



**International Journal of Advanced Research in Arts,
Science, Engineering & Management (IJARASEM)**

Volume 11, Issue 4, July - August 2024



**INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA**

IMPACT FACTOR: 7.583



Gender Inequality and its Impact on Economic Growth

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ABSTRACT: The role of women in economic development has been a popular topic in academic and policy debates. The last half century has witnessed a drastic increase in labor participation of women in most developed and developing countries. However, there is still significant underutilization and misallocation of women's skills and talents. In many developing countries, inequality in access to quality education between girls and boys adversely impacts girls' ability to build human and social capital, lowering their job opportunities and wage in labor markets.

KEYWORDS: gender, inequality, economy, women, education, human, capital

I. INTRODUCTION

We know that in countries with greater gender inequality just closing the gap in women's labor force participation could increase economic output by an average of 35 percent. Progress, however, is slow to come and shocks, such as health and climate disasters, social unrest, and war continue to worsen gender inequality by directly affecting women's lives and livelihoods or keeping them out of school and work.

Appropriate economic and financial policies can help change these negative outcomes, improving economies by supporting the recovery and building resilience against future shocks. A dividend for women, in other words, is a dividend for all. For instance, while the pandemic set women further back everywhere, it also drove policy innovations. Several extraordinary pandemic assistance programs targeted women and brought more people into social safety nets. The latter makes it easier to provide targeted assistance to cope with the current food and fuel price spikes.[1,2,3]

For policymakers, there are well-proven solutions to adopt gender-sensitive macroeconomic actions.

First, step up investment in women's human capital. The gains from providing women equal access to food, healthcare, and education are especially large in emerging and developing economies. Think of cash transfers that help families afford the basics in countries with less developed social safety nets.

Brazil introduced the Emergency Aid cash transfer program early in the pandemic, which provided double the benefits to women-led households. IMF staff estimates show that the poverty rate among such households would have increased from 11 percent to more than 30 percent without Emergency Aid; instead, it fell to about 8 percent. And Egypt recently expanded cash assistance to low-income single mothers helping them keep their children healthy and in school. In Togo, mobile technology helped expedite emergency financial support during the pandemic, especially benefitting women.

The second confirmed solution is enabling women to work outside the home or start their businesses . Reforms to taxation, public spending, financial infrastructure and regulations, as well as labor markets can help . Providing access to quality and affordable childcare frees up more women to work and also creates jobs directly.

In Norway, the expansion of universal childcare increased the likelihood of mothers' employment by 32 percentage points. In emerging and developing economies, access to mobile phones and the internet opens the door to economic opportunity. For instance, IMF research shows that traditional and digital finance is helping close the gender gap in access to financial services, including microlending—resulting in lower income inequality and higher growth.

A third area to tackle is biases . Out of 190 countries surveyed, the World Bank found that women were on equal legal standing with men in just 12 countries. Gender-based discrimination in social institutions costs the world economy \$6 trillion according to the Organisation for Economic Co-operation and Development. But in recent years, countries have reduced these costs through social and legal actions such as curbing underage marriage, criminalizing domestic violence, and increasing the number of female elected officials.

Fourth, increasing the representation of women in leadership positions is also critical . IMF analysis shows that a greater presence of women in financial institutions and financial policymaking goes hand in hand with greater financial



resilience. And in fintech firms and the corporate sector, more women in leadership is associated with better performance and profitability, respectively.

The IMF's Gender Strategy

The IMF has supported members in deploying and improving gender policies for a number of years. And recently, our Executive Board approved the first comprehensive IMF Strategy for Mainstreaming Gender to help our members adapt pro-gender equality policies to their unique circumstances.

The strategy recognizes that macroeconomic and financial policies affect women and men differently, often unintentionally. We are helping policymakers identify and remedy these biases by applying a gender lens to our main activities—from our regular country policy surveillance to how we design and implement programs to our capacity development support.

We have supported increased spending on women in our program countries. For example, Egypt expanded pre-school availability and improved the safety of public transport under an IMF-supported program, helping women get to jobs. And São Tomé and Príncipe, with the support of an IMF program, launched an initiative on gender budgeting—the use of fiscal policies and institutions to promote women's equality across government programs. We also quantified the productivity benefits of getting more girls into high school in Senegal and other countries.

Under the new strategy, the Fund will work in the years ahead with our 190 members and external partners to expand both the breadth of our policy recommendations and bring greater rigor in our analysis to help more countries tailor and deploy policies that support gender equality.

Over time, gender-sensitive macroeconomic and financial policies will result in higher growth, greater economic stability and resilience, and lower income inequality—a dividend not just for women, but for everyone.[4,5,6]

II. DISCUSSION

The gender pay gap (or the gender wage gap) is a metric that tells us the difference in pay (or wages, or income) between women and men. It's a measure of inequality and captures a concept that is broader than the concept of equal pay for equal work.

Differences in pay between men and women capture differences along many possible dimensions, including worker education, experience, and occupation. When the gender pay gap is calculated by comparing all male workers to all female workers – irrespective of differences along these additional dimensions – the result is the 'raw' or 'unadjusted' pay gap. On the contrary, when the gap is calculated after accounting for underlying differences in education, experience, etc., then the result is the 'adjusted' pay gap.

Discrimination in hiring practices can exist in the absence of pay gaps – for example, if women know they will be treated unfairly and hence choose not to participate in the labor market. Similarly, it is possible to observe large pay gaps in the absence of discrimination in hiring practices – for example, if women get fair treatment but apply for lower-paid jobs.

The implication is that observing differences in pay between men and women is neither necessary nor sufficient to prove discrimination in the workplace. Both discrimination and inequality are important. But they are not the same.

The fact that middle-income countries have low gender wage gaps is, to a large extent, the result of selection of women into employment. Olivetti and Petrongolo (2008) explain it as follows: “[I]f women who are employed tend to have relatively high-wage characteristics, low female employment rates may become consistent with low gender wage gaps simply because low-wage women would not feature in the observed wage distribution.”³

Olivetti and Petrongolo (2008) show that this pattern holds in the data: unadjusted gender wage gaps across countries tend to be negatively correlated with gender employment gaps. That is, the gender pay gaps tend to be smaller where relatively fewer women participate in the labor force.

So, rather than reflect greater equality, the lower wage gaps observed in some countries could indicate that only women with certain characteristics – for instance, with no husband or children – are entering the workforce.



In almost all countries, if you compare the wages of men and women you find that women tend to earn less than men. These inequalities have been narrowing across the world. In particular, most high-income countries have seen sizeable reductions in the gender pay gap over the last couple of decades.

How did these reductions come about and why do substantial gaps remain?

Before we get into the details, here is a preview of the main points.[7,8,9]

- An important part of the reduction in the gender pay gap in rich countries over the last decades is due to a historical narrowing, and often even reversal of the education gap between men and women.
- Today, education is relatively unimportant in explaining the remaining gender pay gap in rich countries. In contrast, the characteristics of the jobs that women tend to do, remain important contributing factors.
- The gender pay gap is not a direct metric of discrimination. However, evidence from different contexts suggests discrimination is indeed important to understand the gender pay gap. Similarly, social norms affecting the gender distribution of labor are important determinants of wage inequality.
- On the other hand, the available evidence suggests differences in psychological attributes and non-cognitive skills are at best modest factors contributing to the gender pay gap.

Differences in earnings between men and women capture differences across many possible dimensions, including education, experience, and occupation.

For example, if we consider that more educated people tend to have higher earnings, it is natural to expect that the narrowing of the pay gap across the world can be partly explained by the fact that women have been catching up with men in terms of educational attainment, in particular years of schooling.

Indeed, since differences in education partly contribute to explaining differences in wages, it is common to distinguish between 'unadjusted' and 'adjusted' pay differences.

When the gender pay gap is calculated by comparing all male and female workers, irrespective of differences in worker characteristics, the result is the raw or unadjusted pay gap. In contrast to this, when the gap is calculated after accounting for underlying differences in education, experience, and other factors that matter for the pay gap, then the result is the adjusted pay gap.

The idea of the adjusted pay gap is to make comparisons within groups of workers with roughly similar jobs, tenure, and education. This allows us to tease out the extent to which different factors contribute to observed inequalities.

The chart here, from Blau and Kahn (2017) shows the evolution of the adjusted and unadjusted gender pay gap in the US.⁴

More precisely, the chart shows the evolution of female-to-male wage ratios in three different scenarios: (i) Unadjusted; (ii) Adjusted, controlling for gender differences in human capital, i.e. education and experience; and (iii) Adjusted, controlling for a full range of covariates, including education, experience, job industry, and occupation, among others. The difference between 100% and the full specification (the green bars) is the “unexplained” residual

III. RESULTS

Perhaps the single most intuitive argument for why gender discrimination leads to aggregate inefficiency and hampers economic growth concerns the allocation of talent. Assume that talent is randomly distributed in the population. Then, an economy that curbs women’s access to education, market employment, or certain occupations draws talent from a smaller pool than an economy without such restrictions. Gender inequality can thus be viewed as a distortionary tax on talent. Indeed, occupational choice models with heterogeneous talent (as in Roy 1951)[10,11,12] show that exogenous barriers to women’s participation in the labor market or access to certain occupations reduce aggregate productivity and per capita output (Cuberes & Teignier 2016, 2017; Esteve-Volart 2009; Hsieh, Hurst, Jones and Klenow 2019).

Hsieh et al. (2019) represent the US economy with a model where individuals sort into occupations based on innate ability. Gender and race identity, however, are a source of discrimination, with three forces preventing women and black men from choosing the occupations best fitting their comparative advantage. First, these groups face labor market discrimination, which is modeled as a tax on wages and can vary by occupation. Second, there is discrimination in human capital formation, with the costs of occupation-specific human capital being higher for certain groups. This cost penalty is a composite term encompassing discrimination or quality differentials in private or public inputs into



children's human capital. The third force are group-specific social norms that generate utility premia or penalties across occupations.

Assuming that the distribution of innate ability across race and gender is constant over time, Hsieh et al. (2019) investigate and quantify how declines in labor market discrimination, barriers to human capital formation, and changing social norms affect aggregate output and productivity in the United States, between 1960 and 2010. Over that period, their general equilibrium model suggests that around 40 percent of growth in per capita GDP and 90 percent of growth in labor force participation can be attributed to reductions in the misallocation of talent across occupations. Declining in barriers to human capital formation account for most of these effects, followed by declining labor market discrimination. Changing social norms, on the other hand, explain only a residual share of aggregate changes.

Two main mechanisms drive these results. First, falling discrimination improves efficiency through a better match between individual ability and occupation. Second, because discrimination is higher in high-skill occupations, when discrimination decreases, high-ability women and black men invest more in human capital and supply more labor to the market. Overall, better allocation of talent, rising labor supply, and faster human capital accumulation raise aggregate growth and productivity.

Other occupational choice models assuming gender inequality in access to the labor market or certain occupations reach similar conclusions. In addition to the mechanisms in Hsieh et al. (2019), barriers to women's work in managerial or entrepreneurial occupations reduce average talent in these positions, resulting in aggregate losses in innovation, technology adoption, and productivity (Cuberes & Teignier 2016, 2017; Esteve-Volart 2009). The argument can be readily applied to talent misallocation across sectors (Lee 2020). In Lee's model, female workers face discrimination in the non-agricultural sector. As a result, talented women end up sorting into ill-suited agricultural activities. This distortion reduces aggregate productivity in agriculture.

To sum up, when talent is randomly distributed in the population, barriers to women's education, employment, or occupational choice effectively reduce the pool of talent in the economy. According to these models, dismantling these gendered barriers can have an immediate positive effect on economic growth.

In this section, we review models built upon unitary households. A unitary household maximizes a joint utility function subject to pooled household resources. Intra-household decision making is assumed away; the household is effectively a black-box. In this class of models, gender inequality stems from a variety of sources. It is rooted in differences in physical strength (Galor & Weil 1996; Hiller 2014; Kimura & Yasui 2010) or health (Bloom et al. 2015); it is embedded in social norms (Hiller 2014; Lagerlöf 2003), labor market discrimination (Cavalcanti & Tavares 2016), or son preference (Zhang, Zhang and Li 1999). In all these models, gender inequality is a barrier to long-run economic development.

Galor & Weil (1996) model an economy with three factors of production: capital, physical labor ("brawn"), and mental labor ("brain"). Men and women are equally endowed with brains, but men have more brawn. In economies starting with very low levels of capital per worker, women fully specialize in childrearing because their opportunity cost in terms of foregone market earnings is lower than men's. Over time, the stock of capital per worker builds up due to exogenous technological progress. The degree of complementarity between capital and mental labor is higher than that between capital and physical labor; as the economy accumulates capital per worker, the returns to brain rise relative to the returns to brawn. As a result, the relative wages of women rise, increasing the opportunity cost of childrearing. This negative substitution effect dominates the positive income effect on the demand for children and fertility falls. As fertility falls, capital per worker accumulates faster creating a positive feedback loop that generates a fertility transition and kick starts a process of sustained economic growth.[13,14,15]

The model has multiple stable equilibria. An economy starting from a low level of capital per worker is caught in a Malthusian poverty trap of high fertility, low income per capita, and low relative wages for women. In contrast, an economy starting from a sufficiently high level of capital per worker will converge to a virtuous equilibrium of low fertility, high income per capita, and high relative wages for women. Through exogenous technological progress, the economy can move from the low to the high equilibrium.

Gender inequality in labor market access or returns to brain can slow down or even prevent the escape from the Malthusian equilibrium. Wage discrimination or barriers to employment would work against the rise of relative female wages and, therefore, slow down the takeoff to modern economic growth.

The Galor and Weil model predicts how female labor supply and fertility evolve in the course of development. First, (married) women start participating in market work and only afterwards does fertility start declining. Historically,



however, in the US and Western Europe, the decline in fertility occurred before women's participation rates in the labor market started their dramatic increase. In addition, these regions experienced a mid-twentieth century baby boom which seems at odds with Galor and Weil's theory.

Both these stylized facts can be addressed by adding home production to the modeling, as do Kimura & Yasui (2010). In their article, as capital per worker accumulates, the market wage for brains rises and the economy moves through four stages of development. In the first stage, with a sufficiently low market wage, both husband and wife are fully dedicated to home production and childrearing. The household does not supply labor to the market; fertility is high and constant. In the second stage, as the wage rate increases, men enter the labor market (supplying both brawn and brain), whereas women remain fully engaged in home production and childrearing. But as men partially withdraw from home production, women have to replace them. As a result, their time cost of childrearing goes up. At this stage of development, the negative substitution effect of rising wages on fertility dominates the positive income effect. Fertility starts declining, even though women have not yet entered the labor market. The third stage arrives when men stop working in home production. There is complete specialization of labor by gender; men only do market work, and women only do home production and childrearing. As the market wage rises for men, the positive income effect becomes dominant and fertility increases; this mimics the baby-boom period of the mid-twentieth century. In the fourth and final stage, once sufficient capital is accumulated, women enter the market sector as wage-earners. The negative substitution effect of rising female opportunity costs dominates once again, and fertility declines. The economy moves from a "breadwinner model" to a "dual-earnings model".

Another important form of gender inequality is discrimination against women in the form of lower wages, holding male and female productivity constant. Cavalcanti & Tavares (2016) estimate the aggregate effects of wage discrimination using a model-based general equilibrium representation of the US economy. In their model, women are assumed to be more productive in childrearing than men, so they pay the full time cost of this activity. In the labor market, even though men and women are equally productive, women receive only a fraction of the male wage rate—this is the wage discrimination assumption. Wage discrimination works as a tax on female labor supply. Because women work less than they would without discrimination, there is a negative level effect on per capita output. In addition, there is a second negative effect of wage discrimination operating through endogenous fertility. Since lower wages reduce women's opportunity costs of childrearing, fertility is relatively high, and output per capita is relatively low. The authors calibrate the model to US steady state parameters and estimate large negative output costs of the gender wage gap. Reducing wage discrimination against women by 50 percent would raise per capita income by 35 percent, in the long run.

Human capital accumulation plays no role in Galor & Weil (1996), Kimura & Yasui (2010), and Cavalcanti & Tavares (2016). Each person is exogenously endowed with a unit of brains. The fundamental trade-off in these models is between the income and substitution effects of rising wages on the demand for children. When Lagerlöf (2003) adds education investments to a gender-based model, an additional trade-off emerges: that between the quantity and the quality of children.

Lagerlöf (2003) models gender inequality as a social norm: on average, men have higher human capital than women. Confronted with this fact, parents play a coordination game in which it is optimal for them to reproduce the inequality in the next generation. The reason is that parents expect the future husbands of their daughters to be, on average, relatively more educated than the future wives of their sons. Because, in the model, parents care for the total income of their children's future households, they respond by investing relatively less in daughters' human capital. Here, gender inequality does not arise from some intrinsic difference between men and women. It is instead the result of a coordination failure: "[i]f everyone else behaves in a discriminatory manner, it is optimal for the atomistic player to do the same" (Lagerlöf 2003, p. 404).

With lower human capital, women earn lower wages than men and are therefore solely responsible for the time cost of childrearing. But if, exogenously, the social norm becomes more gender egalitarian over time, the gender gap in parental educational investment decreases. As better educated girls grow up and become mothers, their opportunity costs of childrearing are higher. Parents trade-off the quantity of children by their quality; fertility falls and human capital accumulates. However, rising wages have an offsetting positive income effect on fertility because parents pay a (fixed) "goods cost" per child. The goods cost is proportionally more important in poor societies than in richer ones. As a result, in poor economies, growth takes off slowly because the positive income effect offsets a large chunk of the negative substitution effect. As economies grow richer, the positive income effect vanishes (as a share of total income), and fertility declines faster. That is, growth accelerates over time even if gender equality increases only linearly.

The natural next step is to model how the social norm on gender roles evolves endogenously during the course of development. Hiller (2014) develops such a model by combining two main ingredients: a gender gap in the

endowments of brawn (as in Galor & Weil 1996) generates a social norm, which each parental couple takes as given (as in Lagerlöf 2003). The social norm evolves endogenously, but slowly; it tracks the gender ratio of labor supply in the market, but with a small elasticity. When the male-female ratio in labor supply decreases, stereotypes adjust and the norm becomes less discriminatory against women.

The model generates a U-shaped relationship between economic development and female labor force participation. In the preindustrial stage, there is no education and all labor activities are unskilled, i.e., produced with brawn. Because men have a comparative advantage in brawn, they supply more labor to the market than women, who specialize in home production. This gender gap in labor supply creates a social norm that favors boys over girls. Over time, exogenous skill-biased technological progress raises the relative returns to brains, inducing parents to invest in their children's education. At the beginning, however, because of the social norm, only boys become educated. The economy accumulates human capital and grows, generating a positive income effect that, in isolation, would eventually drive up parental investments in girls' education. But endogenous social norms move in the opposite direction. When only boys receive education, the gender gap in returns to market work increases, and women withdraw to home production. As female relative labor supply in the market drops, the social norm becomes more discriminatory against women. As a result, parents want to invest relatively less in their daughters' education.

In the end, initial conditions determine which of the forces dominates, thereby shaping long-term outcomes. If, initially, the social norm is very discriminatory, its effect is stronger than the income effect; the economy becomes trapped in an equilibrium with high gender inequality and low per capita income. If, on the other hand, social norms are relatively egalitarian to begin with, then the income effect dominates, and the economy converges to an equilibrium with gender equality and high income per capita.

In the models reviewed so far, human capital or brain endowments can be understood as combining both education and health. Bloom et al. (2015) explicitly distinguish these two dimensions. Health affects labor market earnings because sick people are out of work more often (participation effect) and are less productive per hour of work (productivity effect). Female health is assumed to be worse than male health, implying that women's effective wages are lower than men's. As a result, women are solely responsible for childrearing.

The model produces two growth regimes: a Malthusian trap with high fertility and no educational investments; and a regime of sustained growth, declining fertility, and rising educational investments. Once wages reach a certain threshold, the economy goes through a fertility transition and education expansion, taking off from the Malthusian regime to the sustained growth regime.[16,17,18]

Female health promotes growth in both regimes, and it affects the timing of the takeoff. The healthier women are, the earlier the economy takes off. The reason is that a healthier woman earns a higher effective wage and, consequently, faces higher opportunity costs of raising children. When female health improves, the rising opportunity costs of children reduce the wage threshold at which educational investments become attractive; the fertility transition and mass education periods occur earlier.

In contrast, improved male health slows down economic growth and delays the fertility transition. When men become healthier, there is only an income effect on the demand for children, without the negative substitution effect (because male childrearing time is already zero). The policy conclusion would be to redistribute health from men to women. However, the policy would impose a static utility cost on the household. Because women's time allocation to market work is constrained by childrearing responsibilities (whereas men work full-time), the marginal effect of health on household income is larger for men than for women. From the household's point of view, reducing the gender gap in health produces a trade-off between short-term income maximization and long-term economic development.

In an extension of the model, the authors endogenize health investments, while keeping the assumption that women pay the full time cost of childrearing. Because women participate less in the labor market (due to childrearing duties), it is optimal for households to invest more in male health. A health gender gap emerges from rational household behavior that takes into account how time-constraints differ by gender; assuming taste-based discrimination against girls or gender-specific preferences is not necessary.

In the models reviewed so far, parents invest in their children's human capital for purely altruistic reasons. This is captured in the models by assuming that parents derive utility directly from the quantity and quality of children. This is the classical representation of children as durable consumption goods (e.g., Becker 1960). In reality, of course, parents may also have egoistic motivations for investing in child quantity and quality. A typical example is that, when parents get old and retire, they receive support from their children. The quantity and quality of children will affect the size of



old-age transfers and parents internalize this in their fertility and childcare behavior. According to this view, children are best understood as investment goods.

Zhang et al. (1999) build an endogenous growth model that incorporates the old-age support mechanism in parental decisions. Another innovative element of their model is that parents can choose the gender of their children. The implicit assumption is that sex selection technologies are freely available to all parents.

At birth, there is a gender gap in human capital endowment, favoring boys over girls. In adulthood, a child's human capital depends on the initial endowment and on the parents' human capital. In addition, the probability that a child survives to adulthood is exogenous and can differ by gender.

Parents receive old-age support from children that survive until adulthood. The more human capital children have, the more old-age support they provide to their parents. Beyond this egoistic motive, parents also enjoy the quantity and the quality of children (altruistic motive). Son preference is modeled by boys having a higher relative weight in the altruistic-component of the parental utility function. In other words, in their enjoyment of children as consumer goods, parents enjoy "consuming" a son more than "consuming" a girl. Parents who prefer sons want more boys than girls. A larger preference for sons, a higher relative survival probability of boys, and a higher human capital endowment of boys positively affect the sex ratio at birth, because, in the parents' perspective, all these forces increase the marginal utility of boys relative to girls.

Zhang et al. (1999) show that, if human capital transmission from parents to children is efficient enough, the economy grows endogenously. When boys have a higher human capital endowment than girls, and the survival probability of sons is not smaller than the survival probability of daughters, then only sons provide old-age support. Anticipating this, parents invest more in the human capital of their sons than on the human capital of their daughters. As a result, the gender gap in human capital at birth widens endogenously.

When only boys provide old-age support, an exogenous increase in son preference harms long-run economic growth. The reason is that, when son preference increases, parents enjoy each son relatively more and demand less old-age support from him. Other things equal, parents want to "consume" more sons now and less old-age support later. Because parents want more sons, the sex ratio at birth increases; but because each son provides less old-age support, human capital investments per son decrease (such that the gender gap in human capital narrows). At the aggregate level, the pace of human capital accumulation slows down and, in the long run, economic growth is lower. Thus, an exogenous increase in son preference increases the sex ratio at birth, and reduces human capital accumulation and long-run growth (although it narrows the gender gap in education).

In summary, in growth models with unitary households, gender inequality is closely linked to the division of labor between family members. If women earn relatively less in market activities, they specialize in childrearing and home production, while men specialize in market work. And precisely due to this division of labor, the returns to female educational investments are relatively low. These household behaviors translate into higher fertility and lower human capital and thus pose a barrier to long-run development.

In this section, we review models populated with non-unitary households, where decisions are the result of bargaining between the spouses. There are two broad types of bargaining processes: non-cooperative, where spouses act independently or interact in a non-cooperative game that often leads to inefficient outcomes (e.g., Doepke & Tertilt 2019, Heath & Tan 2020); and cooperative, where the spouses are assumed to achieve an efficient outcome (e.g., De la Croix & Vander Donckt 2010; Diebolt & Perrin 2013). As in the previous section, all of these non-unitary models take the household as given, thereby abstracting from marriage markets or other household formation institutions, which will be discussed separately in section 5. When preferences differ by gender, bargaining between the spouses matters for economic growth. If women care more about child quality than men do and human capital accumulation is the main engine of growth, then empowering women leads to faster economic growth (Prettner & Strulik 2017). If, however, men and women have similar preferences but are imperfect substitutes in the production of household public goods, then empowering women has an ambiguous effect on economic growth (Doepke & Tertilt 2019).

A separate channel concerns the intergenerational transmission of human capital and woman's role as the main caregiver of children. If the education of the mother matters more than the education of the father in the production of children's human capital, then empowering women will be conducive to growth (Agénor 2017; Diebolt & Perrin 2013), with the returns to education playing a crucial role in the political economy of female empowerment (Doepke & Tertilt 2009).



However, different dimensions of gender inequality have different growth impacts along the development process (De la Croix & Vander Donckt 2010). Policies that improve gender equality across many dimensions can be particularly effective for economic growth by reaping complementarities and positive externalities (Agénor 2017).

The idea that women might have stronger preferences for child-related expenditures than men can be easily incorporated in a Beckerian model of fertility. The necessary assumption is that women place a higher weight on child quality (relative to child quantity) than men do. Prettnner & Strulik (2017) build a unified growth theory model with collective households. Men and women have different preferences, but they achieve efficient cooperation based on (reduced-form) bargaining parameters. The authors study the effect of two types of preferences: (i) women are assumed to have a relative preference for child quality, while men have a relative preference for child quantity; and (ii) parents are assumed to have a relative preference for the education of sons over the education of daughters. In addition, it is assumed that the time cost of childcare borne by men cannot be above that borne by women (but it could be the same). When women have a relative preference for child quality, increasing female empowerment speeds up the economy's escape from a Malthusian trap of high fertility, low education, and low income per capita. When female empowerment increases (exogenously), a woman's relative preference for child quality has a higher impact on household's decisions. As a consequence, fertility falls, human capital accumulates, and the economy starts growing. The model also predicts that the more preferences for child quality differ between husband and wife, the more effective is female empowerment in raising long-run per capita income, because the sooner the economy escapes the Malthusian trap. This effect is not affected by whether parents have a preference for the education of boys relative to that of girls. If, however, men and women have similar preferences with respect to the quantity and quality of their children, then female empowerment does not affect the timing of the transition to the sustained growth regime.

Strulik (2019) goes one step further and endogenizes why men seem to prefer having more children than women. The reason is a different preference for sexual activity: other things equal, men enjoy having sex more than women. When cheap and effective contraception is not available, a higher male desire for sexual activity explains why men also prefer to have more children than women. In a traditional economy, where no contraception is available, fertility is high, while human capital and economic growth are low. When female bargaining power increases, couples reduce their sexual activity, fertility declines, and human capital accumulates faster. Faster human capital accumulation increases household income and, as a consequence, the demand for contraception goes up. As contraception use increases, fertility declines further. Eventually, the economy undergoes a fertility transition and moves to a modern regime with low fertility, widespread use of contraception, high human capital, and high economic growth. In the modern regime, because contraception is widely used, men's desire for sex is decoupled from fertility. Both sex and children cost time and money. When the two are decoupled, men prefer to have more sex at the expense of the number of children. There is a reversal in the gender gap in desired fertility. When contraceptives are not available, men desire more children than women; once contraceptives are widely used, men desire fewer children than women. If women are more empowered, the transition from the traditional equilibrium to the modern equilibrium occurs faster.

Both Prettnner & Strulik (2017) and Strulik (2019) rely on gender-specific preferences. In contrast, Doepke & Tertilt (2019) are able to explain gender-specific expenditure patterns without having to assume that men and women have different preferences. They set up a non-cooperative model of household decision making and ask whether more female control of household resources leads to higher child expenditures and, thus, to economic development.

In their model, household public goods are produced with two inputs: time and goods. Instead of a single home-produced good (as in most models), there is a continuum of household public goods whose production technologies differ. Some public goods are more time-intensive to produce, while others are more goods-intensive. Each specific public good can only be produced by one spouse—i.e., time and good inputs are not separable. Women face wage discrimination in the labor market, so their opportunity cost of time is lower than men's. As a result, women specialize in the production of the most time-intensive household public goods (e.g., childrearing activities), while men specialize in the production of goods-intensive household public goods (e.g., housing infrastructure). Notice that, because the household is non-cooperative, there is not only a division of labor between husband and wife, but also a division of decision making, since ultimately each spouse decides how much to provide of his or her public goods.

When household resources are redistributed from men to women (i.e., from the high-wage spouse to the low-wage spouse), women provide more public goods, in relative terms. It is ambiguous, however, whether the total provision of public goods increases with the re-distributive transfer. In a classic model of gender-specific preferences, a wife increases child expenditures and her own private consumption at the expense of the husband's private consumption. In Doepke & Tertilt (2019), however, the rise in child expenditures (and time-intensive public goods in general) comes at the expense of male consumption and male-provided public goods.

Parents contribute to the welfare of the next generation in two ways: via human capital investments (time-intensive, typically done by the mother) and bequests of physical capital (goods-intensive, typically done by the father). Transferring resources to women increases human capital, but reduces the stock of physical capital. The effect of such transfers on economic growth depends on whether the aggregate production function is relatively intensive in human capital or in physical capital. If aggregate production is relatively human capital intensive, then transfers to women boost economic growth; if it is relatively intensive in physical capital, then transfers to women may reduce economic growth.

There is an interesting paradox here. On the one hand, transfers to women will be growth-enhancing in economies where production is intensive in human capital. These would be more developed, knowledge intensive, service economies. On the other hand, the positive growth effect of transfers to women increases with the size of the gender wage gap, that is, decreases with female empowerment. But the more advanced, human capital intensive economies are also the ones with more female empowerment (i.e., lower gender wage gaps). In other words, in settings where human capital investments are relatively beneficial, the contribution of female empowerment to human capital accumulation is reduced. Overall, Doepke and Tertilt's (2019) model predicts that female empowerment has at best a limited positive effect and at worst a negative effect on economic growth.[18,19]

Heath & Tan (2020) argue that, in a non-cooperative household model, income transfers to women may increase female labor supply. This result may appear counter-intuitive at first, because in collective household models unearned income unambiguously reduces labor supply through a negative income effect. In Heath and Tan's model, husband and wife derive utility from leisure, consuming private goods, and consuming a household public good. The spouses decide separately on labor supply and monetary contributions to the household public good. Men and women are identical in preferences and behavior, but women have limited control over resources, with a share of their income being captured by the husband. Female control over resources (i.e., autonomy) depends positively on the wife's relative contribution to household income. Thus, an income transfer to the wife, keeping husband unearned income constant, raises the fraction of her own income that she privately controls. This autonomy effect unambiguously increases women's labor supply, because the wife can now reap an additional share of her wage bill. Whenever the autonomy effect dominates the (negative) income effect, female labor supply increases. The net effect will be heterogeneous over the wage distribution, but the authors show that aggregate female labor supply is always weakly larger after the income transfer.

Diebolt & Perrin (2013) assume cooperative bargaining between husband and wife, but do not rely on sex-specific preferences or differences in ability. Men and women are only distinguished by different uses of their time endowments, with females in charge of all childrearing activities. In line with this labor division, the authors further assume that only the mother's human capital is inherited by the child at birth. On top of the inherited maternal endowment, individuals can accumulate human capital during adulthood, through schooling. The higher the initial human capital endowment, the more effective is the accumulation of human capital via schooling.

A woman's bargaining power in marriage determines her share in total household consumption and is a function of the relative female human capital of the previous generation. An increase in the human capital of mothers relative to that of fathers has two effects. First, it raises the incentives for human capital accumulation of the next generation, because inherited maternal human capital makes schooling more effective. Second, it raises the bargaining power of the next generation of women and, because women's consumption share increases, boosts the returns on women's education. The second effect is not internalized in women's time allocation decisions; it is an intergenerational externality. Thus, an exogenous increase in women's bargaining power would promote economic growth by speeding up the accumulation of human capital across overlapping generations.

De la Croix & Vander Donckt (2010) contribute to the literature by clearly distinguishing between different gender gaps: a gap in the probability of survival, a wage gap, a social and institutional gap, and a gender education gap. The first three are exogenously given, while the fourth is determined within the model.

By assumption, men and women have identical preferences and ability, but women pay the full time cost of childrearing. As in a typical collective household model, bargaining power is partially determined by the spouses' earnings potential (i.e., their levels of human capital and their wage rates). But there is also a component of bargaining power that is exogenous and captures social norms that discriminate against women—this is the social and institutional gender gap.

Husbands and wives bargain over fertility and human capital investments for their children. A standard Beckerian result emerges: parents invest relatively less in the education of girls, because girls will be more time-constrained than boys and, therefore, the female returns to education are lower in relative terms.



There are at least two regimes in the economy: a corner regime and an interior regime. The corner regime consists of maximum fertility, full gender specialization (no women in the labor market), and large gender gaps in education (no education for girls). Reducing the wage gap or the social and institutional gap does not help the economy escaping this regime. Women are not in labor force, so the wage gap is meaningless. The social and institutional gap will determine women's share in household consumption, but does not affect fertility and growth. At this stage, the only effective instruments for escaping the corner regime are reducing the gender survival gap or reducing child mortality. Reducing the gender survival gap increases women's lifespan, which increases their time budget and attracts them to the labor market. Reducing child mortality decreases the time costs of kids, therefore drawing women into the labor market. In both cases, fertility decreases.

IV. CONCLUSION

In the interior regime, fertility is below the maximum, women's labor supply is above zero, and both boys and girls receive education. In this regime, with endogenous bargaining power, reducing all gender gaps will boost economic growth. Thus, depending on the growth regime, some gender gaps affect economic growth, while others do not. Accordingly, the policy-maker should tackle different dimensions of gender inequality at different stages of the development process.[20]

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