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Research Article

Occupation and fertility on the frontier: Evidence from the state of Utah

Thomas N. Maloney

Heidi Hanson

Ken R. Smith

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Thomas N. Maloney[1]

Heidi Hanson[2]

Ken R. Smith[3]

Abstract

BACKGROUND

Most of what we know about fertility decline in the United States comes from aggregate (often state or county level) data sources. It is difficult to identify variation in fertility change across socio-economic classes in such data, although understanding such variation would provide deeper insight into the history of the fertility transition.

OBJECTIVE

We use rich micro-level data to examine differences across occupational classes in fertility levels and in the timing and pace of change in fertility in the US state of Utah in the late 19th and early 20th centuries.

METHODS

Our evidence comes from the Utah Population Database, which contains several generations of linked family histories, including information on residents of Utah from the mid-1800s to the present. We use standard linear regression models to identify variation in fertility across birth cohorts and occupational classes as well as cohort-occupation interaction effects (to identify differences across classes in the pace of change over time)

RESULTS

Families of white collar workers led changes in many fertility-related behaviors, particularly those tied to the start of family life (marriage age and first birth interval). Farm families had high fertility levels and added children into late ages, although they also experienced declining fertility.

[1] Department of Economics, University of Utah. E-Mail: Maloney@economics.utah.edu
[2] Department of Family and Preventive Medicine, University of Utah.
[3] Huntsman Cancer Institute and Department of Family and Consumer Studies, University of Utah.

CONCLUSIONS
Examination of detailed micro-level data on fertility change identifies important differences in the patterns of change which may be tied to variation in relevant economic circumstances – for instance, the length of education and training required for particular occupations, or the need for family-based labor on the farm.

1. Introduction

The United States of the 19th century was marked by initially quite high fertility levels but also by the onset of a relatively early decline in fertility. The US frontier was characterized by high fertility relative to the US norm, and regional differences between East and West are an important theme in the study of fertility patterns of the time. Even in the Western US, however, the move to lower levels of fertility is clearly visible among women born in the mid-1800s.

Most of what we know about these patterns in the US comes from aggregate data. Often, county- or even state-level measures of fertility (e.g., child/woman ratios) are compared to local economic and demographic parameters to gain insight into the sources of fertility differentials and to uncover the sources of change over time. Guinnane's recent survey emphasizes the need for more micro-level evidence on the patterns and sources of fertility change, particularly micro-level evidence on wealth, income, and occupation differentials in fertility behavior (Guinnane 2011: 610). We take up this challenge by examining patterns of fertility change in the state of Utah in the late 19th and early 20th centuries. We use records from the Utah Population Database (Smith 2012), particularly family history records linked to death certificates, and focus on occupational differentials in the level of, and change in, the number of children born to a woman, along with several other fertility-related behaviors: age at marriage, the interval from marriage to first birth, the average inter-birth interval, and age at last birth. Our results suggest that there was substantial commonality in the timing of change in fertility across socioeconomic strata (as measured by spouse's occupation). Still, some differences in these behaviors across occupational classes did emerge during the era of the fertility transition. The households of white collar workers and of farmers typically defined the bounds of these behaviors, with white collar households often "leading" change and other occupational groups, including farm households, closing the gap over time.

2. Fertility and the economy during the fertility transition in the US

The traditional view of the fertility decline in the US emphasizes its early beginnings, in the first decades of the 1800s or even the final decades of the 1700s, as well as the fact that this decline occurred in the context of pervasive marriage at young ages relative to European countries. Researchers have also noted that fertility decline in the US was not primarily a product of urbanization, but rather it occurred in urban and rural locations simultaneously, although, as we discuss below, urban/rural differences in fertility levels were pronounced (Haines 2000: 319–20; Carter, Ransom, and Sutch 2004: 273; Haines 1990). Consideration of recent evidence on rising mortality in the US in the mid-1800s has moderated but not fully overturned the conclusion that fertility decline began relatively early in the US (Hacker 2003). While this decline in fertility appears gradual in aggregate data, analysis of more refined evidence suggests some discontinuities in the process. David and Sanderson (1987, 1992) argue that, although some degree of fertility control was already quite common among urban couples by the mid-1800s, the appearance of a 2 or 3 child norm among "fertility controllers" occurred quite rapidly in the 1880s and 1890s. They argue that this shift reflects the introduction and diffusion of cheaper and better methods of contraception which allowed couples to act on their desire to limit family size more effectively.

In addition to documenting these broader patterns, economic historians and other social scientists have examined connections between the economy and fertility behavior over the long-term in the US, but the variation that has driven many of these investigations has been across regions rather than across occupations or income classes. Much of this work focuses on regional differences in the level of rural fertility specifically, with rural fertility increasing as one moves from East to West. In a classic examination of these patterns, Easterlin (1976) tied fertility differences to differences in the rate of change in land values and to a bequest motive on the part of parents. Where land values were rising rapidly (in the West), rural parents felt they were able to give several children an adequate start in life. Where land values, though high, were not rising, farm families had an incentive to limit their fertility in order to give a smaller number of sons an adequate transfer of cash or land.[4]

Sundstrom and David (1988), in examining the same regional differences in fertility, argue that such transfers were the result of a bargaining process in which land was given to a son in exchange for support of his parents in old age. Sundstrom and David also emphasize that the specific "rate of exchange" of wealth transfers for old

[4] Guest (1981) examines the influence of land availability on fertility using state-level variation in the 1900 Census. He finds that the influence of land availability on aggregate levels of childbearing operated through effects on age at marriage, rather than effects on fertility conditional on marriage.

age support depended on the bargaining power of children and thus on the availability of alternative sources of income for these children. Where opportunities in manufacturing work were more widely available (in the East, initially), children were less dependent on wealth transfers from parents and would provide less support to parents in exchange for these transfers. These facts led parents to search for other ways to support themselves in their old age, and they reduced their fertility as they increased their investment in other forms of saving.

Carter, Ransom, and Sutch (2004) agree with much of the thrust of Sundstrom and David's analysis. However, they argue that this model can not explain the decline in fertility prior to 1830, before the appearance of widespread manufacturing opportunities. They also are troubled by the fact that Sundstrom and David's process is in principle "reversible," so that high levels of fertility would be predicted to reappear if manufacturing opportunities declined. Carter, Ransom and Sutch propose a model that they believe remedies these shortcomings. In their model, fertility decline is driven by rising concerns about "child default" due to reduced reliance of children on wealth transfers from their parents. This concern gained prominence due to the opening of new western lands in the early 1800s, rather than through the growth of manufacturing in later years as emphasized by Sundstrom and David. The probability that one's children might move west undermined a system in which children were relied on for old age support (in exchange for land transfers) and in which the resulting large families provided labor for extensive home production, thereby limiting engagement with the market and also limiting the demand for education. An increased risk of child default promoted reduced fertility and increased saving for old age. Smaller families then promoted more engagement with the market both for investment of this increased savings and to acquire goods (due to the decline of home production). These changes also encouraged a shift to education, rather than land, as a primary form of wealth transfer to one's children. Once begun, then, the shift to lower fertility altered many interdependent dimensions of economic life in an irreversible way.

While these studies connect fertility patterns in the US to economic change, they rely on aggregate (state or county level) data and do not directly measure fertility differentials between families in different economic circumstances. Steckel (1992) brings microdata to the examination of geographic differentials in US fertility by linking households from the 1850 US Census to the 1860 Census and calculating the number of children added by married couples during this decade. He then examines the correlation of "children added" with various measures related to Easterlin's and Sundstrom and David's competing hypotheses, including the value of real wealth held by the household, the extent of local manufacturing employment, and the presence of banks (as an alternative form of saving) in the state. Of these measures, banking density carries the strongest (negative) relationship with the number of children added by families in the 1850s. Steckel's micro-level data also allow him to look at occupational differentials in fertility behavior. He finds that the families of both white collar and skilled blue collar workers added fewer children in the 1850s than did the families of farmers or unskilled workers. Haines (1978) similarly finds lower levels of fertility among the families of white collar workers in the anthracite coal mining region of Pennsylvania in the late 1800s, as do Haines and Guest (2008) for New York State in the pre-Civil War era.

Guinnane, Moehling, and O'Grada (2006) also employ micro-level Census data, in their case the 1910 Census, to examine fertility differentials across groups. Their main interest is in patterns of fertility among first and second generation Irish immigrants, although they incorporate information on occupation and home ownership as well. For native born children of native parents, their occupational ranking of childbearing behavior roughly matches that found by Steckel for the 1850s: higher levels of fertility among agricultural workers and the less skilled, and lower levels among professional and clerical workers. This gradient is not present among Irish immigrants, however. Among the second-generation Irish, professional and clerical work was correlated with reduced fertility, but agricultural work was not correlated with high fertility (compared to lower skilled workers).

Murray and Lagger's (2001) study of fatherhood among men who graduated from Amherst College between 1861 and 1899 turns up interesting and nuanced occupational differentials in fertility. When Murray and Lagger limit their analysis to men fathering at least one child, they find that physicians had fewer children than men in other occupations (businessmen, lawyers, teachers, ministers, and others). They attribute this differential to knowledge of more effective contraceptive practices among physicians (echoing David and Sanderson's emphasis on the importance of contraceptive methods), although they also note that physicians in this era often saw patients in their own (the physicians') homes, which may have created an extra incentive to limit family size.

Guinnane, Moehling, and O'Grada (2006) and Murray and Lagger (2001) focus on cross-sectional differentials in fertility across occupations. Haines (1992), using US Census data from 1900 and 1910, examines how these differentials changed across marriage cohorts in the period of fertility transition. He finds that SES differentials in fertility generally increased as overall fertility declined: The earliest and most rapid reductions occurred among those in the highest occupational classes, who were already characterized by lower levels of fertility at the start of this process. Finally, Smith (1996) uses microdata drawn from 1910 federal census manuscripts for Iowa to examine the influence of mother's education on fertility. He finds an inverse relationship between education and fertility. This relationship is fairly stable across (mothers') birth cohorts and for women of different religions and ethnicities.

3. The UPDB and micro-level evidence on fertility in Utah

Here, we add to the micro-level evidence on the fertility transition in the US by examining occupational differentials in fertility, along with change in these differentials, in the frontier state of Utah in the late 1800s and early 1900s. Our data come from the Utah Population Database (UPDB). The core of the UPDB is information on over 185,000 three-generation families identified on "Family Group Sheets" from the Genealogical Society of Utah. These genealogical records provide data on individuals who were migrants to Utah and their Utah descendants from the early 1800s to the mid-1970s. The full UPDB now contains data on nearly 7 million individuals due to longstanding and ongoing efforts to add new sources of data and update records as they become available. Because these records include basic demographic information on parents and their children, fertility and mortality data are extensive with coverage up to the present. Importantly for our purposes, they allow us to follow individuals from several birth cohorts throughout the course of their own childbearing, rather than limiting us to a single cross-section or a limited window of observation.[5]

As with any study of a particular community, it is important to keep in mind the specific context in which we are examining the fertility behaviors of interest. Utah in the late 1800s was a frontier settlement, but one marked by an unusual degree of family migration and thus relatively balanced sex ratios (Bean, Mineau, and Anderton 1990: 47–49). It was of course also marked by the dominant role of the Church of Jesus Christ of Latter Day Saints, both in carrying out the migration and in the administration of the territory. LDS religious teaching promoted large family sizes (ibid: 60). The territorial leaders had practical, as well as theological, reasons for encouraging rapid population growth: They desired to claim as large a geographic territory as they could and also to gain scale economies from rapid growth in order to promote economic independence. These practical and economic concerns supported subsidized immigration (Carson 2001), as well as high levels of childbearing. While family size was particularly large among LDS church members in Utah (as our results below demonstrate), a process of fertility decline was clearly underway in the territory in the late 1800s, as in other parts of the US. Other researchers have found that the economic history of Utah helps to form our understanding of frontier economic development, despite the unusual circumstances of its settlement (Pope 1989; Galenson and Pope 1992). Similarly, we argue that the process of fertility decline in Utah, and our detailed microdata describing

[5] More detail on the breadth and quality of each component data source is available on the UPDB website http://www.hci.utah.edu/groups/ppr

this process, can help form our understanding of the broader phenomenon of fertility transition.

How might the circumstances of early Utahans have enhanced or diluted the connections between economy and fertility discussed in the general literature on fertility change in the US? To the extent that concerns about old age support drove broad fertility change, these forces might be somewhat less relevant in the Utah context. The community we are examining was settled in lands beyond the frontier and whose opening plays the pivotal role in Carter, Ransom, and Sutch's analysis. Moreover, the emphasis of the LDS community on interdependence and shared obligations and resources (Pope 1989: 160–61) might have reduced the primacy of reliance on one's own children in times when self-support was more difficult. Utah was characterized by relatively high levels of education from an early period (Bean, Mineau, and Anderton 1990: 58–60), and, as seen below, the occupational structure evolved substantially away from agriculture and into white collar, manufacturing, and service work in the period we are examining. High levels of education and an emerging sector of non-agricultural employment might promote a shift to lower levels of fertility and growing fertility differentials across classes, whether through ideational change, the transfer of wealth to children through schooling rather than land, or more generally through a shift out of "quantity" and into "quality" in childrearing (Wahl 1992).

The UPDB has already been used to study fertility patterns on the frontier in the era of fertility transition. Bean, Mineau, and Anderton (1990) collect many of the important findings from this work. These authors do not directly incorporate occupation into their analysis, rather they emphasize geographic differentials within Utah, between the more urban Wasatch Front and the much more sparsely populated outlying areas, along with differentials by place of birth and by religious identity (between members of the Church of Jesus Christ of Latter Day Saints and others). Bean, Mineau, and Anderton identify the 1860–1869 birth cohort of women as the first to be characterized by substantial fertility limitation. Fertility differentials between geographic groups increased at this time, with more persistent urban residents, especially those less attached to the church, engaging in greater fertility limitation. Within the context of these growing differentials, however, the authors also emphasize the common timing of fertility change across groups: The shift toward later marriage, later age at first birth, longer birth intervals, and ultimately smaller families was quite broad beginning in the 1860s (dating by mother's birth). Bean, Mineau, and Anderton see this common timing as evidence in favor of an "adaptation" to broadly-felt social and economic changes, including the influence of a larger non-LDS population in Utah, greater residential diffusion within the state, the declining influence of charismatic founding leaders in the LDS church administration, and greater incorporation of the state into the broader US economy.

In a recently published study relying on UPDB data, Jennings, Sullivan, and Hacker (2012) investigate intergenerational correlations in fertility in Utah, both between mother and daughter and between mother-in-law and daughter-in-law. Correlations between mothers' and daughters' fertility emerged beginning in the 1870s, when fertility limitation was becoming more generally apparent. The authors note that these correlations could operate through "ideational change," as new values are passed from parent to child, but they could also represent the effects of intergenerational correlation of economic status, which is not directly measured in their analysis.

4. Occupational differences in fertility in Utah

In this paper we build on the work of these authors by adding occupation to the analysis of fertility change in Utah. Our information on occupation comes from death certificates which are linked to family history records. These death certificates begin in 1904, allowing us to identify the occupation of individuals who died in that year or later. We interpret the information on the death certificates as identifying an individual's "usual occupation" over the course of their work life.[6] We believe this measure of occupation to be a good indicator of socio-economic status in a way that may be superior to an occupation observed in a cross-section, such as a decennial Census. It does, however, omit any information on job change or on the variety of employments that might have been held at a point in time. This may have been especially relevant in the earlier years of the settlement of Utah, when the desire for territorial self-sufficiency could have resulted in individuals being engaged in a variety of kinds of activity simultaneously (Bean, Mineau, and Anderton 1990: 56–57).

Our goal is to discover whether the timing and path of the fertility transition differed by occupational group. To limit the number of confounding variables that might be at play, we restrict our sample to women who were born in Utah between 1850 and 1919; so, for instance, we do not consider the immigrant-native differences that Bean, Mineau, and Anderton examine. We also limit our sample to women who survived to at least age 50, married once and remained married to that spouse through age 50, and who had at least one child. Finally, we exclude women for whom the

[6] Current instructions regarding the recording of occupations on death certificates emphasize the importance of reporting the "usual" or longest-held occupation of the decedent and specifically emphasize that "retired" or "unemployed" should not be entered (US Department of Health and Human Services 2012: 5-6). Only about one-third of one percent of records (198 records) that otherwise met our sample selection criteria had spouses' occupations coded as "retired." We are therefore confident that a usual occupation was reported even in cases in which the individual had stopped working.

spouse's occupation is unknown, unreported, or insufficiently detailed to classify, and a very small number of cases in which spouses were reported to be in the military. Table 1 indicates the number of women in each ten-year birth cohort in our data set, increasing from 1,470 in the 1850s cohort to over 13,000 in the 1910s cohort.

Table 1: Means for regression data set and each birth cohort

	All Cohorts				Women Born in 1850s				Women Born in 1860s			
Variable	Mean or %	Std. Dev.	Min	Max	Mean or %	Std. Dev.	Min	Max	Mean or %	Std. Dev.	Min	Max
Age at First Birth	23.48	4.29	14.23	54.93	20.91	3.30	15.02	43.54	22.08	3.92	14.65	54.93
Age at Last Birth	35.60	6.23	15.06	54.93	40.34	4.78	16.64	53.93	39.60	4.89	18.86	54.93
Number of Children	5.02	2.91	1.00	24.00	8.95	3.04	1.00	20.00	7.82	3.05	1.00	17.00
Average Birth Interval (Months)[a]	42.79	18.69	8.97	119.93	32.28	10.22	18.40	117.75	34.53	11.98	13.23	118.73
First Birth Interval (Months)	21.90	21.16	0.00	120.00	15.86	11.83	0.90	115.87	16.16	13.25	0.00	112.87
Age at Marriage	21.65	3.79	14.00	53.00	19.60	3.17	14.00	42.00	20.72	3.76	14.00	53.00
Woman Born on Wasatch Front	45.87%		0	1	78.03%		0	1	52.28%		0	1
Woman had an Occupation	16.39%		0	1	3.88%		0	1	3.31%		0	1
Woman Active LDS	74.25%		0	1	81.36%		0	1	78.31%		0	1
Inactive LDS	15.24%		0	1	6.53%		0	1	9.98%		0	1
Non-LDS	10.50%		0	1	12.11%		0	1	11.71%		0	1
Spouse White Collar	29.81%		0	1	14.29%		0	1	16.89%		0	1
Service	3.96%		0	1	1.43%		0	1	2.43%		0	1
Farmer	33.26%		0	1	66.87%		0	1	62.06%		0	1
Craft	20.51%		0	1	12.18%		0	1	12.38%		0	1
Oper./ Laborer	12.46%		0	1	5.24%		0	1	6.24%		0	1
N	49,728				1,470				4,847			

[a] The calculation of inter-birth interval includes only those who had at least two births. The overall N for this group is 45,266. For each cohort, the N's are 1,453 in the 1850s, 3,343 in the 1860s, 6,827 in the 1870s, 6,827 in the 1880s, 8,266 in the 1890s, 8,839 in the 1900s, and 11,691 in the 1910s.

Table 1: (Continued)

	Women Born in 1870s				Women Born in 1880s				Women Born in 1890s			
Variable	**Mean or %**	**Std. Dev.**	**Min**	**Max**	**Mean or %**	**Std. Dev.**	**Min**	**Max**	**Mean or %**	**Std. Dev.**	**Min**	**Max**
Age at First Birth	23.34	4.23	14.49	44.14	23.63	4.16	15.22	45.80	23.27	3.98	14.23	47.79
Age at Last Birth	38.61	5.34	17.49	51.75	37.07	5.60	16.53	52.80	34.49	6.20	16.87	54.47
Number of Children	6.66	3.08	1.00	24.00	5.73	2.96	1.00	18.00	4.74	2.63	1.00	18.00
Average Birth Interval (Months)[a]	37.03	14.21	11.20	118.90	39.58	16.32	8.97	119.93	41.22	17.45	10.37	119.93
First Birth Interval (Months)	17.31	15.96	0.00	119.07	19.24	18.46	0.00	119.97	18.15	16.47	0.00	118.63
Age at First Marriage	21.88	3.93	14.00	42.00	22.02	3.79	14.00	45.00	21.74	3.64	14.00	46.00
Woman Born on Wasatch Front	46.34%		0	1	44.54%		0	1	44.10%		0	1
Woman had an Occupation	3.04%		0	1	6.11%		0	1	11.79%		0	1
Woman Active LDS	77.74%		0	1	77.32%		0	1	75.97%		0	1
Inactive LDS	12.16%		0	1	12.53%		0	1	14.03%		0	1
Non-LDS	10.10%		0	1	10.15%		0	1	10.00%		0	1
Spouse White Collar	20.41%		0	1	25.34%		0	1	30.71%		0	1
Service	2.96%		0	1	3.72%		0	1	4.34%		0	1
Farmer	53.92%		0	1	43.43%		0	1	32.60%		0	1
Craft	14.31%		0	1	17.50%		0	1	20.52%		0	1
Oper./ Laborer	8.41%		0	1	10.01%		0	1	11.83%		0	1
N	5,067				7,223				9,011			

[a] The calculation of inter-birth interval includes only those who had at least two births. The overall N for this group is 45,266. For each cohort, the N's are 1,453 in the 1850s, 3,343 in the 1860s, 6,827 in the 1870s, 6,827 in the 1880s, 8,266 in the 1890s, 8,839 in the 1900s, and 11,691 in the 1910s.

Table 1: (Continued)

	Women Born in 1900s				Women Born in 1910s			
Variable	**Mean or %**	**Std. Dev.**	**Min**	**Max**	**Mean or %**	**Std. Dev.**	**Min**	**Max**
Age at First Birth	23.60	4.56	14.43	46.66	24.15	4.37	14.77	44.76
Age at Last Birth	33.76	6.50	15.06	48.91	34.21	5.78	15.77	53.33
Number of Children	3.94	2.23	1.00	17.00	3.82	1.98	1.00	16.00
Average Birth Interval (Months)[a]	47.27	20.69	10.03	119.92	48.45	20.44	10.13	119.93
First Birth Interval (Months)	22.01	20.75	0.00	120.00	29.84	26.96	0.00	119.97
Age at First Marriage	21.76	3.96	14.00	44.00	21.67	3.68	14.00	44.00
Woman Born on Wasatch Front	41.96%		0	1	45.37%		0	1
Woman had an Occupation	24.37%		0	1	29.14%		0	1
Woman Active LDS	74.92%		0	1	67.63%		0	1
Inactive LDS	17.16%		0	1	19.67%		0	1
Non-LDS	7.92%		0	1	12.70%		0	1
Spouse White Collar	33.25%		0	1	37.83%		0	1
Service	4.71%		0	1	4.31%		0	1
Farmer	24.55%		0	1	15.41%		0	1
Craft	23.42%		0	1	25.41%		0	1
Oper./ Laborer	14.07%		0	1	17.03%		0	1
N	10,064				13,027			

[a] The calculation of inter-birth interval includes only those who had at least two births. The overall N for this group is 45,266. For each cohort, the N's are 1,453 in the 1850s, 3,343 in the 1860s, 6,827 in the 1870s, 6,827 in the 1880s, 8,266 in the 1890s, 8,839 in the 1900s, and 11,691 in the 1910s.

Occupations in the UPDB have been coded into categories based on the 1990 US Census occupation and industry schemes. We use the occupation listing to create five broad categories of workers: white collar workers (large groups in this category include accountants and auditors, sales workers, supervisors and proprietors, and general office clerks), service workers (including protective service as well as janitors and cleaners), farmers, blue collar craft and skilled construction workers (including construction supervisors, carpenters, mining machine operators, and production supervisors), and operatives and laborers (including truck drivers, locomotive operating occupations, and undifferentiated laborers).[7] Our observations begin with women born in 1850, soon after the Mormon pioneers entered the Utah territory, and the occupational distribution reflects the importance of agriculture in these early years: About two-thirds of the women in our 1850s birth cohort were married to farmers (see Table 1). Yet by the 1880s birth cohort, the share of these women who were married to farmers had fallen below half, and the farming share was only 15 percent among the husbands of the 1910s birth cohort. White collar occupations and both craft and operative/laborer blue collar positions grew substantially in importance in these years.

This scheme provides a rough SES ranking but also highlights other occupation-related factors that may affect the timing of family formation and fertility levels. Farm families typically "produced their own work force," which promoted higher levels of fertility, while white collar work might require longer periods of schooling or training, which could delay family formation. Periods of training for craft workers could have a similar impact. As we noted above, this categorization might also map into differences in education and exposure to new ideas, although we do not have access to independent information on literacy or education level in these data.

In addition to the woman's birth cohort and her spouse's occupation, we control for several other factors that were correlated with family size in Utah in this era. One obvious factor of importance is religious background. Information on religious affiliation is fairly rare in historical records in the US, such as the Census. Hacker (1999) deals with this problem creatively by comparing the fertility of women who gave their children "biblical"' names to that of women who did not use such names. He finds higher levels of fertility among the former. Our records have more direct information on the strength of affiliation of women with the dominant religious group in Utah, the LDS Church. The UPDB contains information on baptism and endowment dates from family history records, and this was used to classify individuals as active members of the church, inactive members, or non-members. Individuals were

[7] For white collar workers, we use Census 1990 occupation codes 3 to 391. For service work, we use 403 to 469. For farmers, we use 473 to 499. For craft and construction workers, we use 503 to 699. For operatives and laborers, we use codes 702 to 890. We use these categories because they fit naturally with the Census scheme provided in the UPDB records. Elsewhere, we have attempted to transfer these occupations into HISCO and HISCLASS categories to aid comparison with patterns in other countries (Dribe et al. 2013). We have insufficient information to classify spouse's occupation into a 1990 Census category for 17,158 women, roughly 25% of the women who otherwise meet our selection criteria. 1,873 women are excluded because the spouse was reported as being in the military (97 records), retired (198), a homemaker (13), a student (2), a volunteer (1), not working (60), in an unknown occupation (1), or with no reported occupation (1,501).

considered active church members if endowed before age 40.[8] Individuals with a baptism but no endowment date were considered inactive. Those with no recorded baptism were considered non-LDS. (We do not have information on the religious identity of the non-LDS.) Active LDS women make up about three-fourths of our sample through the 1900s cohort before falling to about 67 percent of the 1910s cohort. The inactive LDS group grew fairly steadily in importance, rising to nearly one fifth of the sample in the 1910s cohort. The non-LDS group grew primarily in the last cohort.

Bean, Mineau, and Anderton demonstrate the importance of geographic fertility differentials within Utah, so we also control for the woman's birth along the more densely populated Wasatch Front (Utah, Salt Lake, Weber, and Davis counties). The Wasatch Front share declined from 78 percent for the 1850s birth cohort to 46 percent among those born in the 1870s and changed little thereafter. Finally, we control for whether the woman had an occupation recorded on her death certificate. The number of women for whom an occupation was reported was less than four percent of the sample through the 1870s cohort but then rose rapidly to 29 percent among the 1910s cohort. Most commonly, these women were elementary school teachers, sales workers, secretaries, nurses, and cooks. This measure of occupation, like that used for these women's spouses, comes from death certificates. It is therefore not a clean measure of labor force participation or employment at any particular point in time and can not be easily compared to the kinds of point-in-time measures available in most other sources. Still, it is worth noting that the increase in reported occupation for the women in our dataset matches closely with the increase in labor force participation found by Goldin (1983) in her examination of Census data. Goldin reports labor force participation rates of less than five percent for married white women born between 1866 and 1875. This figure then ranges from about 15 percent (at age 20) to a peak of nearly 40 percent (at age 50) for married white women born between 1906 and 1915 (Goldin 1983: 713). Very few of the mothers in our data set have farming occupations reported on their death certificates, although we expect that many of them were engaged in the various economic activities related to life on a farm. We therefore expect that our measure acts as an indicator of labor market activity outside the home. Farming work and other kinds of home production are quite often missed in the Census and other sources of evidence on women's labor force participation in this period (Sobek 2006: 2-37).

Before examining fertility behavior by occupational status, we present differences in children ever born along the dimensions discussed above: the woman's LDS status, her birth place, and her occupation (see Table 2). In general, religious affiliation is correlated with fertility as we would expect, with active LDS women having just over

[8] An endowment ceremony is a formal ceremony recognizing a high level of commitment to living in accordance with church teachings.

one more child than non-LDS women on average, and with inactive LDS women having fertility levels between these two extremes. While all of these groups experienced substantial declines in fertility between the 1850s cohort and the 1910s cohort, the gap between active LDS women and non-LDS women did not change dramatically over time (so this stable gap in number of children came to constitute a larger percentage difference as the total number of children declined for all groups). The fertility gaps between women with a reported occupation and those without, and between Wasatch Front residents and others, were not as large as the differences by religious affiliation. These gaps tended to grow in the early years of fertility decline and then become smaller as childbearing converged somewhat across groups at a new, lower level in the 1910s cohort.

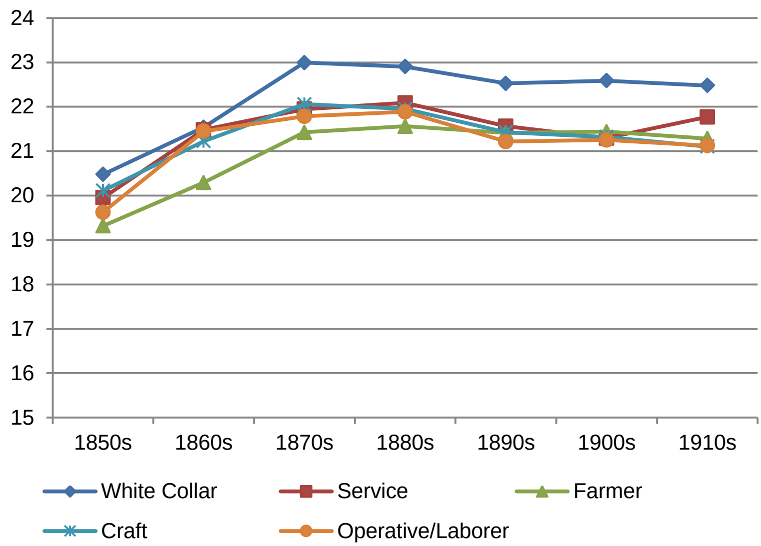
Table 2: Children ever born by mother's birth cohort, employment, LDS status, and birthplace

	Mother's Birth Cohort						
	1850s	1860s	1870s	1880s	1890s	1900s	1910s
Mother's Employment							
No Occupation	8.96	7.82	6.68	5.80	4.84	4.11	3.97
Some Occupation	8.76	7.55	5.81	4.65	3.99	3.41	3.46
Gap by Mother's Employment	0.20	0.28	0.88	1.15	0.85	0.70	0.51
Mother's LDS Status							
NonLDS	7.99	6.94	5.42	4.68	3.53	2.87	2.91
Inactive LDS	8.45	7.01	6.05	5.10	4.28	3.47	3.30
Active LDS	9.14	8.05	6.92	5.98	4.99	4.16	4.14
Gap by LDS Status	1.14	1.11	1.49	1.29	1.46	1.29	1.23
Mother's Birthplace							
Not born on Wasatch Front	8.92	8.08	6.95	6.04	5.02	4.08	3.88
Born on Wasatch Front	8.96	7.58	6.32	5.35	4.40	3.75	3.75
Gap by Wasatch Front Birth	-0.04	0.50	0.63	0.70	0.62	0.33	0.13
N	1470	3416	5067	7223	9011	10064	13027

"Gap by Mother's Employment" = CEB of Mothers with No Occupation – CEB of Mothers with Some Occupation. "Gap by LDS Status" = CEB of Active LDS – CEB of NonLDS. "Gap by Wasatch Front Birth" = CEB of Mothers Not Born on Wasatch Front – CEB of Mothers Born on Wasatch Front.

Our primary interest, however, is fertility differences across spouse's occupation. Figures 1 through 5 present measures of several fertility-related behaviors grouped by the spouse's occupation and the woman's birth cohort. White collar families and farm families generally define the bounds of these behaviors. The "leadership" of white collar workers in terms of increase in age at marriage is apparent in Figure 1. After 1870, age at marriage stopped increasing. However, first birth interval (the time in months between marriage and first birth) rose considerably for all occupation groups for cohorts born after the 1890s (Figure 2), so that delay in the start of childbearing was driven by this mechanism in the latter part of our period.[9]

Figure 1: Age at marriage by mother's birth cohort and father's occupation category



While the increase in first birth interval is concentrated after the 1890s, the average inter-birth interval (the average interval in months between each birth after the first) grew more gradually over time, with more modest acceleration after the 1890s (see Figure 3). The white collar – farmer gap in the length of the average inter-birth interval

[9] Ewbank (1991) emphasizes the role of lengthening birth intervals as a source of declining fertility in the mountain states, including Utah.

rose over the first four cohorts, from about two months in the 1850 cohort to just over four months in the 1880s cohort, before declining back to its initial level.

While white collar families are distinctive in terms of age at marriage, farm families are the outliers when we measure age at last birth (Figure 4). As the stopping age declined substantially for all categories, the gap between farmers and white collar workers grew by over two years through the 1890s birth cohort, and all other occupational groups were clustered close to white collar workers. The age at last birth then rose somewhat for white collar workers over the last two cohorts, approaching the stopping age for farm families by that point. Finally, the number of children ever born declined steadily for all occupation groups across birth cohorts from the 1850s through the first decade of the 20th century before flattening out (see Figure 5). As with most of these measures, the gap between the white collar families and farm families rose for several decades and then declined, concentrating around a new fertility level at about half the initial value.

Figure 2: First birth interval by mother's birth cohort and father's occupation

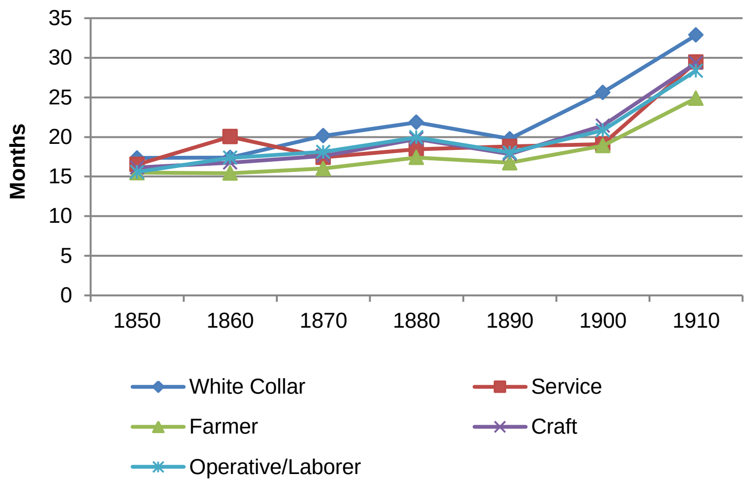
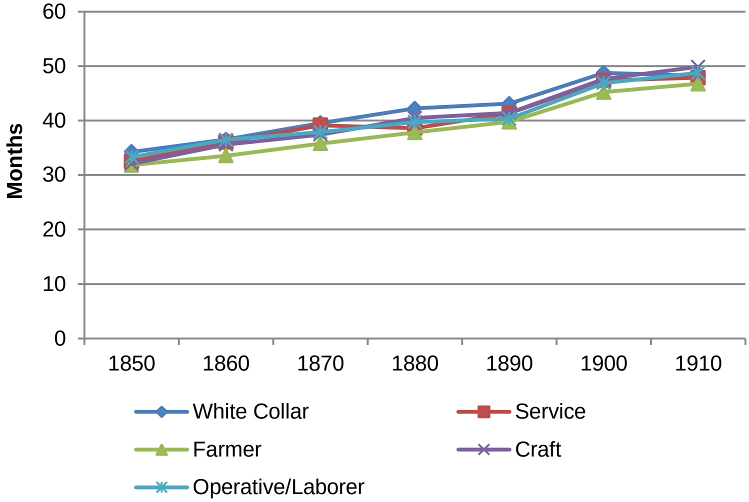
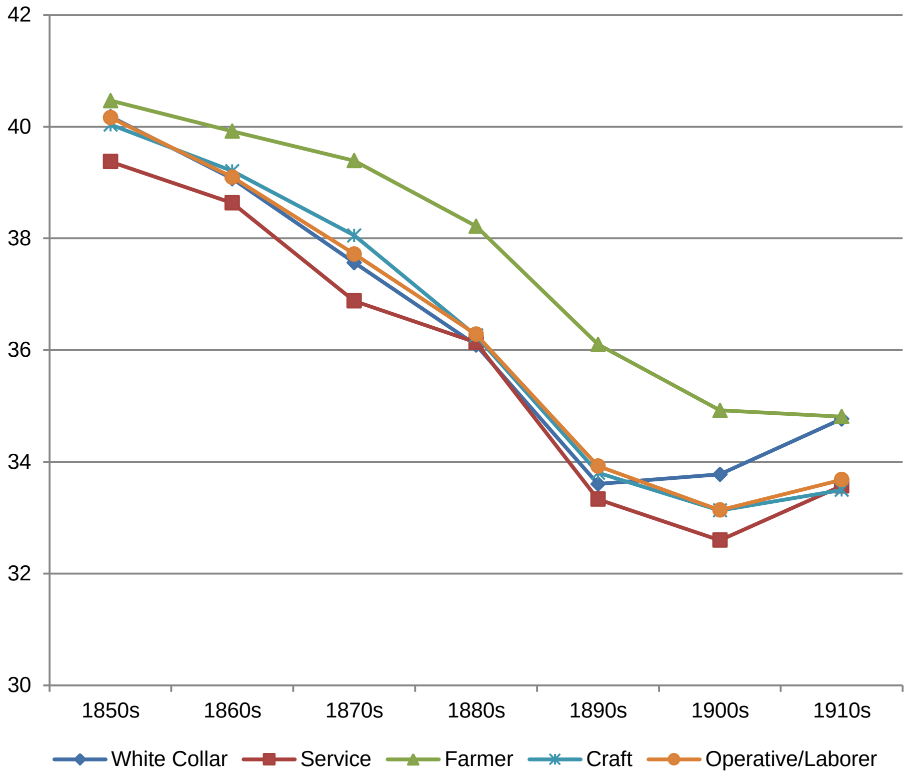


Figure 3: Average inter-birth interval by mother's birth cohort and father's occupation



To examine cross-occupational differences in the level and timing of change in these behaviors more formally, we estimate a series of regressions identifying the correlates of age at marriage, first birth interval, average inter-birth interval, age at last birth, and children ever born, incorporating dummy variables for spouse's occupational category and the woman's birth cohort along with interactions of occupation and cohort. We control for the woman's religious affiliation, place of birth (on the Wasatch Front or elsewhere in Utah), and whether or not she had a reported occupation. We also control for age at marriage in the analysis of birth intervals, age at last birth, and children ever born.

Figure 4: Age at last birth by mother's birth cohort and father's occupation category



Results for age at marriage are found in Table 3. The main cohort effects indicate a general rise in age at marriage across cohorts from the 1850s to the 1860s and from the 1860s to the 1870s. There is then no further increase; in fact there is some decrease in age at marriage between the 1880s and 1890s cohorts and between the 1900s and 1910s cohorts (all of these differences are statistically significant in pairwise tests using a p value of .05). Women married to white collar and craft workers have somewhat higher marriage ages (compared to wives of farmers) in the main effects. The farmer/craft worker gap in marriage ages then declined after 1890.

Figure 5: Children ever born by mother's birth cohort and father's occupation category

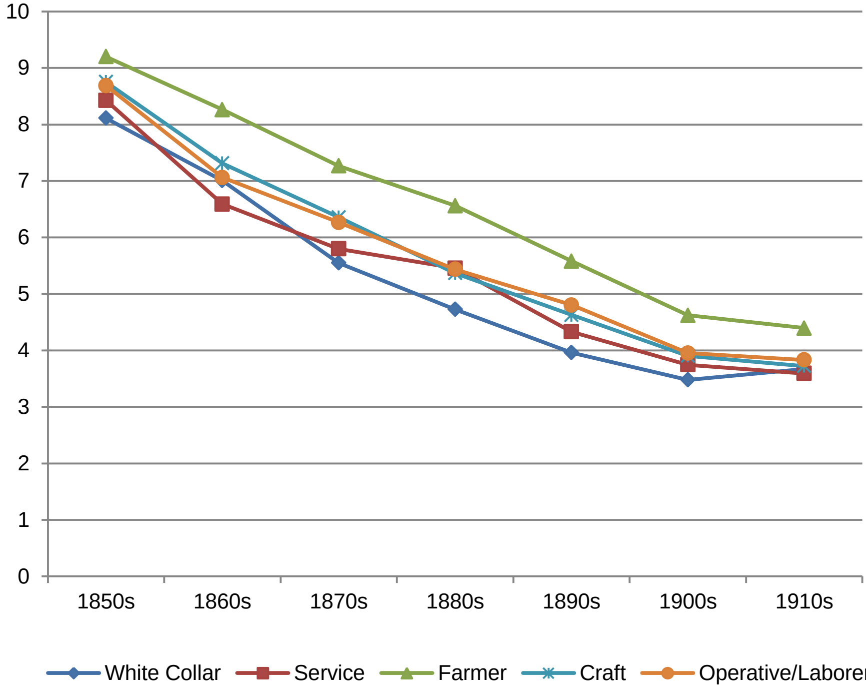


Table 3: Determinants of age at marriage

	Coefficient	Standard Error	[95% Conf.Interval]	
		Woman's Decade of Birth		
1850s	**Reference**			
1860s	**1.093**	**0.143**	**0.813**	**1.373**
1870s	**2.258**	**0.138**	**1.987**	**2.528**
1880s	**2.382**	**0.136**	**2.116**	**2.648**
1890s	**2.196**	**0.137**	**1.927**	**2.464**
1900s	**2.147**	**0.141**	**1.871**	**2.422**
1910s	**1.845**	**0.145**	**1.561**	**2.130**
		Spouse's Occupation		
Farmer	**Reference**			
White Collar	**1.133**	**0.281**	**0.582**	**1.683**
Service	0.707	0.816	-0.890	2.304
Craft	**0.802**	**0.300**	**0.213**	**1.390**
Operative/Laborer	0.320	0.437	-0.537	1.176
		Occupation – Birth Cohort Interactions		
White Collar * 1860s	0.056	0.330	-0.591	0.703
***1870s**	0.349	0.312	-0.261	0.960
***1880s**	0.891	0.301	-0.501	0.679
***1890s**	-0.152	0.297	-0.735	0.431
***1900s**	-0.227	0.298	-0.810	0.356
***1910s**	-0.035	0.297	-0.618	0.548
Service*1860s	0.452	0.913	-1.338	2.243
***1870s**	-0.202	0.871	-1.911	1.506
***1880s**	-0.239	0.848	-1.901	1.422
***1890s**	-0.657	0.839	-2.301	0.986
***1900s**	-1.000	0.835	-2.638	0.637
***1910s**	-0.293	0.833	-1.926	1.341

Adj R^2 = .052, N=49,278 / **Bold** => p value < .05

Table 3: (Continued)

	Coefficient	Standard Error	[95% Conf.Interval]	
Craft*1860s	0.110	0.359	-0.593	0.814
***1870s**	-0.194	0.338	-0.856	0.467
***1880s**	-0.446	0.324	-1.081	0.190
***1890s**	**-0.824**	**0.320**	**-1.450**	**-0.197**
***1900s**	**-0.998**	**0.318**	**-1.623**	**-0.374**
***1910s**	**-0.970**	**0.318**	**-1.593**	**-0.346**
Op/Lab*1860s	0.826	0.511	-0.177	1.828
***1870s**	0.023	0.478	-0.913	0.959
***1880s**	-0.014	0.463	-0.921	0.893
***1890s**	-0.561	0.457	-1.456	0.334
***1900s**	-0.561	0.454	-1.451	0.329
***1910s**	-0.429	0.452	-1.314	0.456
	Woman's LDS Status			
Non-LDS	**Reference**			
ActiveLDS	**0.269**	**0.055**	**0.161**	**0.378**
InActiveLDS	-0.041	0.067	-0.173	0.090
Woman born on Wasatch Front	**0.366**	**0.034**	**0.299**	**0.433**
Occupation Reported for Woman	**1.127**	**0.048**	**1.034**	**1.221**
Constant	**18.788**	**0.130**	**18.533**	**19.043**

Adj R^2 = .052, N=49,278 / **Bold** => p value < .05

Similar results for first birth interval are reported in Table 4. There is a statistically significant increase in first birth interval between the 1870s and 1880s cohort (p value = .01) but then some retrogression in this increase in the 1890s. Increases then re-appear between the 1890s and 1900s (p value = .001) and 1900s and 1910s (p value = .000) cohorts. There are no initial differences across occupations in the main effects, but white collar families are characterized by greater increases in first birth intervals, compared to farmers, by the 1900s.[10]

[10] We incorporate all first births in these calculations, including those likely to have arisen from pre-marital pregnancy. About 6% of all of the first births in our analysis came after an interval (from the marriage date) of seven months or less. The rate of "early birth" increased from a low of about 3% for the 1850 (mothers)

Table 4: Determinants of first birth interval

	Coefficient	Standard Error	[95% Conf.Interval]	
	Woman's Decade of Birth			
1850s	**Reference**			
1860s	-0.279	0.781	-1.810	1.252
1870s	-0.013	0.756	-1.495	1.469
1880s	1.311	0.744	-0.148	2.770
1890s	0.741	0.750	-0.730	2.122
1900s	**2.664**	**0.770**	**1.155**	**4.173**
1910s	**8.410**	**0.795**	**6.853**	**9.968**
	Spouse's Occupation			
Farmer	**Reference**			
White Collar	1.263	1.535	-1.745	4.271
Service	-0.538	4.451	-9.263	8.186
Craft	0.180	1.640	-3.035	3.395
Operative/Laborer	-0.232	2.388	-4.914	4.449
	Occupation – Birth Cohort Interactions			
White Collar * 1860s	-0.098	1.803	-3.633	3.437
***1870s**	1.841	1.702	-1.496	5.177
***1880s**	2.194	1.645	-1.031	5.419
***1890s**	0.613	1.625	-2.572	3.798
***1900s**	**4.487**	**1.626**	**1.301**	**7.674**
***1910s**	**5.461**	**1.625**	**2.275**	**8.646**

Adj. R^2=.091 N=49,278 / Bold => p value < .05

birth cohort to around 6% for the 1890s cohort, and then fell again to 5% for the 1910s cohort. Smith and Hindus (1975) report a similar rise in premarital pregnancy for roughly the same period, though the rates we calculate for Utah are lower and increase less. Pre-marital pregnancy was more common among the wives of men employed in service (6.9%) and operative/laborer (7.7%) jobs. Wives of white collar workers had the lowest rates (3.6%). Inactive LDS church members had higher rates (9.5%) than did either the active LDS (4.7%) or Non-LDS (5.8%). Perhaps the inactive LDS were least integrated into a "central structure of values" (Smith and Hindus 1975: 559), leading to higher rates of premarital pregnancy for this group. Excluding early births from our analysis does not change the results in any substantial way, although it does produce a somewhat greater increase in first birth interval over time, as more early births are dropped from the later cohorts.

Table 4: (Continued)

	Coefficient	Standard Error	[95% Conf.Interval]	
Service*1860s	3.632	4.991	-6.151	13.415
***1870s**	1.081	4.762	-8.253	10.414
***1880s**	0.745	4.632	-8.334	9.824
***1890s**	1.931	4.581	-7.050	10.912
***1900s**	0.090	4.565	-8.857	9.038
***1910s**	3.957	4.554	-4.969	12.884
Craft*1860s	0.136	1.961	-3.708	3.979
***1870s**	0.611	1.844	-3.004	4.226
***1880s**	1.320	1.773	-2.154	4.795
***1890s**	0.151	1.746	-3.272	3.575
***1900s**	1.648	1.741	-1.763	5.055
***1910s**	3.259	1.737	-0.147	6.664
Op/Lab*1860s	0.728	2.795	-4.749	6.206
***1870s**	1.218	2.610	-3.897	6.333
***1880s**	1.888	2.530	-3.070	6.846
***1890s**	0.597	2.495	-4.294	5.487
***1900s**	1.454	2.482	-3.410	6.318
***1910s**	2.683	2.468	-2.155	7.521
	Woman's LDS Status			
Non-LDS	**Reference**			
ActiveLDS	**-8.732**	**0.301**	**-9.322**	**-8.141**
InActiveLDS	**-5.313**	**0.366**	**-6.030**	**-4.595**
Woman born on Wasatch Front	**0.411**	**0.187**	**0.045**	**0.777**
Age at Marriage	**0.401**	**0.025**	**0.352**	**0.449**
Occupation Reported for Woman	**2.183**	**0.263**	**1.669**	**2.698**
Constant	**23.572**	**0.715**	**22.170**	**24.974**

Adj. R2=.091 N=49,278 / Bold => p value < .05

The pattern of change for average inter-birth intervals is somewhat different (see Table 5). Here, an increase in the main cohort effects is present from the 1860s on, with intervals increasing monotonically and statistically significantly across cohorts (with p values below .05 in pairwise comparisons) through the 1910s. White collar families always have longer average birth intervals than do farm families (as is evident in the main occupation effects), but there are no statistically significant occupation*cohort interaction effects.

Table 5: Determinants of average inter-birth interval

	Coefficient	Standard Error	[95% Conf.Interval]	
	Woman's Decade of Birth			
1850s	**Reference**			
1860s	**2.338**	**0.694**	**0.977**	**3.697**
1870s	**5.155**	**0.673**	**3.837**	**6.473**
1880s	**7.259**	**0.663**	**5.960**	**8.558**
1890s	**9.172**	**0.670**	**7.860**	**10.485**
1900s	**14.676**	**0.692**	**13.320**	**16.033**
1910s	**15.984**	**0.713**	**14.586**	**17.382**
	Spouse's Occupation			
Farmer	**Reference**			
White Collar	**2.855**	**1.364**	**0.181**	**5.529**
Service	0.459	3.931	-7.246	8.163
Craft	0.471	1.460	-2.390	3.332
Operative/Laborer	1.429	2.136	-2.757	5.615
	Occupation – Birth Cohort Interactions			
White Collar * 1860s	0.433	1.608	-2.718	3.585
***1870s**	1.367	1.521	-1.614	4.348
***1880s**	1.987	1.467	-0.889	4.863
***1890s**	0.737	1.451	-2.106	3.581
***1900s**	1.051	1.454	-1.799	3.900
***1910s**	-1.041	1.451	-3.885	1.802
Service*1860s	1.900	4.448	-6.817	10.618
***1870s**	2.816	4.220	-5.454	11.087

Adj. R^2=.090 N=45,266 / **Bold** => p value < .05

Table 5: (Continued)

	Coefficient	Standard Error	[95% Conf.Interval]	
*1880s	0.212	4.103	-7.830	8.254
*1890s	1.023	4.058	-6.932	8.977
*1900s	1.311	4.047	-6.620	9.243
*1910s	0.643	4.034	-7.263	8.549
Craft*1860s	1.708	1.747	-1.717	5.132
*1870s	1.138	1.647	-2.090	4.365
*1880s	2.023	1.582	-1.078	5.125
*1890s	0.844	1.560	-2.213	3.901
*1900s	1.591	1.558	-1.462	4.644
*1910s	2.214	1.553	-0.830	5.257
Op/Lab*1860s	1.563	2.495	-3.328	6.453
*1870s	0.339	2.342	-4.251	4.929
*1880s	0.209	2.268	-4.236	4.654
*1890s	-1.386	2.236	-5.769	2.997
*1900s	-0.235	2.227	-4.600	4.130
*1910s	0.100	2.212	-4.236	4.435
	Woman's LDS Status			
Non-LDS	Reference			
ActiveLDS	**-3.104**	**0.292**	**-3.676**	**-2.532**
InActiveLDS	**-1.431**	**0.354**	**-2.124**	**-0.738**
Woman born on Wasatch Front	**0.595**	**0.172**	**0.257**	**0.932**
Age at Marriage	**-0.446**	**0.024**	**-0.493**	**-0.398**
Occupation Reported for Woman	-0.054	0.247	-0.539	0.430
Constant	**33.028**	**0.645**	**31.764**	**34.292**

Adj. R^2=.090 N=45,266 / **Bold** => p value < .05

As with average inter-birth intervals, age at last birth begins to change in the 1860s birth cohort, and this decline in the age at stopping is substantial and sustained through the 1900s cohort in pairwise tests (see Table 6). There are no differences across occupations in the main effects (i.e. no differences from farm families and no other differences in pairwise tests). However, the pace of decline in age at last birth for white collar families exceeds that of farm families by the 1870s cohort, and this statistical difference persists through the 1890s cohort. Both groups of blue collar workers (craft and operative/laborer) experienced greater declines in age at last birth than did farm families in both the 1880s and 1890s birth cohorts. The differential pace of decline in age at last birth for service workers' families, compared to farm families, is of a similar magnitude. However, the number of service workers is fairly small, and none of their interaction effects are statistically significant at conventional levels. There are no differences across any other occupation pairings in the interaction effects.[11]

Table 6: Determinants of age at last birth

	Coefficient	Standard Error	[95% Conf.Interval]	
	Woman's Decade of Birth			
1850s	**Reference**			
1860s	**-0.969**	**0.215**	**-1.390**	**-0.548**
1870s	**-1.950**	**0.208**	**-2.357**	**-1.543**
1880s	**-3.170**	**0.204**	**-3.571**	**-2.769**
1890s	**-5.230**	**0.206**	**-5.634**	**-4.826**
1900s	**-6.319**	**0.211**	**-6.733**	**-5.904**
1910s	**-6.195**	**0.218**	**-6.623**	**-5.767**
	Spouse's Occupation			
Farmer	**Reference**			
White Collar	-0.695	0.421	-1.521	0.132
Service	-0.856	1.223	-3.252	1.540
Craft	-0.635	0.451	-1.518	0.248
Operative/Laborer	-0.297	0.656	-1.583	0.989
	Occupation – Birth Cohort Interactions			
White Collar * 1860s	-0.504	0.495	-1.475	0.467
***1870s**	**-1.579**	**0.468**	**-2.495**	**-0.662**
***1880s**	**-1.761**	**0.452**	**-2.647**	**-0.875**

Adj. R^2=.090 N=45,266 / **Bold** => p value < .05

[11] In Dribe et al (2013), we examine risk of first birth and risk of higher order birth in a proportional hazards framework. The samples and occupation coding schemes are slightly different, but the patterns largely match those found here. For first births, most of the decline in risk occurs among women born after 1900, and women whose spouses hold higher status jobs have somewhat greater reduction in risk at that point. For risk of higher order birth (which combines changes in average birth interval and age at last birth), reduction in risk begins by the 1870s and is more clearly led by white collar and skilled blue collar families, although there is some reduction in socioeconomic differentials after 1900.

Table 6: (Continued)

	Coefficient	Standard Error	[95% Conf.Interval]	
***1890s**	**-1.952**	**0.446**	**-2.827**	**-1.077**
***1900s**	-0.658	0.447	-1.534	0.217
***1910s**	0.444	0.446	-0.431	1.319
Service*1860s	-0.495	1.371	-3.182	2.192
***1870s**	-1.592	1.308	-4.156	0.971
***1880s**	-1.198	1.272	-3.692	1.295
***1890s**	-1.699	1.258	-4.165	0.768
***1900s**	-1.066	1.254	-3.524	1.391
***1910s**	-0.249	1.251	-2.701	2.202
Craft*1860s	-0.169	0.539	-1.225	0.887
***1870s**	-0.682	0.507	-1.674	0.311
***1880s**	**-1.186**	**0.487**	**-2.141**	**-0.232**
***1890s**	**-1.359**	**0.480**	**-2.299**	**-0.419**
***1900s**	-0.771	0.478	-1.708	0.166
***1910s**	-0.208	0.477	-1.143	0.727
Op/Lab*1860s	-0.632	0.768	-2.137	0.872
***1870s**	-1.141	0.717	-2.546	0.264
***1880s**	**-1.426**	**0.695**	**-2.788**	**-0.065**
***1890s**	**-1.391**	**0.685**	**-2.734**	**-0.048**
***1900s**	-1.042	0.682	-2.377	0.294
***1910s**	-0.352	0.678	-1.680	0.977
		Woman's LDS Status		
Non-LDS	**Reference**			
ActiveLDS	**2.591**	**0.083**	**2.429**	**2.753**
InActiveLDS	**0.578**	**0.101**	**0.381**	**0.775**
Woman born on Wasatch Front	**-0.259**	**0.051**	**-0.359**	**-0.158**
Age at Marriage	**0.370**	**0.007**	**0.357**	**0.383**
Occupation Reported for Woman	**-0.902**	**0.072**	**-1.044**	**-0.761**
Constant	**39.379**	**0.196**	**30.995**	**39.764**

Adj R2 = .209, N=49,278 / Bold => p value < .05

Finally, the pattern of change in children ever born is similar to that in age at last birth, with statistically significant declines across birth cohorts from the 1860s on (see

Table 7).[12] White collar families begin with a lower level of childbearing than is found among farm families, and they also experienced larger reductions from the 1870s through the 1900s. Service workers' families had greater reductions in childbearing than did farm families in both the 1890s and 1900s birth cohorts, craft workers' families had greater reductions from the 1870s on, and operative and laborers' families had greater reductions from the 1880s through the 1900s cohorts. White collar families had greater decreases in childbearing than did operative/laborer families in the 1890s cohort, although craft workers' families had greater reductions than did white collar families in the 1910s cohort.

Table 7: Determinants of children ever born

	Coefficient	Standard Error	[95% Conf.Interval]	
		Woman's Decade of Birth		
1850s	**Reference**			
1860s	**-0.075**	**0.013**	**-0.101**	**-0.050**
1870s	**-0.159**	**0.013**	**-0.185**	**-0.134**
1880s	**-0.255**	**0.013**	**-0.280**	**-0.230**
1890s	**-0.422**	**0.013**	**-0.448**	**-0.396**
1900s	**-0.603**	**0.014**	**-0.631**	**-0.575**
1910s	**-0.650**	**0.015**	**-0.680**	**-0.620**
		Spouse's Occupation		
Farmer	**Reference**			
White Collar	**-0.076**	**0.026**	**-0.127**	**-0.024**
Service	-0.019	0.076	-0.168	0.130
Craft	-0.011	0.027	-0.065	0.042
Operative/Laborer	-0.032	0.040	-0.111	0.046
		Occupation – Birth Cohort Interactions		
White Collar * 1860s	-0.025	0.032	-0.087	0.037
***1870s**	**-0.112**	**0.030**	**-0.172**	**-0.053**
***1880s**	**-0.176**	**0.029**	**-0.233**	**-0.118**
***1890s**	**-0.191**	**0.029**	**-0.248**	**-0.134**

Generalized Linear Model, Poisson distribution. N=49,278 / **Bold** => p value < .05

[12] We model the number of children ever born with a Poisson regression. All other models are OLS.

Table 7: (Continued)

	Coefficient	Standard Error	[95% Conf.Interval]	
***1900s**	**-0.135**	**0.030**	**-0.193**	**-0.077**
***1910s**	-0.019	0.029	-0.076	0.039
Service*1860s	-0.127	0.087	-0.298	0.045
***1870s**	-0.156	0.083	-0.320	0.007
***1880s**	-0.120	0.081	-0.278	0.037
***1890s**	**-0.200**	**0.080**	**-0.357**	**-0.043**
***1900s**	**-0.163**	**0.080**	**-0.320**	**-0.006**
***1910s**	-0.123	0.080	-0.279	0.034
Craft*1860s	-0.049	0.034	-0.115	0.017
***1870s**	**-0.071**	**0.032**	**-0.134**	**-0.009**
***1880s**	**-0.144**	**0.031**	**-0.205**	**-0.084**
***1890s**	**-0.144**	**0.030**	**-0.204**	**-0.085**
***1900s**	**-0.130**	**0.031**	**-0.190**	**-0.070**
***1910s**	**-0.114**	**0.031**	**-0.174**	**-0.054**
Op/Lab*1860s	-0.052	0.048	-0.147	0.043
***1870s**	-0.067	0.045	-0.156	0.021
***1880s**	**-0.111**	**0.044**	**-0.197**	**-0.026**
***1890s**	**-0.086**	**0.043**	**-0.170**	**-0.001**
***1900s**	**-0.095**	**0.043**	**-0.180**	**-0.011**
***1910s**	-0.064	0.043	-0.148	0.020
	Woman's LDS Status			
Non-LDS	**Reference**			
ActiveLDS	**0.277**	**0.007**	**0.263**	**0.292**
InActiveLDS	**0.096**	**0.009**	**0.078**	**0.114**
Woman born on Wasatch Front	**-0.032**	**0.004**	**-0.040**	**-0.024**
Age at Marriage	**-0.045**	**0.001**	**-0.046**	**-0.044**
Occupation Reported for Woman	**-0.095**	**0.007**	**-0.108**	**-0.082**
Constant	**1.895**	**0.013**	**1.870**	**1.921**

Generalized Linear Model, Poisson distribution. N=49,278 / **Bold** => p value < .05

Our control variables generally have statistically significant and right-signed coefficients.[13] It might seem surprising that active LDS women had a later age at marriage than did non-LDS women, but this is consistent with Bean et al.'s findings for the late 1800s (Bean et al. 1990: 169). The one other surprise is in the lack of significant effect of the woman's own employment on average inter-birth interval. It may be that the occupation reported on these women's death certificates reflects employment before childbearing, as it affects age at marriage and first birth interval. It might also reflect employment after a desired family size is reached, as woman's own employment reduced both children ever born and age at last birth. During their childbearing years, however, these women may have remained out of the labor market, so that inter-birth intervals were not substantially affected by employment.

To summarize the patterns of correlation of fertility behavior with spouse's occupation, we find that delays in the beginning of family formation are driven by rising age at marriage initially and by longer first birth intervals in later cohorts. White collar families experienced larger increases in first birth interval than did farm families by the end of the period we examine. Average inter-birth intervals increased generally and steadily beginning in the 1860s cohort, and white collar families typically had longer intervals than did farm families, but there were no notable distinctions across occupations in the timing of change in these intervals. Age at last birth and the number of children ever born declined generally and continually. White collar families were "leaders" here to a degree, although most other categories of families also became distinct from farm families on these dimensions over time.

5. Conclusion and discussion

We have uncovered some intriguing interactions between socio-economic status (as measured by spouse's occupation) and fertility change in Utah in the era of the fertility transition. Even though all groups experienced considerable decline in fertility, the specific paths to this decline differed in ways that may be tied to economic imperatives. Families of white collar workers led many of these changes, particularly those relating to the starting of family life, perhaps reflecting the impact of longer periods of education or training and early career transitions. Farm families were particularly distinctive in the late ages at which they continued to add children and also in the number of children ever born, perhaps reflecting an ongoing need for family labor in agriculture, especially to support aging parents.

[13] In all models in which marriage age is an independent variable, we transform it to have a mean of 0.

Interpreting these patterns of change requires attention to the economic context. For instance, agriculture's share of total employment declined considerably during the period we are studying. It is possible that the farmers in our earliest cohorts were engaged in a variety of activities beyond agriculture, while those who remained in farming at the end may have been substantially more specialized. These kinds of changes could affect the impact of father's occupation on fertility and in particular our ability to see cross-occupational differences.[14]

We have only begun to exploit the rich resources of the UPDB for studying fertility change. One area of extension could include looking at broader networks beyond the nuclear family. Might the socio-economic status of grandparents, and of parent's siblings, have had an influence on fertility behavior? While the frontier setting of our analysis, and the prominent role of a unique religious culture in this community, will require us to be cautious about the generalizability of our findings, we believe the opportunity to improve our understanding of fertility change and economic-demographic interaction through the resources of the UPDB is substantial.

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[14] As a first test of this hypothesis, we reran the analysis adding an interaction of "Woman Born on Wasatch Front" with spouse's occupation. The Wasatch Front had a more diversified, less agricultural economy than did the rest of the state throughout the period of our analysis. We find that the farm/non-farm differentials in fertility behavior were typically larger for women born along the Wasatch Front than for those born elsewhere, especially for marriage age and children ever born. This result is only suggestive in that we are controlling for the place of the woman's birth, not the place of her residence at the time of her childbearing. Details available from the authors.

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