Department of Economics

University of California, Berkeley

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Field Exam for Economic Demography

Please answer all parts of all questions, which will be weighted in the total grade as indicated in parentheses. Cite the literature where appropriate. You have three hours.

1.   (25) Three separate literatures address the consequences of population change. One considers the relation of population change to economic development, for example studies by the National Research Council (1986), Acemoglou and Johnson (2007), Kelley and Schmidt (2005). Another considers the economic consequences of immigration to industrial nations, for example studies by Borjas (2003), Card (2005, 2009), . A third considers the economic consequences of population aging, for example Cutler et al, 1990.

a)   (5) In what ways do the sources of demographic variation considered by these literatures differ?

b)   (5) Do these literatures focus on similar potential consequences of population change, or on different ones?

c)   (5) If you find any differences in focus in your answer to b) are these purely idiosyncratic, or are they related in some logical way to the different sources of population change under consideration?

d)   (5) Do these literatures reach conclusions about the economic consequences o population change that are consistent or inconsistent with one another?

e)   (5) Summarize and conclude: Are there good reasons for these separate literatures to exist?

2.   (25) This question concerns sex bias in familial behavior:

a)   (8) Becker's economic theory of fertility does not distinguish between male and female children. Discuss how you might introduce male and female children into his Quantity-Quality theory. You do not need to write down a mathematical model, but you should discuss any issues that arise and possible implications of your two-sex analysis for sex biased fertility, sex biased investments per child, and the effects on these of income.

b)   b) (8) We know from many studies that in some cultures, there is a sex bias in fertility. Does this sex bias carry over to a bias in investment in the human capital of male and female children? Describe an empirical analysis you could do to investigate this question.

c)   (9) Drawing on the theory of marriage, discuss the later consequences for female well being and other outcomes, including female labor force participation, of male-biased sex selection and investment.

3.   (25) Write briefly about each of the following questions:

a)   (8) Describe variations in health by socio-economic status over the life cycle in the US, and offer explanations for this pattern.

b)   (8) Explain why altruistic parents might invest less than the optimal amount (define this) in their children's education.

c)   (9) Discuss possible reasons for the decline of marriage in recent decades in the industrial nations, and the rise of out-of-wedlock childbearing.

4. (25) A corporation provides new employees with an exciting but stressful year of training. Recruits are continually entering and exiting training throughout the calendar year, but the number of places is fixed, so entrances have to equal exits (from dropouts and graduates) at all times.

Recognizing that entrances are like births and exits are like deaths, the CEO consults a demographer.

a) **A selection of useful formulas is given at the end of this question. The probability of dropping out within the first quarter (the first three months) is 0.413. If rates were assumed to be constant across the period, what would be the monthly probability of dropping out? What would be the corresponding hazard rate?**

b) **For those who complete their first quarter of training, the probability of dropping out in the next three months is 0.343. After the training program has been running for a long time, the distribution of trainees by duration of training at any given time reaches a stable state. In this stable state, what would be the ratio of all first-quarter trainees to all second quarter trainees?**

c) The longer a person stays in the program, the higher the person's acquired human capital, and the lower the probability of dropping out as a function of the length of time x in trainig. Suppose the hazard (measured in units per month) is given by the same formula as the Gompertz curve, $\alpha \exp(\beta x)$ but with a negative value for the slope parameter β. Take $\alpha = 0.200$ and $\beta = -0.080$. Is this model consistent with the numbers in Part "a"? What is the predicted probabiliy of completing all four quarters, that is, all twelve months of training?

d) Write down the numerical entries in a Leslie Matrix with three-month-wide age groups for projecting the number of trainees forward in time.

e) The company offers attractive benefits, so there is an incentive for individuals with less-than-excellent health (LTEH) to persist in training, raising graduation rates but imposing future costs. What is the economic term for such a phenomenon? Suppose a proportional hazards model is appropriate, and hazards for LETH recruits equal $\exp(-0.222)$ times the baseline hazards of Part "c". What is the predicted graduation rate for LTEH recruits?

A Selection of Useful Formulas

Survival from hazards: $l_{x+n} = l(x)e^{-h_x\ n}$

Gompertz Model: $h(x) = \alpha e^{\beta x};\ l_x = \exp\left((-\alpha/\beta)(e^{\beta x} - 1)\right)$

Survivorship: $l_{x+n} = l_x(1 - {}_nq_x) = l_x - {}_nd_x$

Person-Years Lived: $_nL_x = (n)(l_{x+n}) + (_na_x)(_nd_x)$

Lifetable death rate: $_nm_x = {_nd_x}/{_nL_x}$

Expectation of Life: $e_x = T_x/l_x$

Brass's Logit System: $l_x = \dfrac{1}{1 + \exp(-2\alpha - 2\beta Y_x)}$

Leslie Matrix Top Row: $\dfrac{_nL_0}{2l_0}\left(_nF_x + {_nF_{x+n}}\dfrac{_nL_{x+n}}{_nL_x}\right)f_{fab}$

Leslie Matrix Subdiagonal: $\dfrac{_nL_{x+n}}{_nL_x}$

Lotka's Equation: $1 = \sum(1/2)\left(_nF_x{_nL_x} + {_nF_{x+n}}{_nL_{x+n}}\right)(f_{fab}/l_0)e^{-r(x+n)}$

Stable Age Pyramid : $_nK_x^{stable} = B(_nL_x)\,e^{-rx}$

Lotka's Parameter: $r \approx \log(NRR)/\mu$

0.1 For Reference: List of Readings Covered on the Field Exam

Background

(*)-Ron Lee (2003) "The Demographic Transition: Three Centuries of Fundamental Change" Journal of Economic Perspectives v.17 n.4 Fall 2003 pp.167-190

Economics of Marriage and Divorce

(**)Becker Gary, Elizabeth Landes, and Robert Michael (1977) "An Economic Analysis of Marital Instability" Journal of Political Economics 85(6): 1141-1187

(*)Lundberg, Shelly and Robert Pollack (2007) "The American Family and Family Economics" Journal o Economic Perspectives v.21 n.2 Spring pp.3-26

(#)Stevenson Betsey, Justin Wolfers (2007) "Marriage and Divorce: Changes and their Driving Forces" Journal of Economic Perspectives v.21 n.2 Spring pp.27-52

(#)Angrist Josh (2002) "How do Sex Ratios Affect Marriage and Labor Markets? Evidence from America's Second Generation" Quarterly Journal of Economics. Vol. 117 No.3 (Aug 2002) pp..997-1038

(#)#Grossbard, Shoshana and Catalina Amuedo-Dorantes (2007) "Cohort-level sex ratio effects on women's labor force participation" Review of Economics of the Household, v.5 n.3 (September), pp.249-278. (May need to get hardcopy from me; not sure.) [ ]

#DAN ARIELY, GUENTER J. HITSCH, ALI HORTACSU (2008) "Matching and Sorting in Online Dating" Working Paper. (bSpace) [ ]

#ALOYSIUS SIOW and CHASS.UTORONTO.CA (2008) "How Does the Marriage Market Clear? An Empirical Framework" Canadian Journal of Economics, Vol. 41, Issue 4, pp. 1121-1155, November/novembre 2008 [ ]

#NGUYEN VI CAO, EMMANUEL FRAGNIERE, JACQUES-ANTOINE GAUTHIER, MARLÈNE SAPIN, ERIC WIDMER (2008) "Optimizing the Marriage Market Through the Reallocation of Partners: An Application of the Linear Assignment Model", Working Paper. (bSpace) [ ]

Economics of Fertility

**Gary S. Becker (1992) "Fertility and the Economy," Journal of Population Economics v.5 n.3 (August) pp.185-201. (Nontechnical, but with a little math; a broad survey and synthesis of the major approaches in the economics of fertility. Not easy reading, but valuable for non-economists as well as economists.)

Martha Bailey (2006) "More Power to the Pill: The impact of contraceptive freedom on women's life cycle labor supply" Quarterly Journal of Economics

Adsera, Alicia. 2004. "Changing Fertility Rates in Developed Countries: The Impact of Labor Market Institutions." Journal of Population Economics.

- AreChildrenNormal.pdf

- TertiltEcHistOfUSFert.pdf (Kelvin)

- BillariFertAndPensions.pdf

- (FLFP_by_age_of_young_child.pdf probably less interesting than others)

- HowParentsAllocateTime.pdf (Alma)

- MorettiDemandForSons.pdf (Emily)

- (OsterHepBAndMaleSexRatio.pdf – retraction of an earlier argument made by Emily Oster on causes of sex ratio imbalance in China)

#Angrist, Josh (2002) "How Do Sex Ratios Affect Marriage and Labor Markets? Evidence from America's Second Generation", Quarterly Journal of Economics, Vol. 117, No. 3. (Aug., 2002), pp. 997-1038. [Monica]

#DAN ARIELY, GUENTER J. HITSCH, ALI HORTACSU (2008) "Matching and Sorting in Online Dating" Working Paper. (bSpace) [Aaron]

#NGUYEN VI CAO, EMMANUEL FRAGNIERE, JACQUES-ANTOINE GAUTHIER, MARLÈNE SAPIN, ERIC WIDMER (2008) "Optimizing the Marriage Market Through the Reallocation of Partners: An Application of the Linear Assignment Model", Working Paper. (bSpace) [Kirsten]

George Akerlof, Janet Yellen, and Michael Katz, "An Analysis of Out-of-Wedlock Childbearing in the United States," Quarterly Journal of Economics, May 1996, 111(2): 277-317

*Claudia Goldin (2006) "The 'Quiet Revolution' That Transformed Women's Employment, Education, and Family," American Economic Review, Papers and Proceedings, (Ely Lecture), 96 (May), pp. 1-21. (read lightly).

Causal Analysis in Economic Demography

**Robert Moffit (2005) "The Analysis of Causal Relationships in Population Research", Demography (Feb 2005), pp.91-108. (Read this article carefully)

These next two on causality and natural experiments are optional. No need even to skim unless you want to.

Rosenzweig, Mark and Ken Wolpin (2000) "Natural 'Natural Experiments' in Economics" Journal of Economic Literature 38:827-74.

Andus Deaton (2009) "INSTRUMENTS OF DEVELOPMENT: RANDOMIZATION IN THE TROPICS, AND THE SEARCH FOR THE ELUSIVE KEYS TO ECONOMIC DEVELOPMENT" NBER WP 14690

This next one you should skim to get the basic idea.

Report: Kasey Buckles and Daniel M. Hungerman "SEASON OF BIRTH AND LATER OUTCOMES: OLD QUESTIONS, NEW ANSWERS" NBER Working Paper 14573

*Make sure to read each of the three following illustrations of causal analysis in economic demography at least lightly, enough to figure out why there is a problem of causal inference, what is the research strategy for identification, and how the results change when this strategy is employed. Do not read each in detail, it would take you forever! These should be considered in relation to the Moffit article on causal inference.

Arline Geronimus and Sanders Korenman (1992) "The Socioeconomic Consequences of Teen Childbearing Reconsidered," Quarterly Journal of Economics CVII: pp.1187-1214.

Joe Hotz, S. McElroy and S. Sanders (1996) "The Costs and Consequences of Teenage Childbearing for Mothers", in Kids Having Kids: Economic Costs and Social Consequences of Teen Pregnancy (Urban Institute Press).

Gertler P and J Molynueax (2000) "The Allocation and Impact of Planning Program Inputs in Indonesia," in Cyrus Chu and Ronald Lee, eds., Population and Economic Change in East Asia, Population Development Review 2000, Vol. 26 (Sup) pp. 61-88.

Health and Mortality

*James Smith (2005) "Unraveling the SES-Health Connection", Population and Development Review, Special Issue (February).

*Robert Fogel (2004) "Why the Twentieth Century Was So Remarkable", Chapter 2 of Robert Fogel, The Escape from Hunger and Premature Death, 1700-2100 (Cambridge University Press, Cambridge England), pp.20-42.

* "THE SES HEALTH GRADIENT ON BOTH SIDES OF THE AT-LANTIC" James Banks, Michael Marmot, Zoe Oldfield, James P. Smith. NBER Working Paper 12674.

* "HEALTHY, WEALTHY, AND WISE: SOCIOECONOMIC STATUS, POOR HEALTH IN CHILDHOOD, AND HUMAN CAPITAL DEVELOPMENT" Janet Currie, NBER Working Paper 13987. (A long, detailed paper; skim, but read enough to get main results.)

"A Dynamic Model of Birth Weight" by Emilia Del Bono, John Ermisch, And Marco Francesconi, IZA Discussion Paper No. 3704 (September 2008).

"Being Born Under Adverse Economic Conditions Leads to a Higher Cardiovascular Mortality Rate Later in Life: Evidence Based on Individuals Born at Different Stages of the Business Cycle" Gerard J. van den Berg, Gabriele Doblhammer-Reiter, Kaare Christensen (IZA Discussion Paper No. 3635 August 2008.

Douglas Almond (2006) "Is the 1918 Influenza Pandemic Over? Long-term Effects of In Utero Influenza Exposure in the Post-1940 U.S. Population" Journal of Political Economy, 114 (August 2006), 672-712.

Age Composition, Family Life Cycle, and Intergenerational Transfers

* A.V. Chayanov, The Theory of Peasant Economy, Daniel Thorner et al translators, (University of Wisconsin Press, 1986; originally 1925); pp. 53-60 and bottom 76-81. (get main ideas; don't need detail)

* Ronald Lee and Karen Kramer (2002) "Children's Economic Roles in the Context of the Maya Family Life Cycle: Cain, Caldwell, and Chayanov Revisited," Population and Development Review, 28 (3):475-499 (September 2002). (get main ideas; don't need detail.).

** Gary S. Becker and Kevin M. Murphy (1988), "The Family and the State," Supplement to Chapter 11 in A Treatise on the Family (Enlarged Edition), Harvard University Press, reprinted from Gary S. Becker and Kevin

M. Murphy (1988), Journal of Law and Economics, April, pp. 1-18. (Read carefully.)

* Ronald Lee. (2003) "Demographic Change, Welfare, and Intergenerational Transfers: A Global Overview," Genus v.LIX, no. 3-4 (July-December), p.43-70.

The following two articles are optional; not required even to skim.

Donald Cox, "Motives for Private Income Transfers," Journal of Political Economy, June 1987, 95: 508-546.

Yean-Ju Lee, William L. Parish, and Robert J. Willis, "Sons, Daughters, and Intergenerational Support in Taiwan," American Journal of Sociology, January 1994, 1010-1041.

*Ron Lee "Some notes on modeling the interface of demography and macro-economics", on bSpace as PopEconMath. 5 pages.

*Paul Samuelson (1958) "An Exact Consumption-Loan Model of Interest With or Without the Social Contrivance of Money," Journal of Political Economy v.66 n.6 pp.467-482. (This is a very difficult classic article that may seem deceptively simple. I will present some of it translated into the framework in the PopEconMath notes. You should get the points emphasized in class lecture.)

*Ronald Lee (1994) "The Formal Demography of Population Aging, Transfers, and the Economic Life Cycle," in Linda Martin and Samuel Preston, eds., The Demography of Aging (National Academy Press). This article is fairly technical in places. Do not feel obliged to try to master the math details.

*David Cutler, James Poterba, Louise Sheiner, and Lawrence Summers (1990) "An Aging Society: Opportunity or Challenge?" Brookings Papers on Economic Activity v.1, pp.1-56 and 71-73. (Read pp.1-16 carefully, and skim the rest.)

Immigration

*George Borjas (2003) "The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market", Quarterly Journal of Economics (November), pp.1335-74.

*David Card (2009) "IMMIGRATION AND INEQUALITY", Eli Lecture to American Economic Association, Jan 2009, and NBER Working Paper 14683, at http://www.nber.org/papers/w14683

*David Card "Is the New Immigration Really So Bad?" Economic Journal 115 (November 2005). bSpace (There is some overlap with his Eli Lecture).

Population and Economic Development (with introductions to many of the readings)

A. Background of the controversy and the revisionist view of the mid-1980s. This report was highly controversial in some circles but was generally accepted by economists, and marked the end of the view that population growth in the Third World was an economic catastrophe.

*National Research Council Working Group on Population and Economic Development (1986) Population and Economic growth Development: Policy Questions (National Academy Press, Washington D.C.) Read the "Introduction" pp.1-10 (ignoring the description of the world population and economic trends of that day), and the "Conclusion", pp.85-93. This book can be read for free on line, but one page at a time, at: http://search.nap.edu/nap-cgi/de2007.cgi?term=population+growth+and+economic+development&GO.x=0&GO.y=0

B. Some analytic framework and cross-national results. This article synthesizes a substantial literature on cross-national regression studies of the effects of population growth on economic development, and highlights the "translation" of population age distribution changes into per capita income.

*Allen C. Kelley, Robert M. Schmidt (2005) "Evolution of recent economic-demographic modeling: A synthesis" Journal of Population Economics 18:275–300

C. Searching for a natural experiment: Abortion, Contraception, and Health. In each case, think about the nature of the "experiment", and how plausible you find it and the identified supposedly causal effect. For the Acemoglu and Johnson reading, see if you can find the estimated effect of population growth in addition to the health result that they feature.

*Daron Acemoglu and Simon Johnson (2007) "Disease and Development: the Effect of Life Expectancy on Economic Growth", Journal of Political Economy, (December) volume 115, pp. 925-985.

*David E. Bloom, David Canning, Günther Fink, and Jocelyn E. Finlay (2007) "Fertility, Female Labor Force Participation, and the Demographic Dividend" working paper (September).

*Grant Miller (forthcoming) "Contraception as Development? New Evidence from Family Planning in Colombia," Economic Journal.

D. Human capital

*Ronald Lee and Andrew Mason (in press) "Fertility, Human Capital, and Economic Growth over the Demographic Transition" European Journal of Population.   (on bSpace).

Biology and Economic Demography

**Cox, Donald (2007) "Biological Basics and the Economics of the Family" Journal of Economic Perspectives v.21 n.2 Spring pp.91-108. Demography and demographic behavior have a strong biological basis. Here a theorist who did seminal work in the past on intergenerational transfers discusses biological influences on family behavior related to demography.

*"Improvements and Future Challenges in the Field of Genetically Sensitive Sample Designs", Frank M. Spinath November 2008. (GenesAndEconomics on bSpace)

*"Individual differences in allocation of funds in the dictator game associated with length of the arginine vasopressin 1a receptor RS3 promoter region and correlation between RS3 length and hippocampal mRNA" A. Knafo†, S. Israel†, A. Darvasi‡, R. Bachner-Melman†, F. Uzefovsky†, L. Cohen§, E. Feldman†, E. Lerer¶, E. Laiba**, Y. Raz††, L. Nemanov‡‡, I. Gritsenko‡‡, C. Dina§§, G. Agam,***, B. Dean†††, G. Bornstein† and R. P. Ebstein* in Genes, Brain and Behavior (2008) 7: 266–275 (GeneticsAndBehavior_2007 on bSpace). (Skim for main ideas; this is a highly technical biology article, but you can easily find the implications of the research.)

*Ronald Lee "Rethinking the Evolutionary Theory of Aging: Transfers, not Births, Shape Senescence in Social Species," Proceedings of the National Academy of Sciences v.100, n.16 (August 5, 2003), pp.9637-9642. (LeePNAS03 in bSpace). (This is short but very difficult; read intro and conclusions, get the flavor of the argument.)