

Possible Mechanisms behind Cross-Sibling Effects on Fertility Rates, and some Concerns about their Proper Estimation

Cross-sibling effects on fertility rates

All social scientists will agree that individuals' decision-making is shaped not only by their own characteristics and previous behavior, but also by social interaction with others through social networks. This contribution discusses some theoretical and methodological aspects of such phenomena in the context of siblings' fertility histories.

First, I provide some arguments for why we would expect influences on fertility decision-making based on siblings' corresponding behavior. Then, I raise some methodological concerns about problems that might arise when estimating effects of social interactions using typical models of demographic rates.

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Social influences between siblings on their fertility behavior

Several authors have emphasized the importance of social interactions for fertility choices. For example, Bongaarts and Watkins have argued that social interactions have at least three aspects: the exchange of information, the joint evaluation of their meaning, and social influence that constrains or encourages action.¹ To understand the divergence in the demographic behavior of different populations with relatively similar environmental conditions, arguments have been made for a combination of economic fertility theory (based on individual optimal and rational decision rules) and theories on social interaction (which incorporate the behaviour of other members of the community/society).²

Siblings should behave in fairly similar ways for several reasons. One is their shared biology. Their common genetic component may include predispositions toward certain types of behavior. Their socioeconomic characteristics and social environment during adolescence are also likely to be very similar. In addition to these similarities, it is clear that siblings may serve as examples and one sibling's behavior might be 'imitated' by the other sibling. Siblings are an obvious component of individual's social networks, as people are likely to keep close social relationships with their sisters and brothers. The experiences of one's siblings will be familiar, and thus constitute an important source of information on life course transitions such as union formation and fertility.

This tendency to imitate might be stronger when a childless woman is considering having her first child than for the choice of having her second or third child. Transition into motherhood constitutes a unique experience, and before giving birth and caring for a child, few people know exactly how and how much their lives will change. Through interaction with her sibling, a woman can experience the company of young children and see how her sibling copes with his or her new role of being a parent. This experience may trigger a stronger desire for motherhood. Once the woman has some experience with having and caring for a baby, she might be less prone to be influenced by social interaction with siblings and others. Thus, progression to a second child might be less influenced by these imitation effects. Moreover, it is easily conceivable that these relations, if they exist, depend on the time that has elapsed since the siblings have become parents. For example, it is likely that a birth to a sibling might have a positive effect on individuals' birth intensities in the short term, while having no effect or a negative effect in the longer term.

To summarize, it seems likely that there are cross-sibling effects on fertility; we would be surprised if that were not the case. For demographers and sociologists, the problem is to model these effects and to measure their strength relative compared with other factors we know play a part in fertility decisions.

Methodological challenges when estimating cross-sibling effects on fertility rates

The phenomenon in question is that individuals' behavior, in this case their childbearing decisions, is affected by the same behaviour in others, i.e. siblings. Whether you call the phenomenon imitation, social interaction, or social influence, it nevertheless falls into the category that Charles F. Manski has called 'endogenous effects'.³

How can we estimate the effects of social interaction? One obvious suggestion would be to model the outcome of one individual as a function of the earlier behavior of one or more other individuals. For example, it is possible to model an outcome variable Y as a function of several X es plus the average Y in a reference group, e.g. the other people in the community. This type of model specification seems intuitive and theoretically appealing to many social scientists without advanced training in quantitative methods. It has been shown, however, that such setups can overestimate the importance of aggregate measures of the dependent variable.⁴ In Monte Carlo simulation experiments, biases were found to be very large, affecting not only the estimated parameter for the reference group average, but also parameters for other contextual variables. The biases remained when the individual in question was left out of the reference group (the individuals on the basis of whom the aggregate measure is computed). More importantly, there was also a bias when the reference group consisted of only one person and, in effect, that person's outcome is included in the model on the right-hand side. This means that the bias arises even when the independent variable is not an aggregate, but the actual behavior of one unit of analysis.

Does this mean that we cannot use the most basic statistical tools to measure social interactions in general and cross-sibling effects on fertility in particular? Manski argues that with dynamic models, the prospects of identifying endogenous effects are better. Thus, using longitudinal data

and a dynamic statistical model, one could perhaps identify the effect on the outcome of one individual of the earlier outcomes of a reference group (or person). After all, an event can only be influenced by prior events. Once an individual has experienced the event, this individual no longer be affected by others' behavior.

Swedish sociologist Yvonne Åberg⁵ described an interesting attempt to measure social influence effects, such as those outlined for siblings above, using standard methods in social demography. She examined how the proportion of unmarried co-workers in workplaces affects the likelihood of divorce. Her method was to estimate a parameter for the proportion of single co-workers using a Cox proportional hazard model. In this model, the rate at which an event is happening in the population at risk of this event is modeled as a function of other, potentially time-varying variables.⁶ The family of hazard regression models is one of the main statistical tools used by demographers to study gradients by other variables in divorce rates and other phenomena. The most well-known and frequently used model is the Cox model. Åberg also added a random term to the model in order to capture unobserved factors at the workplace-level. She found positive effects of the proportion of unmarried co-workers on the divorce rate, indicating that social interaction is in part driving individuals' divorce decisions. The substantive conclusion is that divorce is 'contagious' at workplaces.

A similar study has focused on cross-sibling effects on fertility. A standard hazard model was estimated, quite similar to Åberg's model of divorce in workplaces. The results included a very strong effect of a woman's birth events on the first-birth rate of her sister. However, with the doubts expressed by Manski, how do we know whether these models are adequate for the purpose of estimating cross-sibling effects? As this type of approach becomes more common, some tests should be conducted to assess the reliability of standard models for measuring social interactions, possibly by way of simulation experiments. Sociologists should be content if standard methods, possibly with only multi-level extensions, can be used to study such phenomena. Unfortunately, if one has to resort to other types of techniques, the research will be less accessible to the wider audience of social scientists.

References

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