

Gender Equality: Better for Growth, Debt, Income Equality and Sustainability

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Main Findings

- **Gender inequality persists** despite some progress over recent decades. For example, women in developed countries now live longer and are better educated than men: 37.2% of women complete tertiary education compared to 31.9% of men. Yet the average woman in an OECD country earns 14% less than the average man.
- In advanced countries, **female labour force participation rates are also significantly lower than male ones** by 5%–20%. But labour force participation rate differences (males less females) are even larger in developing countries, e.g., India (51.6%) and Turkey (39.5%).
- Such **inequality hampers global growth and causes women to take on more debt, have lower pensions and higher poverty risk**. For living standards to rise, policymakers need to tackle gender inequality as a priority, with holistic reforms that span health, education, labour, tax and financial services.
- In this report, we present evidence of gender inequality along several dimensions and consider the **implications for economic growth and living standards**. We also study the relationship between the gender gap and income inequality.
- We use disaggregated data in the form of the subcomponents of the UN/IMF Gender Inequality Index (GII) that we regularly follow as part of our demographics research: **maternal mortality, adolescent fertility, educational gender gap and female empowerment**. We believe this helps us better understand the underlying relationships between social and economic factors.
- We conclude from our analysis and estimations that the **elimination of gender inequality is essential for macro growth, development and long-term economic welfare**. We therefore hypothesise that countries that make greater progress on gender equality will grow faster, become more equal and create better-educated, more sustainable societies.
- **This aligns with the conclusions of the IMF, the World Bank and the UN's gender research teams**. The IMF has shown that an amelioration of gender inequality equating to a 0.1 reduction in the Gender Inequality Index is associated with almost 1% higher growth in GDP per capita.
- Country-specific research suggests that **raising the female labour force participation rate to country-specific male levels would, for instance, raise GDP** by 5% in the US and 9% in Japan. In developing countries, the potential is even greater with possible increases of 12% in the UAE and 34% in Egypt.
- We have long advocated improving gender equality as part of the solution to the ageing society problem, but many countries need to make urgent progress to capture the economic and social benefits. **Macro gender policy initiatives must foster better corporate and individual practices in order to be effective** and have lasting impact.

Understanding why gender inequality exists and its implications is central to our global and country-specific macro research on demographics and pensions. In this study, we draw on recent research by international organisations but use different statistical techniques to assess the data. This gives us deeper insight into the relationship between gender inequality, growth, living standards, debt and inequality. In our view, a better macro policy environment for gender should be conducive to better gender practices at individual and corporate levels, e.g., Board representation.

Our report is organised as follows:

Section 1: Gender inequality trends and measures

Section 2: Impact of gender inequality on growth and living standards

Section 3: Gender inequality and income inequality/debt

Section 4: Gender inequality and pensions

Section 5: Gender inequality and sustainability

Section 6: Conclusion

GENDER INEQUALITY: TRENDS AND MEASURES

The number of women in the world has increased by 68.2% from 2.2bn in 1980 to 3.7bn in 2017. Women make up nearly half of the world population as shown in Figure 1. In developed regions, there are more women than men whereas in less developed regions, men outnumber women by 1.6% of the total population. This may reflect extant gender bias in favour of males in the poorer countries.

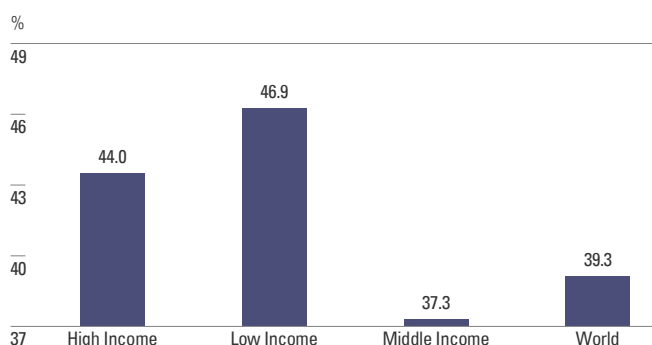
Figure 1: Share of Women in Total Population



Source: UN, SSGA Demographics.

Despite constituting half the world's population, women account for less than 40% of global labour force. In middle income countries, women make up only 37.3% of the labour force while in high income and low income countries, the corresponding numbers are 44% and 46.9% as in Figure 2. This is consistent with the evidence and theories of labour participation rates displaying a U-shaped relationship with income.

Figure 2: Female Labour Force (% of Total Labour Force), 2017



Source: World Bank, SSGA Demographics.

Gender Differences in Life Expectancy

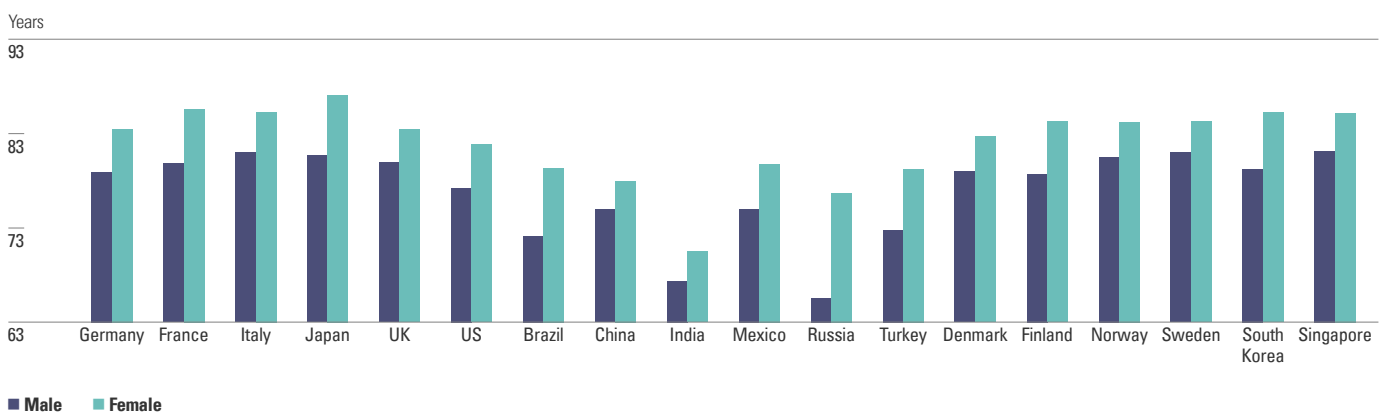
Globally, female life expectancy at birth is projected to be 4.6 years higher than that of males in 2015–2020. In developed regions, female life expectancy at birth is projected to be 82.3 years in 2015–2020, 6.1 years higher than males. In less developed regions, women are expected to live for 72.4 years, 4 years longer than men. Figure 3 highlights that in many countries, women outlive men by at least 3 years; the differences are 11.1 years for Russia, 6.5 years for Japan, 3.1 years for China and India. While women live longer, they face gender inequality throughout their lives. Gender

inequality contributes to future public finance strains when countries need to pay their pensions or other welfare payments.

Gender Differences in Wages

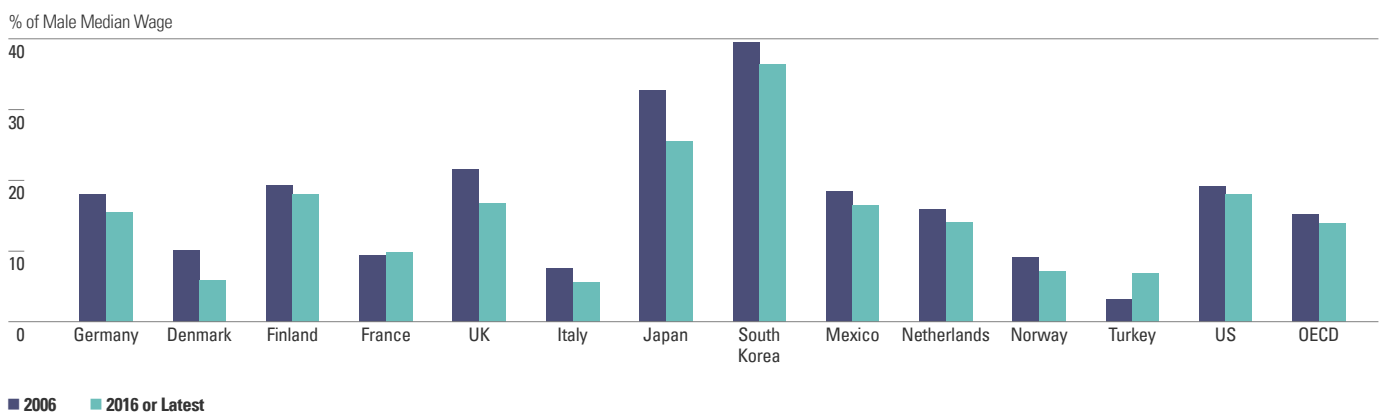
Although there have been some improvements, there exists a significant gap between male and female wages. Figure 4 shows that, on average, a woman in the OECD countries earns 14% less than a man. Among selected countries, the gender wage gap in South Korea is the highest at 36.7% followed by Japan at 25.7%.

Figure 3: Gender Differences in Life Expectancy at Birth (Selected Countries), 2015–2020



Source: UN, SSGA Demographics.

Figure 4: Total Gender Wage Gap in Selected Countries



Source: OECD, SSGA Demographics. Denmark, Finland, Japan & Norway data refer to 2015. France, Italy, Netherlands & Turkey data refer to 2014. Others refer to 2016.

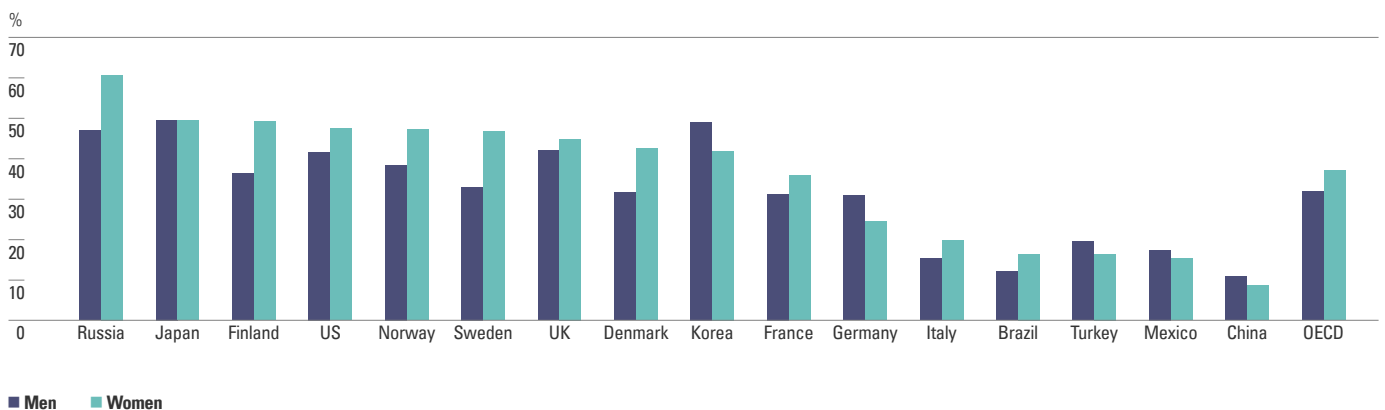
Gender Differences in Education

As highlighted in Figure 5, women's educational attainment in most OECD countries in 2015 is higher than men's with the exception of some countries like South Korea, Turkey, Mexico and China. This matters because according to research (Barro 2003 and Barro and Sala-i-Martin 2004), human capital is a crucial determinant of growth across different countries.

Gender Differences in Labour Participation

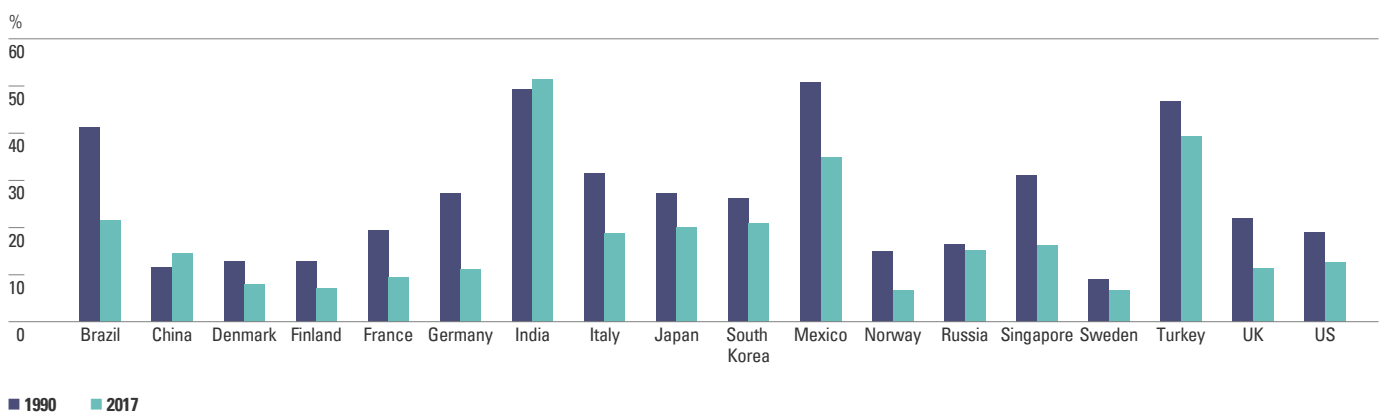
From 1990 to 2017, the gap between male and female labour force participation rates has reduced significantly. As we highlighted in "Global Demographics & Retirement Implications",¹ male labour participation rates have declined sharply over the last 30 years and female participation rates have increased. Research on endogenous growth finds that female labour force participation increases lead to higher growth.² But as in Figure 6, the gap is still significant in some countries: India 51.6%, Mexico 34.9% and Turkey 39.5%.

Figure 5: Share of Population with Tertiary Education, Age Group 25–64 yrs, 2015



Source: OECD, SSGA Demographics.

Figure 6: Total Gender Gap in Labour Force Participation (Male — Female)



Source: ILO, SSGA Demographics.

IMPACT OF GENDER INEQUALITY ON GROWTH AND LIVING STANDARDS

Now that we have an idea of gender inequality trends and how they impact populations, we can turn to a discussion of the UN Gender Inequality Index (GII) and how analysis of its subcomponents allows us to draw conclusions about the relationship between gender inequality and GDP per capita.

The UN Gender Inequality Index and its Subcomponents

In 1995, the United Nations Development Program (UNDP) created the Gender-related Development Index (GDI) and the Gender Empowerment Measure (GEM) as first attempts to develop a comprehensive measure of gender inequality. The UNDP made several improvements to both indices that eventually resulted in the creation of the Gender Inequality Index (GII) in 2010. The GII is a composite that captures gender disparities in health, empowerment and labour markets in 159 countries. The GII has been used widely by the IMF, World Bank and UN for their policy and project evaluation analysis.

The GII is composed of measures for the following areas:

1. Reproductive health (maternal mortality ratios and adolescent fertility rates),
2. Empowerment (share of parliamentary seats) and secondary education attainment for both males and females)
3. Economic opportunity (labour force participation rates by gender)

See Figure 14 in Appendix 1.

Other Gender-related Indices

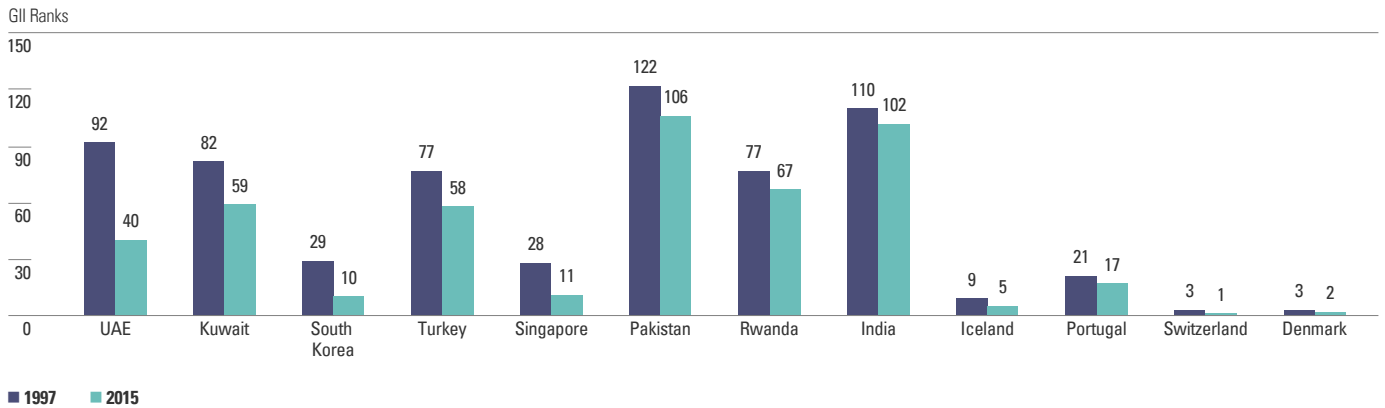
A number of other gender-related metrics and indices exist, including the Economist Intelligence Unit's Women's Economic Opportunity Index (WEOI), the OECD's Social Institution and Gender Index (SIGI), the World Bank's Country Policy and Institutional Assessments (CPIA) Gender Equality Rating and the World Economic Forum's Global Gender Gap Index. However, most of these indices were created recently, which limits time coverage for empirical work.

As the underlying data used for the construction of the GII are available from 1990 onwards, the IMF has been able to cover the period from 1990 to 2013. Data that is available only every 5 years have been linearly interpolated by the IMF.

Changes in the Gender Inequality Index (GII) Rankings

We investigate changes in gender inequality rankings over the last two decades using a mix of GII data from the IMF and the UN. Figure 7 highlights selected countries that have achieved significant improvement in terms of gender equality, as measured by their gender inequality ranking. Switzerland was the best country for gender equality in 2015, up from 3rd in 1997. UAE's GII rank has improved the most, jumping from 92 in 1997 to 40 in 2015. Overall, we notice that most countries which have seen gender equality improvement over the last 20 years have also achieved better economic growth.

Figure 7: Changes in Gender Inequality Index Ranks, 1997–2015



Source: UN, IMF, SSGA Demographics. IMF's GII data is used for 1997 and UN data is used for 2015. The underlying data from both sources are nearly perfectly correlated. Given the combined data and history, we cover 127 countries.

Gender Inequality and Economic Performance

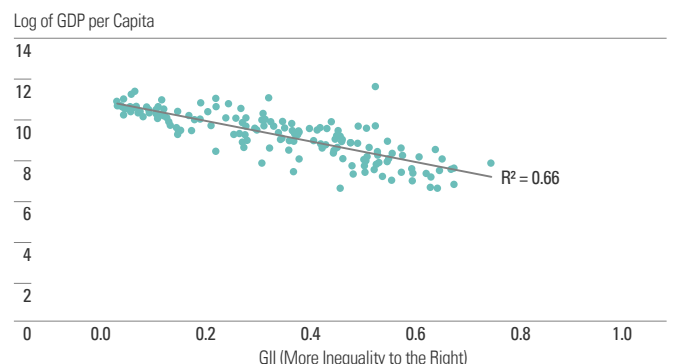
Most studies on this topic focus on the relationship between GII and other economic and income variables. However, in our view, there is additional explanatory power in considering individual sub-components, such as maternal mortality, adolescent fertility and female education, when it comes to highlighting their relationship with common macroeconomic factors. Other studies have highlighted the additional insights gleaned from using sub-indices of the GII.³ Furthermore, endogenous growth researchers often use many of the GII subcomponents as factors that affect economic growth across countries and over time.

a. Gender Inequality and GDP per Capita (Living Standards)

As past studies have shown, gender inequality has important negative effects on macroeconomic performance. Figure 8 shows that the GII and GDP per capita (a measure of living standards) are negatively correlated with an explanatory power (R^2) of 0.66 using data on GII and log GDP per capita for 2015 for 152 countries.

The result is consistent with those of the IMF(2017)⁴ in showing that countries with low GDP per capita also have high gender inequality. There is therefore an

Figure 8: Log of GDP per Capita versus Gender Inequality Index (GII), 2015



Source: World Bank, UN, SSGA Demographics.

urgent need for low income countries to tackle gender inequality as part of the global development agenda of the World Bank and the UN, something the author of this paper has long advocated. A paper by Credit Suisse on the policy actions for ageing societies in 2000⁵ recommended a “further dramatic increase in the role and status of women in the workforce to allow them to realise their full economic potential”.

b. Gender Inequality and GDP Growth

Ageing developed countries, meanwhile, face labour shortages yet exhibit fairly strong gender inequality — this is a contradiction and easily addressed by progressive gender equality policies.

A study by McKinsey (2018)⁶ shows that \$12 trillion could be added to global GDP by 2025, simply by advancing women's equality.

K. Kochhar and the IMF (2017) state that, in countries facing a shrinking workforce, raising economic participation by women can yield direct growth and stability gains. They also found that GII significantly explains GDP per capita growth after controlling for the initial log of GDP per capita. Their results show that higher inequality is associated with lower GDP per capita growth, which might result in lower economic growth. Our results are similar and presented below in Figure 9 and Table 4 in Appendix 1. They also show that GDP per capita growth is inversely related to GII.

Figure 9: GDP per Capita Growth versus Gender Inequality Index (GII)



Source: World Bank, IMF, Penn World Tables, SSGA Demographics. We regressed GII data on 5-year averages of GDP per capita growth for 103 countries after controlling for the initial level of log GDP per capita as is standard practice.

In a cross-country study, Klassen et al (1999)⁷ show that 0.4 to 0.9 percentage points of the difference in growth rates between East Asia, sub-Saharan Africa, South Asia and the Middle East can be explained by differences in gender gaps in education. Amin et al (2015) find that broader gender inequality negatively affects growth and that it holds more strongly across low income countries. They argue that reducing gender inequality in poorer countries reduces the glaring gender gap and brings in much needed growth.

A National Growth Accounting framework established by the European Central Bank shows that GDP growth consists of three components: working age population growth, labour productivity growth and labour utilisation growth. We hypothesise that greater gender equality will lead to an increase in the three components and thus benefit economic growth. In various past global and country-specific papers, we have said that increasing female labour participation and reducing the gender labour gap would lead to an increase in all the three components of GDP growth. In our report “Asia at A Crossroads: Demographics, Economics & Investment”,⁸ for example, we show that GDP growth consists of GDP per capita growth and population growth.

The Relationship Between GII and GDP per Capita

Here we investigate the relationship between GDP per capita and GII (see Appendix 1 for the results). We divide our sample into two groups based on the World Bank classification: i) below median income (including Low Income and Lower Middle Income Countries) and ii) above median income (Upper Middle Income and High Income Countries). Our list of countries along with the country groupings are presented in Appendix 2.

We use the Spearman rank correlation test which is a nonparametric measure of rank correlation (i.e., the statistical dependence between the rankings of two variables). As indicated in Table 1 (Appendix 1), the gender inequality index is negatively correlated with initial GDP per capita for countries *Below Median Income* as well as *Above Median Income*.

Next we consider GDP per capita growth versus initial GDP per capita and GII. As shown in Table 2 (Appendix 1), the gender inequality index is negatively correlated with the growth rate of GDP per capita in *Below Median Income* countries. Also, the initial level of GDP per capita is negatively correlated with GDP per capita growth in *Above Median Income* countries.

GII Sub-components Analysis

We then extend our analysis further by focusing more on the relationship between GII subcomponents and GDP per capita using the same test.

Table 3 (Appendix 1), shows that GDP per capita growth is significantly correlated with most components of the GII for *Below Median Income* countries except for empowerment. In *Above Median Income* countries, the GDP per capita growth rate is shown to be correlated with maternal mortality, adolescent fertility, female education and the education gap.

We classify countries into four groups for our panel data estimation based on World Bank classifications (Appendix 2). Table 5 (Appendix 1) summarises the results from our Panel Data Ordinary Least Squares analysis over the period 1990–2015 along with some Technical details. We find that female education and empowerment are significantly positively correlated with GDP per capita growth. The initial level of GDP per capita is significantly negatively correlated with GDP per capita growth. The results for the different country groups are also included in Appendix 1.

Gender Inequality and Economic Development (Beyond Growth)

So far, we have focused on GDP growth and GDP per capita which are measures of economic growth and living standards. “Economic development” is much broader than growth and encompasses non-economic welfare and social measures too. Leading global development expert E. Duflo (2012)⁹ shows that poverty and a lack of opportunity breed inequality between men and women. When economic development reduces poverty, conditions for women improve on two counts: first, when poverty is reduced, conditions for everyone, including women, improve, and second, gender inequality declines as poverty declines, so conditions improve for women more than they do for men. Economic development, however, is not enough to bring about complete equality between men and women. Policy action is still required.

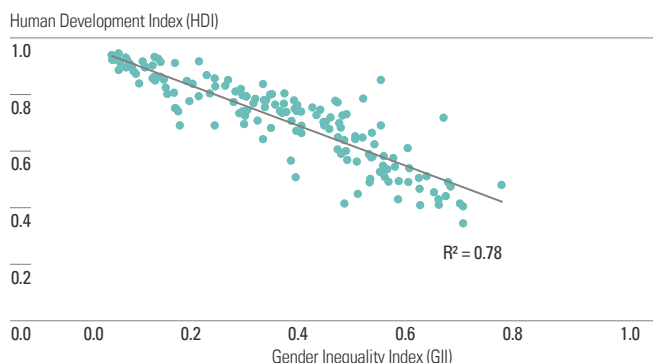
Gender Inequality and Human Development

Gender inequality remains a major barrier to human development. The gender gap is widest in low human development countries. Much of the gap is due to women’s lower income and educational attainment in many countries.¹⁰

Figure 10 shows the relationship between gender inequality, as measured by the GII, and human development, as measured by the **UN Human Development Index (HDI)**. HDI is an aggregate composite index based on three aspects of development (health, education and income) by using the following measures: **life expectancy** at birth, mean **years of schooling** and **gross national income per capita**. HDI ranges from 0 (lowest human development) to 1 (highest human development).

We note that the human development index is negatively correlated with the gender inequality index with explanatory power (R^2) of 0.78, suggesting that **low gender inequality is associated with high human development**. Countries such as the Nordics, Switzerland, Canada and Australia are a few examples of countries with high HDI rankings in recent years.

Figure 10: Gender Inequality Index and Human Development Index (HDI), 2015



Source: UN, SSGA Demographics.

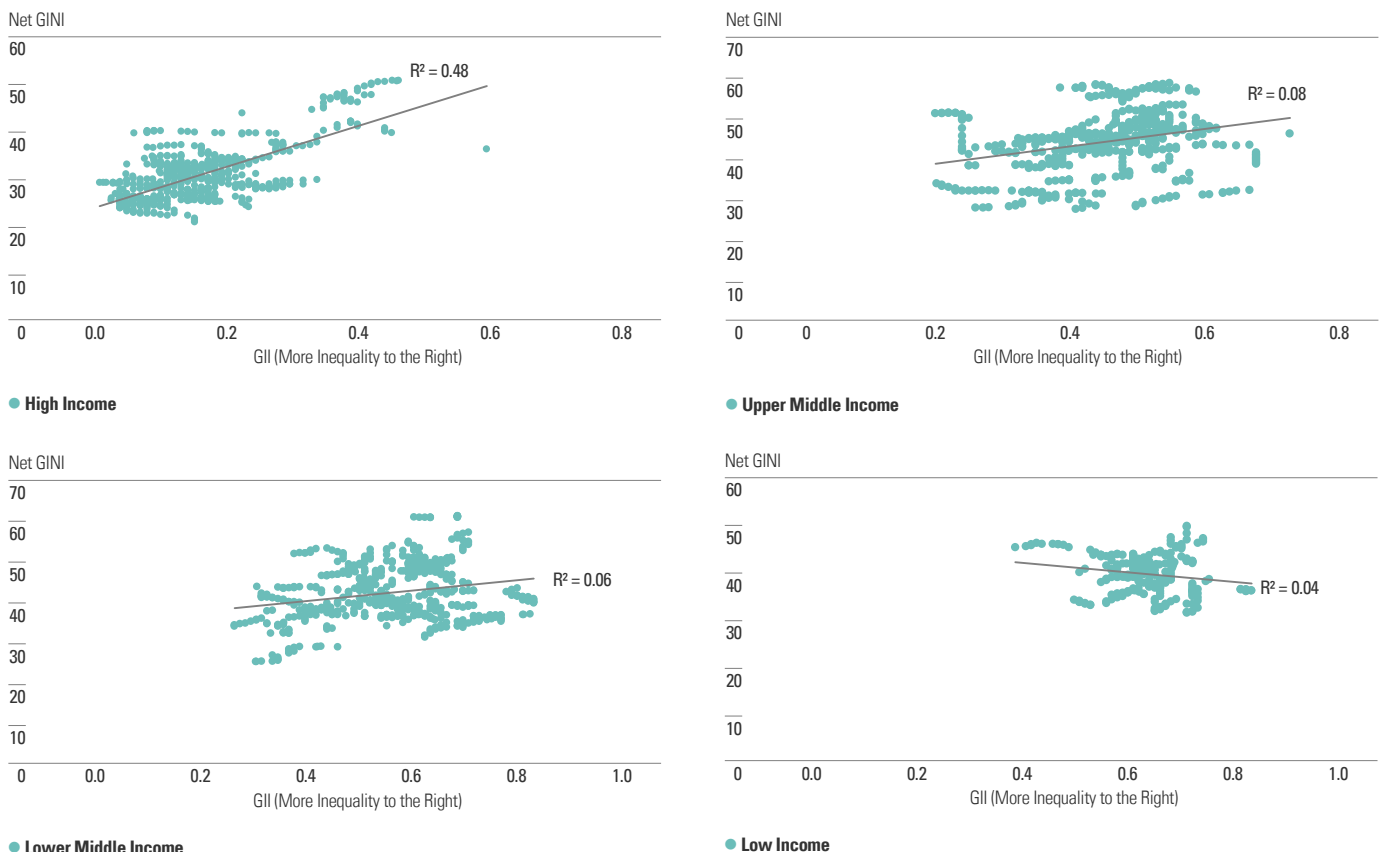
GENDER INEQUALITY AND INCOME INEQUALITY/DEBT

Income inequality is associated with gender-related inequality in many complex ways. Gender wage gaps directly contribute to income inequality between males and females. In addition, **gender gaps** in labour force participation rates are likely to result in unequal earnings between the sexes, thereby exacerbating income inequality. **Inequality of opportunity** across gender in terms of education, health and financial markets leads to income inequality too. Higher inequality in income and wealth can lead to underinvestment in physical and human capital, thus affecting economic growth. Lack of access to financial services and education disadvantages females in poorer countries, causing them to be income-unequal to men.

Gonzales et al of IMF (2015)¹¹ highlight that both gender inequality in outcomes and opportunities are closely related to the level of income inequality across countries. Specifically, maternal health and adolescent fertility are closely related to income inequality and the risk of poverty. Access to financial services has increased worldwide but it remains fragmented both across gender and income, with women having a smaller probability of access to financial services in each region of the world. Countries that have larger disparities in access to financial services across income groups tend to also have larger gender gaps in this area.

We explored the relationship between gender inequality and income inequality across different country groups. The relationship between GII and net GINI which measures inequality in disposable (post-tax, post-transfer) income is not uniform across different income groups, as displayed in Figure 11.

Figure 11: Gender Inequality versus Income Inequality, 1996–2015



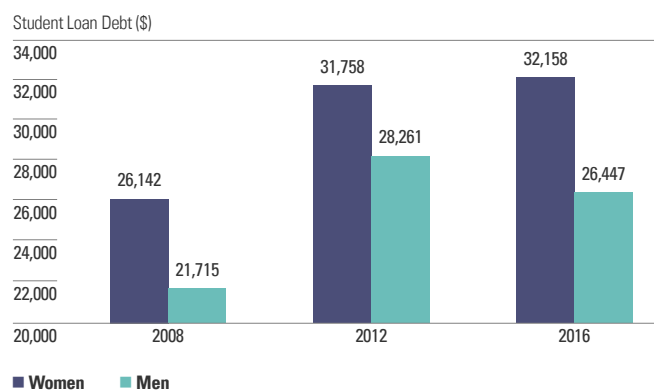
Source: UN, IMF, World Bank, SSGA Demographics.

Figure 15–Figure 18 tell the same story with regard to income inequality and other sub components such as maternal mortality, adolescent fertility, the labour force participation gap and the education gap. The weakest relationship is between income inequality and the education gap, suggesting that other factors may be at play.

Gender Inequality and Debt

A recent report by AAUW¹² (2018) shows that US women have more student debt than men. Due to gender pay inequality, women have lower disposable income to repay their loans after graduation and thus require more time to pay back their student debt than men.

Figure 12: Cumulative Student Loan Debt by Gender



As a result, women hold nearly two-thirds of the outstanding student debt in the United States — almost \$900 billion as of mid-2018.

GENDER INEQUALITY AND PENSIONS

The significant gender gap in labour force participation and wages results in both higher debt during different life stages and lower pensions for women. This is conditional on a major assumption that women have the same access to debt and finances, but that is not true. A major dimension of gender equality is for both genders to have identical or nearly similar financial access and financial inclusion. Microfinance development efforts in poorer countries have focused on increased financial access, financial inclusion and increased financial literacy. This is the virtuous cycle that has multiple positive externalities beyond the individual female, extending to family, work place and society within a country and beyond. The poster child countries on this are Rwanda and Bangladesh.

IMF studies by R. Sahay et al (2015, 2018) find that, while financial inclusion may be an objective when trying to reduce the gender gap, improving access to financial services for women has positive macroeconomic effects on long-term savings and growth. Also, contrary to common perception, many

low and middle income countries have a higher female representation on bank boards and bank supervisors than many advanced countries. The presence of women on boards and in supervision is associated with greater banking stability and resilience.

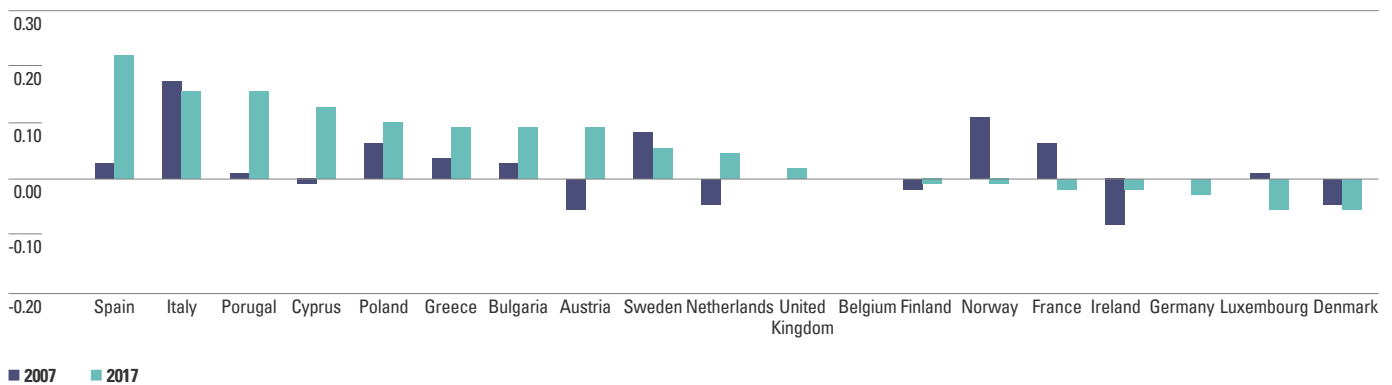
The Gender Pension Gap indicator developed by the European Union highlights the gender imbalances affecting pensions and measures the percentage by which women's average pension is lower than men's. In a report by the European Parliament,¹³ the average EU28 gender pension gap in 2014 stood at 40.2%. This means that men in the 65–74 age class, on average, are entitled to pensions that are 40.2% greater than those of women in the same age class. The pension gap is much higher than the average EU gender pay gap (16.1% in 2014) and the gender gap in annual earnings (23.0% in 2010). This underlines the cumulative effects of women's disadvantaged position in the labour market on pension income in old age and the role of pension design.

We can see this clearly when looking at replacement ratios. The replacement ratio is defined as the ratio of the median individual gross pensions of the 65–74 years category relative to median individual gross earnings of the 50–59 years category, excluding other social benefits.

Gender difference in replacement ratios is defined as the absolute difference between the male replacement ratio and the female replacement ratio. Figure 13 shows

that the gender differences in replacement ratios have increased in many countries with the most significant increase in Spain (from 0.03 in 2007 to 0.24 in 2017). Together with wage differentials, this means that women's income and wealth are decreasing relative to males; thus they are at higher risk of poverty. The differences have narrowed or become negative in some countries such as Sweden (from 0.09 in 2007 to 0.06 in 2017) and Norway (from 0.12 in 2007 to -0.01).

Figure 13: Gender Differences in Aggregate Replacement Ratio (Male — Female)



Source: Eurostat, SSGA Demographics.

GENDER INEQUALITY AND SUSTAINABILITY

Women of all ages, but particularly millennials, are influencing their families and society in creating a fairer, more sustainable future. But for this to become a reality, women need education, literacy and financial access across the four or five generations of people who co-inhabit the planet today.

As part of the UN Sustainable Development Goal no 4 (**Quality Education**), the UNESCO Global Education Monitoring Report has become the mechanism for reporting on SDG4 and the educational elements of the other SDGs. The report acknowledges how access to clean water, air, sanitation and healthcare are preconditions to delivering gender parity in education and increasing female employment opportunities.

Moreover, according to the OECD's household behaviour research, women generally hold more sustainable attitudes to their environment than men. For example, they are more likely than men to buy recyclable, eco-labeled and energy-efficient products. This matters because they account for the lion's share of household purchases in developed countries. However, despite greater general awareness around sustainability, consumption patterns are not as sustainable as they need to be.

The OECD Social Institutions and Gender Index (SIGI) evaluate variables like violence against women, civil liberties, family codes and ownership rights. Sustainable Development Insights (2010)¹⁴ argued that

the lack of progress on gender equality may be the cause of failure to attain rapid progress on sustainability. In a UN paper entitled “Gender Equality and Sustainable Development: A Pathways Approach”, the authors argue that gender equality and sustainable development are integrated and policies should adapt to tackle them together.

CONCLUSION

Achieving gender equality is an imperative if the world is to grow in an equitable and sustainable way, for every generation across all countries.

Some countries, both rich and poor, have made good progress, but we need their standards to be the norm rather than just a good example. Only a more gender-equal world will generate higher growth, lower debt, lower income inequality and more sustainability.

To make this a reality, countries need holistic reforms in education, labour markets and financial services. Countries with good gender policies (Nordics and Switzerland) have also seen better gender equality measures adopted by companies and institutions. The financial services industry has a major role to

play here in ensuring better financial access and financial inclusion of women at all levels, not just at board level. This, as we have seen, can be a major driver of savings and growth.

Finally, the living standard (GDP per capita) losses attributed to the gender gap range between 4% for Japan to up to 27% in poorer countries. While addressing the gap in developed countries is important, the majority of the women whose potential is untapped live largely in developing countries. Therefore the need to close the gap is most acute in these regions and should form part of the immediate agenda of international sustainable development programs.

Gender Equality: Better for Growth, Debt, Income Equality and Sustainability

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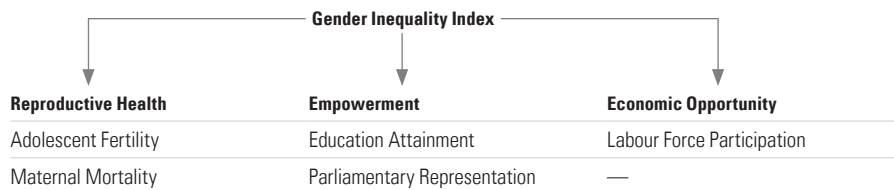
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Appendix 1: Gender Inequality Index Sub-components & Estimation Results

This Appendix presents details on the sub-components of GII and some technical results from our estimations which incorporate both parametric and non-parametric techniques.

Figure 14: UN Gender Inequality Index



Source: UNDP Human Development Report, IMF.

The GII relies on data from publicly available international databases, including the maternal mortality ratio from the United Nations Maternal Mortality Estimation Inter-Agency Group (MMEIG), which includes WHO, UNICEF, UNFPA and the World Bank; adolescent birth rates from the UN Department of Economic and Social Affairs' World Population Prospects; educational attainment statistics from the UNESCO Institute for Statistics' educational attainment tables and the Barro-Lee data sets; parliamentary representation from the International Parliamentary Union (IPU); and labour market participation from the International Labour Organization's Key Indicators of the Labour Market (KILM).

Spearman's rank correlation coefficient is a nonparametric measure of rank correlation (i.e., the statistical dependence between the rankings of two variables). It assesses how well the relationship between two variables can be described using a monotonic function.

The sign of the Spearman correlation indicates the direction of association between the X (the independent) and the Y (the dependent) variable. If Y tends to increase when X increases, the Spearman correlation coefficient is positive. If Y tends to decrease when X increases, the Spearman correlation coefficient is negative.

$$r_s = \rho_{r_{gx}, r_{gy}} = \frac{\text{cov}(r_{gx}, r_{gy})}{\sigma_{r_{gx}} \sigma_{r_{gy}}}$$

ρ denotes the usual bivariate correlation coefficient, but applied to the rank variables.

$\text{cov}(r_{gx}, r_{gy})$ is the bivariate covariance of the rank variables.

$\sigma_{r_{gx}}$ and $\sigma_{r_{gy}}$ are the standard deviations of the rank variables.

For Tables 1–3 below, the GDP per capita growth is the 5-year average of period 2010–2015. The initial income level is the 2010 GDP per capita. The gender inequality is measured by 2010 UN Gender Inequality Index.

Table 1: Gender Inequality versus Initial GDP per Capita (Spearman Rank Correlation Test)

	t-test	
	Below Median Income	Above Median Income
Log of Initial GDP per Capita	-4.85***	-8.79***
Countries	55	92

Source: World Bank, SSGA Demographics.

The symbols *, **, and *** indicate that the estimated coefficient is statistically different from zero at the 10, 5, and 1 percent level, respectively.

There is significant evidence to suggest that the gender inequality index is negatively correlated with the log of initial GDP per capita.

Table 2: GDP per Capita Growth versus Initial GDP per Capita & GII (Spearman Rank Correlation Test)

	t-test	
	Below Median Income	Above Median Income
Log of Initial GDP per Capita	0.42	-3.69***
Gender Inequality Index	-2.49**	2.29**
Countries	55	92

Source: World Bank, SSGA Demographics.

The symbols *, **, and *** indicate that the estimated coefficient is statistically different from zero at the 10, 5, and 1 percent level, respectively.

With regard to above median income countries, the initial GDP per capita is negatively correlated with the growth rate of GDP per capita.

Table 3: GDP per Capita Growth vs. Sub-component of GII (Spearman Rank Correlation Test)

	t-test	
	Below Median Income	Above Median Income
Shares of Female Seats in Parliament	0.12	-0.23
Maternal Mortality Ratio	-2.40**	2.72***
Adolescent Fertility Rate	-2.22**	3.52***
Female Education	2.12**	-1.29*
		(1-tailed test)
Male Education	1.74*	-0.84
Education Gap	1.78*	-1.49
		(1-tailed test)
Female Labour Force Participation	1.91*	-0.75
Male Labour Force Participation	3.00**	-0.29
Labour Force Participation Gap	1.33*	-0.65
	(1-tailed test)	
Countries	55	92

Source: World Bank, ILO, UN, IMF, SSGA Demographics.

The symbols *, **, and *** indicate that the estimated coefficient is statistically different from zero at the 10, 5, and 1 percent level, respectively.

There are significant correlations between GDP per capita growth and most components of Gender Inequality Index for below median income countries except empowerment (shares of female seats in parliament). In *Above Median Income* countries, GDP per capita growth rate is shown to be correlated with maternal mortality, adolescent fertility, female education and education gap.

Table 4: GDP per Capita Growth vs. Gender Inequality

Variable	Coefficient	t-Statistic	Prob.
Gender Inequality Index	-0.1065	-4.8587	0.0000 ***
Log of GDP per Capita	-0.0824	-3.7518	0.0002 ***

Source: IMF, UN, Penn World Tables, SSGA Demographics.

The symbol *** indicate that the estimated coefficient is statistically different from zero at the 1 percent level.

We conduct panel data estimation with data over 103 countries after eliminating outliers based on incomplete data availability or inconsistencies. Each country had four annual observations. The results are presented in Table 5. Our estimated coefficients and signs are similar to those of the IMF.

Table 5: GDP per Capita Growth vs. GII Sub-components (Panel Least Squares Estimation)

Variables	All	High Income	Low Income	Lower Middle Income	Upper Middle Income
Female Education	0.1037***	0.0027	-0.1446	0.2051***	0.1054
Female Labour Force Participation	-0.0747	-0.0596	0.1050	-0.1106	-0.0895
Empowerment	0.0592**	0.0162	0.1171**	0.0745	0.0363
Maternal Mortality Rate	-5.0176*	-106.7793	-5.9734**	-15.6749*	-16.7961*
Adolescent Fertility Rate	-0.7548**	-0.963*	-0.2108	-0.4803	-0.8101*
Log of Initial GDP per Capita	-0.0946***	-0.0618***	-0.1012***	-0.1354***	-0.0812***
R-squared (%)	55.3	58.2	72.8	62	56.3
Countries	118	34	18	34	32

Source: World Bank, ILO, UN, IMF, Barro-Lee, SSGA Demographics.

The symbols *, **, and *** indicate that the estimated coefficient is statistically different from zero at the 10, 5, and 1 percent level, respectively.

We used country fixed effects regression to estimate the following relationship over the period from 1990–2015.

$$\begin{aligned}
 \text{GDP per Capita growth}_{it,t-5} &= \text{initial income per capita}_{it-5} + \text{female education}_{it-5} \\
 &+ \text{female labour force participation}_{it-5} + \text{empowerment}_{it-5} \\
 &+ \text{maternal mortality rate}_{it-5} + \text{fertility rate}_{it-5}
 \end{aligned}$$

Given data availability, the regression relies on non-overlapping five-year averages to remove the effects of business cycle fluctuations in growth rates and deal with data gaps in certain years.

GDP per capita growth is averaged over 5 non-overlapping years based on GDP per capita at Purchasing Power Parity (PPP) at constant 2011 international US dollar rates. Country-fixed effects control for country-specific drivers of GDP per capita growth that are not explicitly controlled for in the regressions and if omitted could result in misleading results.

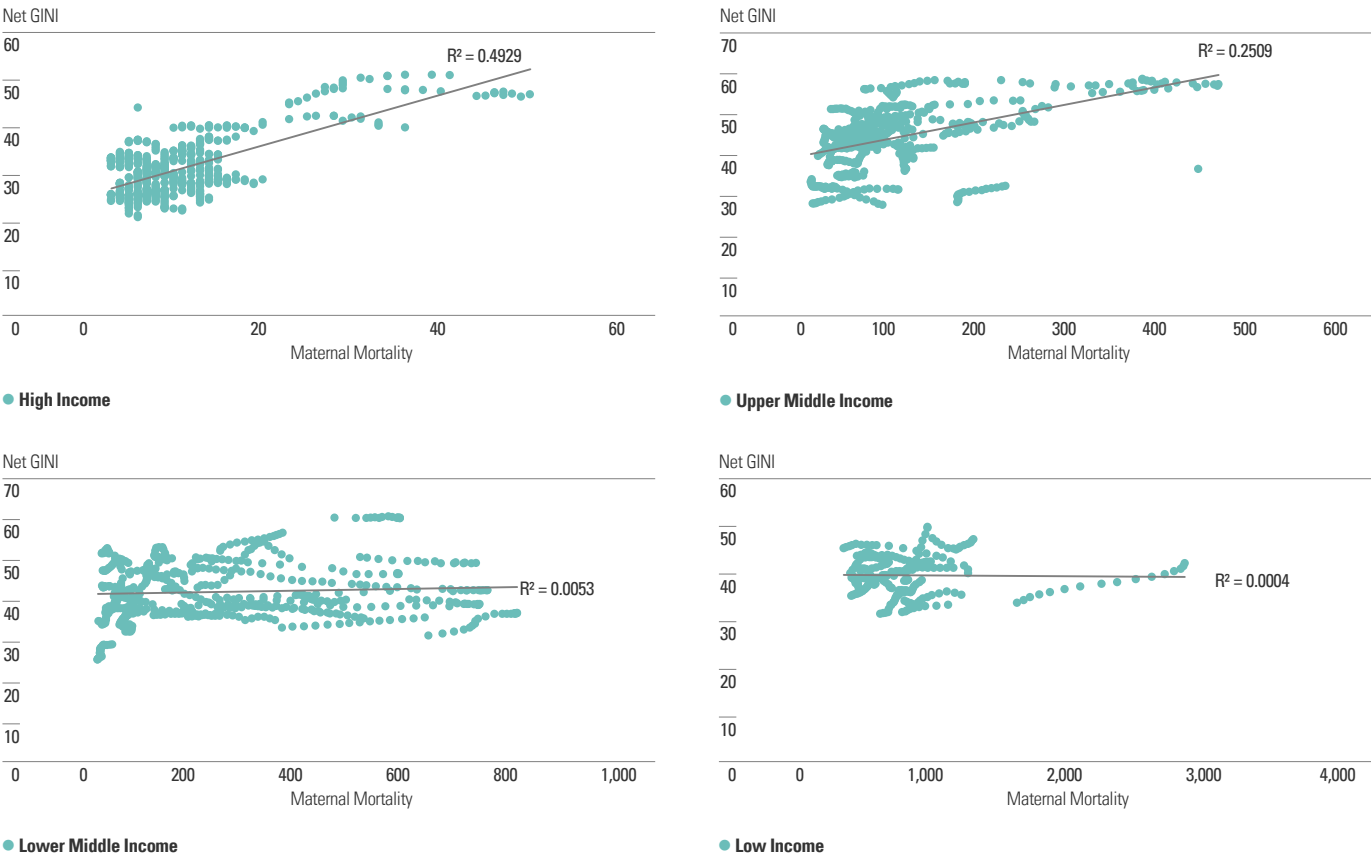
We find that female education and empowerment are significantly positively correlated with GDP per capita growth. The initial level of GDP per capita is significantly negatively correlated with GDP per capita growth.

Appendix 2. World Bank List of Countries by Income Groups

High Income		Upper Middle Income		Lower Middle Income		Low Income
Australia	Latvia	Albania	Libya	Armenia	Pakistan	Afghanistan
Austria	Lithuania	Algeria	Malaysia	Bangladesh	Papua New Guinea	Benin
Bahamas, The	Luxembourg	Argentina	Maldives	Bolivia	Philippines	Burkina Faso
Bahrain	Malta	Azerbaijan	Mauritius	Cambodia	Sri Lanka	Burundi
Barbados	Netherlands	Belarus	Mexico	Cameroon	Sudan	Central African Rep
Belgium	New Zealand	Belize	Montenegro	Congo, Rep.	Swaziland	Congo, Dem. Rep.
Canada	Norway	Bosnia & Herzegovina	Namibia	El Salvador	Tajikistan	Ethiopia
Chile	Oman	Botswana	Panama	Georgia	Tunisia	Gambia, The
Cyprus	Poland	Brazil	Paraguay	Ghana	Ukraine	Liberia
Czech Republic	Portugal	Bulgaria	Peru	Guatemala	Viet Nam	Malawi
Denmark	Qatar	China	Romania	Honduras	Yemen, Rep.	Mali
Estonia	Sao Tome & Principe	Colombia	Russian Federation	India	Zambia	Mozambique
Finland	Saudi Arabia	Costa Rica	Samoa	Indonesia		Nepal
France	Singapore	Croatia	Serbia	Jordan		Rwanda
Germany	Slovak Republic	Cote d'Ivoire	South Africa	Kenya		Senegal
Greece	Slovenia	Dominican Republic	Suriname	Kyrgyz Republic		Sierra Leone
Hungary	Spain	Ecuador	Thailand	Lao PDR		Togo
Iceland	Sweden	Gabon	Tonga	Lesotho		Uganda
Ireland	Switzerland	Guyana	Turkey	Mauritania		Zimbabwe
Israel	Trinidad & Tobago	Iran, Islamic Rep.	Venezuela, RB	Moldova		
Italy	UAE	Iraq		Mongolia		
Japan	United Kingdom	Jamaica		Morocco		
Korea, Rep.	United States	Kazakhstan		Myanmar		
Kuwait	Uruguay	Lebanon		Nicaragua		

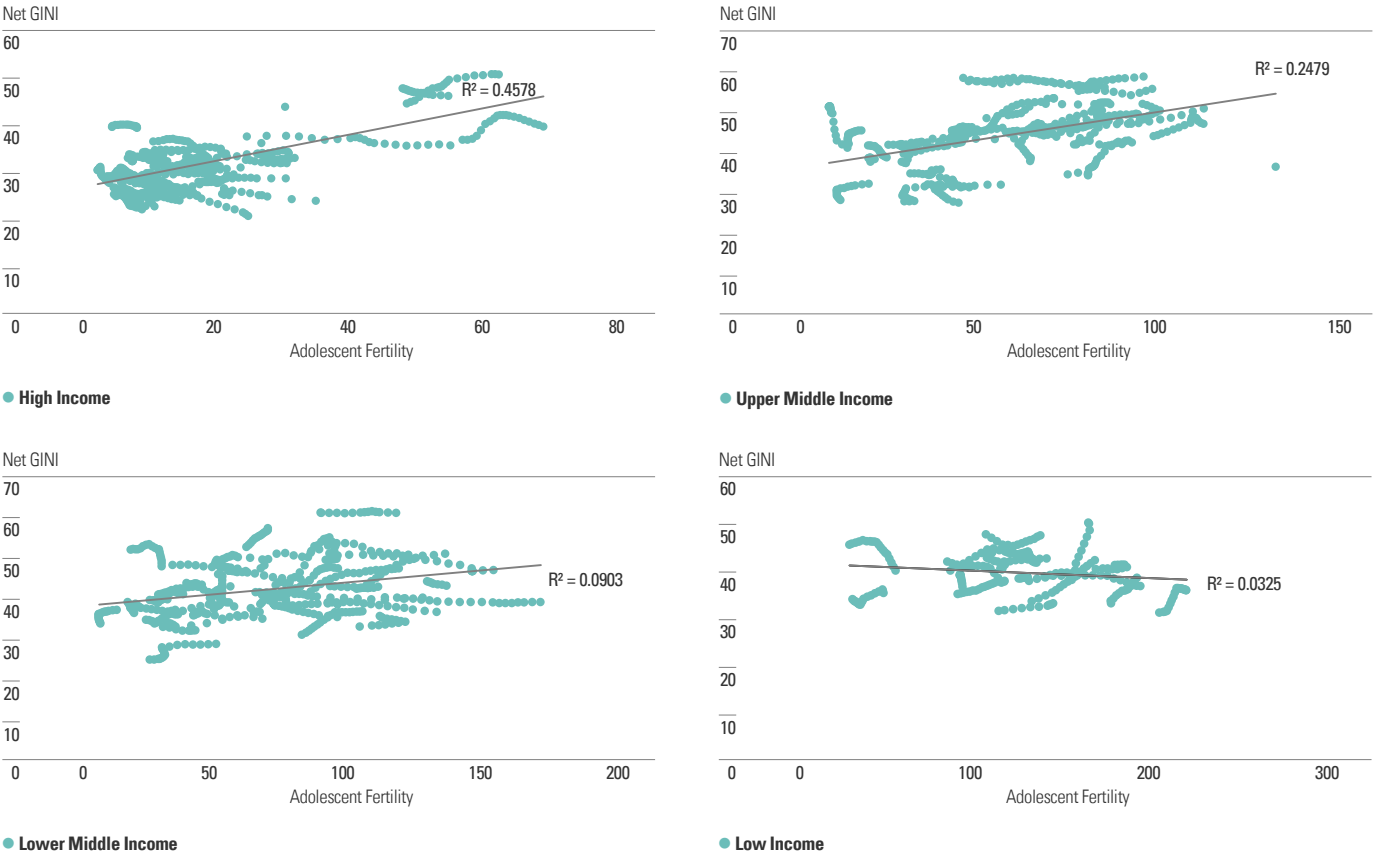
Appendix 3. Net GINI (Income Inequality) and GII Sub-components: Selected Results

Figure 15: Maternal Mortality and Income Inequality



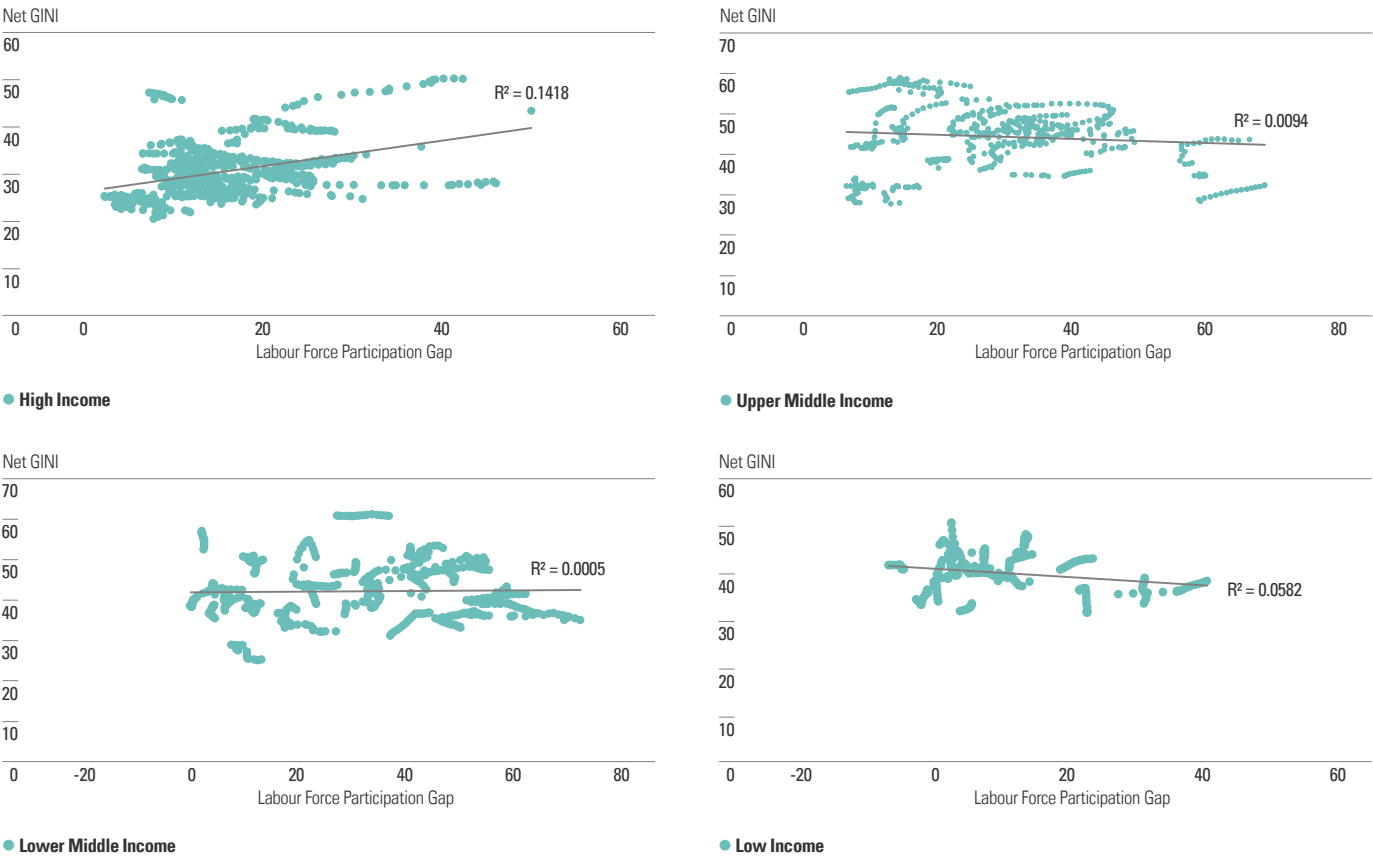
Source: UN, IMF, World Bank, SSGA Demographics.

Figure 16: Adolescent Fertility and Income Inequality



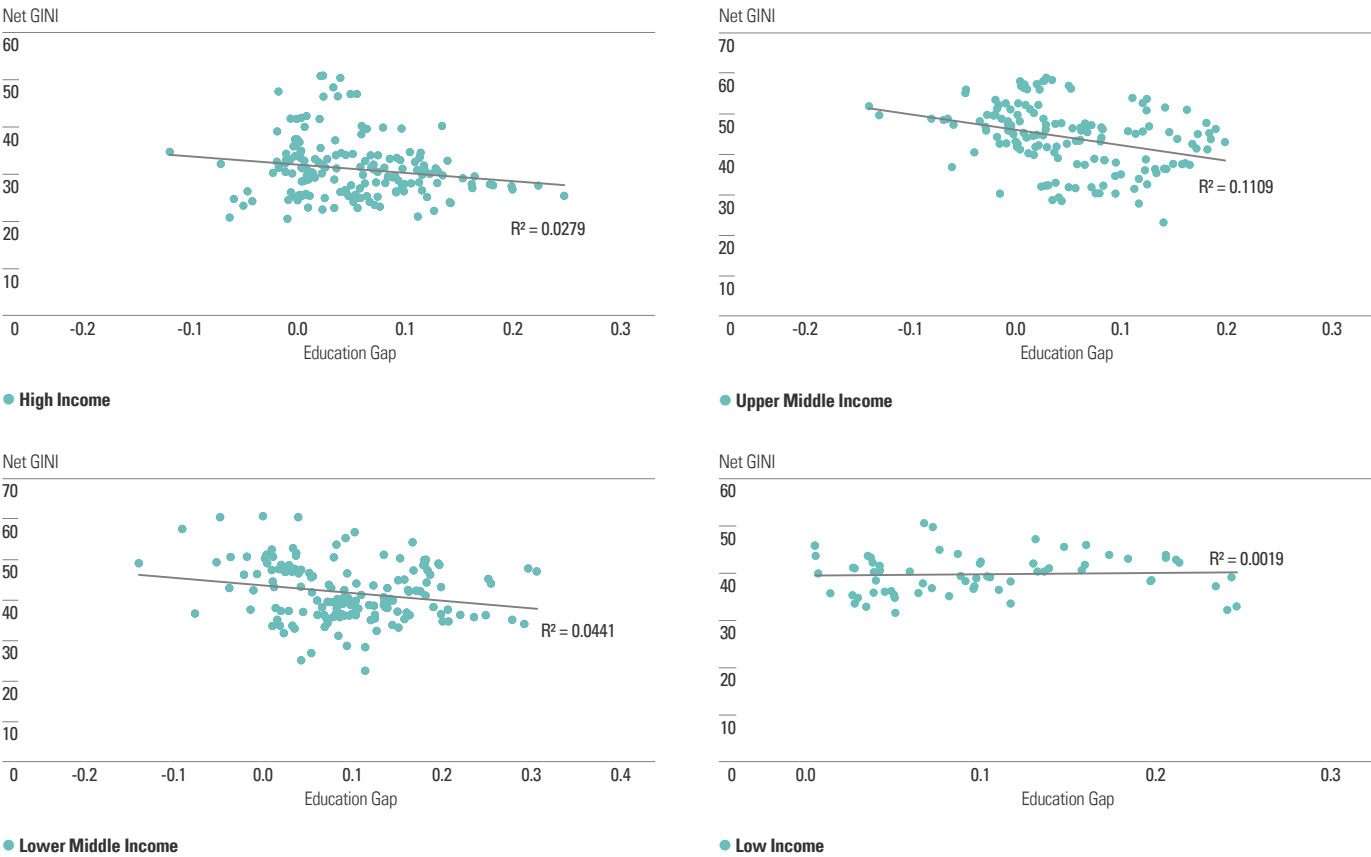
Source: UN, IMF, World Bank, SSGA Demographics.

Figure 17: Labour Force Participation Gap (Male — Female) and Income Inequality



Source: UN, IMF, World Bank, SSGA Demographics.

Figure 18: Education Gap (Male — Female) and Income Inequality



Source: UN, IMF, World Bank, SSGA Demographics.

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