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The Impact of Gender Inequality on Economic Performance in Developing Countries

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Abstract

Despite substantial progress, gender gaps persist in many developing countries. Since the 1990s, a literature has emerged arguing that these gaps not only are inequitable but also reduce economic performance. This review finds that, first, it is methodologically difficult to determine reliable effects of gender gaps on economic performance. Second, accounting studies that calculate how much larger GDP would be if gender gaps in employment disappeared vastly overestimate likely effects. Third, the theoretical literature has generated important insights on mechanisms linking gender gaps to economic performance. Fourth, systematic reviews of the cross-country evidence robustly show that lowering gender gaps in education leads to higher economic performance, while the literature on the impact of other gaps is much more limited. Fifth, there is accumulating micro evidence on how reducing particular gender gaps at the level of households, farms, or firms can improve economic performance in particular contexts, with robust results in some areas, and less clear evidence in others.

1. INTRODUCTION

Gender gaps or gender inequality as discussed here refer to gender differences in dimensions such as education, mortality, labor force participation, pay, or access to productive inputs and resources. They also include differential treatment of men and women in laws and differentials in political representation.[1] Despite substantial progress in recent decades, gender gaps in key areas of rights, well-being, opportunities, and economic and political empowerment persist in many developing countries (and in many developed countries as well). In fact, as surveyed in detail by the World Bank (2011) and Klasen (2017), progress has been highly uneven in terms of both the particular dimension of gender inequality as well as the region in which the developing country is located. The one dimension where progress has been fastest and most widespread has been in education where gender gaps have been closing rapidly, with substantial progress visible everywhere. **Figure 1** illustrates this for the case of secondary school enrollments. Trends are even more favorable when considering primary or tertiary enrollments or test scores (Klasen 2017). Similarly, there has been substantial and widespread progress in reducing gender inequality in rights, although substantial differences persist, particularly in the Middle East/North Africa, South Asia, and parts of Sub-Saharan Africa (Hallward-Driemeier et al. 2013a,b).

In contrast, progress in reducing gender inequality in labor markets has been much slower and more uneven. For example, as shown in **Figure 2**, labor force participation rates of women in prime age (25–54 years) has stagnated or fallen slightly in many regions, fallen substantially in South Asia (from low levels), and increased strongly only in Latin America and the Caribbean. Male labor force participation rates in this age group have invariably been above 90% and stable, showing that gender gaps remain sizable in this indicator in most regions. This is mirrored by time use data showing that women continue to carry most of the care burden for children and elderly in developing countries, with very little reallocation of nonmarket time between men and women (World Bank 2011). There has been even less progress in reducing occupational and sectoral segregation (World Bank 2011). In fact, Borrowman & Klasen (2017) show that occupational and sectoral segregation has increased in more developing countries than it has decreased.

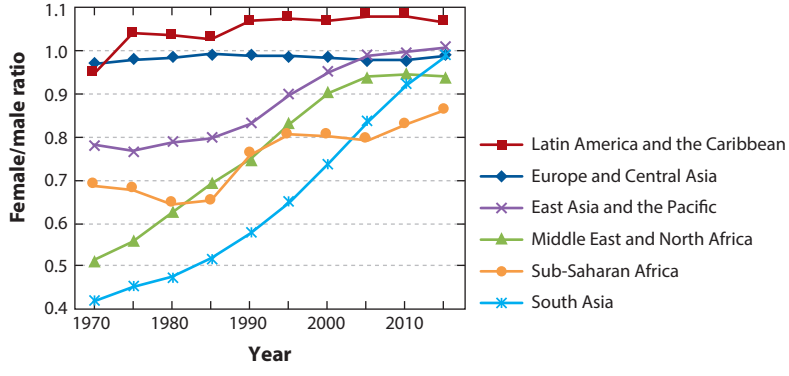

Figure 1

Female/male ratio of gross secondary school enrollment rates worldwide, 1970–2014. The rates show the rapid closing of gender gaps in education in all regions, with a substantial gap remaining only in Sub-Saharan Africa. Data from World Development Indicators (**wdi.worldbank.org**).

[1]Not all gender inequality is necessarily the result of discrimination. See Klasen (2007) for a discussion.

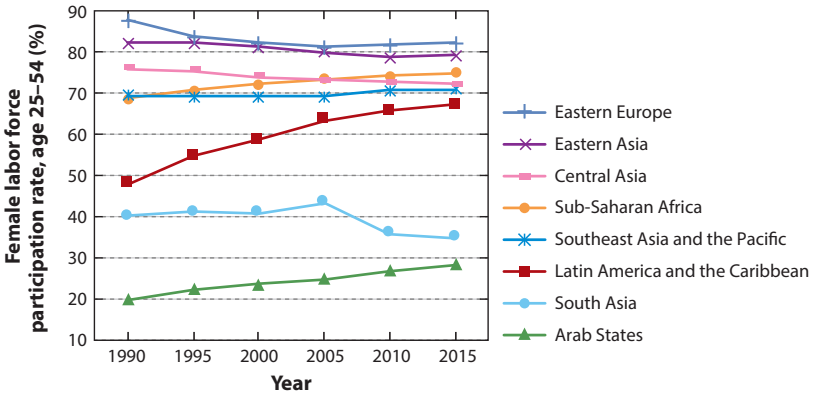

Figure 2

Female labor force participation rate, age 25–54 years. The graph shows that progress in closing gaps has been slow and highly uneven, with gaps widening in some regions. Data from ILOSTAT (**www.ilo.org/ilostat**).

Similarly, unexplained portions of the gender wage gap have remained remarkably persistent (Oostendorp 2009, Weichselbaumer & Winter-Ebmer 2005). Lastly, progress in women's political empowerment has been slow and uneven, and many women continue to suffer from high rates of domestic violence, female genital mutilation, gender discrimination in health and survival, and high maternal death rates (Klasen 2017, Klasen & Vollmer 2013, Klasen & Wink 2003, World Bank 2014).

Given this state of affairs, there continues to be a strong equity case for tackling these gender gaps, particularly those where women suffer from unequal rights, unequal opportunities, or unequal burdens and constraints (Duflo 2012, Klasen & Lamanna 2009). In fact, much policy action on gender has taken such an equity perspective, most notably the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), which has been signed and ratified by nearly all countries of the world [albeit with reservations in a number of countries (Cho 2014)]. Similarly, the gender goals and targets in the United Nations' (UN) Millennium Development Goals and Sustainable Development Goals explicitly take an equity perspective.

At the same time, since about 2000, many actors started to emphasize that reducing gender gaps promotes overall economic development and advanced this as an additional reason to tackle gender gaps. For example, in its gender action plan of 2006, the World Bank (2006, p. 2) stated:

> Gains in women's economic opportunities lag behind those in women's capabilities. This is inefficient, since increased women's labor force participation and earnings are associated with reduced poverty and faster growth; women will benefit from their economic empowerment, but so too will men, children and society as a whole. Women's lack of economic empowerment, on the other hand, not only imperils growth and poverty reduction, but also has a host of other negative impacts, including less favorable education and health outcomes for children and a more rapid spread of HIV/AIDS. In sum, the business case for expanding women's economic opportunities is becoming increasingly evident; this is nothing more than smart economics.

Similar statements have been made more recently by the International Monetary Fund (IMF) (e.g., Hakura et al. 2016, Lagarde 2016), the UN, International Labour Organization (ILO), or the Organisation for Economic Co-operation and Development (OECD) (e.g., OECD et al. 2014).

These policy statements and claims are based on a growing body of research that first emerged in the 1990s (Dollar & Gatti 1999, Hill & King 1995, Klasen 1999). It has grown tremendously since then and has investigated the impact of gender gaps on economic performance. The economic literature now comprises theoretical papers outlining mechanisms linking gender inequality to economic performance; cross-country regressions that investigate the empirical impact of gender gaps on economic growth; simulation studies that estimate the impact of closing gender gaps that can be based on theoretical models, cross-country regressions, or accounting approaches; and micro studies, often based on randomized controlled trials (RCTs) that investigate the impact of a particular gender gap (or its removal) on household incomes or other proximate determinants of economic performance or well-being.

It is probably safe to say that most studies have found that reducing gender gaps is associated with improved economic performance. But there are a number of theoretical as well as empirical studies that have claimed that closing particular gender gaps can hurt economic performance (e.g., Seguino 2000b, Tertilt & Doepcke 2014), and some have argued that the existing evidence is weak (e.g., Bandiera & Natraj 2012). Among the studies finding that gender inequality hurts economic performance, there are profound disagreements on the size of the effects. While Duflo (2012) finds them to be generally modest, a simulation study by the McKinsey Glob. Inst. (2015) recently estimated that the removal of all gender gaps in labor markets (participation, hours, and pay) alone would add a whopping US$28 trillion or 26% to world gross domestic product (GDP), equivalent to the combined size of the US and Chinese economies.

In this survey, I review the burgeoning literature on the impact of gender inequality on economic performance. It focuses largely on studies that concentrate on developing countries, mainly because gender gaps tend to be larger and therefore possibly more consequential than in developed countries.[2] Improving economic performance is also a particular priority for developing countries as they seek to leave poverty and underdevelopment behind. The review makes several points. First, it is methodologically difficult to generate reliable estimates of effects of gender gaps on economic performance, and each of the methods used has critical shortcomings so that some form of triangulation is required. Second, accounting studies such as that by McKinsey Glob. Inst. (2015) vastly overestimate the likely effects. Third, the theoretical literature has generated important insights into key mechanisms linking gender gaps to economic performance. Fourth, and consistent with some of the theoretical literature, systematic reviews of the cross-country evidence robustly show that lowering gender gaps in education leads to higher economic performance, while the literature on the impact of other gaps is much more limited. Fifth, there is accumulating micro evidence on how reducing particular gender gaps at the level of households, farms, or firms can improve economic performance in some contexts, with robust results in some areas but less clear evidence in others.

The review is organized as follows. The next section discusses methodological challenges. Section 3 focuses on theoretical mechanisms, whereas Section 4 discusses cross-country econometric results, also drawing on recently concluded systematic reviews and meta-analyses. Section 5 concludes.

2. METHODOLOGICAL CHALLENGES

Linking gender inequality in dimensions such as education, labor force participation, pay, access to productive inputs or credit, or political representation to aggregate economic output poses

[2] This is, of course, not to say that there are no effects in rich countries.

a range of challenges. First, while one can measure effects at the micro level, it is unclear that they carry over to the macro level. For example, by using Mincer-type wage regressions, one can readily estimate how household incomes increase if individual women have higher education or work more. Whether this effect is the same if all women increase their education or employment levels is less clear for several reasons. On the one hand, it might be the case that the macro returns to increasing female education are much smaller than the micro returns calculated in wage regressions. For example, to the extent that education is merely a signal for higher ability rather than representing greater human capital, it would not increase output. Similarly, the higher education might boost female earnings but lead to no growth if they work in sectors that engage in personally lucrative but socially unproductive activities [such as employment in a public sector that increases hold-up problems for firms and individuals (Pritchett 2001)].

On the other hand, there can be a range of positive spillovers that are difficult to capture at the micro level. In particular, there are the well-known externalities of female education that lead to lower fertility and lower child mortality, which can boost economic performance through demographic effects as well as improved human capital (King et al. 2009, Klasen 2002). But efforts to boost female education and/or employment can lead to wider social change that can, for example, reduce cultural and social barriers to female economic activity that can further boost economic performance. This also suggests that measuring the impact of policies to reduce gender inequality at a micro level using RCTs can at best capture some local spillovers. They can therefore underestimate effects that would be expected if such programs were implemented to scale. This is particularly the case if such effects materialize with some delay. In short, although micro-level studies provide important insights into mechanisms and local effects, they may not be a reliable guide to aggregate economic effects. Here, aggregate analyses, such as cross-country or cross-regional regressions, have distinct advantages, although they suffer from other problems (see below).

Second, when estimating the effects of removing gender inequality, one needs to consider a realistic counterfactual scenario that also takes account of, at least in some crude fashion, the likely general equilibrium effects. This is a major shortcoming of accounting studies that estimate simply how much larger GDP would be if more women worked, such as those by Daly (2007), ILO (2017), McKinsey Glob. Inst. (2015), UNDP (2016), or World Bank (2004). They simply multiply the number of women that would work in addition in their target scenario[3] with average earnings to generate the effects. It is inconceivable that such changes could happen without any impact on the employment of men and/or the level of earnings. Instead, it is likely that such a boost of female workers would lower earnings and lead to some dropout by men (and women) so that the aggregate effects are likely to be substantially smaller. Of course, displacement and other general equilibrium effects can also be a problem for micro studies in which, for example, an intervention to boost female employment might simply displace nonparticipating women or men or would lead to much smaller effects if implemented at scale due to saturation or other general equilibrium effects (Fox & Kaul 2017). Interpreting results from cross-country regressions can also suffer from this problem if researchers only consider the coefficient on female education or employment when making projections. Klasen (2002) tackles this problem directly by providing estimates of the boost to growth due to higher female education if male education stayed the same. This provides an upper bound estimate, and he produces an estimate that assumes that male education would

[3]The target scenario is women having the same employment rate as men (Daly 2007); women having the same employment rate in the Middle East as they would elsewhere if education and fertility were comparable (World Bank 2004); women increasing employment so that the gender gap in employment is reduced by 25% [according to a target of the G20 (ILO (2017)]; women in Africa having the same participation and earnings as men (UNDP 2016); and women having the same employment, hours, and pay as men (McKinsey Glob. Inst. 2015).

decrease by the same amount, which provides a lower bound estimate.[4] Simulation results based on calibrated theoretical models tend to explicitly consider general equilibrium effects and thus suffer the least from this particular problem (e.g., Cavalcanti & Tavares 2016, Cuberes & Teignier 2016).

Third, when measuring the impact of gender gaps on economic performance, one has to recognize that a considerable share of women's work is not captured by national accounts and included in GDP or gross national income (GNI) estimates. As is well known, unmarketed services such as care for one's own children and the elderly or housework that are done overwhelmingly by women are not included in the System of National Accounts (SNA) and would make up a significant share of GNI if they were included (McKinsey Glob. Inst. 2015, OECD 1995, UNDP 1995, United Nations 2008). While the omission itself is a problem, the interaction with gender gaps poses a particular challenge. It may be that countries with higher female employment rates have a higher GDP partly because in those countries more of the household service and care work are marketed and thus included in GDP, whereas the unmeasured service work done by women in their own households is correspondingly smaller (UNDP 1995). If this is the case, the impact of increasing female employment on GDP might overestimate the impact it has on the total provision of (marketed and unmarketed) services, an important indicator of welfare. I know of no work that has empirically attempted to assess this potential bias.

Fourth, much of the empirical work, at the micro as well as the macro level, estimates reduced form relationships. At the macro level, we learn about the impact of aggregate gender gaps on economic performance but cannot be sure of the precise transmission channel. Here, it can help to develop empirical models based on theoretical insights and then specify the empirical model accordingly. For example, Klasen (2002) considers a setup where the direct effect of educational gender gaps (related to distortion arguments) is tested alongside indirect effects that operate via demographic effects. Also at the micro level, RCTs often test black box relationships, although particular transmission channels are also sometimes considered. This generally points to the need for theoretical models illustrating particular mechanisms that can then be empirically tested and structural models that can then be used to test transmission channels. But, of course, theoretical models (and their derived simulated results) tend to focus on few mechanisms and thus are also limited by their setup.

Lastly, while I have noted some distinct advantages of using aggregate-level analyses such as cross-country regressions, endogeneity is a serious problem. When examining the relationship between gender inequality and economic performance, reverse causality can be an issue, and unobserved heterogeneity is bound to be a problem (Bandiera & Natraj 2012, Dollar & Gatti 1999). Choosing an appropriate time structure for dependent and independent variables can partly address reverse causality, and using fixed effects in a panel setting can deal with time-invariant unobserved heterogeneity. However, these are only partial remedies. Many studies use instrumental variable (IV) strategies to address endogeneity, but the instruments used are controversially discussed (e.g., Bandiera & Natraj 2012).

In short, there is no method that would be the gold standard for this type of assessment. All methods suffer from various drawbacks that limit their usefulness. Among the different methods, it appears that the aforementioned accounting studies that simply calculate mechanical GDP effects resulting from more women entering the labor force are particularly problematic and unreliable.

[4]This is achieved by including the male education level and the female/male ratio of education in a specification for the upper bound estimate and the average education level and the female/male ratio for the lower bound estimate. For details, see Klasen (2002).

They ignore general equilibrium effects, are silent on transmission channels, overlook the current time use of women, and give the erroneous impression that a single labor market intervention can have such effects without the need for complementary policies or investments. In the following sections, I no longer consider these studies but focus instead on the other methods to estimate effects. Given the problems with each of them, judgments have to be made based on triangulating from different methods and approaches, checking robustness, and performing systematic reviews.

3. THEORETICAL MECHANISMS

There have been a number of theoretical and empirical studies examining the impact of gender inequality on economic performance, with particular focus on the impact of gender inequality in education, employment, and earnings on aggregate economic performance. I briefly summarize the most important insights here.[5]

There are three arguments suggesting that particular gender gaps could actually promote economic performance. The first goes back to Becker (1981), essentially arguing that there are (static) efficiency gains to a sexual division of labor where each gender specializes on the tasks for which they have a comparative advantage. Becker sees a comparative advantage for women in home production (due to the complementarity of bearing and rearing children). Whatever the merits of the argument, it is likely to become less relevant as fertility falls, household production becomes less time consuming, and falling gender gaps in education and employment reduce the gains from such specialization. A second argument was recently made by Tertilt & Doepke (2014) who argue that higher women's earnings or transfers might actually reduce growth, as they might reduce investment in physical capital or land (though this would not hold if human capital was relatively more important). A third argument relates to the role of pay gaps, in association with low gender gaps in education and earnings. As suggested by Seguino (2000b), high gender pay gaps might become a competitive advantage for countries, particularly in export-oriented manufacturing [and associated foreign direct investment (FDI) to develop the sector]. I return to this argument below.

On the other hand, there are a substantial number of articles arguing the reverse, i.e., that gender gaps reduce economic performance. Regarding gender inequality in education, the theoretical literature suggests that such gender inequality reduces the average amount of human capital in a society and thus harms economic performance. It does so by artificially restricting the pool of talent from which to draw for education and thereby excluding highly qualified girls (and taking less-qualified boys instead; see, e.g., Dollar & Gatti 1999). A second way that it can lower aggregate human capital is if males and females are imperfect substitutes in production in a Solow-type growth model (e.g., Knowles et al. 2002). In such a setup, there are declining marginal returns to education for boys and girls, and restricting the education of girls to lower levels while taking the education of boys to higher levels means that the marginal return to educating girls is higher than that of boys. Reducing this gender gap would boost overall economic performance.

A second set of arguments relates to externalities of female education. Promoting female education is known to reduce fertility levels, reduce child mortality levels, and promote the education of the next generation. Each factor in turn has a positive impact on economic growth (King et al. 2009, World Bank 2001).

Some long-run growth models emphasize these externalities. They argue that there is potential for vicious cycles with larger gender gaps in education, health, or pay leading to high fertility and low incomes, which in turn reproduce these gender gaps (e.g., Bloom et al. 2015, de la Croix

[5]See, for example, Duflo (2012), Kabeer (2017), Klasen (2002), Klasen & Lamanna (2009), and Stotsky (2006) for more detailed reviews.

& Vander Donckt 2010, Galor & Weil 1996, Lagerlöf 2003, Prettner & Strulik 2017). These models are used to explain why historically lower gender gaps in Europe helped promote long-run economic development there (e.g., Lagerlöf 2003), whereas others argue that technological change helped countries move out of the poverty traps by providing incentives to promote female education and employment (e.g., Diebolt & Perrin 2013, Galor & Weil 1996). These models generally also suggest that exogenous (e.g., policy-induced) increases in female education and health would help promote growth and allow countries to escape these poverty traps.

But there is also an important timing issue involved here. Reducing gender gaps in education will lead to reduced fertility levels, which will, after some 20 years, lead to a favorable demographic constellation that Bloom & Williamson (1998) refer to as a demographic gift. For a period of several decades, the working-age population will grow much faster than the overall population, thus lowering dependency rates; this leads to higher savings, investments, and a higher worker/population ratio, each with positive repercussions for per capita economic growth.[6]

A third argument relates to international competitiveness and complements the argument made by Seguino (2000b) mentioned above. Many East Asian countries have been able to be competitive in world markets through the use of female-intensive, export-oriented manufacturing industries, a strategy that is now finding followers in South Asia (particularly Bangladesh) and individual countries across the developing world (e.g., Seguino 2000a,b). For such competitive export industries to emerge and grow, women need to be educated, and there must be no barrier to their employment in such sectors. Gender inequality in education (and employment) would reduce the ability of countries to capitalize on these opportunities (Busse & Spielmann 2006, World Bank 2001).

Regarding gender gaps in employment, there are a number of closely related arguments. First, there is a similar argument that they impose a distortion on the economy, as do gender gaps in education. They artificially reduce the pool of talent from which employees are drawn, thereby reducing the average ability of the workforce with negative growth consequences (e.g., Cuberes & Teignier 2016, Esteve-Volart 2009). Such distortions would not only affect employees, but similar arguments could be made for the self-employed in agricultural and nonagricultural sectors where unequal access to critical inputs, technologies, and resources as well as other barriers would reduce female participation and/or lower the average productivity of these ventures, thereby reducing economic growth (see Blackden et al. 2007, Cuberes & Teignier 2016, Udry 1996).

A second closely related argument suggests that gender inequality in employment or a wage gap can reduce economic growth via demographic effects. A model by Cavalcanti & Tavares (2016) suggests that gender inequality in wages leads to a gender gap in employment, which directly reduces growth through depressing female participation, and it indirectly reduces growth through higher fertility and lower investment.

Third, the results of Seguino (2000a,b) on the impact of gender gaps in pay on international competitiveness imply that gender gaps in employment access would also reduce economic growth, as they would deprive countries of using (relatively cheap) female labor as a competitive advantage in an export-oriented growth strategy.[7]

A fourth argument relates to the importance of female employment and earnings for their bargaining power within families and makes the converse claim of Tertilt & Doepke (2014) discussed above. A sizable literature demonstrates that female employment and earnings increase women's

[6] See Bloom & Williamson (1998) and Klasen (2002) for a full exposition of these arguments.

[7] One would expect that strong demand for female labor would erode these pay gaps and, thus, eventually this competitive advantage as well.

bargaining power at home (e.g., Haddad et al. 1997, King et al. 2009, Klasen & Wink 2003, Sen 1990, Thomas 1997, World Bank 2001). This not only benefits the women concerned, but their greater bargaining power can have a range of growth-enhancing effects. These could include higher savings, as women and men differ in their savings behavior (e.g., Seguino & Floro 2003). They also include more productive investments and use and repayment of credit (see Stotsky 2006), as well as higher investments in the health and education of their children, thus promoting human capital of the next generation and therefore economic growth (e.g., Thomas 1997, World Bank 2001).

A fifth argument relates to governance. There is a growing but still rather speculative and suggestive literature that has collated evidence showing that women, on average, appear to be less prone to corruption and nepotism than men (Branisa et al. 2013, Swamy et al. 2001, World Bank 2001).[8] If these findings prove to be robust, greater female employment might be beneficial for economic performance in this sense as well.

A closely related theoretical literature examines the impact of gender discrimination in pay on economic performance. Here, the theoretical literature is quite divided. On the one hand, studies by Cavalcanti & Tavares (2016) and Galor & Weil (1996) suggest that large gender pay gaps will reduce economic growth. Such gender pay gaps reduce female employment, which in turn increases fertility and lowers economic growth through these participation and demographic effects. In contrast, Blecker & Seguino (2002) highlight a different mechanism that leads to contrasting results. They suggest that high gender pay gaps and associated low female wages increase the competitiveness of export-oriented industrializing economies and thus boost the growth performance of these countries. The most important difference of this study, in contrast to the models considered above, is that it focuses more on short-term, demand-induced growth effects, whereas the other models are long-term growth models in which growth is driven by supply constraints. Clearly, both effects can be relevant, depending on the time horizon considered.

It is important to emphasize that it is theoretically difficult to separate the effects between gender gaps in education, employment, and pay. In fact, in most of the theoretical models considered above, gender gaps in one dimension tend to lead to gender gaps in other dimensions, with the causality running in both directions.[9] For example, gender gaps in education might automatically lead to gender gaps in employment, particularly in the formal sector, where employers prefer educated workers and will not consider applications of uneducated women. Conversely, if there are large barriers to female employment or gender gaps in pay, rational parents (and girls) might decide that education of girls is not as lucrative. This decision might therefore lead to lower demands for female education and result in gender gaps in education and employment.[10] Thus, gender gaps in education, employment, and pay are closely related.

However, gaps in education and employment do not measure the same thing, and thus, it is important to investigate them separately. For one, it might be that female education and employment are largely driven by separate institutions and policies and do not therefore greatly depend on each other. For example, one might think of an education policy that strives to achieve universal education and thus reduces gender gaps, while there continue to be significant barriers to employment for females in the labor market. This might, for example, be particularly relevant in the Middle East/North Africa but, most recently, also in South Asia, where education gaps have

[8]The causes of these differences in behavior may well be related to different socialization of girls and boys, or that women as outsiders may also not be part of networks that are often conducive to corruption.

[9]The exceptions are again the two short-term structuralist models of Blecker & Seguino (2002), where large gender gaps in pay, implicitly combined with no gender gaps in education and employment, can deliver the income-enhancing effects.

[10]For discussion of these issues, see Alderman et al. (1995, 1996), King & Hill (1993), and World Bank (2001).

narrowed, but employment gaps remain wide (see Gaddis & Klasen 2014, Klasen & Pieters 2015). Moreover, the externalities of female education and female employment are not all the same. For example, female education is likely to lead to lower fertility and child mortality of the offspring, whereas the effect of female employment (conditional on education) is likely to be much smaller and more indirect (working mainly through greater female bargaining power). There may also be opposite effects, including that the absence of women in the home might in some cases negatively influence the quality of child care. Conversely, the governance externality is likely to apply solely to female employment, not to female education.

There is also some literature examining the impact of gender gaps in political empowerment on economic outcomes. That literature is mainly focused on the impact that female politicians, owing to their different preferences than men, can have on the provision of public goods, with repercussions on development outcomes (e.g., Duflo 2012, King et al. 2009).

In short, the theoretical literature has defined a range of mechanisms linking gender gaps to economic performance. Although some models posit that gender gaps promote growth, they tend to be quite specific, highlight a particular mechanism, and generally appear to be less relevant to the setting in which many developing countries find themselves. In contrast, there is a much broader set of models and mechanisms suggesting that gender gaps reduce growth. The effects identified can be quite large and be important drivers of long-run growth. But ultimately, it becomes an empirical question which of these models and mechanisms finds most support.

4. EMPIRICAL FINDINGS

The last 20 years have seen the emergence of a large empirical literature on the link between gender inequality and growth. I provide a short overview of that literature by type of gender gap.

4.1. Gender Gaps in Education

The largest and arguably most mature literature has been on the impact of gender inequality in education on economic growth. Most of that literature has used aggregate data, and a systematic review of the evidence has recently been published by Minasyan et al. (2018), which is summarized here. Their review includes all publicly available regression analyses of aggregate data that relate a gender-disaggregated education indicator or a gender gap measure to a measure of output or growth of output. An extensive search strategy of studies published in both journals and working papers yielded 1,421 potentially relevant studies. After a first screening for relevance and removal of duplicates, 264 studies were subjected to full-text screening by two independent screeners. After screening and the addition of 5 studies based on expert recommendations, 54 studies were included in the systematic review. Because nearly all of these studies include a number of different regressions, the number of regressions assessed is substantially larger.

Of those 55 studies included in the systematic review, 34 are cross-country studies, three are cross-regional studies within a country (Nepal, India, Turkey), and another 18 are time-series analyses of single countries. Of those 18, 10 examine the case of Pakistan, and another evaluates Pakistan and Sri Lanka. Sudan, Nigeria,[11] India, and Turkey are the topic of one study each. One study does single-country analyses for 18 countries across the world, including rich and poor countries (Pakistan again included). Sixteen studies use various time-series methods that are

[11] There are two Nigeria studies published in two different outlets but containing the identical empirical analysis, but we treat them as one study.

appropriate for this context, whereas two apply ordinary least squares (OLS) to these time series, which leads to biased results in the (likely) case of nonstationarity or autocorrelation. Fifteen studies find a positive effect of female education on reducing gender gaps on growth, while three find no such effect. Thus, most studied find that reducing gender gaps in education promotes growth.

Time-series analyses, even those using appropriate time-series methods, have to be treated with some caution for several reasons. First, they often consider only a small number of covariates, ignoring many other factors that are likely to influence this relationship. Thus, omitted variable bias (or unobserved heterogeneity) might be a particularly serious problem. Second, they tend to focus on a contemporaneous relationship between gender inequality and growth that may be affected by reverse causality and does not link well to the theoretical literature, which sees mostly a delayed impact of gender gaps on growth. Third, the analyses are often based on only 20–30 data points, each from a single country, so that the external validity of the findings is unclear. Given the preponderance of studies on Pakistan and the lack of studies on most other developing countries, we do not know how representative these findings are.

The 34 cross-country studies fall into two categories in terms of the way they treat educational gender gaps: 17 include male and female education as separate covariates, 16 use the ratio of female and male education as the key covariate to assess the impact of gender gaps, and one uses both. Turning first to the studies with male and female education as separate covariates, they would imply that reducing the gender gap improves growth if the coefficient of female education is positive and larger than that of male education. Among those 18 studies, 17 present a total of 168 regressions that include male and female education as separate covariates. The eighteenth study by Abington (2014) uses a Bayesian model averaging technique to assess the robustness of growth determinants, including male and female education levels as covariates; I discuss this study separately below.

Figure 3 plots the partial correlation coefficients of male and female education of those 168 regressions. Although any combination of male and female coefficients appears in the data, there are numerous regressions in which the male coefficient is positive and the female one is negative. Many of these regressions (marked in green) follow a particular type of regression specification pioneered by Barro & Lee (1994) and used by Barro and others in subsequent analyses. That specification uses either a cross section of countries without controlling for regional fixed effects or a pooled panel without controlling for country or regional fixed effects. The Barro-style regressions always use the initial year values of education (rather than period averages). Regardless of what other covariates are used, this particular specification delivers, as shown below, a seemingly robust finding of a positive effect of male education and a negative effect of female education.[12] This "Barro result" attracted much commentary and discussion. Lorgelly & Owen (1999) note that these results disappear, and both male and female coefficients turn insignificant, when East Asian countries are excluded from the regression. Dollar & Gatti (1999) point out that the results reverse when one controls for Latin America. Knowles et al. (2002) note that the results disappear or reverse once a dummy variable for East Asia is included, and Klasen (2002) also finds that the results reverse once regional dummy variables are included. Given that levels of female education were quite high in Latin America already in 1960 and relatively low in most of East Asia at that time, the Barro specification essentially links Latin America's poor growth record from 1960 to 1990 to high

[12] As shown in **Figure 3**, a few Barro-style regressions deliver a positive male and female coefficient. This is the case once logged fertility and population growth or the dependency rate are included as control variables, as also discussed by Barro & Lee (1994). According to Minasyan et al. (2018), a possible explanation for this finding may be single influential observations with high GDP growth, high population growth, and high fertility rates but low initial female education, such as we see in Botswana.

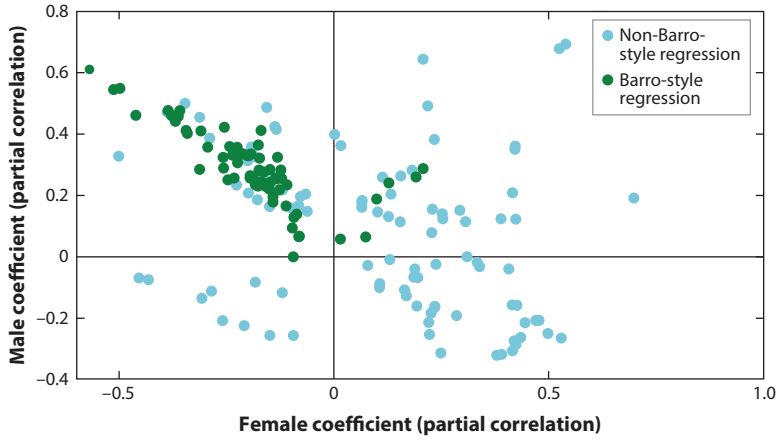

Figure 3

Relation of male to female education coefficients in growth regressions. Each dot shows the combination of the male and female partial correlation coefficient of a regression. Barro-style regressions that use a particular, and arguably problematic, specification mostly find a positive partial correlation coefficient for male education and a negative one for female education, whereas most other regressions find a positive coefficient for female education. Adapted from Minasyan et al. (2018).

initial female education and high growth in East Asia to low initial female education. Clearly, this is a dubious claim, as many factors other than initial female education contributed to the East Asian economic miracle (e.g., World Bank 1994) and Latin America's poor growth record (e.g., Taylor 1998). By including regional or country-fixed effects, as the non-Barro specifications in **Figure 3** do, one controls for these region-specific effects, and now there are many more results with large positive female coefficients. In fact, as shown by Minasyan et al. (2018), when summarizing the non-Barro coefficients and adjusting them for precision, the so-called weighted average of precision effect estimates of non-Barro specifications show a significant positive coefficient for female education that is substantially larger than the (insignificant) male coefficient. To the extent it is correct to discount the Barro-style estimates for the reasons stated above, these results suggest that reducing gender gaps in education would lead to higher economic growth.

As the Bayesian model averaging study also uses the Barro specification in a sample of only 50 countries from 1960 to 1996, it is not surprising that it finds that one of the robust growth determinants in this particular sample (and given the particular choice of 94 possible growth determinants) is female years of tertiary schooling, which has a negative effect (Abington 2014).[13]

Before turning to the studies using the gender gap in education as covariates in cross-country regressions, let me briefly comment on the three studies that run subnational regressions using male and female education or the gap as covariates. One study investigates the impact of education gaps in Nepal's 75 districts in 2001 and finds that female education has a larger positive and significant coefficient than male education (which itself is never significant); in addition, a large education gender gap reduces GDP (Dahal 2011). Another study uses panel fixed effects regressions using annual data for India's 16 states and finds that female literacy leads to significantly higher income

[13] One should also note that the robustness of growth determinants using this method depends greatly on the sample and the covariates considered. For example, Abington (2014) shows that their study has little overlap of robust growth determinants with an earlier study by Sala-i-Martin et al. (2004) even though all they do is add some more human capital variables to the set of growth determinants.

in 10 out of 14 specifications, while male literacy never significantly affects income levels (Esteve-Volart 2009). A last study of Turkey's 67 provinces using 5-year averages from 1975 to 2000 shows that both female and male education affect GDP positively and significantly. Only male education has such an effect in less-developed provinces, and female education has an effect in more developed provinces (Tansel & Gungor 2013). To the extent that one can generalize from these three countries, the results suggest that female education more often has an effect on growth than does male education, thus supporting the argument that reducing gender gaps in education would boost growth.

A particular additional problem of the studies using male and female education as separate covariates is multicollinearity. Despite differences in educational gender gaps across time and country, the correlation coefficient between male and female education is usually above 0.9, increasing standard errors and leading to less-precise estimates (Klasen 2002, Knowles et al. 2002, Lorgelly & Owen 1999). To circumvent this problem, many studies chose to use a covariate for average education and one measuring the gender gap (usually the ratio of female/male education or its inverse), where the correlation between those two covariates is much lower (e.g., Klasen 2002). I now turn to these ratio studies.

Minasyan et al. (2018) are able to perform a meta-analysis that allows assessments of average effects, possible publication bias, and the dependence of the results on particular specifications, control variables, or methods. Seventeen studies with 212 regressions use the gender ratio of education as the key covariate. To make them comparable, the beta coefficients are transformed to partial correlation coefficients. **Figure 4** depicts a so-called funnel plot that plots the partial correlation coefficient of the female/male ratio of education against the precision of the estimates. Two points are worth noting. First, the vast majority of coefficients are greater than zero, suggesting that a higher female/male ratio of education coincides with more growth. Second, the estimates are fairly

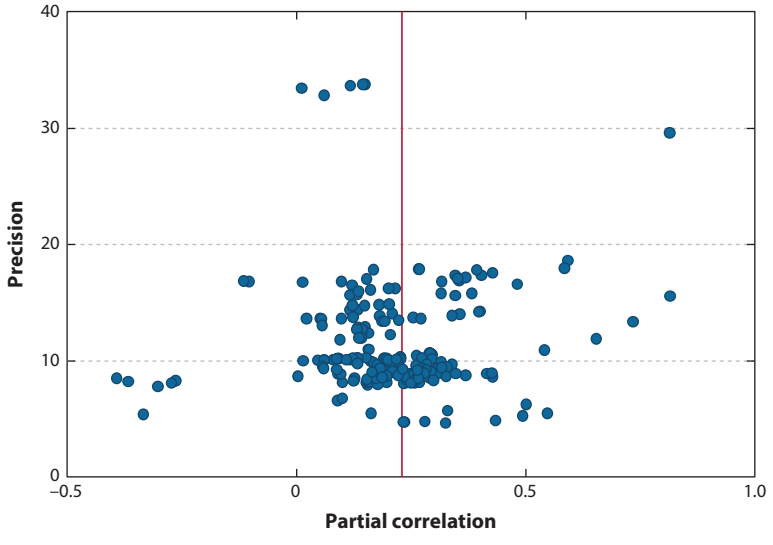

Figure 4

Funnel plot of educational gender gap and growth correlations ($N = 216$). Each dot represents the partial correlation coefficient of the female/male ratio of education and the precision of that coefficient for a single regression. The lack of an asymmetry around the average effect (*red line*) as well as around 0 points to an absence of publication bias. Adapted from Minasyan et al. (2018).

evenly distributed on both sides of the average effect, and there is no strong asymmetry around 0, which indicates that publication bias does not appear to be a serious issue. Formal tests of publication bias in Minasyan et al. (2018) confirm that there is no evidence of publication bias and that the precision-weighted estimate of the average effect of the female/male ratio of education on growth is significant and positive. Regressions on the determinants of the partial correlation coefficient show that the effect of the gender gap on growth is smaller if the model is estimated using fixed effects, when the share of female authors is larger, and when economic controls are included. The effect is significantly larger when the regression controls for average education, includes social or institutional controls, and uses enrollment instead of years of schooling. Whether it is published in a peer-reviewed journal or also includes female labor force participation does not significantly affect the partial correlation coefficient. Based on these results, one can deduce that regression specifications that are arguably the most convincing—i.e., those that use fixed effects and years of schooling as the gap variables and control for a large number of control variables, including average education—will carry a sizable and significant positive correlation coefficient, thus providing robust evidence that reducing the educational gender gap improves economic growth. In terms of quantitative magnitude, the effects are quite large. For example, Klasen (2002) and Klasen & Lamanna (2009) show that if South Asia had East Asia's gender gaps in education, it would have grown by approximately 0.8–1% faster per capita per year between 1960 and 2000 than it actually did.

4.2. Gender Gaps in the Labor Market

There are significantly fewer empirical studies on the impact of gender gaps in employment and pay on economic growth. Cavalcanti & Tavares (2016) as well as Cuberes & Teignier (2016) each calibrate their macro models to specific country circumstances to assess the output costs of gender discrimination in labor markets. Cuberes & Teignier (2016) find that existing restrictions on female employment and entrepreneurship in their model generate an income loss of 27% in the Middle East/North Africa, 19% in South Asia, and approximately 10% in Europe. Cavalcanti & Tavares (2016) find that larger gender pay gaps lead to substantial output losses due to the impact they have on female participation and fertility. According to their model, they can explain more than half of the income differences between the United States and countries such as India, Saudi Arabia, or Egypt. While these are instructive calculations, one has to treat the quantitative magnitudes of the effects with some caution, as they are based entirely on the specific mechanism of their model.

There are few cross-country econometric studies on this issue, largely owing to poor data on employment and wages as well as endogeneity concerns (Gaddis & Klasen 2014). Klasen (1999) found that increases in female labor force participation are associated with higher growth in a cross-country context. But these findings have to be treated with caution because they may suffer from reverse causality or unobserved heterogeneity. Klasen & Lamanna (2009) study the impact of initial gender gaps in education and labor force participation on subsequent growth through use of a cross-country fixed effects panel framework that can control for time-invariant unobserved heterogeneity. They find that gender gaps in both education and labor force participation negatively affect growth, although the results are not always significant when both variables are included, presumably due to multicollinearity. In reduced samples that focus on particular regions, however, the results are significant and estimate growth costs of gender gaps that are particularly sizable in South Asia and the Middle East. In the Middle East, the employment gaps are more important for growth than the education gaps, whereas in South Asia the reverse is seen. In this sense and in the estimated magnitudes, results are quite similar to the model-based estimates of Cuberes & Teignier (2016).

At the subnational level, Berta Esteve-Volart (2009) has found significant negative effects of gender gaps in employment and managerial positions on economic growth of India's states on the basis of panel data and controlling for endogeneity by using instrumental variables.

Some articles by Seguino (2000a,b) support the contention that the combination of small gender gaps in education and employment with large gender gaps in pay (and resulting low female wages) was a contributing factor to the growth experience of export-oriented, middle-income countries. Supporting this empirical claim is a study by Busse & Spielmann (2006) that finds for a sample of 23 developing countries that a combination of small gender gaps in education and employment and large gender gaps in pay helped promote exports. Unfortunately, Seguino's analysis is based on a small sample of semi-industrialized countries, and the measures of gender wage gaps are rather crude. In fact, Schober & Winter-Ebmer (2011) show that the results disappear or even reverse if arguably more robust measures of gender wage gaps are used; thus, these findings cannot be considered robust at this stage.[14]

4.3. Gender Gaps in Social Institutions and Laws

A recently emerging (and far from settled) literature analyzes the impact of gender inequality in social institutions and laws on economic performance or its proximate determinants. Branisa et al. (2013, 2014) and Yoon & Klasen (2018) have shown that gender inequalities in social institutions related to gender are indeed important drivers of female education, fertility, and child mortality. Ferrant & Kolev (2016) show that higher gender inequality in social institutions is associated with worse growth outcomes, over and above the effect this has on educational and labor force gaps. Similarly, Hallward-Driemeier et al. (2013b) provide evidence that reducing legal gender gaps is associated with higher rates of female education and employment, as well as with higher marriage ages, although the effects appear to be smaller in poorer countries.

4.4. Micro-Level Assessments of Gender Gaps and Their Impacts

Apart from this aggregate literature, a micro literature has emerged on the impact of particular gender gaps on micro-level economic performance of households, farms, and firms. It is hard to summarize this disparate literature because it is often very context specific, uses many different indicators of economic performance, and is often linked to particular interventions. I focus on the areas where there appears to be some robust evidence.

One group of studies pioneered by Udry (1996) examines gender gaps in access to land, inputs, and technologies for agricultural production and their impact on farm productivity and finds them to be inefficient. In the case of Burkina Faso, an equal allocation of inputs between male and female farmers would boost output by 10–15% (Alderman et al. 1995). Goldstein & Udry (2008) examine the efficiency costs of insecure land rights for women in Ghana, which leads them to shorten the fallow period to maintain a claim on the land. The output costs of inefficiently short fallow periods are estimated to be 25% of output, and aggregated to all of Ghana, this equals 1% of GDP. A review of the accumulating evidence in this field of research shows that the output costs of these gender gaps in agriculture can be considerable (Croppenstedt et al. 2013). But the importance of these inequalities will greatly depend on region because they depend first on a sizable smallholder

[14]In the case of these studies, the focus on semi-industrialized, export-oriented countries was intended. But this means the studies avoid addressing the question of whether there is a more general relationship between pay gaps and growth in developing countries that do not belong to this small group.

agricultural sector and second on independent management of plots by males and females. These conditions are met in many parts of Africa and are particularly relevant in West Africa. However, in many Asian countries, agriculture is less important, and most plots are managed jointly by families so that the described inefficiencies can only apply to a minority of plots managed by women (e.g., widows or de facto female-headed households due to male migration).[15] In Latin America or the Middle East/North Africa, agriculture is much less important, and smallholders are often not the dominant organizational unit.

There is much less clear evidence of whether gender inequalities in access to inputs, credit, and labor also lead to inefficiencies among firms managed by males and females. The impact evaluation literature has generally shown that many interventions to promote small firms appear to have smaller effects on female rather than male entrepreneurs (McKenzie & Woodruff 2014);[16] whether these smaller effects for women are due to other (inefficient) gender gaps is an area of active research (e.g., de Mel et al. 2014, Field et al. 2010).

Lastly, there are robust findings from many contexts suggesting that greater female control and decision-making power within households promote the health and education of children, with positive repercussions for growth, closely related to the externality arguments of female education and employment mentioned above. The overwhelming finding of many studies is that, for children, the effect on household expenditures, health, and education outcomes of unearned incomes, credit, assets brought into marriage, or targeted transfers brought in by women is larger than the effect of such resources brought in by men (e.g., Pitt & Kandkher 1998; Pitt et al. 2006; Quisumbing & Maluccio 2003; Thomas 1990, 1997; World Bank 2001, 2011). Simulations by King et al. (2009) show that the effect of such interventions to increase women's incomes on economic performance and mortality reduction can be sizeable.

Political decision-making power also matters. In particular, studies by Bhalotra & Clots-Figueras (2014), Chatthopadhyay & Duflo (2004), and Duflo (2012) have found evidence that women's political empowerment promotes the provision of public goods, better human capital, and lower child mortality in India. These outcomes are, of course, valuable in and of themselves but also have an indirect impact on growth. In fact, Baskaran et al. (2017) show that electing female state-level leaders in India has a sizable positive impact on growth in their constituencies. Similarly, King et al. (2009) produce simulation results showing that women's political empowerment can have sizable development impacts through its effect on income growth as well as on mortality reduction. As most of these findings are based on quasi-experimental results from India, it is an open question whether they will carry over to other contexts.

In summary, the micro evidence has shown a range of contexts in which gender gaps also produce inefficiencies and lower economic performance. The findings are by nature more context specific and depend on the particular constraint faced by women in a specific local context. Although one can readily assess the micro impact of these constraints, it is harder to assess their aggregate impact on economic performance due to the role of spillovers and general equilibrium effects.

[15] In fact, Croppenstedt et al. (2013) focus on documenting sizable differences between male- and female-headed households in all developing regions. The incidence of female-headed households differs substantially across regions and is again particularly high in Africa.

[16] Exceptions are Bulte et al. (2017) and McKenzie & Puerto (2017) who find positive effects of training programs on female entrepreneurs in Vietnam and Kenya, respectively. However, neither study compares results with training for males, as the programs were targeted at females.

5. CONCLUSIONS

This review has shown that analyzing the impact of gender inequality on economic performance is not trivial, and all methods to do so have advantages as well as shortcomings. As a result, it is critical to consider several methods when examining this issue, ranging from theoretical modeling via cross-country econometrics to well-identified micro assessments.

Based on this approach, a wealth of theoretical literature and most empirical literature show that gender gaps in education reduce economic growth, with the effects being sizable and robust. There is much less literature on employment gaps, with most of the few studies suggesting that employment gaps reduce growth. Here, there is scope for much more careful econometric analyses of this link through the use of improved data and methods and by testing particular mechanisms. Similarly, a wealth of micro evidence suggests that gender gaps reduce efficiency of farms and firms and reduce household investment in human capital. The relevance and scope of these findings for different country contexts are not always clear and should be an important focus of future research.

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