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Impact of Marriage on Productivity and Career of Women Scholars

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Abstract

Marriage has potential impact on scholarship, especially for women, but lack of appropriate data has prevented its clear assessment. In this article we quantify the impact of marriage on women's scholarship using open data from ORCID (23057 married women scholars are recognized), including longitudinal productivity data and career path. So far we have find marriage have short term negative impact but long term active impact on productivity of women scholars and this impact varies according to the field they worked in. The short term negative impact is more significant if they get married after starting their careers. While we continue to investigate other aspects of this topic, such as the impact of marriage on career progression, we believe this research will offer valuable insights for academic institutions and policymakers, helping to ensure that marriage does not become an insurmountable barrier to women's academic success.

Introduction

Marriage can significantly influence career trajectories, and its impact on women scholars is particularly worth investigating due to the unique demands of academic work (Juraqulova, Byington et al. 2015). The long and nonlinear career progression, reliance on research productivity for tenure and promotion, and the expectation of geographic mobility for academic appointments can create additional challenges for women balancing family responsibilities (Mantai and Marrone 2023). While previous studies have investigated the effects of marriage and parenthood on academic careers, they have primarily relied on survey data, with relatively few studies leveraging large-scale datasets for quantitative analysis. Establishing the causal impact of marriage on productivity and career progression has been challenging due to the lack of detailed longitudinal data on marriage timing, research productivity, and career transitions.

Marriage can lead to many changes to careers. On the one hand, marriages creates a new demand to allocate time to family, particularly for women, to support their family in housework or take care of children (Mason and et al. 2004, Schiebinger and et al. 2010). Parenthood has been proven to decreases the available research time for women, leading to drop down in their productivity(Joecks, Pull et al. 2013, Lutter and Schröder 2019). Parenthood has been shown to reduce research time and lower productivity, but the direct impact of marriage—independent of parenthood—

remains underexplored. Moreover, marriage may influence career trajectories beyond productivity. Women in academia may experience structural and cultural barriers that make academic careers less accommodating after marriage, leading to self-selection out of academia or shifts in job roles to better balance family responsibilities (Hawks and Spade 1998, Wolfinger and Goulden 2008, Cech and Blair-Loy 2019). Aslo considering the limited availability of faculty positions, it can be challenging for both spouses to secure academic jobs in the same city, which is also a factor driving some women scholars to transition from academia to industry.

This study aims to fill this gap by systematically quantifying the impact of marriage on women scholars' productivity and career progression. Using large-scale longitudinal data, we analyze: (1) the impact of marriage on research productivity, (2) the effect of marriage on career promotions, (3) how marriage influences career transitions between academia and industry, and (4) the evolving trends in these impacts over time. We investigate on the productivity pattern before and after marriage as an intervention event occur and compare the carreer trajectories of married women faculty with a selected control group of women faculty to investigate on the impact of marriage on career promotions and transitions. By employing rigorous causal inference methods, we provide a comprehensive analysis of how marriage shapes women's careers in academia and beyond.

Method

In obtaining data on married women researchers, we use ORCID open data to extract marriage timing and longitudinal productivity data, as well as career paths of female researchers. The identification of whether a female researcher is married and the timing of marriage is based on the following measure: In some countries and regions, female researchers change their surname to their husband's surname after marriage. ORCID records each user's name and name change history. We first identify female researchers based on their first names. If their surname undergoes a reasonable change (e.g., replacing their original surname with their husband's surname or adopting their husband's surname while keeping their original surname as a middle name), we consider this as an indicator of marriage. After data preprocessing, 23,057 married women scholars are identified.

We use the Regression Discontinuity Design (RDD) method to investigate the impact of marriage on productivity while controlling for individual fixed effects. RDD determines causal effects by assigning a cutoff or threshold above or below which an intervention is applied. Here, we consider marriage as the intervention, the annual publications as representation of productivity while assuming that there would be one year delay for the effect of marriage on productivity, since article publication needs time.

To analyze the impact of marriage on career promotion and transitions between academia and industry, further causal inference requires constructing an appropriate control group to match with the married women researchers. Therefore, we use Coarsened Exact Matching (CEM). The attributes used for matching include field, academic age, annual publication patterns at different academic ages, and career stage. Academic age is measured by the time elapsed since the first publication.

Result

Impact of marriage on productivity

Overall, marriage is associated with a reduction in the productivity of female scholars. Specifically, the impact varies across different fields: Technology (coefficient = -0.057), Physical Sciences (coefficient = -0.265*), Social Sciences (coefficient = -0.264*), Life Sciences & Biomedicine (coefficient = -0.220**), and Arts & Humanities (coefficient = -0.520**) as showed in Table 1. When examining different career stages, the impact of marriage is negative for women scholars get married during the work phase (coefficient = -0.240***), which is showed in Table 2.

Table 1. Impact of marriage on annual publications in various fields[1].

Field	*Publication*	*Coefficient*
Total	lwald	-0.053
	lwald50	(omitted)
	lwald200	-0.214***
Arts & Humanities	lwald	-0.520**
	lwald50	(omitted)
	lwald200	-0.305*
Life science & Biomedicine	lwald	-0.220**
	lwald50	-0.064
	lwald200	-0.231***
Physical Science	lwald	-0.265*
	lwald50	0.074
	lwald200	-0.133
Social science	lwald	-0.264*
	lwald50	-0.112
	lwald200	-0.240***
Technology	lwald	-0.057
	lwald50	(omitted)
	lwald200	-0.028

Table 2. Impact of marriage on annual publications during various time periods[1].

Period	*Publication*	*Coefficient*
Education	lwald	-0.231
	lwald50	-0.003
	lwald200	-0.100*
Employment	lwald	-0.240***
	lwald50	-0.057
	lwald200	-0.229***

Impact of marriage on career promotion

Married researchers take an average of 2 months longer to be promoted to associate professor and 6 months longer to be promoted to professor.

[1] Result of Regression Discontinuity Design. Lwald, lwald50, and lwald200 represents results in optimal estimating bandwidth, half of optimal estimating bandwidth, and double of optimal estimating bandwidth.

Trends in the impact of marriage

Figure 1 shows the cumulative number of publications over time relative to the first publication for two groups: "married" and "randomly selected". The trend lines suggest that, in most fields, there would be a specific time period that married women scholars publish less than their random selected counterpart, showing a potential negative effect of marriage. However, in some fields like Physical Sciences and Life Sciences & Biomedicine, married scholars continues to publish slightly more compared to their randomly selected counterparts, which means marriage have no negative or even positive effect in these fields.

Although women's productivity were negatively affected by marriage in short terms, they even publish more in long term of time compared with those randomly selected women scholar. It may because of building a family or having a child drive them to become more productive and organized to achieve both(Ward and Wolf 2004, Joecks, Pull et al. 2013, Lutter and Schröder 2019) and a long trend of fathers becoming more involved in family lives(Sayer, Bianchi et al. 2004).

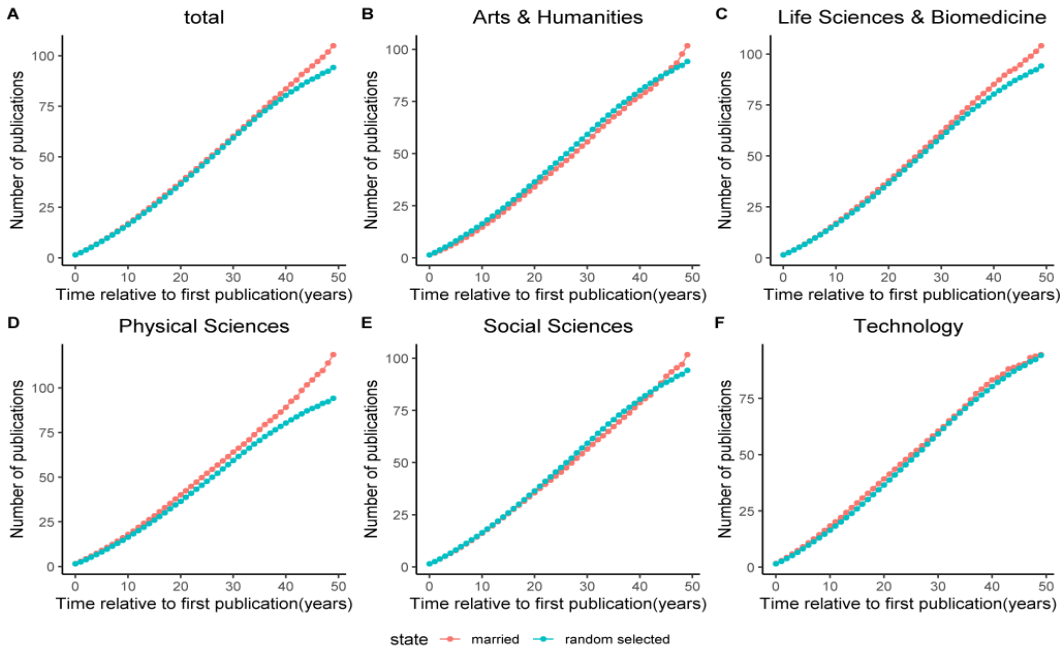

Figure 1. Cumulative number of publications married women and random selected women over their careers. Average cumulative number of publications relative to first publication and productivity gaps for (A) scholar in all field (Nm = 14250, Nr = 12989), (B) scholar in Art & Humanities (Nm = 776, Nr = 521), (C) scholar in Life Sciences & Biomedicine (Nm = 5895, Nr = 6031), (D) scholar in Physical Sciences (Nm = 2141, Nr = 1587), (E) scholar in Social Sciences (Nm = 2673, Nr = 2093), (F) scholar in Technology (Nm = 2082, Nr = 1044).

Further study and limitation

Our next step is to investigate the impact of marriage on career promotion and transitions between academia and industry, using Coarsened Exact Matching (CEM).

We will also incorporate funding data and male scholars as a comparison group to provide a more comprehensive analysis.

A further question that needs to be addressed is: Even if we quantify the impact of marriage on women scholars' productivity and careers, what drives this impact? Do academic women truly prioritize their husbands and families over their academic careers? Or do they still see academia as their primary pursuit but passively experience a decline in productivity due to marriage? Alternatively, do they adopt a "slow accumulation, later breakthrough" career development strategy? What role do their husbands play in this process? To fill these research gaps, we still need more surveys and interviews with women scholars—and perhaps their husbands as well.

The limitations of this study include the following: Since changing one's surname after marriage is a cultural practice specific to certain regions, the regional distribution of married women researchers identified using this method may be uneven. Additionally, with societal changes, even in regions where this practice exists, an increasing number of women choose to retain their original surname after marriage. As a result, the sample of married women researchers obtained may also have temporal limitations. Another limitation is that using the ORCID name change date as the marriage timing for female researchers may not be entirely accurate. Unlike identification documents such as driver's licenses, ORCID is not required for daily life, meaning that the name change recorded in ORCID may lag behind the actual marriage date.

This study enhances our understanding of the relationship between marriage and the productivity and career trajectories of women scholars. By highlighting the complex interplay between marriage, productivity, and career progression, it provides valuable insights for academic institutions and policymakers on how to better support women scholars, ensuring that marriage does not become an insurmountable obstacle to their academic success.

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