

Economics 125 – Economics of Population Growth, Winter 2006

Time, Location	TuTh 5:00 pm - 6:20 pm, Petersen Hall, Room 104
Instructor	Jeff Tayman
Office Location/Hours	Economics Building, Room 109; TuTh 6:30 pm – 7:30pm
Email	jtayman@ucsd.edu
Class Web Site	http://home.san.rr.com/econ125
Teaching Assistant	Jeff Lin; Office Location: Econ. Bldg. 122; Email: jelin@ucsd.edu

Course Purpose: This course is designed to teach you the foundations of demographic analysis and forecasting. You will learn the terminology, analytical tools, major forecasting methods (trend extrapolation, cohort-component, and economic-demographic models), and practical guidance needed to create, evaluate, interpret, and use forecasts. We also cover fundamental demographic concepts such as population size, distribution, composition, and components of change (fertility, mortality, and migration), relationships between economic and demographic processes, and the implications of demographic change on the social security system.

Prerequisites: Economics 120 A-B-C. Economics 178 is recommended.

Required Reading: Stanley K. Smith, Jeff Tayman, & David A. Swanson (2001). *State and Local Population Projections: Methodology and Analysis*. New York, Kluwer Academic/Plenum Publishers, and articles/Internet links on electronic reserve.

You are expected to read the assigned material prior to lecture and bring the book to class. This is an upper division course, which means you have greater responsibility for thinking beyond the assigned material and asking meaningful questions, as oppose to copying notes.

Assignments: You are required to complete 8 assignments. Assignments are to be handed in at the beginning of class. I will not accept late assignments. All assignments should be done with an electronic spreadsheet (Microsoft Excel is available in the computer lab). Tables and graphs for the assignments should be properly labeled and easy to follow (e.g., do not split a table or figure over multiple pages).

Research Paper: You are required to write a paper of no more than five double-spaced typewritten pages, plus references, figures, and tables. This paper is due on March 14. I will not accept a late paper.

Exams: There will be an in-class exam on February 2 and a final exam on March 20. The final exam will only include material covered after the first exam. **I will give no late examinations without a compelling and fully documented medical excuse and will not offer an alternative date/time for the final exam.**

Grading: A student can earn a maximum of 350 points as follows: Assignments (100 points or 28.6%), first exam (60 points or 17.1%), final exam (120 points or 34.3%), and research paper (70 points or 20.0%). I do not grade on a strict curve, but you will receive no lower than an (A-) with 315 points; no lower than a (B-) with 280 points; no lower than a (C-) with 245 points; and no lower than a (D) with 210 points. Depending on the distribution of class scores, the final breakpoints may fall below those indicated.

Course Schedule, Econ-125, Winter 2006

Date	Topics	Assignment
Jan. 10	Course Overview Introduction and Uses of Forecasts	Chapter 1
Jan. 12	Fundamentals of Population Analysis	Chapter 2 SANDAG <i>Info</i> (2002)
Jan. 17	Mortality	Chapter 4; Rogers (1995) Assignment 1 due (5 pts.)
Jan. 19	Fertility	Chapter 5 Demeny (1993); Easterlin (1978)
Jan. 24	Migration	Chapter 6, pp. 97-118 Assignment 2 due (15 pts.)
Jan. 26	Migration	Chapter 6, pp. 119-135
Jan. 31	Finish Migration & Exam Review	Assignment 3 due (15 pts.)
Feb. 2	No Class	
Feb. 7	Exam	
Feb. 9	Cohort-Component Method	Chapter 3; Chapter 7, pp. 137-151
Feb. 14	Cohort-Component Method	Chapter 7, pp. 151-160
Feb. 16	Trend Extrapolation	Chapter 8, pp. 161-175 Assignment 4 due (20 pts.)
Feb. 21	Trend Extrapolation	Chapter 8, pp. 176-183
Feb. 23	Economic-Demographic Models	Chapter 9, pp. 185-198; Hunt (1993) Assignment 5 due (13 pts.)
Feb. 28	Economic-Demographic Models	Chapter 9, pp. 198-214
Mar. 2	Demographic Change and Social Security	Siegel (2002); SSA (2005); Lee, et al. (2003); Calmes (2005) Assignment 6 due (5 pts.)
Mar. 7	Special Adjustments to Forecasts	Chapter 11, pp. 239-258
Mar. 9	Forecast Errors	Chapter 13, pp 301-326; Swanson and Tayman (1995) Assignment 7 due (12 pts.)
Mar. 14	Forecast Errors	Chapter 13, pp. 326-341 Research paper due Assignment 8 due (15 pts.)
Mar. 16	Evaluating Projections Final Exam Review	Chapter 12
Mar. 20	Final Exam	7:00 – 10:00 p.m.

Assignments, Econ-125, Winter 2006

Assignment 1 (5 pts.)

1. For jurisdiction-based area in San Diego County, calculate the numeric and percent change, average annual absolute change, and geometric and exponential growth rates between 1990 and 2000. (1 pt)
2. For San Diego County, calculate the percentage distributions by age for total population in 2000 and 2030 and for male and female populations in 2000. (Hint: a distribution is the share of each age or age/sex group to the **total** population). (1 pt)
3. Draw a line graph comparing the total population distributions in 2000 and 2030. (0.5 pt)
4. Draw a line graph comparing the male and female distributions in 2000. (0.5 pt)
5. Describe the major shifts in the age composition between 2000 and 2030 and the major differences between the male and female age composition in 2000. (2 pts)

Assignment 2 (15 pts.)

1. For San Diego County, calculate age-specific birth rates (ASBR), total and general fertility rates, and the crude birth rate in 2000. (2 pts)
2. For San Diego County females, calculate the child woman ratios (CWR) for ages 0-4 and 5-9 in 2000. (1 pt)
3. Project the San Diego County ASBRs and total fertility rate for 2005 using the synthetic method and projections for California (3 pts)
4. For San Diego County, calculate age-specific death rates for females and crude death rate in 2000. (2 pts)
5. Project San Diego County female survival rates to year 2005 assuming a 1% annual decrease in mortality rates. (2 pts)
6. Project San Diego County female survival rates to year 2005 assuming a 1% annual increase in survival rates. (Hint: apply the adjustment directly to the survival rate). (2 pts)
7. Why is the result obtained by increasing the survival rates not reasonable for some age groups? (2 pts)
8. What would the 2005 County total fertility rate be using the targeting method and assuming 50% convergence to California's total fertility rate in that year? (1 pt)

Assignment 3 (15 pts)

1. For San Diego County females, calculate net migration between 1990 and 2000 using the demographic balancing equation. (1 pt)
2. For San Diego County females, calculate net migration by age between 1990 and 2000 using the forward survival rate method. (Hint: use population ages 75+ in 1990) (5 pts)
3. For San Diego County females, calculate gross in- and out- migration rates by age between 1995 and 2000. (Hint: use population ages 80+ in 1995) (4 pts)
4. For San Diego County females, calculate age-specific cohort change ratios (CCR) between 1990 and 2000. (Hints: use population ages 75+ in 1990 and show CCRs for the age groups in the year 2000) (2 pts)
5. Based on the 1990-2000 CCRs, what is the main drawback of using the CCR (aka census survival rate) to measure survival probabilities? (1 pt)
6. What factors might explain the seemingly erratic pattern of the net migration estimates by age developed from the forward survival rate method? (2 pts)

Assignments, Econ-125, Winter 2006 (Continued)

Assignment 4 (20 pts)

1. Using the projected survival and fertility rates from Assignment 2 and 1990 to 1995 gross in- and out-migration rates from Assignment 3, create year 2005 population projections for San Diego County females by age using the cohort-component method. (10 pts)
2. Compute the components of the female population change from 2000 to 2005. (1 pt)
3. Using the 1990 to 2000 CCR from Assignment 3 and 2000 CWRs from Assignment 2, create year 2010 population projections of San Diego County females by age using the Hamilton-Perry (HP) method. (3 pts)
4. Explain the demographic reasons for the change in the total female population between 2000 and 2005. (6 pts)

Assignment 5 (13 pts)

1. Using 1980 to 1990 as the base period, create year 2000 population projections for each jurisdiction-based area in San Diego County using these four extrapolation methods: 1) Linear Trend (LINE), 2) Exponential Trend (EXPO), 3) Shift-Share (SHIFT), and 4) Share of Growth (SHARE). (Note: use the bottom-up approach for creating the population projection for San Diego County for methods 1, and 2). (6 pts)
2. Which methods produce the highest and lowest projections and why might that be? (Hint look at projected population compared to its 1990 launch year value). (7 pts)

Assignment 6 (5 pts)

1. Estimate two regression equations that describe the relationship between employment change and net domestic migration in San Diego County. Employment change is measured two ways relative to the time of the net migration (lagged 2-years; and not lagged). (2 pts)
2. Explain which of the temporal specifications for employment change has the strongest relationship to net migration and interpret the slope from each equation. (3 pts)

Assignment 7 (12 pts)

1. Using the jurisdiction-based area population projections from Assignment 5, control the Linear and Exponential Trend projections to an independent population projection for San Diego County. (2 pts)
2. Control the 1990 to 2000 female net migration estimates by age to the estimate for all females derived by the demographic balancing equation, both from Assignment 3. (5 pts)
3. What is the name of the method used to control the net migration estimates by age and why did you select that particular method? (3 pts)
4. Why did the projections based on the shift-share and share-of-growth trend extrapolation methods require no controlling? (2 pts)

Assignment 8 (15 pts)

1. Using the controlled population projections by jurisdiction-based area from Assignment 7, calculate algebraic and absolute percentage errors for each jurisdiction and trend extrapolation method. (2 pts)
2. Calculate the following summary measures of error for each trend extrapolation: MALPE, %Pos, MAPE, MEDAPE, and PRE (for the MAPE and MALPE using a naïve forecast derived by adjusting the 1990 census to the 2000 regional forecast). (Hint: only include errors for the jurisdiction-based areas in these summary measures.) (5 pts)
3. Using the summary measures of error, evaluate the precision, bias, utility, and shape of the error distribution of the individual trend methods. Which method(s) do the best? (8 pts)

Articles/Internet Links on Electronic Reserve, Econ-125, Winter 2006

Fundamentals of Population Analysis	http://www.sandag.cog.ca.us/uploads/publicationid/publicationid_856_3595.pdf (SANDAG. 2002. Dynamics of vital events in the San Diego Region)
Mortality	R. Rogers. 1995. Sociodemographic characteristics of long-lived and healthy individuals. <i>Population and Development Review</i> , 21:33-58.
Fertility	P. Demeny. 2003. Population policy dilemmas in Europe at the dawn of the twenty-first century. <i>Population and Development Review</i> , 29:1-28 R. Easterlin. 1978. What will 1984 be like? Socioeconomic implications of recent twists in age structure. <i>Demography</i> , 15: 397-432.
Economic-Demographic Models	G. Hunt. 1993. Equilibrium and disequilibrium in migration modeling. <i>Regional Studies</i> , 27: 341-49.
Forecast Error	D. Swanson and J. Tayman. 1995. Between a rock and a hard place: the evaluation of demographic forecasts. <i>Population Research and Policy Review</i> , 14:233-249
Research Paper	http://www.ssa.gov/pubs/10055.html (Social Security Administration (SSA). 2005. The Future of Social Security) http://repositories.cdlib.org/iber/ceda/papers/2003-0005CL/ (R. Lee, M. Andersen, and S. Tuljapurkar. 2003. Stochastic Forecasts of the Social Security Trust Fund) J. Siegel. 2002. Demographic Aspects of Selected Public Policy Issues, Chapter 13 in <i>Applied Demography: Applications to Business Government, Law, and Public Policy</i> . Academic Press, San Diego, CA Jackie Calmes. 2005. How Social Security Might Change. The Wall Street Journal Sunday, January 30.

Research Paper, Econ-125, Winter 2006

This research paper gives you the opportunity to get hands-on experience in analyzing and evaluating population projections and the impact that fertility, mortality, and migration assumptions can have on the future size of a population and its demographic make-up. The topic of your paper is *U.S. Demographics to the Year 2100 and the Outlook for Social Security*. I expect you will find this to be a challenging and hopefully rewarding exercise. Good luck.

You should not base your paper on data from a published source that has already analyzed it. I want you to analyze and draw your own conclusions from original data. These original data are national population projections prepared by the U.S. Census Bureau. They are contained in an Excel spreadsheet (US_Pop2025-2100.xls) on the class Web site. The Projections Tab contains population by selected age groups for the year 2000, four horizon years (2025, 2050, 2075, and 2100), and three alternatives (lowest, middle, and highest series) The Assumptions Tab shows the fertility, mortality and migration assumptions for each alternative. Also, four articles on electronic reserve that directly relate to this topic are available as a resource.

The key questions that your paper should address are:

1. What aspects of the age distribution most influence the social security system? How can these influences be measured? What are the strengths and weaknesses of these measures?
2. How do these influences vary over time (e.g., comparing the year 2025 with the year 2075)?
3. How do these influences vary under the different projection alternatives? Which alternatives are the most and least favorable to the social security system and why?
4. How would the demographic outlook for social security change if the retirement age was increased to 74 years in the year 2025 and held at that age until the year 2100?
5. If you had to pick one of the three projection alternatives as most likely to occur (i.e., as your forecast), which one would you pick and why (i.e. justify your total fertility rate, life expectancy, and immigration assumptions)? An option you can consider is creating your own assumptions by combining elements from the alternate scenarios.
6. If you were the president and could take only one action to address the social security system, what would that action be? Why would you select it over the other actions being considered?

Here is a list of Do's and Don't's for your research paper:

DO

- A hands-on analysis of population projections
- Include an Introduction in which you provide background information and motivate the topic (answer the "why we should care" question).
- Proofread your papers carefully. Make sure the paper is well-organized (do an outline before writing word one), has proper grammar and spelling, and effectively communicates your ideas.
- Think about the reader when making tables and graphs. Are they easy to read? Is there a better, cleaner way to display the same information? Does the information help support or clarify the analysis and conclusions? Learning to do this well is an invaluable skill that will help you throughout your career.

- Label graphs completely; Give a title that answers what/where/when; label axes; provide a legend if necessary.
- Include a proper source at the bottom of all tables and graphs, telling where the data came from.
- Cite all data and references completely (for Websites, this means the complete URL, the date, the organization publishing it). Consult a style manual if you are not sure how to cite a source.
- Make sure you give your analysis the “common-sense” test. It is very possible to make computing mistakes that yield improbable results such as an elderly dependency ratio greater than 75.

DON'T

- Use data in an already analyzed paper. (You can cite data in a published paper, but it should not be your main source of information.)
- Write a boring paper.
- Wait until the last minute to start your paper.
- Plagiarize. I encourage you to collaborate with your classmates on this project, but the paper must be your own.