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THE ROOTS OF GENDER INEQUALITY IN DEVELOPING COUNTRIES

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ABSTRACT

Is the high degree of gender inequality in developing countries--in education, personal autonomy, and more--explained by underdevelopment itself? Or do the societies that are poor today hold certain cultural views that lead to gender inequality? This article discusses several mechanisms through which, as countries grow, gender gaps narrow. I argue that while much of the GDP/gender-inequality relationship can be explained by the process of development, society-specific factors are also at play: Many countries that are poor today have cultural norms that exacerbate favoritism toward males. Norms such as patrilocality and concern for women's "purity" help explain the male-skewed sex ratio in India and China and low female employment in India, the Middle East, and North Africa, for example. I also discuss why the sex ratio has become more male-skewed with development. Finally, I lay out some policy approaches to address gender inequality.

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1 Introduction

Gender gaps favoring males—in education, health, personal autonomy, and more—are systematically larger in poor countries than in rich countries. This article explores the root causes of gender inequality in poor countries. Is the higher level of gender inequality explained by underdevelopment itself? Or do the countries that are poor today have certain characteristics and cultural beliefs that lead to the larger gender gaps?

I begin by documenting some basic facts about how gender inequality correlates with the level of economic development. I then discuss several mechanisms through which the process of economic development theoretically could improve the relative outcomes of women and review recent evidence on these mechanisms.

I argue that while much of the relationship between development and gender inequality can be explained by the process of development, society-specific factors are also at play. The countries that are poor today, or at least some of them, have cultural features that exacerbate favoritism toward males. Being poor is insufficient to explain parents' strong desire to have a son in China and India, for example.

I then discuss in greater detail the problem of the male-skewed sex ratio at birth, which differs from most other manifestations of gender bias in that it has been intensifying, not lessening, with economic development. Finally, I lay out some policy approaches to accelerate the narrowing of gender gaps.

Note that the article's focus is the causes rather than effects of gender inequality, and thus I do not review the literature on the reverse direction of causality, that is, how gender inequality hinders economic development.[1] Nonetheless, much of the discussion hints at inefficiencies that result from constricted opportunities for women and girls.

2 More gender inequality in poor countries: Some facts

Poor countries by no means have a monopoly on gender inequality. Men earn more than women in essentially all societies. However, disparities in health, education, and bargaining power within marriage tend to be larger in countries with low GDP per capita.

[1] See Duflo (2012) on the bidirectional relationship between women's empowerment and development and Doepke et al. (2012) on the link between legal rights for women and development.

2.1 Education and health

Figure 1(a) shows the ratio of the male and female college enrollment rates plotted against GDP per capita for the several countries included in the World Bank's World Development Indicators (WDI) data set. The relationship is downward-sloping: The male bias in college-going falls (and in fact evaporates) as GDP increases. Although the correlation cannot be interpreted as a causal relationship, it is strong: In a univariate regression of the college gender ratio on log GDP per capita, the R^2 is 0.44, equivalent to a correlation of 0.66. A negative relationship between the schooling gender gap and GDP is also seen for primary and secondary school enrollment. (See Appendix Figure 1, available online. The appendix also describes the data in more detail.)

As with many of the cross-country patterns I show, the college-GDP relationship mirrors the time-series pattern seen within many countries as their economies grow. The male to female ratio of college enrollment in the United States has declined steadily since 1950, falling below parity by 1980 and continuing to decline since then (Goldin et al., 2006).[2]

In Figure 1(a), the data points for China and India are labeled. These two countries are given special attention both because they are large—together they are home to over one third of the world population—and because they are infamous for their strong son preference. Interestingly, in terms of school enrollment, neither China nor India is an outlier.

Turning to health, in general women have a longer life expectancy than men, but this female advantage is somewhat smaller in poor countries, as shown in Figure 1(b). The pattern is not explained by the disease composition varying with the level of development; even for a given cause of death, women have higher age-adjusted mortality relative to men in poor countries than in rich ones (Anderson and Ray, 2010). Most sub-Saharan African countries are above the best-fit line in Figure 1(b); the HIV/AIDS epidemic has hit Africa hard and decreased female life expectancy disproportionately.

2.2 Employment

Figure 2(a) plots the ratio of the male and female labor force participation rates versus GDP per capita. The correlation is essentially zero. India stands out for the underrepresentation of women in the labor force; men are three times as likely as women to be working. Female labor force participation is also abnormally low in the Middle East and North Africa.

[2]In contrast, secondary school enrollment was higher among females than males in the historical U.S.; the U.S. was exceptional in its mass expansion of secondary school in the early twentieth century (Goldin and Katz, 2009).

Even though actual female labor force participation is not systematically higher in rich countries, attitudes about women in the labor force are more progressive in rich countries. Figure 2(b) uses the World Values Survey (WVS), a set of nationally representative surveys fielded to both men and women; I use Wave 5, conducted between 2004 and 2009, because India has not been surveyed in the more recent Wave 6. One of the survey questions asked respondents if they agree or disagree with the statement, "On the whole, men make better business executives than women do." The poorer the country, the more frequently respondents agreed with the statement. Because these are stated attitudes, one caveat is that the pattern could partly reflect a greater degree of political correctness in rich countries.

2.3 Gender-based violence

While there are no reliable data on the incidence of gender-based violence to make cross-country comparisons, attitudes toward gender-based violence vary systematically with economic development. One can see this using data from the Demographic and Health Surveys (DHS), which are nationally representative surveys of women age 15 to 49. One of the DHS questions asked respondents whether and when a husband is justified in beating his wife. The variable shown on the vertical axis in Figure 3(a) is the proportion of respondents who said that a husband beating his wife is justified if she goes out without telling him or argues with him. Average tolerance for gender-based violence varies considerably across countries, from less than 1 percent to over 85 percent, but tends to be higher in poor countries. (Note that the DHS is only fielded in low- and middle-income countries, so the range of GDP per capita examined here is narrower than in the earlier figures. Unfortunately, there is no DHS for China.)

2.4 Decision-making power within marriage

An aspect of gender inequality that receives a great deal of attention from academics and policymakers is decision-making power within the household. A woman's say in household decisions is one aspect of her well-being and thus an end in itself, but the keen interest in female empowerment is in large part because it is believed to be a means of improving children's outcomes (Duflo, 2012). The model in the background is of a non-unitary household, that is, a household as a collective of individuals with different preferences who vary in how much they influence the household's decisions (Browning et al., 1994). Figure 3(b) depicts one measure of decision-making power, self-reports by female respondents in the DHS about whether they have say in household decisions about making large purchases. The poorer the

country, the less likely women are to influence these spending decisions. A similar pattern is seen for decision-making in other spheres such as whether to visit family and friends.

The income gradient seen across countries also holds within countries. The DHS computes a country-specific household wealth index. Women above the median wealth level for their country have more decision-making power and less tolerance for gender-based violence than those with below-median wealth (see Appendix Table 1).[3]

2.5 Freedom of choice and life satisfaction

The GDP gradient in women's welfare is also seen starkly in responses to a WVS question about one's sense of control over one's life; respondents were asked to rate "how much freedom of choice and control you feel you have over the way your life turns out." Figure 4(a) shows the ratio of men's to women's responses: Women in developing countries report having relatively less control over their lives than those in developed countries. There is particularly little freedom of choice for women in India, the Middle East, and North Africa. These are also the places with very low female labor force participation. The correlation between a country's male-female gap in freedom of control and its male-female gap in labor force participation is 0.59.

Another WVS question asks, "All things considered, how satisfied are you with your life as a whole these days?" Women's life satisfaction, relative to men's, is positively correlated with economic development, as seen in Figure 4(b). Two caveats, however, are that the relationship is weaker when using a related question on happiness, and there is no relationship between the gender gap in life satisfaction and GDP in the Wave 6 World Values Surveys that have been completed so far (see Appendix Figure 2).

3 Economic underdevelopment as a cause of gender inequality

As just shown, women in developing countries fare worse relative to men compared to women in developed countries on a variety of measures ranging from college enrollment to control over one's life. In this section, I discuss mechanisms through which economic development itself is the explanation for the positive correlation between gender equality

[3]A similar exercise is not possible with the WDI data because they are national aggregates. The WVS data include an objective measure of household income only for a select set of mainly high-income countries; the WVS outcomes I compare across countries do not vary systematically by household income within country for this subsample.

and GDP per capita, that is, reasons that the correlation could reflect economic development causing gender equality. In examining "economic development" as the explanation, I view the following characteristics as some of the defining features of economic development: high household income, better physical infrastructure, more advanced technology, a larger share of the economy from services, and lower fertility. In section 4, I then consider explanations that appeal to cultural differences in today's poor countries, although the effect of these factors is in many cases compounded by poverty. Of course not all mechanisms and pieces of evidence fit neatly into this development-versus-culture taxonomy. However, despite its imperfections, this way of organizing the discussion helps shed light on whether the process of development will eradicate gender inequality.

3.1 Brawn-based production

As countries grow, the sectoral mix shifts away from agriculture and manufacturing toward services. In the cross section today, the correlation between a country's share of GDP from services and its log GDP per capita is 0.52. This sectoral transition over the course of development offers one explanation for the worse outcomes for women seen in developing countries. Agriculture and manufacturing generally require more physical strength, or "brawn," than services, and men have a comparative advantage in tasks requiring brawn. Thus, relative female labor productivity might increase with development.

Galor and Weil (1996) offer a theoretical model of this phenomenon. In their model, there are physically-intensive tasks and mentally-intensive tasks, and capital raises the relative returns to mentally-intensive tasks. Women have a comparative advantage in mentally-intensive tasks. The process of development entails a growing capital stock and thus reduces the female-male wage gap, which in turn causes female labor force participation (FLFP) to increase. Moreover, there is a positive feedback loop; a higher female wage reduces fertility because the opportunity cost of having children has risen, which pushes up the capital-labor ratio further, accelerating growth.

Lower labor productivity is a potential explanation of not just patterns of FLFP or earnings, but also gender gaps in other outcomes that are influenced by earnings potential. For example, if the main payoff of becoming educated is that one earns a higher wage in the labor market, then men's advantage in labor force participation could lead parents to invest more in boys' education. Agriculture, even though more brawn-based than other sectors, has significant returns to schooling (Foster and Rosenzweig, 1996). If men specialize in brawn-based occupations and women in brain-based occupations, then at early stages

of development boys will receive more education than girls. As brain-based sectors grow, girls should catch up. In fact, if the returns to education are higher in brain-based than brawn-based occupations, girls' schooling could overtake boys' (Pitt et al., 2012).

Doepke and Tertilt (2009) propose a mechanism through which higher returns to education, in turn, can have spillovers to gender equality in other domains. They model men as wanting expanded legal rights for their daughters but restricted rights for their wives. A key benefit to a man if his daughter acquires more rights vis-à-vis his son-in-law is that his grandchildren will be given more education; in the model, women care more than men about children's well-being. Thus, when the returns to education increase, men are tipped toward endorsing legal rights for women. (Fernández (2014) presents a related model in which men face a wives-versus-daughters tradeoff, and economic development induces them to support women's rights; in her model, the driving forces are higher income and lower fertility.)

Some of the best evidence on the effects of gender differences in labor productivity comes from variation within agriculture. Qian (2008) studies economic reforms in China in the late 1970s that made growing cash crops more lucrative. She posits that women have a comparative advantage in picking tea leaves, which are delicate and grow on short bushes, whereas men's height and strength give them an advantage in picking fruit from trees. Thus, she compares the impact of the economic reforms in tea-growing regions, where female labor productivity should have especially risen, to regions specializing in fruit orchards, where male labor productivity should have risen most. In tea-growing regions, the reforms led to fewer "missing girls," consistent with families having fewer sex-selective abortions of female fetuses or engaging in less neglect and infanticide of girls. The mechanism she puts forward is that women's share of household income increased, they gained bargaining power in their families, they had weaker son preference than men, and their gender preference prevailed in household decision-making.

Carranza (forthcoming) examines the relative demand for female labor in agriculture within India, using variation in soil type and its suitability for deep tillage. Coarse soil with a low density of clay is suitable for deep tillage, which uses more male labor. She finds that in parts of India with soil suitable for deep tillage, there is lower FLFP and a more male-skewed sex ratio, consistent with the female-bargaining-power effect highlighted by Qian (2008).

In a similar spirit, Alesina et al. (2013) use variation in how much agricultural production plays to men's physical advantages and examine the implications for gender inequality in other realms. What distinguishes their work is that they use variation in the historical division of labor centuries ago and show that it affects gender attitudes and outcomes today.

Specifically, they test Boserup's (1970) hypothesis that the tools used to prepare land for cultivation in pre-industrial times affected the returns to male versus female labor, and, in turn, norms about gender roles. Men had a large advantage in using ploughs, which require a great deal of upper body and grip strength to operate, while in the use of hand tools such as hoes, women were on a more equal footing. They show that historical plough use in a region is correlated with its current level of FLFP and current gender attitudes, such as agreement with the statement, "On the whole, men make better political leaders than women do," among WVS respondents. They find similar results when they use an instrumental-variables strategy that predicts plough use with a region's geographic suitability for crops that lend themselves to plough cultivation.

The type of physical tasks required is not the only factor that affects men's versus women's labor productivity. Men also often have the advantage of more secure property rights. Even if unequal property rights for women are not codified in law, many developing countries rely on informal property rights, in which case women *de facto* might have weaker rights. Goldstein and Udry (2008) show that in Ghana, people with less social and political power in the community—notably women—face more risk that their land will be expropriated and thus are more reluctant to leave their agricultural plots fallow. This constraint depresses soil fertility and agricultural output on women's land.

Aizer (2010) studies changes in women's relative earning potential in the contemporary U.S. that arise from variation in labor demand growth in female- versus male-dominated industries. Her evidence speaks to an additional potential benefit of women advancing in the labor market: The narrower the gender wage gap, the less domestic violence women suffer.

The research described above focuses on gender differences in the earnings potential from working, but the decision whether to work also depends on non-pecuniary factors. Over the course of development, a change in the composition of jobs as well as rising income might affect women's willingness (or freedom of choice) to work. Goldin (1995) documented a U-shaped cross-country relationship between economic development and FLFP, and Mammen and Paxson (2000) also found a U-shaped relationship in a comparison of households of varying income within India and Thailand. Goldin (1995), building on Boserup (1970), posits that the U-shape arises because at low levels of development, the home and workplace are closely integrated and women do unpaid work on family farms and in family businesses. With development, production migrates to factories and firms, and women withdraw from the labor force, especially from manual labor jobs, because of the social stigma men perceive

from having their wives work in such jobs. Higher wages mean that the household can afford to forgo the woman's earnings. This transition explains the downward part of the U. With even higher levels of development, the female wage grows because of the sectoral shift toward services and increased female education, which causes women to re-enter the workforce. Job growth in occupations deemed "respectable" for women such as clerical work also helps explain the resurgence in FLFP.[4]

An example of the arrival of new types of "good jobs" for women is business process outsourcing, or BPO, (e.g., call centers), which has boomed in several cities in India and elsewhere. Jensen (2012) uses random variation in the location of BPO recruitment drives and job placement services to show that women who would otherwise not have worked take BPO jobs. Moreover, the intervention raised young women's career aspirations, led them to enroll in computer and English training courses, and delayed their marriage and childbearing. Meanwhile, for the younger generation, the prospect of these jobs led to a sizable increase in school enrollment.

3.2 Labor-intensive home production

Economic development is characterized by better physical infrastructure, more advanced technology, and higher household income. This cluster of factors means that home production becomes more efficient and less labor-intensive with development. It takes less time to turn on an electric furnace than to gather wood for a wood-burning stove, so electrification is one example of an innovation that reduces home labor. Because women perform the lion's share of household chores, advances in home production mainly free up women's time.

Greenwood et al. (2005) present a model to explain the rise in FLFP over the twentieth century in the U.S. based on this mechanism. In their calibration, a narrowing gender wage gap explains relatively little of the increase in FLFP on its own. Without technological progress in home production, women's time would still remain tied up at home. Thus, key to the historical expansion of FLFP were the invention and diffusion of technologies that reduced the time spent fetching water, lugging coal for home heating, and other such chores. Notable advances were central heating, electricity (and the electric consumer durables invented thereafter), and running water. Time spent on home production among prime-age women has indeed fallen sharply in the U.S., from 47 hours per week in 1900 to 29 hours in

[4]Certain jobs being deemed unsuitable for women is a cultural norm, but I discuss it in this section because it appears to be common across societies when they are at low levels of development. Section 4 focuses on cultural factors that are specific to or stronger in the parts of the world that are currently less developed.

2005 (Ramey, 2009). The cross-country pattern observed today mirrors the U.S. time trend: The ratio of women's to men's time spent on home production, as well as the absolute amount of time women spend, declines with GDP per capita (see Appendix Figure 3).

Dinkelman (2011) finds that electrification in post-apartheid South Africa increased FLFP. She shows supporting evidence that a likely mechanism is reduced time spent on home production, for example because of a shift away from cooking with wood and toward electric stoves, as well as a greater endowment of productive time because of electric lights. Coen-Pirani et al. (2010) conduct a similar analysis examining changes in the U.S. between 1960 and 1970 and find that greater ownership of household appliances is associated with higher FLFP.

Meeks (2014) analyzes the time savings from construction of village water supply systems and shared water taps in Kyrgyzstan. Having water closer to the home led to a savings of 3 hours per day per household on average. Likewise, in a study based in Morocco, Devoto et al. (2012) find that acquiring a piped-water connection in the home freed up time; people used the extra time for leisure activities, not working more, and self-reported happiness increased. In both of these contexts, men and women shared the water-collection responsibilities, so the incidence of the time savings was gender neutral. In many developing countries, though, fetching water falls to women, so the results are suggestive that such infrastructure advances will disproportionately free up women to work outside the home more or enjoy more leisure.

3.3 High fertility, risky fertility

Low fertility is likely both a cause and effect of economic growth, but in any case, a demographic transition that begins with lower mortality and proceeds to lower fertility is part and parcel of development. The fact that the fertility rate is lower in rich countries helps explain the smaller gender gaps in education, health, and labor market outcomes.

High fertility is partly due to high desired fertility but also to limited access to contraceptive methods to control fertility. Miller (2010) analyzes the rollout of a large-scale family planning campaign across Colombia in the 1960s and 1970s and finds that access to contraception delayed when women began childbearing and increased how much education they attained, as well as their employment rate. This evidence is consistent with Goldin and Katz's (2002) work showing that access to oral contraceptives transformed the career opportunities of women in the U.S., making careers such as law and medicine that require many years of upfront investment more feasible and attractive.

Childbearing is not only more common in developing countries, it is also more dangerous. For these two reasons, 99 percent of the world's maternal mortality (deaths during or shortly after pregnancy from causes related to the pregnancy or birth) occurs in developing countries (World Health Organization, 2014).

Jayachandran and Lleras-Muney (2009) study a period of rapid decline in maternal mortality in Sri Lanka in the 1940s and 1950s, brought about by medical progress and improvements in the public health system. The reduction in maternal mortality risk led to meaningful gains in female life expectancy. Because the years over which girls would accrue returns to schooling rose, the incentive for them to attend school should also have risen. Consistent with this hypothesis, the authors find that the reduction in maternal mortality risk caused girls' schooling to increase and accounts for one third of the narrowing of the gender gap in education that occurred over the period.

Medical progress reduces not just maternal mortality but also maternal morbidity. Albanesi and Olivetti (2009) argue that a reduction in complications from childbearing, which resulted from sulfa drugs, blood banks, standardized obstetric care, and other medical progress, improved the ability of women to work postpartum in the U.S. in the middle of the twentieth century. In their model calibration, medical advances can quantitatively explain the large increase in FLFP among married women of childbearing age that occurred in the U.S. between 1920 and 1965. A second relevant innovation which they consider is infant formula, which allowed other caregivers to be closer substitutes for mothers in infant feeding and thus also spurred FLFP.

4 Cultural factors that cause gender inequality

When it comes to gender inequality, are the poor different from the rich only in that they have less money? The previous section described several mechanisms that do not lean on cultural differences between the rich and the poor, but there are also several contributors to gender inequality that do derive from context-specific features. Lack of development still remains relevant even when cultural factors are at play; poverty often exacerbates the cultural forces that lead to favoritism toward males.[5]

[5]Note that I am not dichotomizing economics and culture: Most of the cultural institutions I discuss create economic incentives to favor males. Cultural norms are also sometimes the legacy of historical economic forces in the society.

4.1 Patrilocality

Many cultures practice patrilocality whereby a married couple lives near or with the husband's parents. When a woman gets married, she essentially ceases to be a member of her birth family and joins her husband's family. Under this system, parents potentially reap more of the returns to investments in a son's health and education because he will remain a part of their family, whereas a daughter will physically and financially leave the household upon marriage. Co-residence of adult sons and elderly parents is much more common in Asia, the Middle East, and North Africa than in Europe, sub-Saharan Africa, and the Americas (Ebenstein, 2014).

Within India, the northern region has a much stronger patrilocal (and patrilineal) system than the south, which is a leading explanation for why gender inequality is more pronounced in the north (Dyson and Moore, 1983). For example, Chakraborty and Kim (2010) examine the 1901 Indian Census and find that the sex ratio was less male-skewed in the south, a pattern that continues to hold today. More generally, Ebenstein (2014) shows that the male-to-female sex ratio is positively correlated with the rate of co-residence between adult sons and their parents both across and within countries.

If parents fully internalized their daughters' returns to nutrition, health care, and schooling, then patrilocality would not necessarily cause gender gaps in these inputs. In practice, though, the longer duration that parents will co-reside and pool financial resources with their sons seems to cause them to invest disproportionately in sons. For example, parents are more likely to seek medical care for a sick son than sick daughter. In one study, 405 parents in India who had been advised that their child needed surgery to correct a congenital heart condition were followed up one year later; 70 percent of the boys but only 44 percent of the girls had undergone surgery (Ramakrishnan et al., 2011). The financial mindset about investing in daughters is encapsulated in an often quoted Indian saying that "raising a daughter is like watering your neighbors' garden." This sentiment is echoed in a Chinese proverb that describes raising a daughter as "ploughing someone else's field."

Poverty could exacerbate the tendency to invest more in sons than daughters. Suppose the net returns to surgery are positive for both boys and girls but higher for boys. If a family is liquidity-constrained, they might seek medical care only for their son, but with more available resources, they would seek care for both their son and daughter. (The same reasoning could apply if parents invest more in boys because boys have higher labor market returns to health, and not just when the gender gap is due to cultural practices.) Consistent with the idea that

poverty can widen the gender gap in investment, Rose (1999) found that favorable rainfall in rural India increased girls' survival more than boys'. Theoretically, parents' marginal spending need not always benefit the disadvantaged group, however (Kanbur and Haddad, 1994). Oster (2009) reports that better access to health care initially widens the gender gap in vaccinations in India, but further improvements close the gender gap.

4.2 Old-age support from sons

Closely linked to patrilocality is the fact that sons traditionally provide old-age support for their parents in societies such as China and India. Ebenstein and Leung (2010) investigate this old-age support norm as a reason for the desire to have sons in China. When the Chinese government instituted the Rural Old-Age Pension Program, parents now had a better substitute for old-age support from sons, and thus their desire to have a son should have abated. The authors show several patterns in the data consistent with this hypothesized effect. Households without sons are more likely to participate in the pension program (and also to have more savings). In addition, having access to the pension program is associated with a less skewed sex ratio.

Here one again sees how culture and development interact. With the rollout of the pension, the cultural norm that sons not daughters support parents did not change, but its implications for the desire to have a son and the skewed sex ratio did change. When a formal institution for retirement savings arose, the informal method of relying on sons became less important, and therefore this force driving son preference became less relevant.

4.3 Dowry system

In some but not all societies where a woman joins her husband's family upon marriage, there is also a dowry system through which parents make a payment to the couple or groom at the time of marriage. Historically the daughter held property rights over this money; dowry was a pre-mortem inheritance from her parents. In this original formulation, the dowry system was intended to improve the financial well-being of females. However, the system has evolved so that today the groom usually has property rights over the money. Dowry has morphed into the price of a groom (Anderson, 2007).

Most of the evidence on the impacts of the dowry system on women's welfare is anecdotal. The anecdotal evidence points to the dowry system causing pro-male bias. The prospect of paying dowry is often cited as a key factor in parents' desire to have sons rather than daughters in India, for example (Arnold et al., 1998; Das Gupta et al., 2003). The financial

burden of dowry indeed seems to loom large in prospective parents' minds. Kusum (1993) describes a billboard that was put up when prenatal sex-diagnostic tests were just arriving in India; a new clinic in the city of Amristar urged parents to "Invest Rs. 500 now, save Rs. 50,000 later." The 500 rupees today was for an ultrasound test, which would tell the parents if their fetus was female; the 50,000 rupees later—which was obvious enough that it did not need to be spelled out on the billboard—was the dowry the parents would save if they aborted the female fetus.

Having to pay a dowry for a daughter's marriage should decrease the desire to have daughters but should not necessarily reduce investments in daughters. In principle, parents could recoup their investment in their daughter's health and education in the form of lower dowry demands or a higher quality son-in-law. However, this idealized market solution where parents invest in their daughter's human capital and the groom later compensates them for the investment does not seem to work in practice, perhaps because investments are not fully observable by the groom. In addition, parents have reason to care more about the quality of their daughters-in-law than their sons-in-law because daughters-in-law will live with them under patrilocality and raise their heirs under patrilineality. Besides reducing human capital investments, the dowry system also results in newly married women sometimes being the victim of violence or, worse, "dowry deaths" as punishment for the dowry amount being deemed inadequate by the groom (Bloch and Rao, 2002).

4.4 Patrilineality

In a patrilineal system, names and property pass to the next generation through male descendants. This system puts sons on a higher footing than daughters, and the specific feature of land inheritance is especially likely to have effects on gender gaps. For example, in India because widows traditionally do not inherit their husbands' ancestral property, they rely on their sons as their conduit for holding onto the family property and maintaining their standard of living in widowhood. This consideration might be one reason that the desire to have sons is not appreciably different between women and men.

Under the Hindu Succession Act of 1956, sons shared the right to inherit ancestral property in India. In the 1980s and 1990s, the law was amended in four states to make daughters' status equal to sons'. The reforms had some bite: In the sample that Deininger et al. (2013) analyze, 8 percent of daughters whose fathers died before the reforms inherited land; the proportion increased to 16 percent among those whose father died after the reforms. (About 70 percent of fathers owned land; the fraction of sons who inherited land remained steady

at 70 percent before and after the reforms.) As a result of the law changes, women's age of marriage rose, consistent with their having more bargaining power within the family and financial independence (Deininger et al., 2013). The reforms also increased girls' schooling, presumably because their mothers were more empowered in the household or because education and asset ownership are complements (Deininger et al., 2013; Roy, 2013). However, the legal reforms also seem to have had some negative consequences for women. Anderson and Genicot (2014) find that they led to a rise in suicides, which they conjecture is due to a backlash effect whereby the increase in female bargaining power sparked marital conflict.

4.5 Role of sons in religious rituals

In certain belief systems, such as Confucianism in China and Hinduism in India, sons play a special role. Confucianism encourages the patrilineal and patrilocal system in place in China, Vietnam, and elsewhere. But another part of the special role of sons is in rituals. Ancestor worship within Confucianism involves rituals where a son plays an essential part.

Similarly, son preference is mentioned in the Vedas, the ancient Hindu texts. In addition, in Hindu societies, it is supposed to be a son who lights a deceased person's funeral pyre and brings him or her salvation. Hindu kinship norms are adhered to more strictly among upper castes than lower castes (Mandelbaum, 1970), and Chakraborty and Kim (2010), in their analysis of the 1901 Indian Census, find a more skewed sex ratio for upper castes than lower castes.

The funeral-pyre underpinning of son preference specifically generates a strong desire for *one* son (with further sons perhaps serving as insurance in case the first son predeceases his parents). Other reasons for son preference such as wanting someone to carry on the family name or widows wanting to retain family land also make the first son especially valuable. Consistent with this idea, Jayachandran (2014) finds that parents in India strongly want to have one son and, once they have one son, prefer a balanced gender ratio, more or less.

4.6 Desire to protect female safety and "purity"

Concern for women's and girls' safety and "purity" constrains their physical mobility in many developing countries. It is difficult to say how much of the limited mobility is out of genuine concern for women's welfare, aimed at protecting them from harassment and sexual violence, and how much is simply a way to stifle female autonomy. In a cross-country study of mate preferences, men put more weight on their spouse's sexual inexperience at marriage than on physical appearance in India, China, Indonesia, Taiwan, and Iran, while the opposite

prioritization was seen in each of the 24 European, North American, South American, and sub-Saharan African countries studied (Buss, 1989). Restrictions on female mobility often seem largely aimed at keeping unmarried women chaste and married women faithful. In any case, they are a proximate cause of reduced female schooling and career opportunities.

One reason parents cite for not educating their daughters is the distance to school. Burde and Linden (2013) evaluate a school-building initiative in Afghanistan and find that having a school located within one's village itself matters much more for girls' enrollment; a village school essentially closes the otherwise-large gender gap in enrollment. Muralidharan and Prakash (2013) show that a program that gave girls bicycles to travel to school in India similarly had a sizable impact on girls' school participation. These results suggest that better infrastructure, which comes with economic development, could offset some of the effect that social constraints on girls' mobility have on their education.[6]

Besides distance to school, parents might also want their daughters segregated from male peers or teachers. Kim et al. (1999) evaluate a program in the Pakistani city of Quetta that subsidized the creation of neighborhood private schools in part to meet parents' demand for single-sex schools for their daughters. Similarly, the construction of sex-segregated school toilets boosted adolescent girls' enrollment in India (Adukia, 2014).

In a setting where the genders are socially segregated, the benefits of having a same-gender teacher might be especially large. Muralidharan and Sheth (2013) find large same-gender effects on test scores for both boys and girls in India. But girls lose out on the same-gender benefit as they progress because there are fewer female teachers at higher grades; the gender mismatch can explain 10 to 20 percent of the negative trend in girls' test scores as they progress to higher grades.

Another consideration is that parents feel pressure to marry off their daughters early in societies where female chastity is prized by men, which leads to early school dropout. Field and Ambrus (2008) estimate that, in Bangladesh, for every year an adolescent girl's marriage is delayed, she completes an additional 0.22 years of schooling.

The risks associated with female mobility—both objective risk and socially constructed risk to family honor—might also explain the very low FLFP in India, the Middle East, and North Africa seen in Figure 2(a). One of the tenets of the Hindu caste system is that women should be protected from "pollution," which includes men outside their families. Disallowing

[6]One explanation for the female advantage in high school enrollment but disadvantage in college enrollment in the U.S. in the early twentieth century is that college was further from home (Goldin and Katz, 2009). Thus, distance to school mattering more for females is not unique to today's developing countries.

women from working outside the home is one way of maintaining their purity (Chen, 1995). Because these restrictions apply more stringently to upper caste women in India, lower caste women often have more professional flexibility and autonomy (Field et al., 2010, 2014; Luke and Munshi, 2011).

Female seclusion (*purdah*) is also an important tenet of Islam, and Muslim women resemble Hindu women in their low labor force participation and low self-reported freedom of choice. A notable contrast is that many of the norms that underlie Hindu parents' desire for sons, such as dowry and bequests only to sons, are weaker or non-existent among Muslims. Correspondingly, within India the sex ratio at birth and child survival exhibit less pro-male bias among Muslims than Hindus (Borooah and Iyer, 2005).

4.7 Persistence of gender norms when economic conditions change

One type of evidence that gender gaps do not simply reflect the current economic environment—that culture also matters—is their persistence even when the economic environment changes. Complementing Alesina et al.'s (2013) work on the long-run persistence of gender norms, recent work has shown that gender norms are sticky in the shorter run, e.g., from one generation to the next. Using the U.S. Census for 2000 and U.S. birth records, respectively, Almond and Edlund (2008) and Abrevaya (2009) find evidence of missing girls among U.S. residents of East Asian and South Asian origin. The male-skewed sex ratio is concentrated at higher parity and in cases when all the older siblings are girls, consistent with couples having sex-selective abortions when they are trying to have a son but conceive a daughter. If the preference for sons were driven entirely by the local economic environment, we would not expect it to be manifest among those who have immigrated to a wealthy country. Many of the cultural practices such as dowry and non-employment of women are abandoned upon immigration, so the economic incentives to prefer sons should be less strong for the immigrant communities. Their continued son preference suggests that gender-related practices are embodied in preferences or beliefs that might have a long half-life.

Fernández and Fogli (2006) also study immigrants to the U.S. and find that a woman's fertility is predicted by her mother's fertility and by the average fertility in her country of origin. Fernández (2007) shows that, similarly, a woman's labor force participation is correlated with the average behavior in her country of origin. Fernández et al. (2004) find that if a mother works, her son's wife is more likely to work, further evidence that gender gaps in behavior at least partly reflect gender norms that are passed along from parents to children. These findings indicate that gender-related behaviors depend on cultural background and

not just the economic environment one faces.

5 Sex imbalance at birth

A particularly troubling form of gender bias is the sex imbalance at birth. Sen (1990) famously highlighted this problem of missing women, which he found to be concentrated in East and South Asia. The dearth of females materializes before birth and in early childhood but continues over the entire lifespan, as emphasized by Anderson and Ray (2010).

The sex imbalance at birth is noteworthy because it has become much worse over the past fifty years in several countries. Figure 5 plots the sex ratio at birth for China and India; in both countries, it has increased sharply in recent decades. The most recent estimates (from 2012) are that 116 boys are born for every 100 girls in China, and 111 boys for every 100 girls in India. The natural sex ratio is in the range of 103 to 106.

Figure 6(a) plots the sex ratio at birth across countries. Two features stand out. First, mirroring the fact that the sex ratio has worsened over time in China and India, the sex ratio is worse in more developed countries. Second, India and China are outliers, with exceptionally male-skewed sex ratios.

5.1 Distinction between desire for sons and higher investment in sons

Parents' favoritism toward boys encompasses both wanting to have sons more than daughters and choosing to invest more in sons than daughters. These two dimensions of favoritism often go hand-in-hand, but they are not identical.

Conceptually, parents could have a preference over their number of sons n_s and daughters n_d that is distinct from their preference over the average quality of each, $\overline{q_s}$ and $\overline{q_d}$. For example, parents might have a preference for sons over daughters but value the quality of both the same. Their utility function $u(n_s, n_d, \overline{q_s}, \overline{q_d})$ would reduce to $u(n_s, n_d, \overline{q})$. With this utility function, they could still have a strong desire to have a son, represented by $\partial u/\partial n_s > \partial u/\partial n_d$ at $n_s = n_d = 0$.

There are at least two important differences between the quantity and quality dimensions of son preference. First, the fact that India and China are large outliers for the sex ratio at birth but not for investment outcomes like schooling is *prima facie* evidence of a distinction between the two dimensions. More generally, there is stronger regional variation in the sex ratio at birth, with African countries generally exhibiting less skewed sex ratios at

birth (conditional on GDP per capita) and Asia exhibiting more skewed ratios, while gender gaps in human capital exhibit less of this geographic clustering.

Second, while today's rich countries were historically similar to developing countries today in terms of generally having higher human capital investments in males than females, they did not exhibit as strong a desire to have sons as seen today in many developing countries. I find that historically in the U.S., the sex ratio of last births (SRLB) was not skewed toward males. A male-skewed SRLB is a useful measure of the desire to have sons. A couple who wants to have a son but whose first children are girls will often continue beyond their originally intended family size to try again for a son. This fertility stopping behavior will mean that last-born children are disproportionately male. A skewed sex ratio of *last* births occurs even without infanticide, neglect, or sex-selective abortions—behaviors that lead to a skewed population sex ratio, or sex ratio of *all* births. The SRLB is the better metric to compare son preference in the historical U.S. and modern developing countries because the technology in use today to manipulate the population sex ratio (e.g., ultrasound tests) was not available in the nineteenth century, while son-biased stopping behavior is feasible as long as there are contraceptive methods to control total fertility.

India exhibits a strongly skewed SRLB. Using the 1992 DHS, I find that the SRLB was 1.34, that is, 1.34 boys for every 1 girl among the youngest surviving children of mothers. The calculation restricts the sample to cases where the youngest child is age 10 or older, or born before 1982, both because using earlier birth cohorts limits the likelihood of prenatal sex determination (ultrasound machines were scarce in India until the mid-1980s) and because this sample of women is likely to have completed their fertility.[7,8]

The U.S. in 1809 had the same PPP-adjusted GDP per capita as India in 1992. However, contraception availability was limited, so I use a later U.S. census, specifically 1860, as a more appropriate comparison group. Making the same sample restrictions as above, the SRLB in the U.S. in 1860 was 1.04—not male skewed at all.[9] This lack of son-biased fertility stopping

[7]Sex-selective abortions occur disproportionately at last births, which makes the SRLB more skewed. In the 2005 DHS for India, the SRLB is 1.48. Declining desired fertility likely pushed the SRLB higher too; couples who want a small number of children will often fail to have a son naturally within that number.

[8]I also limit the sample to cases where the youngest child is below age 15 and resides with the mother for consistency with the U.S. analysis; for the U.S. analysis, I use children below age 15 because older children who have left the household cannot be matched to their mother in the census. Conversely, in the U.S. analysis, I limit the sample to mothers age 49 and younger for consistency with the DHS sampling rule. The results are very similar when I vary these restrictions.

[9]I repeat the exercise with the 1900 Census because desired total fertility affects whether families need to try again for a son, and the U.S. fertility rate in 1900 was comparable to India's rate of 3.7 in 1992. The SRLB in the 1900 U.S. census was 1.02. The child mortality rate is higher for males than females, which

behavior is evidence that, historically, parents in the U.S. did not have a strong desire for sons. In contrast, during this same time period, the U.S. did exhibit other gender gaps that resemble what is seen in developing countries today such as a smaller female advantage in life expectancy and low FLFP, especially among married women (Preston, 1976; Goldin, 1986).

The two differences above suggest that while economic development could go a long way in explaining the gender gap in human capital investment, it does considerably less well in explaining the preference over the number of sons versus daughters. The desire to have a son appears to have strong cultural roots and thus might be slow to fade even as the economies of countries like India and China grow rapidly.

Interestingly, one way the quantity and quality dimensions of gender bias are entangled is that the desire to have sons can cause gender gaps in investments even if parents derive the same utility from boys' and girls' quality. For example, son-biased stopping behavior means that girls will tend to grow up in larger families than boys (Yamaguchi, 1989; Clark, 2000; Jensen, 2003). Given fixed financial resources, girls will thus be raised in families that have fewer resources to spend on each child. In addition, Jayachandran and Kuziemko (2011) show that because women in India want to and are more likely to become pregnant again after a daughter is born, they stop breastfeeding girls sooner to regain their fecundity or as a result of the new pregnancy. Daughters will be breastfed for a shorter duration than boys, which is likely detrimental to their health, even without parents having an explicit preference to provide more health inputs to sons.

5.2 Distinction between desire for sons and sex imbalance

As seen in Figure 6(a), the sex ratio is *less* skewed in poorer countries. In contrast, the desire to have more sons than daughters is *more* intense in poorer countries, as shown in Figure 6(b). The latter figure is based on a DHS question that asked respondents about their ideal number of sons and daughters. The sex imbalance at birth is an aspect of gender inequality that seems to be aggravated by development even though the desire to have sons fades with development.

One reason that the sex imbalance is worsening, even though son preference is not, is technological innovation. Infanticide and neglect of infant girls have long been (proximate) causes of missing women, but the ability to ascertain the sex of a fetus has given rise to sex-selective abortions and dramatically exacerbated the problem of the skewed sex ratio. Chen et al. (2013) estimate that about half of the increase in the sex imbalance in China is

likely explains why the sex ratio of children was slightly lower than the natural sex ratio of births.

explained by access to ultrasound. Lin et al. (2014) find that this technological advance also played a large role in driving the skewed sex ratio in Taiwan.

A second factor behind the worsening sex ratio is declining fertility. For example, conventional wisdom is that the extremely skewed sex ratio in China is due to the One Child Policy; constrained to have only one (or two) children, couples use sex-selective abortions to ensure that they have at least one son. Consistent with this idea, in the parts of China where the penalties for violating the One Child Policy were more onerous, the sex ratio was more imbalanced (Ebenstein, 2010).

Jayachandran (2014) shows that the desired sex ratio in India is more male-skewed at low fertility levels. Individuals express a strong preference to have at least one son, not a general preference to always have sons rather than daughters. When parents want to have three or four children, the likelihood of naturally ending up with no sons is relatively small, but this undesired scenario becomes more likely when couples want to have two or even just one child. Therefore, as couples' desired family size gets smaller, for example because of a higher female wage which raises the opportunity cost of having children, they are more likely to resort to sex-selective abortions in order to obtain their desired son. The conceptual upshot is that the sex ratio is not a measure of son preference per se; it is the realization of one's son preference combined with one's family-size preference (Jayachandran, 2014). Figure 6 conveys the message that son preference—the desire for sons—might decline with development, but the problem of the sex imbalance at birth appears to worsen with development, at least over a certain range.

6 Policy approaches to reduce gender bias

The existence of culturally-rooted gender norms means that even when India and China advance to today's level of U.S. GDP per capita, they might not advance in terms of their desire to have sons, the decision-making power of women, and so forth. Eliminating gender inequality might require explicit policy intervention. Moreover, one might not want to wait patiently as the problem of gender inequality resolves itself via economic growth.

One type of gender-progressive policy is granting legal rights to women. A powerful example of this tool is India's move to reserve political seats for women. A fraction of seats at various levels of government are, by mandate, held by women. The most direct impact of the law change on women's welfare has been to close the gap in women's representation; female leaders implement policies that better reflect the policy preferences of their female

constituents (Chattopadhyay and Duflo, 2004). Moreover, this reform has begun to reshape attitudes toward women as leaders (Beaman et al., 2009) and raised the aspirations of and long-term investments in girls (Beaman et al., 2012).

A limitation of legal reforms is that enforcement is often weak. For example, the legal reform granting women rights to ancestral land in India that was described earlier has some bite, but it is far from universally enforced. Similarly, bans on prenatal sex determination, dowry, and child marriage are often minimally enforced.

A second policy tool is financial incentives for parents to invest in or have girls. For example, many states in India offer incentives to have daughters (Anukriti, 2013). In addition, many conditional cash transfer programs such as Progresa/Oportunidades in Mexico give a larger financial incentive to educate girls than boys, responding to the higher dropout rate of girls (Schultz, 2004).

Another approach is to shift household financial resources to mothers based on the hypothesis that more influence in the household for women will help break the cycle of gender discrimination because women have less pro-boy bias than men do. There are several pieces of evidence that when women control a larger share of household income, girls' outcomes improve (Thomas, 1990; Duflo, 2003).

An important caveat to this approach is that the differences between men and women in their gender attitudes are sometimes surprisingly small, or even go in the counterintuitive direction. In India, tolerance for gender-based violence (based on the DHS question depicted in Figure 3(a)) is 37 percent among women and 33 percent among men. (The survey was also fielded to men in India.) Similarly, when asked about their ideal sex composition of children, 20 percent of women and 19 percent of men wanted strictly more sons than daughters. In other cases, women do state more progressive gender attitudes than men but not by a wide margin. For a WVS question about whether a university education is more important for boys than girls, in China 23 percent of men and 18 percent of women agree with the statement. The similar gender attitudes of men and women imply that more decision-making power for mothers might not necessarily translate into significantly better treatment of girls.

Why aren't women's attitudes more progressive? Their views might be shaped by practical concerns. For example, women gain status in the household and enjoy greater well-being once they give birth to a son (Li and Wu, 2011; Milazzo, 2014). In addition, the lack of role models for women means that they might simply fail to realize that equality for women is possible (Beaman et al., 2012).

Thus, another policy approach is to try to change women's attitudes, whether by creat-

ing a cadre of role models or by other means. Despite not having this explicit goal, commercial television appears to have reshaped women's views, for example about having a smaller family size, in Brazil and India (La Ferrara et al., 2012; Jensen and Oster, 2009). Changing men's attitudes might be equally important. On the one hand, mothers' gender attitudes appear to be more influential than those of fathers in shaping children's gender views (Dhar et al., 2014). On the other hand, fathers typically have more say in the household about decisions affecting girls, such as how much to spend on their education.

7 Conclusion

This article showed that gender gaps in several domains are large in developing countries. Should we expect these gender gaps to shrink and disappear over time? I laid out several mechanisms through which, as countries grow, women's lot should improve. First, a sectoral shift away from agriculture toward services occurs. Second, technological advances reduce the time needed for household chores. Third, the frequency and risk of childbearing declines. Each of these factors increases women's participation in the labor force, which in turn increases human capital investment in girls and women's personal autonomy.

However, I also described certain cultural practices that could make gender inequality in today's poor countries persist even in the face of economic growth, such as patrilocality and male-centered funeral rituals. These cultural norms help explain the extremely male-skewed sex ratio in India and China, for example. Similarly, the anomalously low female labor force participation rate in India, the Middle East, and North Africa is likely rooted in the high value these cultures place on women's "purity." The cultural institutions favoring males might themselves fade naturally with economic modernization, enabling gender gaps to close, but there is also scope for policymakers to expedite the process.

Summary points

- Along several dimensions, there is greater gender inequality in poor countries than in rich ones.
- Three key elements of the development process increase women's participation in the labor force, which in turn increases human capital investment in girls and women's personal autonomy: growth of the services sector, technological advances in home production, and reduced risk and frequency of childbearing.
- In many poor countries, the desire for sons and constricted opportunities for women are exacerbated by cultural practices and norms.
- India, the Middle East, and North Africa stand out for their very low female employment and freedom of choice for women, which appear to be rooted in these societies' concern for women's "purity."
- The extremely male-skewed sex ratio at birth in India and China is rooted in cultural practices that create a strong desire to have at least one son, such as patrilocality, patrilineality, and religious rituals performed by sons.
- The quantity and quality dimensions of son preference—that is, the desire for sons and higher human capital investment in sons—have important differences.
- The skewed sex ratio at birth has been getting worse with economic development due to the advent of prenatal sex-diagnostic technologies and declining desired fertility.
- While gender inequality in developing countries will likely diminish with economic growth, policymakers have several options to hasten the process.

Literature cited

Abrevaya, J. (2009): "Are There Missing Girls in the United States? Evidence from Birth Data," *American Economic Journal: Applied Economics*, 1–34.

Adukia, A. (2014): "Sanitation and Education," Working paper, University of Chicago.

Aizer, A. (2010): "The Gender Wage Gap and Domestic Violence," *American Economic Review*, 100, 1847–1859.

Albanesi, S. and C. Olivetti (2009): "Gender Roles and Medical Progress," Working Paper 14873, National Bureau of Economic Research.

Alesina, A., P. Giuliano, and N. Nunn (2013): "On the Origins of Gender Roles: Women and the Plough," *Quarterly Journal of Economics*, 128, 469–530.

Almond, D. and L. Edlund (2008): "Son-Biased Sex Ratios in the 2000 United States Census," *Proceedings of the National Academy of Sciences*, 105, 5681–5682.

Anderson, S. (2007): "The Economics of Dowry and Brideprice," *Journal of Economic Perspectives*, 21, 151–174.

Anderson, S. and G. Genicot (2014): "Suicide and Property Rights in India," Working Paper 19978, National Bureau of Economic Research.

Anderson, S. and D. Ray (2010): "Missing Women: Age and Disease," *Review of Economic Studies*, 77, 1262–1300.

Anukriti, S. (2013): "The Fertility-Sex Ratio Trade-off: Unintended Consequences of Financial Incentives," Working paper, Boston College.

Arnold, F., M. K. Choe, and T. Roy (1998): "Son Preference, the Family-Building Process and Child Mortality in India," *Population Studies*, 52, 301–315.

Beaman, L., R. Chattopadhyay, E. Duflo, R. Pande, and P. Topalova (2009): "Powerful Women: Does Exposure Reduce Bias?" *Quarterly Journal of Economics*, 124, 1497–1540.

——— (2012): "Female Leadership Raises Aspirations and Educational Attainment for Girls: A Policy Experiment in India," *Science*, 335, 582–586.

Bloch, F. and V. Rao (2002): "Terror as a Bargaining Instrument: A Case Study of Dowry Violence in Rural India," *American Economic Review*, 92, 1029–1043.

Borooah, V. K. and S. Iyer (2005): "Religion, Literacy, and the Female-to-Male Ratio," *Economic and Political Weekly*, 40, pp. 419–427.

Boserup, E. (1970): *Woman's Role in Economic Development*, London: George Allen and Unwin Ltd.

Browning, M., F. Bourguignon, P. A. Chiappori, and V. Lechene (1994): "Income and Outcomes: A Structural Model of Intrahousehold Allocation," *Journal of Political Economy*, 102, 1067–1096.

Burde, D. and L. L. Linden (2013): "Bringing Education to Afghan Girls: A Randomized Controlled Trial of Village-Based Schools," *American Economic Journal: Applied Economics*, 5, 27–40.

Buss, D. M. (1989): "Sex Differences in Human Mate Preferences: Evolutionary Hypotheses Tested in 37 Cultures," *Behavioral and Brain Sciences*, 12, 1–14.

Carranza, E. (forthcoming): "Soil Endowments, Female Labor Force Participation, and the Demographic Deficit of Women in India," *American Economic Journal: Applied Economics*.

Chakraborty, T. and S. Kim (2010): "Kinship Institutions and Sex Ratios in India," *Demography*, 47, 989–1012.

Chattopadhyay, R. and E. Duflo (2004): "Women as Policy Makers: Evidence from a Nationwide Randomized Experiment in India," *Econometrica*, 72, 1409–1443.

Chen, M. (1995): "A Matter of Survival: Women's Right to Employment in India and Bangladeshh," in *Women, Culture and Development*, ed. by M. Nussbaum and J. Glover, Oxford, UK: Clarendon Press.

Chen, Y., H. Li, and M. Lingsheng (2013): "Prenatal Sex Selection and Missing Girls in China: Evidence from the Diffusion of Diagnostic Ultrasound," *Journal of Human Resources*, 48, 36–70.

Clark, S. (2000): "Son Preference and Sex Composition of Children: Evidence from India," *Demography*, 37, 95–108.

Coen-Pirani, D., A. León, and S. Lugauer (2010): "The Effect of Household Appliances on Female Labor Force Participation: Evidence From Microdata," *Labour Economics*, 17, 503–513.

Das Gupta, M., J. Zhenghua, L. Bohua, X. Zhenming, W. Chung, and B. Hwa-Ok (2003): "Why Is Son Preference So Persistent in East and South Asia? A Cross-Country Study of China, India and the Republic of Korea," *Journal of Development Studies*, 40, 153–187.

Deininger, K., A. Goyal, and H. Nagarajan (2013): "Women's Inheritance Rights and Intergenerational Transmission of Resources in India," *Journal of Human Resources*, 48, 114–141.

Devoto, F., E. Duflo, P. Dupas, W. Pariente, and V. Pons (2012): "Happiness on Tap: Piped Water Adoption in Urban Morocco," *American Economic Journal: Economic Policy*, 4, 68–99.

Dhar, D., T. Jain, and S. Jayachandran (2014): "The Intergenerational Transmission of Gender Attitudes: Evidence from India," Mimeo, Northwestern University.

Dinkelman, T. (2011): "The Effects of Rural Electrification on Employment: New Evidence from South Africa," *The American Economic Review*, 101, 3078–3108.

Doepke, M. and M. Tertilt (2009): "Women's Liberation: What's in It for Men?" *Quarterly Journal of Economics*, 124, 1541–1591.

Doepke, M., M. Tertilt, and A. Voena (2012): "The Economics and Politics of Women's Rights," *Annual Review of Economics*, 4.

Duflo, E. (2003): "Grandmothers and Granddaughters: Old Age Pension and Intra-Household Allocation in South Africa," *World Bank Economic Review*, 17.

——— (2012): "Women Empowerment and Economic Development," *Journal of Economic Literature*, 50, 1051–1079.

Dyson, T. and M. Moore (1983): "On Kinship Structure, Female Autonomy, and Demographic Behavior in India," *Population and Development Review*, 9, 35–60.

Ebenstein, A. (2010): "The "Missing Girls" of China and the Unintended Consequences of the One Child Policy," *Journal of Human Resources*, 45, 87–115.

——— (2014): "Patrilocality and Missing Women," Working paper, Hebrew University.

Ebenstein, A. and S. Leung (2010): "Son Preference and Access to Social Insurance: Evidence From China's Rural Pension Program," *Population and Development Review*, 36, 47–70.

Fernández, R. (2007): "Women, Work, and Culture," *Journal of the European Economic Association*, 5, 305–332.

——— (2014): "Women's Rights and Development," *Journal of Economic Growth*, 19, 37–80.

Fernández, R. and A. Fogli (2006): "Fertility: The Role of Culture and Family Experience," *Journal of the European Economic Association*, 4, 552–561.

Fernández, R., A. Fogli, and C. Olivetti (2004): "Mothers and Sons: Preference Formation and Female Labor Force Dynamics," *Quarterly Journal of Economics*, 119, 1249–1299.

Field, E. and A. Ambrus (2008): "Early Marriage, Age of Menarche, and Female Schooling Attainment in Bangladesh," *Journal of Political Economy*, 116, 881–930.

Field, E., S. Jayachandran, and R. Pande (2010): "Do Traditional Institutions Constrain Female Entrepreneurship? A Field Experiment on Business Training in India," *American Economic Review*, 100, 125–129.

Field, E., S. Jayachandran, R. Pande, and N. Rigol (2014): "Friends at Work: Can Peer Support Stimulate Female Entrepreneurship?" Mimeo, Northwestern University.

Foster, A. D. and M. R. Rosenzweig (1996): "Technical Change and Human-Capital Returns and Investments: Evidence from the Green Revolution," *American Economic Review*, 86, 931–53.

Galor, O. and D. N. Weil (1996): "The Gender Gap, Fertility and Growth," *American Economic Review*, 86, 374–87.

Goldin, C. (1986): "The Female Labor Force and American Economic Growth, 1890-1980," in *Long-Term Factors in American Economic Growth*, ed. by S. Engerman and R. Gallman, Chicago: University of Chicago Press.

——— (1995): "The U-Shaped Female Labor Force Function in Economic Development and Economic History," in *Investment in Women's Human Capital and Economic Development*, ed. by T. P. Schultz, University of Chicago Press.

Goldin, C. and L. F. Katz (2002): "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions," *Journal of Political Economy*, 110, 730–770.

Goldin, C., L. F. Katz, and I. Kuziemko (2006): "The Homecoming of American College Women: The Reversal of the College Gender Gap," *Journal of Economic Perspectives*, 133–156.

Goldin, C. D. and L. F. Katz (2009): *The Race Between Education and Technology*, Harvard University Press.

Goldstein, M. and C. Udry (2008): "The Profits of Power: Land Rights and Agricultural Investment in Ghana," *Journal of Political Economy*, 116, 981–1022.

Greenwood, J., A. Seshadri, and M. Yorukoglu (2005): "Engines of Liberation," *Review of Economic Studies*, 72, 109–133.

Jayachandran, S. (2014): "Fertility Decline and Missing Women," Working Paper 20272, National Bureau of Economic Research.

Jayachandran, S. and I. Kuziemko (2011): "Why Do Mothers Breastfeed Girls Less Than Boys?: Evidence and Implications for Child Health in India," *Quarterly Journal of Economics*, 126, 1485–1538.

Jayachandran, S. and A. Lleras-Muney (2009): "Life Expectancy and Human Capital Investments: Evidence from Maternal Mortality Declines," *Quarterly Journal of Economics*, 124, 349–397.

Jensen, R. (2003): "Equal Treatment, Unequal Outcomes? Generating Sex Inequality Through Fertility Behavior," Mimeo, Harvard University.

——— (2012): "Do Labor Market Opportunities Affect Young Women's Work and Family Decisions? Experimental Evidence from India," *Quarterly Journal of Economics*.

Jensen, R. and E. Oster (2009): "The Power of TV: Cable Television and Women's Status in India," *Quarterly Journal of Economics*, 124, 1057–1094.

Kanbur, R. and L. Haddad (1994): "Are Better Off Households More Unequal or Less Unequal?" *Oxford Economic Papers*, 445–458.

Kim, J., H. Alderman, and P. F. Orazem (1999): "Can Private School Subsidies Increase Enrollment for the Poor? The Quetta Urban Fellowship Program," *The World Bank Economic Review*, 13, 443–465.

Kusum (1993): "The Use Of Pre-Natal Diagnostic Techniques for Sex Selection: The Indian Scene," *Bioethics*, 7, 149–165.

La Ferrara, E., A. Chong, and S. Duryea (2012): "Soap Operas and Fertility: Evidence from Brazil," *American Economic Journal: Applied Economics*, 4, 1–31.

Li, L. and X. Wu (2011): "Gender of Children, Bargaining Power, and Intrahousehold Resource Allocation in China," *Journal of Human Resources*, 46, 295–316.

Lin, M.-J., J.-T. Liu, and N. Qian (2014): "More Missing Women, Fewer Dying Girls: The Impact of Abortion on Sex Ratios at Birth and Excess Female Mortality in Taiwan," *Journal of European Economic Association*, 12.

Luke, N. and K. Munshi (2011): "Women as Agents of Change: Female Income and Mobility in India," *Journal of Development Economics*, 94, 1–17.

Mammen, K. and C. Paxson (2000): "Women's Work and Economic Development," *Journal of Economic Perspectives*, 14, 141–164.

Mandelbaum, D. G. (1970): *Society in India, Volumes 1 and 2*, Berkeley, CA: University of California Press.

Meeks, R. (2014): "Water Works: The Economic Impact of Water Infrastructure," Mimeo, University of Michigan.

Milazzo, A. (2014): "Why Are Adult Women Missing? Son Preference and Maternal Survival in India," World Bank Policy Research Working Paper 6802, World Bank.

Miller, G. (2010): "Contraception as Development? New Evidence from Family Planning in Colombia," *The Economic Journal*, 120, 709–736.

Muralidharan, K. and N. Prakash (2013): "Cycling to School: Increasing Secondary School Enrollment for Girls in India," Working Paper 19305, National Bureau of Economic Research.

Muralidharan, K. and K. Sheth (2013): "Bridging Education Gender Gaps in Developing Countries: The Role of Female Teachers," Working Paper 19341, National Bureau of Economic Research.

Oster, E. (2009): "Does Increased Access Increase Equality? Gender and Child Health Investments in India," *Journal of Development Economics*, 89, 62–76.

Pitt, M. M., M. R. Rosenzweig, and M. N. Hassan (2012): "Human Capital Investment and the Gender Division of Labor in a Brawn-Based Economy," *American Economic Review*, 102, 3531–3560.

Preston, S. H. (1976): *Mortality Patterns in National Populations*, New York: Academic Press.

Qian, N. (2008): "Missing Women and the Price of Tea in China: The Effect of Sex-Specific Earnings on Sex Imbalance," *Quarterly Journal of Economics*, 123.

Ramakrishnan, S., R. Khera, S. Jain, A. Saxena, S. Kailash, G. Karthikeyan, S. S. Kothari, R. Juneja, B. Bhargava, M. Kalaivani, M. Mehta, V. K. Bahl, and B. Airan (2011): "Gender Differences in the Utilisation of Surgery for Congenital Heart Disease in India," *Heart*, 97, 1920–1925.

Ramey, V. A. (2009): "Time Spent in Home Production in the Twentieth-Century United States: New Estimates from Old Data," *Journal of Economic History*, 69, 1–47.

Rose, E. (1999): "Consumption Smoothing and Excess Female Mortality in Rural India," *Review of Economics and Statistics*, 81, 41–49.

Roy, S. (2013): "Empowering Women: Inheritance Rights and Female Education in India," Mimeo, Warwick University.

Schultz, T. P. (2004): "School Subsidies for the Poor: Evaluating the Mexican Progresa Poverty Program," *Journal of Development Economics*, 74, 199 – 250, new Research on Education in Developing Economies.

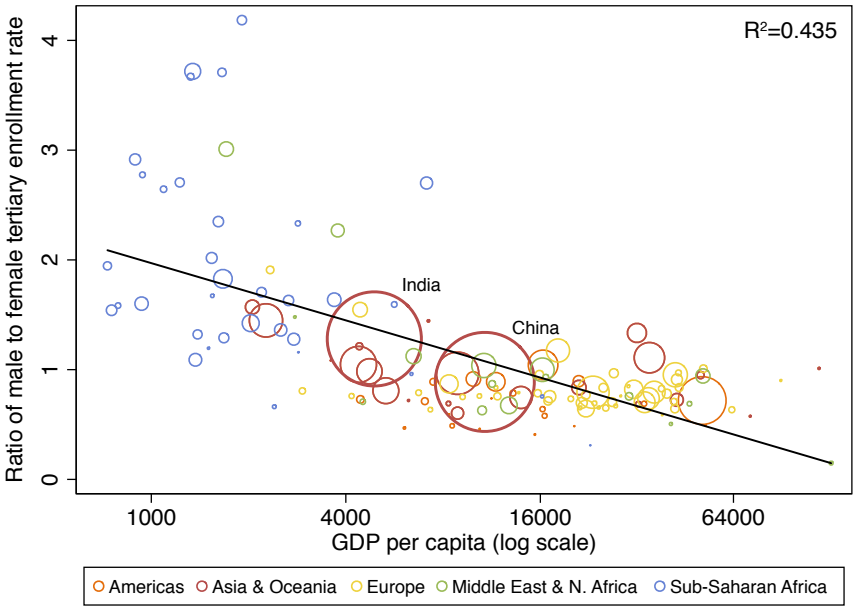
Sen, A. (1990): "More Than 100 Million Women Are Missing," *New York Review of Books*, 37.

Thomas, D. (1990): "Intra-household Resource Allocation: An Inferential Approach," *Journal of Human Resources*, 25, 635–664.

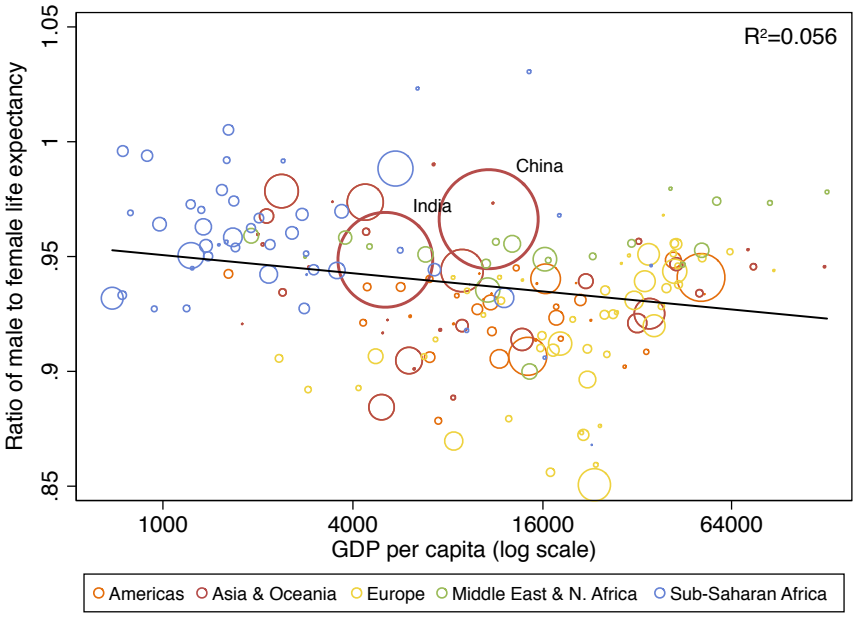
World Health Organization (2014): "Maternal Mortality. Fact Sheet No. 348," http://www.who.int/mediacentre/factsheets/fs348/en/.

Yamaguchi, K. (1989): "A Formal Theory for Male-Preferring Stopping Rules of Childbearing: Sex Differences in Birth Order and in the Number of Siblings," *Demography*, 26, 451–465.

Figure 1: Gender gaps in education and life expectancy



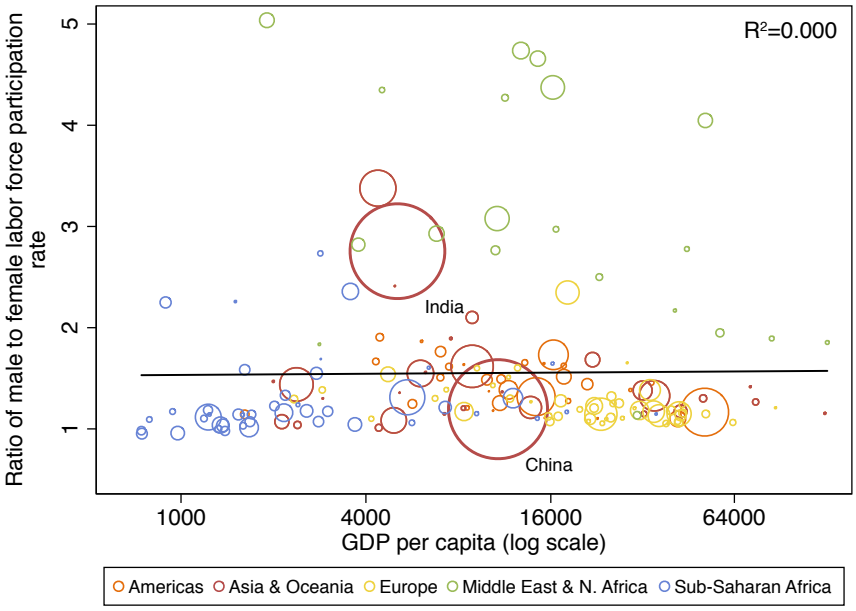
(a) College enrollment rate (M/F ratio)



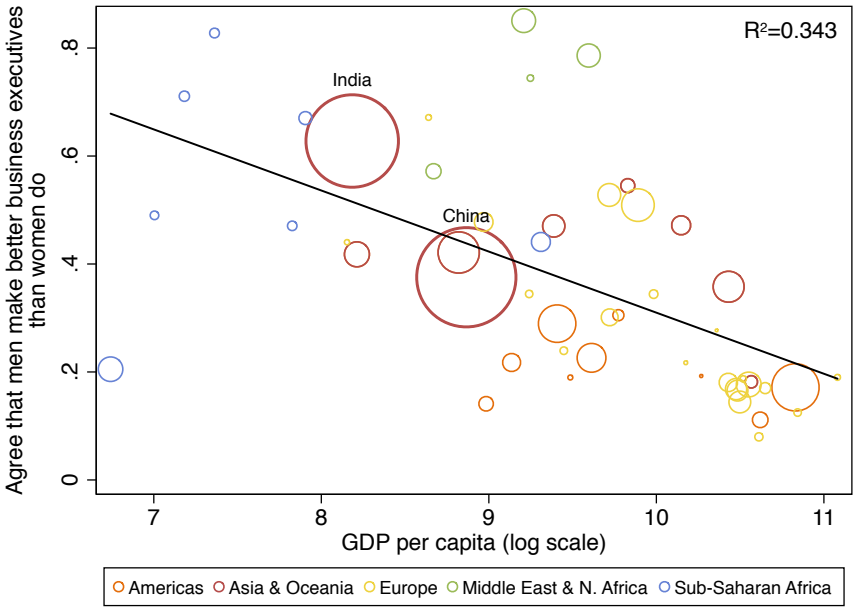
(b) Life expectancy (M/F ratio)

Notes: GDP per capita is the PPP-adjusted value in the year the outcome (vertical-axis variable) is measured, expressed in 2011 U.S. dollars; the data source is the World Bank's World Development Indicators (WDI). Outcome data are from WDI. In this and subsequent figures, the circle size for each country is proportional to its population (from WDI) in the year the outcome is measured, and the line shown is the best (unweighted) linear fit.

Figure 2: Gender gaps in labor market outcomes



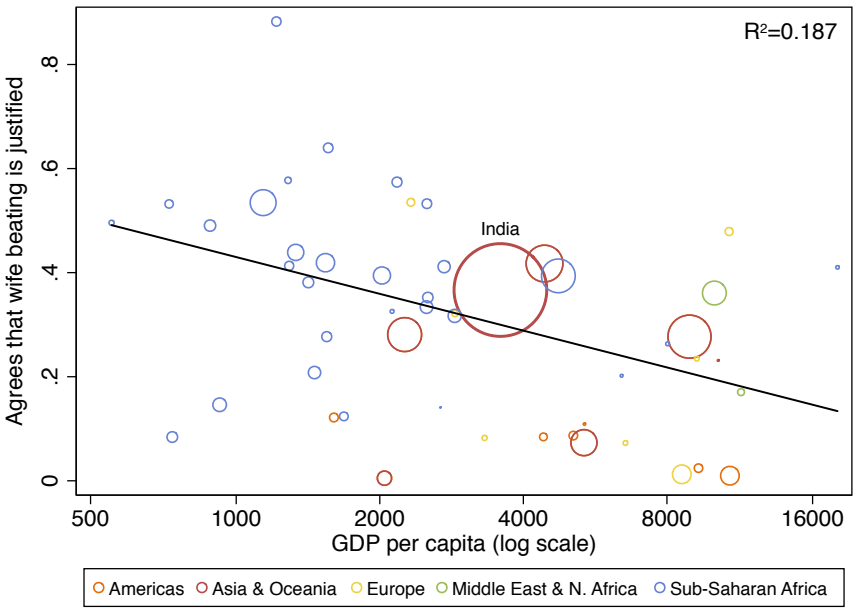
(a) Labor force participation rate (M/F ratio)



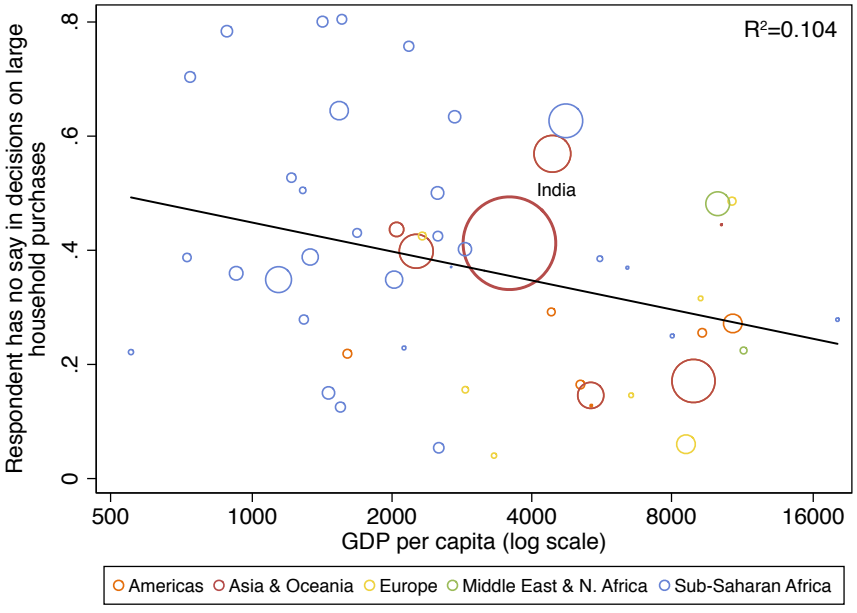
(b) Agree: Men make better business executives than women

Notes: GDP per capita is the PPP-adjusted value (from WDI) in the year the outcome is measured, expressed in 2011 U.S. dollars. Outcome data are from (a) WDI and (b) World Values Survey (WVS), wave 5.

Figure 3: Attitudes toward gender-based violence and female decision-making power



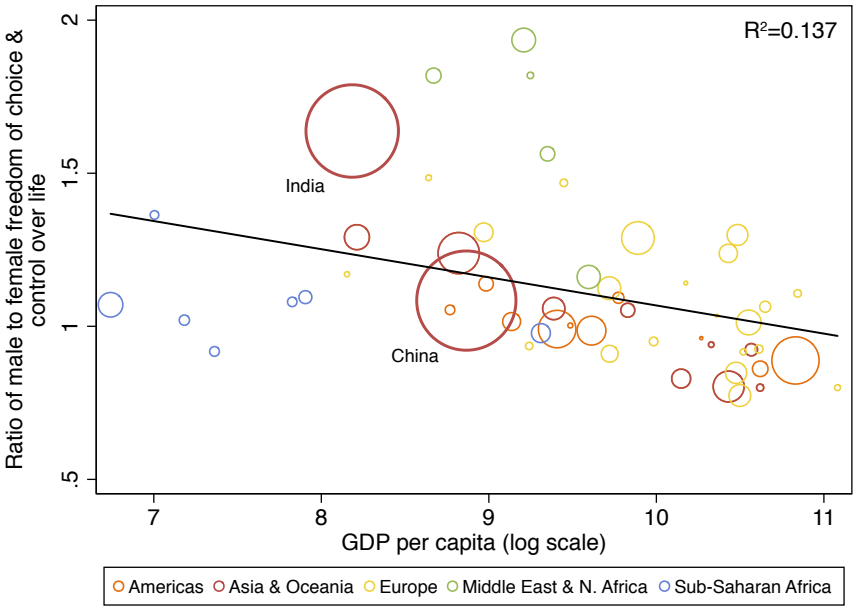
(a) Agree: Wife beating is justified



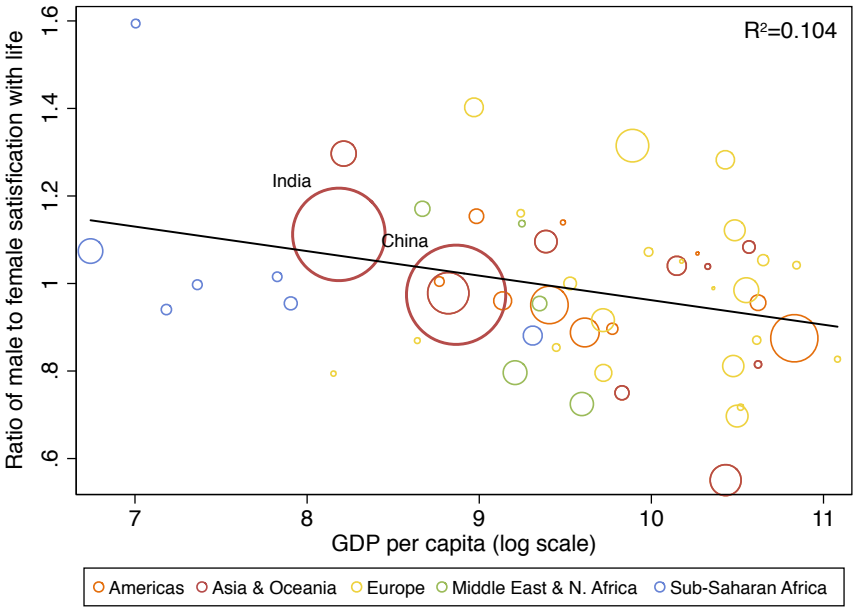
(b) Woman does not have say in large household purchases

Notes: GDP per capita is the PPP-adjusted value (from WDI) in the year the outcome is measured, expressed in 2011 U.S. dollars. Outcome data are from Demographic and Health Surveys (DHS).

Figure 4: Gender gaps in control over one's life and life satisfaction



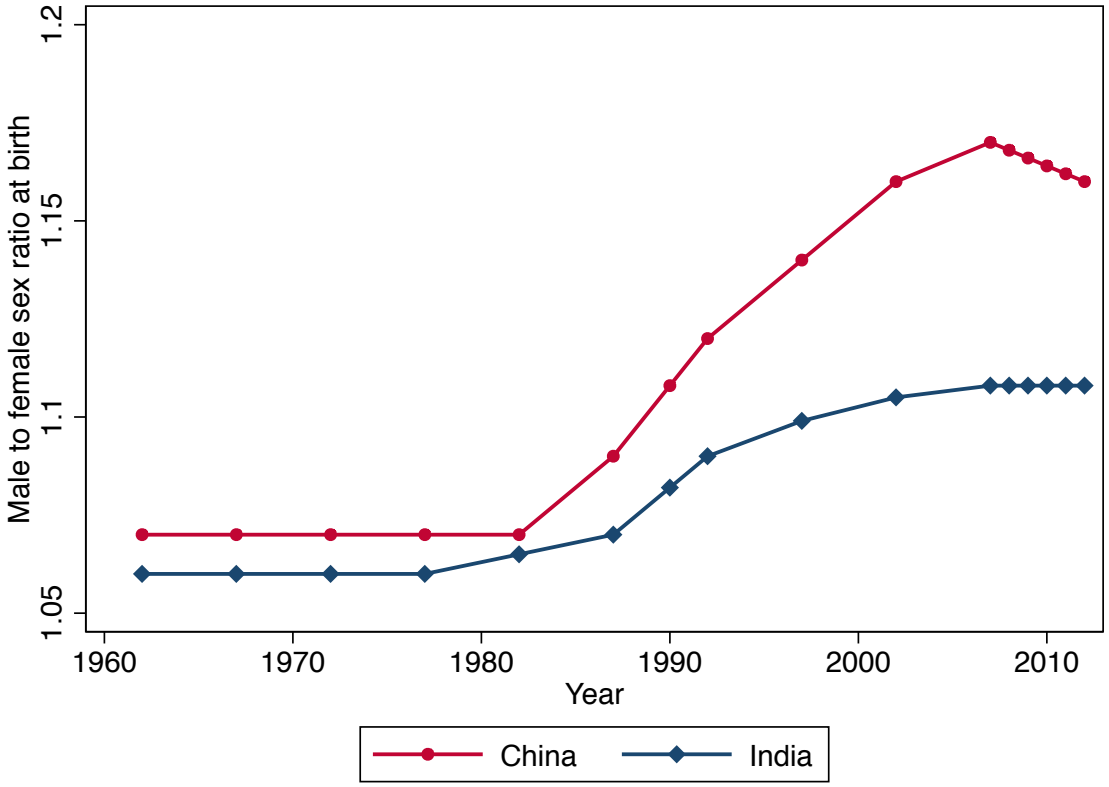
(a) Freedom of choice and control over one's life (M/F ratio)



(b) Life satisfaction (M/F ratio)

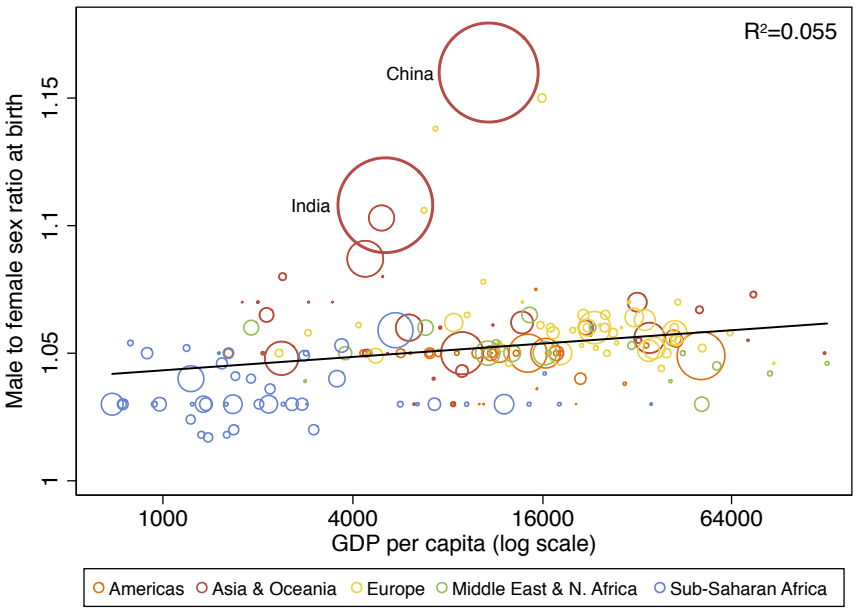
Notes: GDP per capita is the PPP-adjusted value (from WDI) in the year the outcome is measured, expressed in 2011 U.S. dollars. Outcome data are from WVS, wave 5. The outcome is the male-female ratio in proportion of respondents who give an answer of 9 or 10 on a scale of 1 to 10, where a higher number indicates (a) more freedom and (b) more satisfaction.

Figure 5: Sex ratio at birth in China and India, 1962 to 2012

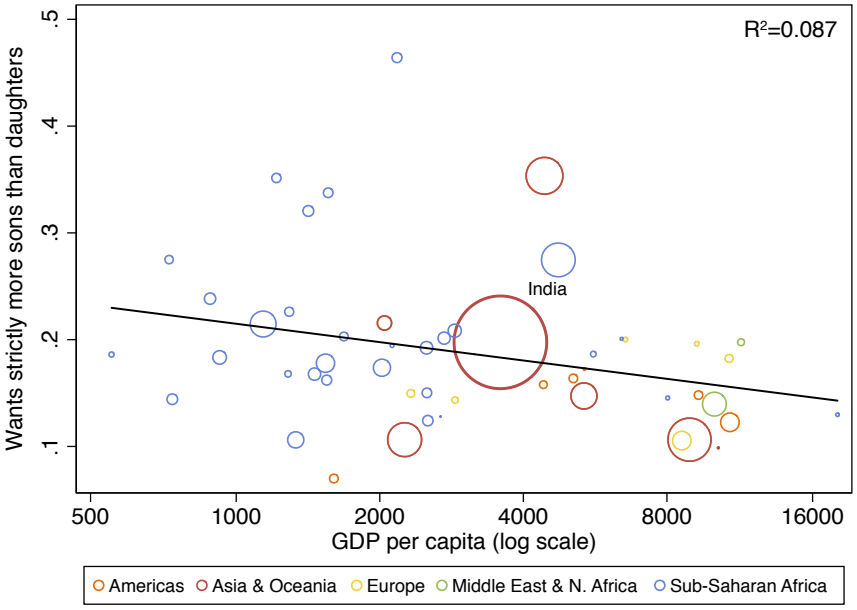


Notes: Data source is WDI.

Figure 6: Sex ratio at birth and desire for sons



(a) Male-female sex ratio at birth



(b) Desire for more sons than daughters

Notes: GDP per capita is the PPP-adjusted value (from WDI) in the year the outcome is measured, expressed in 2011 U.S. dollars. Outcome data are from (a) WDI and (b) DHS.

Appendix

Main data sources

Three main cross-country data sources are used: the Demographic and Health Surveys (DHS), the World Values Survey (WVS), and the World Bank's World Development Indicators (WDI). The DHS data are the most recent standard DHS (Phase V or VI) for the 54 countries surveyed between 2005 and 2012; 80% of the countries have data from 2008 or later. The DHS is only carried out in developing countries or countries receiving US foreign aid. There is no DHS for China. In Wave 5 of the WVS, 57 countries were surveyed from 2005 to 2009. WDI compiles data from various sources such as the United Nations, World Health Organization, U.S. Census Bureau, and individual census reports. The database provides population and GDP per capita data in addition to other country-level development, gender, and health indicators for 214 countries. Of these countries, recent GDP data is missing for 24, which are thus excluded from the analysis. The final WDI sample comprises 190 countries.

Geographic categorization

Appendix Tables 2 and 3 list the country data sets used from each data source, organized by five geographic regions: the Americas, Asia & Oceania, Europe, Middle East & North Africa, and Sub-Saharan Africa. Regional categories are based on the World Health Organization's six regions, with minor modifications. Specifically, the WHO Western Pacific countries are combined with its South-East Asia countries to create a larger Asia & Oceania region, where Pakistan is included. Algeria is categorized under the Middle East & North Africa region, which is renamed from "Eastern Mediterranean," while Sudan is categorized as Sub-Saharan Africa. Bermuda and Puerto Rico are added into the Americas and Kosovo into Europe.

GDP and population data

Population and GDP data are from WDI. WDI reports midyear estimates of total population, which includes all current residents of the country regardless of legal status, with the exception of non-permanent refugees. Log GDP is calculated using PPP-adjusted GDP per capita in constant 2011 US dollars. For the analysis using DHS and WVS data, GDP and population data are survey-year specific. Several surveys extended over two consecutive years in which case GDP and population are averaged for the two years. For WDI outcomes, the most recent available data between 2009-2013 are used and matched to GDP and population for that year. Countries missing GDP data for the relevant year are excluded from the sample.

Variable definition: DHS

DHS data are from the Birth Recode, Individual (women's) Recode, and Household Recode data sets. Variables are coded so that higher values indicate greater inequality or discrimination against women.

Gender-based violence Women answered yes or no in agreement or disagreement to five scenarios that justified a husband beating his wife. Of these five scenarios, two are used to construct the gender-based violence variable: (1) "Wife beating is justified if she goes out without telling him"; and (2) "Wife beating is justified if she argues with him." Of women who responded to both questions, those who answered "Yes" to either question are considered to agree that wife beating is justified and are coded as 1. Women who answered "No" or "Dont know" to both questions are coded as 0. Data from the men's sample for India is also used for this outcome.

Desire for sons Women were asked about the ideal number of children they would like to have, and then asked to specify the number of boys, girls, or either sex they would ideally like within this number. A small number of women who provided inconsistent answers between the specific genders and the total number of children are excluded from the analysis. If the ideal number of boys is strictly greater than the ideal number of girls, then the respondent is coded as wanting more sons than daughters. Data from the men's sample for India is also used for this outcome.

Decision-making power The DHS surveys asked women about who in their household has the final say on a variety of decisions. As this question is only asked to married women in most countries, the sample is restricted to women who are currently married. For "the final say on making large household purchases," women who answered "respondent alone," "respondent and husband/partner" or "respondent and other person" are considered as having a say in decisions on large household purchases and are coded as a 0. Those who responded with "husband/partner alone," "someone else" or "other" to this question are considered as having no say and are coded as 1. Responses to "the final say on visits to family or relatives" are coded in the same way.

Sex ratio of last births The DHS asked all mothers the birth order of all their living and deceased children. The sex ratio of last births (SRLB) is the ratio of the number of boys to girls among mothers' youngest living child age 10 or older, excluding twins and other multiple births. This statistic is calculated for the 1992-3 Indian DHS (NFHS-1) and the most recent Indian 2005-6 DHS (NFHS-3).

Wealth index The DHS constructs a country and survey-year specific wealth index based on household assets, access to water, sanitation facilities, and other dwelling characteristics.

Variable definition: WVS

All ratios are calculated as the average male response divided by the average female response by country, and all other outcomes are averaged by country. A higher value indicates greater inequality or discrimination against women.

Business executives This variable is an indicator for agreement with the statement, "On the whole, men make better business executives than women do." Responses that are "Strongly agree" or "Agree" are coded as 1, while "Disagree" and "Strongly disagree" are coded as 0.

University education Respondents were asked how strongly they agreed or disagreed with the statement, "A university education is more important for a boy than for a girl." Responses of "Strongly agree or "Agree" are coded as 1, while "Disagree" and "Strongly disagree" are coded as 0.

Freedom of choice Respondents were asked to indicate "how much freedom of choice and control you feel you have over the way your life turns out" on a scale of 0 to 10, with 0 representing "no choice at all" and 10 meaning "a great deal of choice." A response of 9 or 10 is coded as 1, or as having freedom of choice, while anything lower is coded as 0.

Life satisfaction Respondents were asked to use a scale of 1 to 10, with 1 representing "completely dissatisfied" and 10 representing "completely satisfied" to answer the question, "All things considered, how satisfied are you with your life as a whole these days?" A 9 or a 10 is coded as 1 and indicates satisfaction with life, while any response below 9 is coded as 0. For this question, the 52 surveys completed in Wave 6 of the WVS (2010 to 2014) are also used.

Happiness This variable is constructed based on the question, "Taking all things together, would you say you are: (1) Very happy (2) Rather happy (3) Not very happy (4) Not at all happy?" Participants who responded "Very happy" or "Rather happy" are coded as 1, while "Not

very happy" and "Not at all happy" are coded as 0.

Variable definitions: WDI

When available, the most recent (2013) data for each country is used. If data from 2013 are missing, 2012 data is used, and so on, until 2009. Several countries nonetheless have missing data for certain indicators. The number of available countries for each indicator is specified below.

School enrollment rate Data on primary, secondary, and tertiary school enrollment rates include public and private schools and are from UNESCO Institute for Statistics. Out of the 190 countries in the sample, 164 have data available for primary enrollment; 156 for secondary enrollment; and 141 for tertiary enrollment. The reported variable is the proportion of relevant-age boys enrolled in school divided by the proportion of relevant-age girls enrolled.

Life expectancy WDI defines life expectancy at birth as "the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life." The statistics have been compiled from multiple sources including the UN Population Division, the U.S. Census Bureau and census reports. Life expectancy for females and males is used to create the life expectancy ratio for each country. Seven countries in the sample are missing data for life expectancy.

Labor force participation The underlying data source is the International Labor Organization (ILO), which compiles the data from population censuses and labor force surveys. ILO defines the labor force as people ages 15 or older who are "economically active" and excludes "persons occupied solely in domestic duties in their own households exclusively." An important limitation of the labor force participation data is that "the extent to which family workers, particularly women, who assist in family enterprises are included among the enumerated economically active population varies considerably from one country to another." The variable used in the analysis is the labor force participation rate of males divided by the labor force participation rate of females. Fifteen countries are missing this variable.

Sex ratio The male to female sex ratio at birth is from the UN Population Division and is calculated as the ratio of the number of male births to female births. Nine countries are missing data on the sex ratio at birth.

Percent of GDP from services Services as a percent of GDP is from the World Bank and the OECD. "Services" as defined by divisions 50-99 of the International Standard Industrial Classification (ISIC) includes "value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services." Twenty countries do not have services data available.

U.S. Census

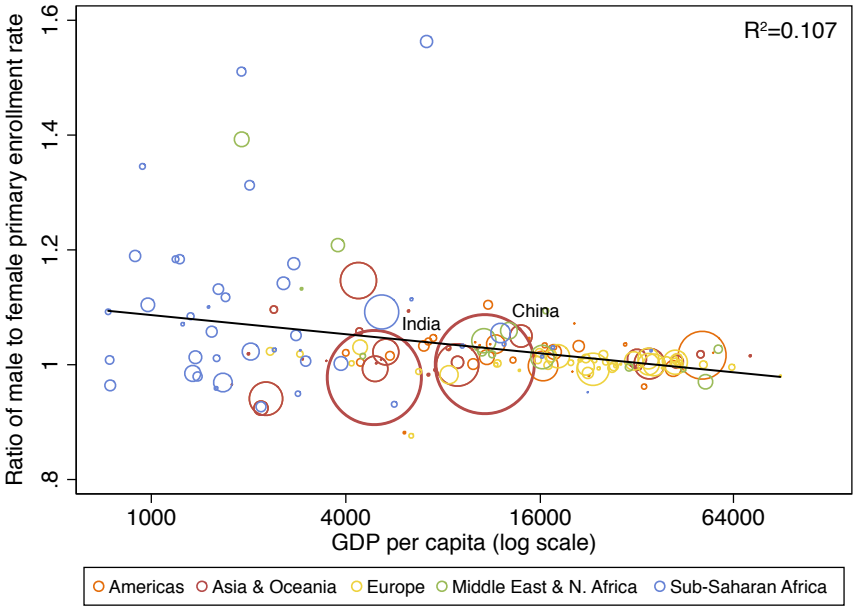
The sex ratio of last births is calculated using the public-use 1% sample for the 1860 U.S. Census of Population and 5% sample for the 1900 U.S. Census of Population, available from IPUMS. The sample is restricted to women whose youngest child is age 10 to 15. The restriction to age 10 or older is to increase the likelihood that the woman has completed her fertility and for consistency with the Indian DHS analysis which is restricted to cohorts born before prenatal sex-diagnostic tests were widely available. The restriction to age 15 or younger is because older children who are no longer in the household cannot be matched to their mother. The sample is also restricted to women age 49 and younger to match the sample inclusion criteria that the DHS uses. The sex ratio of last births is the ratio of boys to girls among the last-born surviving children, excluding stepchildren and multiple births.

Other data sources

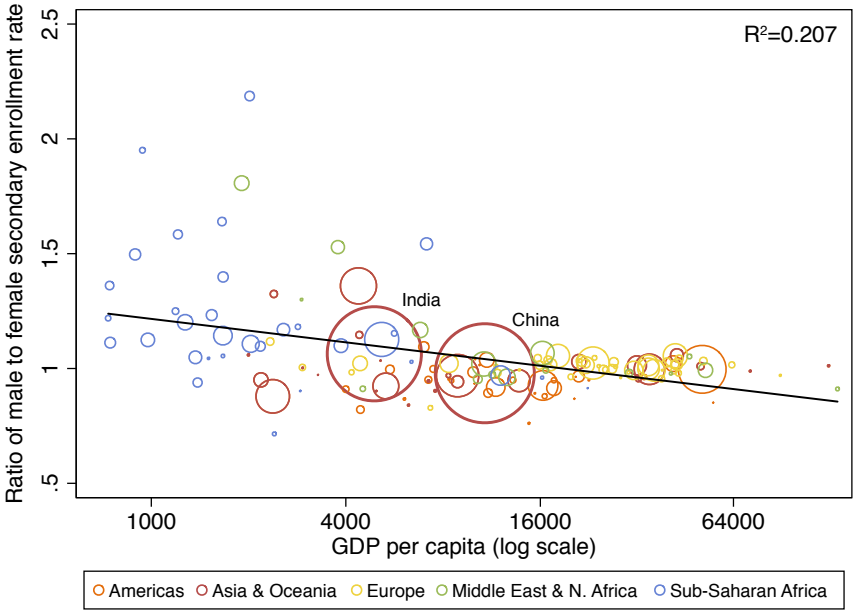
Home production Data on home production for men and women age 15 to 64 come from the OECD Time Use Survey Database, which compiles data from national time use surveys. The sample includes 29 countries, with a focus on OECD member countries. China, India, and South Africa are included by the OECD for comparison. The surveys were conducted between 1999 and 2011, with the majority from 2005 onwards. The measure of home production used is the "unpaid work" category and includes hours spent per day on routine housework, shopping, care for household members (including child care and adult care), and travel related to household activities. Following Ramey's (2009) definition of home production, care for non-household members and volunteer work are excluded.

Men's preference for spouse's chastity at marriage Buss (1989) asked respondents to rate how important or desirable 18 characteristics were in terms of choosing a mate. The four-point scale ran from 3 ("indispensable") to 0 ("irrelevant or unimportant"). Two of the characteristics were "Physically attractive" and "Chastity: no previous experience in sexual intercourse."

Appendix Figure 1: Gender gaps in primary and secondary school enrollment



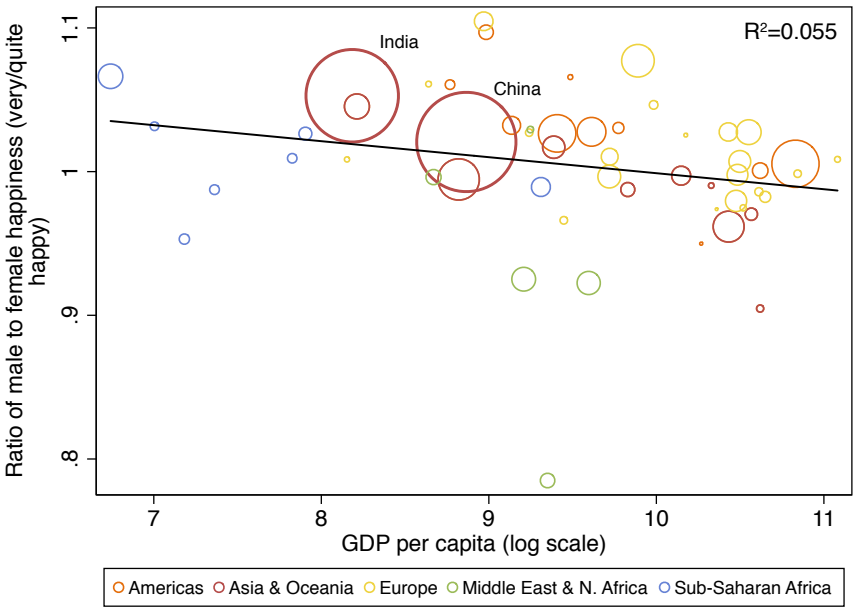
(a) Primary education enrollment (M/F ratio)



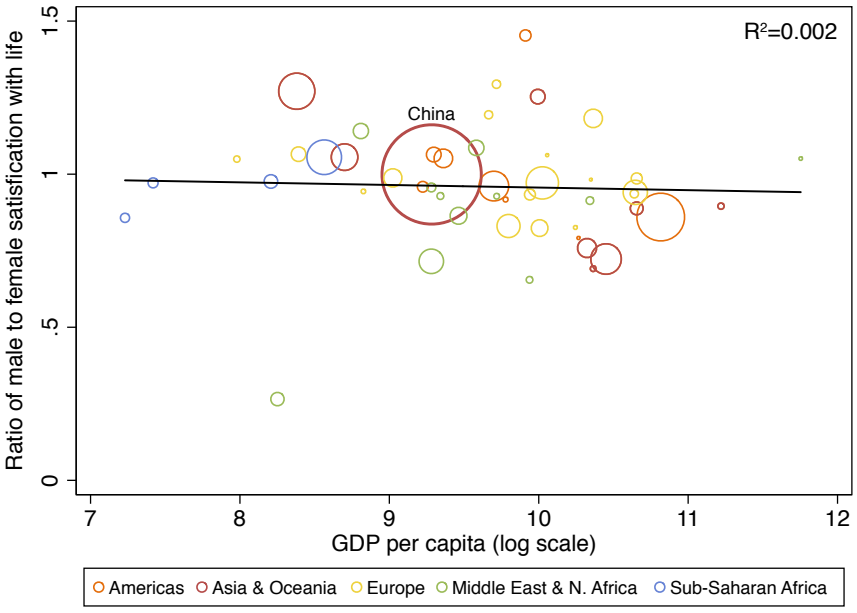
(b) Secondary education enrollment (M/F ratio)

Notes: GDP per capita is the PPP-adjusted value (from WDI) in the year the outcome is measured, expressed in 2011 U.S. dollars. Outcome data are from WDI.

Appendix Figure 2: Gender gaps in happiness and (Wave 6) life satisfaction



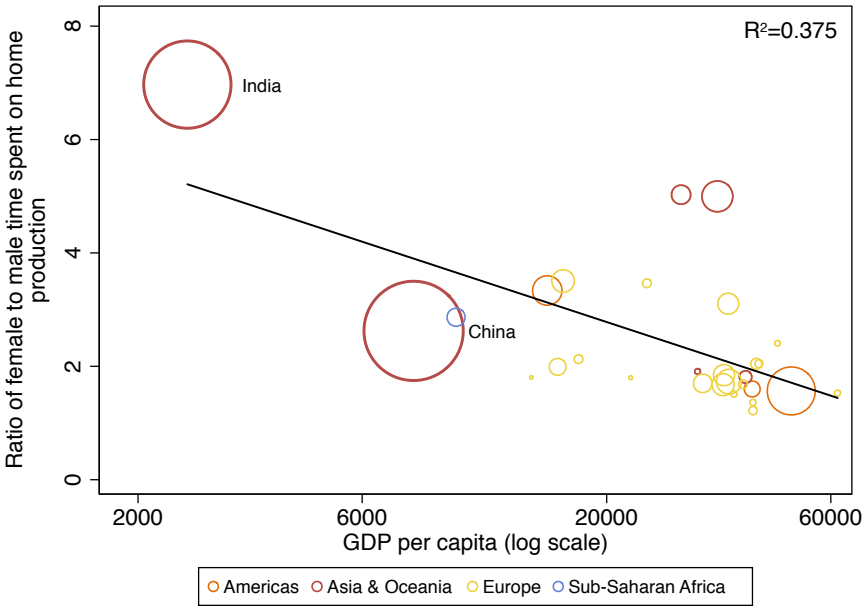
(a) Self-reported happiness (M/F ratio)



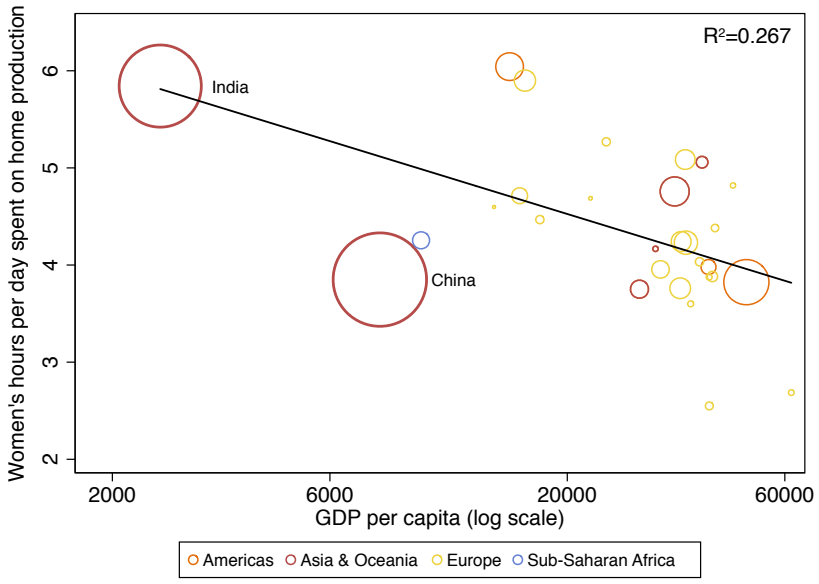
(b) Life satisfaction (M/F ratio), Wave 6 sample

Notes: GDP per capita is the PPP-adjusted value (from WDI) in the year the outcome is measured, expressed in 2011 U.S. dollars. Outcome data are from (a) WVS, wave 5 and (b) WVS, wave 6.

Appendix Figure 3: Time spent on home production



(a) Time spent on home production (Female-male ratio)



(b) Women's time spent on home production

Notes: GDP per capita is the PPP-adjusted value (from WDI) in the year the outcome is measured, expressed in 2011 U.S. dollars. Outcome data are from the OECD Time Use Survey Database.

Appendix Table 1: Within-country comparisons of DHS gender outcomes

	Below median wealth index	Above median wealth index	Below=Above p-value
Agrees that wife beating is justified	0.393 [0.229]	0.292 [0.212]	0.020
Has no say in decisions on large household purchases	0.401 [0.206]	0.335 [0.196]	0.092
Has no say in decisions on visiting family or relatives	0.312 [0.184]	0.250 [0.169]	0.070

Notes. The sample comprises women in 54 DHS surveys. Households are classified according to whether they are above or below a sample-specific (i.e., country-specific) household wealth index. The wealth index is constructed by the DHS using principal component analysis of several asset ownership and dwelling characteristic variables. The first two columns report the mean response with the standard deviation in brackets for the two subsamples. The p-value for the equality of means is reported in the third column.

Appendix Table 2: DHS and WVS samples

DHS Sample				WVS Wave 5 Sample (2004-09)	
Americas		**Sub-Saharan Africa**		**Americas**	Great Britain
Bolivia	2008	Burkina Faso	2010	Brazil	Hungary
Colombia	2010	Benin	2011-12	Canada	Italy
Dominican Republic	2007	Burundi	2010	Chile	Moldova
Guyana	2009	Cameroon	2011	Colombia	Netherlands
Haiti	2012	Congo, Dem. Rep.	2007	Guatemala	Norway
Honduras	2011-12	Congo, Rep.	2011-12	Mexico	Poland
		Cote dIvoire	2011-12	Peru	Romania
Asia & Oceania		Ethiopia	2011	Trinidad & Tobago	Russia
Bangladesh	2011	Gabon	2012	United States	Serbia
Cambodia	2010	Ghana	2008	Uruguay	Slovenia
India	2005-06	Guinea	2012		Spain
Indonesia	2012	Kenya	2008-09	**Asia & Oceania**	Sweden
Maldives	2009	Lesotho	2009	Australia	Switzerland
Nepal	2011	Liberia	2007	China	Turkey
Pakistan	2012-13	Madagascar	2008-09	Hong Kong	Ukraine
Philippines	2008	Malawi	2010	India	
		Mali	2006	Indonesia	**Middle East & N. Africa**
Europe		Mozambique	2011	Japan	Egypt
Albania	2008-09	Namibia	2006-07	South Korea	Ethiopia
Armenia	2010	Niger	2012	Malaysia	Ghana
Azerbaijan	2006	Nigeria	2008	New Zealand	Iran
Kyrgyz Republic	2012	Rwanda	2010	Viet Nam	Iraq
Moldova	2005	Sao Tome & Principe	2008-09	Thailand	Jordan
Tajikistan	2012	Senegal	2010-11		Morocco
Ukraine	2007	Sierra Leone	2008	**Europe**	
		Swaziland	2006-07	Bulgaria	**Sub-Saharan Africa**
Middle East & N. Africa		Tanzania	2010	Cyprus	Burkina Faso
Egypt	2008	Timor-Leste	2009-10	Finland	Mali
Jordan	2012	Uganda	2011	France	Rwanda
		Zambia	2007	Georgia	South Africa
		Zimbabwe	2010-11	Germany	Zambia

Appendix Table 3: WDI sample

Americas	Japan	Kazakhstan	**Sub-Saharan Africa**
Aruba	Kiribati	Kosovo	Angola
Antigua and Barbuda	Korea, Rep.	Kyrgyzstan	Benin
Bahamas	Laos	Latvia	Botswana
Barbados	Macao (China)	Lithuania	Burkina Faso
Belize	Malaysia	Luxembourg	Burundi
Bermuda	Maldives	Macedonia	Cameroon
Bolivia	Marshall Islands	Malta	Cabo Verde
Brazil	Micronesia, Fed. Sts.	Moldova	Central African Rep.
Canada	Mongolia	Montenegro	Chad
Chile	Nepal	Netherlands	Comoros
Colombia	New Zealand	Norway	Congo, Dem. Rep.
Costa Rica	Pakistan	Poland	Congo, Rep
Cuba	Palau	Portugal	Cote d'Ivoire
Dominica	Papua New Guinea	Romania	Equatorial Guinea
Dominican Republic	Philippines	Russian Federation	Eritrea
Ecuador	Samoa	Serbia	Ethiopia
El Salvador	Singapore	Slovakia	Gabon
Grenada	Solomon Islands	Slovenia	Gambia
Guatemala	Sri Lanka	Spain	Ghana
Guyana	Thailand	Sweden	Guinea
Haiti	Timor-Leste	Switzerland	Guine-Bissau
Honduras	Tonga	Tajikistan	Kenya
Jamaica	Tuvalu	Turkey	Lesotho
Mexico	Vanuatu	Turkmenistan	Liberia
Nicaragua	Viet Nam	Ukraine	Madagascar
Panama		United Kingdom	Malawi
Paraguay	**Europe**	Uzbekistan	Mali
Peru	Albania		Mauritania
Puerto Rico	Armenia	**Middle East & N. Africa**	Mauritius
St. Kitts & Nevis	Austria	Afghanistan	Mozambique
St. Lucia	Azerbaijan	Algeria	Namibia
St. Vincent and the Grenadines	Belarus	Bahrain	Niger
Suriname	Belgium	Djibouti	Nigeria
Trinidad & Tobago	Bosnia & Herzegovina	Egypt	Rwanda
United States	Bulgaria	Iran	Sao Tome & Principe
Uruguay	Croatia	Iraq	Senegal
Venezuela	Cyprus	Israel	Seychelles
	Czech Republic	Jordan	Sierra Leone
Asia & Oceania	Denmark	Kuwait	South Africa
Australia	Estonia	Lebanon	South Sudan
Bangladesh	Finland	Libya	Sudan
Bhutan	France	Morocco	Swaziland
Brunei Darussalam	Georgia	Oman	Tanzania
Cambodia	Germany	Qatar	Togo
China	Greece	Saudi Arabia	Uganda
Fiji	Hungary	Tunisia	Zambia
Hong Kong, China	Iceland	United Arab Emirates	Zimbabwe
India	Ireland	West Bank and Gaza	
Indonesia	Italy	Yemen	