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THE FUTURE OF AMERICAN FERTILITY

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ABSTRACT

This paper reviews the major social and demographic forces influencing American fertility levels with the aim of predicting changes during the next three decades. Increases in the Hispanic population and in educational attainment are expected to have modest and offsetting effects on fertility levels. A cessation of the recent pattern of increasing ages at childbearing will at some point put upward pressure on period (but not cohort) fertility rates. Higher relative wages for women and better contraception have empowered women and fundamentally altered marriage and relations between the sexes. But women's childbearing has become less dependent upon stable relations with men, and educational differences in intended fertility have narrowed. One explanation of higher fertility in the U.S. than in other developed countries is that its institutions have adapted better to rising relative wages for women and the attendant increase in women's labor force participation.

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The level of fertility in a population is the principal determinant of the shape of its age structure, which in turn is a critical factor in the terms of trade within a pay-as-you-go system of public pensions. Simulations done by the Social Security Administration show that the 75-year actuarial balance of the social security system would be higher by $2.6 trillion in present value if fertility were high (2.3 children/woman) rather than low (1.7) (compiled from Trustees, 2007). Partly because of their age structural consequences, national fertility levels are considered "too low" by a majority of governments in developed countries (Kohler et al. 2006).

This paper reviews the major factors that appear to be affecting fertility levels in the United States, with an eye towards making defensible statements about future directions of fertility. The subject covers a vast disciplinary range including demography, economics, sociology, public health, reproductive biology, evolutionary biology, political science, and psychology. There is no single, widely-accepted framework for analyzing the determinants of fertility at the level of a population. In its place, we will pursue an eclectic, inductive approach, surveying the landscape of fertility variation in search of clues about its principal drivers. Our search considers variation over time and space and across individuals.

Why Do People Have Children in the Twenty-First Century?

It is useful to begin with this provocative question posed by Morgan and King (2001). If there were no compelling answer to the question, we would have to confront the possibility that levels of fertility will approach zero. Clearly, the answer to the question does not lie in the domain of finance, since children are very costly and probably always have been. Early suggestions that children were a net economic asset in hunter-gatherer or subsistence economies

appear to have been inaccurate, although children's greater contribution to the family economy in such circumstance reduced their net costs relative to children in the present (Kaplan, 1994).

Sociologists have usefully distinguished between childbearing aimed at satisfying social expectations and childbearing aimed at self-fulfillment. Thornton and Young-DeMarco's (2001) review of trends in attitudes about one's own childbearing and that of others shows a huge reduction during the 1960s and 1970s in the degree of "oughtness" regarding fertility. While the desire to satisfy social expectations has not disappeared, people began to perceive less social pressure to bear children and to have less rigid expectations of others' performance. Increasingly, people justified childbearing in terms of its impact on their personal well-being, satisfaction, and happiness. One of the instrumental features of children that several sociologists have stressed is their value in forming social networks (Schoen et al. 1997).

In view of the imperatives of reproduction for the survival of a species, it would be surprising if the rewards from childbearing and childrearing did not have a deep evolutionary basis imprinted in human biology (Foster 2000). Recent investigations in psychology help to clarify the nature of these rewards. Bartels and Zeki (2004) use fMRI imaging to measure brain activity in mothers when they viewed pictures of their own children and those of acquainted children and adults.[1] Pictures of their own children, but not of others, activated regions of the brain rich in oxytocin and vasopressin receptors-- neurohormones associated with pair-bonding-- while deactivating regions associated with negative emotions and social judgment. Animal studies confirm the central role of oxytocin and vasopressin in attachment and bonding (Carter et al. 2005).

Mothers are aware of the intense emotions evoked by their children. "The Motherhood Study," a nationally representative telephone survey of 2,009 mothers, found that 93% agreed

[1] To date, there have been no equivalent studies of fathers.

with the statement that “I have an overwhelming love for my children unlike anything I feel for anyone else.” 81% said that they were very satisfied with their life as a mother and an equal percentage agreed that “being a mother is the most important thing that I do” (Erickson and Aird 2005). The potential rewards of parenthood -- presumably social as well as emotional -- are acknowledged by high school seniors, three quarters of whom believe that motherhood and fatherhood will be fulfilling. Between 1976-77 and 1997-98, the percentage so reporting rose by 11 points for women and 7 points for men (Thornton and Young-DeMarco 2001). The increase was greatest for females and males whose fathers had attended college (Sayer, Wright, and Edin, 2003).

It is possible that the rewards and costs of childbearing are not fully appreciated until one has a child. One ethnographic study reports that mothers in fact did not anticipate how completely they would fall in love with their offspring (McMahon 1995), which raises the possibility that the motivations for having the first child are systematically different from those of subsequent children. A study in Bulgaria (Buhler 2006) concluded that the principal attitudes predictive of having a first child were beliefs that it would strengthen relations with partner and parents, whereas the principal attitude predictive of a second child for both men and women was the perception that it would bring “increased joy and satisfaction in life.” Companionship for the first child is also often cited as a motivation for having a second child (Fawcett 1983). In a careful study of reported happiness among monozygotic twins in Denmark, having one child was found to increase the happiness of young women, but there was no increment in happiness from additional children (Kohler et al. 2005). Once partnership status was controlled, a man’s happiness was unaffected by the number of children he had, including the first.

Recent Trends in American Fertility

The most common measure of fertility is the period total fertility rate (TFR), which indicates how many children would be born to a woman who survived to the end of her reproductive years and experienced at each age the observed age-specific fertility rate of a particular period. The level of the total fertility rate that allows each generation to replace itself exactly is approximately 2.08 children per woman. Figure 1 shows the value of the TFR in the United States since 1928. With virtually no interruption except the post-World War II baby boom, the TFR fell continuously from 1820 to 1975 (not shown). Since 1989 it has remained in the narrow range of 1.98 to 2.10. Figure 1 also shows the average number of children ever born to cohorts who completed their childbearing and were aged 26 during the year shown on the x-axis.[2] Clearly, there has been less volatility in the completed family sizes of actual cohorts than in the period measures based on synthetic cohorts. This relation is also evident in Europe (Bongaarts 2002).

The period TFR is usefully considered to consist of a volume component, measuring the completed family sizes of cohorts then bearing children, and a timing component, indicating when in the course of their lives the cohorts will bear their children. During a period when ages at childbearing are growing older, the period TFR will be systematically lower than the TFR of relevant cohorts because of a "thinning out" of lifetime cohort births.[3] Based upon age-specific rates of childbearing provided by the National Center for Health Statistics, the mean age at childbirth in the US has risen fairly steadily from 26.00 in 1980 to 27.90 in 2005. Using an

[2] The completed family size of a cohort would be identical to the TFR of the cohort if there were no differences in fertility at a particular age between migrants and non-migrants or between those who survive to age 45 and those who die before reaching that age.

[3] In the extreme, imagine that the cohort born in 1970 had all of its births at age 29.0 and the cohort born in 1971 had all of its births at age 30.0. In 2000, there would be no births at all. This deficit in period rates would not be offset by a subsequent surplus unless ages at childbearing eventually became younger again.

adjustment formula developed by Ryder, we find that this delay has reduced period total fertility rates in the US during this period by about 0.15 children per woman. A more elaborate procedure developed by Bongaarts and Feeney produces a similar reduction averaging 0.14 children per woman over the period 1980-1997 (Schoen, 2004). Faster delays in Europe have had a slightly bigger impact on period fertility levels there, averaging 0.26 in 18 countries over the period 1990-97 (Bongaarts 2002). So the volume components of European and American fertility levels are somewhat more similar than would appear from period TFR measures.

The decline in American fertility is reflected in changes in the distribution of parities (the number of children a woman has born) among women who have completed childbearing. Figure 2 shows that parity two has become the most common destination for women, while parities zero and one have grown steadily in frequency; families of three have become somewhat less common, and families of four or more children have fallen precipitously from being the most common in 1976 (i.e., among mothers of the baby boom) to the least frequent in 2002.

Bearing children is subject to disturbances that can raise or lower the number of births relative to intentions or expectations. Morgan (2003) finds that only 38% of women aged 22 in the National Longitudinal Study of Youth in 1982 had realized their stated intended parity by age 40. A common form of interference is poor contraception, either through method failure or failure to use any contraception when no conception is wanted. By European standards, Americans have an unusually high incidence of unwanted or mistimed births. 14% of births during the period 1997-2002 were retrospectively classified as “unwanted” (i.e. not wanted at any time in the future) at the time of conception by their mother and 21% were mistimed (US National Center for Health Statistics 2005a). While a mistimed birth will not necessarily increase a woman’s parity above her intentions, an unwanted birth will. 44% of births to 22-44-year-old

women who had not completed high school were classified as unwanted or mistimed, compared to only 15% among women who had completed college. The high incidence of unwanted and mistimed births is somewhat surprising in view of the legality of abortion. However, abortion may not be readily available, may be expensive, or may violate personal moral codes. Well-educated women are less likely to have an unwanted or mistimed birth in part because a higher proportion of their unintended conceptions result in an induced abortion.

One factor that can cause fertility to fall short of intentions is subfecundity. 7.4% of married women aged 15-44 in 2002 were classified as infertile: not practicing contraception and not becoming pregnant for at least one year (US National Center for Health Statistics 2005a). Separation from a partner may also cause women to fall short of childbearing expectations (Quesnal-Vallee and Morgan, 2003). The balance of positive and negative forces resulted in slightly fewer births than expected by respondents in the National Longitudinal Survey of Youth; not surprisingly, women who began childbearing late were particularly likely to fall short of targets expressed at an earlier age. Falling somewhat short is the typical but not universal cohort pattern (US Census Bureau 2000a; Hagewen and Morgan, 2005).

Women, Men, Partnerships, and Children

By long-standing practices supported by powerful social norms, childbearing and childrearing in western countries occurred within marriage. The connection between marriage and childbearing has become more tenuous in the United States:

- 37% of births in 2005 were out-of-wedlock, compared to 5% in 1960 and 18% in 1980 (US National Center for Health Statistics 2006a; US Bureau of the Census 1979).

- fewer than half of American children aged 15 live with both natural parents (Kiernan, 2004).

- 60% of first births conceived before marriage in 1960-64 were “resolved” by marriage, compared to 23% in 1990-94 (Ventura and Bachrach 2000).

- two-thirds of adults now disagree with the statement that children are the main rationale for marriage (Thornton and Young-DeMarco 2001).

In short, marriage has become less important as a sanctioning device for childbearing and childrearing, as well as for sexual expression and cohabitation (Thornton and Young-DeMarco 2001). And marriage itself is changing as husbands and wives are becoming more similar in their household and market activities. Married women are spending less time doing housework while their husbands are spending more time (Bianchi, 2000). 68.5% of married women aged 25-34 participated in the labor force in 2003, compared to 38.8% in 1970 (US Census Bureau 2005b). Signaling greater independence of decisions within the family, a married woman’s labor force participation has become less responsive to her husband’s wage (Blau and Kahn 2005). It has also become less responsive to the presence and ages of her children. The labor force participation rate of women with a child under age one rose from 31% in 1976 to 55% in 2004 (US Census Bureau 2005a).

It is plausible to argue that the decline in marriage as a social institution and the changes that are occurring within marriage during the last four decades have the same basic sources: greater economic opportunities for women and vastly improved means of contraception (Chiappori and Oreffice 2008; Lundberg and Pollak, 2007; Preston 1987). Both have given women more power in their lives and in their relationships. The advent of the pill and the IUD in the early 1960s provided methods that were highly effective in preventing pregnancy, in part

because they were independent of any particular act of intercourse and thus required less cooperation from a partner. Marriage became less essential as a precondition for sexual expression. Furthermore, women could invest in their education and in their careers with less threat of disruption from an unwanted pregnancy whether inside a marriage or out (Goldin and Katz 2002). Such investment was also encouraged by the rise in divorce.

If the rise in women's labor force participation had originated exclusively from a supply shift -- resulting, for example, from fertility declines induced by contraceptive improvements -- it is likely that women's wages would have declined relative to men's. Instead, the median earnings of women working full-time year-round rose from 61% of men's in 1960 to 77% in 2005 (US Census Bureau 2007b). An important factor in the increase in women's participation and relative wages is probably the rise of service industries in which productivity is not associated with physical strength. Changing norms relating to equity and inequality were probably important as well. The increase in women's labor force participation would not have been as great had they not been able to find acceptable care for their children, and had they not believed that their children were not endangered by such care (Rindfuss et al. 2003).

As Gary Becker (1981) foresaw, the "gains from trade" in the conventional breadwinner/homemaker marriage eroded as women's opportunities outside the home became more similar to those of men. The reduction in gains was likely abetted by improvements in technology for performing standard household tasks (Greenwood et al. 2005; see also Isen and Stevenson, forthcoming). What was less foreseeable was that fertility would level off and even rise modestly as the institution of marriage was fundamentally changing. Had bearing children not been a powerful goal of most American women, they would have found ample reason to avoid them by virtue of their increasingly tentative relationships and the growing attractions of

work outside the home. Instead, they took advantage of their new powers to maintain a fertility level that is the envy of most other developed countries.

Individual-level Characteristics Associated with Fertility in the United States

In this section, we examine fertility variation according to major personal characteristics in order to seek some guidance about future fertility levels. We focus on two variables whose distributions are expected to change in predictable ways and that might therefore shed light on the future of fertility.

One of these variables is women's educational attainment, which has been shown to be negatively associated with fertility in many societies, including historically in the US (Yu 2006; Billari and Philipov 2004; Jones and Tertilt 2006). Prominent interpretations of this negative relationship are that better educated women have a higher opportunity cost of time and are better contraceptors. Table 1 presents the (virtually) completed family sizes of women aged 40-44 in National Surveys of Family Growth (NSFG) from 1973 to 2004.[4] Fertility has fallen by approximately one child per woman in three of the four educational classes and by 0.8 children among high school graduates.

More contemporary evidence can be generated by including younger women and their expected additional births. Table 2 is based upon women aged 30-44 in these same NSFGs. It presents the coefficients relating years of completed schooling to children ever born; to additional births expected; and to the sum of these two, which we term "total births expected." We use OLS regression, which has the convenient property that coefficients in the first two

[4] The 1973 NSFG was applied only to ever-married women. Approximately 5.7% of the cohort was never-married at age 40-44 (US Bureau of the Census 1972:104). This percentage varies from 4.5% for high-school graduates to 11.2% for college graduates. Conclusions would not be materially altered if these women and their relatively low levels of fertility could be included.

regressions add up to that in the third. We control a woman's age using a second-degree polynomial. For total births expected, the coefficient of a woman's years of schooling declined from -0.153 to -0.126 to -0.097 over this period. Schooling became less closely associated with fertility despite the fact that educational differentials in women's earnings became much steeper (Blau 1998; Goldin and Katz 2007). The reduction in the coefficient is entirely attributable to the number of additional births expected; the effect of educational attainment on the number of births that had already occurred to women remained very stable at -0.150 to -0.163. In other words, better educated women have consistently borne fewer children than more poorly educated women by their 30s and early 40s, but they increasingly expect to catch up before childbearing ends.

In 2002 for the first time, the NSFG was administered to men. Using the same format employed for women, Table 2 shows that the male coefficient of "total births expected" on education is only -0.053 in 2002, about half of that for women. An obvious interpretation of the sex difference is that men do not bear as much of the time costs of children as women do. Thus, the trade-off between parenting and earnings, which rise with education, is less acute for men (Schultz 1994). According to Table 2, the sex difference is manifest not in additional births expected but in achieved fertility, which is substantially less influenced by educational attainment for men than it is for women.

The regressions do not include any adjustment for marital status. We have argued that the increasing independence and power of women has made marital status less relevant to childbearing. Nevertheless, the large majority of births continue to occur within marriage and the ability of women and men to find suitable marriage partners is doubtless a factor in fertility levels. It is noteworthy in this context that the 2002 coefficients on education are scarcely

changed when current marital status is introduced: -0.097 for women remains -0.097 and -0.053 for men becomes -0.059.[5] It is not essential to introduce marital status factors in order to study the relation between educational attainment and fertility, a finding also reported in Australia (Yu, 2006).

A second major characteristic associated with variation in American fertility is ethnicity. High levels of immigration in recent years have left their mark on the fertility of a population already distinguished by longstanding black/white divisions. Table 3 presents the total fertility rates of major ethnic groups in the recent past.[6] The table shows that the fertility of non-Hispanic whites has been stable or has risen slightly during the past 16 years. The TFR of non-Hispanic whites in the United States would rank in a tie for second highest among developed countries, behind France (see below). So it is not correct to attribute the relatively high level of US fertility exclusively to high fertility among ethnic minorities -- and many European countries themselves have sizeable high-fertility ethnic minorities. In fact, the fertility of blacks has fallen sharply and is now below the national average. Hispanic fertility has been roughly level over this period.

The individual-level data files from NSFG enable us to investigate several additional questions about the relationship between ethnicity and fertility. Table 4 presents ethnic differentials in fertility among women aged 30-44, controlling age and years of school completed, over the period 1973 to 2002. It is clear that ethnic differentials in fertility persist

[5] The categories are never married/not cohabiting, married, cohabiting, and widowed/separated/divorced.

[6] Numerators are derived from birth certificates and denominators from census estimates. The ethnic classification is not strictly comparable in the two sources and the National Center for Health Statistics (2006b) has attempted to bridge the divide. Furthermore, it is likely that the reporting of births is more complete for Hispanics than the estimates of populations. A substantial proportion of Hispanics are illegal immigrants and would not want to be reported to census authorities, whereas they have an incentive to have their births reported. Thus, the figures in Table 3 may be overestimated for Hispanics. Weak support for this suggestion comes from the 2004 Current Population Survey, wherein Hispanic women aged 40-44 reported only 2.30 births, on average [US Census Bureau 2005a]. On the other hand, the number of births reported in the CPS are clearly deficient and especially so for out-of-wedlock births to Hispanics (www.census.gov/population/socdemo/fertility/ofw-childtx). A third source of data is the National Survey of Family Growth. Hispanic women aged 40-44 in the 2002 NSFG averaged 2.49 children, about 0.2 children higher than in the CPS. Hispanic women aged 30-34 expected to bear 2.77 children in NSFG, implying rising fertility and giving some credibility to the still higher figure of NCHS.

when education is controlled. Over the 29-year period, the differential between blacks and whites contracted sharply while the differential between Hispanics and non-Hispanic whites expanded. In both cases, the trend in the differential is primarily attributable to changes in the number of births that have already occurred rather than to those that are expected in the future.

The increasing fertility differences between Hispanics and non-Hispanics are primarily a result of the changing composition of the Hispanic population itself. Cubans and Puerto Ricans, who made up a larger share of the Hispanic population in the past, have relatively low fertility levels (TFRs of 1.733 and 2.057, respectively, in 2004). In contrast, Mexican-American women had a TFR of 3.021 (US National Center for Health Statistics 2006b). Mexican-Americans contributed 61% of Hispanics births in 1989 and 72% in 2004. The Mexican/non-Mexican differences reflect fertility differences in country of origin, as well as in length of time spent in the United States. It is unlikely that a widening of Hispanic/non-Hispanic fertility differences will continue. Mexican-Americans are already a high percentage of the Hispanic population and their fertility is declining across generations in the US (Parrado and Morgan 2007). It is worth remembering that Italian and Polish immigrants to the US had TFRs of 6.94 and 6.97 in 1905-09 when the US value was 3.56 (Morgan et al. 1994).

Spatial Differences in US Fertility

Geographic differences in US fertility have been used in several ways. One is to examine the impact of interstate differences in laws, programs, and regulations that may be related to fertility. Moffit's (1998) review of research on the relationship between welfare payments and fertility, most of which is based on interstate data, concludes that there are modest positive effects of benefit levels on fertility, although there are some contrary findings including a

subsequent article on the "family cap" (Kearney 2004). As noted below, Klerman (1999) finds modest effects on fertility of interstate differences in access to abortion and of Medicaid payment schedules for abortion.

A second effort to use areal data focuses on identifying what may be thought to be "cultural" differences in attitudes, values and practices related to childbearing. Areal differences in fertility are substantial. States in New England -- Massachusetts, New Hampshire, Rhode Island -- have 2004 TFRs in the lowest range of 1.7- 1.8. States with high Mormon concentrations, Utah and Idaho, have TFRs in the highest range of 2.3-2.5. Lesthaeghe and Niedert (2006) perform a factor analysis and find that a state's fertility level is closely related to its frequency of late marriage and of abortions per live birth. Since these are, in a sense, components of fertility, the results are not especially surprising.

More surprising is the high correlation that they find, -0.87, between the factor representing this demographic cluster and the percentage of a state that voted for George Bush in 2004. This correlation suggests to the authors that there may be important variation in the underlying structure of values and orientations that manifests itself in both family and political domains. They do not identify the main features of that structure.

A third approach to studying areal variation uses metropolitan areas rather than states as the units of analysis. Metropolitan areas form more cohesive labor markets than states and are better suited to testing ideas about the impact of labor market conditions on fertility. We have supplemented the 2002 NSFG individual-level data on fertility histories and personal characteristics with data on characteristics of the metropolitan areas in which individuals reside. We consider four aggregate-level economic indicators: the median earnings of female full-time full-year workers; the median earnings of male full-time full-year workers; the unemployment

rate in the area; and the median value of owner-occupied houses. All data are taken from the US Census of 2000. We expect, following Becker (1981), that the level of women's earnings in an area, an indicator of economic opportunities, will have a negative effect on fertility and that men's earnings will have a positive effect. Jones, Schoonbroodt, and Tertilt (forthcoming) provide a broad review of the assumptions that are required in order to generate such predictions. We expect that the median value of houses, an indicator of the housing price structure, will be negatively related to fertility because children are space intensive. We also expect fertility to be negatively related to an area's level of unemployment.

The model that we estimate includes individual-level variables whose values were established in childhood: mother's educational attainment (that is, the mother of the woman interviewed in NSFG); the religion in which a woman was raised, if any; and whether or not her parents' marriage was intact when she was aged 18. Coefficients of the OLS regression are presented in Appendix Table 1. Standard errors are not adjusted for clustering. Areal variables were available for the 280 largest metropolitan areas. 82% of weighted respondents resided in one of these areas (77 cities total) and were included in the analysis.

Coefficients of female and male earnings levels in a metropolitan area are in the expected direction, large, and statistically significant. Table 5 summarizes the coefficients in relevant equations. As before, the coefficients of births achieved and additional births expected sum to the coefficient of total births expected. Both achieved fertility and the additional number of children expected are significantly affected by female and male earnings. The coefficient of female earnings on total births expected of -2.7 implies that a 10% increase in relative women's earnings would provoke a reduction of 0.27 children. This very large effect is highly reflective of the fertility expectations -- rather than achievements -- of younger women. If estimation is confined

to women aged 30-44, where expected family sizes have for the most part already been achieved, the female earnings coefficient for total births expected declines in absolute value to -1.421 and the male declines to 1.638.

As in the case of a woman's educational attainment, a woman's marital and partnership status is not material to interpreting the coefficients in Table 5. When marital and cohabiting status is controlled, the values of coefficients on female and male earnings change by less than 10%.

The female and male earnings coefficients are roughly equal in value and opposite in sign, so that the ratio of female to male earnings in an area is a good predictor of fertility. Among large cities, the highest ratios of female to male earnings (range of 0.76 to 0.81) are found in San Diego, Miami, Los Angeles, Tampa, Washington D.C., and New York City. The lowest ratios (0.62 to 0.70) are found in interior rust-belt cities of Detroit, St. Louis, Pittsburgh, Cleveland, and Chicago. Among smaller metropolitan areas, the range goes from 0.57 to 0.91.

For purposes of prediction we would like to be able to treat relative earnings levels as exogenous, but there is no question that selective migration is affecting results. Women with high tastes for work or low tastes for childbearing would be more likely to move to, or remain in, an area of relatively high women's earnings. Likewise, women with high tastes for childbearing and low tastes for work might be more likely to move to or remain in an area of relatively high male earnings. It would be a mistake to use the coefficients that we have estimated to make predictions about the future of fertility since those coefficients include the effects of selective migration. A second upward bias in the coefficient may result from the effect of fertility patterns in an area on women's earnings; e.g., non-market factors inducing low fertility in an area may

cause women to accumulate more labor market experience and hence raise their earnings. No equivalent bias is expected on the coefficient of male earnings.

The relationship between women's earnings in an area and fertility could be expected to be stronger for well-educated women than for poorly-educated women because areal variation in the opportunity cost of children, as well as in the gains from work-related migration, should be greater for those with higher potential earnings. To test this hypothesis, we created an interactive variable equal to a woman's completed years of schooling times the mean earnings for women in her metropolitan area. When added to the regression model for women aged 15-44 shown in Appendix Table 1, the coefficient of the interactive variable is positive and significant ($p<.00$). The largest (negative) coefficients are for births achieved rather than future births expected. So it does appear that the fertility of better educated women is more responsive to the level of earnings in a metropolitan area, although the role of selective migration adds complexity to the interpretation.

The coefficient of an area's unemployment level is not significant. The median price of owner-occupied houses in an area has a significant positive coefficient, an unanticipated result that may reflect a wealth effect.

International Differences

An international perspective permits the examination of the effects of a broader range of institutional and cultural settings than is available within any single country. Table 6 shows that US fertility is higher than that in any other developed country with 5 million or more inhabitants. Even the lowest-fertility US state, Rhode Island with a TFR of 1.71 in 2004, would rank well

above the median of 1.35. As noted above, the period TFR underestimates cohort fertility when ages of childbearing are rising. Few cohorts who have recently completed childbearing in Europe have TFRs less than 1.7 (Frejka and Sardon 2004). In terms of parity distributions, the major difference between Europe and the US is not in the prevalence of childless women but rather of women with 3+ children (Caldwell and Schindlmyer 2003). The mean "ideal family size" in Europe remains at two or above except in Germany and Austria. In low-fertility Italy, it is 2.1 (Goldstein et al. 2003).

One prominent explanation of declining fertility in Europe is called "the second demographic transition", according to which the emergence of individualism and its emphasis on self-fulfillment have undercut familistic norms (e.g., Lesthaeghe and Neidert 2006; van de Kaa 1996). However, this explanation does a poor job of accounting for cross-national variation. The northern European countries where ideational changes have been among the most far-reaching have the highest fertility levels in Europe (McDonald 2002), whereas many southern and eastern European countries with low fertility have retained relatively high levels of familism in value surveys and in many other behaviors such as cohabitation and divorce (Coleman 2004; Kertzer et al. 2006).

Perhaps the most important observation about cross-national variation in fertility is that the international correlation between the TFR and women's labor force participation in western Europe has become strongly positive at +0.81 (Billari and Kohler 2004). In 1975, the correlation for these same countries was -0.61. This demonstration has been replicated by several other analysts using slightly different groupings of OECD countries (e.g., Morgan, 2003). So countries in which the largest proportion of women work are now countries with the highest fertility. This relation is also apparent regionally in Italy (Kertzer et al. 2006).

It is very likely that, because of industrial and occupational changes, the relative wages for women have risen in virtually all developed countries. Some countries appear to have been able to adapt to this change in ways that better accommodate the combination of women's work with childbearing. These countries -- e.g., the United States, Sweden, Norway -- exhibit both high fertility and high female labor force participation. Some of the accommodations have been in the form of government programs. Hoem (2005) cites a battery of public policies in Sweden that he believes to be responsible for its relatively high fertility, including parental leave for 13 months at 80% of salary and state-run day care centers. Reviews of the effectiveness of family-friendly policies on fertility in Europe conclude that there have been several relatively modest successes (McDonald 2002, 2006; Kohler et al. 2006).

According to independent accounts of close observers in Italy (Kertzer et al. 2006) and Japan (Retherford and Ogawa, 2006), a major obstacle to higher fertility levels and greater participation of women in the labor force in these countries is the persistent strength of norms that idealize the traditional breadwinner/homemaker family. These norms discourage mothers from working and discourage unmarried women from becoming mothers. Mothers are thought to be the best guardians of their children, and men participate relatively little in child-rearing. Policy initiatives may have little impact under these circumstances. Japan has made very costly efforts to raise its fertility levels. The programs include generous child allowances, heavily subsidized state child care facilities, changes in educational standards to reduce the costs of child tutoring, and laws designed to encourage men's greater participation in child-rearing. But the Japanese TFR remains in the neighborhood of 1.3.

The institution of marriage appears to be more important in sanctioning childbearing and sexual behavior in these countries. In Japan, only 2% of births are out of wedlock and in Italy,

10% (Kiernan, 2004). To state the obvious: discouraging out-of-wedlock childbearing discourages childbearing. If the US were to eliminate all out-of-wedlock births and not replace them with marital births, its TFR would have been only 1.31 in 2004. Countries with higher proportions of births out of wedlock have higher TFRs: the correlation is +0.65 across 37 European countries in 1999. In 1975, when marriage was a stronger institution, it had been -0.35 (Billari and Kohler, 2004). Ironically, the maintenance of traditional family values, especially in the form of rigid norms about appropriate sex roles within the family and the sanctity of marriage as a childrearing institution, may be responsible for very low levels of fertility in many places (see also McDonald 2000; Caldwell and Shindlmyer 2003).

Strong norms supportive of traditional family relations were also very prominent in the United States but they have substantially eroded. For example, the General Social Survey asked whether respondents agreed or disagreed with the statement that "It is more important for a wife to help her husband's career than to have one herself." Only 36% of women disagreed with the statement in 1977-78 while 80% disagreed in 1996-98 (Thornton and Young-DeMarco 2001). Perhaps the incentives to abandon the breadwinner/homemaker model were higher in the US or perhaps, as de Tocqueville (1945) argued 170 years ago, American society is more flexible and adaptive than European.

Whatever adaptations occurred in the US were not primarily a product of public policy (Morgan 2003). The US tax code is not unusually friendly to families with children (d'Addio and d'Ercole 2005) and welfare benefits per child are low relative to child allowances in many European countries (Blau 1998). Government plays a relatively small role in day care for children in the US in terms of both finance and management. The adaptations permitting more mothers to work in the US were primarily a result of private negotiations between women and

various childcare providers, including their partners. They were facilitated by institutional adaptations such as longer store hours, which provided both opportunities for shopping by people who worked during the day and jobs at an hour when a spouse may be available for child care (Kohler et al 2006). The labor market in the US may also be more accommodating to young workers than are European labor markets, which are more rigid on many quantitative indicators (Nickell, 1997). American businesses, less encumbered by industrial policies, may have been able to provide more flexible hours and days. The declining coefficient relating fertility to women's educational attainment is another indication that the tensions between childbearing and work are easing in the United States.

Another major theme of de Tocqueville's is that Americans are unusually prone to form and gather in private associations. One institution that they join in far greater numbers than Europeans is the church. 50% of American women report that religion is very important to them, compared to 16% of European women. 50% of American women aged 18-44 attend church at least once a month, compared to 26% of European women (European Values Survey data cited in Frejka and Westoff 2006). The frequency of church attendance is highly positively correlated with actual and expected fertility both in the US and in Europe (Ibid.; Philipov and Berghammer 2007). For young parents, a church often provides opportunities for interaction with other young families, childcare services, and moral support for the difficult endeavors of parenthood (Wuthnow 2005). These features may lift fertility levels among members. Taking literally the empirical relation between religiosity and fertility, Frejka and Westoff (2006) estimate that the fertility of American women aged 35-44 would be 6% lower if Americans attended church as infrequently as Europeans and 18% lower if they perceived the same importance of religion as Europeans.

These estimates represent upper bounds because there is undoubtedly self-selection of family-oriented people into the community of church-goers, a tendency that would spuriously elevate the correlation between fertility and religious behavior. Nor does their analysis control other variables, such as educational attainment, that are correlated with both fertility and church attendance. To overcome partially these problems, we have used the 2002 NSFG to estimate the relationship between fertility and the religion of one's upbringing, controlling a woman's years of schooling and ethnicity. Results are shown in Table 7. Fertility differs substantially -- by a half a child or more -- between those raised with no religion (about 6% of all women) and those raised with any religion. The additional variance explained by introducing the religious variables is significant at .001.

Thus, religious differences in fertility are not readily explained by mechanisms of selection or contamination by third variables. The greater religiosity of the American population may in fact be contributing to US/European differences in fertility. The fertility differences by religious affiliation hold out the possibility that fertility will rise as high-fertility groups have more children who inherit the religion of their parents and maintain their high fertility levels. This possibility is not entirely theoretical: the growth of fundamentalist Protestant groups in the past century is attributable primarily to their unusually high fertility combined with a 70-80% intergenerational retention rate (Hout, et al. 2001). The example illustrates a more general point: there is upward pressure on fertility each generation by virtue of the fact that each generation is born disproportionately to the high-fertility members of the previous generation. The upward bias should be particularly strong when the high fertility example of one's own parents is reinforced by pronatalist norms and associations such as those typically found in churches.

Why are Americans more likely to attend church and espouse religious beliefs than Europeans? One prominent explanation is that American religious institutions are more flexible and entrepreneurial than are European (Finke and Stark 2005). Whereas European countries often face a virtual monopoly of religious institutions, staffed by clerics determined to maintain the monopoly, American religious institutions vigorously compete for adherents and use attendance and participation as principal gauges of success. Churches represent another instance in which institutional adaptability may help account for high fertility in the United States relative to Europe.

Implications

What have we learned that bears upon the future of American fertility? Several variables robustly associated with fertility are changing in predictable ways, as summarized in Table 8. One of these is ethnicity. The US Census Bureau projects the size and ethnic composition of the US population using data on fertility achievements and expectations and anticipated immigration. Its latest projections suggest that the Hispanic population will grow from 12.6% of the population in 2000 to 20.1% in 2030 (US Census Bureau 2004a). Combined with the large Hispanic/non-Hispanic fertility differentials shown in Table 3, and assuming that fertility levels remain constant within ethnic categories, this increase in Hispanic representation would increase the TFR from 2.046 to 2.113, an increase of .07 children. If Hispanic/non-Hispanic differentials contract, as has happened with other immigrant groups, the effect would be reduced.

A second variable related to fertility and moving in predictable directions is educational attainment. The US Census Bureau (2000b) projects educational attainment distributions to 2028. For adult women, their projections imply a gain of approximately 0.7 years of school

completed between 2003 and 2028.[7] Combined with the fertility coefficient on years of schooling of -.097, such changes would produce a reduction in fertility of .07 children. The effect is not large, and it should be recalled that the coefficient of women's education has been declining.

So the two most predictable changes in population composition, educational attainment and ethnicity, are expected to induce relatively small changes in fertility by 2028-30, and these changes essentially offset one another. In a multivariate framework, the combined changes in distributions of education and ethnicity would produce a decline in fertility of 0.02 children. [8]

We anticipate that the ratio of female to male earnings will continue to increase as industrial structures change and as equity norms become more universal. As noted earlier, our coefficients on female and male earnings represent an upper bound on the sensitivity of fertility to exogenous variation in these variables. To illustrate the potential impact of changes in the earnings ratio, we use the fertility equation for 30-44 year old women. The ratio of median female to male earnings of full-time full-year workers grew from 0.738 in 1995 to 0.788 in 2005 (U.S. Census Bureau 2008). If the same rate of annual increase occurred between 2005 and 2030, the effect on fertility would be approximately -1.5{0.163} = - 0.24 children, where -1.5 is the approximate coefficient of the earnings ratio (from Table 5) and 0.163 is the projected change in the natural log of the earnings ratio over a 25-year period. Thus, a continuing growth of women's earnings relative to men's may put significant downward pressure on fertility. But we reiterate that ours is an upper bound estimate because of possible upward biases in the coefficient resulting from selective migration and reverse causation. Moreover, a more egalitarian

[7] This is the mean gain for the high and low projections, weighted by ethnicity distributions in 2000 and assigning 10 years of schooling to those who did not complete high school, 12 to those who did, 14 to those who started but did not finish college, and 17 to those who finished college.

[8] The coefficient of educational attainment in a regression controlling age and ethnicity is -.083.

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distribution of childraising responsibilities would be expected to reduce the sensitivity of fertility to the sex ratio of earnings.

Other factors that may play a role:

- improvements in contraceptive technology should put mild downward pressure on fertility. But contraceptive improvements have been very slow since the 1960s, especially in the area of male contraception. And any improvements may be significantly offset by improvements in proceptive technologies for subfecund individuals. Barring advances in technology, improvements in contraceptive use could be expected to accompany improvements in educational attainment and to be captured by the estimated effects thereof.

- a more conservative Supreme Court may result in greater restrictions in access to abortion. Based on studies of interstate differences in access to abortion and in Medicaid funding thereof, the estimated effects on fertility would not be large. Klerman (1999) estimates that eliminating public funding altogether would increase the TFR by 2% and that making all abortions illegal would increase it by an additional 3%.

- eventually, the rise in ages at childbearing must come to an end. This process has reduced the period TFR by approximately 0.15 children per woman. When it stops, period rates (but not necessarily cohort rates) will be pushed upwards. At the rate at which the mean age at childbearing has been rising in the US, approximately 0.08 years per year, it would take 20 years before the mean age in the US reached the level of 29.5 years already observed in Sweden (and longer to reach the mean age currently observed in France, the Netherlands, Ireland and Spain; compiled from US Census Bureau 2004b.) So the timing-induced depression in US period rates could last a long time.

It is clear that modeling fertility timing is an important element in fertility projections. As Figure 1 demonstrated, the sharp changes in American fertility over the past 80 years have been powerfully influenced by timing factors. The baby boom and baby bust could not be predicted or accounted for by the marginalist approach taken here. It seems likely that elements of social contagion have operated in the past to add volatility to period measures of fertility. There is no reason to believe that they cannot reappear in the future.

Fertility in the United States is relatively high, even for its lowest-fertility groups. Compared to most countries in Europe and East Asia (but not northwestern Europe), fertility is high even for white non-Hispanics, for states with the lowest fertility, and for college graduates. One possible explanation of American "exceptionalism" is an unusually flexible and adaptive society, one in which women were able to react quickly to the rise in their work opportunities and find ways to combine motherhood and work while many other societies stayed wedded to more traditional family forms. If American women have simply been quicker to find ways to do things that women elsewhere also want to do -- have at least two children even when they have attractive earnings prospects outside of the home -- then fertility elsewhere should rise to American levels as women and men adapt to new circumstances and abandon older cultural forms.

A second, related explanation of American exceptionalism is the unusually high degree of religious belief and participation among Americans. Projecting religiosity into the future is risky, in part because recent trends are not entirely consistent. The proportion of American adults identifying their religious affiliation as "no religion" in the General Social Survey rose from 7% to 14% between 1991 and 2000 (Hout and Fischer, 2002); the rise was especially sharp among young adults. On the other hand, the proportion of adults who identify as conservative

Christians continues to grow, fueled by differential fertility and high rates of intergenerational retention. And the proportion of American children attending church and participating in youth groups rose sharply between 1997 and 2003 (Hofferth 2008). The possibility that American fertility has strong religious underpinnings does not suggest a clear-cut direction for future fertility trends, but it does add uncertainty to them.

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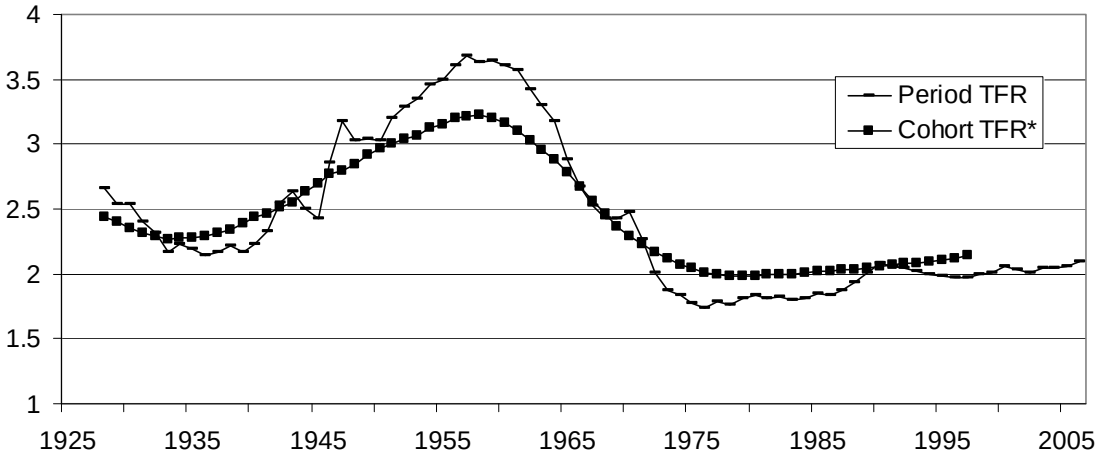
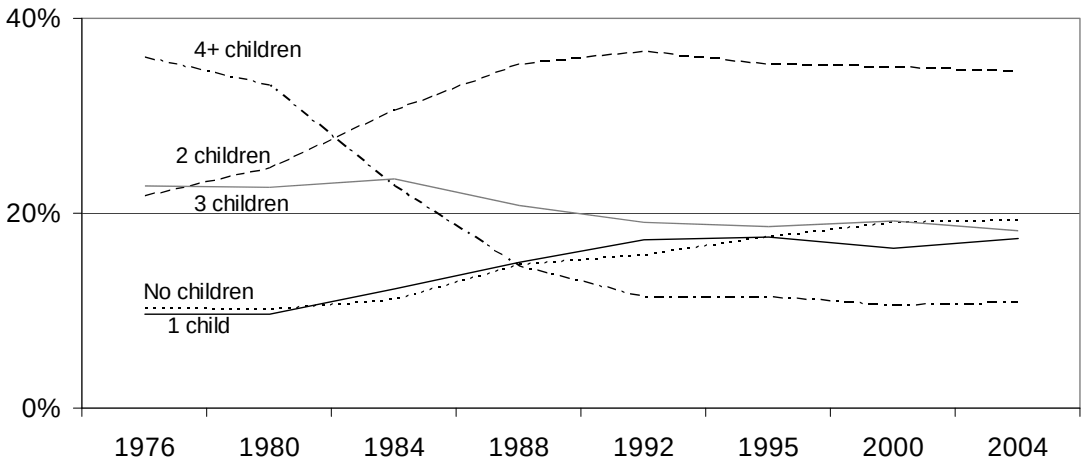
Figure 1. Period and cohort total fertility rates, United States 1928-2005



*For cohort born t-26; Note: Last data points for CTFR use imputed data; Sources: Schoen 2004, National Center for Health Statistics 2005b, 2006a

Figure 2. Distribution of women 40-44 by number of children ever born



Source: US Census Bureau 2005a

Table 1. Mean number of children ever born by women's educational attainment, women 40-44			
	1973	1988	2002
Less than high school	3.86	2.92	2.75
High school graduate/GED	2.96	2.17	2.19
Some college	3.02	2.12	2.00
Bachelor's degree or higher	2.86	1.58	1.73
Total	3.26	2.15	2.11

Note: Educational attainment based on number of years of school completed; Sources: National Surveys of Family Growth

Table 2. Coefficient of years of schooling completed among respondents aged 30-44, National Survey of Family Growth 1973, 1988, 2002			
Survey year, sex	**Dependent Variable**		
	Total births expected	Current parity	Additional births expected
1973 Women	-0.153 *	-0.157 *	0.004
1988 Women	-0.126 *	-0.163 *	0.037 *
2002 Women	-0.097 *	-0.150 *	0.053 *
2002 Men	-0.053 *	-0.101 *	0.048 *

*Significant at 0.001 level; Note: Age is controlled via a second-degree polynomial

Table 3. Total fertility rates among major ethnic groups, United States					
	Total	Non-Hispanic Whites	Non-Hispanic Blacks	Hispanics	
				All	Mexicans
1989	2.014	1.770	2.424	2.904	2.916
1996	1.976	1.781	2.140	2.772	3.052
2004	2.046	1.847	2.020	2.824	3.021

Source: National Center for Health Statistics, 2006b

Table 4. Coefficients of ethnicity among women aged 30-44, National Surveys of Family Growth 1973, 1988, 2002			
Survey year, race	**Dependent Variable**		
	Total births expected	Current parity	Additional births expected
Non-Hispanic Blacks			
1973	0.688 *	0.634 *	0.054 *
1988	0.236 *	0.204 *	0.032
2002	0.233 *	0.215 *	0.018
Hispanics			
1973	0.211	0.062	0.150 *
1988	0.352 *	0.210	0.142 *
2002	0.426 *	0.336 *	0.096 *

*Significant at 0.01 level; Note: Age, age squared, and years of schooling completed are controlled

Table 5. Coefficients of median female and male earnings in various fertility regressions		
Dependent Variable	Coefficient of ln F[1]	Coefficient of ln M[2]
Total births expected	-2.726 ** (.387)	2.077 ** (.353)
Total births achieved	-1.654 ** (.321)	1.265 ** (.265)
Total additional births expected	-1.072 ** (.329)	0.811 * (.261)
Total births expected, controlling marital status[3]	-2.492 ** (.375)	1.955 ** (.354)
Total births expected, women aged 15-29	-3.591 ** (.516)	2.219 ** (.419)
Total births expected, women aged 30-44	-1.421 * (.529)	1.638 * (.535)

Note: Control variables listed in Appendix Table 1.
*Significant at .01
**Significant at .001
[1]F = Median annual earnings of full-time, full-year female workers in a metropolitan area
[2]F = Median annual earnings of full-time, full-year male workers in a metropolitan area
[3]Marital status categories are never married/non-cohabiting; currently married; currently cohabiting; and widowed/divorced/separated

Table 6. Total fertility rates in selected developed countries*			
Country	**TFR (year)**	**Country**	**TFR (year)**
United States	2.10 (2006)	Hungary	1.35 (2006)
France	1.98 (2006)	Spain	1.34 (2005)
Sweden	1.85 (2006)	Germany	1.34 (2005)
Denmark	1.85 (2006)	Greece	1.34 (2005)
Australia	1.81 (2005)	Czech Republic	1.33 (2006)
Finland	1.81 (2006)	Ukraine	1.32 (2006)
United Kingdom	1.79 (2005)	Russia	1.31 (2006)
Belgium	1.72 (2005)	Romania	1.31 (2006)
Netherlands	1.68 (2006)	Poland	1.28 (2006)
Canada	1.52 (2005)	Slovakia	1.25 (2005)
Switzerland	1.43 (2006)	Japan	1.25 (2005)
Portugal	1.41 (2005)	South Korea	1.13 (2006)
Bulgaria	1.38 (2006)	Taiwan	1.12 (2005)
Austria	1.38 (2006)	Hong Kong	0.99 (2006)
Italy	1.35 (2006)		

*Countries with populations above 5 million; Source: Population Reference Bureau http://www.prb.org/pdf07/TFRTable.pdf

Table 7. Coefficients relating the expected number of births to religious affiliation at age 16, women aged 30-44, National Survey of Family Growth 2002	
No religion	-0.444
Mainline Protestant	0.000
Fundamentalist Protestant	0.194
Catholic	0.127
Other non-Christian religion	0.264

Note: Age, age squared, years of schooling completed, and race/ethnicity are controlled

Table 8. Summary of positive and negative pressures on TFR		
	Effect on TFR	Projection year
Increases in proportion Hispanic	+0.07	2030
Increases in women's education	-0.07	2028
Increases in F/M earnings ratio (upper bound)	-0.24	2030
Possible restrictions on abortion access	+0.10	
Stabilization in mean age of childbearing	+0.15	

Appendix Table 1. Coefficients of regressions of fertility on individual and areal variables, National Survey of Family Growth 2002

	Women 15-44			Women 30-44
	Total births expected	Current parity	Additional births expected	Total births expected
Age	0.131	0.318	-0.187	0.071
	(0.000)	(0.000)	(0.000)	(0.548)
Age^2	-0.002	-0.004	0.002	-0.001
	(0.000)	(0.000)	(0.000)	(0.433)
Religion				
Mainline Protestant (Ref)				
No religion	-0.414	-0.162	-0.251	-0.438
	(0.000)	(0.002)	(0.000)	(0.000)
Catholic	0.055	0.057	-0.002	0.134
	(0.324)	(0.236)	(0.96)	(0.08)
Fundamentalist Protestant	0.101	0.143	-0.042	0.153
	(0.193)	(0.056)	(0.48)	(0.173)
Non-Christian	0.151	0.205	-0.051	0.414
	(0.175)	(0.025)	(0.526)	(0.013)
Mother's education				
Less than high school	0.193	0.157	0.036	0.284
	(0.003)	(0.007)	(0.335)	(0.001)
High school (Ref)				
Some college	0.079	-0.006	0.085	0.075
	(0.141)	(0.895)	(0.047)	(0.317)
Bachelor's degree or higher	0.165	0.037	0.129	0.237
	(0.005)	(0.432)	(0.008)	(0.004)
Family intact at age 18	0.112	-0.056	0.168	0.010
	(0.016)	(0.166)	(0.000)	(0.89)
Race/Ethnicity				
White, Non-Hispanic (Ref)				
Hispanic	0.237	0.214	0.023	0.326
	(0.000)	(0.000)	(0.601)	(0.001)
Black	0.143	0.258	-0.114	0.247
	(0.009)	(0.000)	(0.002)	(0.003)
Other race	0.276	-0.037	0.312	0.007
	(0.024)	(0.653)	(0.007)	(0.953)
Highest grade of school completed	-0.064	-0.153	0.088	-0.078
	(0.000)	(0.000)	(0.000)	(0.000)
Percent unemployed in metropolitan area	0.027	0.009	0.018	0.049
	(0.092)	(0.574)	(0.062)	(0.061)
Log of male income in metropolitan area	2.077	1.265	0.811	1.638
	(0.000)	(0.000)	(0.002)	(0.002)
Log of female income in metropolitan area	-2.726	-1.654	-1.072	-1.421
	(0.000)	(0.000)	(0.001)	(0.007)
Value of owner-occupied housing in metropolitan area (per $100,000)	0.204	0.008	0.196	0.004
	(0.000)	(0.853)	(0.000)	(0.957)

Note: Values in parentheses are p-values