A Chinese proverb says that “women hold up half the sky.” However, in large parts of the world, this proverbial equal status of women is far from their real situation. Despite substantial economic development, women continue to lag behind men in educational attainment, access to healthcare, employment, personal autonomy, and political participation, among other things. My intellectual objectives are to understand the reasons behind women’s inferior position, especially in developing societies, and to explore mechanisms that can bring about gender equity, in both private and public spheres, and at various stages of the lifecycle. The papers described in this statement are a part of this broader research agenda. Another overlapping theme of my work is to examine how economic outcomes are shaped by social norms and public policy.

More specifically, I am an applied micro-economist, with interests in the fields of development economics, economics of gender and the family, political economy, and demography. My research is driven by questions, rather than methods. I combine primary and secondary data with experimental and non-experimental methods to answer policy-relevant questions in a causal framework. Although my research is primarily empirical, it is deeply rooted in economic theory, and often draws upon insights from related disciplines, such as, sociology, psychology, and anthropology.

1. Male-biased Sex Ratios at Birth

One of the starkest manifestations of gender inequality in recent decades has been the large-scale selective abortion of female fetuses, especially in the world’s two most populated nations, India and China. Since the early 1980s, the availability of cheap and reliable prenatal sex-detection technology, i.e., ultrasound scanners, has transformed the demographic landscape in countries where sons are valued more than daughters. It has been estimated that, in India alone, 480,000 girls were aborted each year during 1995-2005; the number of “missing females” at birth is even larger in China and has increased over time. This trend has generated considerable policy and academic interest in the underlying causes and effects of these sex-imbalances, as well as in the efficacy of interventions aimed at correcting them. My research, as I explain below, has made fundamental contributions to our understanding of these issues, particularly in the Indian context.

A. The role of fertility decline as a causal factor. Although ultrasound access is clearly the proximate determinant of rising sex ratios at birth, it has been conjectured that fertility decline has also played a causal role. Jayachandran (2017), for instance, has shown that the desired sex ratio increases sharply as fertility falls. This suggests that policies that incentivize smaller families can increase the use of prenatal sex-selection if the underlying desire for sons does not concurrently weaken. Abhishek Chakravarty and I show this quite clearly in ‘Democracy and Demography: Societal Effects of Fertility Limits on Local Leaders,’ (Journal of Human Resources, 2019) where we examine a novel population control policy in India that disbars individuals with more than two children from contesting village council or Panchayat elections. Starting in 1992, eleven states have enacted such legislations; and they remain in effect in seven major states. The policy objective is to promote economic development by precipitating fertility decline. We exploit geographical and temporal variation in the announcement of these limits across states to estimate their impacts on citizens’ demographic outcomes. We find that although these limits significantly decreased fertility and improved child survival, they also increased the male-bias in the sex ratio at birth in castes with strong son preference.
To our knowledge, this is the first paper on India that shows that a policy focused on lowering fertility can have unintended consequences for the sex ratio; prior evidence was limited to China’s One Child Policy. Our findings are highly policy-relevant as the Indian government continues to promote fertility decline as a tool for poverty reduction (LiveMint, 2019). For instance, individuals with more than two children will not be eligible for government jobs in the state of Assam after January 2021 (Times of India, 2019). This study highlights that such population policies need to be designed with caution as they can worsen the already biased sex ratio. Given the topical nature and the policy-relevance of this paper, it has been covered by major national media outlets in India, such as The Hindu, LiveMint, Scroll, and DailyO.

B. Can financial incentives help? Skewed sex ratios can have undesirable effects on crime, marriage markets, social security, and women’s social status, among other things. As a result, policymakers have been actively trying to decrease selective abortion of girls. Outright bans on sex selection have proved difficult to implement since abortion and ultrasound scans are, typically, not illegal in these countries. Therefore, policymakers have instead turned to a common policy lever—financial incentives.

However, such financial incentive programs encounter the same conflict as the one my previous paper highlights for population-control policies—reducing sex ratios can increase fertility. Decreasing the sex ratio by incentivizing parents to have more girls or, more generally, by improving the relative value of girls, may lead to higher fertility if parents respond by increasing the number of daughters without decreasing the number of sons equally. This may happen if sons and daughters are imperfect substitutes or if parents desire a minimum number of sons. Thus, fertility reduction and a gender-balanced population often appear to be conflicting objectives, as targeting one alone may worsen the other.

Policymakers in India and China have introduced several programs that seek to resolve this “fertility-sex ratio trade-off” by rewarding parents that have fewer children and more girls. In ‘Financial Incentives and the Fertility-Sex Ratio Trade-off’ (American Economic Journal: Applied Economics, 2018), I conduct the first empirical investigation of the efficacy of such dual-target policies that have proliferated in recent years. Specifically, I examine the effects of the Devi Rupak program, that, conditional on sterilization, provides couples with substantial cash transfers to promote a one-child norm and to decrease the sex ratio. A key feature of this program is that it does not reward a mixed-sex child composition—the incentivized choices are one son, or one daughter, or two daughters, with one-girl being the most rewarded choice. I find that although this program reduces fertility, it worsens the sex ratio at birth. This is because it leads families to have just one son—son preference is strong enough that families are unwilling to give up sons entirely despite substantially higher benefits for a daughter, but the one-son incentives are sufficient for them to give up daughters. These findings and the theoretical framework in this paper highlight that, in a setting with strong son preference and easy access to ultrasounds and abortions, even reasonably large incentives may, at best, be ineffective, and at worst, can have unintended effects on sex-imbalances when lower fertility is jointly targeted. This study has also been widely cited by national newspapers in India, such as The Hindu Business Line and Live Mint.

Together, these two papers demonstrate that the structure of programs with similar competing demographic priorities must be carefully designed since key parameters such as the degree of son preference and the cost of children are largely unobservable to the policymakers.

C. Prenatal sex-selection narrows postnatal gender gaps. Although sex-selection technology is new, favorable treatment of sons is not. Before ultrasound scans became available, parents adjusted the gender composition of their children in two ways. First, by continuing childbirth till they achieved the desired number of sons, as a result of which the average girl had more siblings than the average boy, and grew
up in households with fewer per capita resources. The second approach was to subject girls to deliberate neglect, which culminated in excess girl mortality during early childhood. Ultrasound access can weaken reliance on both of these channels by virtue of enabling fetal sex detection and facilitating termination of unwanted female fetuses. In joint work with Sonia Bhalotra and Hiu Tam, ‘On the Quantity and Quality of Girls: Fertility, Parental Investments, and Mortality,’ I show that this is indeed what has happened in India—the increase in sex-selective abortions fueled by ultrasound technology substantially decreased explicit and implicit postnatal gender discrimination against girl children in India.

Using a triple-differences-in-differences estimation strategy, we find that ultrasound access led to substantial improvements in the relative survival of girls after birth to age five. Investigating mechanisms, we find a narrowing of gender gaps in parental investments in children (immunization and breastfeeding), moderation of son-biased fertility stopping, and shrinking of the gap between actual and desired fertility. So, although fewer girls were born in the post-ultrasound era, those that survived to birth were more “wanted” and, as such, were treated more equally. Nevertheless, the decline in postnatal death of girls only partially offsets the rise in female feticide. For every three girls that went “missing” before birth, only one girl survived after birth who otherwise would have died. Thus, the number of missing women continues to increase. We also find that ultrasound availability generated a shift in the distribution of girls in favor of families with low socioeconomic status (SES) since more girls were aborted in high-SES families and more girls survived to age five in low-SES families. This too moderates optimism about the long-run benefits of increased investments in girls. Our results contribute several new insights to current debates on biased population sex ratios. 

This paper is under second-round review at The Economic Journal since June 2019.

D. What causes son preference? The studies described above beg the question of what underlies such strong desire for sons in societies like India. If son preference reflects a deeper taste for sons, possibly driven by cultural norms that are unlikely to change in the short run, financial incentive programs like Devi Rupak are unlikely to correct the sex-imbalance. On the other hand, if parents prefer sons because they are more valuable or because daughters are more costly in the short run, then public policy can change sex-selective behavior through incentives.

I have two papers that speak to the above question. The first study is ‘Women’s Worth: Trade, Female Income, and Fertility in India,’ (Economic Development and Cultural Change, 2019), which is joint work with Todd Kumler. In this paper, we show that India’s 1991 tariff reform, one of its most important structural changes in recent history, affected relative female income, which in turn affected sex ratios and fertility. Female (relative to male) employment increased for lower castes and decreased for upper castes in districts with larger tariff declines relative to the national trend. Moreover, the proportion of male births and relative female child mortality decreased (increased) in groups that experienced increases (decreases) in relative female employment. This implies that the practice of prenatal and postnatal sex-selection is responsive to the relative value of women. However, we also find that fertility changes in the opposite direction as the sex ratio at birth, implying that parents consider daughters imperfect substitutes for sons.

The conclusion I draw from this and my other work is that son preference has economic roots; but the net benefit to parents from a son relative to a daughter is so large that it has been difficult for policies to overcome it completely, i.e., to the extent that they would make parents forgo having a son altogether.

My second related project is ‘Saving for Dowry: Evidence from Rural India,’ (joint work with Sungoh Kwon and Nishith Prakash) where I investigate if the marriage market institution of dowry, an often-cited reason for son preference, is indeed a significant explanation for son-biased fertility behaviors. Although this paper is mainly focused on the effect of future dowry payments on household saving behavior, we find that
dowry does not seem to be an additional significant explanatory factor for sex-selection beyond other reasons that make sons desirable. This paper is under second-round review at the *Journal of Human Resources*.

Some of the findings described above have also appeared as a book chapter titled ‘Economic Incentives and The Fertility-Sex Ratio Trade-off,’ in *Policy Challenges from Demographic Change in China and India*, published by the Brookings Institution Press in 2015.

2. Marriage Markets

Another crucial determinant of well-being, especially for women in traditional societies, is marriage. I have two projects related to marriage markets in India. The first is ‘Saving for Dowry: Evidence from Rural India,’ (joint work with Sungoh Kwon and Nishith Prakash) where I estimate the impact of dowry expectations on households’ saving behavior using nationally representative data on household savings and dowries. The ancient custom of dowry, i.e., bride-to-groom marriage payments, remains ubiquitous in many contemporary societies. Utilizing variation in firstborn gender and in dowry amounts across marriage markets in rural India, we find that the prospect of higher dowry payments at the time of a daughter’s marriage leads parents to save more in advance. The higher savings are primarily financed through increased paternal labor supply. This implies that people are farsighted; they work and save more today with payoff in the distant future. As previously mentioned, this paper is under second-round review at the *Journal of Human Resources*.

Our findings emphasize the crucial role of traditional cultural institutions, like dowry, in shaping economic behavior. Although the relationship between marriage and savings has been previously recognized in the economics literature, we highlight a hitherto under-appreciated motive for savings in dowry-paying societies. We also make a substantial contribution to the literature on marriage payments. The bulk of the previous work on dowries has been theoretical; the small number of empirical papers have been largely focused on explanations for dowry trends and not on the effects of dowry. We are the first study to estimate the impact of children’s future dowry on parents’ savings and labor supply in a causal manner. Our findings are also related to the studies on barriers to savings in low-income countries, where household savings are even more important due to imperfect credit and insurance markets. This literature typically relies on small-sample data on micro-savings collected in the context of randomized control trials; we utilize nationally representative data on all forms of household savings.

I have also written a book chapter titled, ‘Marriage in Developing Countries,’ with co-author Shatanjaya Dasgupta, that was published in the *Oxford Handbook of Women and the Economy* by the Oxford Economic Press in 2017. This chapter reviews the literature in economics on marriage in developing countries.

**Work-in-progress.** I analyze the effects of sex ratio imbalances on marital outcomes and pre-marital investments in ‘Sex Ratios, Schooling, and the Marriage Market in India.’ Additionally, in joint work with Sungoh Kwon and Nishith Prakash, I describe how dowry has changed over time and across regions for various castes and religious groups in contemporary India, and explore whether these changes can be explained by the variation in marriage-market sex ratios. Preliminary results indicate that greater male-bias in the sex ratio at birth is associated with lower educational attainment, age at marriage, and labor force participation rate, and an increase in spousal age, for women relative to men. These projects will contribute to the limited literature on the impact of rising sex ratios on marital outcomes in India. Our findings thus far suggest that a scarcity of women on the marriage market may not necessarily benefit them if it causes parents to pull daughters out of school earlier to marry them off sooner and to pay lower dowry.
3. Female Sterilization

Access to contraception has far-reaching implications for women’s education, marriage, fertility, and labor market outcomes. There is a large literature in economics that examines the positive effects of family planning programs on women via greater control over the timing and the number of births. India too has a well-established population program that began in the 1960s and a key feature of which has been incentive payments for voluntary sterilization. In fact, India was one of the first countries in the world to experiment with incentive payments for family planning. Despite increasing use of condoms and birth-control pills, sterilization remains India’s most prevalent contraceptive method. However, there is substantial gender disparity in its usage—while 39 percent of all currently-married women aged 15-49 were sterilized in 2015, only one percent of their husbands were sterilized. India spends 85 percent of its family planning budget on female sterilization, which is also the most prevalent contraceptive method globally.

To the extent that female sterilization prevents unwanted births more reliably than temporary methods, it potentially benefits women in myriad ways. However, female sterilization can have unintended consequences that have not been recognized by policymakers and social scientists. In ‘Female Sterilization and Women’s Well-being,’ I show that a wife’s sterilization makes her more likely to work, which is consistent with lower fertility, but it also leads to greater spousal violence against her. The increase in spousal abuse can be partly explained by the increase in wife’s income if the husband uses violence as an instrument to gain greater control of his wife’s earnings. However, I also highlight other channels—husband’s belief that contraception makes women promiscuous and discordant spousal fertility preferences—that are relevant channels for the increase in spousal abuse. This paper provides new insights into the broader implications of family planning programs, as well as contributes towards the scant literature on domestic violence in developing countries. This project is in the working paper stage at the moment.

Work-in-progress. Although the bulk of the sterilizations in India today are considered voluntary, this has not always been the case. During a two-year span in the 1970s, known as the Emergency, eight million men and two million women were coercively sterilized. In an ongoing project with Shareen Joshi, I examine if the Emergency had long-term negative consequences for citizens’ trust in the state machinery and for the utilization of family planning and other public health services. Since almost all of the sterilization adopters in contemporary India are female, we would also like to understand if the greater emphasis on male sterilization during the Emergency can explain the female-bias in contraceptive use in India today.

4. Women’s Social Networks

A new strand of my work explores women’s social networks. Despite rapid growth in research on networks and peer effects in economics, we know quite little about gender differences in the structure and formation of networks. These differences are likely to be starker in societies with low female autonomy, where restrictive social norms may inhibit network formation and limit access to existing networks for women.

My first project on this theme examines the social networks of 18-30-year-old married women in rural Uttar Pradesh, India. In joint work with Catalina Herrera-Almanza, Mahesh Karra, and Praveen Pathak, ‘The Influence of Mothers-in-law on Women’s Social Networks and Autonomy in Rural India,’ I document that women in rural India are quite isolated, especially in terms of interactions with peers about more private matters like fertility and family planning. We then explore the role of a mother-in-law in influencing her daughter-in-law’s ability to form social connections outside the home. The presence of a mother-in-law in the household increases the mobility constraints experienced by the daughter-in-law and reduces the number
of outsiders that she speaks to about personal matters. The mother-in-law imposes these restrictions in an attempt to control the daughter-in-law’s fertility and family planning choices. This is likely to have detrimental effects on the daughter-in-law as women with fewer outside peers in our data are less likely to visit health facilities, to use modern contraceptive methods, and to work, and have weaker say in decision-making relative to their husbands. We find that outside peers not only provide information but also improve women’s mobility and access to health clinics; consistent with this, modern method use and fertility are positively correlated among peers.

Social networks, both formal and informal, benefit their members in many ways, e.g., through information diffusion and risk sharing. The above findings imply that policy interventions that can overcome restrictive social norms and can counteract the influence of dominant individuals, such as the mother-in-law, are necessary for reducing women’s social isolation. In this spirit, we conducted a 10-month-long field experiment in 27 villages in Jaunpur, Uttar Pradesh to investigate if women’s barriers to accessing family planning services can be overcome (a) by offering women subsidized services and (b) by enabling women to seek these services with peers. We randomly varied whether a woman received a voucher for subsidized family planning only for herself, or also for her peers who accompany her to the family planning clinic, or received nothing. The own-use voucher seeks to increase a woman’s visits to the family planning clinic by empowering her financially. Vouchers for peers seek to increase the set of people who can accompany a woman to the clinic, thereby overcoming her mobility constraints and related social barriers to access. We recently completed the endline data collection and are now in the data cleaning and analysis phase.

5. Future directions

In addition to the ongoing projects described above, I have two new papers in the pipeline.

**Determinants of political participation.** In joint work with Rossella Calvi, Abhishek Chakravarty, and Anandi Mani, I am examining how a large-scale education reform in India, that led to significant increases in educational attainment of both men and women, affected political participation. Preliminary results show that exposure to the District Primary Education Program significantly increased the number of candidates in state elections. However, all the new entrants were men, further widening the female candidacy and representation gap. Next we plan to disentangle the potential mechanisms for these findings.

**Low female labor force participation (FLFP).** A second pipeline project with Rachel Heath tackles the low FLFP rate in India. While most countries have experienced rising FLFP over the past two decades, India is a notable exception: FLFP fell from 37 percent to 28 percent during 1990-2015. This development is of concern, given that FLFP delays marriage and childbearing and improves a woman’s status in the household, investment in children’s human capital, and productivity of the economy overall. We are in conversations with a corporate foundation to implement a randomized experiment to test if providing information about job opportunities via cellphone messages and assisting women with job applications can increase FLFP and employment in India.

References