

Economics 125 – Economics of Population Growth, Spring 2005

Time, Location	TuTh 5:00 pm - 6:20 pm, Petersen Hall, Room 103
Instructor	Jeff Tayman
Office Location	Economics Building, Room 110A
Office Hours	TuTh 6:30 pm – 7:30pm
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Teaching Assistant	Jason Shafrin

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 will 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 conclude with some new directions in forecasting.

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 May 30. I will not accept a late paper.

Exams: There will be an in-class exam on April 21 and an in-class final exam on June 8. 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, Spring 2005

Date	Topics	Assignment
March 29	Course Overview Introduction and Uses of Forecasts	Chapter 1
March 31	Fundamentals of Population Analysis	Chapter 2 SANDAG <i>Info</i> (2002)
April 5	Mortality	Chapter 4 Rogers (1995); Fogel and Costa (1997) Assignment 1 due (5 pts.)
April 7	Fertility	Chapter 5 Demeny (1993); Easterlin (1978)
April 12	Migration	Chapter 6, pp. 97-118 Assignment 2 due (15 pts.)
April 14	Migration	Chapter 6, pp. 119-135
April 19	Finish Migration & Exam Review	No Assignment
April 21	Exam	
April 26	Cohort-Component Method	Chapter 3; Chapter 7, pp. 137-151 Assignment 3 due (15 pts.)
April 28	Cohort-Component Method	Chapter 7, pp. 151-160
May 3	Trend Extrapolation	Chapter 8, pp. 161-175 Assignment 4 due (20 pts.)
May 5	Trend Extrapolation	Chapter 8, pp. 176-183
May 10	Economic-Demographic Models	Chapter 9, pp. 185-198 Hunt (1993) Assignment 5 due (13 pts.)
May 12	No Class	
May 17	Economic-Demographic Models	Chapter 9, pp. 198-214 Assignment 6 due (5 pts.)
May 19	Special Adjustments to Forecasts	Chapter 11, pp. 239-258
May 24	Forecast Errors	Chapter 13, pp 301-326; Swanson and Tayman (1995) Assignment 7 due (12 pts.)
May 26	Forecast Errors	Chapter 13, pp. 326-341
May 30	Evaluating Projections	Chapter 12 Assignment 8 due (15 pts.) Research paper due
June 2	New Directions in Forecasting Social Security Discussion Final Exam Review	Chapter 15
June 8	Final Exam	7:00 – 10:00 p.m.

Assignments, Econ-125, Spring 2005

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 change in age composition in 2000 and 2030 and 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 ratio (CWR) for ages 0-4 and 5-9 in 2000. (1 pt)
3. Project the 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 County's total fertility rate be in 2005 had one used the targeting method and assumed full convergence to California's fertility rates 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)

Hamilton-Perry (HP) method. (3 pts)

4. Explain the demographic reasons for the change in the total female population between 2000
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. What are the main differences between the HP method and the growth trend extrapolation methods? (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, Spring 2005

Fundamentals of Population Analysis	http://www.sandag.cog.ca.us/uploads/publicationid/publicationid_856_3595.pdf (SANDAG publication on the dynamics of vital events in the San Diego region)
Mortality	R. Fogel and D. Costa. 1997. A theory of Technophysio evolution with some implications for forecasting population, health care costs, and pension costs. <i>Demography</i> , 34: 49-66 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 Publication on the Future of Social Security) http://simsoc.demog.berkeley.edu/Reports/LAT_SSA_Mar2003.pdf (Research Paper on Stochastic Forecasts for the Social Security Trust Fund by R. Lee, M. Andersen, and S. Tuljapurkar) 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. <i>The Wall Street Journal</i> Sunday, January 30.

Research Paper, Econ-125, Spring 2005

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_Projections_2025-2100.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.

Some 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?
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 72 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. justifying total fertility rate, life expectancy, and immigration assumptions)? An option you can consider is creating your own assumptions by combining elements from the alternate assumptions.
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 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.