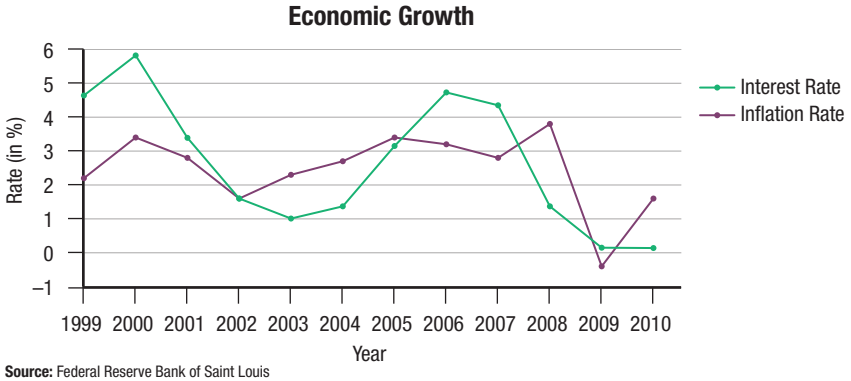
2.4 Exercises

Basic Concepts

1. What are time series measurements?
2. What problems are associated with the concept of population when studying time series data?
3. What is a stationary process?
4. What is a nonstationary process?
5. What is a trend? If a time series has an 'upward trend' what does this mean?
6. What are cross-sectional data?
7. What is the difference between cross-sectional data and time series data?

Exercises

8. Consider the following graph of long-term interest rates (10-year treasury notes) and inflation rates.



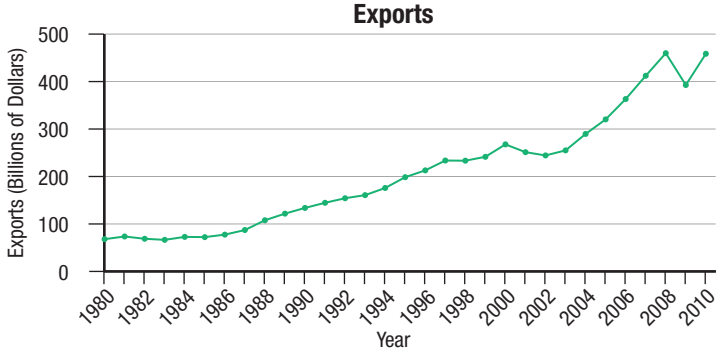
Source: Federal Reserve Bank of Saint Louis

   a. Are the interest rate data presented above time series data?

   b. Are the inflation rate data presented above time series data?

   c. For each of parts **a.** and **b.** if the data is time series data, does the series appear to be stationary or nonstationary?

9. Consider the following graph of total exports.



Source: Federal Reserve Bank of Saint Louis

   a. Are these data time series data?

   b. If the data are time series data, does the series appear to be stationary or nonstationary?

10. Using a newspaper, journal, or website as your source, give an example of time series data. Be sure to reference your source and give a brief description of the data.

11. The following table shows the annual average crude oil price from 1946 through 2011. Prices are adjusted for inflation to April 2011 prices using the Consumer Price Index (CPI-U) as presented by the Bureau of Labor Statistics. Inflation adjusted prices were at an all-time high in 1980, reaching $102.26 dollars per barrel. Crude oil prices reached an all-time low in 1998 (lower than the price in 1946!) when the price per barrel dipped to $16.44. Using the data in the table, discuss if the data set contains time series or cross-sectional data. Also, discuss the data and make some inferences. That is, can you explain some of the fluctuations in the oil prices?

Annual Average Domestic Crude Oil Prices ($ per Barrel)

Year	Nominal	Inflation Adjusted (April 2011)	Year	Nominal	Inflation Adjusted (April 2011)
1946	1.63	18.49	1979	25.10	77.05
1947	2.16	21.73	1980	37.42	102.26
1948	2.77	25.92	1981	35.75	88.55
1949	2.77	26.17	1982	31.83	74.24
1950	2.77	25.90	1983	29.08	65.69
1951	2.77	24.00	1984	28.75	62.26
1952	2.77	23.47	1985	26.92	56.28
1953	2.92	24.50	1986	14.44	29.62
1954	2.99	25.04	1987	17.75	35.13
1955	2.93	24.57	1988	14.87	28.32
1956	2.94	24.35	1989	18.33	33.24
1957	3.14	25.12	1990	23.19	39.80
1958	3.00	23.38	1991	20.20	33.36
1959	3.00	23.15	1992	19.25	30.85
1960	2.91	22.15	1993	16.75	26.09
1961	2.85	21.44	1994	15.66	23.76
1962	2.85	21.19	1995	16.75	24.73
1963	2.91	21.39	1996	20.46	29.32
1964	3.00	21.75	1997	18.64	26.12
1965	3.01	21.47	1998	11.91	16.44
1966	3.10	21.48	1999	16.56	22.30
1967	3.12	21.04	2000	27.39	35.76
1968	3.18	20.53	2001	23.00	29.23
1969	3.32	20.36	2002	22.81	28.50
1970	3.39	19.65	2003	27.69	33.86
1971	3.60	20.00	2004	37.66	44.81
1972	3.60	21.44	2005	50.04	57.57
1973	4.75	23.87	2006	58.30	65.03
1974	9.35	42.58	2007	64.20	69.51
1975	12.21	51.00	2008	91.48	95.25
1976	13.10	51.78	2009	53.48	55.96
1977	14.40	53.41	2010	71.21	73.44
1978	14.95	51.58	2011 (Partial)	86.84	–

Source: www.inflationdata.com

12. Do you think the pay of executives working for digital companies increases/decreases as the company's stock price increases/decreases? Examine the following table.

CEO Compensation and Stock Performance

Exec	Salary/ Bonus ($)	Stock/ Options ($)	Other Non-Equity Compensation ($)	Total 2007 Compensation ($)	Change from 2006 Compensation (%)	2007 Stock Performance (%)
Tom Rogers (Tivo)	800,000	6,200,000	495,075	7,495,075	+102	+32
Mel Karmazin (Sirius)	5,250,000	–	18,743	5,268,743	+23	–23
Paul Sagan (Akamai)	403,651	3,554,264	497,362	4,455,277	–40	–48
Reed Hastings (Netflix)	850,000	1,568,307	270	2,418,577	+5	–6
Rob Glaser (RealNetworks)	1,169,384	643,400	354,200	2,166,984	–26	–45
Bobby Kotick (Activision Blizzard)	899,560	1,188,467	–	2,088,027	+6	+49
Magid M. Abraham (comScore)	421,952	1,125,000	–	1,546,952	+185	–16
Barry Diller (IAC)	500,000	–	927,429	1,427,429	+270	+21
John S. Riccitiello (Electronic Arts)	750,000	–	625,350	1,375,350	–37	–38
Steve Ballmer (Microsoft)	1,340,833	–	10,001	1,350,834	N/A	0
Wayne T. Gattinella (WebMD)	830,000	–	9214	839,214	+6	+10

Source: paidContent.org

What type of data is in the Salary/Bonus column? What do you think about executive salaries as a function of the company's stock performance? Justify your responses.