

IMF STAFF DISCUSSION NOTE

Women in the Labor Force: The Role of Fiscal Policies

Stefania Fabrizio, Anna Fruttero,
Daniel Gurara, Lisa Kolovich, Vivian Malta,
Marina M. Tavares, and Nino Tchelishvili

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INTERNATIONAL MONETARY FUND

Strategy, Policy, and Review Department

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JEL Classification Numbers:

D15, J16

Keywords:

Female labor force participation; gender-responsive fiscal policy; inequality; labor productivity; overlapping generations general equilibrium model; poverty

Authors' E-mail Addresses:

SFabrizio@imf.org; AFruttero@imf.org;
DGurara@imf.org; LKolovich@imf.org; VMalta@imf.org;
MMendesTavares@imf.org; NTchelishvili@imf.org

¹ Research assistance was provided by Sibabrata Das, Angelica Martinez, and Carine Meyimdjui and production assistance by Natalia Romanova and Elisavet Zachou. The note draws on research produced under the project on macroeconomic research on low-income and developing countries (project id: 60925) supported by the UK Department for International Development (DFID). The views expressed herein are those of the authors and should not be attributed to the IMF, its Executive Board, or its management.

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EXECUTIVE SUMMARY

Despite the increase in female labor force participation over the past three decades, women still do not have the same opportunities as men to participate in economic activities in most countries. The average female labor force participation rate across countries is still 20 percentage points lower than the male rate, and gender gaps in wages and access to education persist. As shown by earlier work, including by the IMF, greater gender equality boosts economic growth and leads to better development and social outcomes. Gender equality is also one of the 17 United Nations Sustainable Development Goals that 193 countries committed to achieve by 2030.

Since the mid-1980s, many countries have adopted fiscal policy measures to promote gender equality. Countries use tax and expenditure policies to address gender inequality and the advancement of women in areas such as education and economic empowerment. As of 2018, at least 80 countries have used gender-responsive fiscal policy interventions to reduce gender inequality.

This note explores how gender-responsive fiscal policies affect women's participation in the paid workforce (female labor force participation), gender wage gaps, economic growth, income inequality, and poverty in both advanced economies and low-income countries.

Understanding the effects of gender-responsive fiscal policies not only on gender inequality but also on other macroeconomic and social variables is essential for policymakers in designing effective and sustainable gender-responsive fiscal policy measures, particularly in a fiscally constrained environment. Focusing on selected interventions, the note examines (1) the macroeconomic and distributional consequences of fiscal policy interventions aimed at fostering women's entry into the labor market; and (2) the channels and mechanisms through which these policies affect female labor force participation, growth, inequality, and poverty, given the structural characteristics of advanced economies and low-income countries.

For illustrative purposes, the note zooms in on selected fiscal interventions that are regarded as promoting gender equality in advanced economies and low-income countries (IMF 2018a). For advanced economies, it focuses on reducing the cost of childcare, providing publicly financed maternity leave, and removing tax provisions that discriminate against secondary (predominantly female) earners. For low-income countries, the note analyzes the impact of investing in education, providing cash transfers to poor women in the labor force, and investing in infrastructure (for example, clean water) to provide a level playing field for women.

The findings confirm that these gender-responsive fiscal policies can support female labor force participation and have important macroeconomic and distributional effects. The scope of the analysis is to shed light on the key channels through which policies impact women's participation in the paid workforce, economic growth, income inequality, and poverty, rather than considering trade-offs among the different measures and ranking them. The impact and the transmission channels of the different fiscal interventions depend on both the design of the measures and a country's features, such as its level of development, labor market and economy

structures, education gaps between men and women, and the degree of discrimination against women's economic empowerment. The results of our illustrative analysis suggest the following:

- In advanced economies, removing tax provisions that discriminate against secondary earners would have a very significant positive impact on female labor force participation for all women and for economic growth, at no fiscal cost in the long run. The measure would also increase the progressivity of the tax system, with a positive impact on both inequality and poverty. However, this measure could potentially have a negative impact on some married, single-earner households. Subsidizing childcare and providing paid maternity leave would boost economic activity supported by an expansion of female labor force participation, mostly among women with low and moderate skills.
- In low-income countries, investing in education and in infrastructure projects that have higher return for women, such as for safe water, would have the largest economic and social payoffs while boosting female labor productivity. While investing in education is important for shaping future labor force productivity providing cash transfers to poor women in the labor force can help reduce poverty in the meantime.

INTRODUCTION

1. The global average gap between male and female labor force participation rates has declined over the past 30 years, yet differences across countries are striking. Globally, the gap decreased from 27 percentage points in 1990 to 20 percentage points in 2018. However, during the same period, while four-fifths of countries saw the gap decrease or remain steady, the gap increased in the remaining 20 percent of countries due to declines in female labor force participation.²

For example, female labor force participation increased in Peru (28 percentage points), Spain (27 percentage points), Cabo Verde (25 percentage points), and Maldives (23 percentage points) but declined in Papua New Guinea (25 percentage points), Sri Lanka (11 percentage points), China (10 percentage points), and Romania (8 percentage points). Furthermore, in 2018, the gender gap in labor force participation in 37 countries exceeded 35 percentage points.

2. Higher female labor force participation directly promotes economic growth. Women's economic empowerment is key for growth both through the direct impact of the size of the labor force on output and the impact on productivity (Cuberes and Teignier 2016) and through higher domestic demand. Greater participation of women in the labor force also brings greater diversity that can foster new ideas for production and management, boosting aggregate productivity (Ostry and others 2018; Christiansen and others 2016a; Loko and Diouf 2009). A wide range of country and regional case studies provides further support for the positive relationship between female labor force participation and growth. For example, the entry of married women greatly expanded potential GDP in the United States in the 1970s and the 1980s (Juhn and Potter 2006). Tsani and others (2013) show that removing barriers to female labor force participation could have a significant positive impact on growth in Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine, Syria, Tunisia, and Turkey. Increased female labor force participation could also support growth in rapidly aging developed economies such as Japan (Steinberg and Nakane 2012). In addition, the International Labour Organization estimates that reducing the gender gap in participation 25 percent by 2025 could boost global GDP 3.9 percent (ILO 2017).

3. Higher female labor force participation also reduces income inequality and poverty. Gender inequality in economic opportunities is associated with a more unequal overall income distribution; if a country were to move from complete gender inequality, as measured by the United Nations Gender Inequality Index, to perfect gender equality, net income inequality as measured by the Gini coefficient would decrease by approximately 10 points (Gonzales and others 2015). Growth in women's labor market earnings and higher participation rates, along with the introduction of noncontributory pension programs for women, were the main factors that contributed to the reduction in Latin America's poverty in the first decade of the 2000s (World Bank 2012).

4. Gender equality in its various facets is associated with higher growth; thus, lower gender gaps in labor force participation also raise growth. For low-income countries, a reduction

² Our sample comprises 190 countries for which information on labor force participation is available in the World Bank World Development Indicators.

in gender inequality of 1 percentage point, as measured by a multidimensional index that combines gender gaps in opportunities and outcomes, is associated with higher cumulative growth, over five years, of 0.2 percentage point (Hakura and others 2016). Greater gender equality in education can also impact economic growth. Meta-analysis of the empirical literature on the link between gender inequality in education and per capita economic growth shows that studies that include education by gender as separate covariates in growth regressions report larger correlation sizes of female than male education with growth (Minasyan and others 2019). The importance of investing in women's education is also underscored by the finding that in Korea higher female labor force participation reduced productivity as women initially started with lower human capital (Han and Lee 2020).

5. Fiscal policy is a powerful tool to close gender gaps. In advanced economies, childcare subsidies, paid parental leave, and a shift from household to individual tax filing have been used to encourage female labor force participation (Andresen and Havnes 2019; Bick and Fuchs-Schündeln 2017; Gelbach 2002; Kalb 2018; Christiansen and others 2016b, c). In developing economies, investing in female education and in infrastructure (including electricity, roads, water and sanitation) that reduces the time women spend on household production has yielded positive results in terms of female labor force participation (Cubas 2016; Dinkelman 2011; Ilahi and Grimard 2000; Jain-Chandra and others 2018)³. Cash transfers are also shown to have a positive effect on female labor force participation.⁴

6. Yet, there is little understanding of the transmission channels through which fiscal policy addresses gender inequality. Empirical evidence suggests that there is a short-term correlation between fiscal policy shocks and female labor force participation (Akitoby, Honda, and Miyamoto 2019). Beyond these short-term correlations, however, it is imperative to understand the long-term effects of fiscal policy on gender inequality, the transmission channels, and possible interactions with macroeconomic and social variables, so that policymakers can design effective and sustainable gender-responsive fiscal policies. However, much of the literature has focused on processes and case studies,⁵ and to date there have been few studies analyzing the causal links and the transmission channels between fiscal policies and gender equality outcomes.

7. This note aims to shed light on the impact and transmission channels of gender-responsive fiscal policies regarding gender inequality and economic and social outcomes. It uses general equilibrium models that reflect features of a typical advanced economy and of a low-income country. Given the extensive heterogeneity among emerging market countries in terms of their macroeconomic and structural features, including gender-related outcomes, it is not possible to settle on a representative case for parametric estimation. Thus, while the parametrization does

³ See also Lei, Desai, and Vanneman (2019), and Minasyan and others (2019).

⁴ See Salehi-Isfahani and Mostafavi-Dehzoeei (2018), Mostert and Castello (2019), and Asfaw and others (2014).

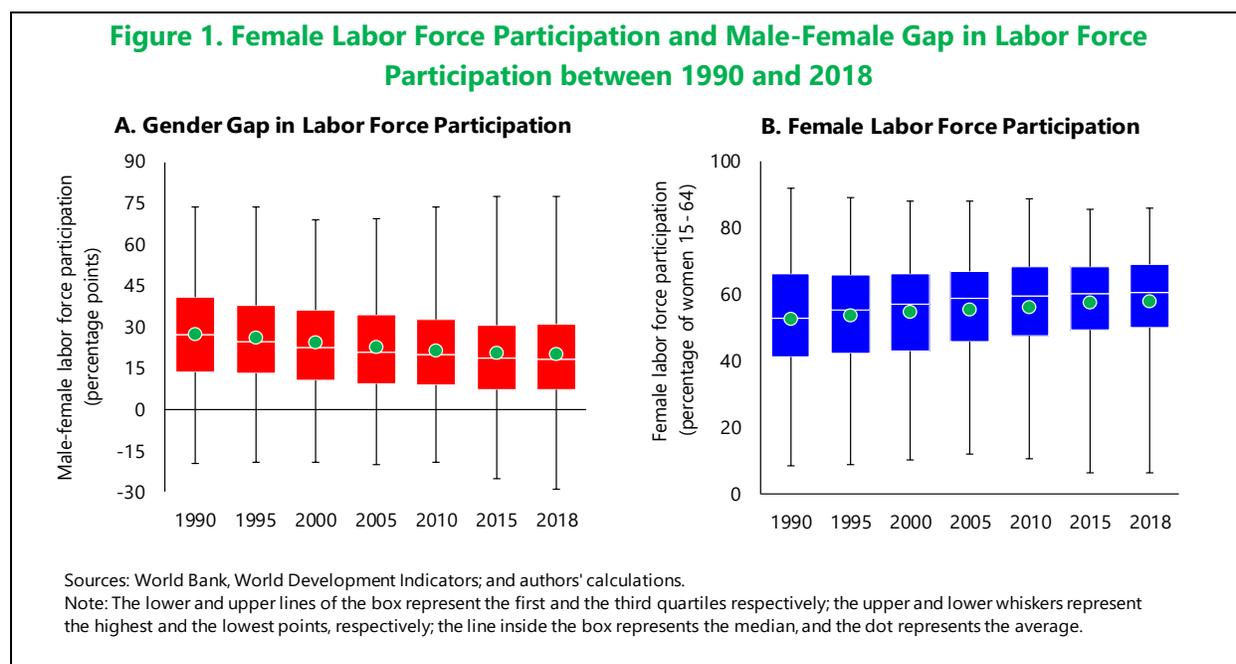
⁵ For instance, Stotsky and Zaman (2016) show that Indian states that adopted pro-female fiscal policies have made more progress on gender equality in primary school enrollment than those that have not adopted such policies.

not include emerging markets, issues related to gender inequality in such countries have features similar to those in advanced economies, low-income countries, or both, depending on the country in question, and lessons can be inferred from the examples considered. This note analyzes the impact of selected gender-responsive fiscal policy interventions and examines the mechanisms through which the policies affect female labor force participation, wage gaps, GDP growth, public fiscal balances, income distribution, and poverty.⁶ This provides essential information for policymakers, who, in a fiscally constrained environment, intend to adopt fiscal policy measures to empower women economically and, at the same time, need to tackle other economic and social priorities, such as sustainable and inclusive growth, inequality, and poverty.

8. The rest of the note is structured as follows. The next section provides stylized facts on female labor force participation. The section after that describes the modeling framework and discusses the impacts of selected gender-responsive fiscal policies in advanced economies and low-income countries. The last section offers the main policy lessons.

FEMALE LABOR FORCE PARTICIPATION: STYLIZED FACTS

A. Developments in Female Labor Force Participation

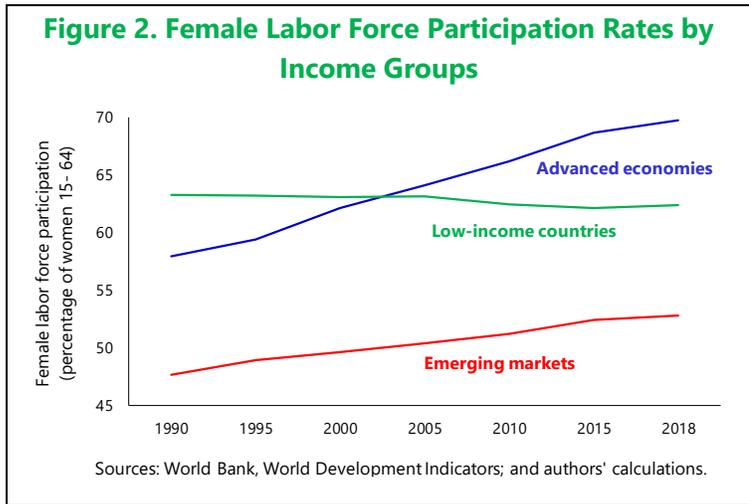


9. Although the gender gap in labor force participation has declined substantially over the past 30 years, average female labor force participation remains well below the male rate.

⁶ A comprehensive assessment of all gender-responsive fiscal interventions is beyond the scope of this note.

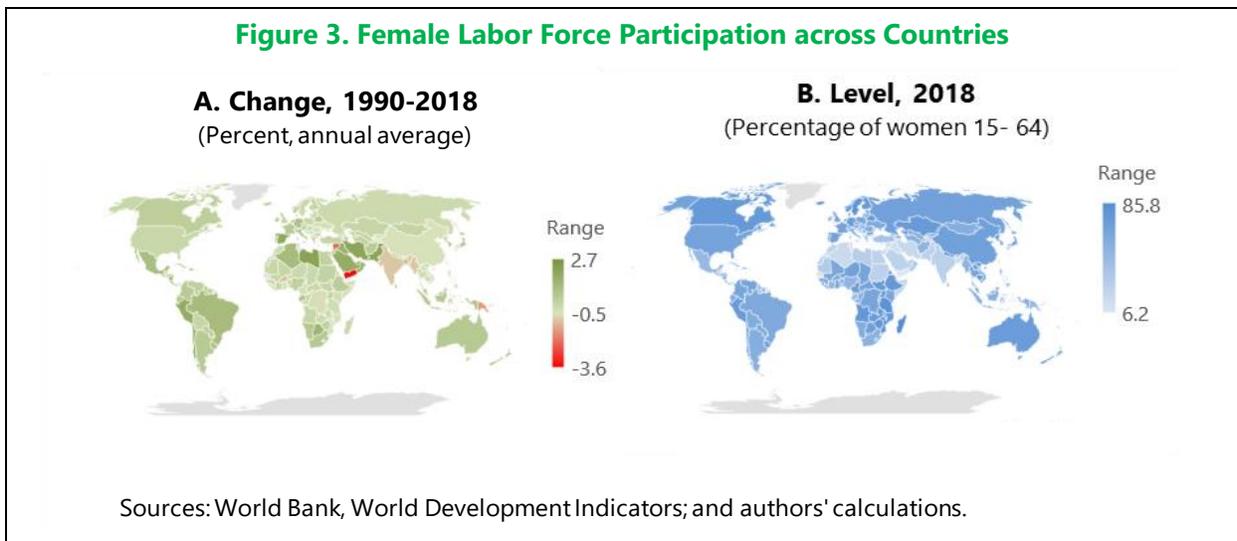
Increased female labor force participation and stable male labor force participation led to a 7 percentage point decline in the global gender gap in labor force participation, which fell to

20 percentage points in 2018 (Figure 1, panel A). However, on average only 60 percent of 15- to 64- year-old women were in the labor force in 2018 (Figure 1, panel B) compared with 80 percent of men. In 21 countries, including India, Pakistan, and Egypt, female labor force participation was below 30 percent.



10. The global rise in female labor force participation has been

driven mostly by changes in advanced economies and emerging markets (Figure 2). In 2018, advanced economies as a group had the highest female labor force participation rate, at 70 percent, which reflects an increase of 12 percentage points over the past two decades. Rates remained relatively stable in low-income countries, at about 63 percent. In emerging markets, the average rate increased by 5 percentage points but remains substantially lower than in advanced economies and low-income countries. Higher female labor force participation was driven mostly by labor market policies, structural transformation, gains in educational attainment, and shifts in social norms (Grigoli, Koczan, and Topalova 2018; Klasen 2019).



11. Averages mask important differences across countries. Female labor force participation varied widely (Figure 3) across countries, from 15 percent in Algeria and Jordan to 86 percent in Iceland. This reflects historical differences in economic and social structures that have affected

women's economic opportunities (Klasen 2019). Countries also differ greatly in the growth of female labor force participation since 1990. Globally, about one-quarter of countries have experienced declining female labor force participation. Countries such as India and Sri Lanka faced an average annual decrease of 1 percent between 1990 and 2018, whereas Pakistan, Peru, and Spain experienced average annual increases of 2 percent.

12. Trends in female labor force participation are affected by factors such as household economic conditions, growth of jobs deemed socially appropriate for more educated women, and occupational barriers within the sectors that predominantly employ women (Klasen 2019). Social norms and legal barriers thus play significant roles in explaining the variations in female labor force participation. For example, an Organisation for Economic Co-operation and Development (OECD) report (2019) points out that 88 countries prohibit women from entering certain professions, 32 countries prohibit women from remarrying within a specified period after a divorce, and 29 countries do not grant female surviving spouses and daughters the same rights as their male counterparts to inherit land and nonland assets. Moreover, despite legal requirements on the minimum age for marriage in most countries, early marriage remains possible in 112 countries due to parental or judicial consent exemptions. Deprived inheritance rights and early marriage affect female labor force participation by constraining women's prospects to invest in their human capital or use such capital in the formal labor market.

B. Gender-Responsive Fiscal Policies

13. Fiscal policies have been used extensively to boost overall employment. They can play an important role in promoting labor market entry due to the link between labor supply and income (IMF 2012). Many fiscal policy reforms aim to boost employment for both women and men, but some are directly focused on boosting female labor force participation. For various reasons, related also to social norms, women face specific barriers to entering and remaining in the labor market, resulting in low labor force participation. Yet, there is ample evidence that when women can develop their full potential, there can be significant macroeconomic gains (Elborgh-Woytek and others 2013).

14. Fiscal policy interventions can be shaped to help improve gender equality. Since the mid-1980s, many countries have adopted gender budgeting—the design and use of tax and expenditure policies and/or public financial management instruments to address gender inequality and the advancement of women in areas such as education, health, and economic empowerment (Box 1). Several international organizations, including the IMF, provide policy advice and technical assistance to countries in this area.⁷ As of 2018, more than 80 countries had adopted gender budgeting with varying levels of intensity (Kolovich 2018).

15. Empirical evidence for advanced economies suggests that income taxation has a significant impact on female labor force participation. The design of a country's tax system has both distributional and allocative effects—impacting the distribution of income across the

⁷ This note focuses on pro-female fiscal policy measures; it does not cover the broader approach to gender budgeting, which includes budget institutions.

population, including between women and men, as well as individuals' decisions about working in the informal or formal sector. In countries with a system of joint taxation, the incomes of husband and wife are pooled and then taxed using a set of tax brackets that are typically wider than the brackets for unmarried individuals. The after-tax return from taking a job is lower for a married woman, who often is the secondary (lower) earner within the couple, than for an otherwise similar single woman (LaLumia 2017). For instance, using a sample of 17 European countries and the United States, Bick and Fuchs-Schündeln (2017) show that female labor supply would have been higher by almost 8 percent in the United States and 35 percent in Belgium in the absence of joint taxation. Cross-country correlations for advanced economies show a negative relationship between female labor force participation and taxation of the secondary earner in married couples (Figure 4).

Box 1. Gender Budgeting to Promote Gender Equality

Gender budgeting allows fiscal authorities to ensure that tax and spending policies and public financial management instruments address gender inequality and the advancement of women in areas such as education, health, and economic empowerment (Budlender and Hewitt 2003; Budlender and Sharp 1998; Elson 2003; Stotsky 2006, 2016; IMF 2017a, 2020; Kolovich 2018). It helps governments analyze fiscal policies (revenue and expenditure) and budgetary decisions to understand their impact—both intended and unintended—on gender equality and to use this information to design and implement more effective fiscal policies to support gender equality. Such approaches can be applied at all stages of the public financial management cycle. IMF research has examined gender budgeting across all regions and levels of development (Kolovich 2018), including through an in-depth study of gender budgeting in Group of Seven countries (IMF 2017a) and a forthcoming study on G20 countries (IMF, forthcoming). This body of work highlights the contribution of well-structured fiscal policies and sound budgetary institutions to gender equality. Countries should adopt fiscal policy instruments tailored to their particular gender gaps. To help support these policies, countries should integrate a gender-oriented approach into the public financial management cycle.

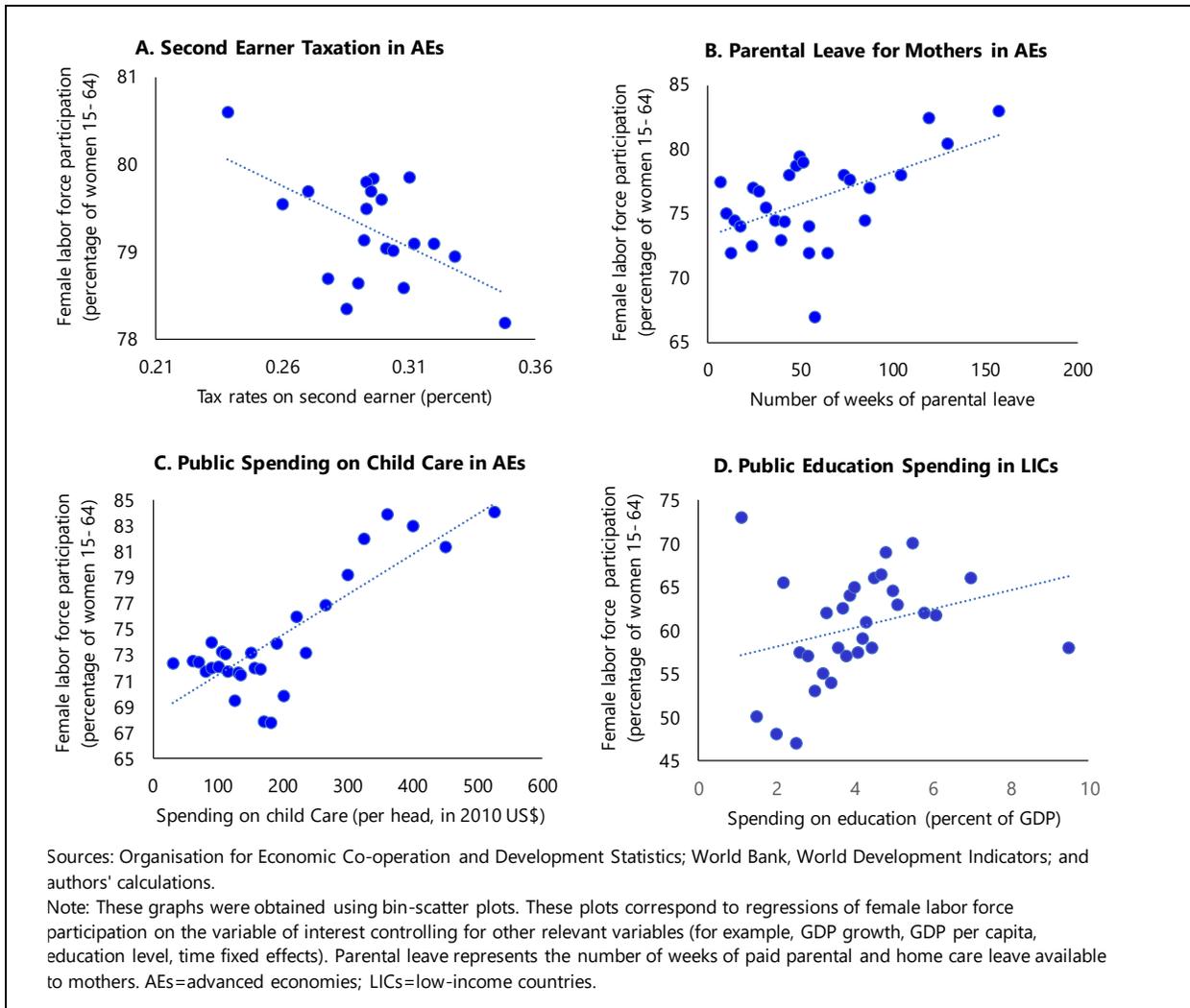
Countries have taken diverse approaches to gender budgeting, and there is no one-size-fits-all method. To gain a better understanding of cross-country good practices, the IMF, in collaboration with the UK Department for International Development, surveyed all member countries on their gender budgeting practices in 2015. Two years later, an in-depth survey, used in recent studies (IMF, forthcoming), gathered data from over 70 countries. The results from these analyses identified several factors that contribute to the success of gender budgeting efforts. They generally include political support for better gender equality, a legal basis for gender budgeting, and the support of the Ministry of Finance and senior-level management within spending ministries. Countries, however, also highlighted gender budgeting implementation challenges, including lack of guidance on how to incorporate gender considerations into the annual budget, the poor quality of gender analysis and assessments, the lack of gender disaggregated statistical data, and weak coordination across ministries.

The IMF has worked with over 60 countries through training, technical advice, and peer learning workshops to help operationalize policy advice and research and to disseminate good gender budgeting practices. Close collaboration with UN Women has led to numerous joint training courses and peer learning workshops on gender budgeting at regional technical assistance and training centers, and with country authorities. In addition, the IMF has provided technical assistance to individual countries on integrating gender budgeting into public financial management institutions and implementing gender budgeting (for example, Albania, Austria, Cambodia, Ethiopia, Niger, and Ukraine). The IMF continues to work on gender budgeting issues as part of a broader effort to promote gender equality and inclusive growth.

16. Policies such as subsidized childcare and paid parental leave have a positive impact on female labor force participation, especially in advanced economies. In Norway, for instance, the expansion of universal childcare for toddlers increased the likelihood of married or cohabiting mothers' employment by 32 percentage points vis-à-vis the baseline participation rate of 63 percent (Andresen and Havnes 2019). Parental leave policies are also an important instrument for supporting work-life balance. Blau and Kahn (2013) show that parental leave had positive effects on female labor force participation in OECD countries. Figure 4 shows the positive correlation in a cross-country regression of female labor force participation and the number of parental leave days available to mothers and public spending on childcare.

17. Providing greater educational opportunities to women can boost female labor force participation in low-income countries. Policies that support girls' education have contributed to the increase in female labor force participation (Heath and Jayachandran 2017); underdeveloped human capital is a key binding constraint for women entering the labor force. Figure 4 shows a positive correlation between female labor force participation and education spending in low-income countries.

Figure 4. The Positive Impact of Selected Fiscal Policies on Female Labor Force Participation



18. Expanding access to infrastructure services also has a significant effect on easing entry into the labor market. In South Africa, for instance, rural electrification raised female labor force participation by about 9 percentage points and simultaneously increased the hours worked by women already in the labor force by about 4 to 15 percent (Dinkelman 2011). Similarly, in rural India, better access to roads and more frequent bus service have raised female labor force participation above that of men (Lei, Desai, and Vanneman 2019). Koolwal and van de Walle (2013) show that improved access to water is correlated with a lower burden of unpaid nonmarket work, freeing up women’s time to participate in income-generating activities.

GENDER-RESPONSIVE FISCAL POLICIES AND THEIR MACROECONOMIC AND DISTRIBUTIONAL IMPACTS

19. This section explores how gender-responsive fiscal policy measures affect gender inequality, economic growth, public finances, income inequality, and poverty. Drawing on the

work of Chade and Ventura (2002); Guner, Kaygusuz, and Ventura (2012, 2019); and Malta, Martinez, and Tavares (2019), two overlapping generation general equilibrium models are calibrated to replicate the prominent macro- and microeconomic characteristics of a representative advanced economy and a low-income country. The models simulate the impact of various gender-responsive fiscal policy interventions and analyze the channels and mechanisms through which these measures affect labor force participation, gender wage gaps, economic growth, public finances, income inequality, and poverty. The analysis provides insight into which policies could most effectively achieve multiple objectives for the two groups of countries. Below, we describe the main assumptions and features of the models, with technical details provided in the annex. This section also provides an illustrative analysis of how the impact of these measures could change if discriminatory social norms were reduced.

20. The advanced economy model is a life cycle model in which households make joint consumption, labor supply, and saving decisions. Households differ in their initial education levels and have varying costs related to the female partner in households participating in the labor market. These costs depend on family characteristics. Female human capital is endogenously calculated: it grows when women work, and it depreciates when they do not. Households have children and face child care costs when women work. The government collects a progressive labor income tax, social security contributions, and capital tax and spends on childcare and government consumption. Household members of both sexes retire when they reach old age and receive a pension that depends on their initial level of education.

21. In this framework, women face various challenges to achieving their full potential throughout their lives. These include: (1) initial lower productivity (which reflects a wage differential at the beginning of their working life); (2) the costs of taking care of the home and family (represented by a utility cost and financial cost for families when the women work); and (3) a tax system that penalizes the secondary earner (who is typically the female partner).

22. Similarly, the lower-income country life cycle model features heterogeneous agents and captures key characteristics of a typical low-income country. The framework is based on a small open economy model, with formal and informal sectors, in which the government collects taxes on formal labor income, consumption of formal goods, and formal firms' profits. It spends on education, formal goods, and cash transfer programs. Families go through three phases of life: as young adult parents, adults, and seniors. In addition to gender and generation, agents differ from one another in initial income and skill level. Throughout their lives, families choose how much to consume of each of the goods, how much to work in the formal and informal sectors, and how much to save (if they have enough income to save).

23. In this framework, women face various barriers to economic empowerment throughout their lives. These include: (1) less education;⁸ (2) the costs of taking care of the home and family (represented by a utility cost for families with the female partner working); and (3) gender

⁸ The analysis assumes only public education.

discrimination in the labor market (manifested in lower returns to experience, fewer job opportunities, and pay gaps).

24. The models are calibrated for countries with features of typical advanced economies and low-income countries, as discussed in the previous section, and allow for analysis of the impact of specific gender-responsive fiscal interventions. The analysis is meant to shed light on transmission channels that can be considered representative of the country groups. The size of the impact of the various measures, which is country-specific and subject to model assumptions, should be considered only for illustration purposes.

- **The advanced economy model is calibrated to the United States.** The United States has subsidized childcare programs, but costs are on average higher than in other OECD countries. Paid parental leave is provided, but it is not universal and is less than the OECD average of 18 weeks. In addition, in the United States, families may file taxes jointly or individually, which offers a good case study for analysis of the impact of switching from joint to individual tax filing.
- **The low-income country model is calibrated to Senegal.** Senegal exhibits the characteristics of a typical low-income country, including a sizable gender gap, high informal sector employment, low levels of education, and predominance of the agricultural sector.⁹ In addition, as in many other low-income countries, women in Senegal face additional penalties in the labor market, including lower returns from experience and other “unexplained” gender pay gaps.¹⁰

⁹ Average years of education of the workforce are lower than for the average low-income country.

¹⁰ “Unexplained” pay gap is the portion of the wage gap that cannot be explained by observed data, such as education differentials, location, type of work, years of experience, and so on. Unexplained wage gaps are associated with labor market discrimination. For a thorough analysis of Senegal’s gender gaps, see Malta, Martinez, and Tavares (2019).

A. Gender-Responsive Fiscal Policies in Advanced Economies

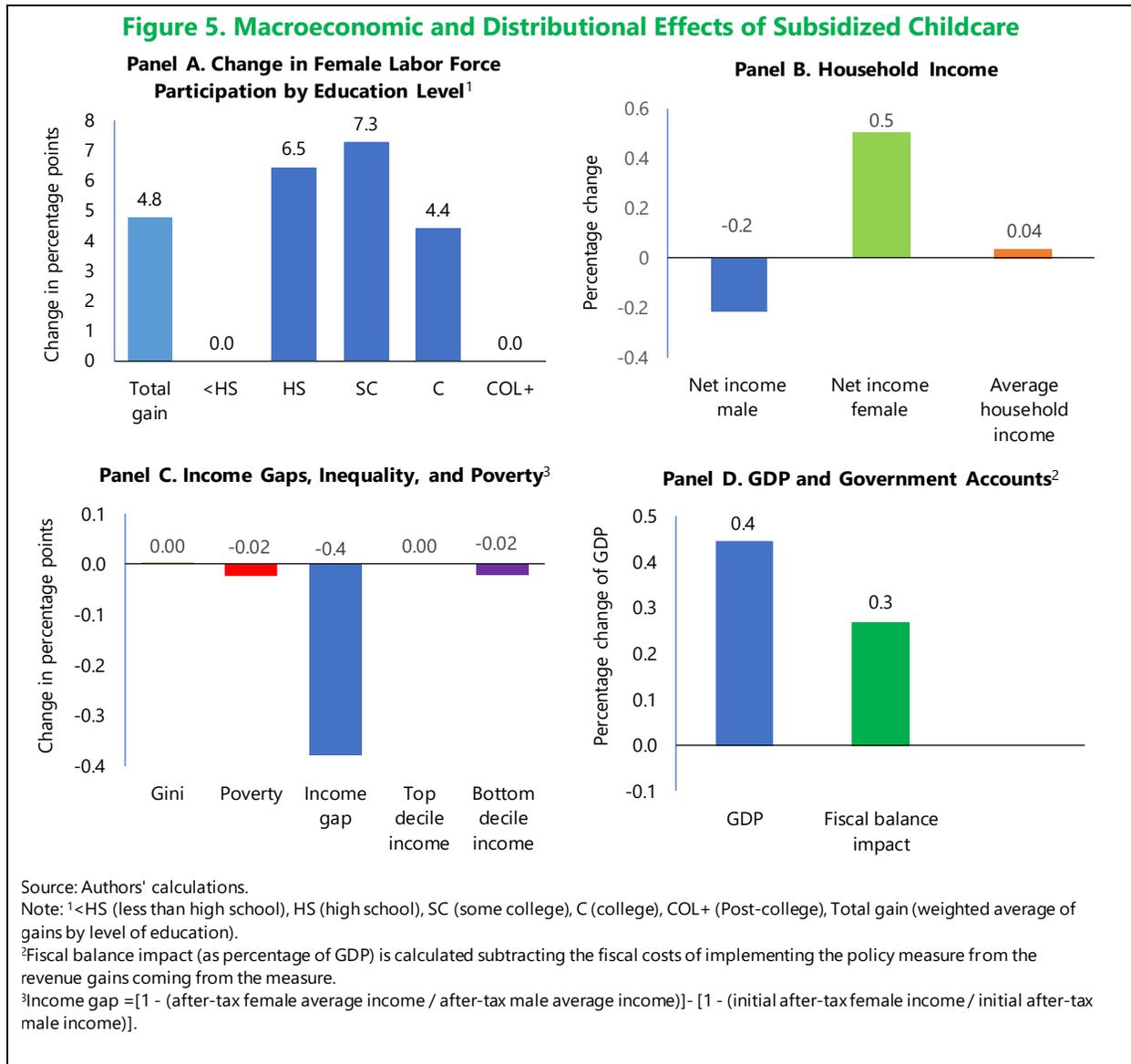
25. We analyze the impact of three gender-responsive fiscal policy interventions that are widely used to tackle gender inequality: subsidized childcare, paid maternity leave, and individual income tax filing. Each of these policies has the potential to increase female labor force participation and hours worked by women (see, for example, Andresen and Havnes 2019; Kalb 2018; Bick and Fuchs-Schündeln 2017). These policies have also been recommended extensively by the IMF (IMF 2018a), among other institutions. Depending on their design, these policies can target different segments of the female population. For example, on a relative basis, maternity leave and childcare costs would benefit women with little education (who face higher childcare costs as a share of potential labor earnings) more than women with higher education (and hence income). Changing the unit of taxation would, however, positively impact high-skilled women more—while it would benefit all women, high-skilled women are often married to high-skilled men, which can amplify the impact of joint taxation. These variations on which subset of women benefits more from a given policy can, in turn, have different effects on overall productivity, growth, public finances, inequality, and poverty. Later in this note, we draw on models to trace out these effects by considering several policy interventions.

Subsidized Childcare

26. Our model simulations suggest that reducing the cost of childcare by half for all middle-class working mothers of preschool children increases female labor force participation, particularly among low-income families (Figure 5).¹¹ These families comprise women with high school or lower levels of education and face relatively high childcare costs in relation to their earnings. Thus, reducing the cost of childcare for working mothers increases the return on participating in the labor market. When women participate in the labor market, they accumulate returns on experience, which also increases their income over their life cycle.

27. A greater pool of workers boosts economic growth and aggregate income, but has complex implications for the incomes of different segments of the population. A larger pool of workers reduces the average female wage as more low-skilled women (women with high school or less than high school education) enter the labor market, thus decreasing aggregate productivity. Overall household income increases in our model because more low-skilled women would have paid work. The increase in the overall labor supply because of greater female labor force participation also depresses economy-wide wage levels, including the wages of men with similar skills (due to the general equilibrium impact on wages). This result—of a complex impact on both male and female wages resulting from higher female labor force participation—matches the empirical findings of Acemoglu, Autor, and Lyle (2004).

¹¹ In the analysis, the cost of childcare per child is reduced from 10 percent of family income to 5 percent. Currently, the United States offers a federal government program, the Child Care Development Fund (CCDF), for poor families. The exercise in this subsection envisages that women who already benefit from CCDF would be excluded from the extension of childcare subsidies. The cost of this intervention is estimated at 0.6 percent of GDP.



28. This policy creates incentives (and means) for low-skilled women to enter the labor market and generally reduces poverty. The model shows that the share of the population below the poverty line decreases as more low-skilled women enter the labor market, increasing the earnings of individuals at the lower level of the income distribution. This, in turn, reduces poverty, though some individuals in the bottom decile could experience some reduction in wages without benefiting from lower child care costs. Households at the top of the income distribution are affected by this reform only marginally. Income inequality remains broadly stable.¹²

¹² It should be noted that if the analysis were to assume further subsidization of childcare (for example, for families currently eligible for CCDF), the impact on poverty and inequality could be much larger.

Providing Maternity Leave

29. **Instituting a paid maternity leave policy of 18 weeks, which is equivalent to the OECD average, would boost female labor force participation mostly among low-skilled women**

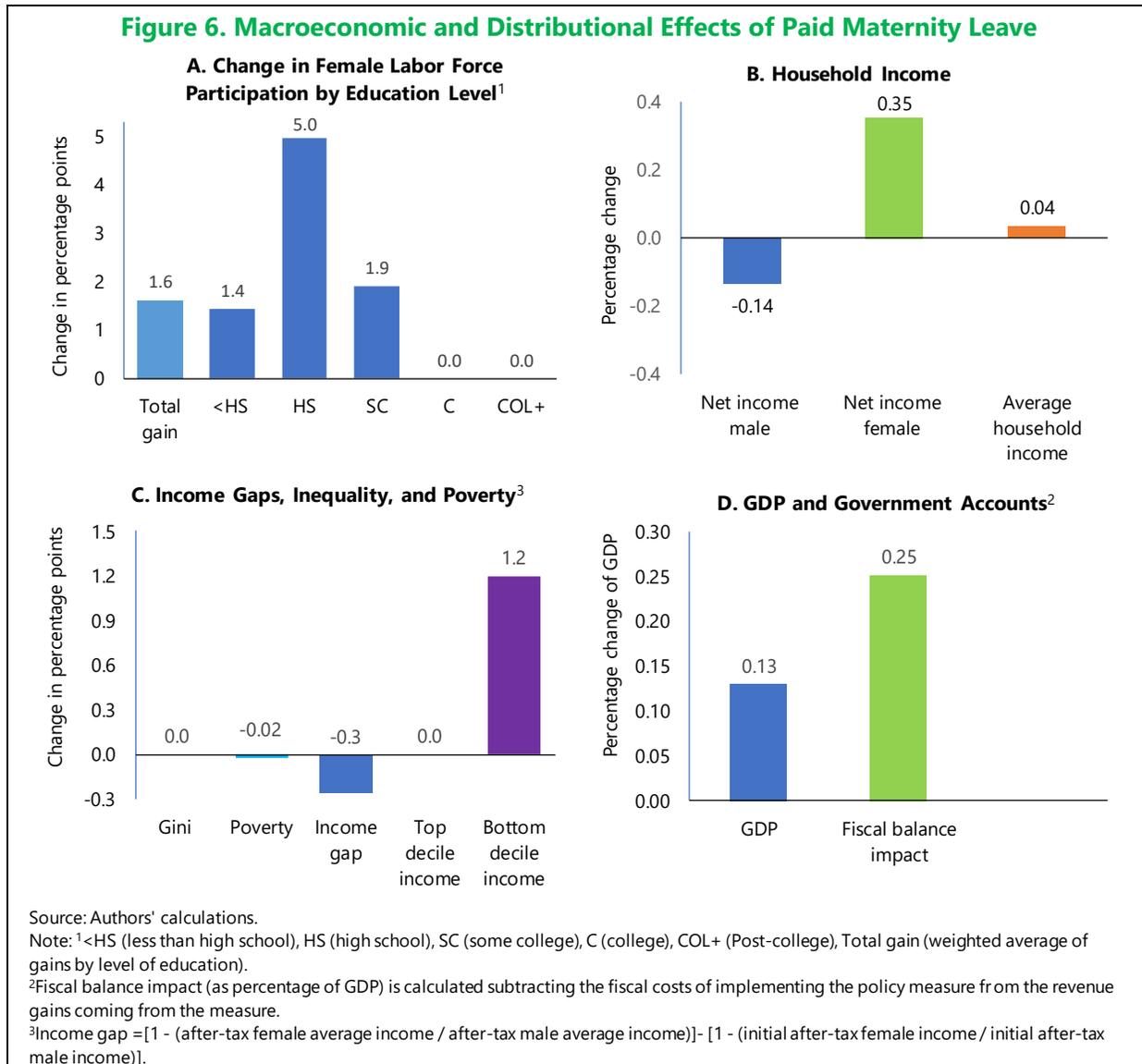
(Figure 6).¹³ Low-skilled women have on average more children and face relatively higher childcare costs (in relation to their income), especially when they do not qualify for subsidies.¹⁴ As a result, establishing parental leave would reduce the cost of participating in the labor force, particularly for low-skilled mothers of young children.

30. The higher level of female labor force participation boosts economic activity, but can also have large fiscal costs. Overall household income increases in our model due to a larger pool of human resources and the accumulation of high-skilled human capital. The policy has a slightly negative impact on men's wages due to the general equilibrium effects of higher female labor force participation on wages. However, the cost of instituting leave for all women could potentially be large (about 0.5 percent of GDP) as all new mothers, including high-skilled mothers with higher salaries, could use this benefit.

31. Establishing parental leave increases income, in particular for the poorest women, thereby reducing the share of the population below the poverty line. This policy improves inclusion as it benefits women at the bottom of the income distribution who face a relatively larger cost of child-rearing in the absence of parental leave. These results are consistent with the findings of Rossin-Slater, Ruhm, and Waldfogel (2013), who examined the effects of California's paid family leave program on labor market outcomes.

¹³ While we consider only the extension of maternity leave (due to modeling constraints), gender-neutral parental leave might have even stronger benefits for women by leveling the playing field and reducing discrimination against mothers (IMF 2018a). However, there is evidence that an excessively long period of parental leave (in particular maternity leave) could be detrimental to female labor force participation because it leads to detachment from the labor force (IMF 2018a; Ruhm 1998).

¹⁴ In the United States, married women with less than a high school education have on average 2.8 children, while married women with a college degree or more have on average 1.6 children. In addition, poorer families face higher costs of childcare as a share of their total income. According to Herbst (2015), using data from the Survey of Income and Program Participation (SIPP), families in the top quartile of the income distribution spend on average 7.8 percent of their income on childcare, while families in the bottom quartile spend 17.4 percent.



Changing to Individual Taxation

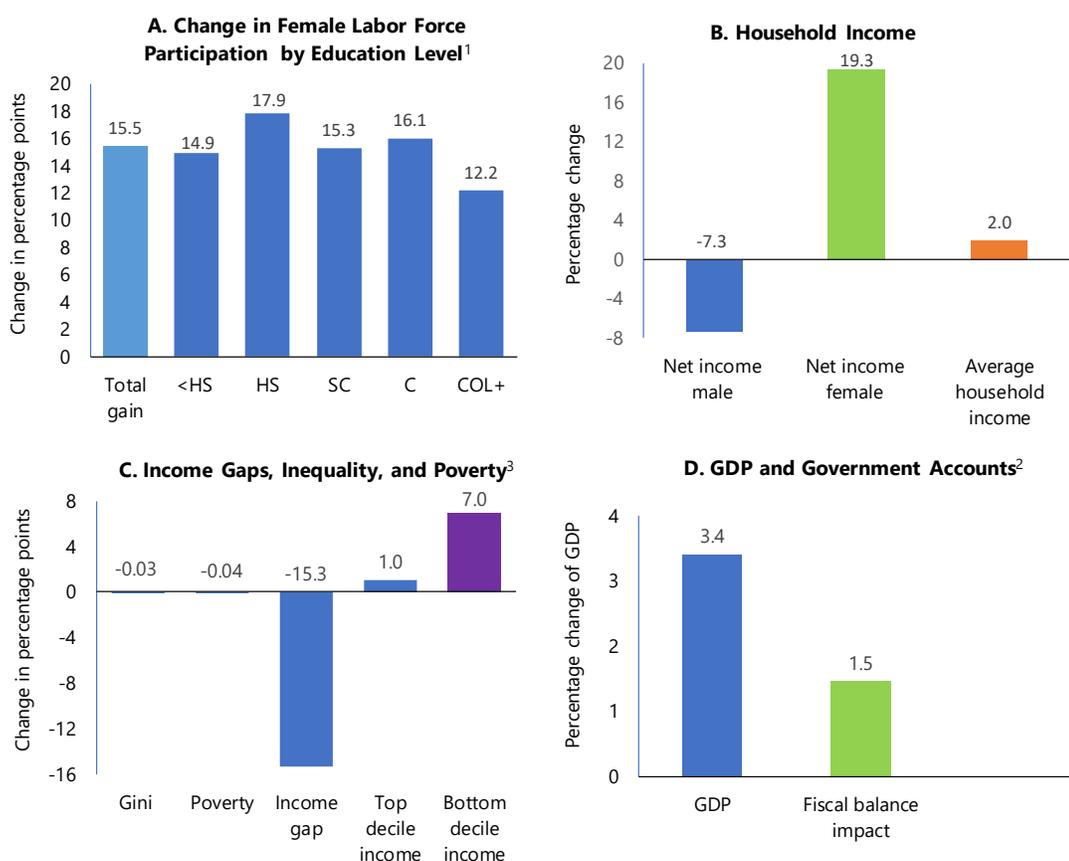
32. Changing the unit of taxation from the family to the individual benefits all working women in the economy.¹⁵ This policy reduces the marginal income tax of the secondary earner, often women, and increases the marginal income tax of the primary earner, often men. The decline in the marginal income tax of the secondary earner increases the return of participating in the labor force (extensive margin) and, among women who already participate, generates a large increase in

¹⁵ According to the Internal Revenue Service, fewer than 3 percent of married couples file under separate status in the United States. This is likely because various credits and tax breaks are available only for joint filing (examples include earned income credits, credits for adoption-related expenses, student loan interest deductions, and interest income from qualified US savings bonds used for higher education). There are other nonnegligible costs associated with switching from one system to the other.

the number of hours worked (intensive margin) (Figure 7). These results are in line with previous studies in the literature (Guner, Kaygusuz, and Ventura 2012; Borella, De Nardi, and Yang 2019).

33. The change in the unit of taxation stimulates economic activity and increases government revenue. More women join the labor market in our model, and women already employed increase their working hours. Men, on the other hand, reduce the number of hours worked somewhat due to the increase in the marginal income taxes. Overall, household income increases as the rise in women’s earnings compensates for the fall in men’s earnings. The policy also generates additional government revenue, with more individuals paying at higher tax brackets. However, some married, single-earner households could be negatively affected by this measure, depending on their income level, as the rate under the individual taxation could be higher.

Figure 7. Macroeconomic and Distributional Effects of Changing Income Taxation Filing from Jointly to Separately



Source: Authors' calculations.

Note: ¹<HS (less than high school), HS (high school), SC (some college), C (college), COL+ (Post-college), Total gain (weighted average of gains by level of education).

²Fiscal balance impact (as percentage of GDP) is calculated subtracting the fiscal costs of implementing the policy measure from the revenue gains coming from the measure.

³Income gap = [1 - (after-tax female average income / after-tax male average income)] - [1 - (initial after-tax female income / initial after-tax male income)]

34. The change in the unit of taxation reduces income inequality and poverty. Increasing the marginal income taxes of high earners makes the tax system more progressive. At the same time, the changes in the unit of taxation increase female labor force participation and hours worked among women at the bottom of the income distribution, leading to a lower share of the population below the poverty line.

B. Gender-Responsive Fiscal Policies in Low-Income Countries

35. This section examines the effects of selected gender-responsive fiscal policies in low-income countries.¹⁶ We consider three policy experiments: (1) closing the gender gaps in years of education between women and men at the same income level; (2) increasing spending on water infrastructure that benefits women in particular, as they spend more time fetching water than men;¹⁷ and (3) cash transfers to poor women participating in the labor market. We first trace out the impacts, as demonstrated by our model, of these measures on female labor force participation, income, fiscal budgets, inequality, and poverty.

Box 2. Previous IMF Policy Work on Gender Equality Using Similar Methodology

Since 2017, the IMF has been analyzing gender issues in its country work, using in several studies a model framework similar to the one applied in this note.¹ Country examples include Argentina (2017), Iran (2018), Nigeria (2019), and Lao P.D.R. (2019).

- *Argentina* (IMF 2017b): Female labor force participation has increased less than in its peer countries in the past decades, and discrimination in the labor market persists—the average wage gap between women and men with similar jobs, location, education and work experience is estimated at about 15 percent. The study finds that providing cash transfers to low- and middle-income working mothers could generate economic growth, boost government revenues and lower income inequality. In particular, the policy could bring many middle-income women into the formal labor market, where wage gaps and gender discrimination are lower.

- *Iran* (IMF 2018c): Although gender gaps in education are small, female labor force participation is low compared with peer countries. Highly educated women outside the labor market are an untapped source of growth and productivity. Simulations indicate that reducing discrimination in the labor market and the gender pay gap by half could boost GDP by 26 percent and double female labor force participation.

- *Lao P.D.R.* (IMF 2019a): Labor force participation rates are relatively equitable between men and women, but gender gaps persist in formal employment and in wages. Adopting policies to close the gap in returns on experience between women and men as well as to eliminate other sources of discrimination in the formal workplace could decrease the gender wage gap by almost 12 percentage points.

- *Nigeria* (IMF 2019b): Education gaps between men and women are relatively high, in particular among the poor. Closing the education gaps for each income level would boost GDP by 5 percent, and income inequality, as measured by the Gini coefficient, would decrease by 2 percentage points.

1/ In line with its mandate, the IMF addresses issues of gender inequality where such issues significantly impact macroeconomic outcomes (IMF 2018b).

¹⁶ Different exercises have been performed using the same calibration (see Malta, Martinez, and Tavares 2019), which produced robust results. The model has also been extensively applied to different countries (see Box 2).

¹⁷ Based on survey data from 45 developing economies, the World Health Organization estimates that women are about three times more likely than men to fetch water (UN-WHO 2010). A similar pattern is also observed in Senegal.

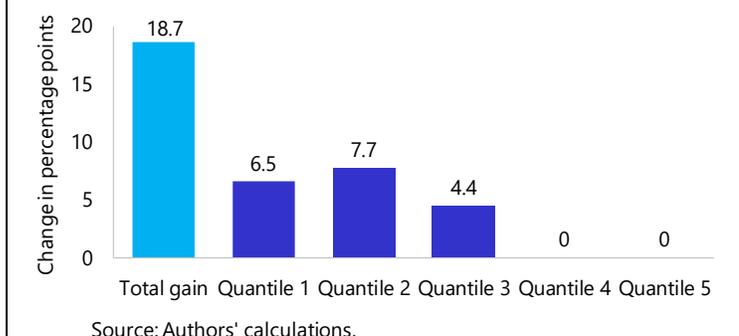
Closing Gender Gaps in Education

36. Closing education gender gaps increases female labor force participation and results in large GDP gains. In the baseline scenario, working women have 35 percent fewer years of schooling on average than men, and this gap is wider for households at the bottom 50 percent of the income distribution.¹⁸ The exercise envisages closing the gap so that men and women at every income level will have the same

number of years of education (differences will remain between individuals at different income levels). Simulations of our model suggest that closing education gaps boosts female labor force participation by almost 19 percentage points, while output grows by about 9 percent in the long run, as a more educated female labor force increases overall labor productivity (Figures 8 and 9). With higher skills, some low and lower-middle-income women join the labor force in our model, while young female workers continue to work throughout their lifetimes due to the financial returns from experience. Women with less education and experience would join the large informal sector, while middle-income and upper-middle-income women shift more of their working time to the formal sector, where wages are higher, and jobs are more secure.¹⁹

37. Gender wage gaps, income inequality, and poverty rates fall. Because of the rise in female education, the gender pay gap would shrink. Despite higher competition in the labor market, the growth in aggregate demand is enough to offset pressures on men's wages, which decline only marginally. Closing education gaps would also reduce poverty substantially, as poorer and less educated women would gain relatively more years of education. This would reduce inequality, shrinking the income gap between the top 10 percent of the income distribution and the bottom 10 percent. In the long run, this measure would bring net fiscal revenue gains, reflecting higher collection of consumption and labor income tax revenues due to higher economic activity, which could be channeled to finance social and development spending.²⁰

Figure 8. Impact from Closing the Gender Education Gaps on Female Labor Force Participation by Quantile

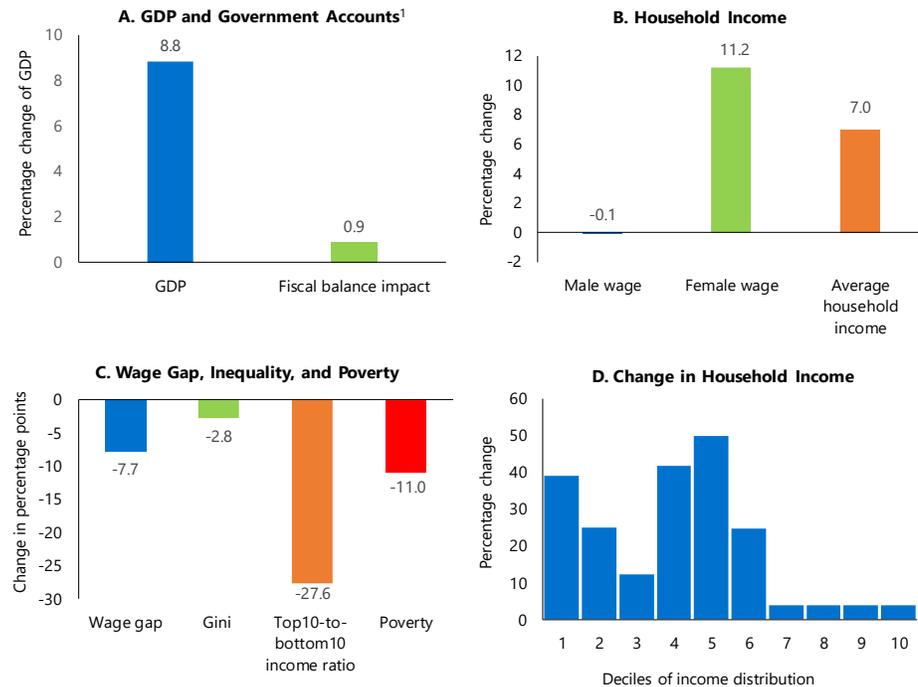


¹⁸ The average years of education of the workforce in Senegal is calibrated at 3.8 years for men and 2.5 years for women. There is a 41 percentage point gap in years of education for working women at the bottom 50 percent of the income distribution compared with men, while among the top 50 percent of the distribution this gap drops to 30 percentage points.

¹⁹ Female labor force participation increases by 18 percentage points from its initial level of 39 percent, which was calibrated in the model based on household survey data. The share of the informal labor market is calibrated at 79 percent. The data indicate that women working in the informal sector face larger gender pay gaps (after controlling for other factors, such as education, experience, and location), suggesting that the larger the informal sector, the lower the economic incentives for women to join the labor force.

²⁰ Using Gaspar and others (2019) costing methodology, we estimate the cost of this policy to be about 0.4 percent of GDP a year.

Figure 9. Macroeconomic and Distributional Effects from Closing Gender Gaps in Education

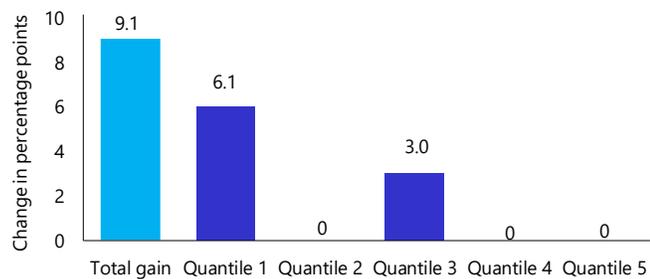


Source: Authors' calculations.
¹Fiscal balance impact (as percentage of GDP) is calculated subtracting the fiscal costs of implementing the policy measure from the revenue gains coming from the measure.

Promoting Infrastructure

38. Investing in infrastructure for safe water would free up women’s time to participate in the labor force, leading to better overall economic outcomes (Figure 10). Household survey data suggest that in many low-income countries, including Senegal, most households spend considerable time fetching water, though poor women spend more time than both richer women and men.²¹ If the daily hours men and women spend fetching water were instead used for paid work opportunities, productivity would increase substantially. Higher

Figure 10. Impact of Better Infrastructure for Safe Water on Female Labor Force Participation by Quintile

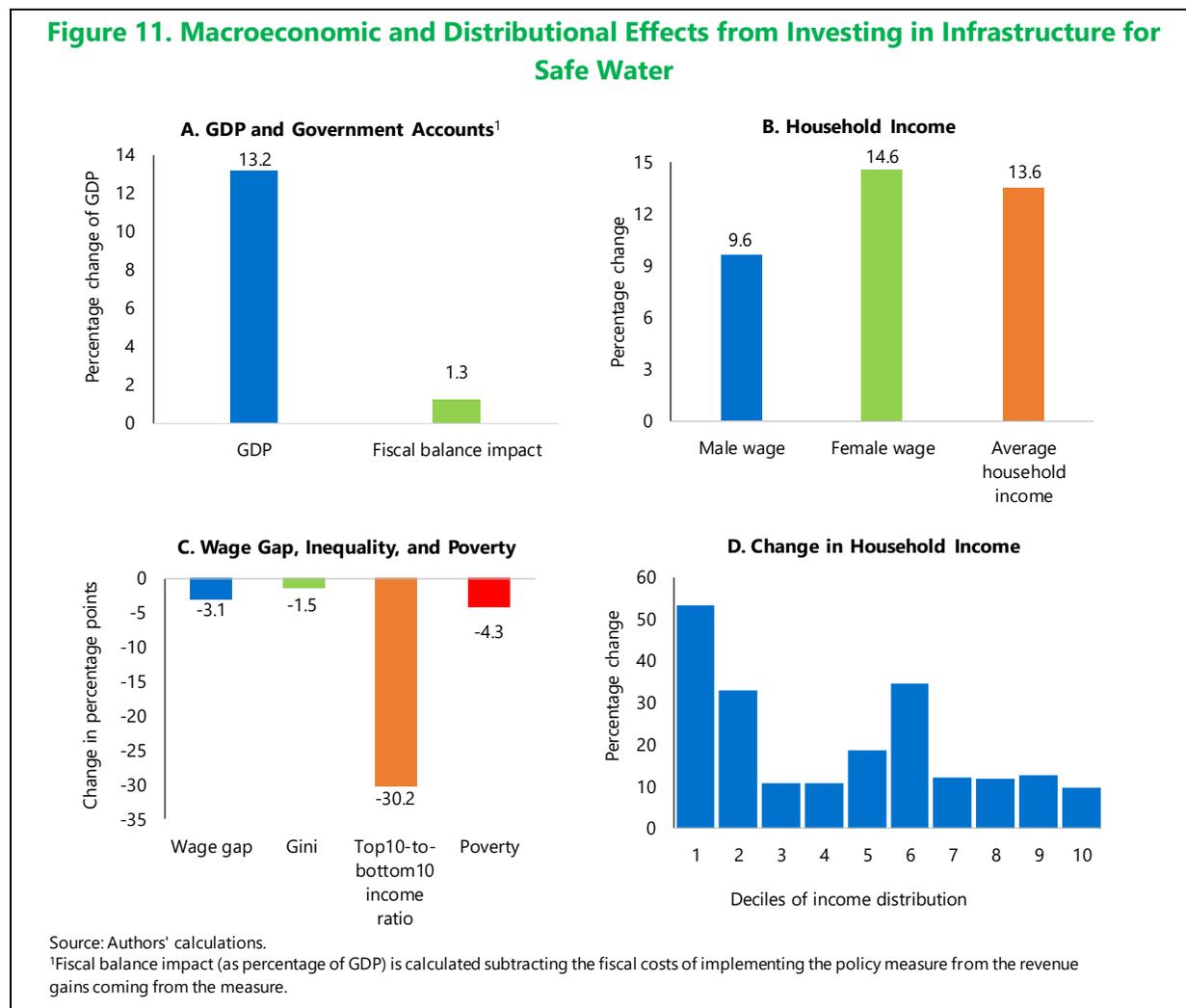


Source: Authors' calculations.

Note: Women in the second quintile do not enter the labor force because they have lower marginal returns (financial incentives) of working. While women in the first quintile enter the labor force because they are poorer, some skilled women in the third quintile join the labor market as their return to entering the labor market increases.

²¹ Household survey data show that women spend on average 1.9 hours a day fetching water (while men report spending on average 1.5 hours a day), and that poorer households tend to spend more time than richer households fetching water.

productivity and labor force participation, in turn, generate a virtuous cycle of higher supply and demand for goods and services, which, in the long run, boosts economic growth and fiscal revenues (Figure 11).²² Furthermore, this measure would benefit households at all income levels of the distribution.



39. Greater access to safe water reduces gender gaps, poverty, and inequality. Both men and women see their wages grow, with the gender wage gap shrinking, as women’s productivity grows disproportionately more than men’s. The entire population, particularly poor women and families, who spend more time fetching water, benefits economically from greater access to safe water, reducing both poverty and inequality.

²² Using Gaspar and others (2019) costing methodology, the cost associated with this measure is estimated at 0.74 percent of GDP.

Instituting Cash Transfers

40. Cash transfers to poor women in the labor force boost female labor force participation, but the increase in productivity is limited. Cash transfer programs have become an important instrument for social safety nets around the world—about two-thirds of countries have either conditional and/or

unconditional cash transfer programs (World Bank 2017). Providing cash transfers to all poor women participating in the labor market (either formal or informal) increases female labor force

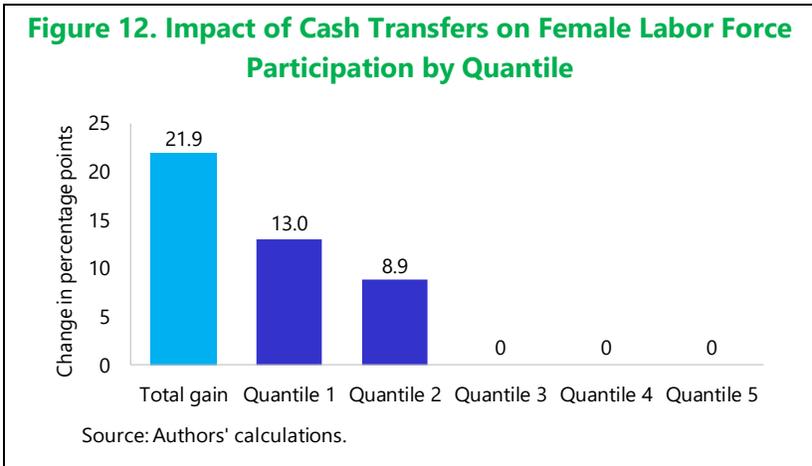
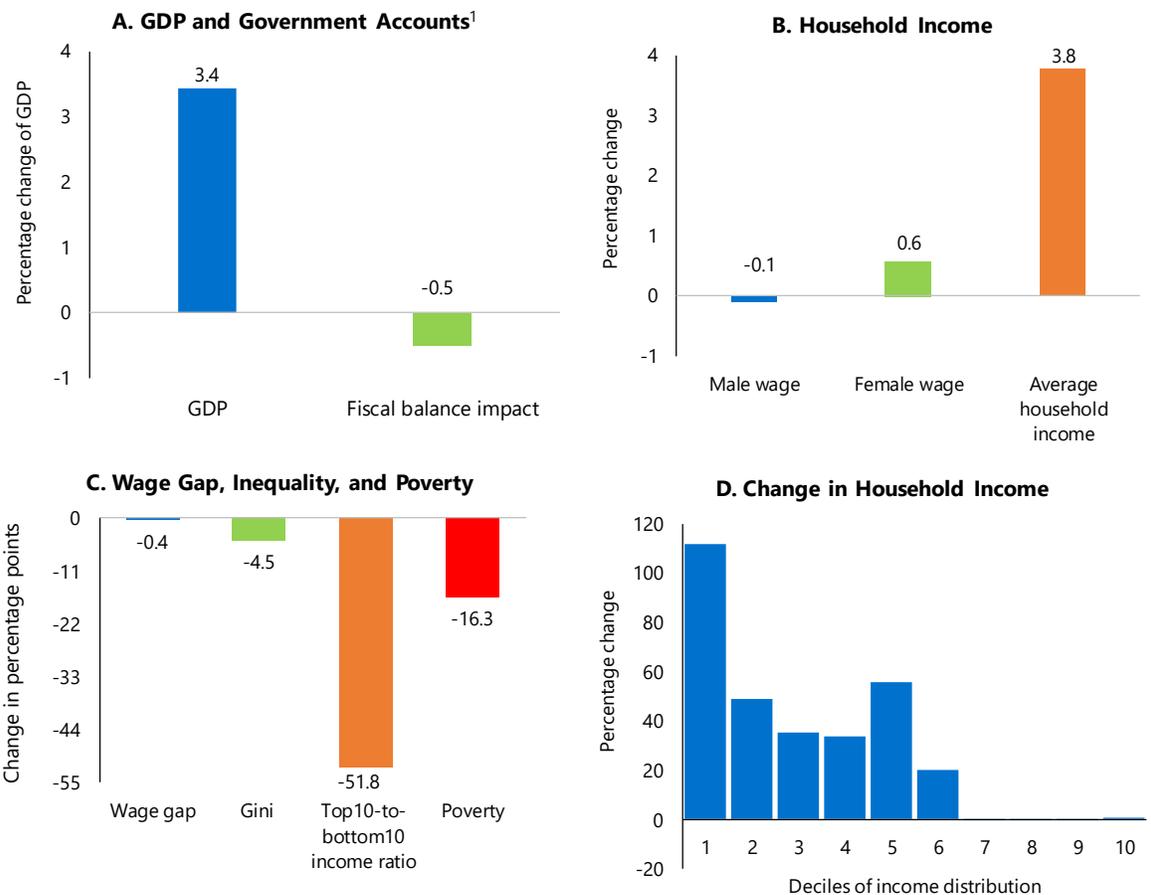


Figure 13. Macroeconomic and Distributional Effects of Cash Transfers to Poor Women Who Participate in the Labor Market



Source: Authors' calculations.

¹Fiscal balance impact (as percentage of GDP) is calculated subtracting the fiscal costs of implementing the policy measure from the revenue gains coming from the measure.

participation and boosts output in the model, though it reduces average productivity per worker, as many of these women are less educated and have lower skills (Figures 12 and 13).²³ Higher GDP is driven primarily by higher labor force participation,²⁴ while average women's wages are affected not only by the low-skilled female entrants (which drives average wages down), but also by the introduction of middle-income women into the formal labor market as a result of higher economic activity (pushing women's average wages up). These different forces rebalance wages, with an increase in female wages and a slight reduction in male wages, which results in higher average household income. Government revenues increase only marginally; these women would mostly join the informal labor market and not pay income taxes, and many goods in this economy are not subject to consumption taxes since they are produced in informal markets.

41. Overall, the cash transfer program reduces income inequality and poverty. Because this measure directly targets the poorest portion of the population, it reduces poverty and income inequality both in the short and long term.²⁵

C. Addressing Social Norms

42. Gender-biased social norms are still important barriers to women's economic empowerment across the globe. The OECD (2019) estimates that discriminatory laws and social norms and practices induce a loss of 8 percent in global investment, reduce women's average years of schooling by 16 percent, and decrease labor force participation by 12 percent, resulting in a global income loss of 7.5 percent. Furthermore, the OECD finds that while progress has been made in reducing discriminatory social norms and introducing legal reforms as measured by a multidimensional index,²⁶ no country is immune from discrimination.

43. Reducing gender-biased social norms magnifies all positive effects of gender-responsive fiscal policies. For illustrative purposes, we model the reduction in social bias against women as an exogenous reduction in the utility cost of females participating in the labor market in low-income countries. We find that the GDP gains estimated above can increase further by up to 5 percent, depending on the particular policy intervention. The reduction of gender-biased social norms further reduces poverty and inequality because easier entry into the labor market is more beneficial to poor and lower-skilled women.

²³ We assume an extension of the current cash transfer program in Senegal to all working women below the poverty line (38 percent of the population). Based on the current cash transfer values, the cost of the program is estimated at 1 percent of GDP.

²⁴ Note that the model does not allow for unemployment and assumes that all women looking for a job would find one.

²⁵ The model-based analysis captures only long-term effects. That said, because cash transfers would immediately increase the disposable income of poor women, the measure is expected to have an impact on poverty and inequality in the short run, too.

²⁶ The Social Institutions and Gender Index (SIGI) measures gender discriminatory social institutions: formal and informal laws, social norms, and access to empowerment opportunities and resources (OECD 2019).

44. Countries have introduced a variety of measures aimed at reducing social biases against women. For example, the Gender Roles, Equality, and Transformations (GREAT) program in Uganda included a radio drama discussing gender equality issues, resulting in increased gender equitable values among participants (Institute for Reproductive Health 2016). More than 34 countries have implemented the Promundo's Program H that aims to engage men and boys on gender norms and participants report that they are more likely to help with unpaid domestic work (Promundo 2017). Unterhofer and Wrohlich (2017) find that introducing a quota on parental leave in Germany, which led to the share of fathers taking at least two months of paid leave increasing more than 30 percentage points in just ten years, had a positive impact on social attitudes towards gender equality. In Saudi Arabia, Bursztyn, Gonzalez, and Yanagizawa-Drott (2018) found that men were more likely to support their wives working after participating in peer-learning sessions.

POLICY LESSONS

45. Given the high returns from many of the gender-responsive fiscal policy interventions, analyzing the impact of gender-responsive fiscal policy interventions should be an early consideration for policymakers. It is imperative to analyze the macroeconomic and distributional impacts of gender-responsive fiscal policies so that policymakers can adopt the most effective and sustainable measures to support gender equality while boosting economic growth and reducing income inequality and poverty.

46. The selected fiscal policy interventions considered in this note provide incentives and create conditions for women to work while also boosting growth and reducing poverty and inequality. The transmission channels and impacts of the various policy measures depend to a great extent on each country's features, such as the size of the informal sector, education levels and the education gaps between men and women, and the degree of existing gender discrimination due to social norms. Some measures have an important impact on productivity and, in turn, on economic growth. However, most of these measures take time to bear fruit. Measures such as cash transfers that target low-skilled and poor women may have a particularly relevant impact on reducing poverty and inequality and may potentially be more effective in the short term. In particular:

- In advanced economies, changing the unit of taxation has a potentially high long-term return on female labor force participation for all women, growth, and inequality at zero cost (making the tax system more progressive). However, it may have a negative impact on households with only one working individual in a married couple (changing the unit of taxation would increase the effective taxes on earnings for this type of household), depending on the design of the tax system in terms of tax rates, income brackets, and deductions.
- Subsidizing child care and paid maternity leave in advanced economies also boosts female labor force participation, but the impact would be more concentrated among low-skilled women. Paid maternity leave could be an expensive undertaking if granted to all women who work.

- Higher spending on education and infrastructure with higher return for women, such as for safe water, would increase labor productivity and, in turn, sustainable growth—with a positive impact on government coffers in low-income countries. Investing in education would be a highly effective policy from both a macroeconomic and social perspective. It would boost women’s human capital and, in turn, shape future total labor productivity.
- Providing cash transfers to poor (low-skilled) women in the labor force in low-income countries could have an immediate positive impact on poverty and inequality. It would not substantially raise worker productivity but would still increase output since more women would enter the labor market.

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Annex I. Modeling Framework

A. Model for Advanced Economies

Environment

We study a stationary overlapping generations economy populated by a continuum of married males (m) and females (f). Let $j \in \{1, 2, \dots, J\}$ denote the age of each individual. We assume that the population grows at rate n and that the population structure is stationary.

In the model, individuals are endowed with a given level of education and start their adult life married. They retire at age Jr and collect pension benefits until they die at age J . We assume for simplicity that agents are married to individuals of the same age. Married individuals differ in their education and number of children, and the latter is a function of the couple's education. Children appear in the beginning of parents' lifetime and stay with them for three periods.

Each period, working households make labor supply, consumption, and saving decisions. Households cannot borrow but can save. If a woman with children works, the household pays for childcare. Households differ according to the childcare costs, which in turn depend on the household education level and the children's age. Childcare costs are mitigated by childcare transfers that depend on households' total income. In addition, if the female member of the household works, the household incurs a utility cost related to the female labor force participation that is not captured in the model, such as support of relatives, heterogeneity in the preferences of educating her own children, and availability of childcare. Females who decide not to work incur labor efficiency costs in the next period due to loss of experience.

The government taxes households and provides transfers. Child-related transfers include childcare subsidies, child tax credits, and childcare tax credits. The government also administers the earned income tax credit (EITC), which works as a wage subsidy for households below a certain income and as a means-tested welfare system, providing transfers for low-income households.

Technology

There is an aggregate firm that operates constant returns to scale technology. The firm rents capital and labor services from households at rates R and w . Using K units of capital and L units of labor, the firm produces $F(K, L) = K^\alpha L^{1-\alpha}$ units of consumption goods. Capital depreciates at rate δ .

Childcare services are provided using labor services only in a linear way. Thus, the price of childcare services is wage rate w . Total labor services available are divided between childcare services and the production of goods. Households save in the form of a risk-free asset that pays the competitive rate of return $r = R - \delta$.

Demographics

Individuals differ in terms of their labor efficiency at the beginning of their lives; each individual is endowed with an exogenous type z for males and x for females. Males' productivity at age j and type z is denoted by $h_m(z, j)$. As opposed to males', females' productivity evolves endogenously. Each female starts her life with productivity that depends on her education level, denoted by $h_f(x, 1)$. After age 1 her productivity level h_f' depends on her past level of productivity h_f , age j , education level x , and labor supply l_f and is given by

$$h_f' = \exp\left(h_f + \alpha(x, j)I(l_f > 0) - \delta(x, j)(1 - I(l_f > 0))\right)$$

in which $\alpha(x, j)$ is the female's productivity growth rate associated with her work experience, $\delta(x, j)$ is her productivity depreciation rate for not working, and I is an indicator function that is equal to 1 when the woman works and zero otherwise. The growth and depreciation rates depend on her education, which captures the difference in age-earning profiles of females with different levels of education.

Preferences, Children, and Childcare Costs

If a female works, the household must pay childcare costs. The cost depends on the husband's and wife's education, the age of the children, and the number of children. The childcare cost is paid as a fraction of household income and is denoted by θ .

At the start of their lives, married households draw a utility cost q that represents the cost of joint market work. Following Guner, Kaygusuz, and Ventura (2012), we assume that the initial utility cost depends on the husband's education. The momentary utility function for a married household is then given by

$$u(c, l_m, l_f, q) = 2 \log(c) - \varphi (l_m)^\chi - \varphi (l_f)^\chi - q (I\{1\}(l_f > 0))$$

in which c is consumption, l_f and l_m are the time devoted to market work, φ is the parameter for the disutility of work, χ is the intertemporal elasticity of labor supply, and q is the utility cost incurred by the family when the female works ($l_f > 0$).

Government

The government collects various taxes: value-added taxes τ_c and progressive labor income $\tau_l(\cdot)$ and capital income taxes τ_k and uses tax collection to pay for government consumption, tax credits, transfers, and childcare subsidies. It also collects payroll taxes τ_{ss} and pays social security benefits.

Income, Taxation, and Social Security

Income for tax purposes is defined as total labor and capital income, which is equal to

$$I = ra + w (l_m h_m(z, j) + l_f h_f(x, j)).$$

We assume that social security benefits are not taxed and that retired households' income for tax purpose is just ra . The total tax income liability depends on the presence of children in the household and is represented by $\tau_i(I, k)$. These functions are continuous in I , increasing, and convex. Each household can also receive the EITC, which is a fully refunded tax credit that works as a wage subsidy for low-income households. We assume that the social security system balances its budget every period.

Retired households have access to social security benefits. We assume that social security benefits depend on agents' education type; that is, more educated agents receive larger social security benefits. This allows us to capture in a parsimonious way the positive relationship between lifetime earnings and social security benefits. Households receive childcare subsidies to cover a share of childcare costs when their total income is below I_d and the wife works.

Decision Problem

Households maximize the sum of the utilities of husband and wife. Consumption is a public good. Let $s = (z, x, q)$ be the exogenous state for married couples. Couples maximize household utility by choosing consumption, labor supply, and saving according to the following:

$$V(a, h, s, j) = \max_{\{a', l_f, l_m\}} u(c, l_m, l_f, q) + \beta V(a', h', s, j + 1)$$

subject to

$$(1 + \tau_c)c + a' = (w l_m h_m + w h_f l_f + ra)(1 - \tau_i(I) - \tau_{ss} - \theta(j)k(s, j)(l_f > 0)) + a(1 + r(1 - \tau_k))$$

in which $l_m, l_f > 0$ and $I = w h_m l_m + w h_f l_f + ra$.

Equilibrium

The stationary equilibrium of this economy consists of a stationary distribution of types over assets and human capital space, policy functions, and value functions such that given prices and government policies, they satisfy households' maximization problems, government budget constraints, distribution's law of motion, and labor and capital market clearing conditions.

Calibration

The model is calibrated to match data from the US 2018 Current Population Survey. A large share of the parameters is calibrated jointly, in equilibrium, allowing the model to match the moments from US aggregated and disaggregated characteristics in 2018. The US tax code is calibrated using the Organisation for Economic Co-operation and Development tax base. Table A1 reports the results for the parameters calibrated endogenously, and Table A2 and Table A3 reports some exogenous parameterization values. Some of the parameters calibrated draw on Guner, Kaygusuz, and Ventura (2019) and Hannusch (2019) as their main source.

Targeted Statistic	Model	Data
Average hours worked	0.40	0.40
FLFP females with less than high school education	0.42	0.46
FLFP females with high school education	0.68	0.69
FLFP females with some college education	0.74	0.74
FLFP females with college education	0.75	0.75
FLFP females with more than college education	0.83	0.82
Capital-output ratio	2.93	2.93

Source: Guner, Kaygusuz, and Ventura (2019).

Note: FLFP = female labor force participation.

Statistics	Value Found in Data and Added to the Model
Model period	5 years
Population growth (n)	0.01
Elasticity of labor supply (χ)	3.5
Discount factor (β)	0.96
Capital share (α)	0.343
Depreciation of capital (δ)	0.055
Capital taxes (τ_k)	0.236
Value-added taxes (τ_c)	0.075
Labor income tax function $\tau_i(I) = a + b(I/AW) + c(I/AW)^d$ ²⁷	-0.85, -0.15, 1.00, 0.38
Social security contribution (τ_{SS})	20
Childcare subsidy	0.25
Childcare cost, early education	0.10
Childcare cost	0.07

Source: Guner, Kaygusuz, and Ventura (2019).

	>HS	HS	SC	COL	+COL
>HS	5.77	2.35	2.65	0.047	0.12
HS	0.19	7.21	7.80	2.31	0.70
SC	1.49	5.34	16.85	6.82	2.38
COL	0.29	1.27	5.41	11.18	4.83
+COL	0.06	0.36	1.54	5.01	5.87

Source: Guner, Kaygusuz, and Ventura (2019).

Note: <HS (less than high school), HS (high school), SC (some college), C (college), COL + (post-college), Total gain (weighted average of gains by level of education).

²⁷In which AW is the average income in the economy.

B. Model for Low-Income Countries

A detailed description of the model is provided by Malta, Martinez, and Tavares (2019). Its main features are described below.

- It is an overlapping generations model in which various families live in a small open economy for three periods and die at the end of the third period. Individuals initially differ from each other by generation, gender, endowment, and access to the saving market. Only individuals with higher initial endowments save and borrow. In the first period, a household comprises a husband and wife and two children. In periods two and three, the children have left to form their own households, and the original household comprises only the husband and the wife.
- The husband and wife make decisions together. They determine the husband's labor supply in the formal and/or informal sector and the woman's labor force participation and, in the case of participation, how much time she will spend in the formal and informal sectors. There is no unemployment in the model; all individuals participating in the labor force are employed. They also decide how much to consume of each of the two types of goods in the economy (formal versus informal goods). Richer couples also decide how much to save and borrow.
- Education for children and adolescents is provided by the government, and the amount of education is not equal across gender and initial endowments, reflecting heterogeneity in the data. Whenever women supply labor there is a utility cost incurred by the family. This cost relates to the difficulty in coordinating multiple household activities, such as home production, child and elderly care, and other unpaid work. For some countries, this cost can also be interpreted as social and cultural barriers to a woman working outside the home.
- Production in the formal sector uses capital and labor, while the informal sector uses only labor. The formal sector in this economy is modeled as a representative firm that hires both male and female effective hours of labor and rents capital at rate r^* from rich households or from abroad to produce formal goods. Besides being produced domestically, formal goods can be imported from abroad. Formal goods can be used as consumption goods, capital, or education.
- The model also captures discrimination that women face in the workplace in both the formal and informal sectors. This discrimination constrains women's ability to achieve their full salary, productivity, and career potential.
- The government collects taxes on labor income, consumption, and firms' profits and spends on education, formal goods, and cash transfers. The government has access to external financial markets and can finance its debt by borrowing at interest rate r^* from abroad or from domestic households with access to the financial sector.

Calibration

The model is calibrated to match data from Senegal's 2011 Household Survey and aggregate data from that same year. Almost half of the parameters are calibrated jointly, in equilibrium, so that the model matches the moments from Senegal's aggregated and disaggregated characteristics in 2011. Table A4 reports the results for the parameters calibrated endogenously, and Table A5 reports some exogenous parameterization values.

Table A4. Parameters Calibrated Endogenously		
Targeted Statistic	Model	Data
Female-to-male employment ratio	0.60	0.60
Gini coefficient (income)	0.63	0.63
Share of formal labor force	0.21	0.14
Female-to-male per hour wage in the formal sector	0.74	0.74
Female-to-male per hour wage in the informal sector	0.64	0.64
Government revenues on corporate taxes (as percent of GDP)	1.45	1.45
Government expenditure on education as percent of GDP	6.1	6.1
Government expenditure on formal goods as percent of GDP	5.2	5.2
Size of formal sector (as percent of GDP)	55	55

Source: Female-to-male employment ratio, Gini coefficient (income), Share of formal labor force, Female-to-male per hour wage in the formal and in the informal sector are authors' calculations using Senegal's 2011 Household Survey. The remaining parameters' sources are World Bank, IMF and Unesco.

Table A5. Parameters (Exogenously input)	
Statistics	Value Found in Data and Added to the Model
Number of years in each household period	18
Returns from experience when shifting from young adult to adult (18 years) – males	0.34
Returns from experience when shifting from young adult to adult (18 years) – females	0.16
Returns from experience when shifting from adult to elderly (18 years) – males	0.09
Returns from experience when shifting from adult to elderly (18 years) – females	0.07
Consumption tax rate on formal goods	0.18
Returns on education	0.34
Percentage of savers	20
Share of consumption in informal goods	0.45
Share of consumption in formal goods	0.55

Source: Authors' calculations using Senegal's 2011 Household Survey and Iberglobal.

C. Comparing the Models for Advanced Economies and for Low-Income Countries

Both advanced economy and low-income country models are overlapping generations macroeconomic general equilibrium models that capture gender inequalities in their micro-foundation. The main differences between the two frameworks are summarized as in Table A6.

- The framework for low-income countries replicates households' income distribution through an initial endowment shock, while the framework for advanced economies bases its distribution on different education levels.
- The low-income country framework contains two sectors, producing one good each—the formal and the informal, while the advanced economy framework has only one good being produced in only one sector in the economy.

- In the low-income country framework all men work; women may or may not work. In addition, all workers work full-time—as seen in the data (full-time work is defined as more than 30 hours a week). In the advanced economy framework, men’s and women’s labor supply decisions are made endogenously and are not imposed.
- In both frameworks there is human capital accumulation, but only the advanced economy framework features human capital depreciation when a person temporarily stops working.
- Both frameworks feature utility cost for families when a woman decides to work and different education levels for men and women. In the low-income country framework there is also gender discrimination in the labor market; in the advanced economy framework, families face the financial cost of childcare.
- The low-income country model is calibrated to reflect lower education levels and higher inequality and poverty than the advanced economy model.

Table A6. Main Differences between the Analytical Models for Low-Income Countries and Advanced Economies

Framework for LICs	Framework for AEs
Framework based on income levels	Framework based on education levels
2 sectors, 2 goods: formal and informal	Only 1 sector and 1 good
Everyone who works work full time (> 30 hours per week)	Men and Women have an endogenous labor supply
Working women accumulate skills but human capital does not depreciate while out of labor market	Working women accumulated skill and not working led to a depreciation of females human capital
Men always work	Men also face disutility of labor: might not work
Women face gender discrimination in the labor market	Working women face cost of childcare and utility cost of working
Calibration	
Low education	More educated workers
More inequalities	Less inequalities – Progressive Tax System
More poverty	Less poverty