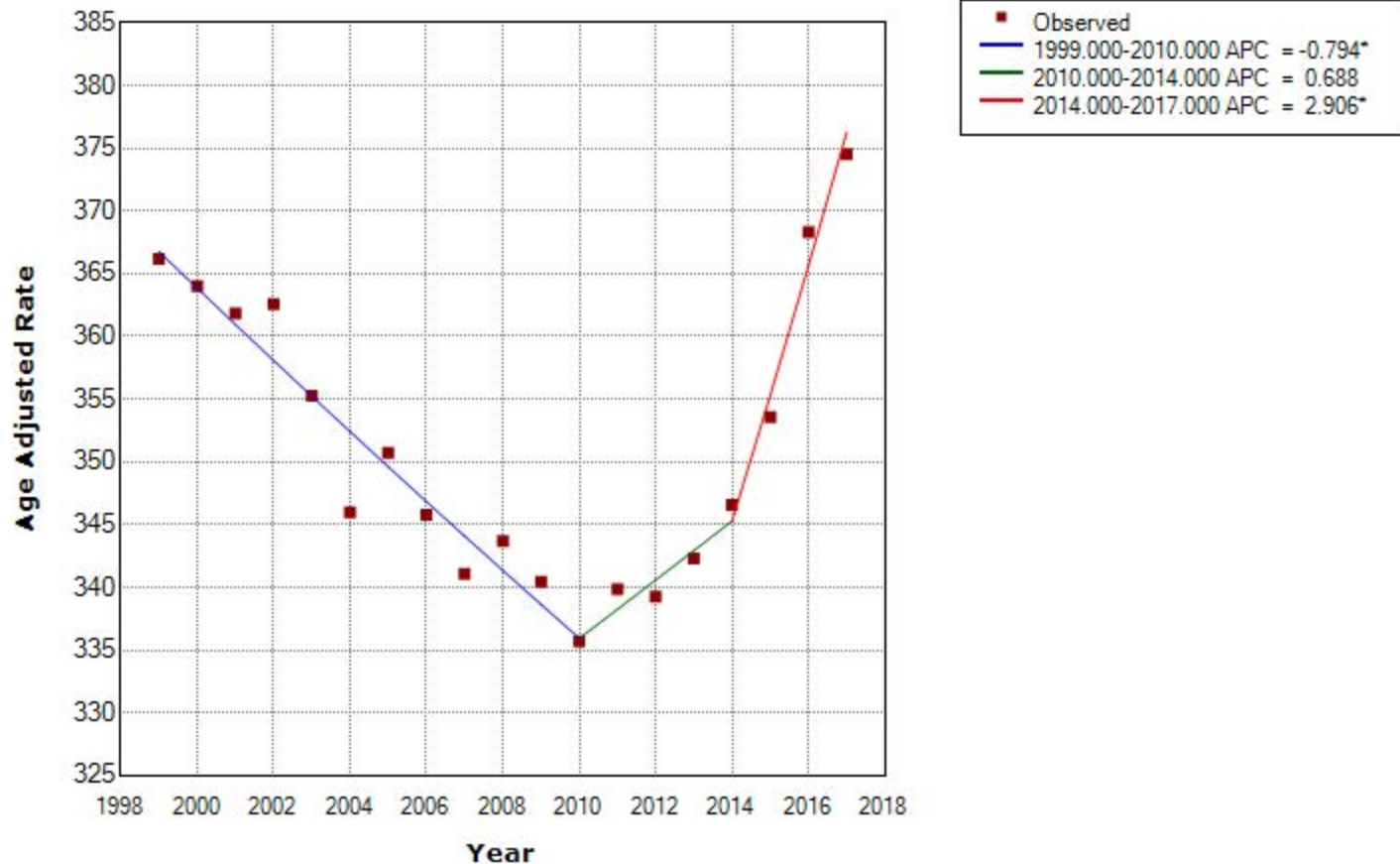
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Division 2: Middle Atlantic: 2 Joinpoints



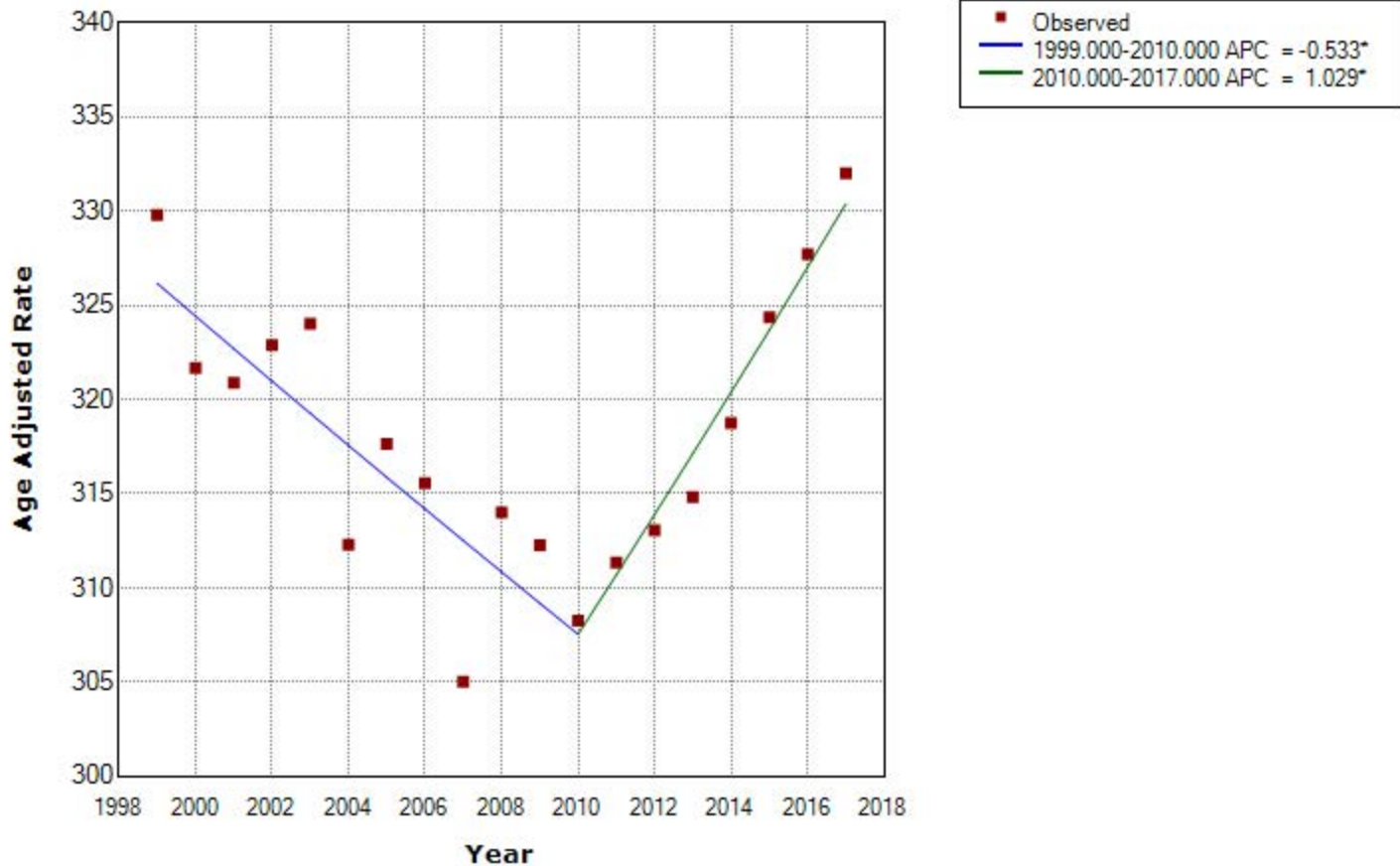
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Division 3: East North Central: 2 Joinpoints



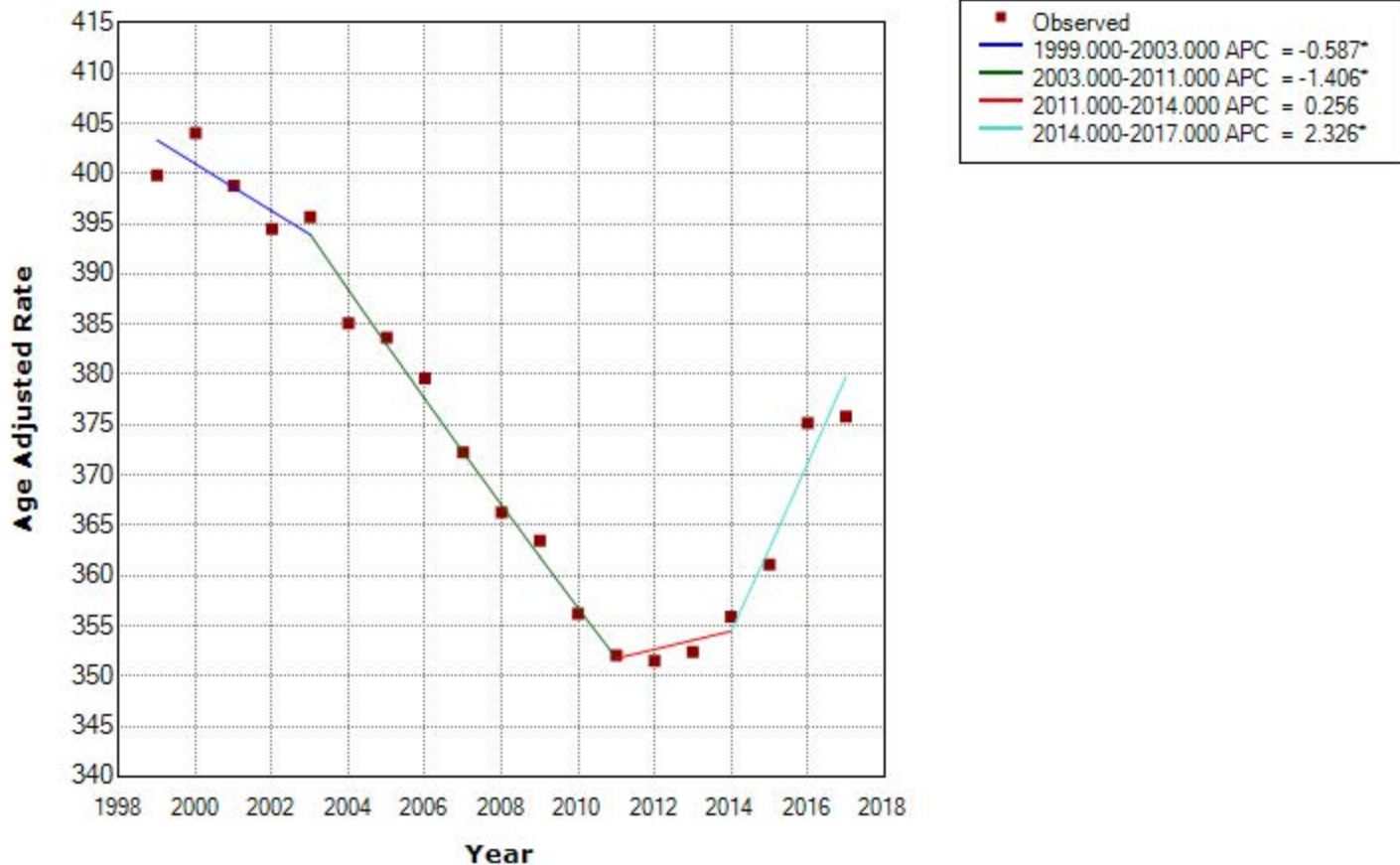
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Division 4: West North Central: 1 Joinpoint



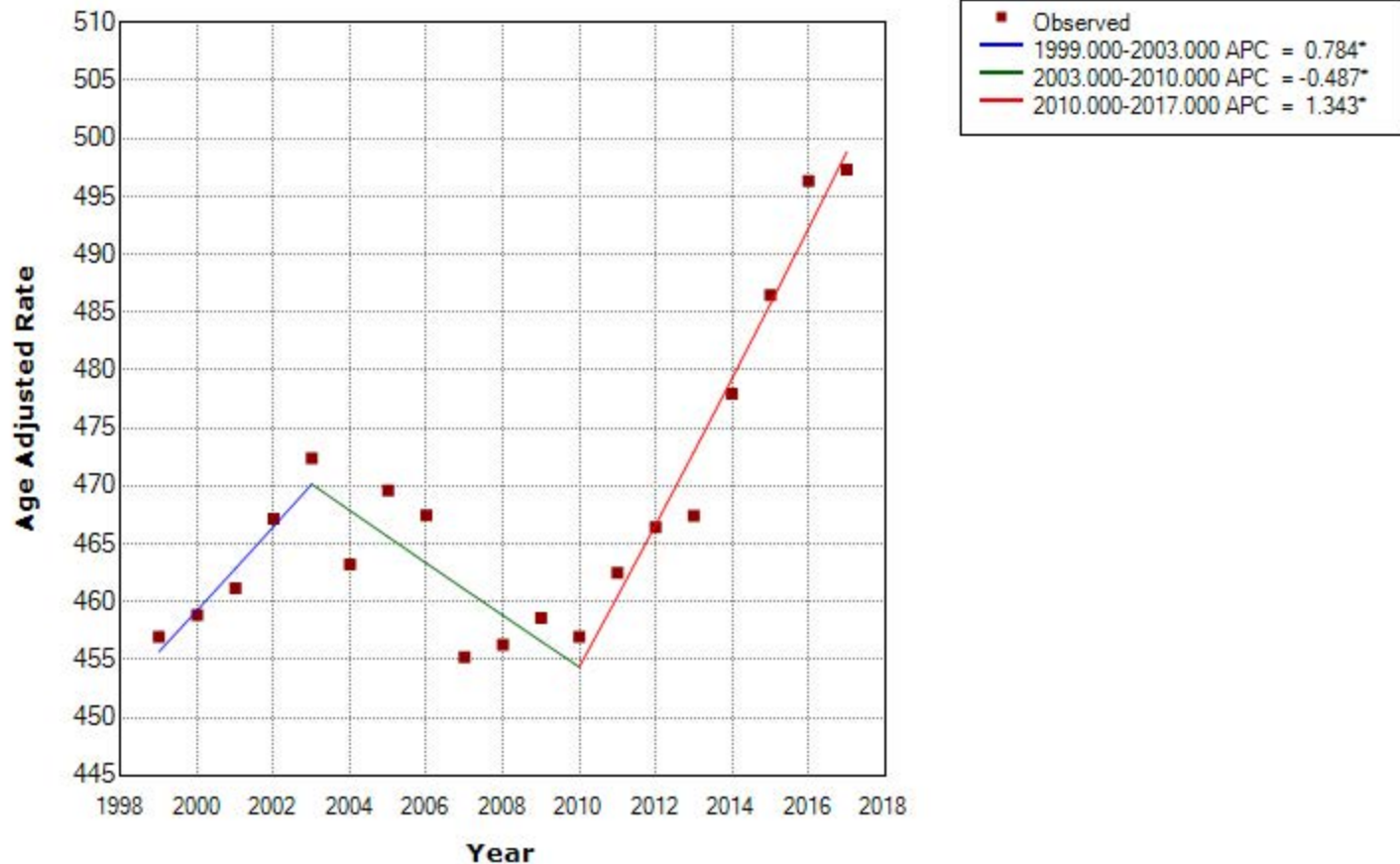
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Division 5: South Atlantic: 3 Joinpoints



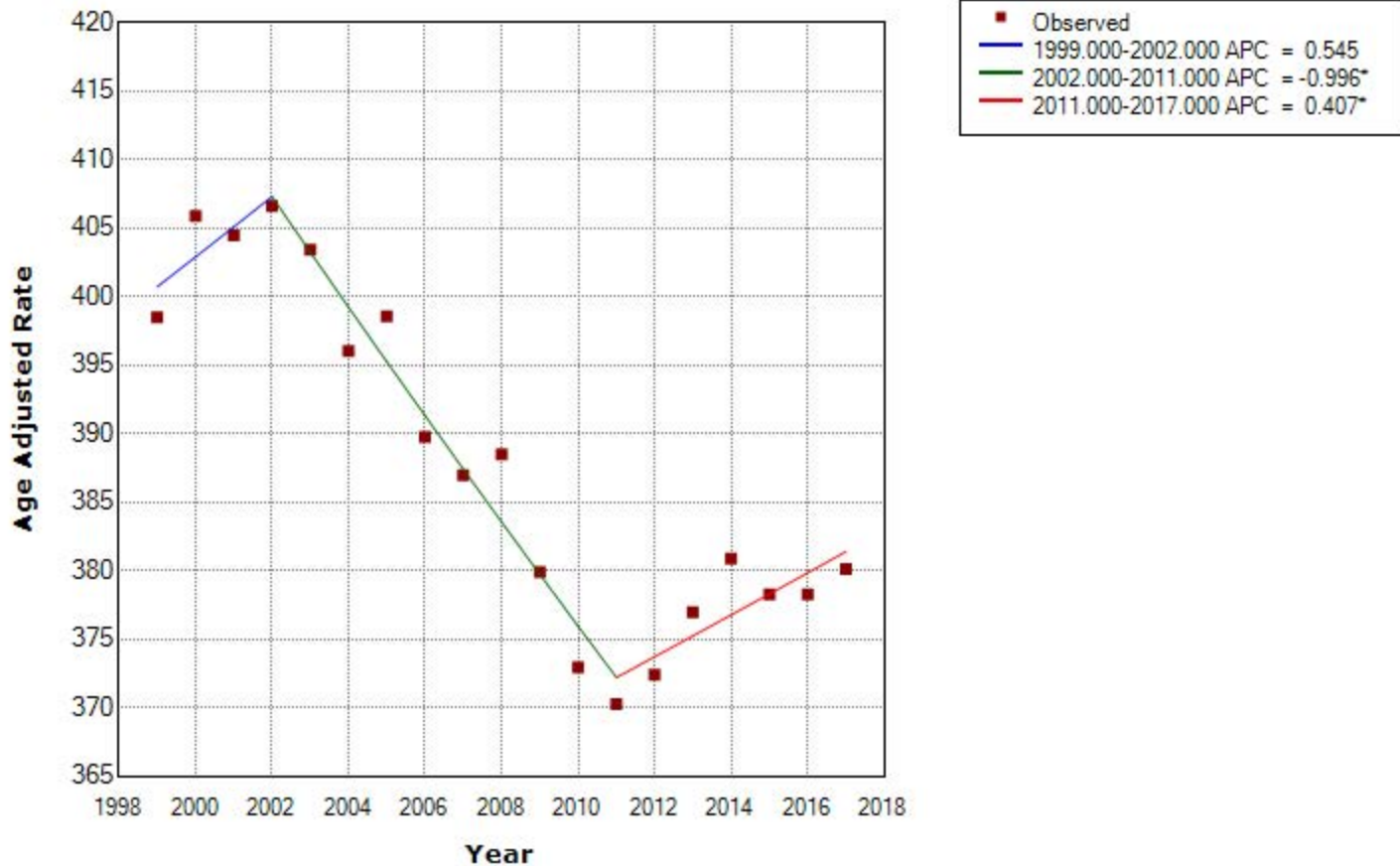
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Division 6: East South Central: 2 Joinpoints



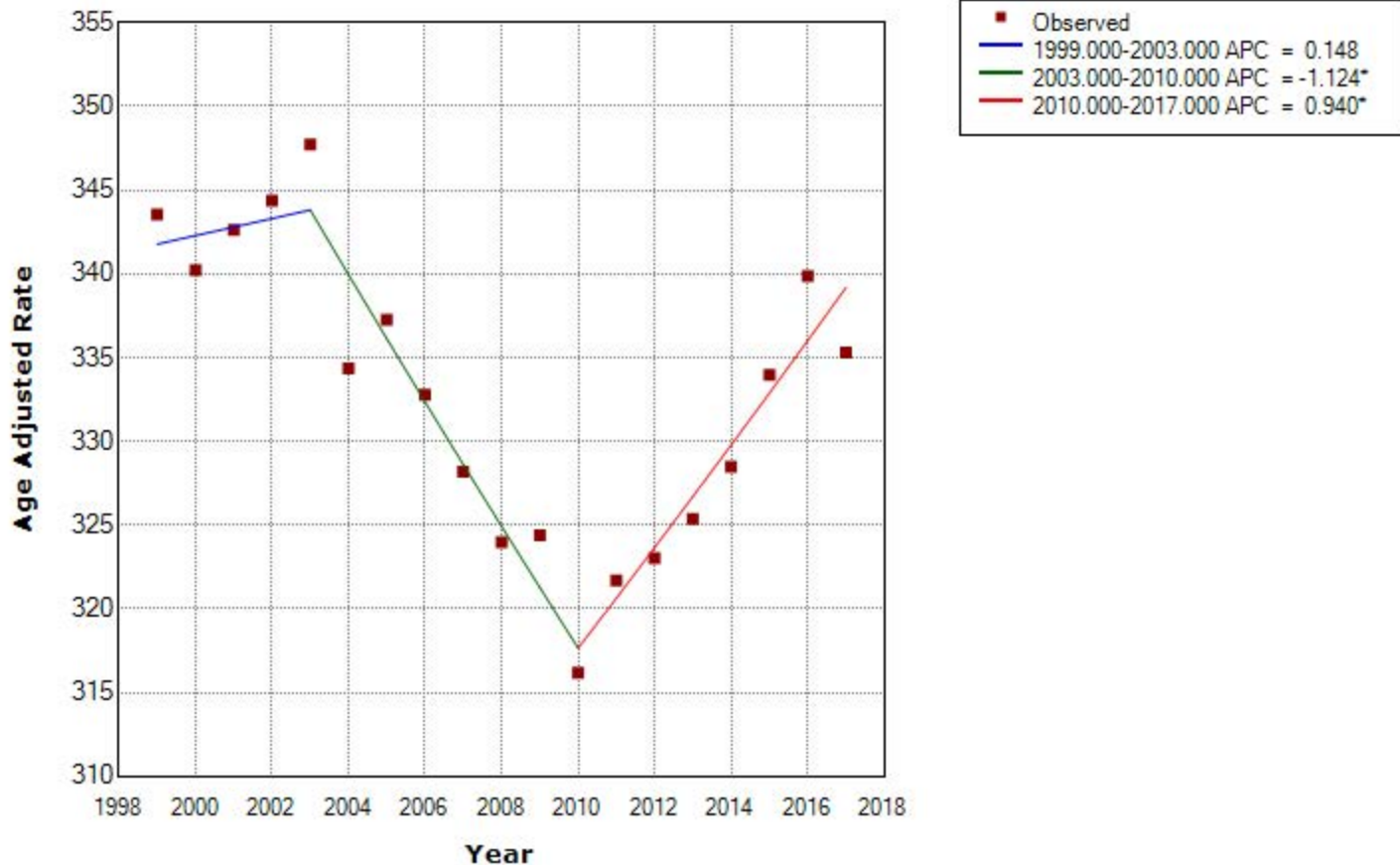
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Division 7: West South Central: 2 Joinpoints



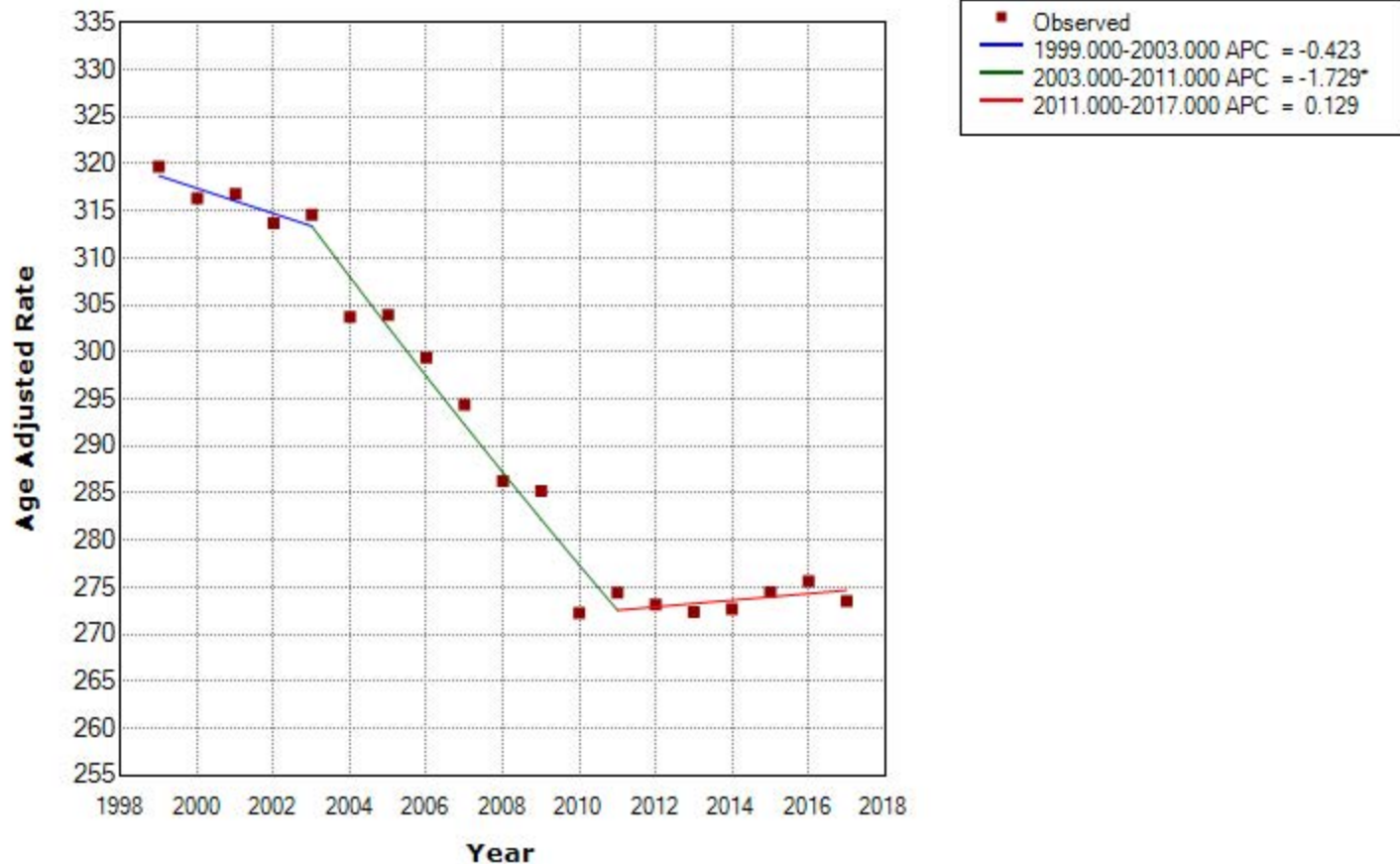
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Division 8: Mountain: 2 Joinpoints



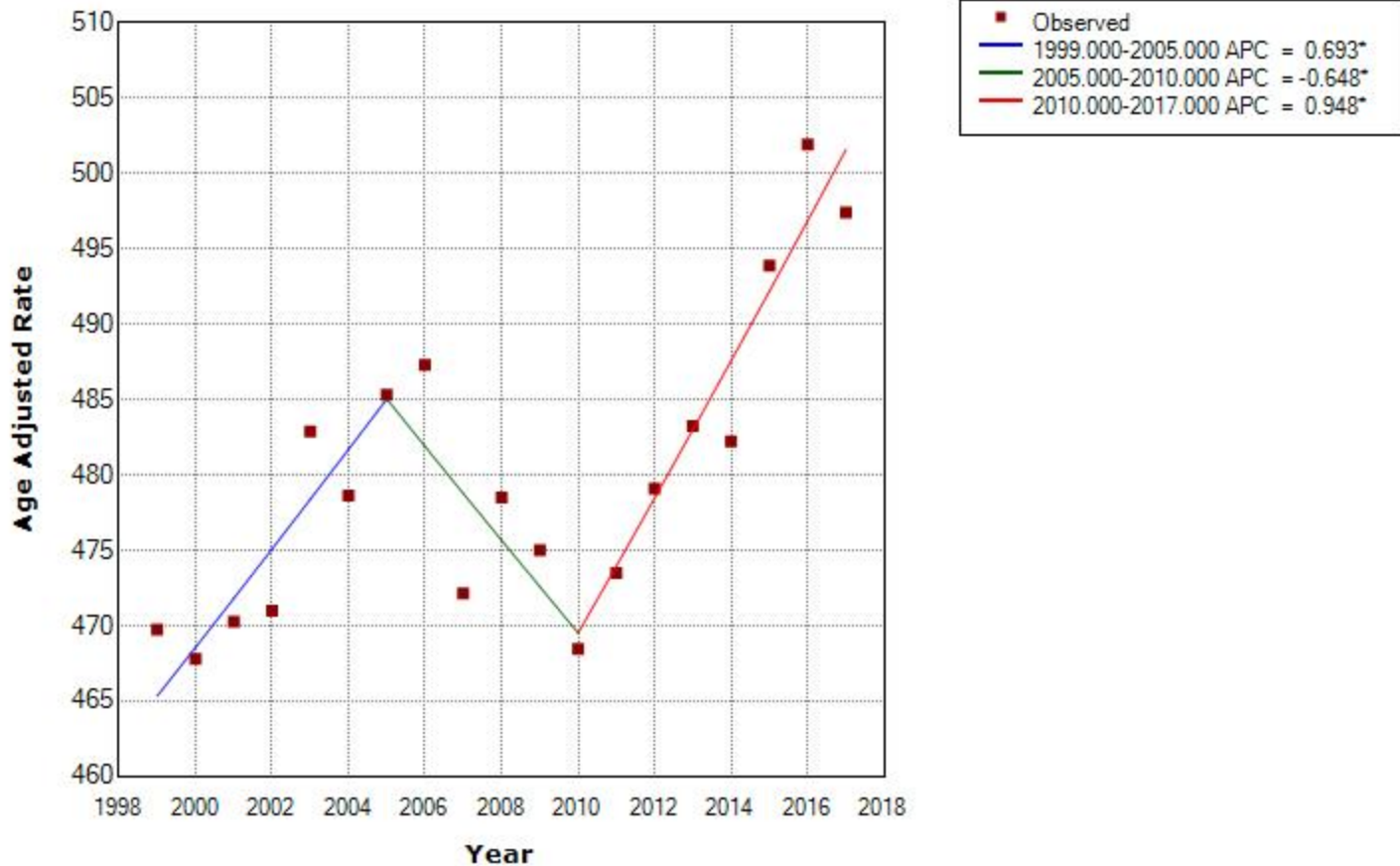
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Division 9: Pacific: 2 Joinpoints



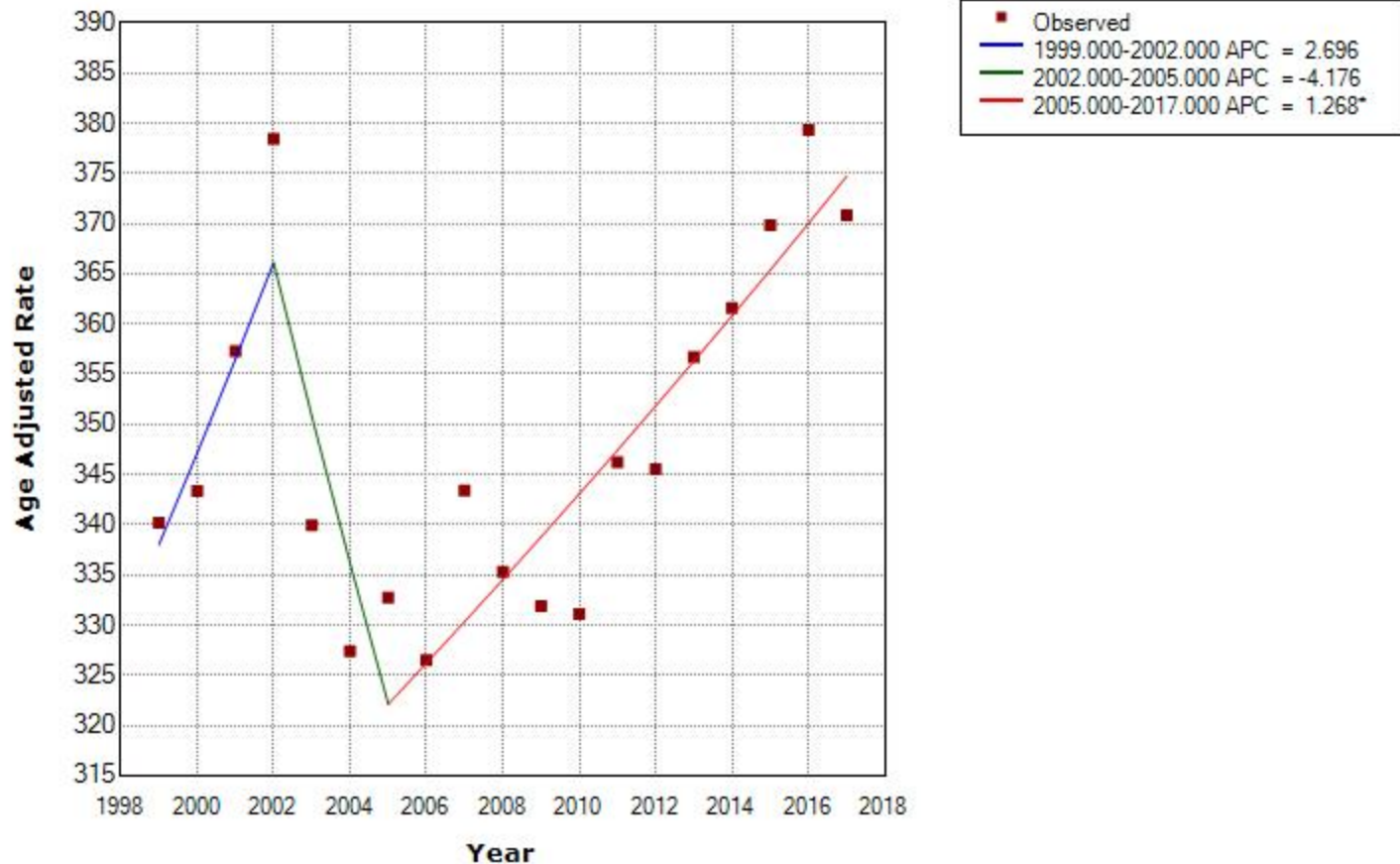
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Alabama: 2 Joinpoints



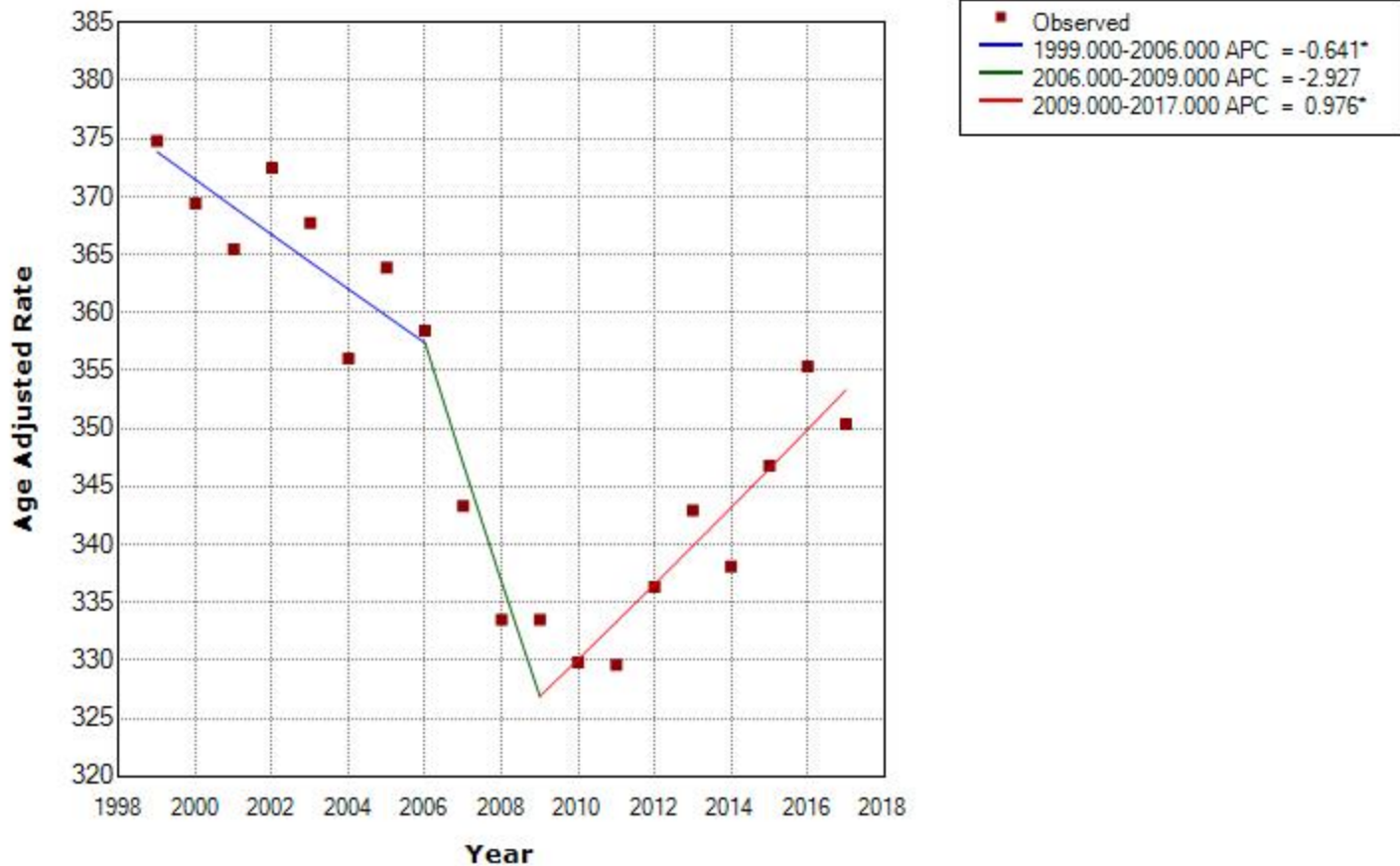
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Alaska: 2 Joinpoints



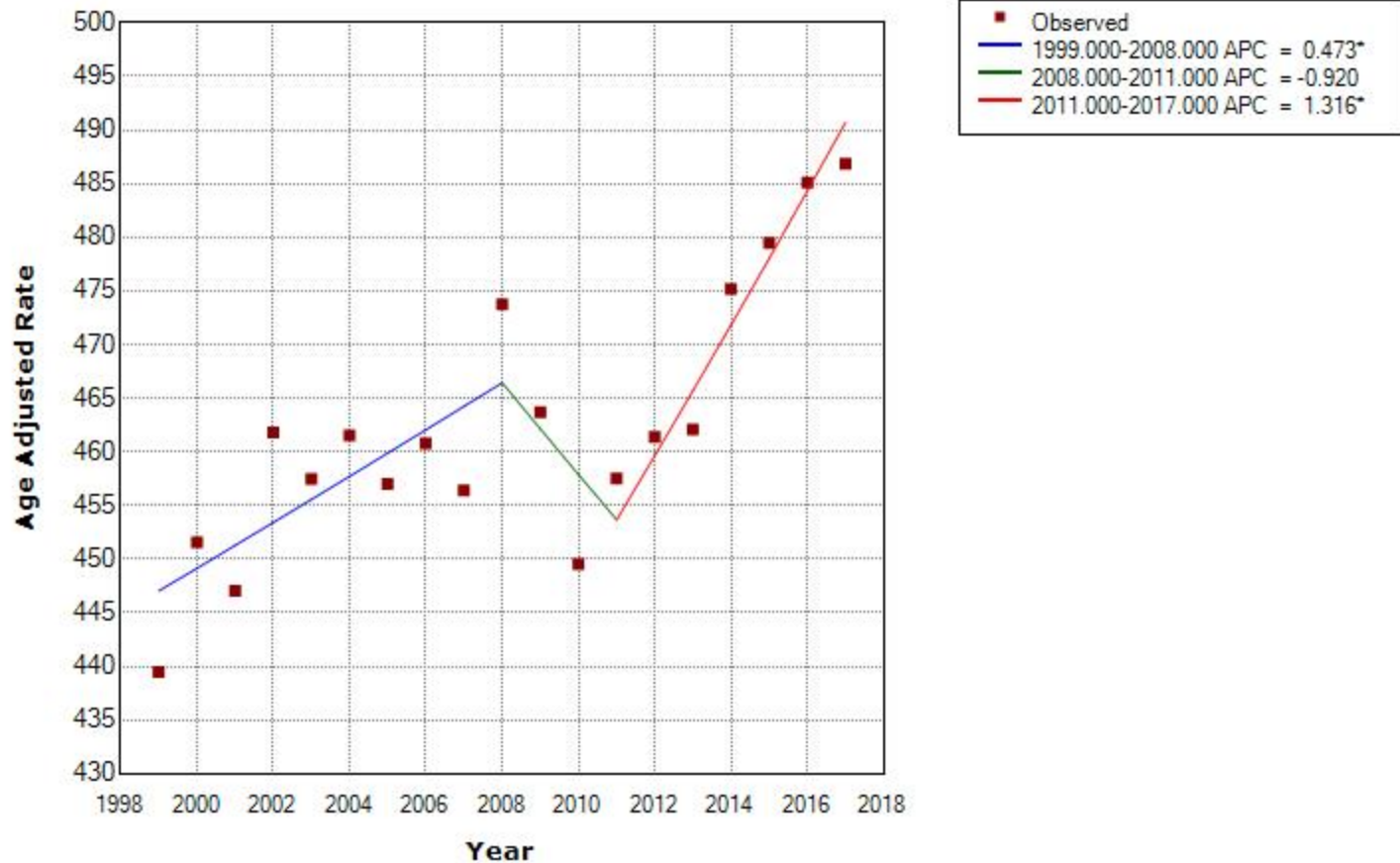
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Arizona: 2 Joinpoints



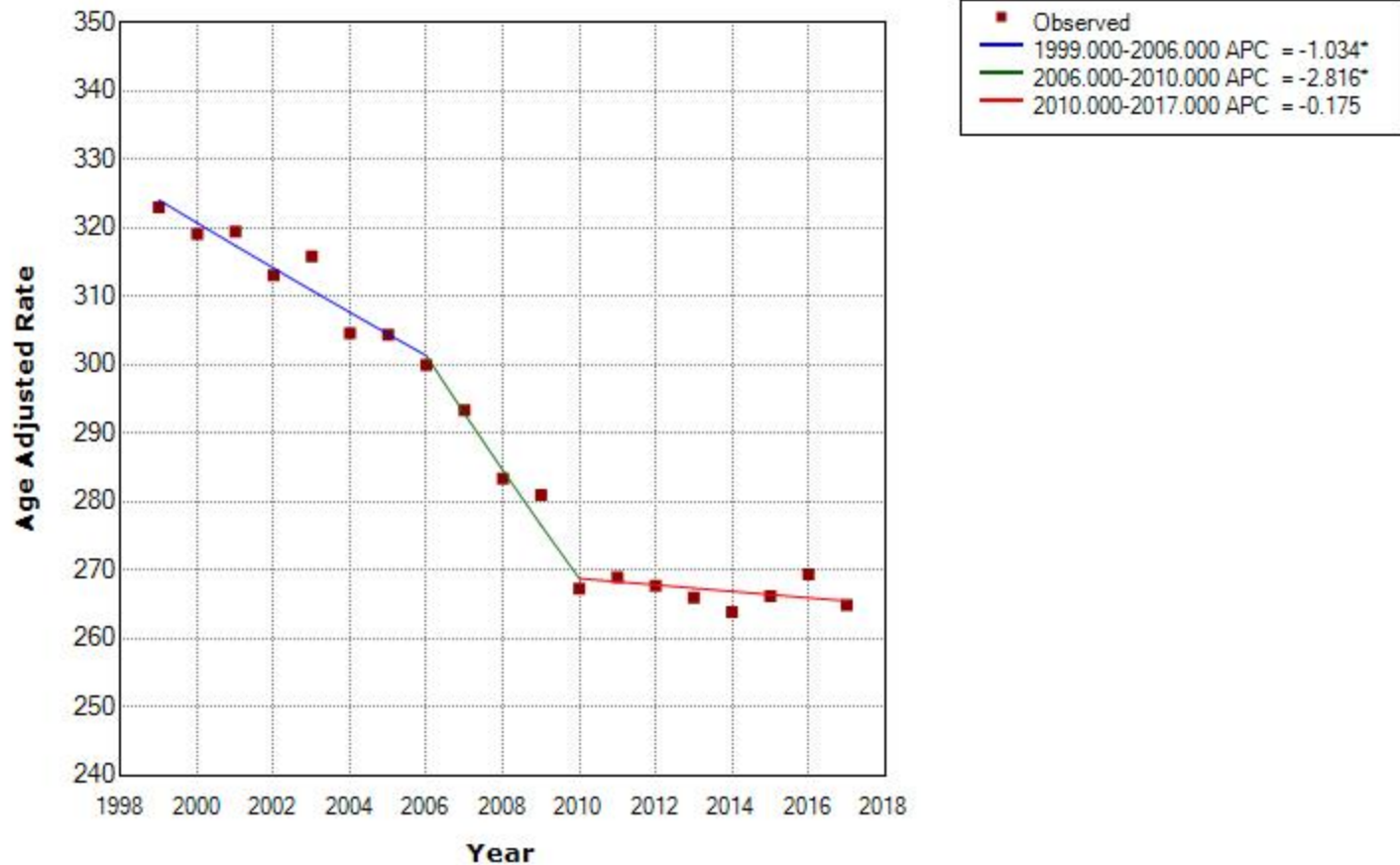
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Arkansas: 2 Joinpoints



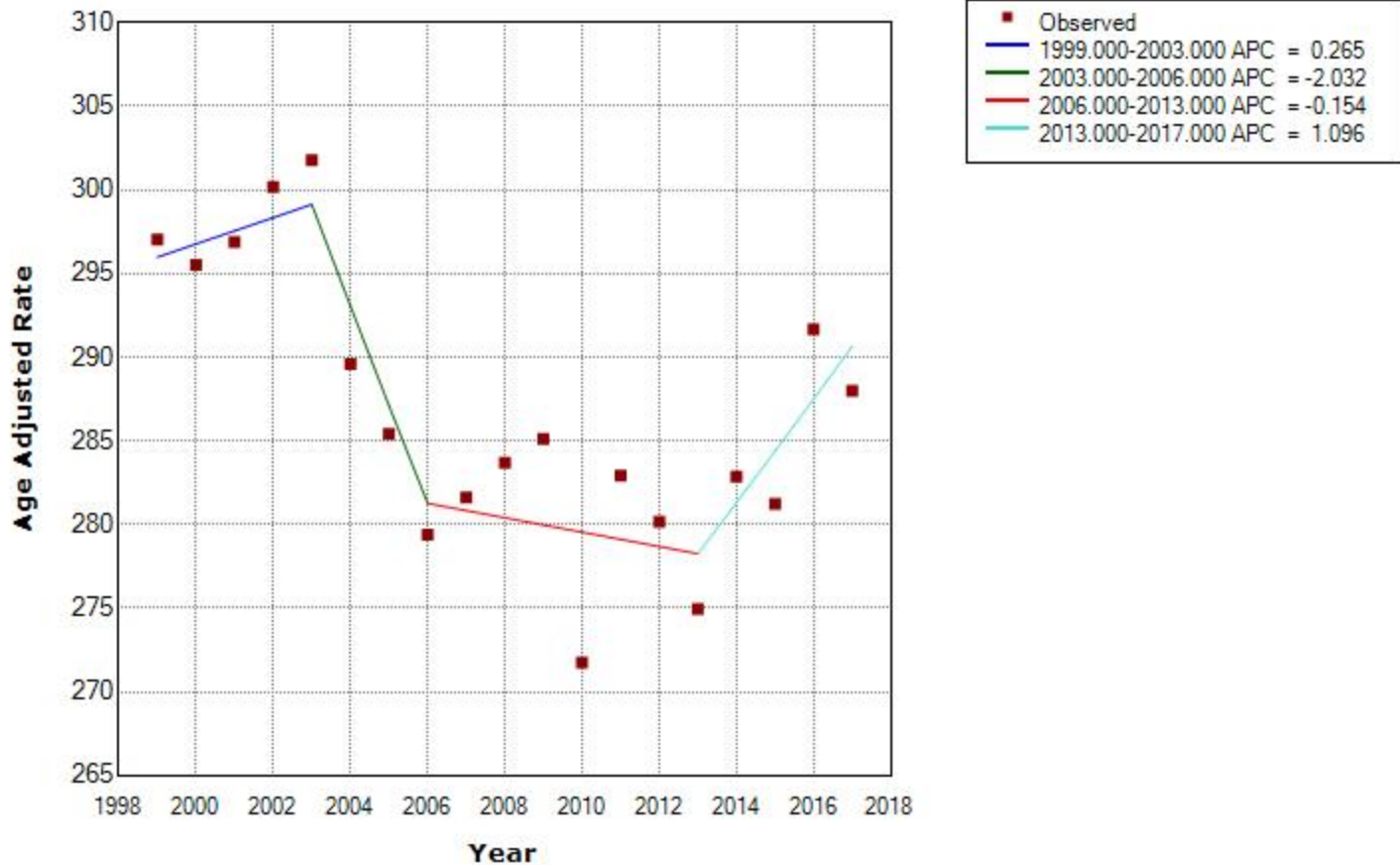
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

California: 2 Joinpoints



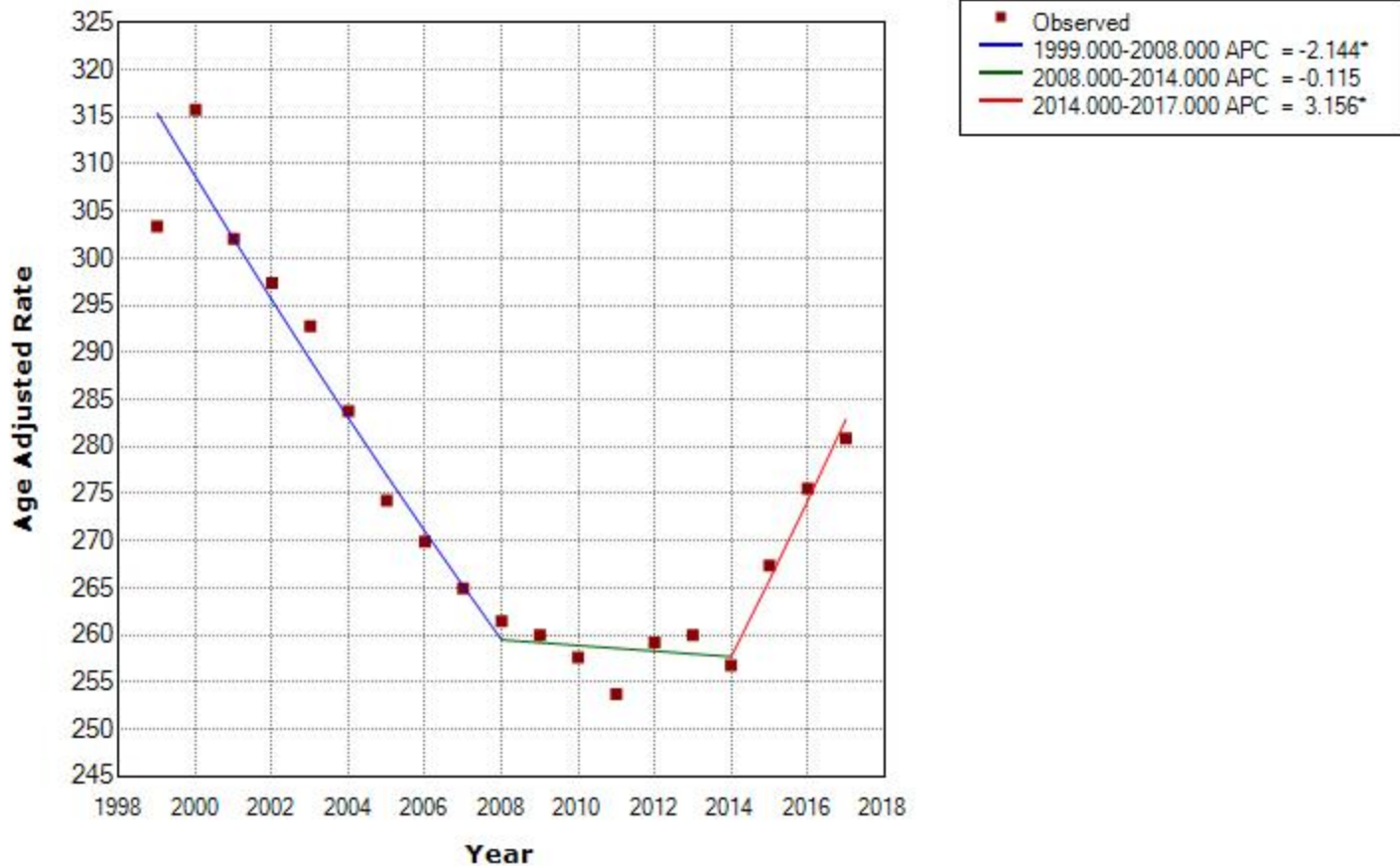
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Colorado: 3 Joinpoints



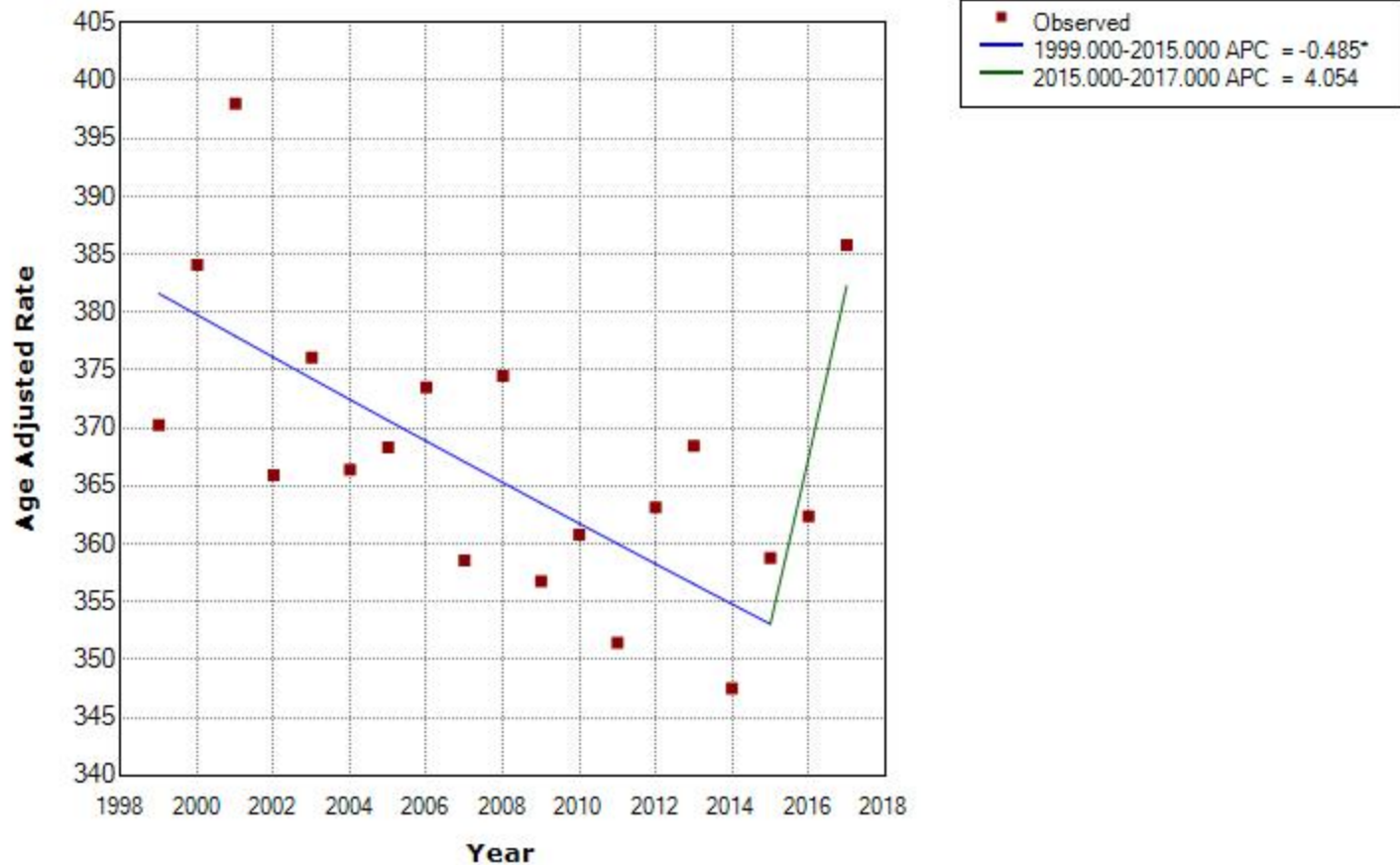
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Connecticut: 2 Joinpoints



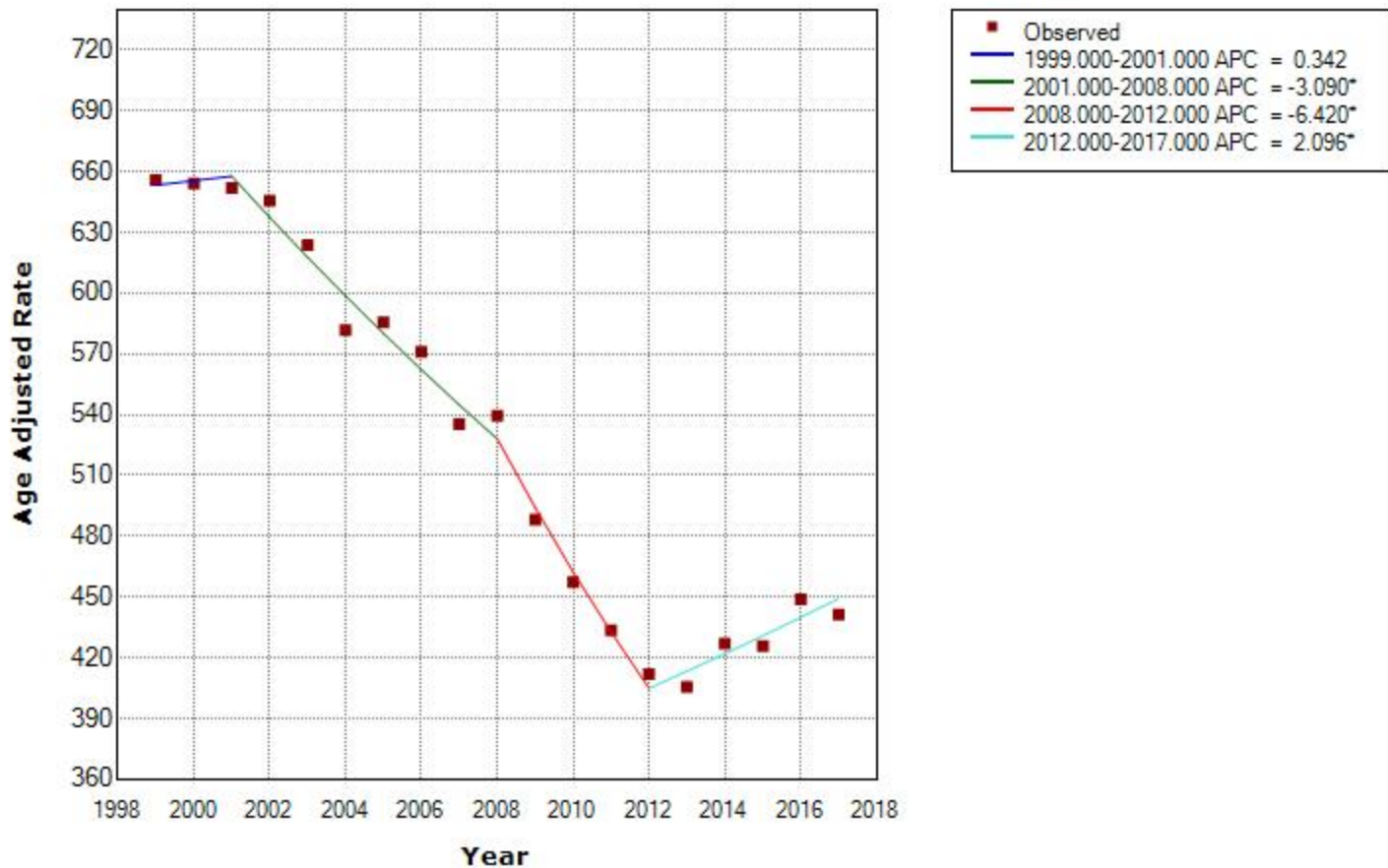
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Delaware: 1 Joinpoint



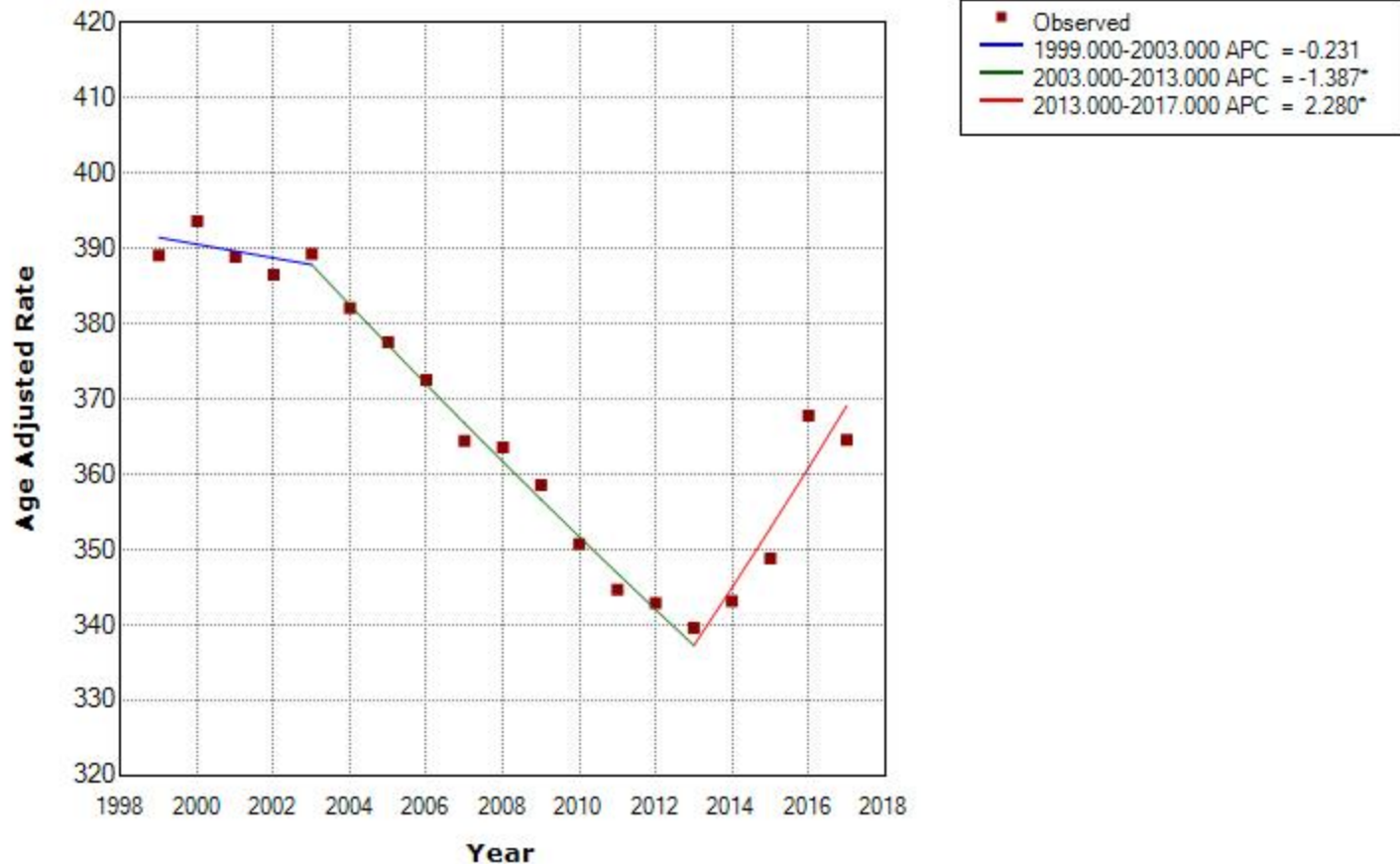
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

District of Columbia: 3 Joinpoints



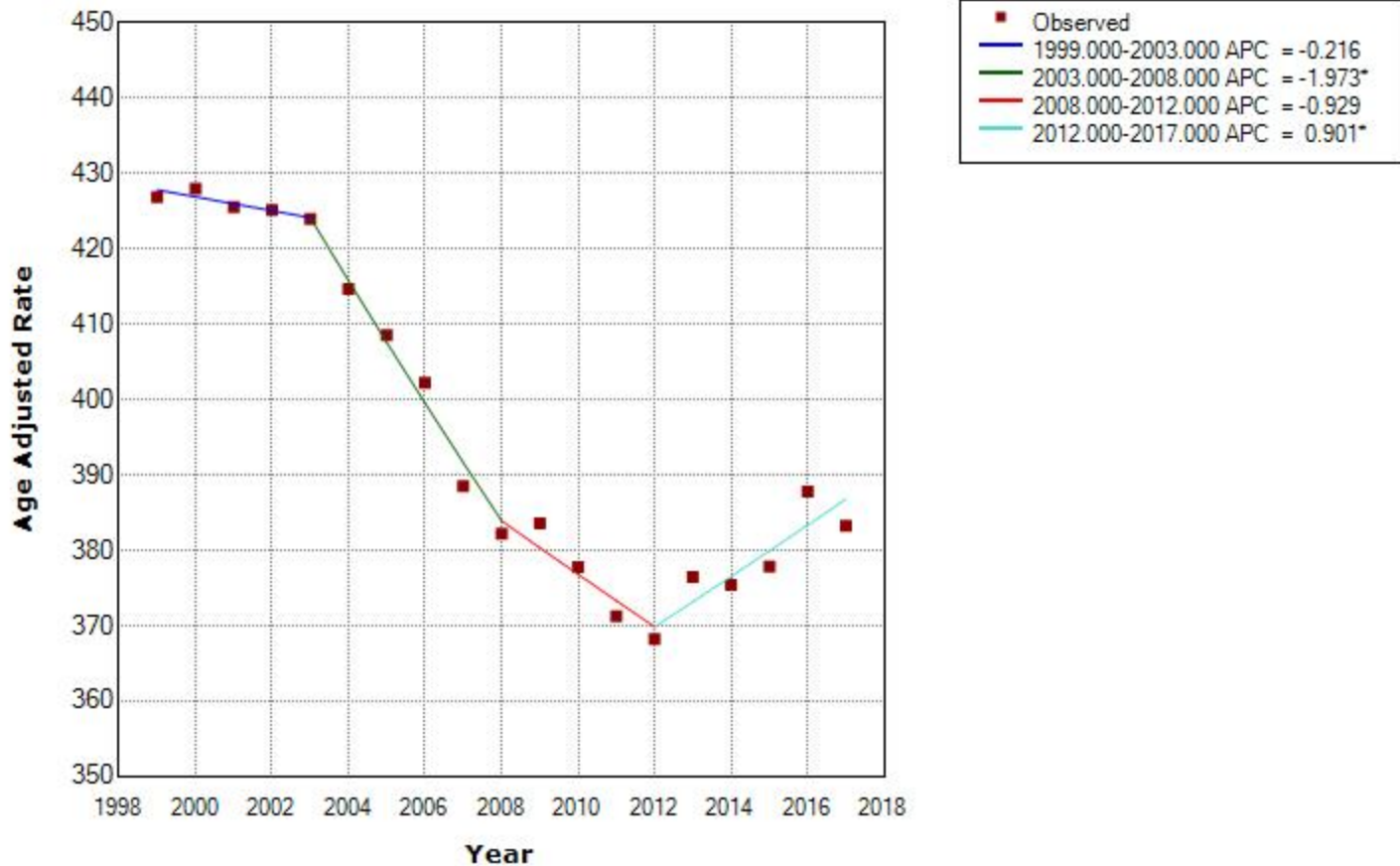
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Florida: 2 Joinpoints



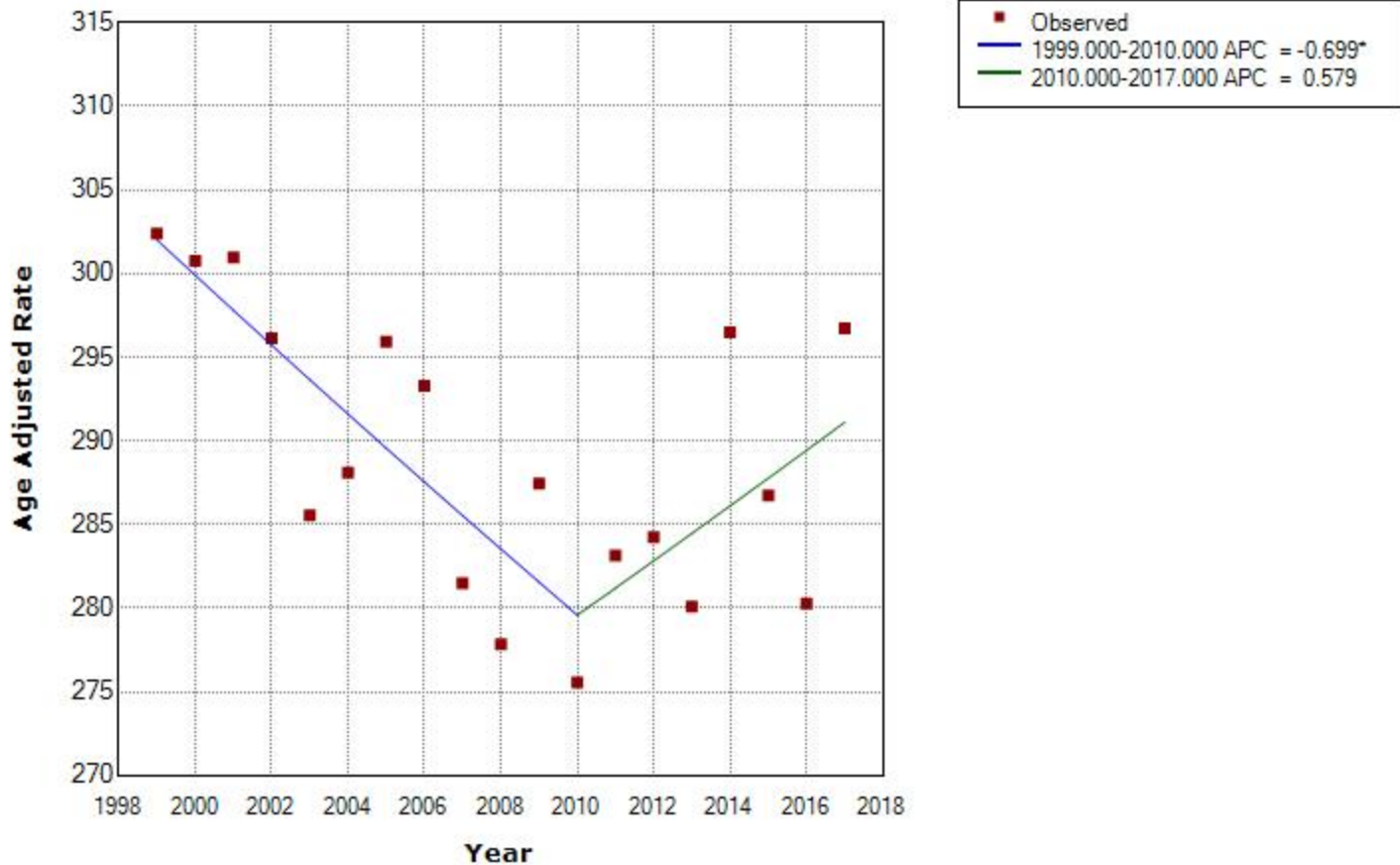
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Georgia: 3 Joinpoints



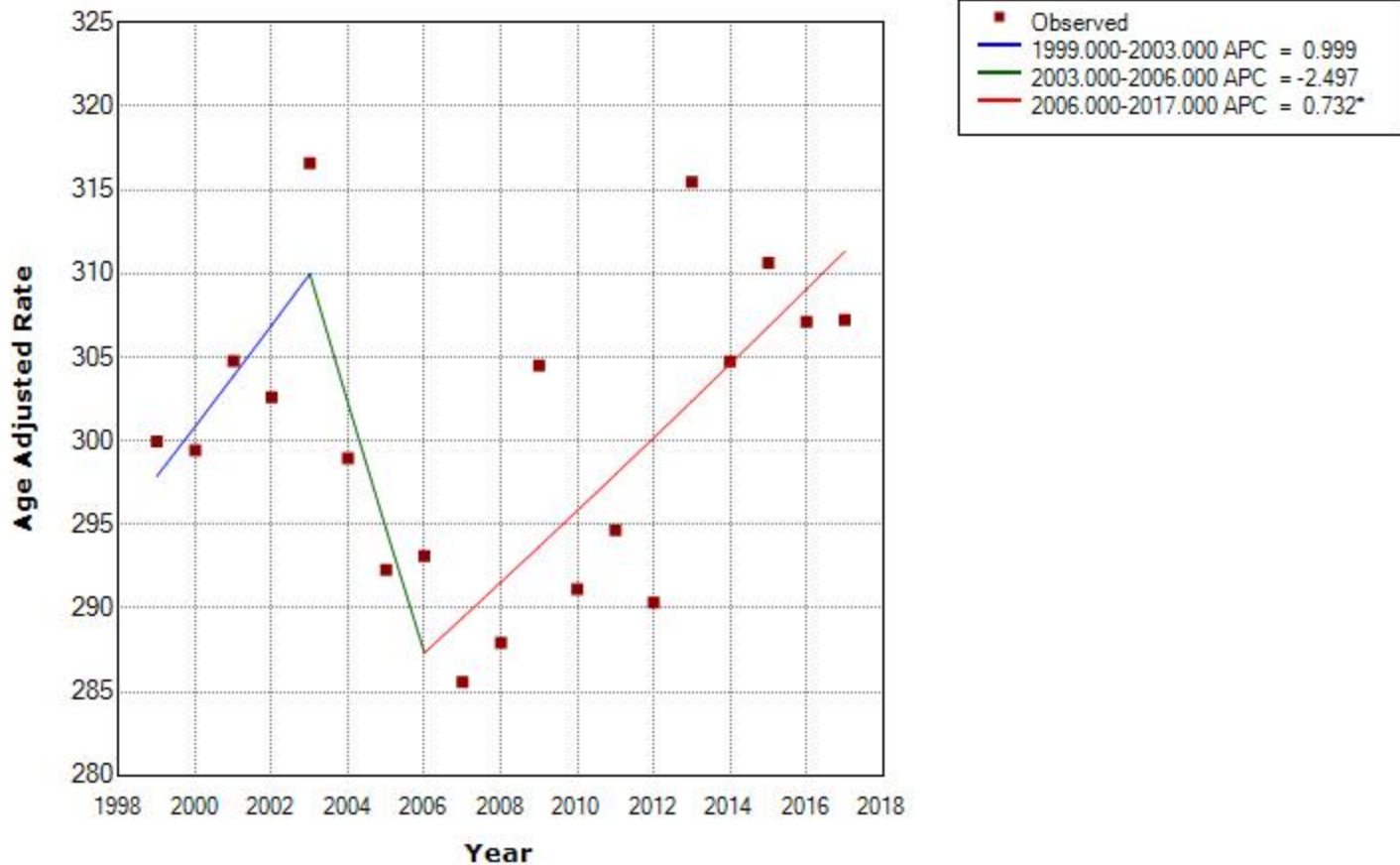
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Hawaii: 1 Joinpoint



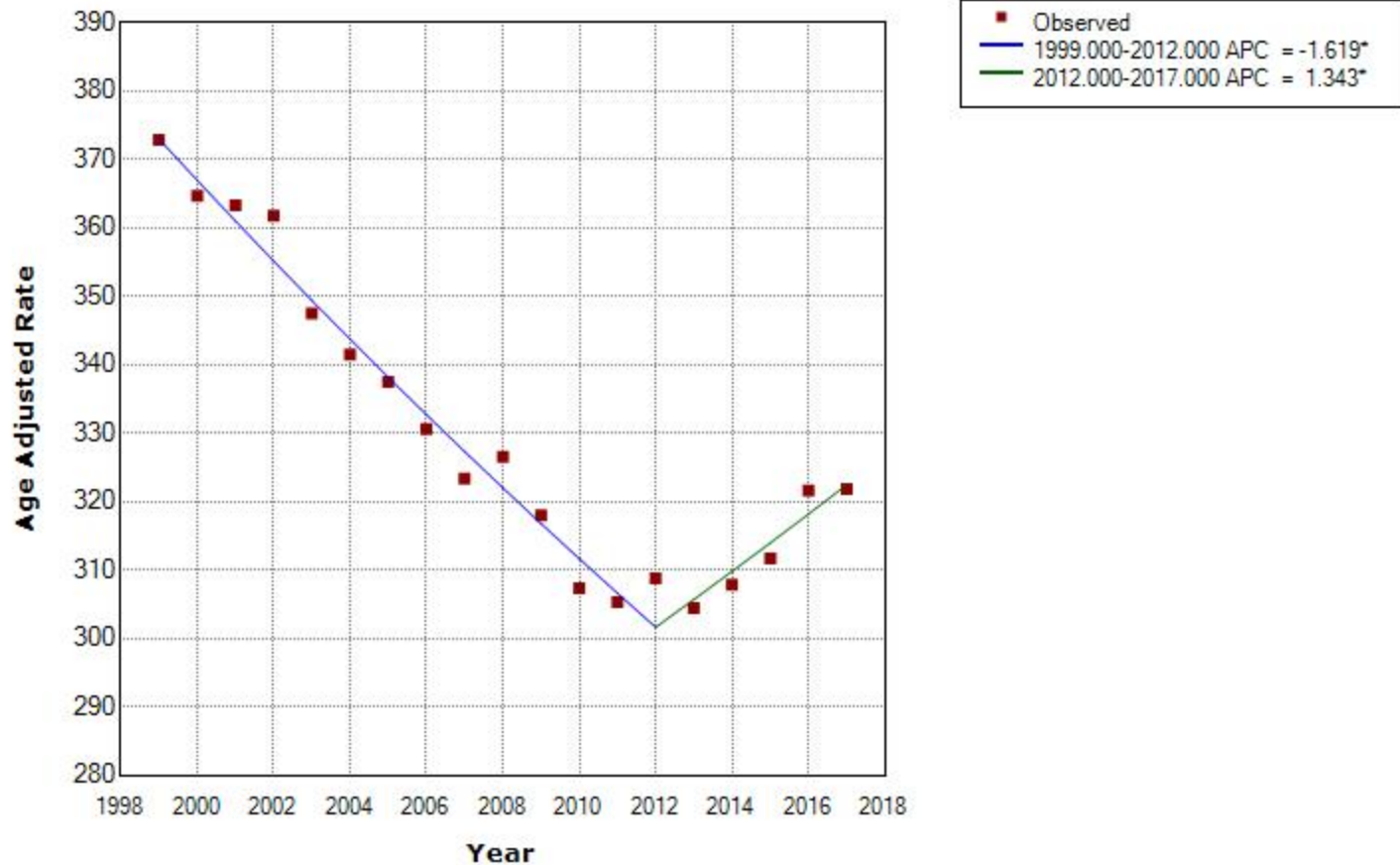
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Idaho: 2 Joinpoints



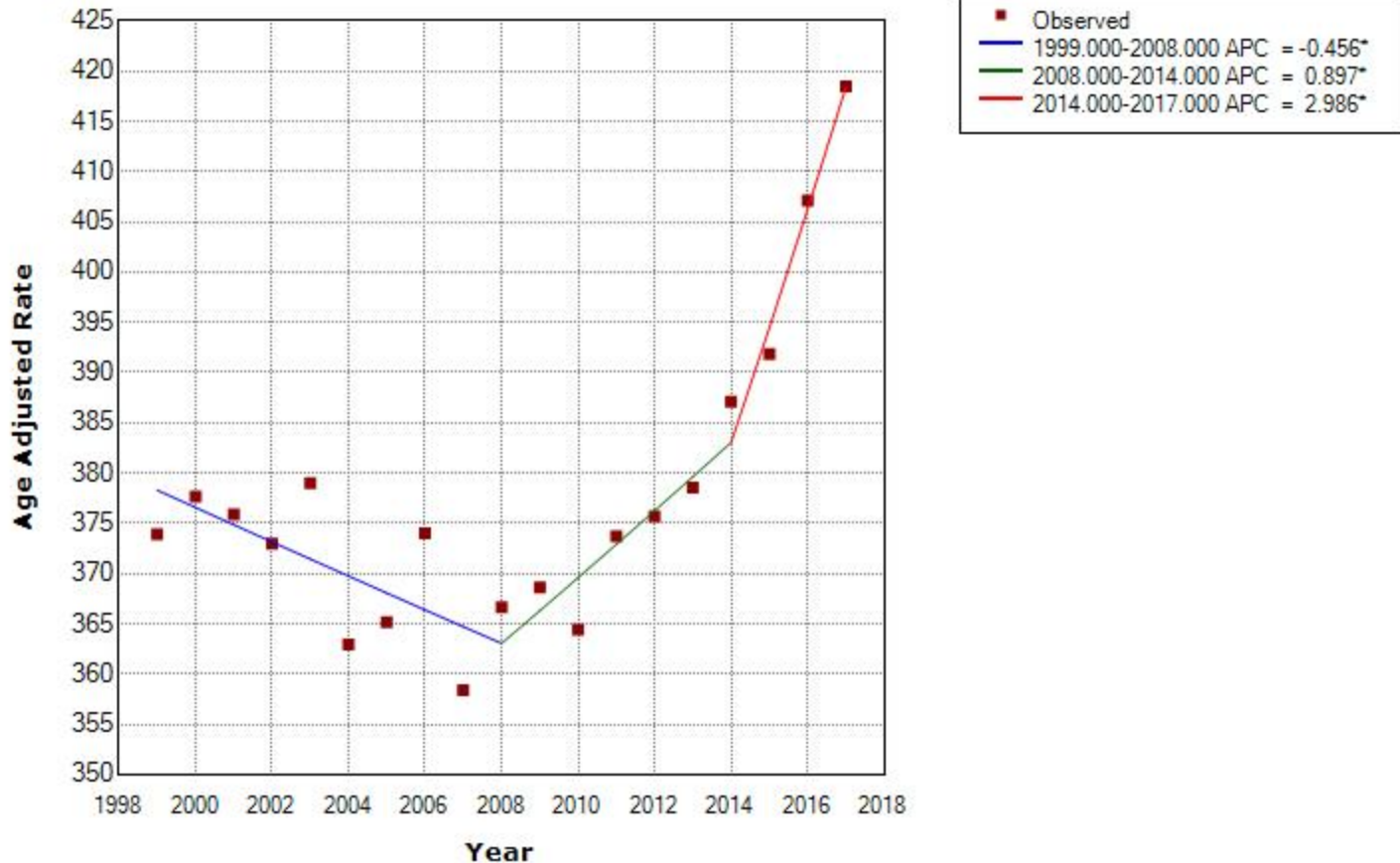
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Illinois: 1 Joinpoint



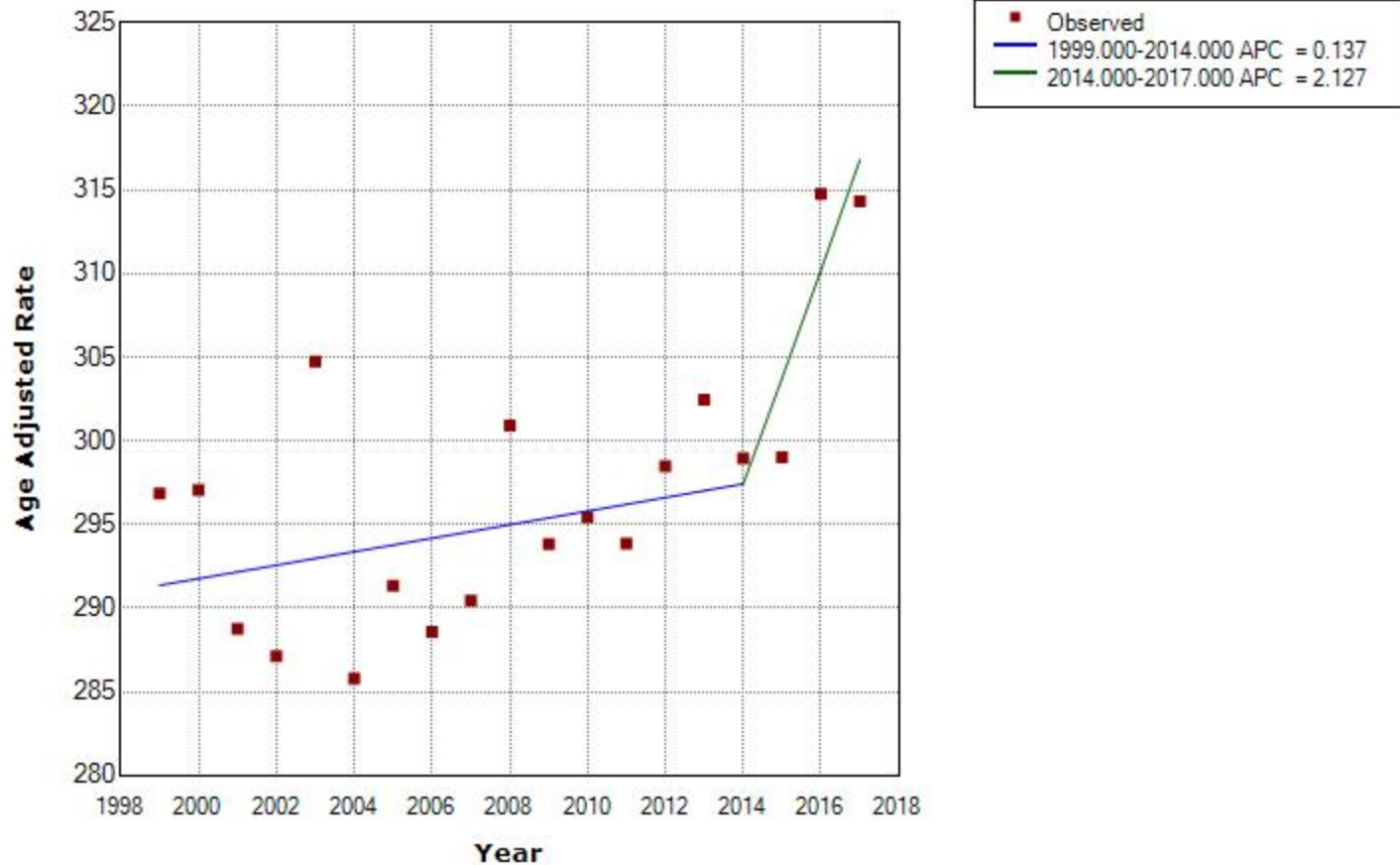
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Indiana: 2 Joinpoints



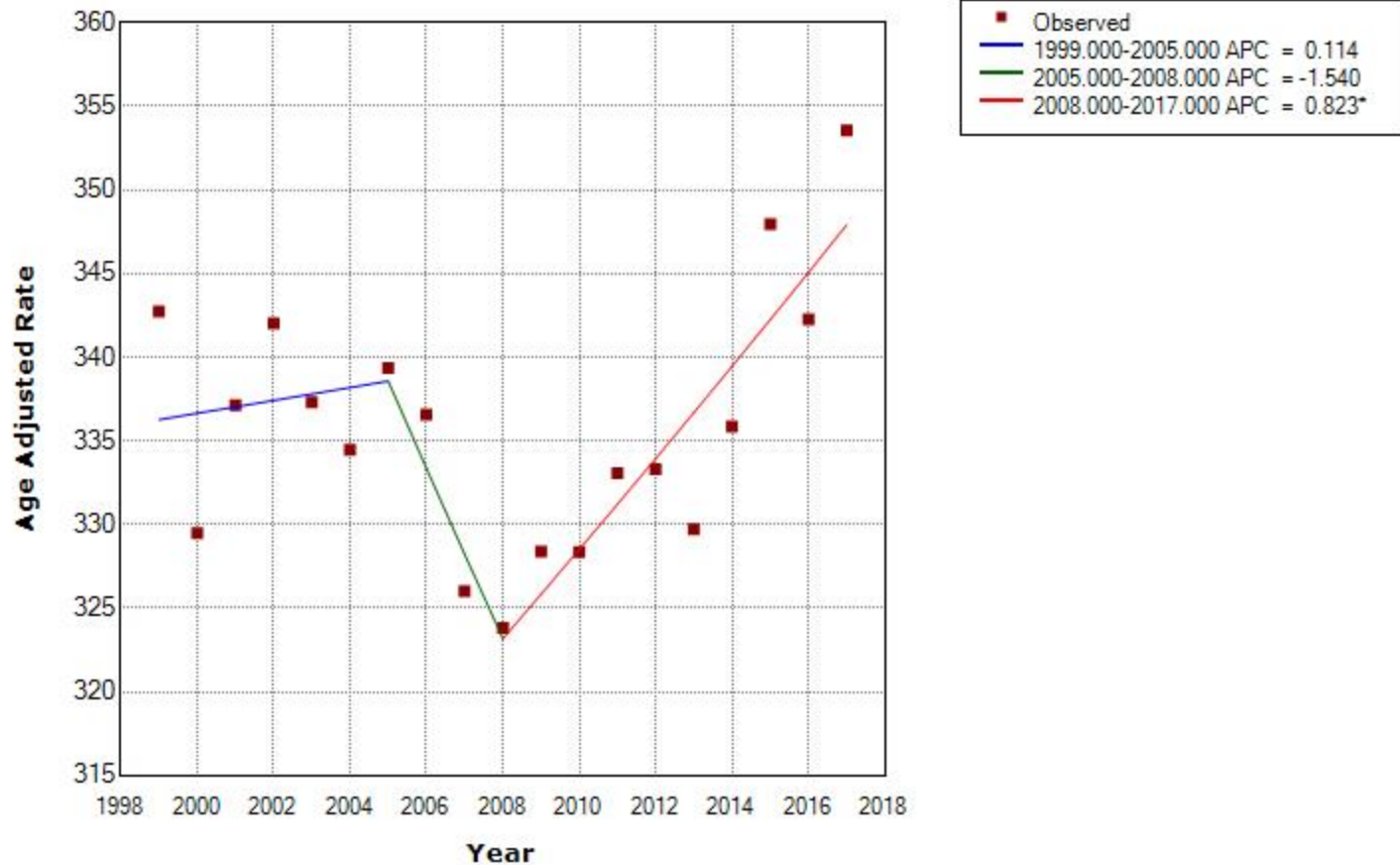
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Iowa: 1 Joinpoint



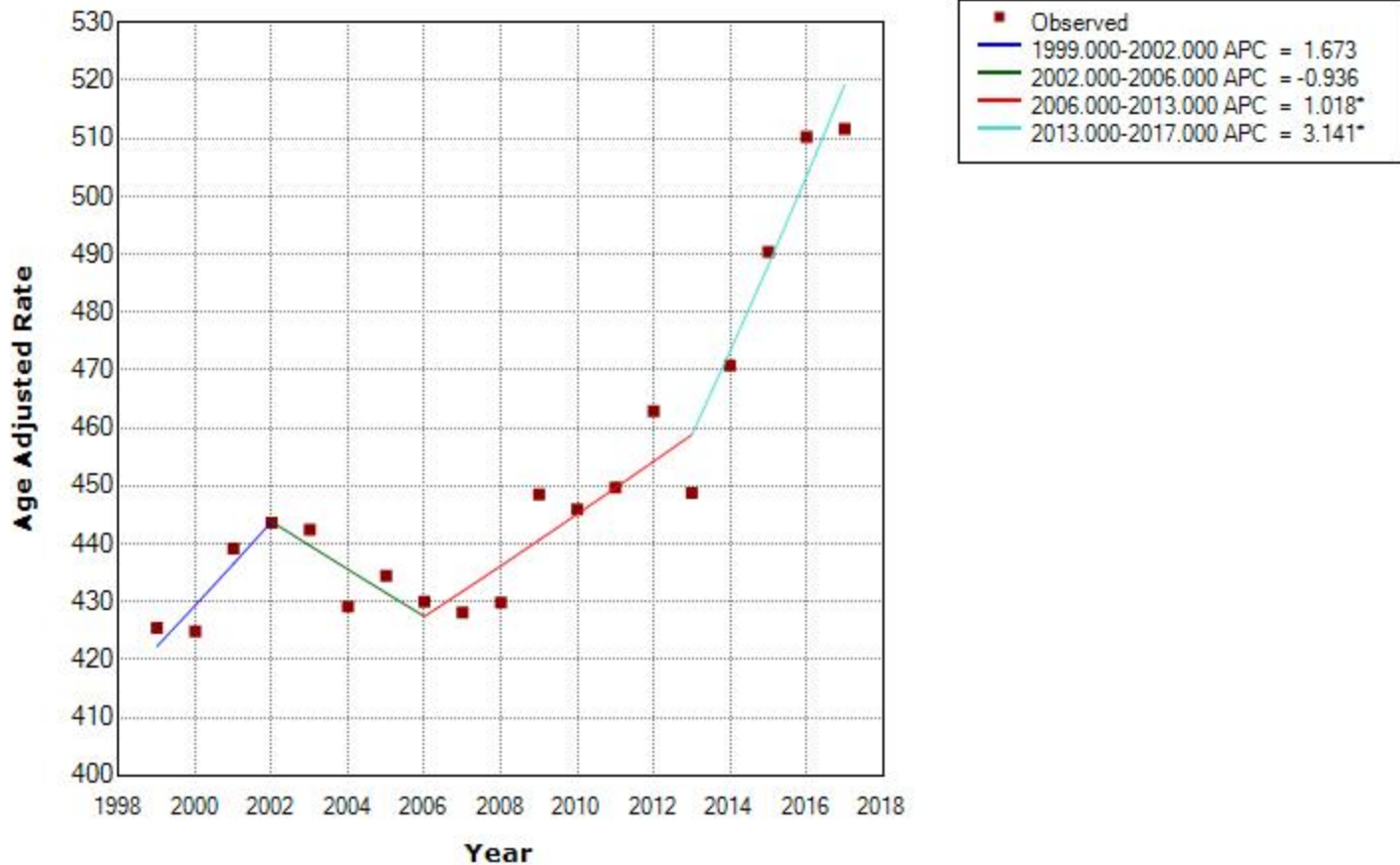
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Kansas: 2 Joinpoints



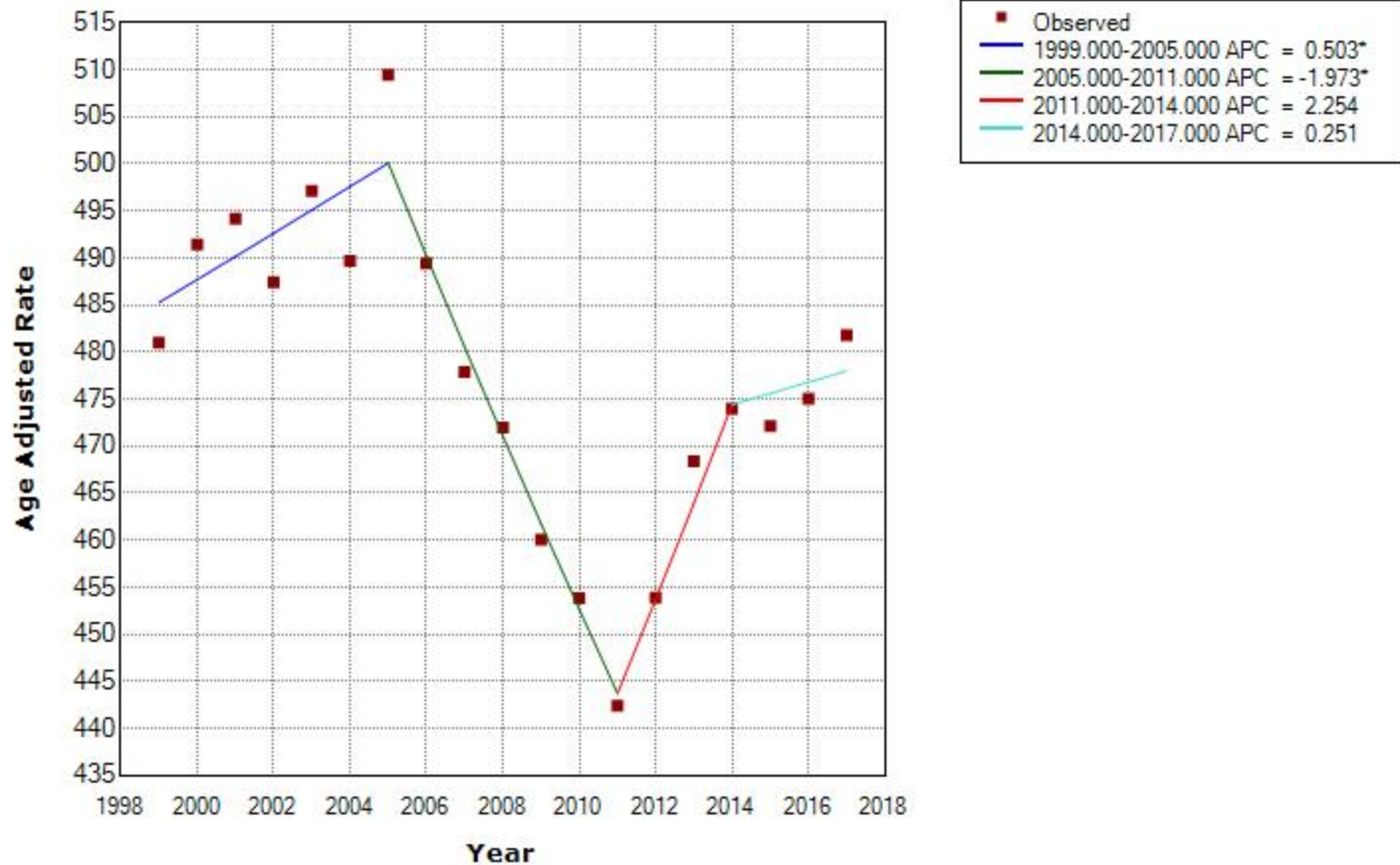
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Kentucky: 3 Joinpoints



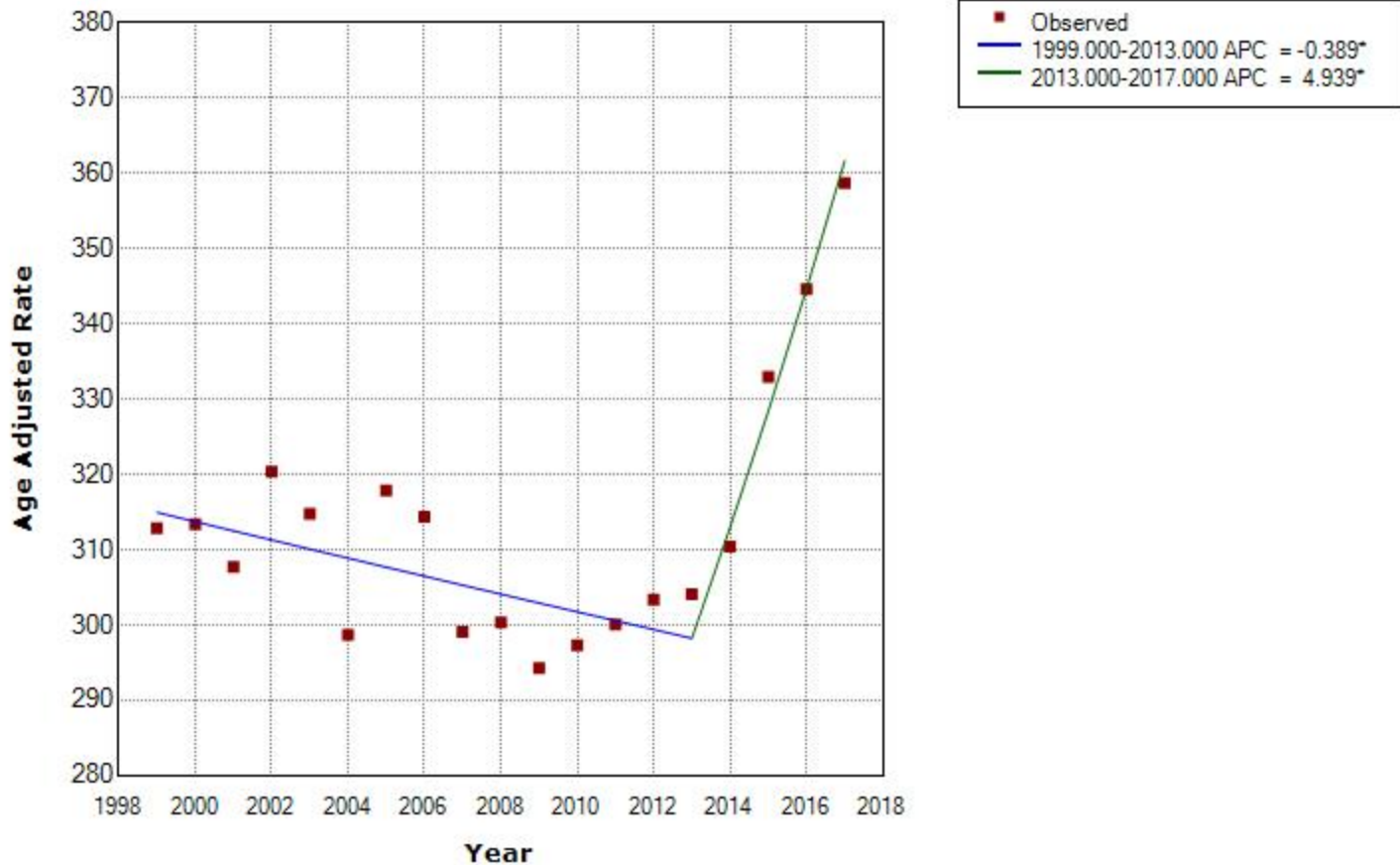
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Louisiana: 3 Joinpoints



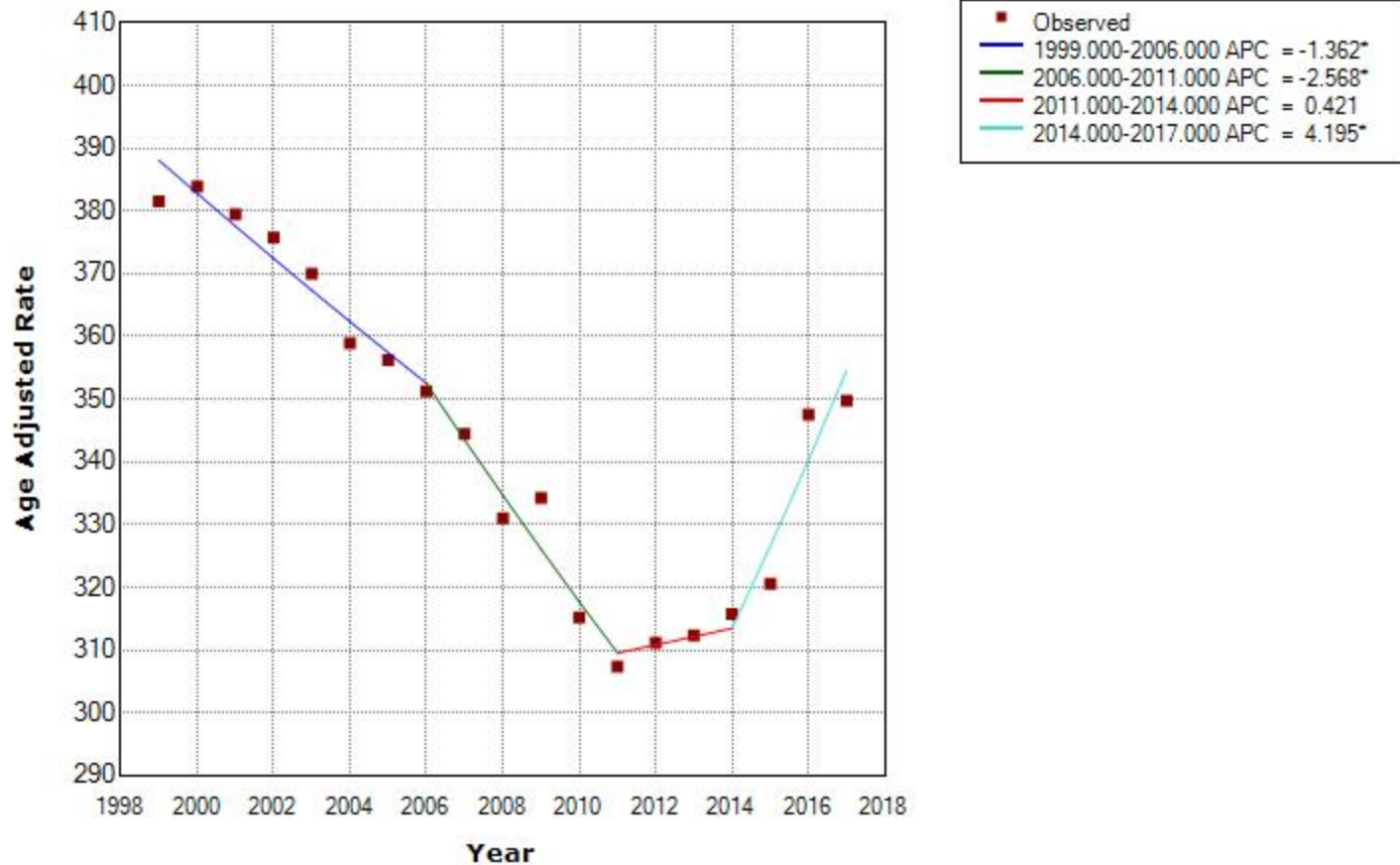
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Maine: 1 Joinpoint



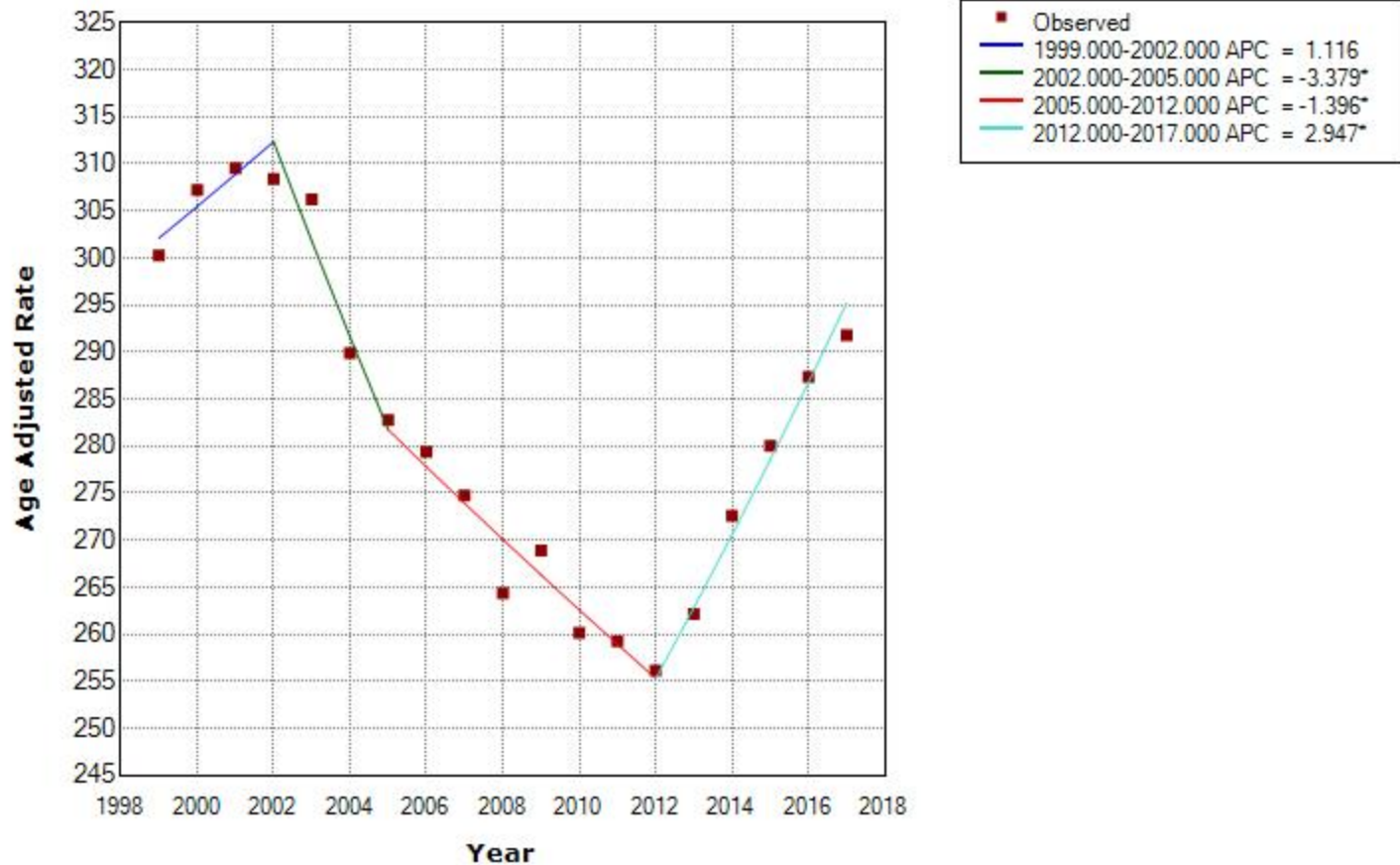
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Maryland: 3 Joinpoints



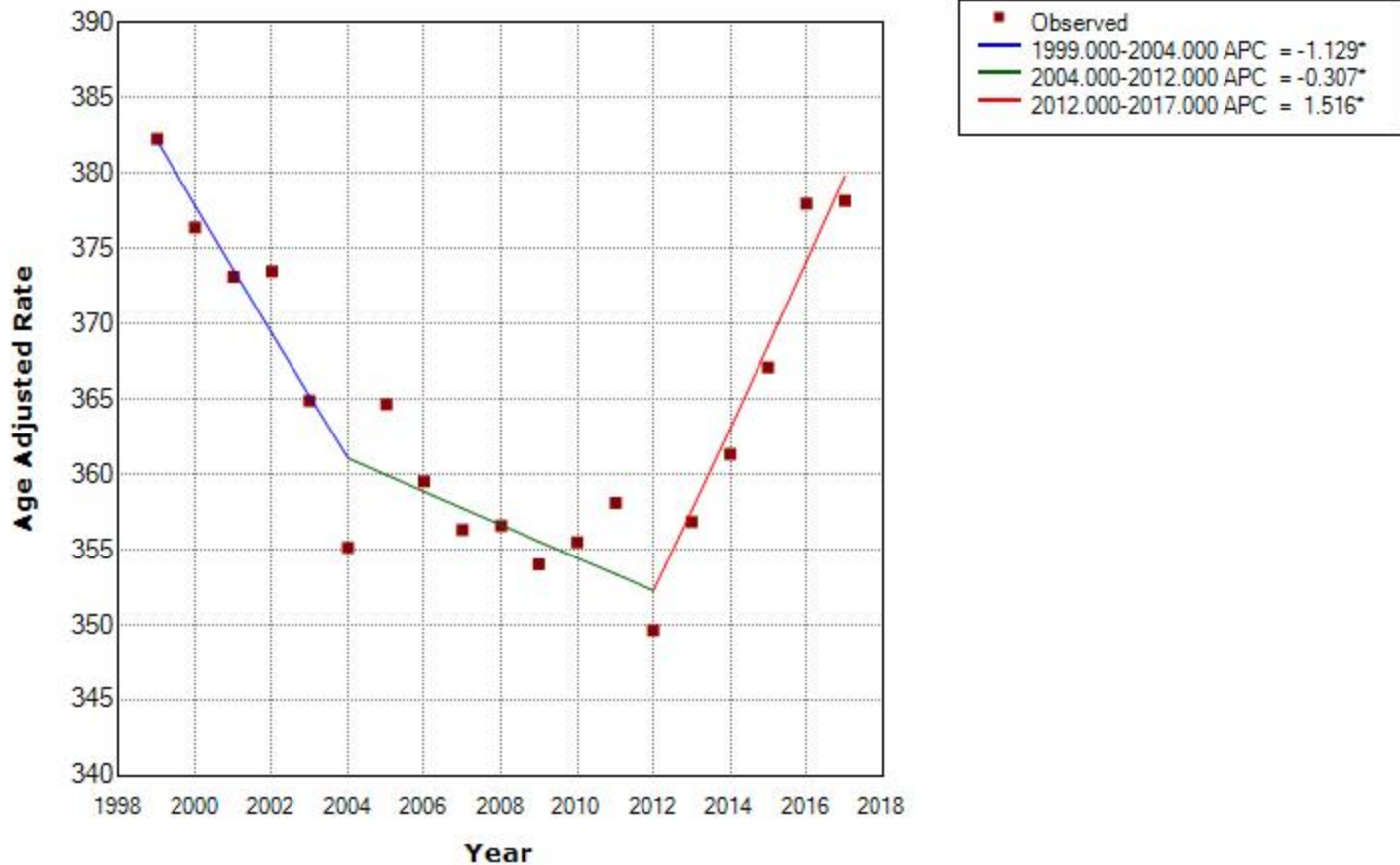
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Massachusetts: 3 Joinpoints



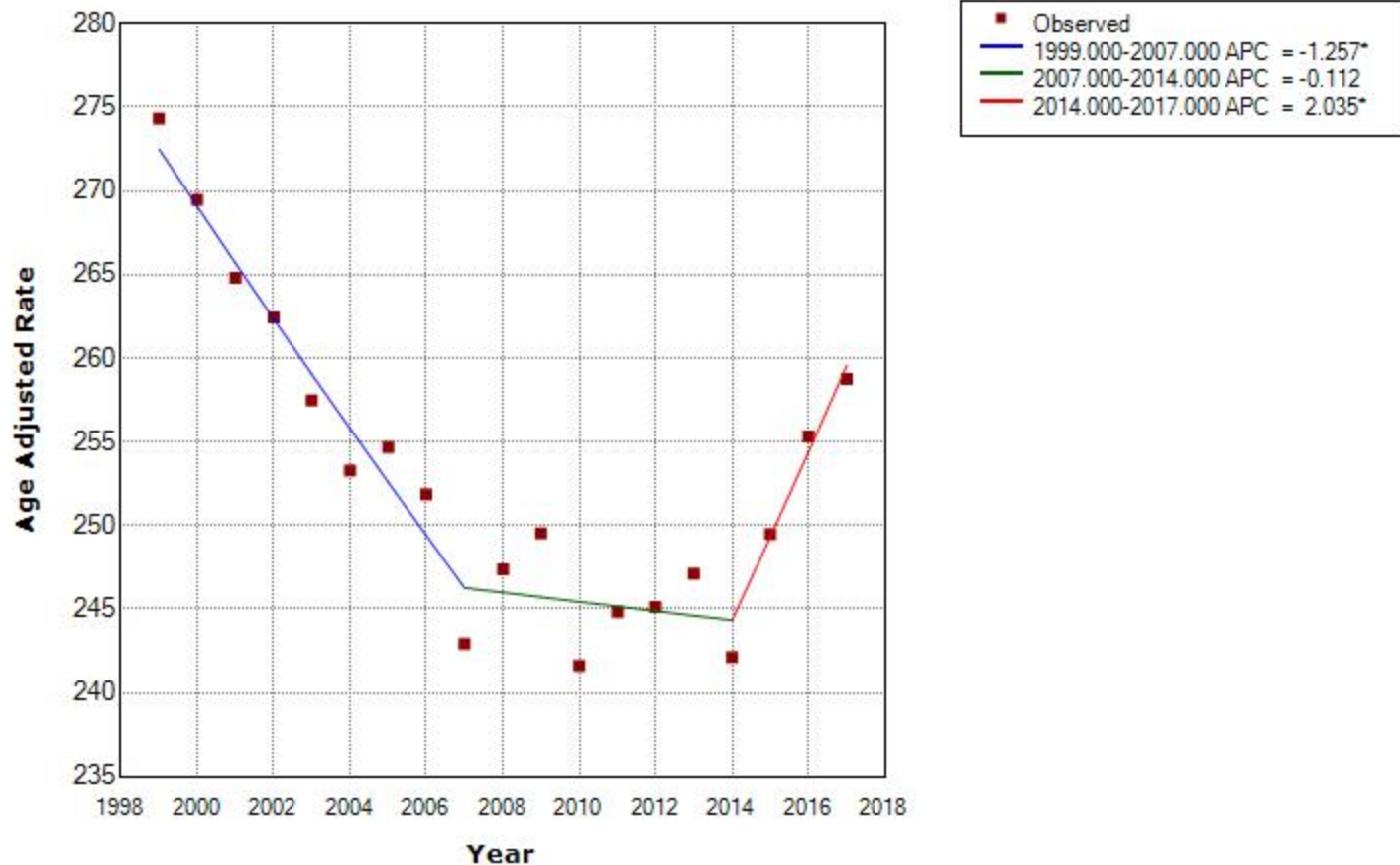
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Michigan: 2 Joinpoints



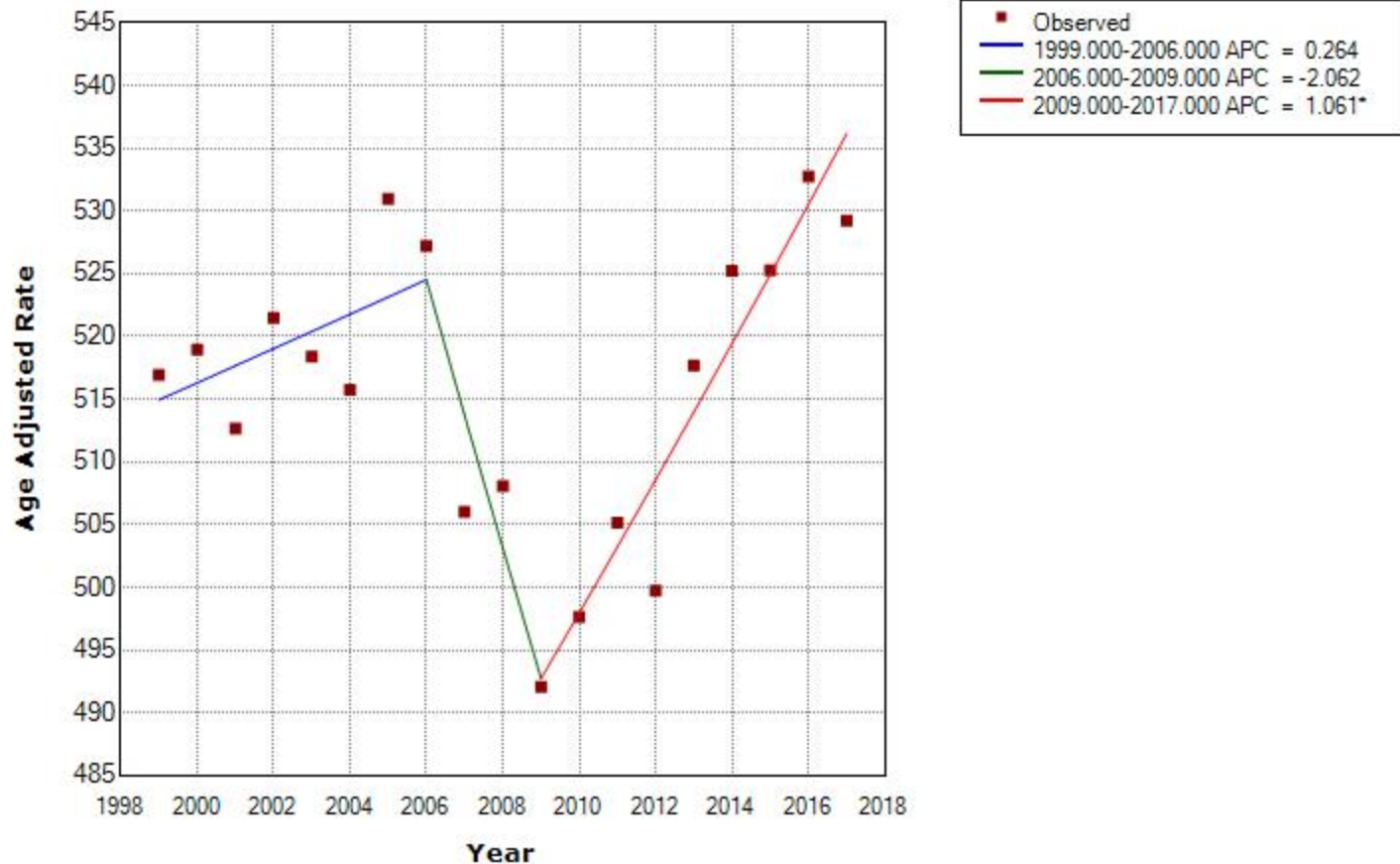
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Minnesota: 2 Joinpoints



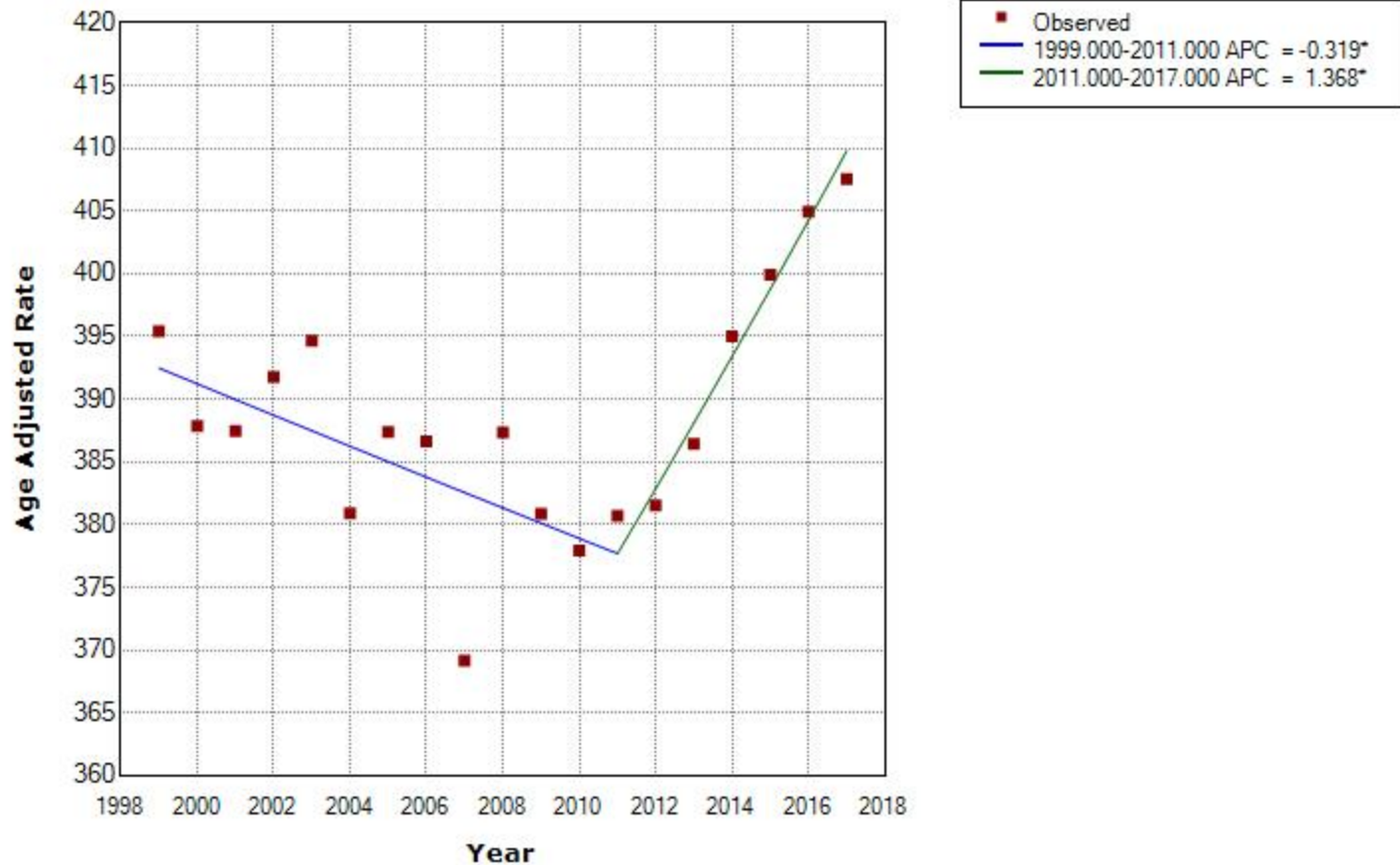
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Mississippi: 2 Joinpoints



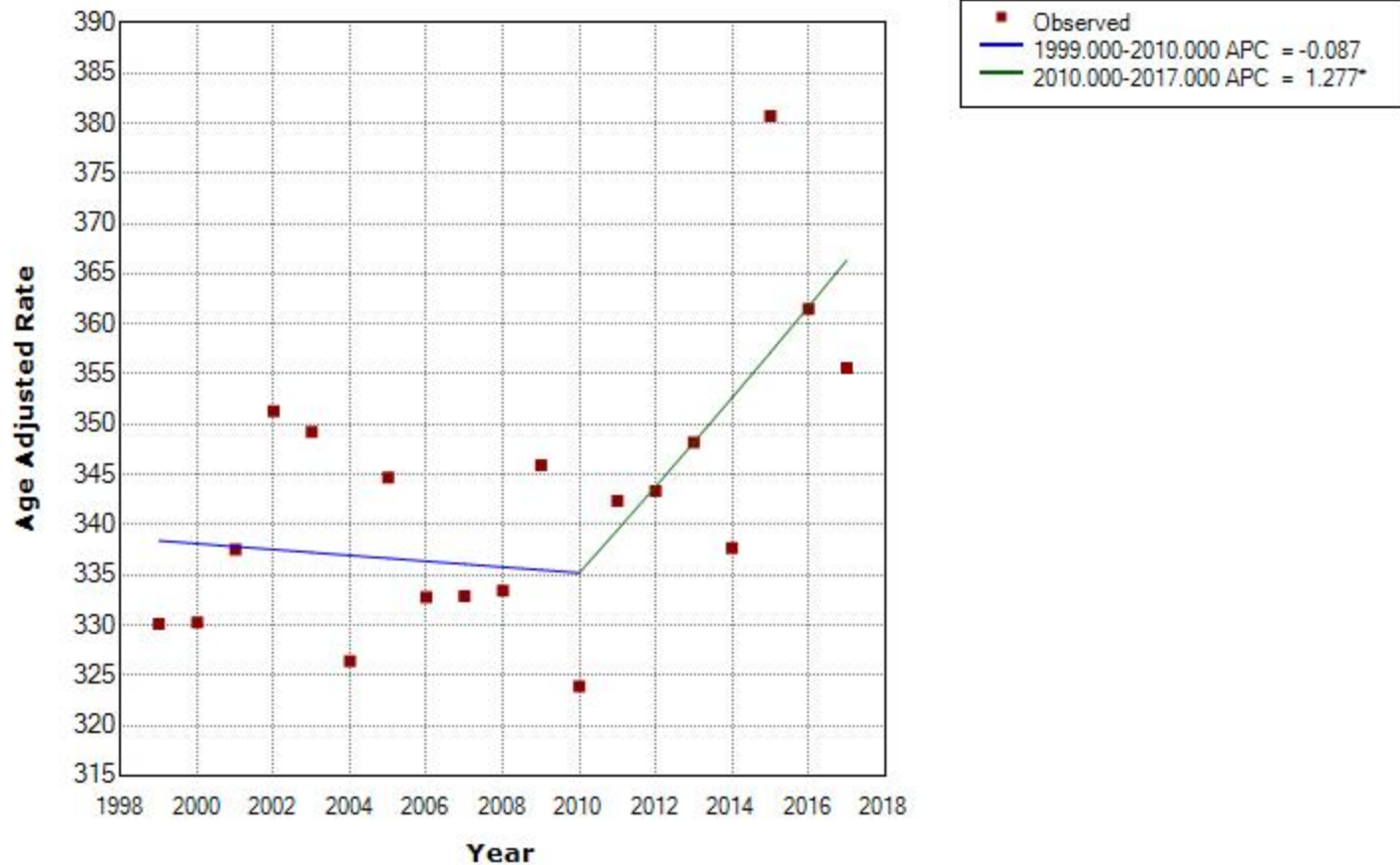
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Missouri: 1 Joinpoint



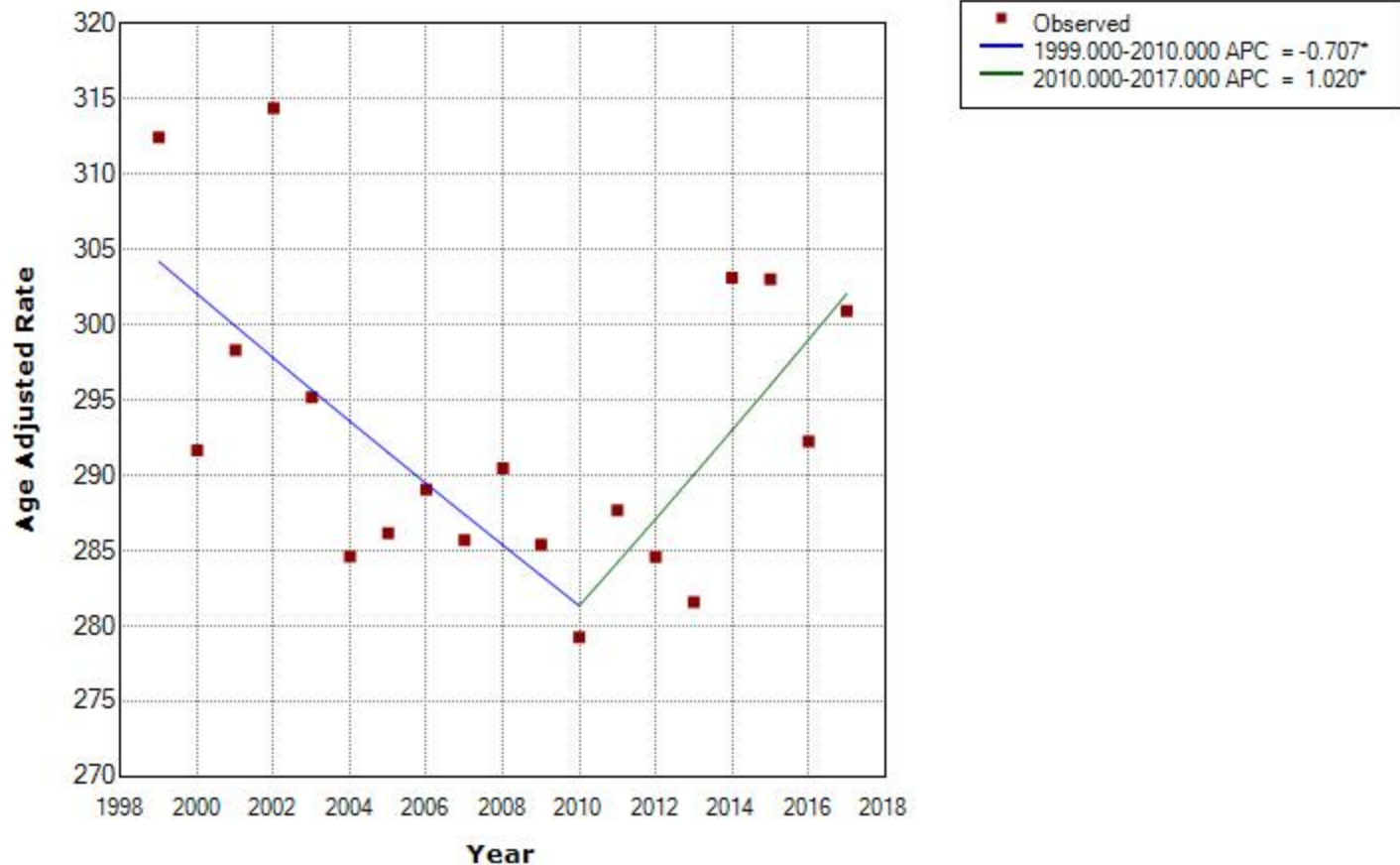
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Montana: 1 Joinpoint



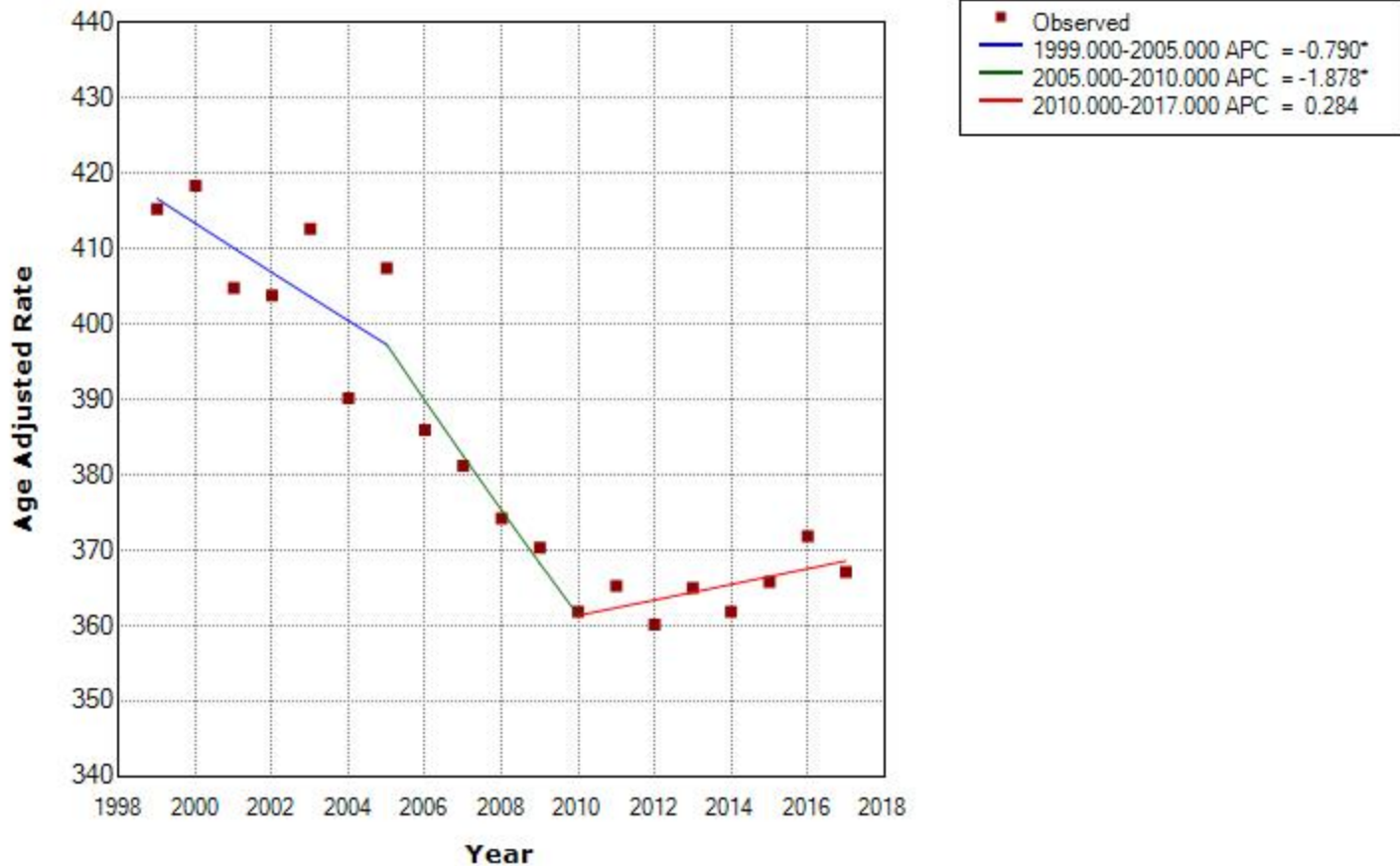
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Nebraska: 1 Joinpoint



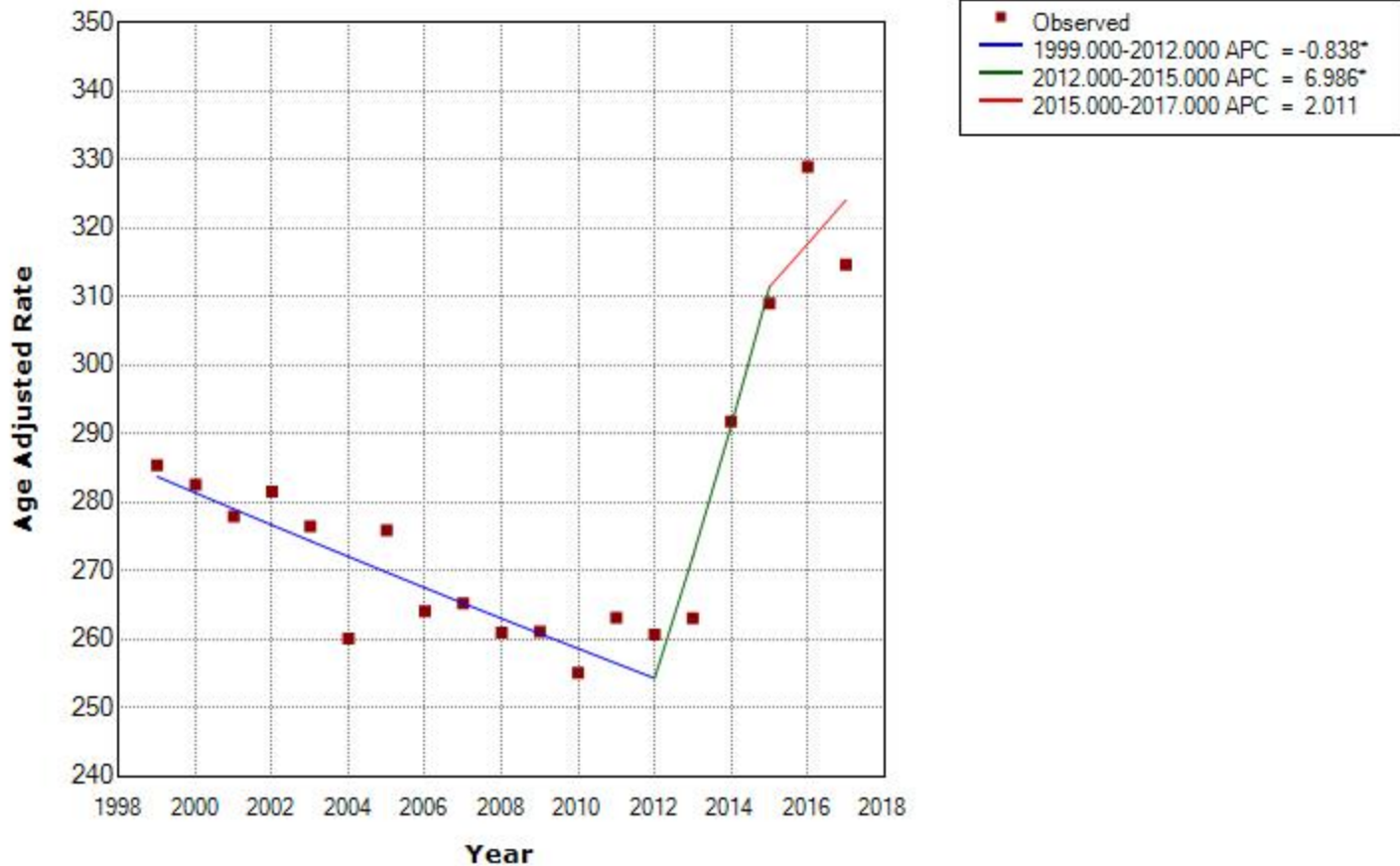
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Nevada: 2 Joinpoints



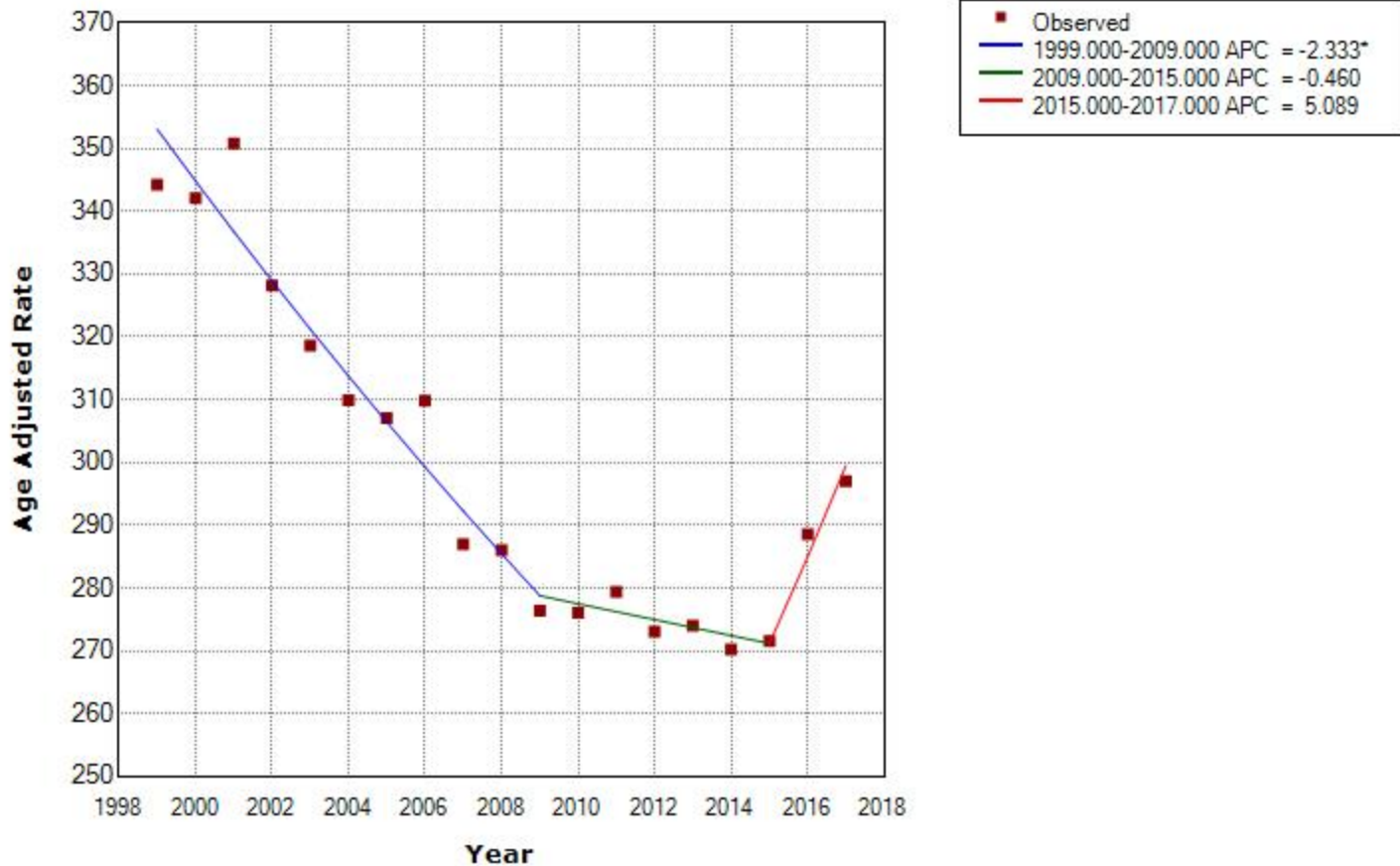
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

New Hampshire: 2 Joinpoints



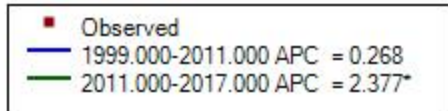
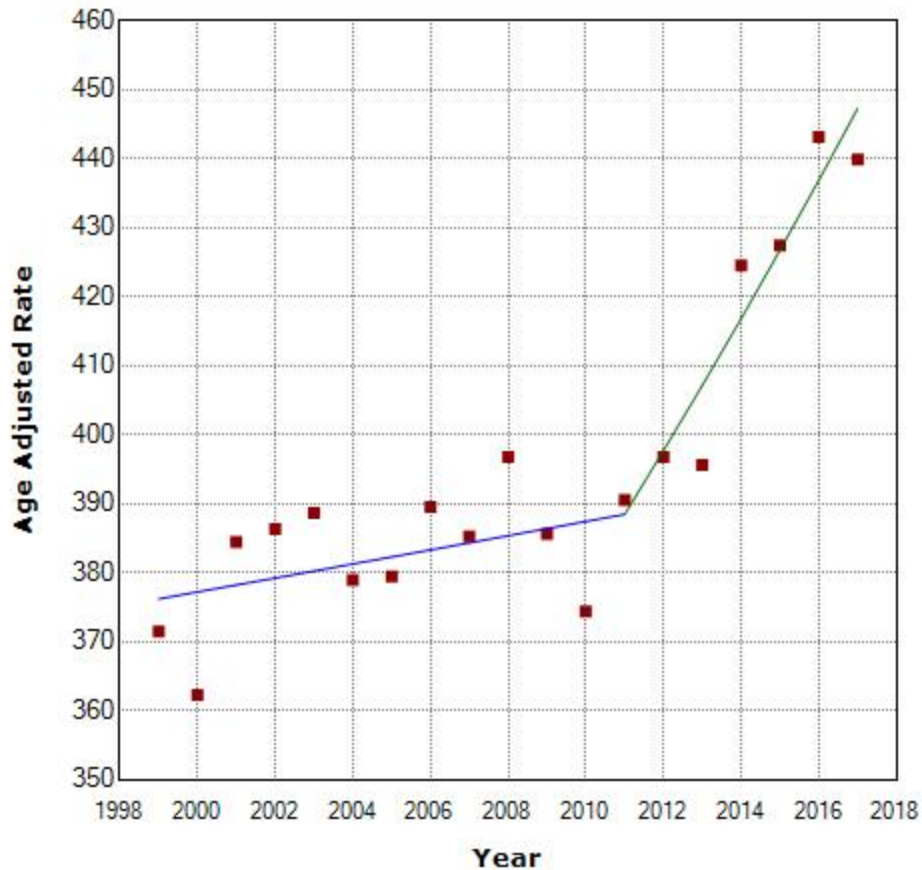
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

New Jersey: 2 Joinpoints



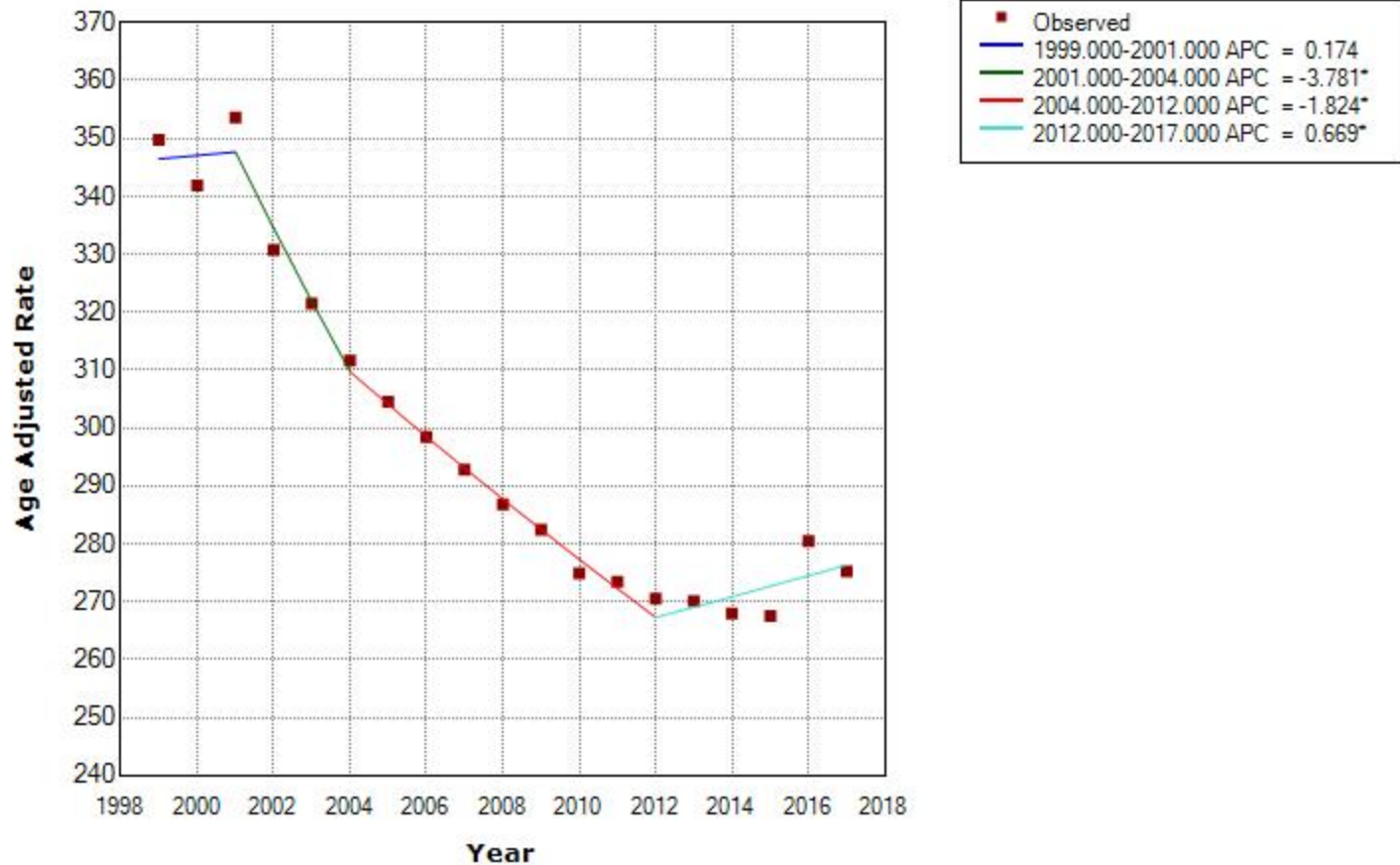
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

New Mexico: 1 Joinpoint



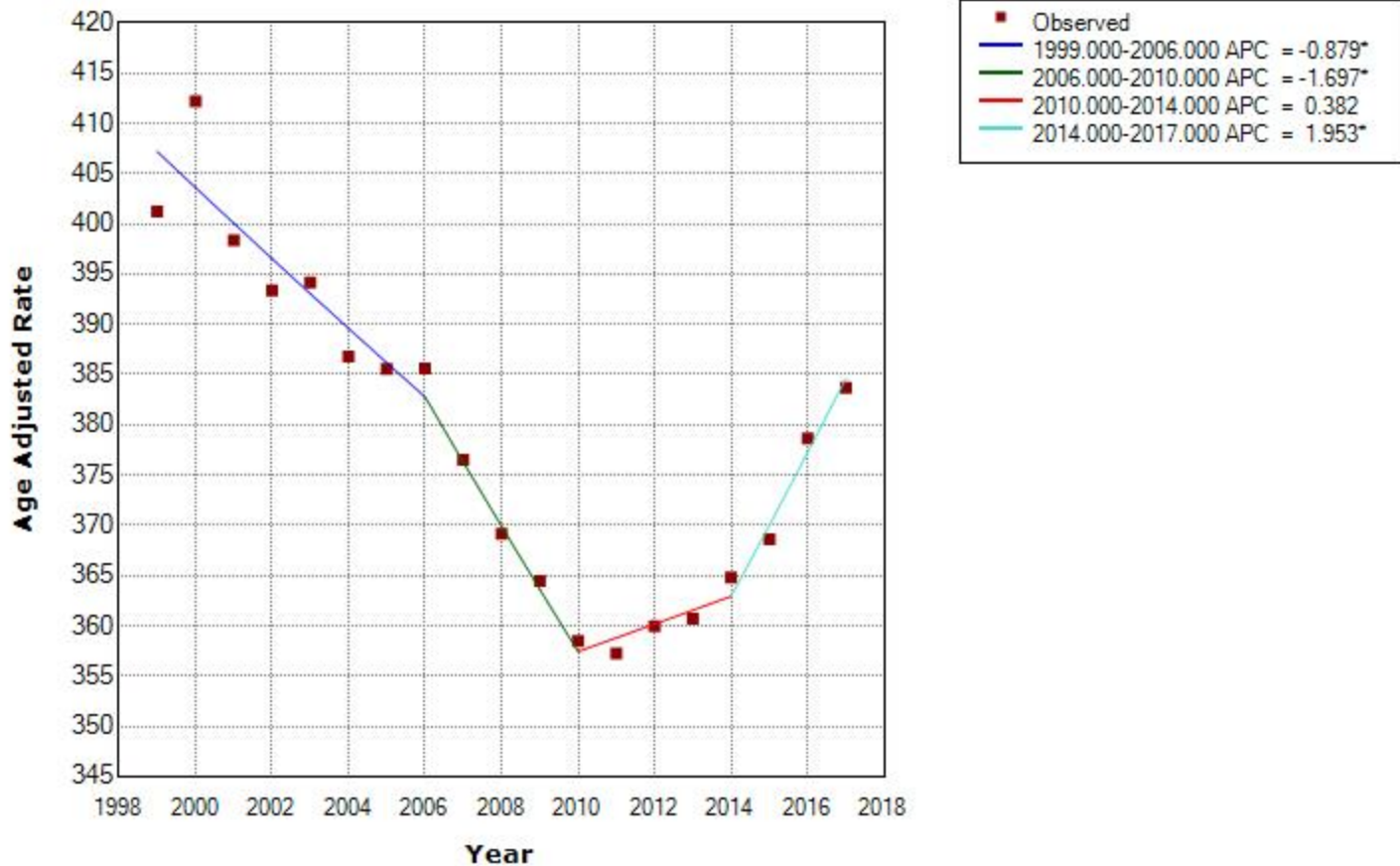
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

New York: 3 Joinpoints



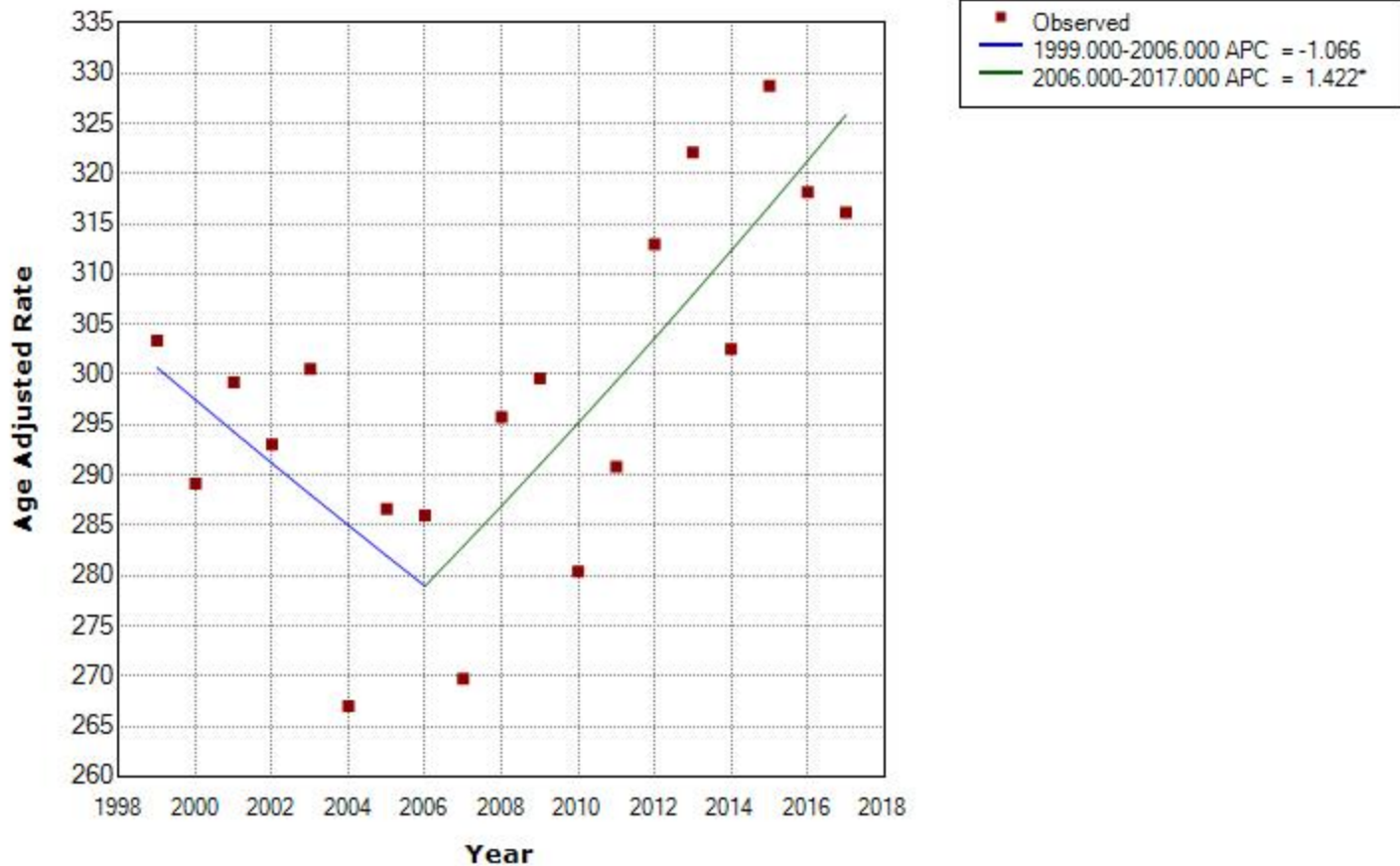
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

North Carolina: 3 Joinpoints



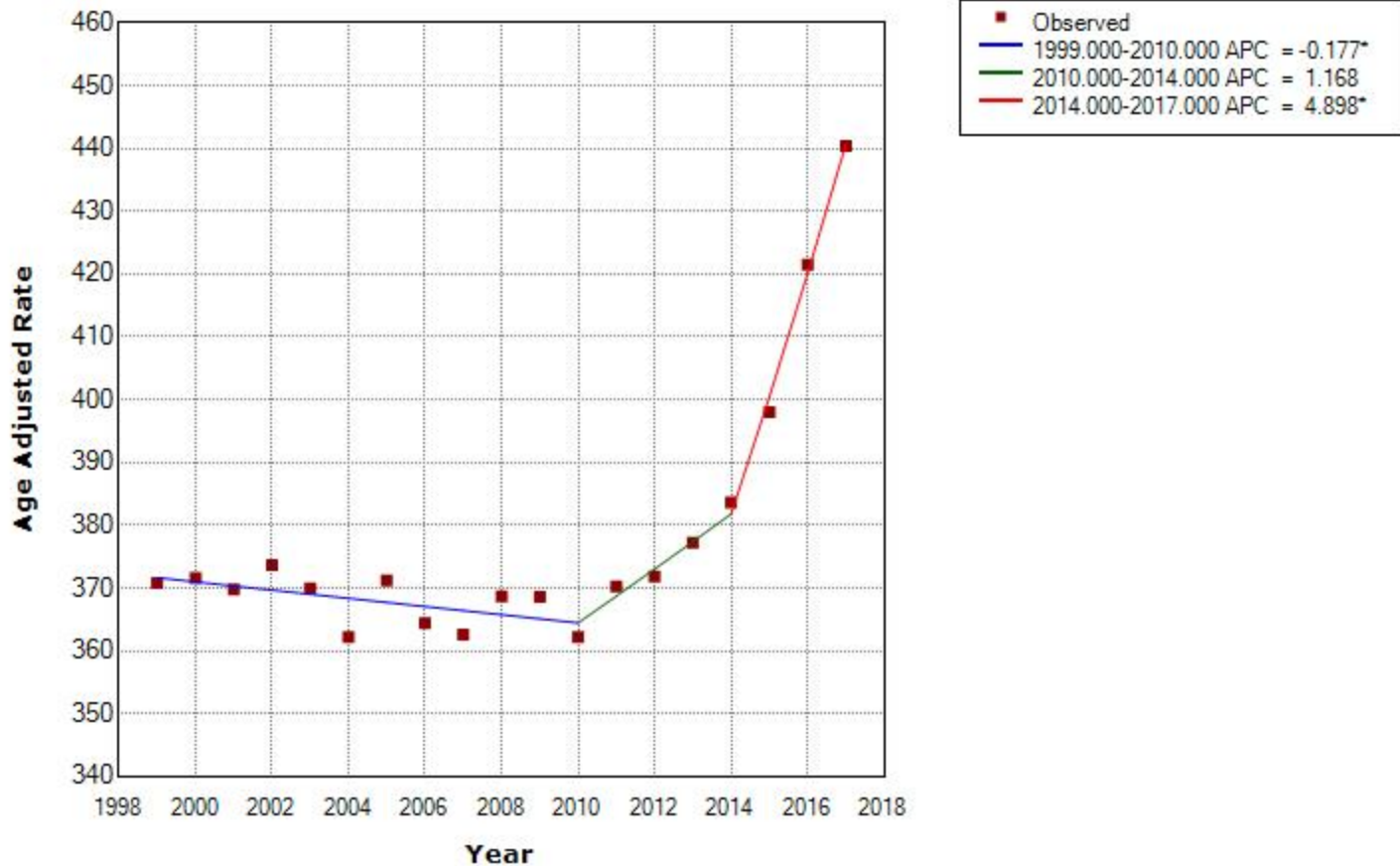
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

North Dakota: 1 Joinpoint



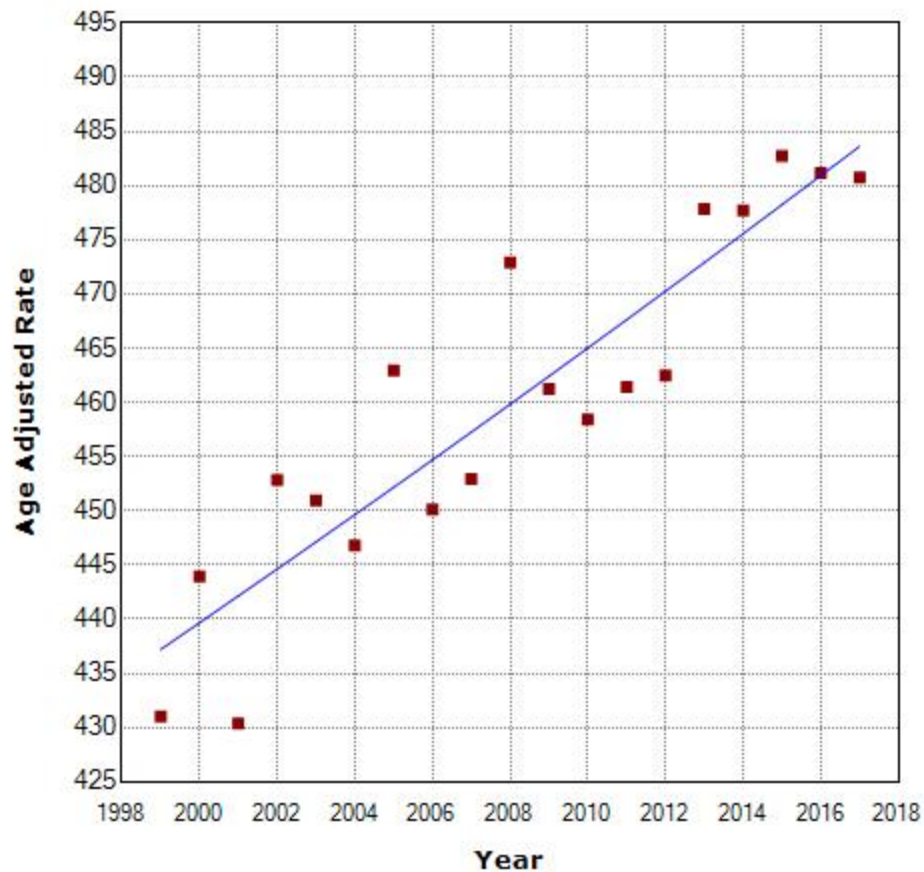
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Ohio: 2 Joinpoints



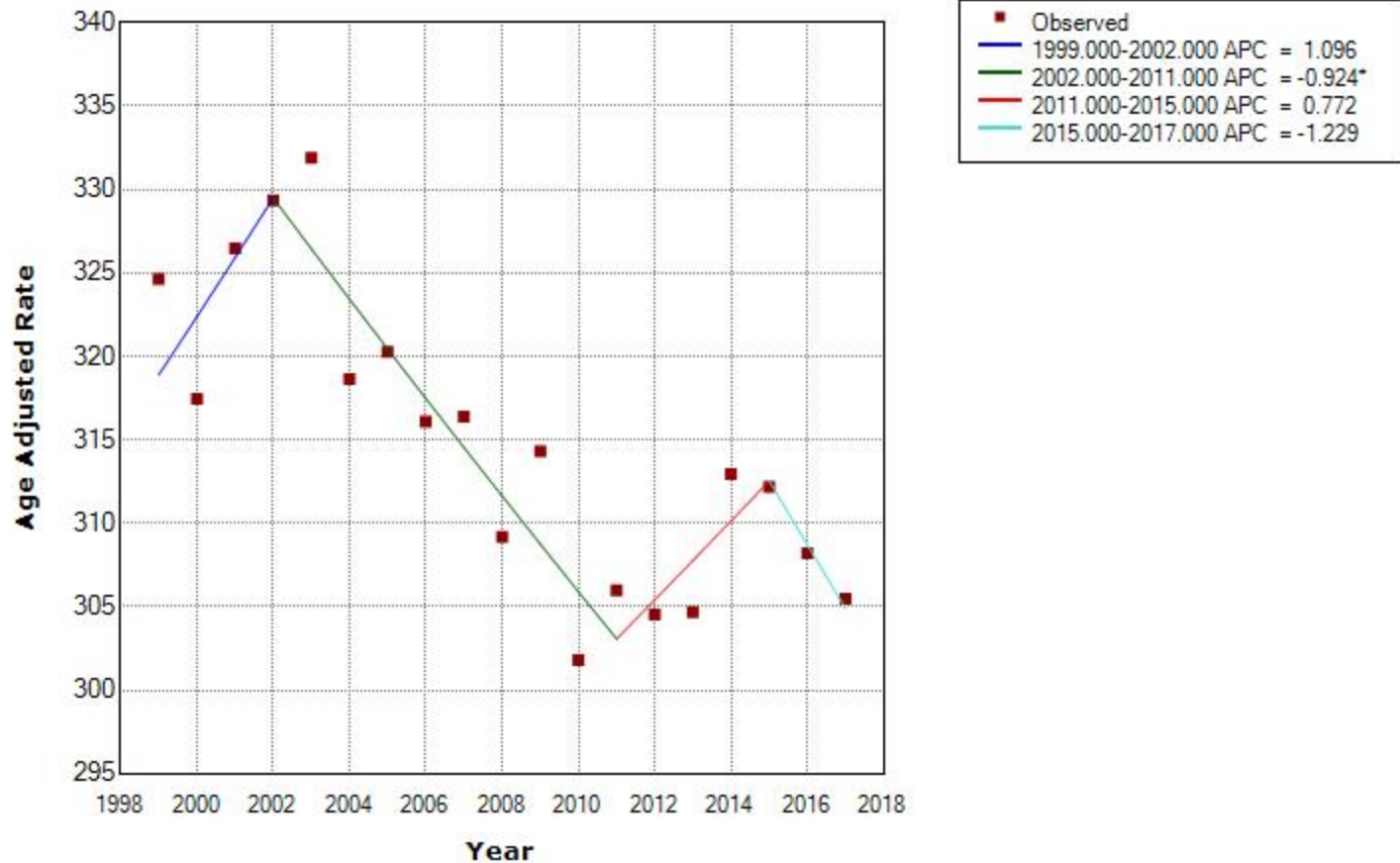
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Oklahoma: 0 Joinpoints



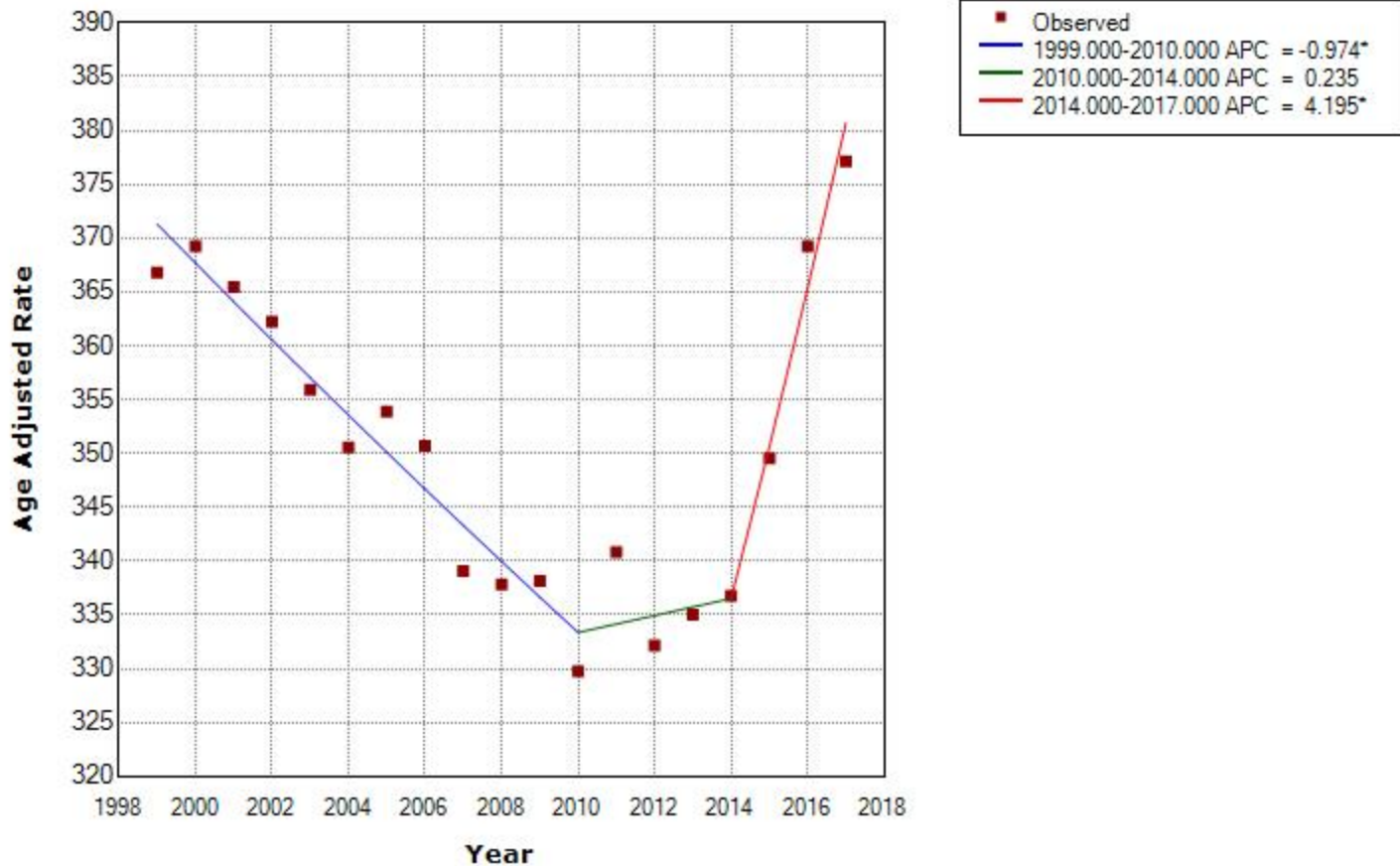
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 0 Joinpoints.

Oregon: 3 Joinpoints



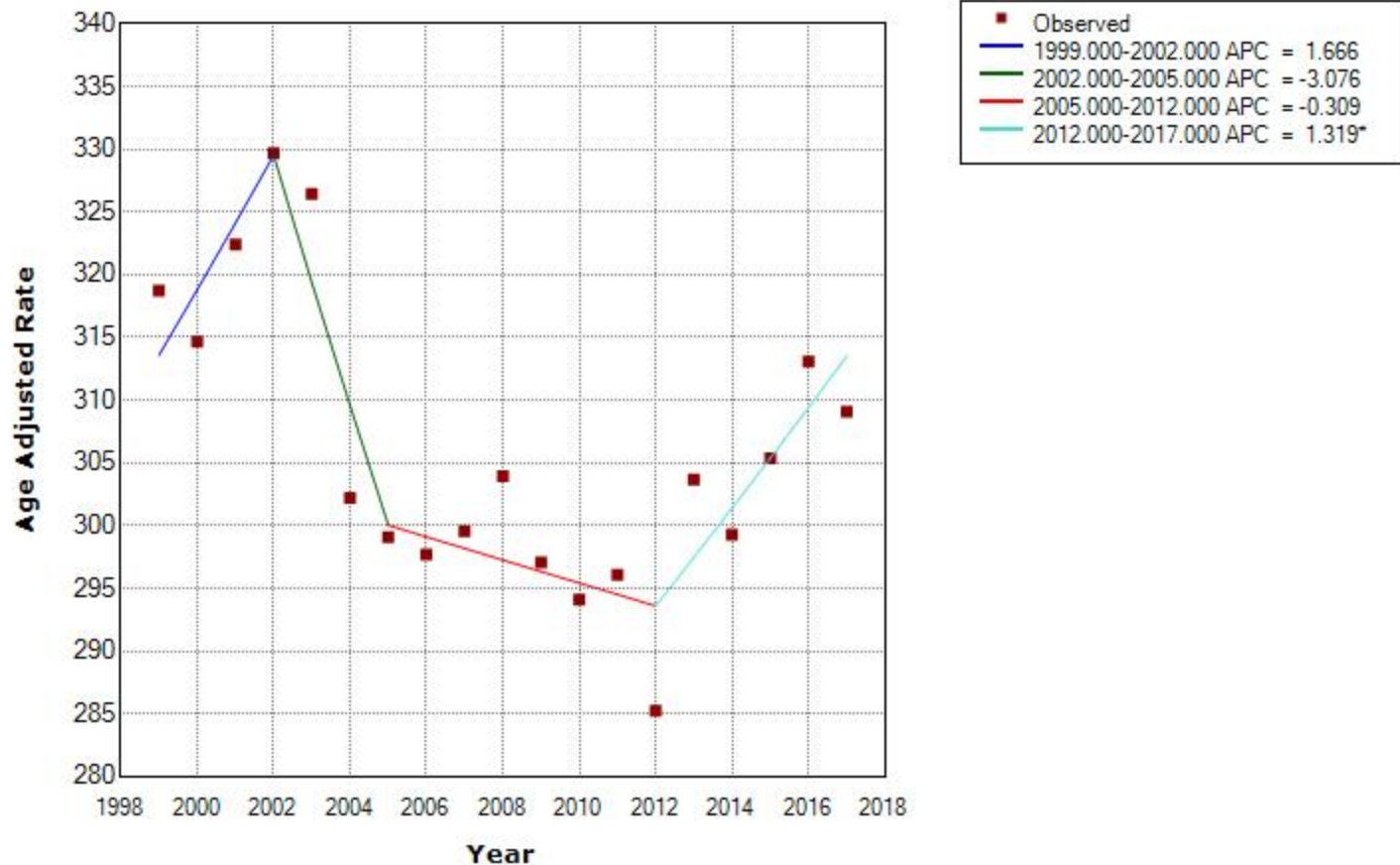
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

Pennsylvania: 2 Joinpoints



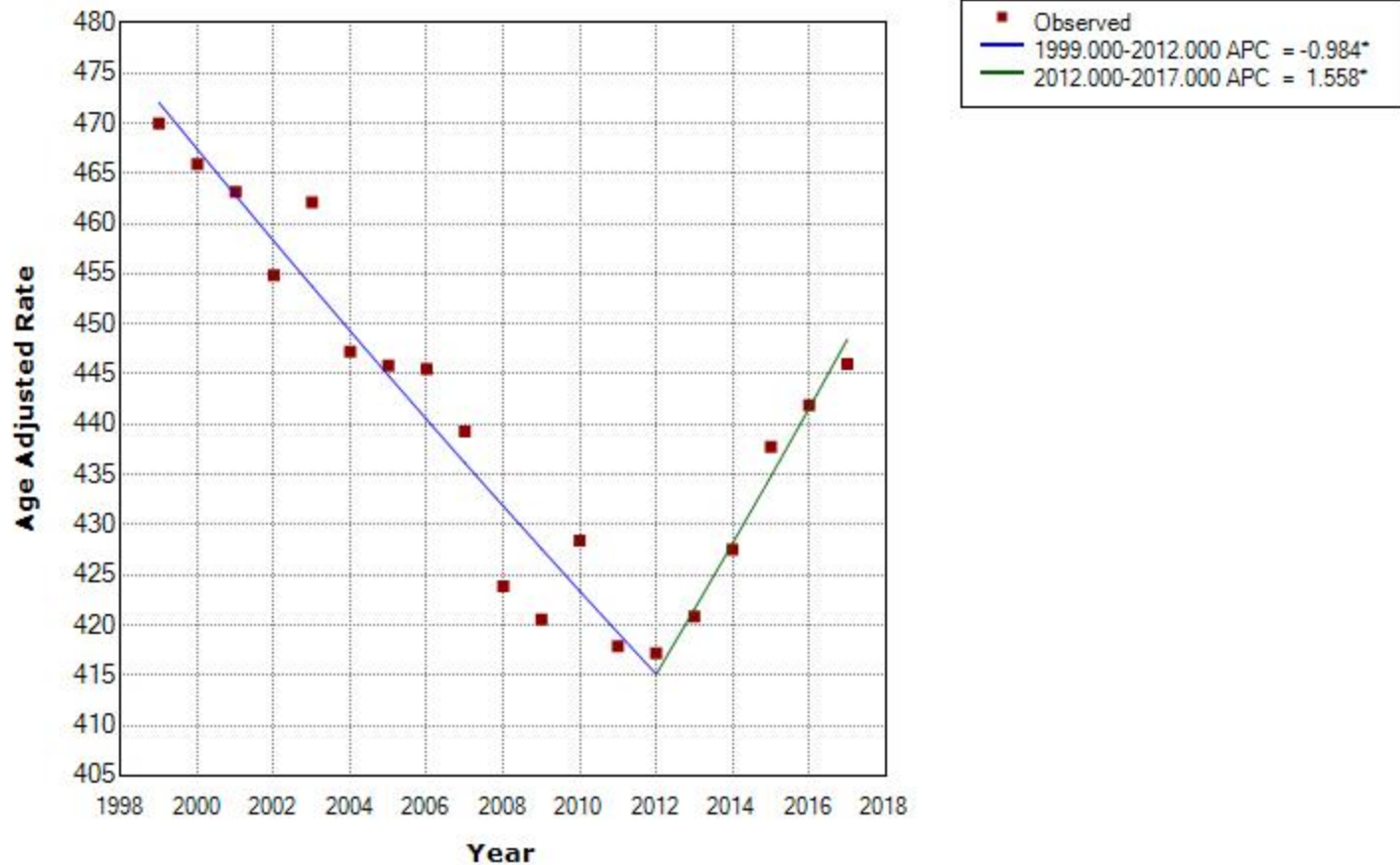
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Rhode Island: 3 Joinpoints



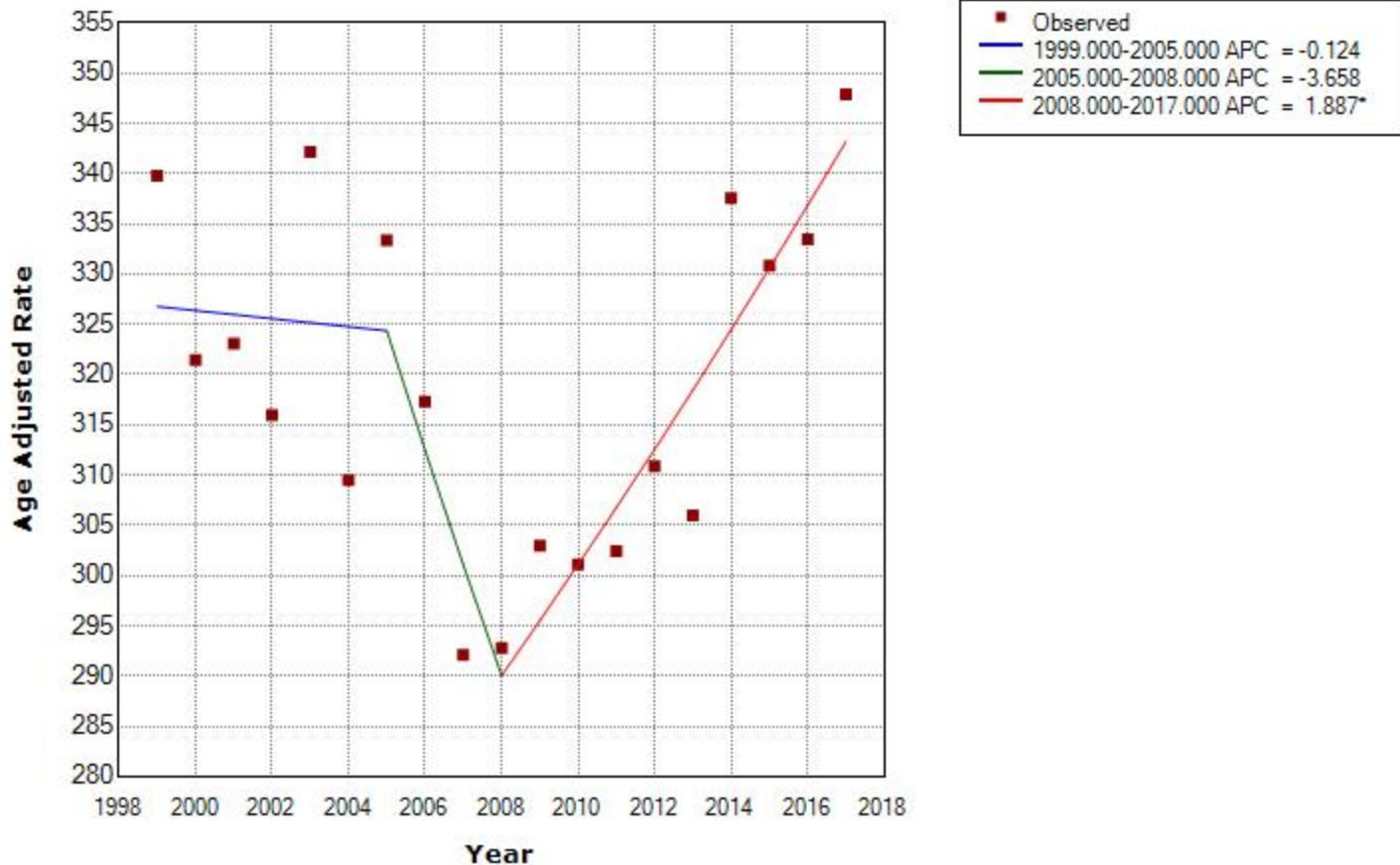
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 3 Joinpoints.

South Carolina: 1 Joinpoint



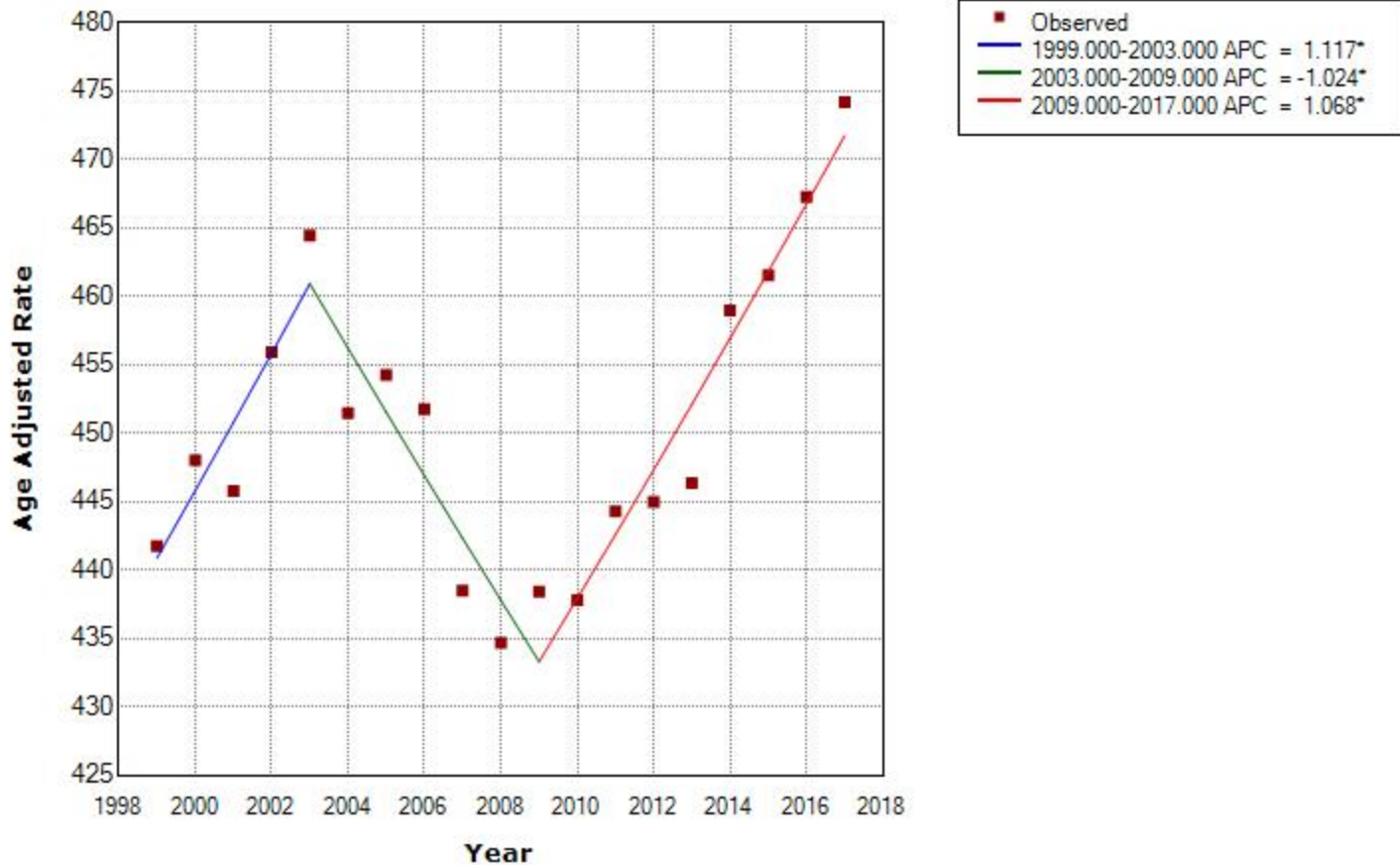
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

South Dakota: 2 Joinpoints



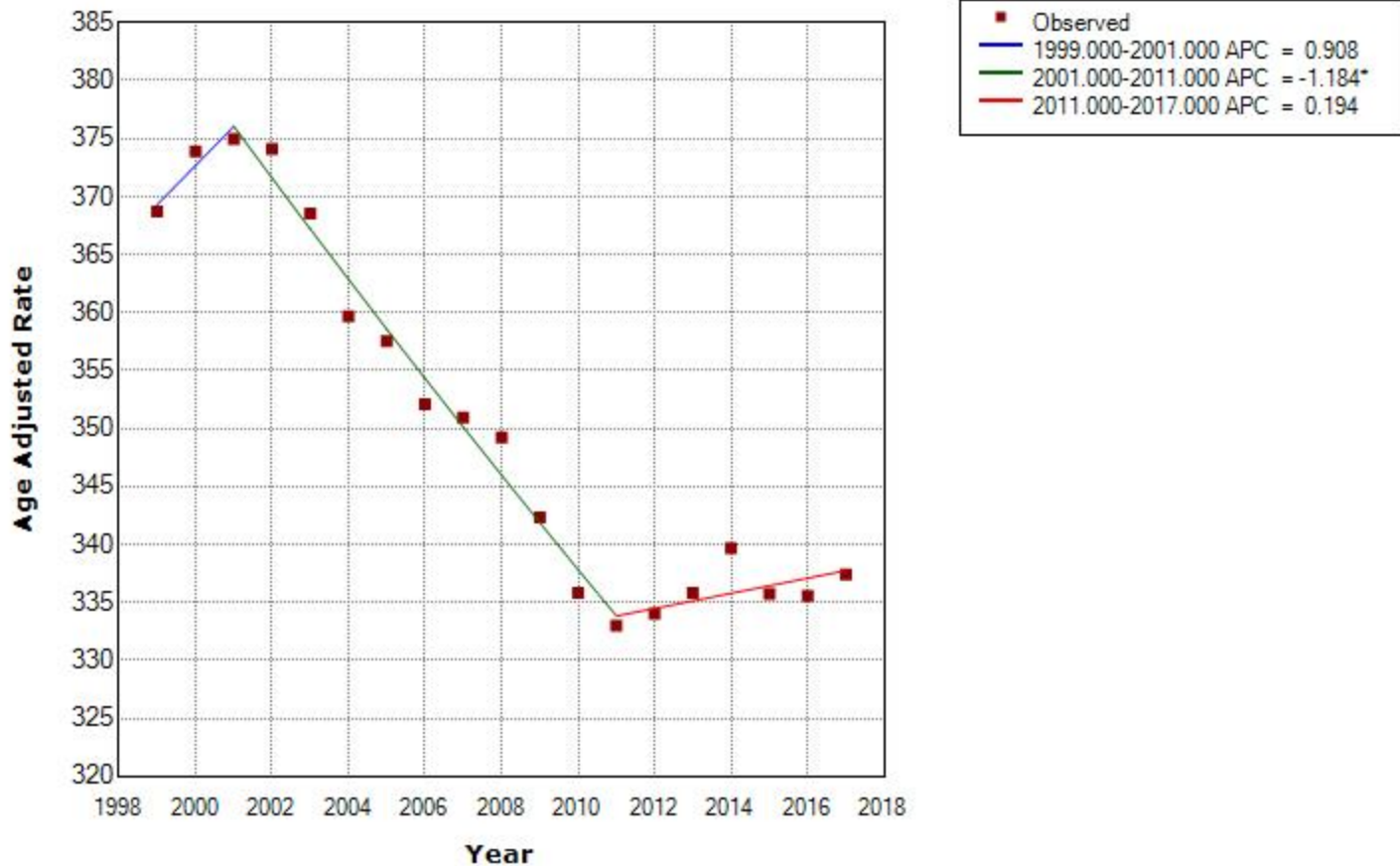
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Tennessee: 2 Joinpoints



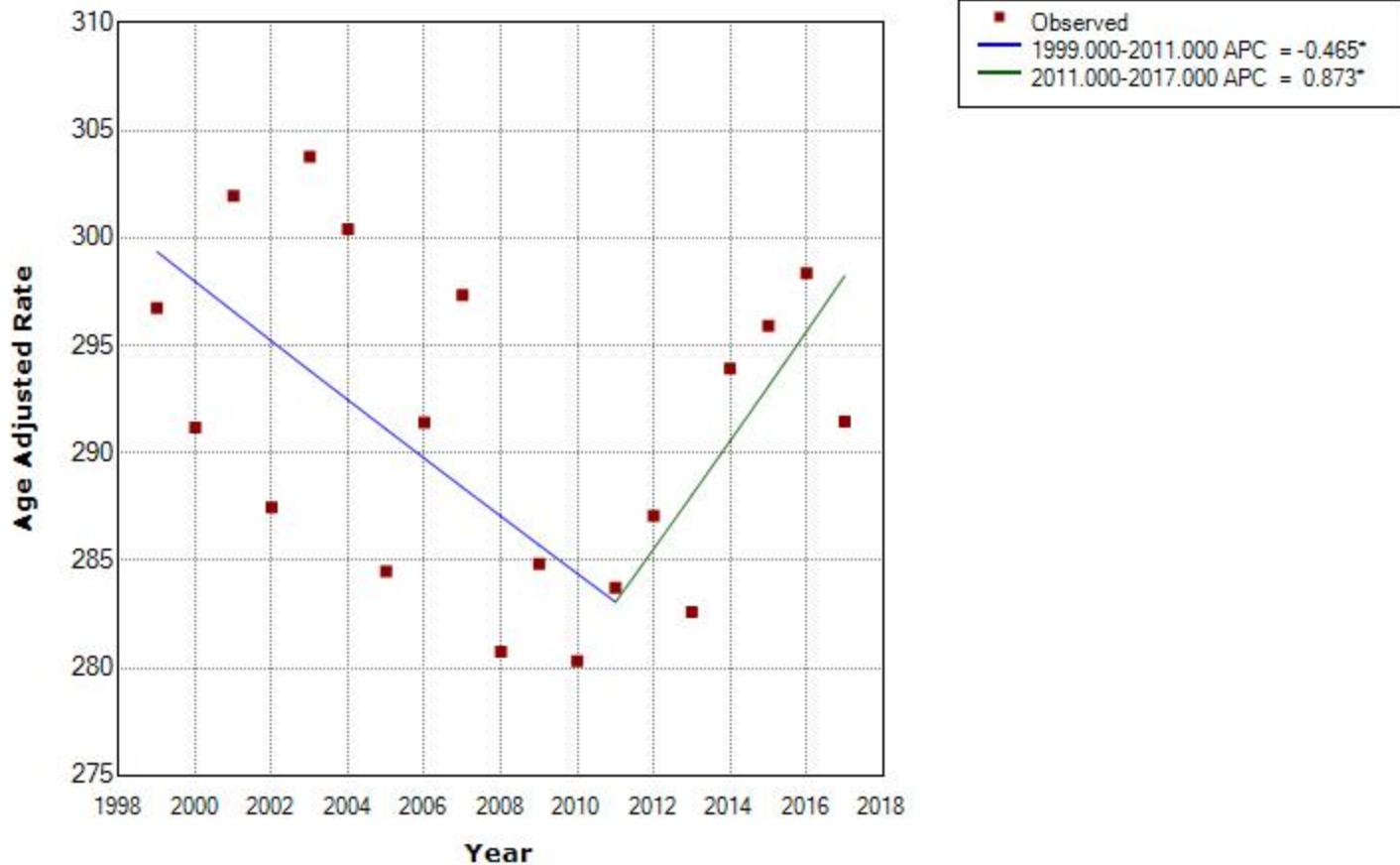
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Texas: 2 Joinpoints



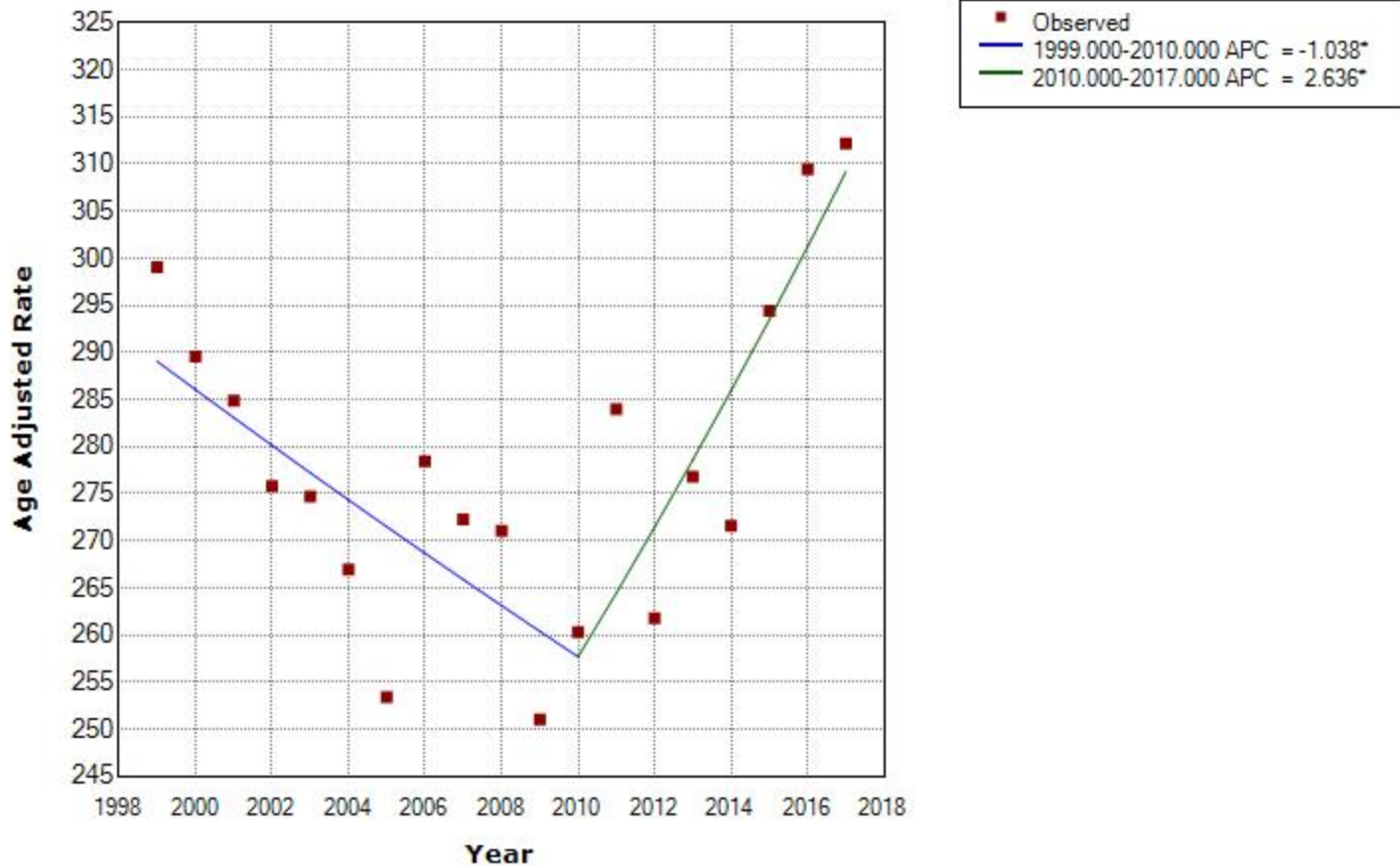
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 2 Joinpoints.

Utah: 1 Joinpoint



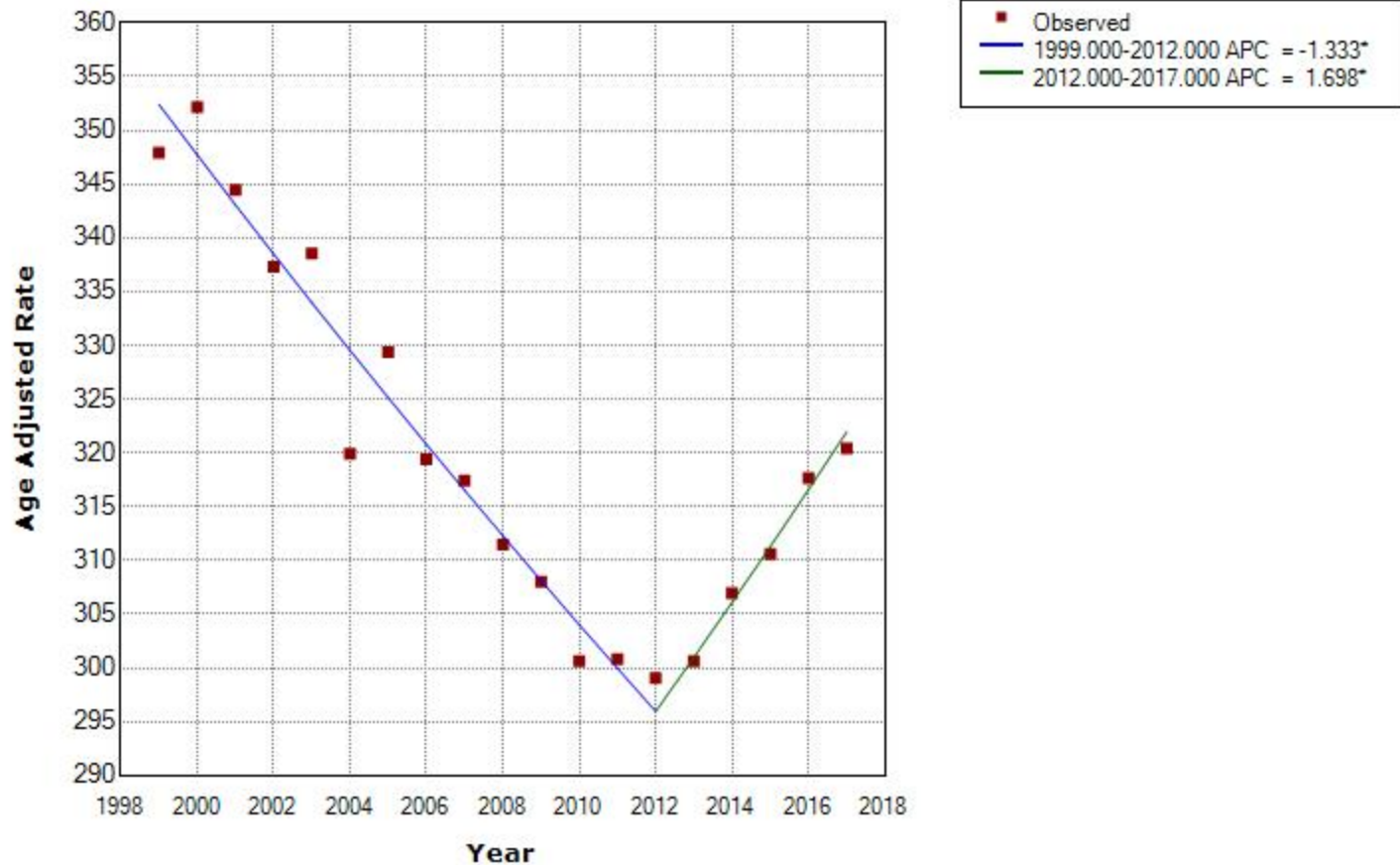
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Vermont: 1 Joinpoint



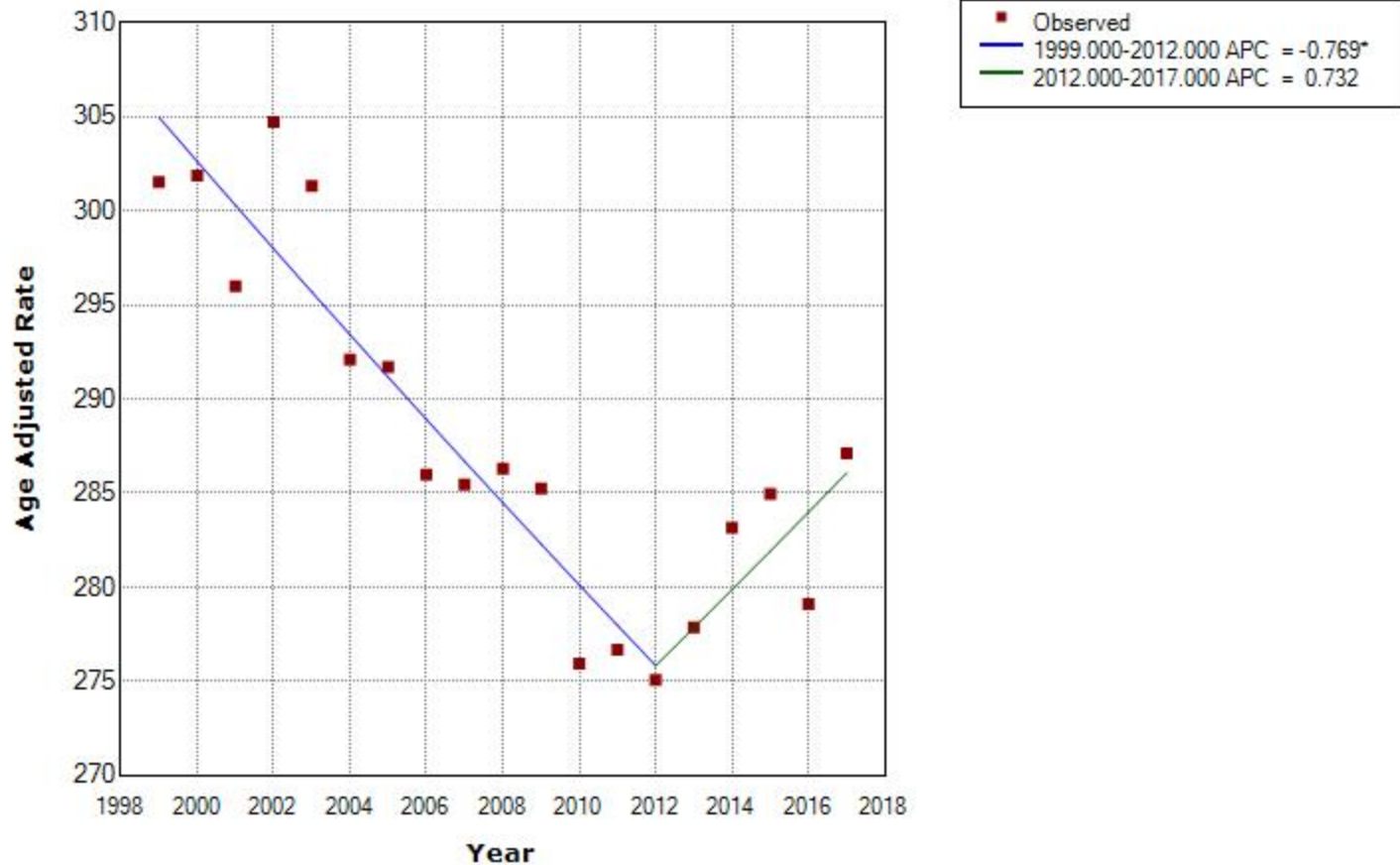
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Virginia: 1 Joinpoint



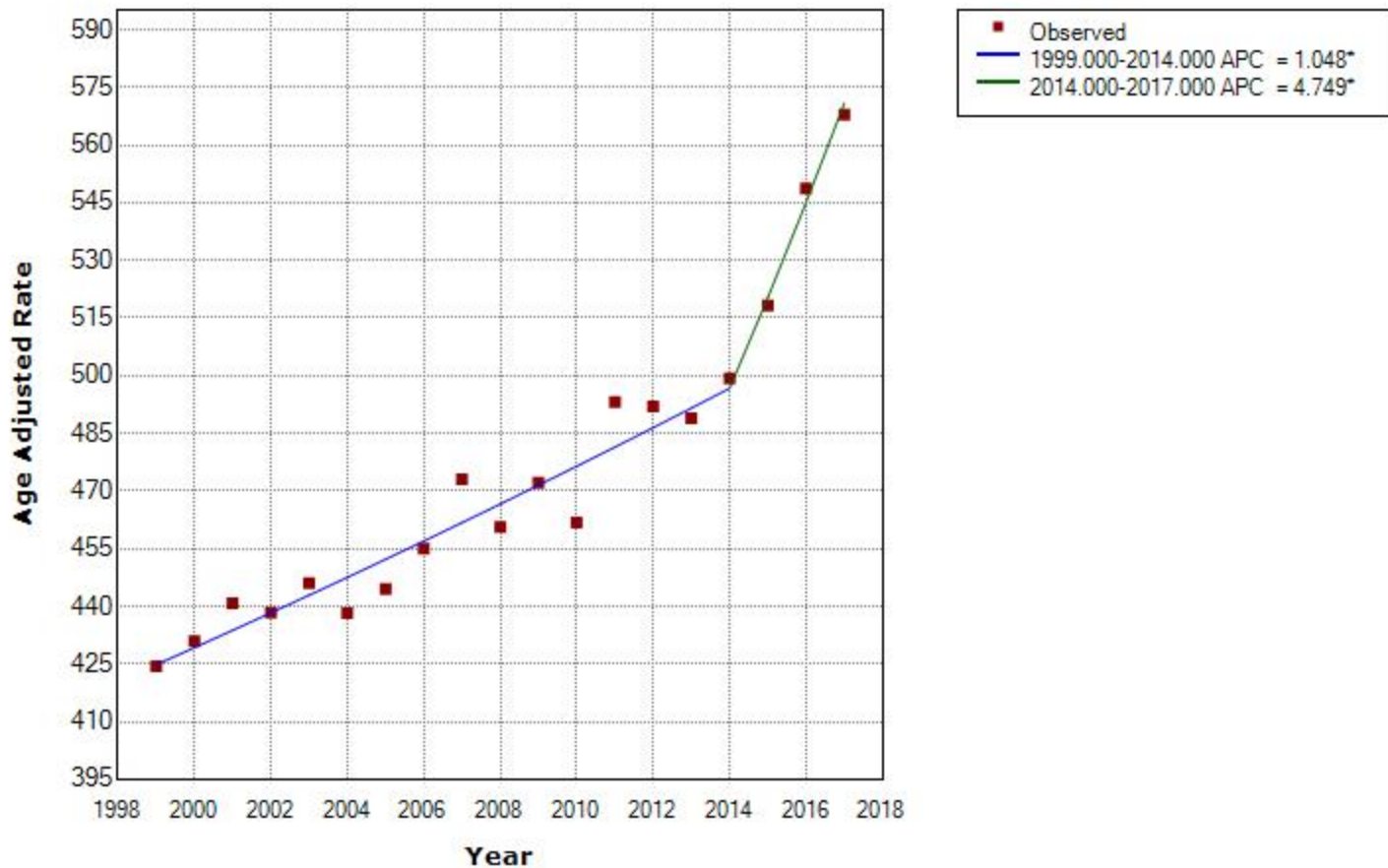
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Washington: 1 Joinpoint



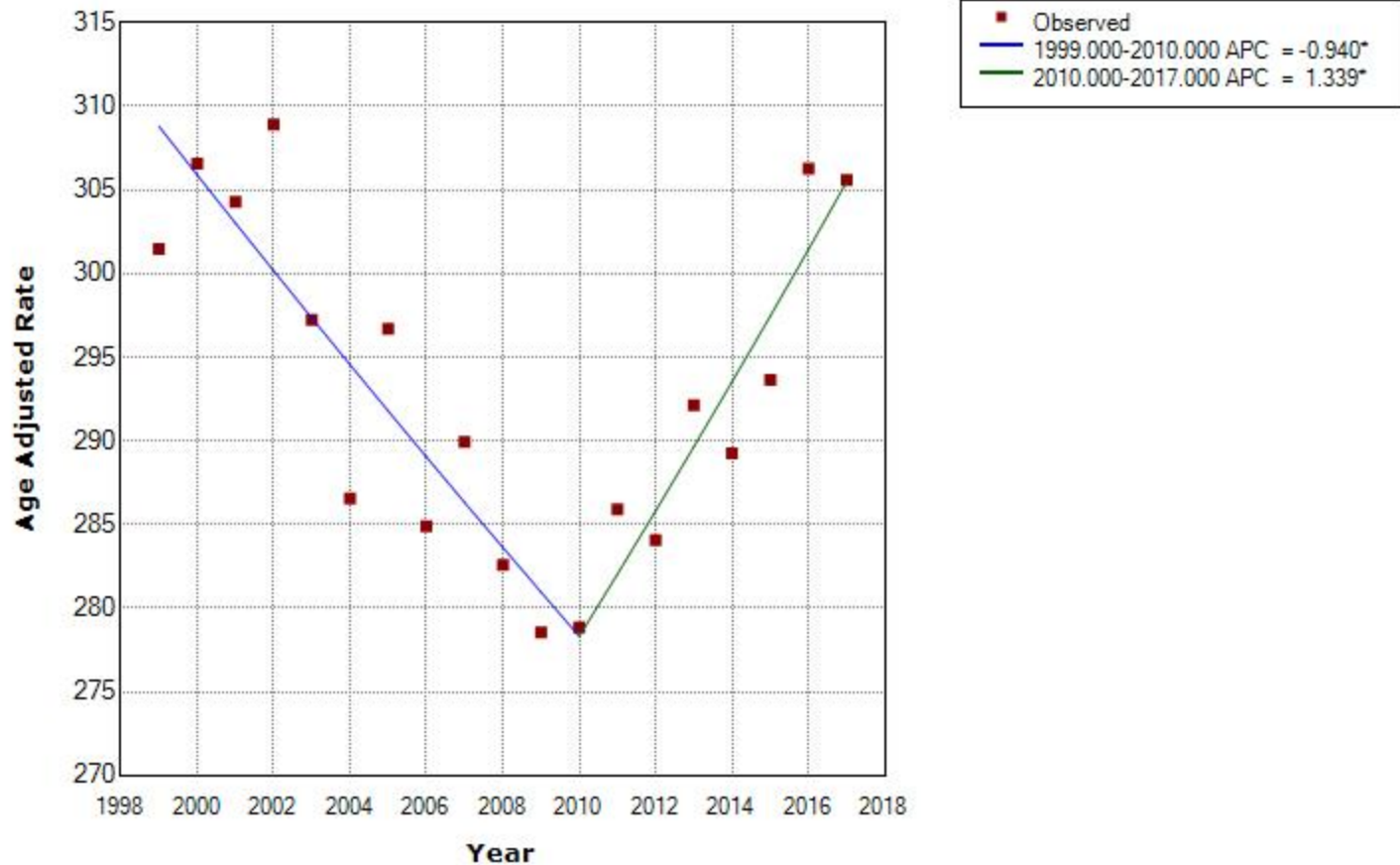
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

West Virginia: 1 Joinpoint



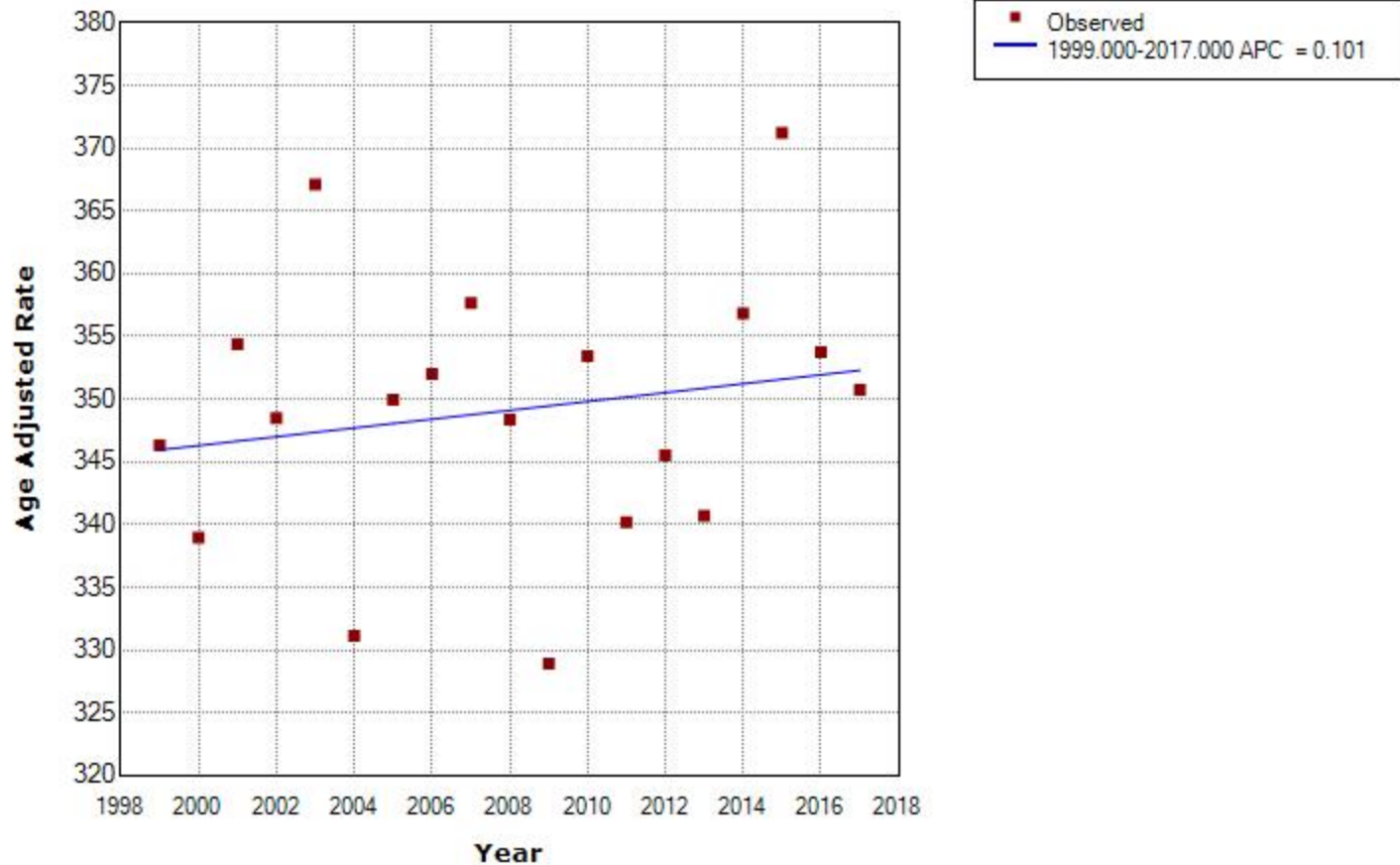
* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Wisconsin: 1 Joinpoint



* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 1 Joinpoint.

Wyoming: 0 Joinpoints



* Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Final Selected Model: 0 Joinpoints.