On the Relationship Between Fertility and Wealth: Evidence from Widow Suicides *(Satis)* in Early Colonial India

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February 8, 2013

Abstract

Evidence on the pre-modern relationship between wealth and fertility has so far almost entirely relied upon data from Europe. We use British colonial records from early 19th-century India on widow suicides (satis) to show that there is a robust positive relationship between income and fertility.

JEL codes: J13, N35, D31

Keywords: fertility, wealth, early colonial India.

Acknowledgement 1 *We thank Premansu Bandyopadhyay for inspiring the project and pointing us to the data source. All errors are ours.*

1 Introduction

According to Malthusian models there should have been a positive association between wealth and fertility before the onset of the demographic transition, with the rich having more children than the poor (Galor, 2011). Yet evidence supporting this hypothesis is quite rare, inasmuch as it requires data on both wealth and fertility for pre-modern societies. What evidence does exist has almost entirely come from early modern European countries like England, France, the Netherlands, Sweden and Switzerland (Boberg-Fazlic, Sharp, & Weisdorf, 2011; Clark & Hamilton, 2006; Hadeishi, 2003; Lagerlöf, 2009; Perrenoud, 1975; Schellekens, 1989; Weir, 1995). The one non-European example in the literature comes from late-18th and early 19th-century Liaoning in north-east China, where Lee and Campbell (1997) find a positive relationship between wealth and children, although they do not assess this relationship in a rigorous fashion. Indeed, Clark (2007) goes so far as to suggest not only that the rich in pre-modern England had higher levels of fertility than elsewhere but that downward mobility in England helped to spread middle-class values and norms and thereby explains the geographic origins of the Industrial Revolution, while in other parts of the world the rich did not have notably higher levels of fertility than the poor and thus the spread of middle-class values throughout society failed to take place.

We examine the relationship between pre-modern wealth and fertility with data from pre-modern India. We use data collected by British officers about the prevalence of widow suicides (sati) between 1823 and 1826 from the Bengal Presidency. The sati data is particularly valuable not only because of its systematic nature but also since it is the only source of data on Indian income and fertility prior to the onset of modern mortality decline in the late-19th century (Banthia & Dyson, 1999; R. Lee, 2003). Our results show a strong positive relationship between income and fertility, and are robust to the use of controls for age and caste and the use of total number of children and total number of sons as dependent variables.

2 The Data

The ancient tradition of sati, which derives from the Sanskrit word sat, meaning pure or chaste, involves the suicide or self-immolation of widows on their husband's funeral pyre. Originally the practice was limited to members of the Kshatriya caste but at some point the practice became instead associated with Brahmins, especially in Bengal and especially in the 16th through 18th centuries. The advent of British colonial rule in late 18th century India at first saw British officials practise a policy of non-interference; however, by the early nineteenth century missionaries had grown vocally opposed to it and thus the British passed legislation in 1815 that separated "legal" or voluntary sati

from "illegal" involuntary sati. After much campaigning by Bengali activists such as Raja Rammohun Roy sati was abolished in Bengal in 1829 along with other parts of India such that the last legal sati occurred in 1861 in Udaipur.

To make sure all satis were conducted legally prior to 1829 British officials were directed to be present at each sati, all of which were subsequently documented in an effort to assess trends in satis across British territories and across time. While the data was collected in the then three Presidencies of British India, Bengal, Bombay and Madras, in the latter two cases the number of satis in Bombay and Madras were neither very substantial nor comprehensively documented. The records contain basic information about each sati, including the name of the woman and her husband as well as her age, caste, location and date of death and, from 1823 onwards and in certain districts only, data on her total number of children and their gender. As regards data on wealth a British edict from the early 1820s required officials to henceforth record some information on the "husband's profession and circumstances in life, so as to enable government to judge the degree in which the rite prevails amongst the more opulent and better educated classes, or is confined to the poor and ignorant" (Parliamentary Papers 1824 (443), p. 43). Yet this data was only sporadically recorded and there was no central decision on how it should be categorized, with data from some districts merely distinguishing between poor and rich households while in others wealth levels were listed as poor, moderate or rich with no indications that these descriptions had any standard definitions.

However, systematic information exists for 162 satis which occurred in the District of the Suburbs of Calcutta from 1823 to 1826. In three cases the records only state that the husband "subsisted on the profits of his labour," but in all other cases there is data on monthly income in rupees. There is a single case of two women (aged 35 and 40) married to the same husband, neither of which had children, for which we use their mean age as one observation. Concerns that the sample might not be representative of Indian society at the time due to the proximity to Calcutta can be addressed by examining the listed professions of the husbands, which ranged from low-paid jobs like barbers, manual laborers and fishermen to priests, civil servants, traders and even talukdars (small landlords) and zamindars (large landlords). In the three cases where the husband is stated to be a beggar without income we list his monthly income as 1 rupee to allow us to take the log of income, with similar results if we instead fix the income at other comparable levels. All of our results are also robust to using the square root of income as the independent variable instead.

3 Empirical results

Our empirical strategy is, as with Clark and Hamilton (2006), to regress both total number of children and existence of any surviving children on wealth. We use two types

of models: first we use negative binomial regression for we have rich data on the number of children per household, and we repeat the estimation using probit regression with a dependent variable measuring whether there are children in the household or not. We examine the number of sons and any surviving sons as additional dependent variables based on the fact that having sons would have been essential for the transference of wealth across generations, both because of inheritance laws as well as dowry expenses. Moreover, we add control variables for caste (in the form of a Brahmin dummy) as well as for age and age squared of the sati to account for increasing fertility with age. Finally, we include fixed effects for years and the four police jurisdictions included in the data, and cluster our standard errors at the jurisdiction level.

The model estimated is given by:

$$Children_i = \alpha + \beta_1 Income_i + \beta_2 Age_i + \beta_3 Age_i^2 + \beta_4 Caste_i + \varepsilon_i$$

where, $Children_i$ is the number of children in household i, $Income_i$ is the estimate of income provided for household i, Age_i is the age of the widow when self-immolation takes place, $Caste_i$ is the caste of the household i, and ε_i is an error term assumed to normally distributed with $N(0,\ \sigma_\varepsilon^2)$. This specification is estimated using negative binomial regression. As an alternative specification we replace the dependent variable by whether the household has a child or not and estimate the model using probit regressions. Fixed effects for the four jurisdictions and years are also included in each model estimated.

In Table 1 column 1 lists the results of a regression using total number of children as the dependent variable, while in column 2 the dependent variable is instead the total number of sons. In columns 3 and 4 the dependent variables are instead whether or not the family had any children or sons, respectively. In all four cases the coefficient of the income variable is positive and statistically significant, as is both age and age squared. We do not report the fixed effects coefficients.

[Insert Table 1 here]

We can also examine the relationships between profession and fertility. Indeed, the mean number of children per laborer is 1.36, while for landlords it is 2.72. In Table 2 we use professions instead of income as a robustness check, using dummy variables for whether the husband was a laborer or a landlord and the same sources and control variables as in Table 1. The coefficient on the laborer dummy is always negative and statistically significant, while the landlord coefficient is positive and significant. Clearly, the evidence provides additional support of a positive relationship between income levels and fertility.

[Insert Table 2 here]

4 Conclusion

Using data from widow suicides collected by British officials in India in the 1820s, we find that wealth and fertility are positively correlated in the Suburbs of Calcutta. These results thus throw into question Clark (2007)'s conclusions that the reason why the Industrial Revolution took place in England and not elsewhere was due to the fact that there was only a weakly positive relationship between wealth and fertility outside England (or western Europe more generally). Indeed, our results suggest that the Indian rich were no different from the European rich in their high levels of fertility. In fact, evidence from Canada and the US seems to suggest that an abundance of land might have contributed to an inverse relationship between pre-modern income and fertility in certain contexts (Clark & Hamilton, 2004; Jones & Tertilt, 2006). Nonetheless, given the low number of observations analyzed here, it is necessary to conduct further research into this field before we can begin to definitely state anything about cross-national variations in the pre-modern relationship between wealth and fertility.

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Table 1: Wealth and Number of Surviving Children, Suburbs of Calcutta, 1823-1826
Source: Parliamentary Papers 1825 (518), 1826 (354), 1830 (178)

Dependent Variable	Total Children	Total Sons	Any Children	Any Sons
Regression Type	Negative Binomial	Negative Binomial	Probit	Probit
	(1)	(2)	(3)	(4)
Income (Log Rupees/month)	0.155***	0.162***	0.124***	0.126**
	(0.036)	(0.051)	(0.023)	(0.056)
Age of Widow(s)	0.093***	0.081**	0.077***	0.104***
	(0.021)	(0.032)	(0.008)	(0.030)
Age squared	-0.0007***	-0.0005*	-0.0005***	-0.0007***
	(0.0002)	(0.0003)	(0.0001)	(0.0002)
Caste (Brahmin Dummy)	0.052	-0.042	-0.079	-0.321
	(0.151)	(0.127)	(0.138)	(0.181)
Constant	-2.132***	-2.546***	-1.401***	-2.989***
	(0.544)	(0.898)	(0.124)	(0.464)
N	158	158	158	158

Notes: * $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$. Police jurisdiction and year fixed effects are included but not reported here. Robust standard errors in parentheses are clustered by police jurisdiction.

Table 2: Wealth and Number of Surviving Children, Robustness Checks

Dependent Variable	Total Children	Total Sons	Any Children	Any Sons
Regression Type	Negative Binomial	Negative Binomial	Probit	Probit
	(1)	(2)	(3)	(4)
Laborer	-0.764**	-0.464**	-1.144***	-0.781**
	(0.311)	(0.203)	(0.354)	(0.338)
Landlord	0.359**	0.439**	0.247***	0.346***
	(0.140)	(0.220)	(0.094)	(0.100)
N	161	161	161	161

Notes: * $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$. The sources and control variables are the same as in Table 1. Robust standard errors in parentheses are clustered by police jurisdiction.