

## Economics 125 – Demographic Analysis and Forecasting, Fall 2011

Location/Time	Center Hall; Room 216; T/TH 3:30 pm – 4:50 pm
Instructor	Jeff Tayman Email: <a href="mailto:jtayman@ucsd.edu">jtayman@ucsd.edu</a>
Office Location/Hours	Economics Annex #103; T/TH 2:10 pm – 3:10 pm Map of office location at the end of the syllabus (page 9)
Class Web Site	ted.ucsd.edu
Teaching Assistants	Chin Lau; Econ 122; Office Hours: Tuesday 10:00 a.m. - 12:00 p.m.  Aniela Pietrasz; Econ 123; Office Hours: Monday 11:30 a.m. - 1:30 p.m.

### Course Objectives

This course is designed to teach you the foundations of demographic analysis and forecasting. You will learn: (1) the terminology, methods, and practical guidance needed to create, evaluate, interpret, and use forecasts; (2) fundamental demographic concepts including population size, composition, and change; (3) the measurement, and interpretation of trends and patterns in fertility, mortality, and migration; (4) key relationships between economic and demographic process; and (5) the implications of demographic changes for the social security system.

### Required Readings

1. Stanley K. Smith, Jeff Tayman, & David A. Swanson (2001). *State and Local Population Projections: Methodology and Analysis*. New York, Kluwer Academic/Plenum Publishers.
2. Articles on Electronic Reserve, Internet Links, and the course Web page (see page 6 of syllabus).

### Academic Integrity

Students found to have violated the Policy on Integrity of Scholarship will face administrative sanctions imposed by their college Dean of Student Affairs and academic sanctions imposed by me. Administrative sanctions can range from disciplinary probation to suspension and dismissal from the university; those are not at my discretion. Academic sanctions can range from 0 points on an assignment/test to an F in the class.

If you have any questions about academic integrity policy, call (858)-822-2163 or visit the Website ([http://www.ucsd.edu/current-students/\\_organizations/academic-integrity-office/](http://www.ucsd.edu/current-students/_organizations/academic-integrity-office/)).

## Course Assessment

*Problem Sets*— There are five problem sets. All assignments should be done with an electronic spreadsheet. (Microsoft Excel is available in the computer lab). Inputs to the assignments are on the class Website in the Folder labeled **Assignment/Inputs**. The URL <http://www.usd.edu/trio/tut/excel/index.html> is a link to an Excel tutorial.

*Research Paper*— A research paper is required (details on page 7-8 of the syllabus).

*Exams*— There is one mid-term exam and a final exam. The final exam is not cumulative. If you miss the mid-term because of a compelling and fully documented medical excuse or family emergency, your Final will count for 50% of your grade instead of 33%. Missing the midterm for any other reason will result in zero points. There will be no alternate date/time for the final exam. A make-up final will be given in case of a fully documented medical excuse or family emergency.

*Pop Quizzes*— There are four pop quizzes given randomly, with no make up provision.

*Grading*— You can earn a maximum of 300 points as follows: Assignments (60 points, 20%), first exam (50 points, 17%), final exam (100 points, 33%), pop quizzes (20 points, 7%), and research paper (70 points, 23%). **Any disputes about points earned must be resolved within a week after the assignment, test, paper has been returned.**

You will receive no lower than: an (A-) with 270 points; a (B-) with 240 points; a (C-) with 210 points; and a (D) with 180 points. Depending on the distribution of the total points, the above breakpoints may be lowered.

## Assessment Expectations

Assignments are due at the start of class; assignments submitted later than 15 minutes after class starts or by email will receive a score of zero.

You have two choices for doing the problem sets and research paper: 1) do them independently without assistance; or 2) do them as a group no larger than **6** people. Each member of the group will receive the same score and all names of the group must be typed on the submission when it is turned in. Group members with hand written names will receive a score of zero.

It is expected that the problem sets/research paper be completed on your own or as a group and in your own or the group's computations, graphs, tables, and words. You must not use the answers or spreadsheets developed by another person/group, including assignments from previous Econ 125 classes; or copy the work completed by others, including the Economics Tutor; or write the research paper with another person unless he/she is part of your group.

**Any individual or group assignment that shares too many similarities with the assignment submitted by another or assignments from past Econ 125 classes will be further investigated to determine if cheating occurred. All suspected violations of academic integrity will be reported to the Academic Integrity Office according to university policy. If you do not understand these expectations please see me by the end of the second week of classes.**

## Course Schedule

Date	Topics	Readings
Sept. 22	Overview and Introduction	Chapter 1
Sept. 27	Fundamentals of Population Analysis	Chapter 2; SANDAG <i>INFO</i> (2007)
Sept. 29	Mortality	Chapter 4; Rogers (1995)
Oct. 4	Fertility	Chapter 5 Demeny (1993); Easterlin (1978)
Oct. 6	Finish Fertility; Begin Migration	Chapter 6
Oct. 11	Migration	
Oct. 13	Finish Migration & Exam Review	
Oct. 18	<b>Exam</b>	
Oct. 20	Demographic Change and Social Security	Research Paper Readings <b>Assignment 1 due</b>
Oct. 25	Cohort-Component Method	Chapter 3; Chapter 7; Isserman (1993)
Oct. 27	Cohort-Component Method	
Nov. 1	Trend Extrapolation	Chapter 8 <b>Assignment 2 due</b>
Nov. 3	Trend Extrapolation	
Nov. 8	Economic-Demographic Models	Chapter 9; Hunt (1993) <b>Assignment 3 due</b>
Nov. 10	Economic-Demographic Models	<b>Paper Due</b>
Nov. 15	Special Adjustments	Chapter 11, pp. 241-258
Nov. 17	Finish Special Adjustment; Begin Forecast Error	<b>Assignment 4 due</b> Chapter 13; Swanson and Tayman (1995)
Nov. 22	Forecast Errors	
Nov. 24	<b>Thanksgiving, No Class</b>	
Nov. 29	Finish Forecast Error; Begin Evaluating Projections	<b>Assignment 5 due</b> Chapter 12
Dec. 1	Finish Evaluating Projections; Final Exam Review	
Dec. 5	<b>Final Exam</b>	<b>3:00 – 6:00 p.m.</b>

## **Problem Sets**

### **Assignment 1 (14 pts.)**

1. Project to the year 2015 San Diego County age specific birth rates (ASBR) using the synthetic method based on projections for the California. (2 pts.)
2. Compute the projected 2015 TFR for San Diego County (1 pt.)
3. Project to the year 2015 San Diego County female age specific survival rates using, assuming a 70% convergence to U.S. survival rates by 2035. (2 pts.)
4. For San Diego County females, calculate total net migration between 2005 and 2010. (1 pt.)
5. For San Diego County females, calculate net migration by age between 2005 and 2010. (3 pts.)
6. Net migration rather than natural increase has been cited as contributing more to recent population growth in San Diego. Based on your results for question 4, would you support or refute this argument? (2 pts.)
7. Describe the changes in age pattern of San Diego County ASBR and in the TFR from 2010 to 2015. (1 pt.)
8. Explain how you determined the convergence factor for projecting the 2015 age-specific survival rates (2 pts.)

### **Assignment 2 (16 pts.)**

1. Create a 2015 population projection by age for San Diego County females using the cohort-component method (CCM). (8 pts.)
2. Compute the components of the female population change from 2010 to 2015. (1 pt.)
3. For San Diego County females, calculate age-specific cohort change ratios (CCR) between 2005 and 2010 and child woman ratio CWR) for ages 0-4 in 2010. (2 pts.)
4. Create a 2015 population projection by age for San Diego County females using the Hamilton-Perry (HP) method. (2 pts.)
5. Measure the difference in the 2015 total female population between the HP and CCM methods? What factors might account for the difference in the two projection methods? (1 pt.)
6. Explain the demographic reasons behind the change in female population from 2010-2015. (2 pts.)

### **Assignment 3 (11 pts.)**

1. Using 1980 to 2000 as the base period, create population projections for the year 2010 for each geographic subregion in San Diego County using five extrapolation methods: 1) Linear Trend (LINE); 2) Exponential Trend (EXPO); 3) Shift-Share (SHIFT); 4) Share of Growth (SHARE); and 5) Constant Share (CONSTANT). (5 pts.)
2. Use a bottom-up approach for creating the population projection for San Diego County for LINE and EXPO. (1 pt.)
3. Why was it necessary to create a projection for San Diego County for the SHIFT, SHARE, and CONSTANT methods? (1 pt.)
4. Describe why the 2010 projections vary by method and geographic area. (4 pts.)

## **Problem Sets (Cont.)**

### **Assignment 4 (8 pts.)**

1. Estimate a regression equation to project net domestic migration based on job change lagged 2-years using time series data from 1985 to 2006. (1 pt.)
2. Using that equation, project net domestic migration for the years 2007 thru 2010. (You must use the CALIB factor in the projection equation.) (2 pts.)
3. Conduct an out-of-sample analysis. (2 pts.)
4. Interpret the slope of the equation. (1 pt.)
5. Based on the out-of sample analysis (question 3), evaluate the equation as a forecasting tool. (2 pts.)

### **Assignment 5 (11 pts.)**

1. Using the population forecasts by geographic subregion for 2010, calculate algebraic and absolute percentage errors for each geographic subregion and trend extrapolation method. (3 pts.)
2. Calculate the following summary measures for each trend extrapolation method: MALPE, MAPE, MEDAPE, and PRE (for the MAPE and MALPE using the naïve forecast). (1 pt.)
3. Evaluate the precision, bias, shape of the error distribution, and utility of each trend extrapolation methods. Which method(s) do the best and worst? (7 pts.)

## Articles/Internet Links on Electronic Reserve/Class Web Site

<b>Fundamentals of Population Analysis</b>	SANDAG. 2007. Vital Events for the San Diego Region. <a href="http://www.sandag.org/uploads/publicationid/publicationid_1343_7681.pdf">http://www.sandag.org/uploads/publicationid/publicationid_1343_7681.pdf</a>
<b>Mortality</b>	R. Rogers. 1995. Socio-demographic characteristics of long-lived and healthy individuals. <i>Population and Development Review</i> , 21:33-58. <b>(Electronic Reserve)</b>
<b>Fertility</b>	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. <b>(Electronic Reserve)</b> R. Easterlin. 1978. What will 1984 be like? Socioeconomic implications of recent twists in age structure. <i>Demography</i> , 15: 397-432. <b>(Electronic Reserve)</b>
<b>Cohort-Component Method</b>	A. Isserman. 1993. The right people, the right rates: Making population estimates and forecasts with an interregional cohort-component model. <i>Journal of the American Planning Association</i> , 59: 45-64. <b>(Electronic Reserve)</b>
<b>Economic-Demographic Models</b>	G. Hunt. 1993. Equilibrium and disequilibrium in migration modeling. <i>Regional Studies</i> , 27: 341-49. <b>(Electronic Reserve)</b>
<b>Forecast Error</b>	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. <b>(Electronic Reserve)</b>
<b>Research Paper</b>	B. Bergmann. 2005. Could social security go broke? The Economist Voice, 2(1): Article 10. <b>(On class Website)</b> M. Boskin. 2005. Straight talk on social security. The Economist Voice, 2(1): Article 11. <b>(On class Website)</b> J. Calmes. 2005. How social security might change. The Wall Street Journal. <b>(On class Website)</b> P. Diamond and P. Orszag. 2005. Social security: The Diamond-Orszag plan. The Economist Voice, 2(1): Article 8. <b>(On class Website)</b> R. Lee, M. Andersen, and S. Tuljapurkar. 2003. Stochastic forecasts of the social security trust fund. <a href="http://repositories.cdlib.org/iber/ceda/papers/2003-0005CL/">http://repositories.cdlib.org/iber/ceda/papers/2003-0005CL/</a> D. Myers. 2007. Testimony before the House Committee on the Judiciary Ellis Island New York and New Jersey. <b>(On class Website)</b> J. Siegel. 2002. Demographic aspects of selected public policy issues, pp 595-605 in <i>Applied Demography: Applications to Business Government, Law, and Public Policy</i> . Academic Press, San Diego, CA <b>(On class Website)</b> Social Security Administration (SSA). 2011. OASDI Trustees Report (Sections I, II, and V.A, V.B, and VI.E). <a href="http://www.socialsecurity.gov/OACT/TR/2011/trTOC.html">http://www.socialsecurity.gov/OACT/TR/2011/trTOC.html</a> R. Weaver. 2008. Bridging the Social Security Divide: Lessons from Abroad. Brooking Policy Brief # 166 <a href="http://www.brookings.edu/papers/2008/06_social_security_weaver.aspx">http://www.brookings.edu/papers/2008/06_social_security_weaver.aspx</a>

## Research Paper: Topic, Questions, and Scoring

This research paper provides the “real world” opportunity to analyze and evaluate 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 the paper is *U.S. Demographics to the Year 2050 and the Outlook for Social Security*. I hope this will be a challenging and rewarding exercise. Good luck.

The paper should not be based only on data/information from a published source that has already analyzed. you must analyze and draw conclusions from original data, which are national population projections prepared by the U.S. Census Bureau. They are contained in an Excel spreadsheet (US\_Pop2010-2050.xls) on the class Website. The **Projections Tab** contains population by selected age groups for the launch year 2010, three horizon years (2020-2050 in 10-year time increments), and four alternatives (low, middle, highest, and no immigration series) The **Assumptions Tab** shows the fertility, mortality and migration assumptions for each alternative. Articles on electronic reserve, the Internet, and the class website are available as resources.

The paper **must** address these questions (points are shown in parenthesis):

1. What two segments of the age distribution most influence the social security system? What measure, based solely on age groups, has been used to relate these segments? What are the strengths and weaknesses of this measure? What age groups are you using in this measure and why? (10 pts.)
2. Based on the selected measure, how does the age distribution vary under the different projection alternatives and why? Which alternatives are the most and least favorable to the social security system and why? (20 pts.)
3. Based on the selected measure, how does the age distribution vary within the 50-year forecast horizon? What are the reasons for these trends? (5 pts.)
4. Which one of the four projection alternatives is most likely to occur (i.e., as a forecast) and why (i.e., by **numerically specifying and justifying** the total fertility rate, life expectancy, and immigration assumptions)? You have the options of creating assumptions by combining elements from the alternate scenarios or specifying and justifying assumption values not in any scenario. (15 pts.)
5. Playing the role as president, what strategies would be implemented to address the social security system problem? Why would these be selected over the other strategies being considered? (10 pts.)
6. Overall Quality: organization; including an Introduction and Conclusion; spelling and grammar; professional looking graphs/tables; proper citations and bibliography; well-articulated, concise, supported, and documented arguments (10 pts.)

## **Research Paper: Guidelines**

### **DO**

- Include a cover page
- A hands-on analysis of population projections based on the U.S. projection data provided.
- Include an Introduction to provide background information and motivation for the topic (answer the “why we should care” question) and Conclusion summarizing the implications of your findings.
- Proofread the paper 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.
- Label and number tables and graphs properly (see SANDAG publication for examples); Include a proper source at the bottom, telling where the data came from; All tables and figures should be cited in the text (e.g. As shown in Figure 1). Don’t split tables and figures across pages.
- Cite all data and references completely (for Websites, this means the complete URL, the date, the organization publishing it). Consult a style manual for the proper way to cite a source.
- Give the analysis the “common-sense” test. It is very possible to make computing mistakes that yield improbable results.
- Have a friend from another class read the paper.

### **DON’T**

- Exceed more than five double-spaced typewritten pages, excluding references, figures, and tables.
- Rely exclusively on data analyzed by others. (Information can be cited from external sources, but the paper must include the analysis of the U.S. projection data).
- Include extraneous information (verbiage, tables, and charts) that are not helpful in answering the questions, defending a position, or supporting a claim.
- Wait until the last minute to start your paper.
- Plagiarize. If the ideas, data, and findings, etc. come from other sources they must be cited and given appropriate credit.



## Professor Tayman Office Location- Economics Annex #103

