Household Production Technology and the American Baby Boom

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Abstract:
More than half a century after its peak, the causes of the baby boom remain a matter of scholarly debate. In a provocative new article, Greenwood et al. (2005) postulate that rapid changes in household production technology from 1940 to 1960 explain this phenomenon by lowering the cost of childrearing. This causal argument is laid out in an overlapping-generations model that integrates population growth, technological change, and household production. Using newly compiled datasets, we subject the "household productivity" hypothesis to empirical scrutiny. We find little evidence that increases in appliance ownership or electrification at the county-level corresponded to increases in the general fertility rate. Moreover, we find no evidence that greater exposure to electricity as a young adult is related to increases in completed fertility. Finally, we provide evidence (corroborated in the demography literature) that the Amish, a group that restricted their use of electric, household technologies for religious reasons, experienced a mid-century baby boom as well. In sum, the data provide no support for the household-productivity hypothesis.

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1. Introduction

After 140 years of secular decline, births per 1,000 women (age 15 to 44) in the United States increased by more than 50 percent between 1939 and 1957, rising from 78 to 123 (see figure 1). The "baby boom" was not merely a short-lived, statistical aberration reflecting postponed births from the Depression or World War II. Rather, it stretched over two decades and was driven by couples who chose to marry and have children at younger ages, reduce intervals between births, and have significantly more children over their lifetimes (Ryder 1980, Rogers and O'Connell 1984).[1]

The baby boom presents a fascinating challenge to economists and demographers who usually associate rising income, urbanization, educational attainment, and women's labor force participation, all of which occurred between 1940 and 1960, with declining fertility. The ultimate causes of the baby boom remain a matter of debate more than a half century after its peak, as the "boomers" themselves begin to pass into retirement. Richard Easterlin's work (1961, 1980) and the many studies it has motivated form a cornerstone in this literature. Easterlin emphasizes the importance of a cohort's perceived "earnings potential" relative to its "material aspirations." Children who grew up in the Depression, for example, may have formed material aspirations that were far exceeded by their actual experience as young adults in the later 1940s and 1950s, and they may have responded to their surprisingly good fortune by having more children.[2] For at least three decades, this has been the dominant hypothesis explaining twentieth-century fertility cycles in the United States.

Greenwood, Seshadri, and Vandenbrouke (2005, henceforth GSV) recently issued a significant challenge to this view in a provocative article in the *American Economic Review*, "The Baby Boom and Baby Bust." Their article put forward a bold, new explanation for historical changes in the U.S. birth rate. Specifically, GSV argue that the mid-century rise in fertility was driven by a decline in the price of childrearing, which followed from a sudden rise in the productivity of household technology that was closely linked to the diffusion of modern appliances and other time-saving innovations. In essence, couples responded to changes in household productivity by substituting toward the lower cost commodity (children). In their words,

[1] In fact, women born during the 1930s had completed fertility rates as high as those among cohorts born in the late nineteenth century.

[2] See Macunivich (1998) for a review of the empirical literature that the Easterlin hypothesis spawned. See Sanderson (1976) for a discussion of the main differences in the Easterlin and Becker (1965, 1973) views.

…technological advance in the household sector, due to the introduction of electricity and the development of associated household products such as appliances and frozen foods, reduced the need for labor in the child-rearing process. This lowered the cost of having children and should have caused an increase in fertility, other things equal. This led to the baby boom (p. 185).

This causal argument is laid out in rigorous fashion in an overlapping generations model that integrates population growth, technological change, and household production. In this context, a rise in household-sector productivity, x_t, increases the optimal number of children in the household, n_t, or $dn_t/dx_t > 0$.[3] The model also predicts that fertility declines as market productivity and wages rise, $dn_t/dw_t < 0$, and, thus, explains the dominant, downward fertility trend in U.S. history (pp. 188, 205).[4]

If it is correct, this interpretation of the baby boom would be a triumph for neoclassical models that emphasize changes in technology and prices in explaining changes in fertility. It would present a stark counterpoint to arguments from the Easterlin school of thought, which emphasize a causal and independent role for changes in preferences (cf. Fernandez 2007). Moreover, it would represent a fundamental shift in traditional narratives of U.S. demographic history and changes in women's labor market participation.

After a critical review of the quantitative evidence originally offered in support of the household-productivity hypothesis, our analysis subjects this potentially paradigm-shifting explanation to closer empirical scrutiny. First, we test the model's central claim, $dn_t/dx_t > 0$, in a regression framework that draws on a rich combination of newly-encoded and pre-existing county-level datasets for the entire United States. A barrage of empirical tests that examine county-by-year changes in household electrification, appliance ownership, and period fertility rates provides little evidence in support of the household-productivity hypothesis and much evidence to the contrary. Then, using newly compiled archival information on annual residential electrical service at the state level, we examine the relationship between completed fertility and an index of women's access to electrical service as young adults. Again, the evidence weighs against the hypothesis that new household technologies caused the baby boom. Finally, to assuage concerns that unobservable or omitted county-level factors lead to misleading regression results, we examine the demographic history of the Old Order Amish. The Amish, on religious grounds, strictly limited their use of

[3] The theoretical model also predicts that fertility is a negative function of the time price of household technology (g), where time price is defined as number of hours of work required to purchase the technology at the current wage rate. Because GSV's quantitative version of the model ignores *g* (p. 191, fn 17), we do so as well.

[4] GSV attach a strong causal interpretation to these conditions stating that a "rise in household-sector productivity, x_t, causes fertility, n_t, to increase" and that a "fall in the time price of the household technology, g_t, leads to a rise in n_t".

modern household appliances, but they were not isolated from the general economic conditions of the period under study. Even without modern appliances, the Amish had a sizable rise in fertility that coincided with the general population's baby boom. Taken together, this new evidence suggests that changes in household technology are unlikely to have been a central cause of the baby boom.

2. Long-term perspective on technological progress in the household

Economic history and macroeconomic calibration

The main quantitative evidence supporting the household-productivity hypothesis comes from a computational experiment that is based on a parameterized version of the GSV model. Some of the parameters are set to values commonly cited in the macroeconomics literature (e.g., labor's share of total income), or to values based upon independent sources (e.g., the time series of total factor productivity). Other parameters are estimated, subject to specific constraints, in a manner that minimizes the sum of squared residuals for the fertility rate observed at ten-year increments from 1800 to 1990. The model's key parameter is household productivity, x, but the time path of x is neither measured directly in others' work nor easy to compute using available historical data. Instead, values of x are selected that best fit the fertility time series within the constrained minimization problem, where the constraints force household productivity to be constant from 1800 to 1940; allow it to rise between 1940 and 1960; and then force it to be constant again from 1960 to 1990.[5]

GSV justify the constraints by invoking a "burst of technological progress in the household sector" at mid-century (p. 183 and 191), much of it embedded in the electrical appliances that diffused widely at the time. With this burst of progress, the model can nearly mimic the upswing of baby boom, and with household technology held constant in all other periods, the model can trace the secular decline in fertility before the baby boom. But to accept the results, one must also accept the plausibility of the constraints placed on x. It is true that some appliances diffused rapidly between

[5] This strikes us as a less-than-compelling way to test the explanatory power of household technology in accounting for the baby boom. In the calibrated GSV model, an increase in x is assumed to cause fertility to rise; x is constrained to rise at exactly the same time as the baby boom; and the value of x is chosen to best fit the fertility time series. Kydland and Prescott note in their discussion of computational experiments: "...if the question is of the type 'how much of fact X is accounted for by Y,' then choosing the parameter values in such a way as to make the amount accounted for as large as possible according to some metric is an attempt to get a particular – not a good – answer to the question" (1996, pp. 73-74).

1940 and 1960, but quantitative and qualitative sources reveal that rapid progress in household production began long before the 1940s.

To wit, Lebergott (1976 and 1993) estimates that in 1890, 24 percent of homes had running water and 13 percent had flush toilets, and in 1900, he estimates that 3 percent of homes had electrical service and essentially no one had mechanical refrigerators, washing machines, or vacuum cleaners (1993, p. 113). In contrast, by 1940, the Census reports that about 70 percent of households had running water, 60 percent had a private flush toilet, 80 percent had electrical lighting,[6] 44 percent had mechanical refrigerators, 54 percent had gas or electric stoves (rather than wood, coal, or kerosene), and 42 percent had central heating. We estimate that about 50 percent had clothes washers.[7] Thus, it is extremely difficult to defend the assumption that significant changes in home production took hold only after 1940. The pre-1940 diffusion of cleaner and more efficient stoves, indoor plumbing, sewing machines, electricity, refrigeration, vacuum cleaners, and more efficient retail shopping were all significant advances, rivaling the changes that unfolded between 1940 and 1960. Contrary to the hypothesized *positive* link between appliances and fertility, however, the U.S. fertility rate declined substantially before 1940. In fact, the fertility rate fell by as much from 1910 to 1940 as it increased from 1940 to 1960 even though electrification and appliance ownership were increasing rapidly in both periods.

Aside from appliances *per se*, the marketing of frozen foods and popular writings about the "scientific management" of the home may have influenced household production in the period under study (GSV 2005, p. 197). Frozen foods, however, are best viewed as part of a century-long progression in the production and distribution of processed foods, including canned goods, refrigerated and preserved meat, and ready-to-eat cereals (Strasser 1982, Cowan 1983).[8] As with household appliances, there is no sign of a burst of change in the 1940s, but rather there is a continuation of a strong pre-existing trend. Likewise, Christine Frederick's oft-cited writings (1912) on improving efficiency in household work were published decades before the baby boom and are best understood as a continuation of a literature that dates to the mid-nineteenth century work of

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[6] It is probable that nearly as many households had electric irons, as irons were commonly the first appliance acquired after gaining electrical access.

[7] This is from multiplying figures for clothes washer ownership in 1940 among "wired" households (61 percent) from Bowden and Offer (1994, p. 745) by the proportion of occupied dwellings with electrical lighting (79 percent) from the U.S. Census (as reported in Brunsman and Lowery 1943, p. 91).

[8] For example, Cowan writes, "By the turn of the century, canned goods were a standard feature of the American diet: women's magazines contained advertisements for them on nearly every page, standard recipes routinely called for them, and the weekly food expenditures of even the poorest urban families regularly included them" (1983, p. 73).

Catharine Beecher (1841).

The computational experiment's assumption that household production technology froze in 1960 (as fertility began to decline) is also at odds with history. After 1960, automatic dishwashers, clothes dryers, air-conditioning, and microwaves were recasting patterns of housework yet again (Cox and Alm 1997, p. 22), and television entertainment may have lessened children's demands on parents' time and energy. It is noteworthy that the calibrated model fails to replicate the post-1960 baby bust. The authors introduce a hybrid model using the quantity-quality tradeoff to suggest possible extensions that may account for the baby bust.

Overall, the historical and quantitative literatures provide little support for an anomalous burst in household-sector productivity between 1940 and 1960, but the imposition of such a burst is precisely what "causes" the baby boom in the model's calibration. This incongruence does not disprove the hypothesis that household production technologies influenced fertility decisions, but it invites further evidence to test the validity of the household-productivity hypothesis.[9]

Cross-country evidence on the cause of the baby boom

The other main piece of empirical evidence offered in support of the household-productivity hypothesis is a set of graphs that compare (on one axis) baby-boom magnitude or the year-of-boom-onset and (on the other axis) income per capita in 1950 in 18 OECD countries or an index of appliance ownership in 6 countries (GSV, pp. 201-202). The GDP per capita comparisons rely upon the idea that households in rich countries are more likely to own labor-saving appliances. As the household-productivity hypothesis suggests, baby boom size is positively correlated with GDP per capita and appliance ownership, and year-of-onset is negatively correlated with GDP per capita and appliance ownership.

Cross-place comparisons are certainly useful in this context, and the raw correlations are

[9] To offer some cross-validation of the model, GSV note that one of its main quantitative predictions – that time spent in household production fell by a factor of four between 1900 and 1970 – is consistent with estimates from Lebergott (1993). Unfortunately, Lebergott's claim has never squared with a large literature on household-level time-use studies, which suggests that there were small (if any) declines in time spent on housework before the mid-1960s (see, inter alia, Vanek 1973, Cowan 1983, Bryant 1996, Ramey and Francis 2006), a paradox that Mokyr (2000) ascribes to a shift in demand for cleanliness driven by changes in knowledge about the sources of disease. Importantly, Francis and Ramey (2006) and Ramey (2007) point out that Lebergott appears to have misread a critical table in his underlying data source – an unfortunate but significant mistake. After carefully re-weighting observations across the early time-use studies, Ramey (2007) concludes that average weekly hours of housework by American adults were nearly constant from 1900 to 1965, followed by a slight decline to 1975. Thus, it appears that the massive decline in time spent on housework predicted by GSV's model (and implied by Lebergott's mistake) simply did not transpire in fact.

consistent with the household-productivity link. But these plots also illustrate the limitations of causal inference based on simple correlations. There is little scope for addressing omitted variables, identifying channels of influence, or discerning among competing explanations. Consequently, the plots leave open crucial questions of interpretation. First, does income influence fertility solely through its effect on household technology, or is the relationship between income and fertility direct? A key problem is that the correlations are fully consistent with the leading *alternative* explanation of the baby boom – Easterlin argues that the fertility boom was a response to post-war prosperity (1980). Second, why did so many countries initiate baby booms within five years of the U.S. by the GSV metric even though they typically had far fewer modern appliances? One of the baby boom's remarkable features (both within the U.S. and across countries) is that fertility rates climbed nearly simultaneously in places with vastly different economic characteristics and vastly different degrees of exposure to modern household conveniences.[10] To investigate the hypothesized positive link between household technology and fertility, this paper conducts a variety of empirical tests using existing and newly-compiled data.

3. Inferences from cross-county comparisons in the United States

To ameliorate concerns about omitted variables and to better distinguish the predictions of the GSV model from those of the Easterlin hypothesis, we compiled a large dataset of county-level economic and demographic variables from 1940 to 1960. For many of the economic and demographic variables, we drew on the publicly-available Haines files (2004); for other variables, including many of the appliance ownership counts, we punched in the data from the published census volumes. Every county in the U.S. with available information (excluding those in Hawaii and Alaska) is in our dataset for each of the three census years that span the baby boom. We also include a county-level fertility rate variable for 1930 as a control for pre-baby boom fertility. Altogether, this yields a panel data set with more than 3,000 county-level observations per decade.

The key variables of interest for our analysis are the fertility rate, which we measure as the number of infants per 1,000 women ages 15 to 44, and modern appliance ownership rates, which we measure as the proportion of housing units with electrical service (as indicated by having electric lights), refrigerators, washing machines for clothing, and modern stoves (e.g., fueled by electricity or

[10] One could also ask: Why did Ireland and France experience baby booms of comparable size to that in the U.S. (by GSV's metric) despite being decades behind in terms of appliance diffusion? Conversely, why did Australia and New Zealand far exceed the magnitude of the U.S. baby boom despite having fewer modern appliances (if GSV's GDP per capita proxy is accepted)?

gas, rather than coal, wood, or kerosene).[11] Not every appliance variable is available in every census year: electrical service and refrigerators are reported in 1940 and 1950; washing machines are reported only in 1960; and modern stoves are reported in 1940, 1950, and 1960. Nonetheless, these data provide the most detailed view of the diffusion of modern appliances that one can assemble for the baby boom period in the United States.

The data reveal that between 1940 and 1960, more than 95 percent of all U.S. counties had increases in their general fertility rate. In this sense, the baby boom was widespread, but it was certainly not evenly spread: across counties, increases in the general fertility rate range from 11.3 at the 10th percentile to 66.1 at the 90th percentile. Likewise, the increase in electrification and appliance ownership was widespread but not evenly spread. The increase in ownership of modern stoves from 1940 to 1960 ranges from 35.2 percentage points at the 10th percentile to 84.9 percentage points at the 90th percentile; the increase in electrical service from 1940 to 1950 ranges from 8 percentage points at the 10th percentile to 49.8 percent at the 90th percentile. Table 1 reports means and standard deviations for each of the key variables used in our analysis.[12] The considerable variation in these measures and the size and detail of the dataset allow us to examine correlations between fertility and appliance ownership at the county-level while accounting for many other relevant demographic and economic differences.

The testable implication of the GSV model is that family size (the number of children) should increase as the productivity of household technology increases, other things equal (2005, p. 205). This can be tested in the county-level data by examining whether counties with higher rates of appliance ownership (and, therefore, earlier diffusion) experienced higher general fertility rates—after accounting for other observable characteristics that may be correlated with both appliance ownership and childbearing decisions. This hypothesis test is implemented in the following a linear regression framework,

(1) $$I_{is} = \tau A_{is} + \boldsymbol{\beta X}_{is} + \sum_{k=1}^{49} \gamma_k I(s=k)_k + \varepsilon_{is} \ ,$$

where *I* is the number of infants per 1,000 women age 15 to 44 in county *i* and state *s* (our estimate of

[11] The Census counted a home as having electrical lighting as long as there was a light that was wired to an electrical source (even if service was temporarily suspended).

[12] It is worth noting that although appliances and fertility both trended upward between 1940 and 1960, they trended in opposite directions for the first four decades of the twentieth century. In GSV (2005) this is explained by an especially strong change in household production technology during the baby boom that more than offsets downward pressure on fertility associated with rising market productivity.

the general fertility rate), *A* represents the proportion of households in the county with a particular appliance, and the γs account for state-specific differences in fertility due to unobserved factors. To account for county-level differences that may affect both fertility rates and appliance ownership, the specification includes several variables in $\boldsymbol{X}$, including measures and correlates of family income (median years of schooling for those over age 24, log of median property value for owner-occupied housing, log of median family income [in 1950 and 1960 only], racial composition), measures of local economic development (the proportion working in agriculture, the proportion working in manufacturing, the urban proportion of the county's current population, and population density), correlates of the opportunity cost of childrearing (the proportion of women in the labor force), and a proxy for unobserved county-level factors that affect fertility choices (pre-boom fertility rates measured in 1930). Assuming the model is properly specified, a hypothesis test of $\hat{\tau} > 0$, provides one empirical test of the household-productivity hypothesis, $dn_t/dx_t > 0$.

Another testable implication of the household-productivity hypothesis is that counties with larger *changes* in appliance ownership would have experienced larger changes in general fertility rates. This approach is most similar in spirit to the scatter plots discussed above (GSV, Figure 13, p. 203). As before, we implement this test in a linear regression framework,

$$\Delta I_{is} = \tau^D \Delta A_{is} + \boldsymbol{\beta}^D \Delta \boldsymbol{X}_{is} + \sum_{k=1}^{49} \gamma_k^D I(s = k)_k + u_{is}, \quad (2)$$

where Δ denotes county-level changes in the variable over a 10 or 20 year period (either from 1940 to 1950, 1950 to 1960, or 1940 to 1960), and the remaining notation remains as previously described. Equation 2 is a first-differenced version of equation 1. This differenced version implicitly accounts for unobservable time-invariant, county-level factors that influence appliance ownership and fertility. In addition, the state fixed effects now absorb unobserved state-specific trends in fertility due to changes in prosperity, optimism, policy, or other relevant conditions. Specification (2), therefore, substantially narrows the scope for omitted variables bias. Estimates of τ^D will be biased if unobserved, county-level deviations from state-level trends are correlated with changes in appliance ownership and changes in fertility changes. Again, assuming the model is properly specified, a hypothesis test of $\hat{\tau}^D > 0$ provides another empirical test of the household-productivity hypothesis, $dn_t/dx_t > 0$.

Both tests are limited by important measurement issues. First, our data contain information on the ownership of appliances but not literally the "state of household technology", *x*. Because appliance ownership reflects both the demand for and the availability of appliances (which is perhaps a closer approximation to the "state of technology"), our estimates of τ reflect exogenous variation in x only in so far as the control variables and fixed effects in specifications (1) and (2) account for heterogeneity in the demand for appliances. Second, our county-level data measure the number of births in the past year rather than completed fertility, n, which is featured in GSV's theory.[13] Our use of the general fertility rate follows a long literature in economics and demography, and the general fertility rate is highly correlated with changes in completed fertility (as shown in figure 1)—especially during in the U.S. baby boom—but a closer fit to the theory may be desirable. Later sections of the paper address these measurement issues in more detail.

Table 2 reports the key results from several OLS regressions that correspond to equation 1 in 1940, 1950 and 1960. Each coefficient reported in the table is from a separate cross-county regression of fertility on appliance ownership. The specification in column 1 includes no covariates or fixed effects; column 2 adds state fixed effects; and column 3 adds the full set of economic and demographic controls.[14] In 1940, the raw correlation between fertility and appliance ownership (refrigerators, modern stoves, and washing machines) is strongly negative (column 1). Adding state fixed effects (column 2) tends to increase the magnitude of the point estimates in most regressions, and the strong negative correlation between fertility and appliance ownership remains. Adding the long list of relevant economic and demographic covariates reduces the magnitude of the negative coefficients (column 3), but they remain negative in most cases. Although the negative relationship is significantly attenuated in column 3 relative to columns 1 and 2, only one positive and statistically significant coefficient appears – for modern stoves in 1950. The coefficient on modern stoves, however, is negative in both 1940 and 1960, and in 1960's regression the estimate is strongly statistically significant. In sum, we find little evidence in the cross-sectional analysis that is consistent with the claim that $dn/dx > 0$.

To narrow the scope for omitted variable bias, table 3 reports estimates from the differenced specification described in equation 2. Because the census did not collect information on the same appliances in 1940, 1950, and 1960, our comparisons are limited by data availability. Panel A presents estimates for 1940 to 1950 changes in refrigerator ownership; panel B presents estimates for changes in the ownership of modern stoves (panel B1 is for 1940 to 1960; B2 is for 1940 to 1950;

[13] Although the GSV theory addresses completed fertility (n) at the level of the representative agent, their paper fits the period fertility rate in its quantitative analysis.
[14] The full set of regression coefficients are available on request.

and B3 is for 1950 to 1960). The sequence of specifications across columns corresponds to those in table 2. After accounting for time-invariant county-level factors (by differencing), state-level trends in unobservable characteristics, and changing county-level demographic and economic characteristics (ΔX) (column 3), the point estimates in panels A and B1 are strongly and consistently negative. Note that the negative coefficients persist even after controlling for changes in women's labor force participation, suggesting that they are not merely picking up the influence of changing labor market opportunities for women. One interesting twist on the evidence is that the estimates in panel B2 are positive, suggesting that changes in the proportion of households using modern stoves was positively correlated with fertility between 1940 to 1950. Because income measures are unavailable for the 1940 counties, however, no controls for changes in household income could be included. In the specification in column 3 of panel B3, which does include changes in median household income for the 1950 to 1960 period, the regression coefficients are negative.

After accounting for a host of factors that may be correlated with both fertility and appliance ownership, the bulk of the regression evidence weighs against the hypothesis that appliance diffusion was positively linked to fertility in the United States during the baby boom. Nonetheless, there is some scope for negative bias in the regression results that merits attention.[15] For instance, rapid changes in opportunities for women in the labor market might be associated with smaller increases in the fertility rate and more investment in labor-saving household appliances. Although we control for differential changes in the female labor force participation rate, it is possible that the control is an imperfect reflection of cross-county changes in the opportunity cost of childrearing, potentially imparting a negative bias to $\hat{\tau}^D$.[16] Similarly, changes in perceptions regarding lifetime income may have induced greater investments in appliances and mitigated increases in fertility if households chose fewer but higher quality children. If the state-fixed effects and county-level measures of education, property values, family income, race, and urbanization imperfectly control for changes in lifetime potential income that are correlated with appliance purchases and fewer children, then again $\hat{\tau}^D$ could be biased downward.

[15] There is also scope for *positive* bias (working in favor of the appliance-fertility hypothesis) associated with reverse causality (e.g., families buy appliances because they have more children) or with young families differentially sorting into areas that were more likely to have electrical service and/or newer housing.
[16] However, regressions run without the control for female labor force participation generally have similar results to those run with the control variable, suggesting that differences and changes in this regard are unlikely to be empirically significant sources of bias.

Electrical service as the state of technology

As mentioned above, one limitation of the regressions in tables 2 and 3 is that there is no clear measure of the "state of household technology", *x*, as featured in the GSV model. From the perspective of households, access to electrical service, which dramatically widened the scope for the adoption of modern appliances, may be a closer proxy for the "state of technology" than is actual ownership of specific household appliances. Few families that had electrical service available to them declined to have lights (or electric irons), whereas the decision to purchase specific, large consumer durable goods reflected a variety of household-level differences in circumstances and plans.[17] To the extent that previous specifications do not adequately control for differences in demand for such appliances, one might view local electrification as a more plausibly exogenous event (with respect to fertility) than the purchase of a major appliance. The history of local utilities in the U.S. supports the notion that electrical service was rolled out in ways that sometimes reflected idiosyncratic community-level politics and funding arrangements, local topology and proximity to natural resources, and federal government investment projects.

The Census of Housing inquired about lighting and reported the proportion of homes with lights at the county level in 1940 and 1950.[18] Panel A of table 4 shows that the presence of electrical service was strongly positively correlated with the level of refrigerator and modern stove ownership in 1940, though not one for one. Thus, the extension of electrical service and the take up of modern appliances seem to be closely, but not perfectly, linked.

Panels B and C report results from regressions of the fertility rate on the proportion of homes with electrical service in 1940 and 1950 (corresponding to equation 1), and panel D reports results from a regression of the change in the fertility rate on the change in electrical service between 1940 and 1950 (corresponding to equation 2). Contrary to the hypothesized positive link between electrification and fertility, columns 1 and 2 in panels B through D suggest that the relationship between greater electrification was strongly negative and highly statistically significant. The inclusion of economic and demographic covariates in column 3 reduces the magnitude of the coefficient estimates (reflecting that county-level observables are correlated with both electrification and fertility), but the estimates are still strongly negative. Overall, the county-level results based on electrical service, a broader and more uniform measure of the "state of household technology" than

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[17] From a measurement perspective, electrical service also has the advantage of being fairly homogenous relative to specific examples consumer durables.

[18] In 1960 more than 98 percent of homes in the U.S. had electrical service (United States Department of Commerce 1975), implying that the scope for cross-county differences in access was quite narrow by that time.

major appliance ownership, reinforce the view that fertility was not positively influenced by the new tools of household production.

Using completed childbearing instead of the general fertility rate

The second major difficulty with testing the household-productivity hypothesis is that contemporaneous census data measure period fertility rates rather than completed fertility, *n*, as in the GSV model. Period fertility and completed fertility rates are generally highly correlated, but to bring the empirical analysis closer to the theoretical model, we paired individual-level completed fertility data from the IPUMS (Ruggles et al. 2006) with state-level data from archived issues of the Edison Electrical Institute's *Statistical Bulletin*. For this analysis, we drew a large sample of women born between 1910 and 1931 from the 1960 to 1990 census data.[19] Each woman in the sample reported the number of children she had ever had, and each was aged between 41 and 60 at the time of observation. The EEI *Statistical Bulletin* reports annual, state-level information on the number of residential electrical service customers from 1925 to 1960.[20] We used this information to assign each woman an "electrical service exposure index" based on her age and state of birth.[21] The index is the average proportion of households in that state that had electrical service during the years in which the woman would have been at the peak of her childbearing years (ages 15 to 29) and is, therefore, a rough measure of the probability of having access to electricity during the main years of family formation.[22] These years are chosen to correspond closely in spirit to the GSV model, which assumes that households make decisions about the number of children in the first period of adulthood based upon the current "state of household technology." It is also important to note that the "state of household technology" is measured more broadly than access to electricity in the individual's county of residence.

[19] Completed fertility peaked around the birth cohorts of 1935. Our birth cohorts cover most of the increase in completed fertility for the cohorts born between 1920 and 1935 as well as 10 years of cohorts prior to the increase.
[20] In the EEI data, Maryland and Washington DC customers are always counted together. North Carolina and South Carolina customers are often counted together, and for consistency we have summed their counts for all years.
[21] We divided the EEI customer counts by the Census of Housing counts of families (1920 and 1930) or occupied dwelling units (1940-1960) in each state to estimate the proportion of families with electrical service. We interpolated the housing counts between census dates. This choice of denominator is consistent with the housing unit counts in *Historical Statistics of the United States* (2006). See Kenneth Snowden's discussion (volume 4, pp. 4-500 and 4-501): "Before 1940 the census enumerated "families" and not housing unit…. However, the two concepts are closely related: a census family was defined in 1930 as a single person living alone, a small group of unrelated persons sharing living accommodations, or, more normally, a group of related persons who live together as one household. Despite differences in terminology, therefore, the basic notion of a family, dwelling unit, or housing unit has provided essentially comparable measures of the residential housing stock since 1890."
[22] This approach is similar to that used by Card and Krueger (1992).

Table 5 reports estimates from linear regressions of children-ever-born on the index of exposure to electricity in early adulthood. Column 1 presents an unadjusted correlation between exposure to electricity. Column 2 includes only state fixed effects, and the positive coefficient simply reflects the fact that completed fertility and electrical service both trended upwards over time. Including only cohort fixed effects (column 3) yields a negative coefficient. That is, after accounting for the joint trends, women born in states with more developed electrical networks tended to have fewer children, likely reflecting the states' higher levels of economic development and income. We prefer the specifications that control for both birth-state and birth-year fixed effects reported in columns 4 to 7. In addition to the full set of fixed effects, columns 5 through 7 include controls for the woman's race and education level (columns 5 and 6) and her husband's education level (column 7).[23] (Specifications with characteristics of the husband implicitly limit the sample to women with spouses in the household.) In columns 4 through 7, the estimates are negative and highly statistically significant. Moreover, the estimates are almost identical for women living with their spouses at the time of observation (columns 4 to 6) as well as those who were not (column 7). Finally, it is particularly noteworthy that after accounting for birth-year and birth-state fixed effects, the addition of covariates such as race and education (which are strongly correlated with lifetime income) has a negligible impact on the magnitude of the point estimates. In contrast to estimates using the general fertility rate and aggregated county-level data, the results provide no reason to suspect that exposure to electricity was highly correlated with observable or unobservable individual characteristics that affected fertility. Although the R-squared term increases from 0.24 (column 4) without the covariates to 0.73 (column 7) with the full set of covariates, the point estimate on "exposure to electricity" changes very little – precisely the result one would expect if exposure to electricity had been randomly assigned. It is, therefore, plausible that exposure to electricity in early adulthood was idiosyncratic with respect to unobservable characteristics that determined lifetime fertility after accounting for birth cohort. In this sense, table 5 provides the most compelling evidence yet that the "state of household technology", x, as embodied in electrification is not positively associated with completed fertility, n.

In summary, empirical tests using the best available measures of appliance ownership, electrification, the general fertility rate, completed fertility, and a variety of potential confounding observable characteristics provide very little support for the notion that new household technologies

[23] We use these covariates because they are likely to have been the same at the time households were making decisions about the number of children and they are highly correlated with lifetime income.

positively influenced fertility decisions. In fact, the evidence is more consistent with the existence of a negative relationship between fertility and the state of household technology. The analysis has not been able to rule out definitively the role of unobservable confounding factors, and this form of misspecification presents the most concerning threat to the interpretation of our results.

4. Outen the lights: The Amish and the baby boom

The Old Order Amish are an especially interesting group in this context of this investigation because, as a matter of religious principle, they limited their take up many modern household conveniences and generally refused to adopt appliances powered by electricity.[24] If the "state of household technology" induced important and large changes in childbearing behavior and, therefore, the baby boom, one would expect fertility rates among the Amish to have remained relatively unchanged as household technology and electrification diffused. Amish demographic history, therefore, provides an independent test of the hypothesis that a burst in household technological progress explains the mid-century baby boom.

A striking feature of Amish demographic history is that—in the absence of household modernization—they experienced a notable rise in fertility that was comparable in timing and magnitude to that in the general U.S. population, despite starting with a relatively high pre-boom level of fertility. Ericksen et al. (1979) examined population data from the four largest Amish settlements in the United States: Lancaster, Pennsylvania; Elkhart, Indiana; and Holmes and Geauga Counties, Ohio. They reported fertility data by birth cohort (rather than by period). Between the 1909-18 birth cohort of Amish women and the 1929-38 cohort, the study documents a decline in the proportion of childless women, a rise in age-specific marital fertility for 20-24 and 25-29 year olds, and a rise in cumulative marital fertility by about 0.6 children (at age 35) (1979, pp. 258-260). As shown in figure 2, the cohort timing of this rise in Amish fertility mirrors the increase in the U.S. population in timing and in magnitude. Over the same period, non-Amish U.S. women increased

[24] The Amish began settling in Pennsylvania in the early 1700s, and later settled in parts of Ohio, New York, Indiana, Illinois, and Ontario. For background on the Amish, see Hostetler (1963) or Nolt (1992). We caution against assuming that the Amish were *completely* isolated from new household technologies. In the early 1960s, Hostetler wrote, "Custom is regional and therefore not strictly uniform. The most universal of all Amish norms across the United States and Canada are the following: no electricity, telephones, central-heating systems, automobiles, or tractors with pneumatic tires…" (1963, p. 61). Later in his study, however, he notes that some Amish had started to use gas-powered kitchen and farm equipment (p. 305). Nonetheless, in comparison with the general U.S. population, it is clear that the uptake of modern appliances was highly constrained among the Old Order Amish in the mid-twentieth century. Hostetler explains, "The social organization of the Amish community has little facility for dealing with change. The general effort to preserve the old and degrade the new is so pervasive that change must occur slowly…" (p. 306).

their completed fertility rates by 0.6 from the 1913 to the 1933 cohort as well.

These results are corroborated in other studies of the Amish. Markle and Pasco (1977) relied on the Indiana Amish Directory from 1971, and they reported figures on a period basis (rather than birth cohort). Between 1935-39 and 1955-59, the average age at marriage for women in their sample fell from 22.8 to 20.8 years, and the average time between marriage and first birth declined. Reflecting these trends, they document a large increase in the birthrates of women in their 20s between 1935-39 and 1960-64 – the birthrate (divided by 1000) for women aged 20-24 increased from approximately 0.30 to 0.53; for women 25-29, from about 0.38 to 0.48 (p. 274, figure 1).[25] In earlier work, Smith (1960) studied the Amish in rural southeastern Pennsylvania. He, too, reported that birth spacing was significantly shorter for Amish women who married in the 1940s and 1950s compared to earlier cohorts (p. 104).

More recently, Greska (2002) compiled data from a 1993 directory for the Amish settlement in Geauga, Ohio, including 1,337 women. Consistent with the studies above, he finds a dip in age at first marriage and age at first birth for the 1928-37 birth cohort of women, and he finds a jump in fertility rates for women in their 20s from the 1928-37 birth cohorts relative to previous cohorts. He reports that the 1928-37 cohorts had cumulative fertility that was 0.42 higher than 1908-17 cohort, and 0.49 higher than the 1918-27 cohort (p. 195-197).

Finally, we used census data to verify the estimates in these studies. Using information on the language spoken (Pennsylvania Dutch), we identified 788 "likely Amish" women in the 1980 and 1990 Census Integrated Public Use Microdata, who were born between 1920 and 1949 (IPUMS, Ruggles et al. 2006).[26] Figure 2 presents the mean number of children ever-born for these- women and, for comparison, children-ever-born to all U.S. women and all native born white U.S. women.. Consistent with the detailed demographic studies of this population, the likely-Amish women in our sample had higher levels of completed fertility than other U.S. women (plotted on the right vertical axis). And they also experienced sizable baby boom in the same cohorts of women as in the U.S. more generally.

In summary, the mid-century increase in period and completed fertility among the Amish suggests that the baby boom occurred among populations that were relatively unaffected by changes in electrification, modern appliances, the availability of frozen food, and other advances in household

[25] Markle and Pasco do not report the exact birthrate figures, but rather present a graph (1977, p. 274, figure 1). The figures in the text above are based on our measurement from Markle and Pasco's graph.
[26] Unfortunately, this information on the language spoken at home was only collected in the 1980 and 1990 censuses.

technology. In combination with the results in previous sections, this is a compelling reason to look beyond rapid technological progress in household production for an explanation for one of the 20th century's most puzzling and important demographic phenomena.

5. Conclusions

The mid-twentieth-century rise in fertility is a compelling puzzle not only because it was a dramatic departure from the previous 140 years of American demographic history, but also because it unfolded against a background of rapid income growth, urbanization, educational increases, infant mortality declines, and rising women's labor force participation – many of the factors that economists and demographers typically associate with *declining* fertility. Instead, women who reached their childbearing years in the 1940s and 1950s (women born between 1920 and 1935) got married younger, bore their first child sooner, and had more children over their lifetimes.

The reasons for the baby boom have never been clearly identified in an econometric sense, but Easterlin's view of the event, which emphasizes the contrast between post-war prosperity and pre-war penury for the key generation of parents, has dominated the literature for decades. An intriguing alternative explanation, which posits a rapid change in the cost of childrearing due to advances in household production technology, has recently entered the debate equipped with the formal structure of modern macroeconomic theory and a sophisticated computational experiment (Greenwood, Seshadri, and Vandenbrouke 2005).

The goal of this paper's analyses is to provide a more comprehensive investigation of the hypothesis that increased productivity in the household was the central cause of the baby boom. Our analysis of a comprehensive dataset for over 3,000 U.S. counties provides scant evidence that is consistent with the claim that the diffusion of modern appliances or access to electrical service were positively linked to fertility rates or completed fertility. On the contrary, it provides much evidence suggesting the relationship may have been the reverse. This does not appear to be an artifact of poor measurement of key variables such as the "state of household technology", x, or completed fertility, n, as used in GSV's model. In fact, in a sample of over 900,000 women, there appears to be a robust, *negative* relationship between exposure to electricity in early adulthood (a broad proxy for the "state of technology") and completed fertility—even after adjusting for differences in education and race (strong correlates of lifetime income) and state-of-birth and birth-cohort fixed effects. Finally, a long demographic literature and this paper's original analysis of census data indicate that the Amish, who were remained comparatively isolated from household technology improvements in the period of interest, had a large baby boom that coincided with that in the U.S. population.

Although this paper has concentrated on the evaluation a specific hypothesis, insights emerge that can inform broader research on U.S. demographic history and the baby boom. First, whatever factors explain the baby boom must account for its occurrence in urban and rural areas, among different educational and racial groups, and in all regions of the U.S. It was a remarkably widespread event, and scholars should endeavor to explain the near simultaneity of baby booms in places that varied widely in economic circumstances. At the same time, we show that although it was widespread, the boom was not evenly spread, and the variation in changes in fertility invites analyses based on detailed cross-place and cross-household data. Both Easterlin's pioneering work and GSV's ambitious addition to the literature are based primarily on national level time-series patterns in the United States, but more disaggregated views may prove extremely valuable, and indeed necessary, for discerning among the many channels that influence fertility.

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Table 1: Summary Statistics, U.S. County-Level Data

	1940	1950	1960
Infants per woman (age 15-44)	79.9 (17.4)	105.6 (17.5)	120.1 (20.1)
Proportion of housing units with electric lights	55.0 (24.7)	85.0 (13.0)	---
Proportion of housing units with a mechanical refrigerator	27.1 (14.8)	67.7 (16.2)	---
Proportion of housing units with a modern stove (using gas or electricity as fuel)	23.0 (22.5)	54.5 (24.0)	87.5 (13.3)
Proportion of housing units with a washing machine	---	---	78.3 (12.4)

Notes: These are unweighted averages across all counties in the United States (excluding Hawaii and Alaska). Standard deviations are in parentheses. Counties that are omitted from table 2's regressions due to missing values for economic or demographic control variables are also excluded in this table, but this has little effect on the reported figures.
Sources: Infants and children per woman, proportion of homes with lights (in 1940), refrigerators, and washing machines are from Haines (2004). We compiled lights in 1950 and stoves in all years from the published volumes of the Census of Housing.

Table 2: Cross-Sectional Regressions of Fertility on Appliances in U.S. Counties, 1940-1960

	1	2	3
Panel A: 1940			
Pct with refrigerator	-0.689	-0.665	-0.081
	[0.018]	[0.021]	[0.034]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3034	3034	3034
R-squared	0.34	0.50	0.73
Pct with modern stove	-0.427	-0.409	-0.027
	[0.011]	[0.012]	[0.017]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3034	3034	3034
R-squared	0.30	0.48	0.73
Panel B: 1950			
Pct with refrigerator	-0.403	-0.488	-0.226
	[0.019]	[0.026]	[0.044]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3028	3028	3028
R-squared	0.14	0.40	0.55
Pct with modern stove	-0.193	-0.248	0.060
	[0.013]	[0.017]	[0.025]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3028	3028	3028
R-squared	0.07	0.35	0.55
Panel C: 1960			
Pct with washing machine	-0.130	-0.280	0.012
	[0.036]	[0.052]	[0.054]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3013	3013	3013
R-squared	0.01	0.29	0.48
Pct with modern stove	-0.231	-0.434	-0.215
	[0.034]	[0.040]	[0.044]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3013	3013	3013
R-squared	0.02	0.32	0.48

Notes: Each coefficient is from a separate regression. The dependent variable is the number of infants (under 1 year) per thousand women ages 15 to 44. Each county is an observation. Robust standard errors are in brackets.

The “economic and demographic control variables” include the urban proportion of the county’s population, the log population density, the nonwhite proportion of the county’s population, the proportion of employment in agriculture and manufacturing (separately), the median years of schooling for those over age 24, the log of median property value, the fertility rate in 1930 (measured as infants per 1,000 women age 15-44), and the proportion of women in the labor force. The urban variable generally measures the proportion of the population residing in incorporated places with more than 2,500 residents. The density measure is the log of residents per square mile. Nonwhite includes both black and “other” racial categories. The proportion of workers employed in agricultural and manufacturing industries are expressed relative to total employment. The percent of women in the labor force is the ratio of all women in the labor force divided by the number of women over age 14. The median schooling variable in 1940 table is for women, whereas in 1950 and 1960 it is for both men and women. A relatively small number of observations with missing values for any economic or demographic control variable are dropped to maintain a consistent sample across specifications; the omissions appear to have little effect.
Sources: Data for refrigerators, washing machines, and control variables are from Haines (2004). We compiled data on the type of cooking fuel from the published census volumes in each year.

Table 3: Differenced Regressions of Fertility on Appliances in U.S. Counties, 1940-1960

	1	2	3
Panel A: Refrigerators 1940-50			
ΔPct with refrigerator	-0.007	-0.214	-0.131
	[0.030]	[0.036]	[0.036]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3023	3023	3023
R-squared	0.00	0.20	0.30
Panel B1: Modern stoves, 1940-60			
ΔPct with modern stove	-0.229	-0.295	-0.114
	[0.018]	[0.020]	[0.023]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	2991	2991	2991
R-squared	0.04	0.29	0.41
Panel B2: Modern stoves, 1940-50			
ΔPct with modern stove	0.192	0.055	0.072
	[0.022]	[0.026]	[0.025]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	2989	2989	2989
R-squared	0.03	0.19	0.30
Panel B3: Modern stoves, 1950-60			
ΔPct with modern stove	-0.197	-0.179	-0.036
	[0.017]	[0.023]	[0.030]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	2975	2975	2975
R-squared	0.04	0.16	0.25

Notes and sources: See table 2.

Table 4: Regressions of Appliance Ownership on Fertility and Electrical Service, 1940-1950

	1	2	3
Panel A1: Refrigerator ownership cross section, 1940			
Pct with electric lights	0.512	0.600	0.449
	[0.006]	[0.008]	[0.018]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3034	3034	3034
R-squared	0.73	0.84	0.85
Panel A2: Modern stove ownership cross section, 1940			
Pct with electric lights	0.642	0.765	0.221
	[0.013]	[0.017]	[0.034]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3034	3034	3034
R-squared	0.49	0.69	0.77
Panel B: Fertility cross section, 1940			
Pct with electric lights	-0.410	-0.515	-0.110
	[0.011]	[0.014]	[0.025]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3034	3034	3034
R-squared	0.34	0.55	0.73
Panel C: Fertility cross section, 1950			
Pct with electric lights	-0.505	-0.556	-0.182
	[0.026]	[0.030]	[0.049]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3027	3027	3027
R-squared	0.14	0.40	0.55
Panel D: Fertility Change, 1940-1950			
ΔPct with electric lights	-0.276	-0.327	-0.197
	[0.016]	[0.023]	[0.031]
State fixed effects	No	Yes	Yes
Economic and demographic control vars.	No	No	Yes
Observations	3022	3022	3022
R-squared	0.08	0.24	0.30

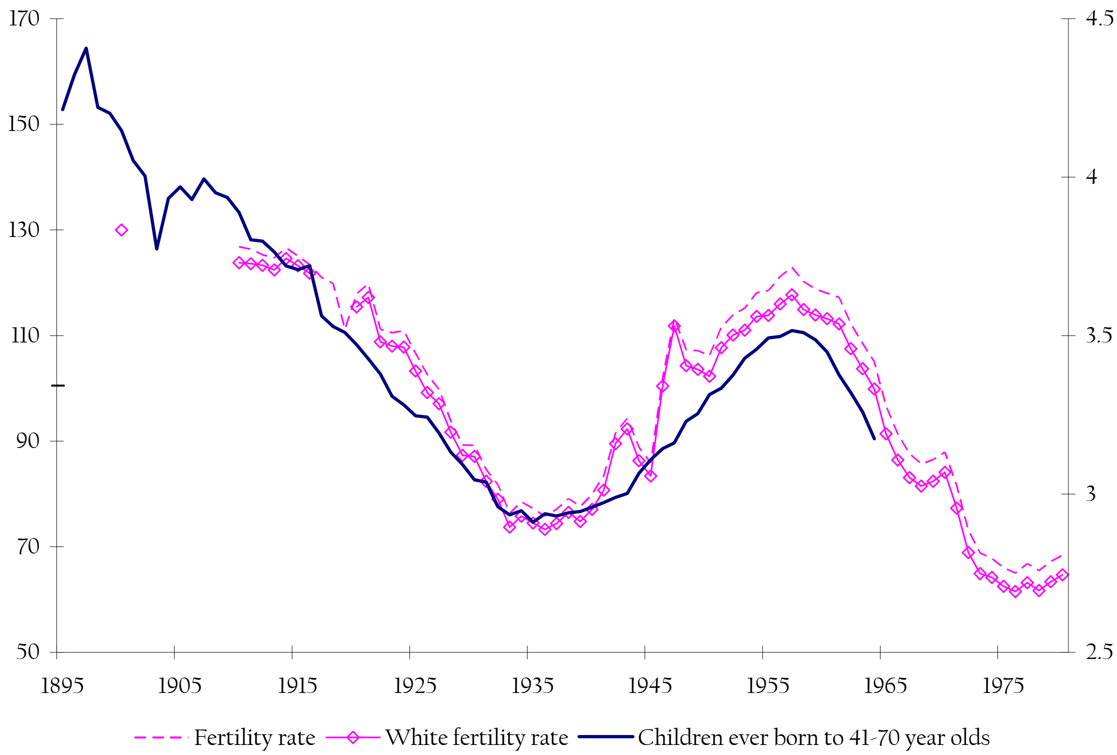
Notes and sources: See table 2. We compiled the data for electric lights in 1950 from the published volumes of the Census of Housing; the 1940 electric light data are from Haines (2004).

Table 5: Regressions of Children-Ever-Born on Exposure to Electrical Service for the 1900-1930 Birth Cohorts

	1	2	3	4	5	6	7
Exposure to electricity x 100	-0.003	0.010	-0.014	-0.010	-0.009	-0.010	-0.012
	[0.002]	[0.002]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]
Constant	3.47	2.897	3.786	3.703	3.375	3.802	3.965
	[0.146]	[0.125]	[0.068]	[0.097]	[0.097]	[0.087]	[0.106]
State of birth controls	No	Yes	No	Yes	Yes	Yes	Yes
Year of birth controls	No	No	Yes	Yes	Yes	Yes	Yes
Race dummy	No	No	No	No	Yes	Yes	Yes
Race and education dummies	No	No	No	No	No	Yes	Yes
Above and husband's education	No	No	No	No	No	No	Yes
Observations	918,842	918,842	918,842	918,842	918,842	918,842	713,273
R-squared	0.001	0.018	0.016	0.024	0.044	0.071	0.073

Notes: The dependent variable is self-reported children-ever-born. Robust standard errors are in parentheses. The numerator for "mean exposure to electricity" is constructed from Edison Electrical Institute (EEI) Statistical Bulletin information on annual state-level information on the number of residential electrical customers from 1925 to 1960. In the EEI data, Maryland and Washington DC customers are always counted together. North Carolina and South Carolina customers are often counted together. For consistency we have used these larger units of aggregation for all years. To calculate the denominator, we use the housing unit count from the census (interpolated between dates). "Mean exposure to electricity" is calculated as the mean of this proportion by year of birth and birth state for each woman exposed to electricity (and multiplied by 100). The sample includes women born from 1910 to 1931.
Sources: Edison Electric Institute *Statistical Bulletin* (various years) and 1960-1990 IPUMS (Ruggles et al. 2006).

Figure 1: U.S. General Fertility Rate and Children Ever Born from 1895 to 1985



Notes: The outcome variables are the period fertility rate (and separately for white women) and the mean self-reported number of children by birth cohort. Mean children ever born excludes women who had no children. Birth cohorts are indexed to year of birth and increased by 25 years. (For instance, the birth cohort of 1870 corresponds to the year 1895 on the graph's horizontal axis.) Computations using the IPUMS use census weights.
Sources: Annual fertility rates are calculated using Historical Statistics, http://www.cdc.gov/nchs/data/statab/t001x01.pdf. The mean number of children ever born per woman is calculated using a sample of ever-married women ages 41 to 70 in the 1950, 1960, 1970, and 1980 IPUMS (Ruggles et al. 2004).

Figure 2: Mean Children Born to Amish Women born from 1910-1949

Notes: The sample is comprised of women ages 41 to 60 at the time of observation. "Likely Amish" corresponds to women reporting that they speak Pennsylvania Dutch at home. The series for white, native-born and all U.S. women are plotted on the left vertical axis; the series for "likely Amish" women is plotted on the right vertical axis.
Source: *IPUMS* (Ruggles et al. 2006).

Appendix Table 1: Summary Statistics on the "Likely Amish" from the U.S. Census

	Likely Amish	White, native-born	All women
1910-14		2.28	2.32
		[83,006]	[103,665]
1915-19		2.44	2.48
		[93,601]	[113,234]
1920-24	3.53	2.63	2.68
	[72]	[295,415]	[360,114]
1925-29	4.09	2.86	2.92
	[86]	[294,651]	[365,196]
1930-34	4.29	3.03	3.12
	[196]	[457,217]	[570,822]
1935-39	4.35	2.90	2.98
	[173]	[456,512]	[580,256]
1940-44	4.27	2.46	2.55
	[131]	[275,872]	[347,001]
1945-49	3.94	2.04	2.13
	[130]	[337,381]	[425,307]

Notes: The table entries represent the mean number of children ever born and the figures in brackets are the respective sample sizes. The sample is comprised of women ages 41 to 60 at the time of observation. "Likely Amish" corresponds to women reporting that they speak Pennsylvania Dutch at home. All calculations use person weights. Source: 1980 and 1990 *IPUMS* (Ruggles et al. 2006).