|  |  |  |  |
| --- | --- | --- | --- |
| Model | DV | IV | Interpretation |
| **Level-level Regression**  http://www.cazaar.com/_/rsrc/1446671436460/ta/econ113/interpreting-beta/levlev.gif | *y* | *x* | “If you change *x* by one,  we’d expect *y* to change by β1"  Δy = β1 ⋅ Δx |
| **Log-Level Regression**  http://www.cazaar.com/_/rsrc/1446671436460/ta/econ113/interpreting-beta/loglev.gif | *ln(y)* | *x* | “If we change x by 1 (unit), we’d expect our *y* variable to change by 100⋅β1 percent”  %Δy = 100 ⋅ β1⋅Δx |
| **Level-Log Regression**  http://www.cazaar.com/_/rsrc/1446671436460/ta/econ113/interpreting-beta/levlog.gif | *y* | *ln(x)* | "If we increase *x* by one percent,  we expect *y* to increase by (β1/100) units of *y*."  Δy = ( β1/100 ) ⋅ %Δx |
| **Log-Log Regression**  http://www.cazaar.com/_/rsrc/1446671436460/ta/econ113/interpreting-beta/loglog.gif | *ln(y)* | *ln(x)* | “If we change *x* by one percent,  we’d expect *y* to change by β1 percent  (i.e., an elasticity).”  %Δy = β1 ⋅ %Δx |

\*Table borrowed shamelessly from: http://www.cazaar.com/ta/econ113/interpreting-beta

Population of the 100 Largest US Cities in 1900

Source: U.S. Bureau of the Census

Internet Release date: June 15, 1998

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Rank | Place 1/ | Population || Rank | Place | Population

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1 New York city, NY \*................ 3,437,202 51 Wilmington city, DE................ 76,508

2 Chicago city, IL................... 1,698,575 52 Camden city, NJ.................... 75,935

3 Philadelphia city, PA.............. 1,293,697 53 Trenton city, NJ................... 73,307

4 St. Louis city, MO................. 575,238 54 Bridgeport city, CT................ 70,996

5 Boston city, MA.................... 560,892 55 Lynn city, MA...................... 68,513

6 Baltimore city, MD................. 508,957 56 Oakland city, CA................... 66,960

7 Cleveland city, OH................. 381,768 57 Lawrence city, MA.................. 62,559

8 Buffalo city, NY................... 352,387 58 New Bedford city, MA............... 62,442

9 San Francisco city, CA............. 342,782 59 Des Moines city, IA................ 62,139

10 Cincinnati city, OH................ 325,902 60 Springfield city, MA............... 62,059

11 Pittsburgh city, PA \*.............. 321,616 61 Somerville city, MA................ 61,643

12 New Orleans city, LA............... 287,104 62 Troy city, NY...................... 60,651

13 Detroit city, MI................... 285,704 63 Hoboken city, NJ................... 59,364

14 Milwaukee city, WI................. 285,315 64 Evansville city, IN................ 59,007

15 Washington city, DC................ 278,718 65 Manchester city, NH................ 56,987

16 Newark city, NJ.................... 246,070 66 Utica city, NY..................... 56,383

17 Jersey City city, NJ............... 206,433 67 Peoria city, IL.................... 56,100

18 Louisville city, KY................ 204,731 68 Charleston city, SC................ 55,807

19 Minneapolis city, MN............... 202,718 69 Savannah city GA................... 54,244

20 Providence city, RI................ 175,597 70 Salt Lake City city, UT............ 53,531

21 Indianapolis city, IN.............. 169,164 71 San Antonio city, TX............... 53,321

22 Kansas City city, MO............... 163,752 72 Duluth city, MN.................... 52,969

23 St. Paul city, MN.................. 163,065 73 Erie city, PA...................... 52,733

24 Rochester city, NY................. 162,608 74 Elizabeth city, NJ................. 52,130

25 Denver city, CO.................... 133,859 75 Wilkes-Barre city, PA.............. 51,721

26 Toledo city, OH.................... 131,822 76 Kansas City city, KS............... 51,418

27 Allegheny city, PA \*............... 129,896 77 Harrisburg city, PA................ 50,167

28 Columbus city, OH.................. 125,560 78 Portland city, ME.................. 50,145

29 Worcester city, MA................. 118,421 79 Yonkers city, NY................... 47,931

30 Syracuse city, NY.................. 108,374 80 Norfolk city, VA................... 46,624

31 New Haven city, CT................. 108,027 81 Waterbury city, CT................. 45,859

32 Paterson city, NJ.................. 105,171 82 Holyoke city, MA................... 45,712

33 Fall River city, MA................ 104,863 83 Fort Wayne city, IN................ 45,115

34 St. Joseph city, MO................ 102,979 84 Youngstown city, OH................ 44,885

35 Omaha city, NE..................... 102,555 85 Houston city, TX................... 44,633

36 Los Angeles city, CA............... 102,479 86 Covington city, KY................. 42,938

37 Memphis city, TN................... 102,320 87 Akron city, OH..................... 42,728

38 Scranton city, PA.................. 102,026 88 Dallas city, TX.................... 42,638

39 Lowell city, MA.................... 94,969 89 Saginaw city, MI................... 42,345

40 Albany city, NY.................... 94,151 90 Lancaster city, PA................. 41,459

41 Cambridge city, MA................. 91,886 91 Lincoln city, NE................... 40,169

42 Portland city, OR.................. 90,426 92 Brockton city, MA.................. 40,063

43 Atlanta city, GA................... 89,872 93 Binghamton city, NY................ 39,647

44 Grand Rapids city, MI.............. 87,565 94 Augusta city, GA................... 39,441

45 Dayton city, OH.................... 85,333 95 Pawtucket city, RI................. 39,231

46 Richmond city, VA.................. 85,050 96 Altoona city, PA................... 38,973

47 Nashville city, TN................. 80,865 97 Wheeling city, WV.................. 38,878

48 Seattle city, WA................... 80,671 98 Mobile city, AL.................... 38,469

49 Hartford city, CT.................. 79,850 99 Birmingham city, AL................ 38,415

50 Reading city, PA................... 78,961 100 Little Rock city, AR............... 38,307

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The US population has been growing by approximately 1% a year.

What is the predicted size of NYC in 2010? What about Milwaukee, WI?

Actual NYC population in 2010 = 8,175,133

log(8,175,000) = 15.91659 vs. predicted level of 16.15011

Predicted size of Omaha: 306,425

Actual size in 2010: 408,958

Predicted log score of 12.63273 vs actual of 12.92147

These are not bad predictions using a one-parameter model (% growth each year). The main take-away is that we are using rates of change as the predictor, not actual population values each year.