IMF STAFF DISCUSSION NOTE

Catalyst for Change: Empowering Women and Tackling Income Inequality

Christian Gonzales, Sonali Jain-Chandra,

Kalpana Kochhar, Monique Newiak, and

Tlek Zeinullayev

Catalyst for Change: Empowering Women and Tackling Income Inequality

Prepared by Christian Gonzales, Sonali Jain-Chandra, Kalpana Kochhar, Monique Newiak, and Tlek Zeinullayev

Authorized for distribution by Kalpana Kochhar

October 2015

CONTENTS

EXECUTIVE SUMMARY

"Gender equality is more than a goal in itself. It is a precondition for meeting the challenge of reducing poverty, promoting sustainable development and building good governance." Kofi Annan

The attainment of a more equitable society and narrowing gender differences are two issues that are drawing considerable attention from policymakers in a number of countries. There is also increasing recognition that the pursuit of these two objectives is not just desirable from a social equity perspective, but that it would have beneficial effects for the macroeconomy. As a result, a number of papers have studied the links between income inequality and growth, as well as female labor force participation and its link to the overall economy. This paper aims to extend this literature by documenting the links between inequality of income and that of gender.

Income inequality and gender-related inequality can interact through a number of channels. First, gender wage gaps directly contribute to income inequality. Furthermore, higher gaps in labor force participation rates between men and women are likely to result in inequality of earnings between sexes, thus creating and exacerbating income inequality. Differences in economic outcomes may be a consequence of unequal opportunities and enabling conditions for men and women, and boys and girls.

This note finds that several dimensions of gender inequality are associated strongly with income inequality across time and countries of all income groups. The main results are:

- *Empirical analysis.* Controlling for the standard drivers of income inequality previously highlighted in the literature and extending the United Nation's Gender Inequality Index to cover two decades for almost 140 countries, our study highlights that gender inequality is strongly associated with income inequality. An increase in the multi-dimensional Gender Inequality Index from 0 (perfect gender equality) to 1 (perfect gender inequality) is associated with an increase in net inequality (measured by the Gini coefficient) by almost 10 points.

- *No silver bullet.* These results hold for countries across all levels of development, however the relevant dimensions of gender inequality vary. For advanced countries—with largely closed gender gaps in education and more equal economic opportunities across sexes— income inequality arises mainly through gender gaps in economic participation. In emerging markets and low-income countries, inequality of opportunity, in particular gender gaps in education and health, appear to pose the main obstacle to a more equal income distribution.

Aspiring to equality of opportunities and removing legal and other obstacles that prevent women from reaching their full economic potential would give them the option to become economically active should they so choose. This note argues that working toward gender equity and increasing female economic participation in turn are associated with higher growth, more favorable development outcomes, and lower income inequality.
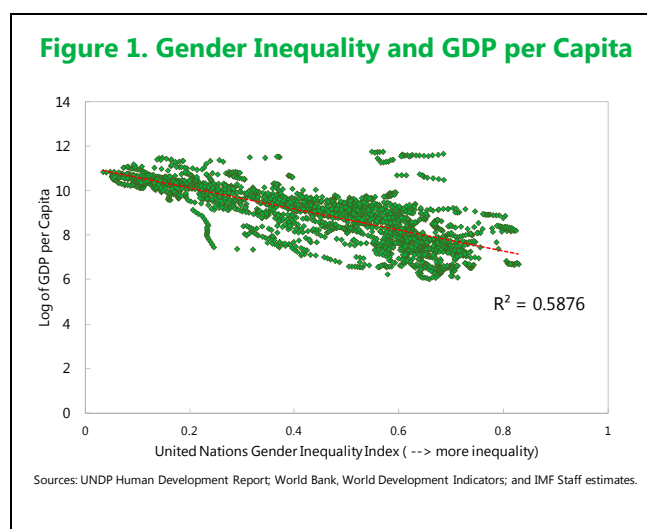
INTRODUCTION

Income and Gender Inequality: Two Phenomena with Significant Macroeconomic Implications
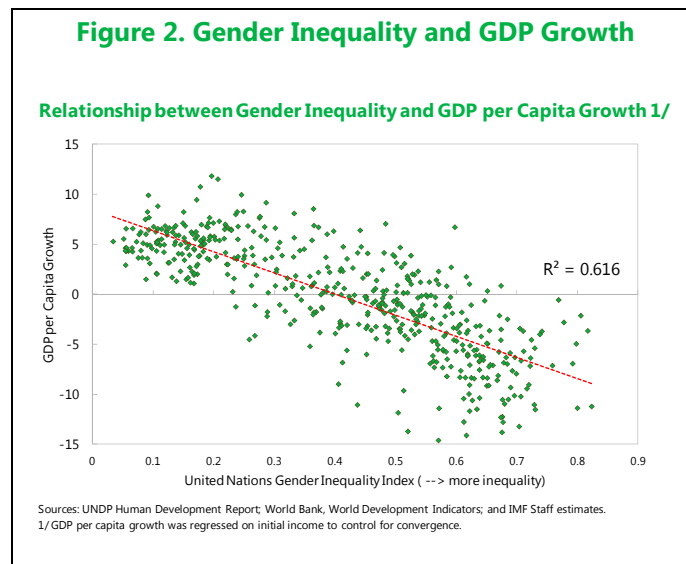
1.   **Income inequality can impede economic growth**. The literature has highlighted various channels through which income inequality can affect growth: higher inequality in income and wealth can lead to underinvestment in physical and human capital (Galor and Zeira, 1993; Galor and Moeav, 2004; Aghion and others, 1999); it has been associated with lower levels of mobility across generations (Corak, 2013), and can dampen aggregate demand (Carvalho and Rezai, 2014). On the other hand, inequality can also stimulate growth by providing incentives for innovation and entrepreneurship and providing the minimum to some individuals to start a business (Lazear and Rosen, 1981; Barro, 2000). While the effect of income inequality on growth is thus ambiguous in principle, two recent IMF studies have shown empirically that a less equal income distribution hurts growth. In particular, lower net income inequality has been robustly associated with faster growth and longer growth spells (Ostry, Berg and Tsangarides, 2014). Moreover, the distribution of income also matters in its own right: an increase in the income share of the top 20 percent is associated with lower GDP growth over the medium term, while an increase in the income share of the bottom 20 percent is associated with higher GDP growth (Dabla-Norris and others, 2015). Using U.S. micro-census data, van der Weide and Milanovic (2014) show that income inequality decreases income growth for the poor but not for the rich.

2.   **Likewise, the various dimensions of gender-based inequality also have major macroeconomic and development-related implications.** Gender inequality can influence economic outcomes via a variety of channels (Elborgh-Woytek and others, 2013):

- *Development*. There is a positive association between gender equality and per capita GDP, the level of competitiveness, and human development indicators (WEF, 2014; Duflo, 2012; Figure 1). Women are more likely than men to invest a large proportion of their household income in the education of their children; higher economic participation and earnings by women could therefore translate into higher expenditure on school enrollment for children (Aguirre and others, 2012; Miller 2008; Rubalcava and others, 2004; Thomas, 1990).

Figure 1. Gender Inequality and GDP per Capita

$R^2 = 0.5876$

Log of GDP per Capita

United Nations Gender Inequality Index (--> more inequality)

Sources: UNDP Human Development Report; World Bank, World Development Indicators; and IMF Staff estimates.

- *Economic Growth.* Gender gaps in economic participation restrict the pool of talent in the labor market and can thus yield a less efficient allocation of resources and total factor productivity losses and lower GDP growth (Cuberes and Teignier, 2015; Esteve-Volart, 2004). In a cross-country study, Klasen (1999) shows that 0.4 to 0.9 percentage point 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. Figure 2 and Box 1 highlight that higher gender inequality (as measured by the multi-dimensional Gender Inequality Index) is associated with lower economic growth. This finding is consistent with IMF (2015), which shows that gender inequality is negatively associated with growth in particular in low-income countries, broadly confirming the findings by Amin, Kuntchev, and Schmidt (2015), which are based on a cross-section of countries.

Figure 2. Gender Inequality and GDP Growth

Relationship between Gender Inequality and GDP per Capita Growth 1/

$R^2 = 0.616$

Sources: UNDP Human Development Report; World Bank, World Development Indicators; and IMF Staff estimates.
1/ GDP per capita growth was regressed on initial income to control for convergence.

- *Macroeconomic Stability.* In countries facing a shrinking workforce, raising economic participation, including of women, can directly yield growth and stability gains by mitigating the impact of a decline in the labor force on growth potential and ensuring the stability of the pension system (Steinberg and Nakane, 2012).

Two Sides of the Same Story: How Are Inequality of Gender and Inequality of Income Linked?

3.   **While the concepts of gender and income inequality have mostly been treated separately in the literature, they can interact via the following channels:**

- *Inequality of economic outcomes.* Gender wage gaps directly contribute to income inequality. Furthermore, higher gaps in labor force participation rates between men and women are likely to result in inequality of earnings between sexes, thus creating and exacerbating income inequality. Also, women are more likely to work in the informal sector, in which earnings are lower, which widens the gender earnings gap and exacerbates income inequality.

- *Inequality of opportunities.* Inequality of opportunities, such as unequal access to education, health services, financial markets and resources as well differences in empowerment is strongly associated with income inequality (Mincer, 1958; Becker and Chiswick, 1966; Galor and Zeira, 1993; Brunori, Ferreira, and Peragine, 2013; Murray, Lopez, and Alvarado, 2013; Castello-Climent and Domenech, 2014). We find that these inequalities of opportunities are strongly associated with gender gaps in opportunities. Consequently, differences in

economic outcomes may also result from unequal enabling conditions for men and women, and boys and girls. Specifically:

> Education: Gender gaps in education still persist, leading to higher inequality in opportunity (when both boys and girls go to school, opportunities are more equal than if only boys go to school). If one segment of the population is excluded from educational opportunities, future income for this segment will be lower than for the other, resulting in higher income inequality.

> Financial access/inclusion: Women still, on average, have lower access to financial services than men, which makes it more difficult for them to start businesses or invest in education, exacerbating inequality of opportunity and therefore lowering wage and other income for women, worsening income inequality.

4.   **This study finds that several dimensions of gender inequality are associated with income inequality across time and countries of all income groups.** Following the above arguments, our empirical analysis examines the effect of differences in outcomes and opportunities for men and women on income inequality.[1] Controlling for the drivers of inequality previously highlighted in the literature, our results highlight that gender inequality is strongly associated with income inequality. These results hold for countries across all levels of development; however, the relevant dimensions vary. For advanced countries—with largely closed gender gaps in education and more equal economic opportunities across sexes—income inequality arises mainly through gender gaps in economic participation. In emerging markets and low-income countries, inequality of opportunity, in particular in gender gaps in education, political empowerment and health, appear to pose the main obstacle to a more equal income distribution.

5.   **The results from this study suggest that mitigating gender inequality by leveling the economic playing field between men and women could also go a long way toward reducing the overall inequality of the income distribution.** In other words, in addition to being a development objective in itself, a decline in gender inequality would also be associated with lower income inequality. In recommending equal opportunities and more gender parity, this study argues for leveling the playing field in economic opportunities and outcomes between men and women. It does not intend to render a judgment of countries' broadly accepted cultural and religious norms.

6.   **The analysis makes use of existing cross-country data on inequality, which have certain drawbacks.** In the past, empirical analysis of the drivers and consequences of income inequality has been impeded by the limitations of the existing data sets. The Standardized World Income Inequality Database (SWIID), which this Staff Discussion Note (SDN) uses, incorporates data from a number of sources with a view to maximizing the comparability while ensuring the widest possible coverage across countries and over time. Nevertheless, these data have drawbacks, as

---

[1]These theoretical arguments could be most clearly tested if income inequality was measured at the individual level. However, available data measures income inequality at the household level. Smaller gender gaps could potentially lead to higher income inequality across households if husbands and wives have the same (potential) income. However, in our empirical exercise, we find a strong association between gender inequality and income inequality even at the household level.

missing observations are generated via model-based multiple imputation estimates. As a robustness check, the paper estimates the model for a subset of countries for which Gini data are available from the Luxembourg Income Study (LIS), which consists of harmonized data at the unit level on household incomes. The LIS data are available for a smaller set of countries than the SWIID but are more consistent.

7.   **The note proceeds as follows.** After providing stylized facts on the relationship between gender inequality and income inequality, this study presents an empirical quantification of the effects and policy recommendations on how to mitigate gender inequality.

Box 1. Gender Inequality and Economic Growth

Previous studies have highlighted that gender gaps in labor force participation, entrepreneurial activity, and education impede economic growth (Cuberes and Teignier, 2012; Esteve-Volart, 2004; Klasen and Lamanna, 2009). Cuberes and Teigner (2015) simulate an occupational choice model that imposes several frictions on economic participation and wages of women, and show that gender gaps in entrepreneurship and labor force participation significantly reduce per capita income. IMF (2015) finds that legal equality is robustly related to real GDP per capita growth in all countries.

This note extends the United Nations' Gender Inequality Index (GII) which captures three dimensions of gender inequality, including labor market participation, reproductive health, and empowerment (see Box 2 for details on the construction of the index). This multidimensional index is then included in cross-country growth regressions. The results in Table 1 highlight that higher gender inequality is associated with lower economic growth even when controlling for a number of determinants of growth such as investment, population growth, institutional quality, and education. The results indicate that an amelioration of gender inequality that corresponds to a 0.1 reduction in the GII is associated with almost 1 percentage point higher economic growth. In a similar exercise, IMF (2015) finds that increases in the GII are associated with a decrease in growth in low-income countries, on top of the effect of initial income inequality, as measured by the ratio of the top 20 to the bottom 40 percent of the income distribution.

	Table 1. Gender Inequality and Economic Growth			
	Dependent Variable: GDP per Capita Growth			
	Fixed Effects 1/		System GMM 2/	
VARIABLES	(1)	(2)	(3)	(4)
Log (Initial income per capita)	−0.1068***	−0.0975***	−0.0539***	−0.0202***
	(0.0116)	(0.0137)	(0.0165)	(0.0049)
UNDP Gender inequality index (GII)	−0.1120**	−0.1131**	−0.3818***	−0.0885*
	(0.0431)	(0.0430)	(0.1099)	(0.0452)
Log (Investment)		0.0225***		0.0205**
		(0.0084)		(0.0100)
Log (Population growth)		0.0046		0.0118
		(0.0048)		(0.0109)
Log (Total education)		−0.0013		0.0238
		(0.0176)		(0.0179)
Large negative terms of trade shock		−0.0004		−0.0069
		(0.0049)		(0.0124)
Political institutions		0.0002		0.0002
		(0.0004)		(0.0006)
Openness		0.0238***		0.0113
		(0.0079)		(0.0121)
Debt liabilities		−0.0081***		−0.0140***
		(0.0024)		(0.0040)
Observations (five-year averages)	508	405	508	405
Countries	128	97	128	97

Sources: Barro and Lee 2012; IMF, World Economic Outlook (WEO); Lane and Milesi-Ferretti 2012; Ostry, Berg, and Tsangarides 2014; Penn World Tables; Polity IV; UNDP Human Development Report; World Bank, World Development Indicators; and IMF staff estimates.

1/ Estimated using country and year fixed-effects panel regressions with robust standard errors clustered at the country level shown in parentheses, *p < 0.10; **p < 0.05; ***p < 0.01.

2/ Estimated using two-step system GMM. Standard errors in parentheses, *p < 0.10; **p < 0.05; ***p < 0.01. Standard tests for the joint validity of instruments, as well as AR tests were satisfied. The Windmeijer (2005) finite sample correction for standard errors was used.

LINKING GENDER-BASED INEQUALITY AND INCOME INEQUALITY: STYLIZED FACTS

8.   **Gender inequality in outcomes and opportunities is strongly related to income inequality worldwide**. The United Nations' Gender Inequality Index (GII) combines the following dimensions of outcome and opportunity based gender inequality: the labor market (gap between male and female labor force participation rates), education (difference between secondary and higher education rates for men and women), empowerment (female shares in parliament), and health (maternal mortality ratio and adolescent fertility) (Box 2 contains details of the GII and its construction).[2] This note extends the index to construct a long time series that enables empirical analysis. Figure 3 shows that the GII varies significantly across countries, with more gender inequality prevalent in the South Asia and Middle East and North Africa regions. Encouragingly, gender inequality as measured by the GII has been declining in the majority of countries (Figure 4). The GII is highly correlated with income inequality, with the share of the 10 percent of the income distribution across countries, as well as with poverty (Figure 5). This highlights that both gender inequality in outcomes as well as opportunities interact closely with the level of income inequality across countries.

---

[2]The gender inequality index ranges between 0 (equal) and 1 (unequal), with a higher value of the index indicating more gender disparities in health, empowerment and labor market outcomes. The world average score on the GII is 0.451. Regional averages range from 0.13 percent among European Union countries to nearly 0.58 percent in Sub-Saharan Africa. Sub-Saharan Africa, South Asia and the Middle East exhibit the highest gender inequality (with average GII values of 0.58, 0.54 and 0.55, respectively).

Figure 3. Gender Inequality Index across Countries, 2010
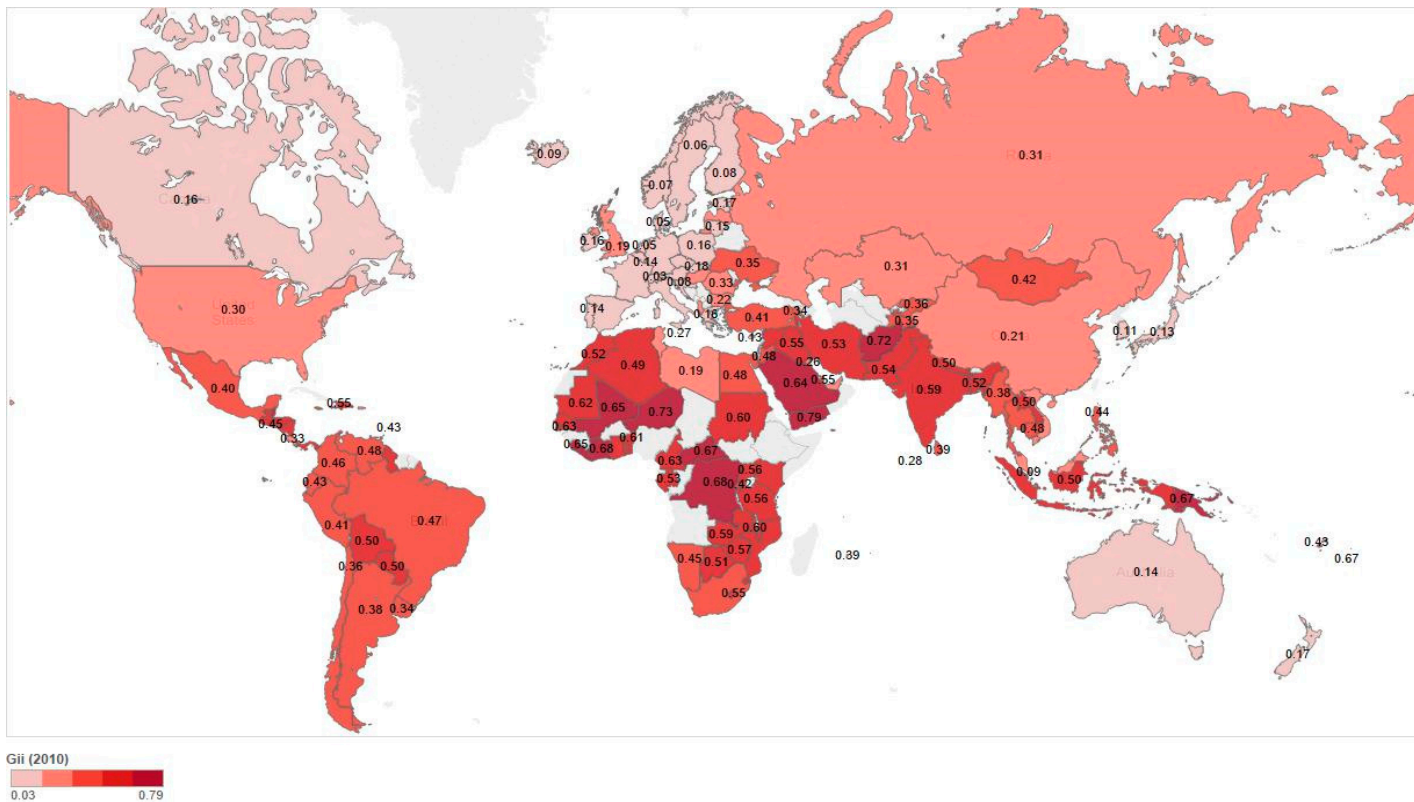
Sources: UNDP, Human Development Report; and IMF staff estimates.

Note: Numbers in the map indicate Gender Inequality Index (0 = all equal, 1 = no equality).

Figure 4. Change in Gender Inequality Index across Countries, 1990–2010
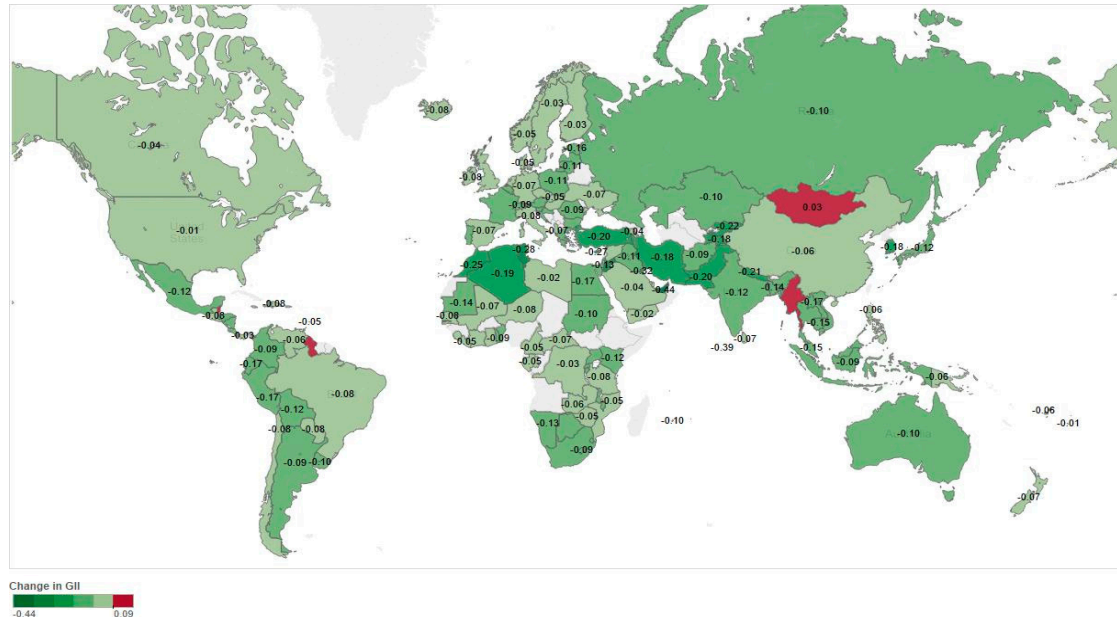
Change in GII
-0.44   0.09

Sources: UNDP, Human Development Report; and IMF staff estimates.

Note: Numbers in the map indicate Gender Inequality Index (0 = all equal, 1 = no equality).

Figure 5. Gender Inequality, Income Inequality, and Poverty

Income Inequality and Gender Inequality
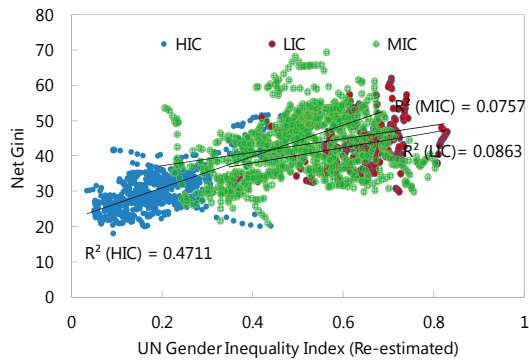
Sources: SWIID; United Nations; and authors estimates.
Note: HIC = High-income countries; LIC = Low-income countries; MIC = Middle-income countries.

Income Inequality and Gender Inequality
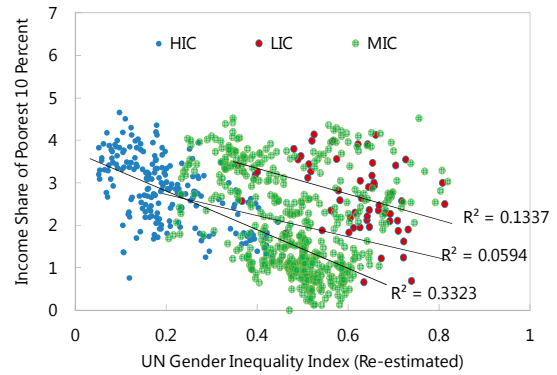
Sources: World Bank, World Development Indicators; United Nations; and authors estimates.

Poverty (US$2) and Gender Inequality
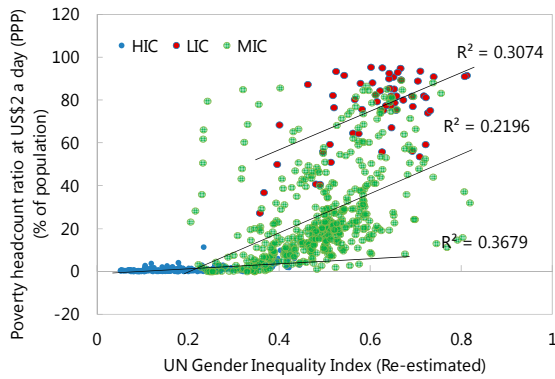
Sources: World Bank, World Development Indicators; United Nations; and authors estimates.

Poverty (US$1.25) and Gender Inequality
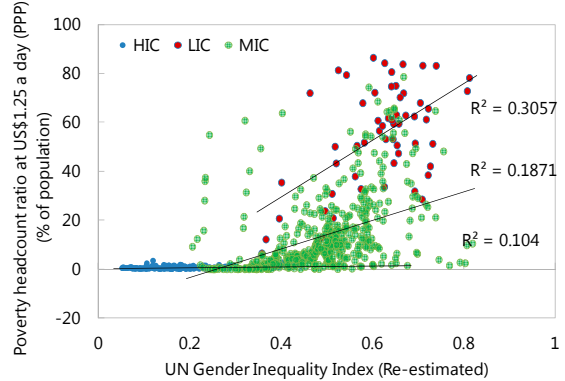
Sources: World Bank, World Development Indicators; United Nations; and authors estimates.

Box 2. Measuring Gender Inequality

Background. As there is no universally accepted compound measure of gender inequality, most studies have focused on specific elements of gender inequality such as gaps in education, health, labor force participation, and political representation. 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.

What does the GII measure? The GII is a composite measure of gender inequality in the areas of reproductive health (maternal mortality ratios and adolescent fertility rates), 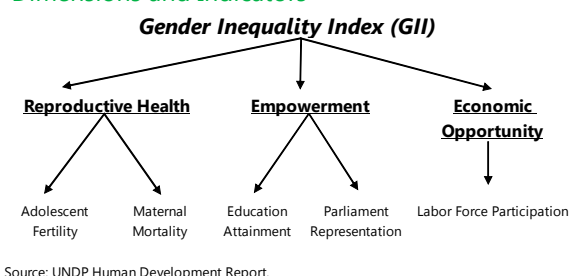empowerment (share of parliamentary seats and education attainment at the secondary level for both males and females), and economic opportunity (labor force participation rates by sex). While not directly mapped to the HDI, the higher values of the GII can be interpreted to be a loss in human development. While the GII has drawbacks (such as a complicated functional form and combining indicators that compare men and women with indicators that pertain only to women), it is preferable to alternatives such as the GDI (in which one of the main components is not observed and is imputed). The regressions in this note are also run on sub-components of the GII, with the findings being robust to the inclusion of these subcomponents.

United Nations Gender Inequality Index
Dimensions and Indicators

Source: UNDP Human Development Report.

Extending the GII. The GII is currently available for 2008, and from 2011 to 2013. As the underlying data used for the construction of the index are available from 1990 onward, a major innovation of this paper was to extend the GII from 1990 to 2010. Data that are available only every five years were linearly interpolated. As the analysis conducted in this note uses five-year panel regressions, this interpolation was not a major concern, but the nature of the data could be limiting in other types of analysis. There is a close relationship between the actual and constructed GII (correlation of 0.97).

Other gender-related indices. A large number of gender-related indices have been developed: 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, among others. However, most of these indices were created recently, which limits time coverage for empirical work. For years for which data overlap, the extended GII is highly correlated with other gender-related indices.

United Nations Gender Inequality Index
Constructed and Original
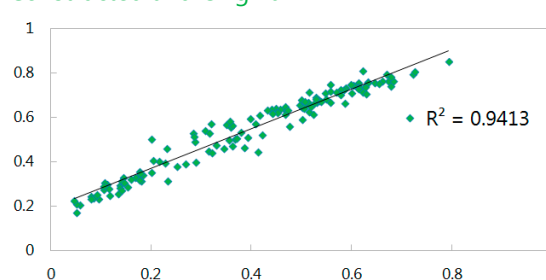
Sources: UNDP 2014 Human Development Report; and IMF staff estimates.

Correlation between GII (original and constructed) and Other Indices of Gender Inequality

	GII (constructed)	GII (original)
SIGI	(0.89)	(0.88)
WEOI	(0.66)	(0.67)
Gender CPIA	0.50	0.60
GII (constructed)	1.00	0.97
UNDP GII (original)		1.00

Note: Negative signs are not an issue, because they simply reflect the fact that higher values for some indices represent higher inequality, while others represent higher equality. Time Coverage by Index: SIGI(2009, 2012, 2014), WEOI (2010 and 2012), CPIA(2005-2014), GII Constructed (1990-2010), GII Original (2008, 2011-2013).

Gender Inequality in Economic Outcomes: Labor Force Participation and Income Gaps
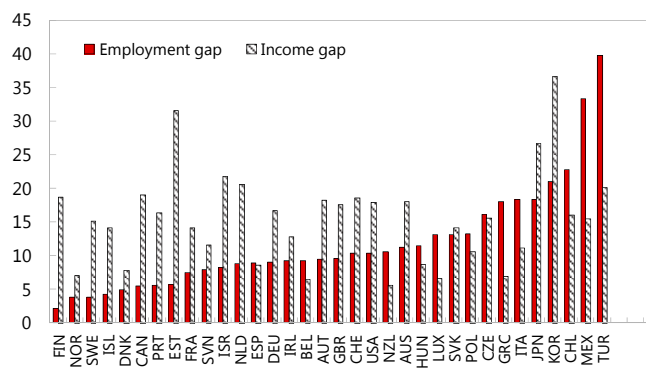
9.   **High gaps in labor force participation rates between men and women are likely to result in inequality of earnings between the sexes, thus increasing income inequality** (Figure 6; Box 3). The correlation between gender gaps in labor force participation and income inequality is strongest in high-income countries compared with other country groupings. This may be explained by the fact that there are fewer differences in the levels of education and working conditions between men and women in these countries. Also, there tends to be less legal and other discrimination between men and women in employment. In these circumstances, gender gaps in labor force participation would translate directly into differences in earnings for men and women, and thus increase income inequality. In particular, in Organization for Economic Co-operation and Development (OECD) countries, an increase in the proportion of households with working women decreased income inequality by 1 Gini point on average, and OECD countries with large gender pay gaps tend to have larger employment gaps as well (OECD, 2015; Box 3). In lower-income countries, the correlation between income inequality and gender gaps in labor force participation tends to be lower as other gender gaps (in education and health) are significant and are in themselves key drivers of income inequality, a finding borne out by regression analysis contained in the following section.

Box 3. Employment and Income Gaps in the OECD

The gaps between men and women in employment and earnings have been shrinking over the past 20 years (OECD, 2015). Between 1992 and 2013, the gender employment gap decreased by 8 percentage points in the OECD on average, with Spain and Ireland experiencing the highest decline of almost 20 percentage points. However, the increase in men's unemployment as a result of the great financial crisis has been driving these results to a large extent (OECD, 2012). The earnings gap between men and women has also declined by 4 percentage points compared with 2000, but men's median incomes remain higher than women's in all OECD countries. Women take home on average 15 percent less than men; they have higher chances of ending up in lower-paying jobs and face a lower probability of being promoted in their careers than men.

A higher proportion of working women has been associated with lower income inequality in the OECD. In particular, an increase in the proportion of households with working women (increase from 52 percent in the mid-1980s/early 1990s to 61 percent in the late 2000s), on average, decreased income inequality by 1 Gini point. The increasing work intensity of women was also associated with lower income inequality. Overall, the study finds that having more households with women in paid work, especially full-time work, means less income inequality by about 2 Gini points.

OECD: Employment and Income Gaps
(Male minus Female Employment and Income, in Percent)

Source: OECD (2015).

Figure 6. Gender Gaps in Labor Force Participation and Income Inequality

Female labor force participation is significantly associated with lower income inequality in advanced markets, and …

… the share of income held by the poorest increases with higher ratios of female to male labor force participation.

Inequality and Female Labor Force Participation

Inequality and Female Labor Force Participation

Sources: SWIID; World Bank, World Development Indicators.
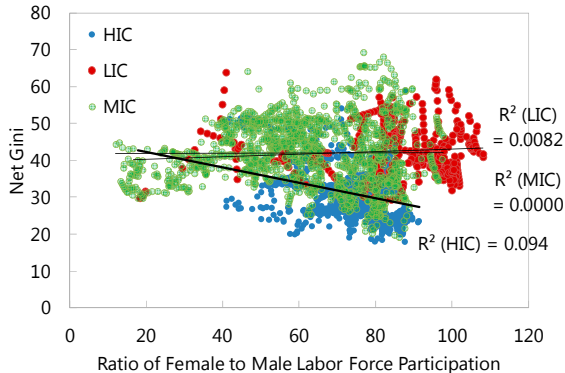
Sources: World Bank, World Development Indicators.

Countries with higher gender gaps in employment also tend to have higher gender income gaps.
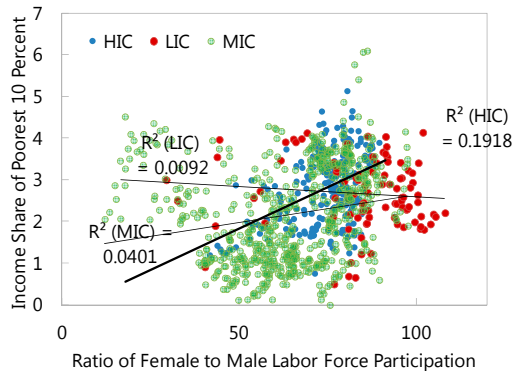
Gender gaps in labor force participation rates have been shrinking but remain high in most regions.

OECD: Employment and Income Gap

Labor Force Participation Gaps, 1993–2013
(Male minus Female Labor Force Participation Rates, in Percent)

Source: OECD (2015).
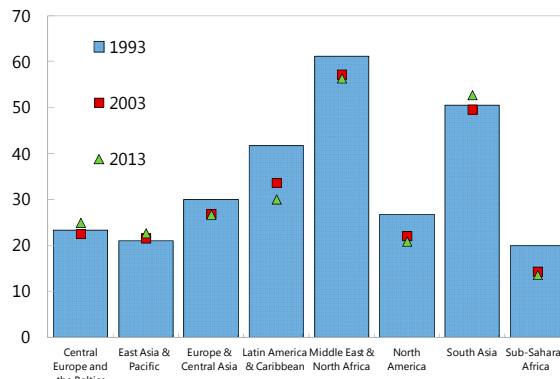
Sources: World Bank, Word Development Indicators; 2015, ILO KILM.

Inequality of Opportunity: Education, Financial Access, and Health

10.   **Considerable gender gaps in education persist and are closely linked with more unequal access to education, and also to inequality in outcomes, particularly income inequality**.

- Gender gaps in education (measured by the difference in years of schooling between men and women) are highly correlated with the overall inequality in educational attainment across countries, as measured by the education Gini coefficient (Figure 7). There appears to be a clear gender dimension in terms of access to education.

- While progress has been made and both gender gaps in education and the education Gini have been declining steadily over the past decades, sub-Saharan Africa and the Middle East and North Africa exhibit the highest education-related inequality. Gender gaps in literacy rates among adults remain substantial in low- to middle-income countries, likely reflecting a lag until narrower gender gaps in primary and secondary education translate into higher literacy rates.[3]

- A more equal distribution of education in turn has been associated with a more equal income distribution in empirical work. However, the large decline in education inequality has not coincided with a similar decrease in income inequality over time, likely due to growing returns to education, skill-biased technological change and globalization as offsetting factors (Thomas and others, 2001, Gregorio and Lee 2002; Castello-Climent and Domenech, 2014; Dabla-Norris and others, 2015a).

11.   **Limited financial access can increase inequality, and financial access by income and gender are closely related.** Figure 8 highlights that financial access for women is lower than for men, while higher-income households have greater access to financial services. Specifically, while access to financial services has increased worldwide it remains fragmented both across gender and income, with women and the poorest 40 percent of the income distribution having a smaller probability of access to financial services in each region of the world. In three regions, the gender gap in financial access has actually increased between 2011 and 2014 (in the Middle East and North Africa, South Asia, and sub-Saharan Africa). Countries that have larger disparities in access to financial services across income groups tend to also have larger gender gaps in this area. This could be due to the fact that weaker financial access among such groups distorts the allocation of resources resulting from underinvestment in human and physical capital, and can thereby exacerbate income inequality (Galor and Zeira, 1993). Better access to financial services has been empirically associated with lower Gini coefficients (Honohan, 2007). However, theoretically, the effect may be non-linear. In a micro-founded general equilibrium model, Dabla-Norris and others (2015) find that lowering the cost to financial access, may decrease inequality only after a critical share of the population accesses these services, and lowering collateral constraints may increase inequality as it favors economies of scale for the most productive enterprises.

12.   **Inequality in access to health services is widespread in some countries and is associated with higher income inequality.** Specifically, maternal health and adolescent fertility are closely related to income inequality and the incidence of poverty. High fertility rates have been associated with less economic activity by women. In particular, high adolescent fertility rates prevent girls from going from school and, subsequently, entering the labor market, or result in women entering the labor market with a low skill level, thereby increasing inequality of education, economic participation, and pay between men and women. This association is mirrored in higher degrees of inequality and higher poverty rates for countries in which adolescent fertility is high (Figure 9).

---

[3] There is no significant difference in the completion of primary and secondary school rates between boys and girls worldwide. Women's tertiary enrollment rates have recently started exceeding those of men on average.

Figure 7. Education

Gender inequality in education is very closely associated with gender inequality across countries.

Scatterplot Education Gini vs Education Gender Gap
Correlation: 0.759 (polynomial fit)
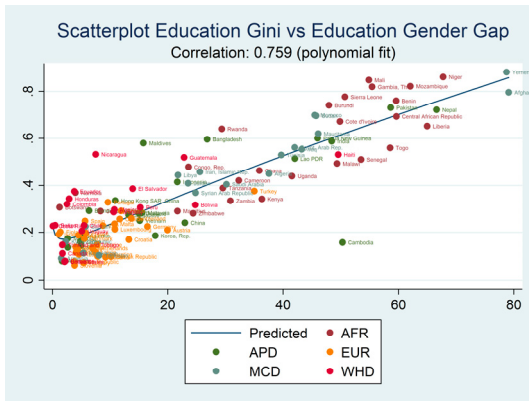
The decline in education inequality over the past decades...

Education Gini, 1980–2010
(0 = equal; 1 = unequal)
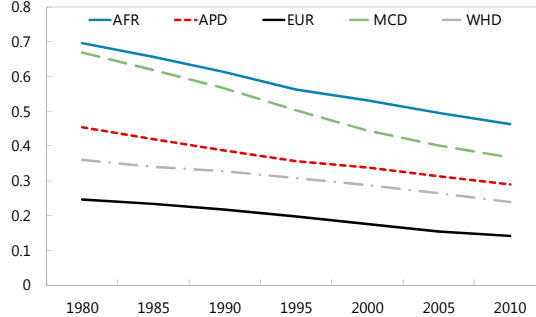
Note: AFR = Africa; APD = Asia and Pacific; EUR = Europe; MCD = Middle East and Central Asia; WHD = Western Hemisphere.

...has coincided with a period in which gender gaps in education shrank worldwide.

Gender Gap in Educational Attainment, 1960–2010
(5-Year Averages, Gap in Male minus Female Years of Education over Male Years of Education)
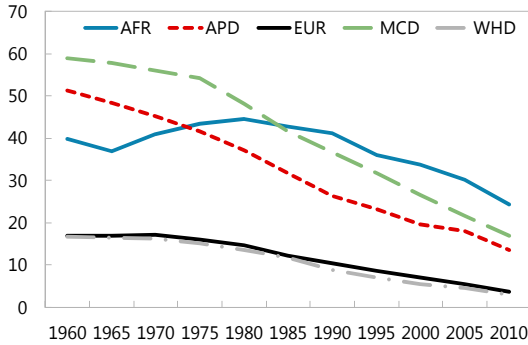
Girls, once enrolled in school, do not perform worse than boys.

Completion Ration, 2012 or Latest Available
(In Percent of Relevant Age Group)
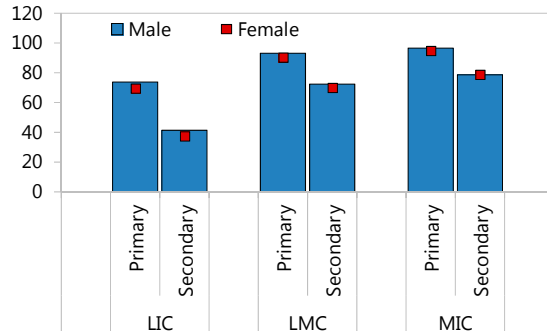
Source: World Bank, World Development Indicators, 2015.
Note: LIC = Low income; LMC = Lower middle income; MIC = Middle income.

On average, female tertiary enrollment rates have recently started to exceed male rates.

Tertiary Enrollment Ratio, 1970–2012
(Female-to-Male, in Percent)
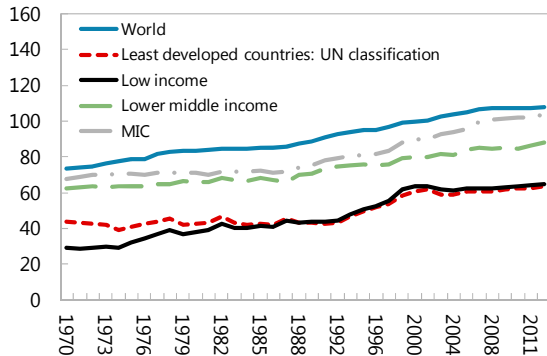
Note: HIC = High income.

Even so, gender gaps in adult literacy rates still exist worldwide.

Adult Literacy Rate (2012 or Latest Available)
(In Percent of People Age 15+)
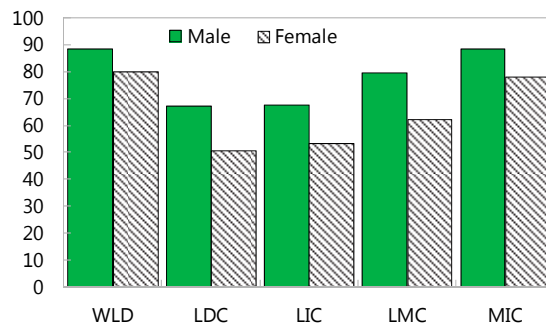
Source: World Bank, World Development Indicators, 2015.
Note: LDC = Least developed; WLD = World.

Figure 8. Financial Inclusion

Women access financial services less often than men worldwide, and...

Account at a Financial Institution, 2014
(In Percent of Population)
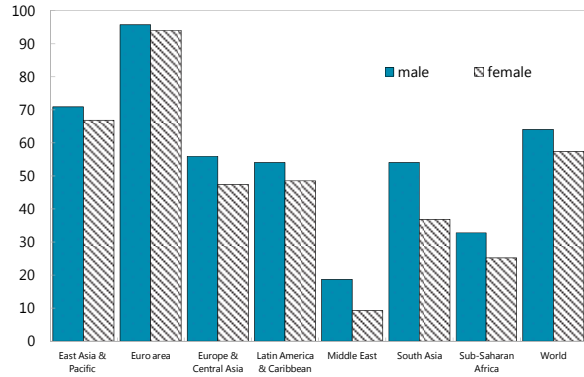
Source: Findex 2014.

... access to financial services is also more common in the share of population with higher income.

Account at a Financial Institution, 2014
(In Percent of Population)
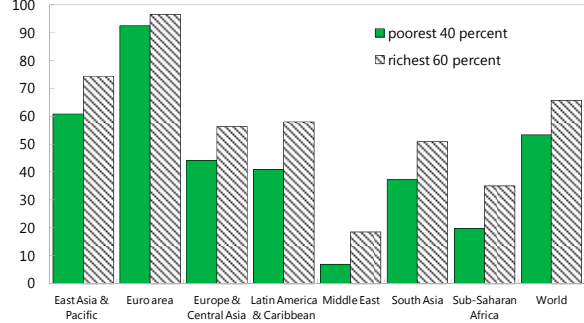
Source: Findex 2014.

Gender gaps in financial access have been increasing in some regions.

Gender Gap in Financial Inclusion
(Percentage of Men minus Percentage of Women with Account at Financial Institution)
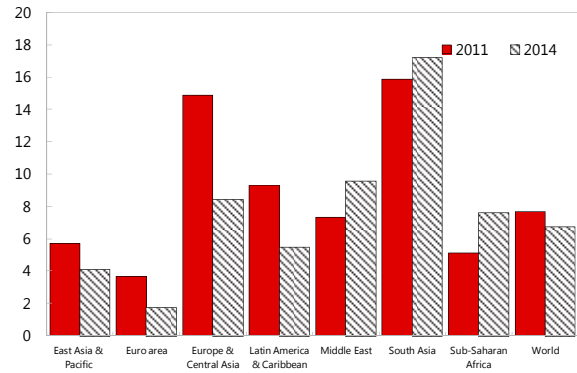
Source: Findex 2014.

They are closely related to access gaps between richer and poorer parts of the population.

Financial Access by Income and Gender
(In Percent of Repective Population)
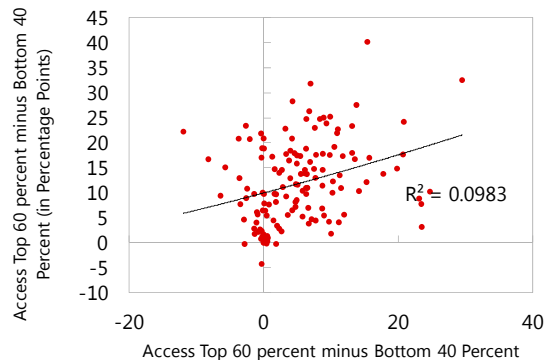
Source: Findex 2014.

Figure 9. Health

Countries with high adolescent fertility rates exhibit higher income inequality...

Inequality and Adolescence Fertility

$R^2 = 0.2071$

(Net Gini vs. Adolescence Fertility scatter plot; HIC, LIC, MIC)
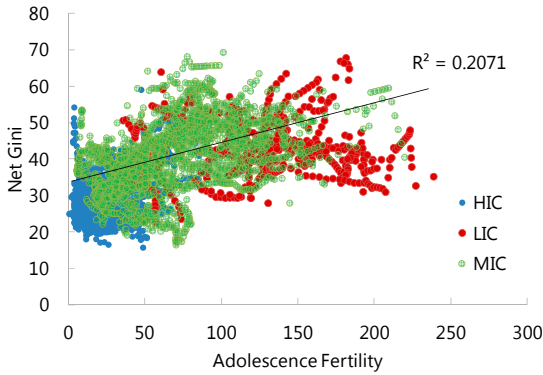
Sources: SWIID; World Bank, World Development Indicators.

... as well as higher poverty rates.

Poverty and Adolescence Fertility

$R^2 \text{ (LIC)} = 0.2077$

$R^2 \text{ (MIC)} = 0.1142$

$R^2 \text{ (HIC)} = 0.2588$

(Poverty headcount ratio at US$2 a day (PPP) (% of population) vs. Adolescence Fertility scatter plot; HIC, LIC, MIC)
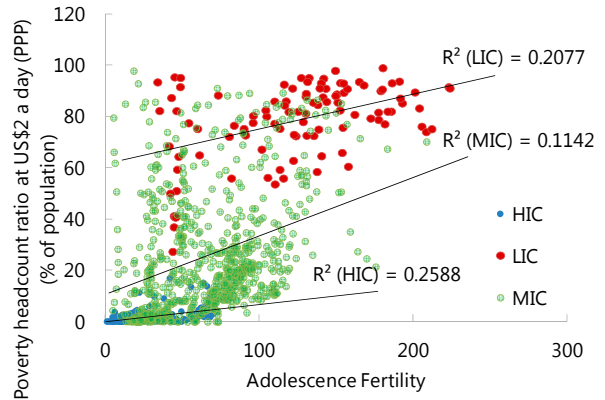
Sources: SWIID; World Bank, World Development Indicators.

While adolescent fertility has been falling, it remains high in some regions.

Trends in Adolescent Fertility by Region

(Line chart: APD, AFR, EUR, MCD, WHD, 1960–2010)
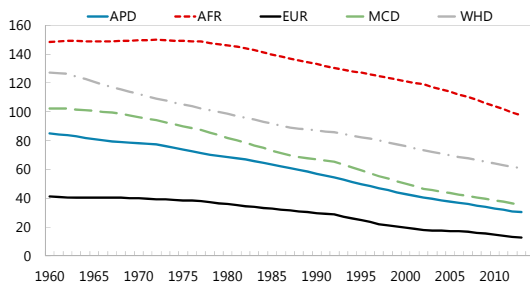
Source: World Bank, World Development Indicators.

The risk of maternal death has decreased in all regions, but remains high in Sub-Saharan Africa and South Asia.

Lifetime Risk of Maternal Death
(Per Thousand Women)

(Bar chart with 1990, 2000, 2013 markers across regions: Central Europe and the Baltics, East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, North America, South Asia, Sub-Saharan Africa)
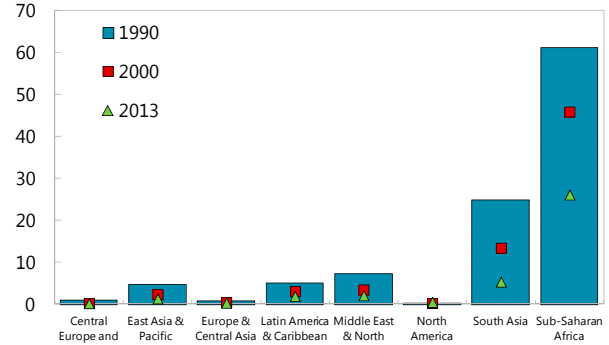
Source: World Bank, Word Development Indicators, 2015.

LINKING GENDER AND INCOME INEQUALITY EMPIRICALLY

13.   **This section presents results of the empirical analysis of the extent to which gender inequality drives income inequality.** The literature posits a number of standard determinants that drive income inequality. Recent analysis by the IMF (Dabla-Norris and others, 2015) finds that the drivers of income inequality include technological progress and the resulting increase in skill premium, globalization, the decline of some labor market institutions, and financial openness and deepening. The relevant drivers differ depending on the level of development, with the rise in the skill premium being a key driver in advanced economies, while financial deepening (in the absence of commensurate increases in financial inclusion) has driven inequality in emerging markets and developing countries. This note augments standard determinants of income inequality to include different dimensions of gender inequality.

14.   **We find that gender inequality drives income inequality above and beyond determinants previously identified in the literature.** The empirical framework is presented in Box 4, while the details of the data and the econometric specification and robustness tests can be found in Annexes 1 and 2. The key results are:

➢   The results (Table 2) support the findings highlighted in the previous literature in that financial openness, labor market institutions, and government spending are significantly associated with income inequality.

- In particular, greater *financial openness* is associated with rising income inequality. One explanation is that higher capital flows, including foreign direct investment, are destined for high-skill and capital-intensive sectors, which also lowers the income share of unskilled workers, exacerbating income inequality.

- Consistent with Dabla-Norris and others (2015), *technological progress* is associated with a decline in the income share of the bottom 10 percent, though unlike previous work the association with the top income decline is not statistically significant. Technological advances have driven enhanced productivity and growth but have also been accompanied by rising skill premium, leading to higher income inequality.

- Also in line with previous findings, *financial deepening* is associated with higher income inequality, as credit is often concentrated and financial inclusion does not keep pace with deepening.

- Higher government spending (a proxy for redistribution-related spending) is associated with a decline in income inequality.

- Finally, the easing of *labor market regulations in favor of business*[4] is associated with greater income inequality as well as rising income shares of the top 10 percent, while it has a dampening effect on the income share of the bottom 10 percent. This result is consistent with Dabla-Norris and others (2015) and Jaumotte and Osorio Buitron (2015), which find that changes in labor market institutions that reduce labor's bargaining power are associated with the rise of income inequality in advanced economies. Specifically, the decline in unionization is related to the rise of top income shares, while the reduction in minimum wages is correlated with considerable increases in overall income inequality.

➢ The main contribution of this paper is to examine the importance of *gender inequality* as a source of income inequality. The Gender Inequality Index (GII), which captures both gender inequality in outcomes (labor force participation gap and share of female seats in parliament) as well as gender inequality in opportunity (education gaps, maternal mortality, and adolescent fertility), is significantly related to income inequality. An increase in the GII from 0 (perfect gender equality) to 1 (perfect gender inequality) is associated with an increase in net inequality by almost 10 points. Alternatively, if the GII falls from the highest level of 0.7 (highest level in the sample, seen in Yemen) to the median level of 0.4 (seen in Peru), the net Gini decreases by 3.4 points, which is similar to the difference in net Gini between Mali and Switzerland.

15. **We also find that gender inequality has a strong association with the actual distribution of income in an economy** (Table 2; Figure 10). Higher gender inequality is strongly associated with higher income shares in the top 10 percent income group, possibly as being a woman may undermine earning possibilities disproportionately at the higher end of the income distribution. If the GII index increases from the median to the highest levels, the income share of the top 10 percent increases by 5.8 percentage points, which is the difference between Norway and Greece. Gender inequality also goes hand in hand with lower income shares at the bottom of the income distribution. As before, if the GII index increases from median to highest levels, the income share of the bottom 20 percent declines by 2 percentage points (which is similar to the difference between Estonia and Uganda).

---

[4] The indicator pertaining to labor market regulations is drawn from the Fraser Institute. It is a composite index that captures the extent to which regulations govern issues such as minimum wages, hiring and firing regulations, collective bargaining, mandated cost of hiring, mandated cost of worker dismissal, and so on.

Box 4. Empirical Strategy

We analyze the effect of gender inequality, together with previously identified determinants, on income inequality. To obtain an unbiased estimate, we control for unobservable variables that differ across countries using five-year averages in the fixed effects regression model by estimating the following relationship over the period from 1980 to 2010:

$$Inequality_{it} = \beta' \; Gender \; gap_{it}' + \beta_1 Trade \; openness_{it} + \beta_2 Financial \; openness_{it} + \beta_3 Technology_{it} + \beta_4 Financial \; deepening_{it}$$
$$+ \beta_5 Labor \; market \; institutions_{it} + \beta_6 Government \; spending_{it} + \beta_7 Educational \; attainment_{it} + \beta_8 \mu_{AE} * Financial \; deepening_{it}$$
$$+ \beta_9 Share \; of \; population \; over \; 65_{it} + \mu_i + \vartheta_t + \varepsilon_{it}$$

in which

- $Inequality_{it}$ refers to the inequality measure used for country i at time t, such as the Gini coefficient, and different percentiles of the income distribution (for example, income share of the richest 60 percent of the population, income share of the poorest 40 percent of the population, and so on).

- $Gender \; gap_{it}$ represents one or a number of measures of gender inequality, such as the Gender Inequality Index (GII) and one or several of its dimensions (labor force participation gaps; measures of empowerment such as the share of women in parliament and gender gaps in educational attainment; and health indicators, such as adolescent fertility and the risk of maternal death).

We include other controls previously identified in the literature. *Trade openness* proxies trade globalization and is the sum of exports and imports relative to GDP. *Educational attainment* is the average year of schooling. *Financial openness* measures financial globalization and is the sum of foreign assets and liabilities as a share of GDP. *Government spending* relative to GDP is a proxy for redistributive policies. *Technology* is measured as the share of information and communications technology capital in the total capital stock. *Financial deepening* is calculated by the ratio of private credit to GDP. *Share of population over 65* refers to the fraction of the population over 65 years old. *Labor market institutions* capture the extent to which regulations govern issues such as firing and hiring, minimum wages, and collective bargaining. The terms μ_i and ϑ_t represent a full set of country and time dummies, and ε_{it} captures all the residual factors.

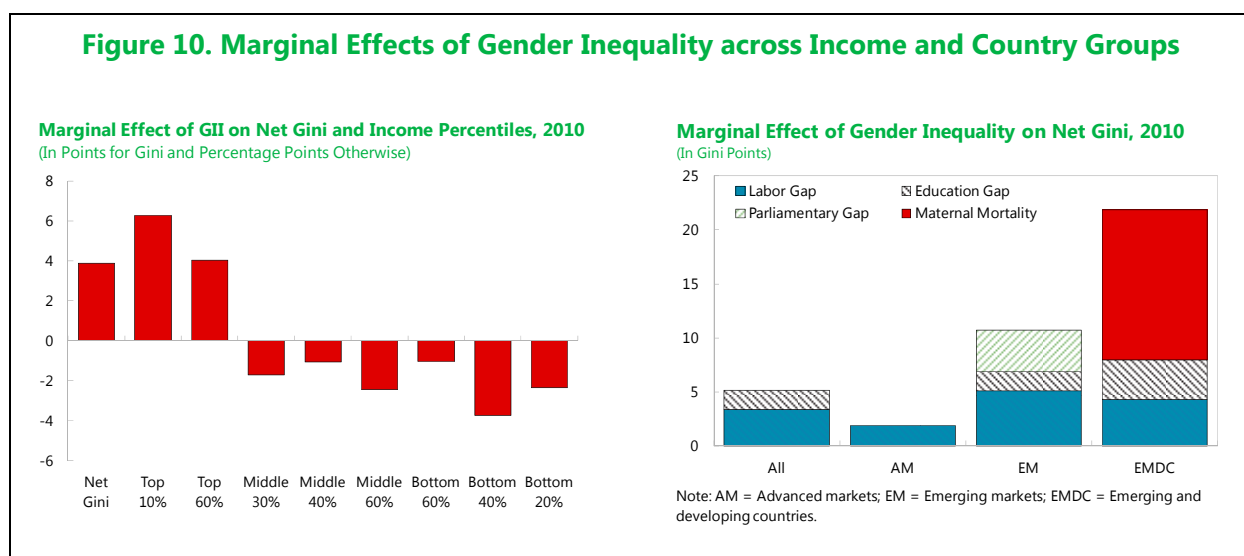### Table 2. Gender Inequality and Income Distribution

VARIABLES	Dependent Variable: Net GINI and Income Shares				
	(1) Net GINI	(2) Top 10	(3) Top 60	(4) Bottom 40	(5) Bottom 20
United Nations Gender Inequality Index (GII)	9.761*	16.81*	10.09**	−9.367**	−5.934**
	(5.589)	(8.431)	(4.444)	(4.385)	(2.390)
Trade Openness	−0.0109	−0.00942	−0.0146	0.0132	0.00588
	(0.0140)	(0.0121)	(0.0101)	(0.0102)	(0.00550)
Financial Openness	0.0422***	0.0310***	0.0347***	−0.0291***	−0.0141**
	(0.0113)	(0.0115)	(0.00967)	(0.0100)	(0.00544)
Technology	−1.567	25.30	22.83*	−22.24*	−14.59**
	(18.53)	(20.74)	(12.21)	(12.45)	(6.187)
Financial Deepening	0.0233**	0.0230***	0.0208**	−0.0200**	−0.00876**
	(0.00916)	(0.00785)	(0.00809)	(0.00800)	(0.00385)
Financial Deepening * AM Interaction	−0.0286***	−0.0208**	−0.0315***	0.0296***	0.0132***
	(0.0101)	(0.00952)	(0.00847)	(0.00841)	(0.00408)
Educational Attainment	−0.793**	−0.504	−0.481**	0.546***	0.292***
	(0.334)	(0.318)	(0.194)	(0.203)	(0.109)
Labor Market Institutions	0.688***	0.268	0.331**	−0.249*	−0.133*
	(0.197)	(0.172)	(0.133)	(0.140)	(0.0733)
Government Spending	−0.320***	−0.356***	−0.112**	0.132**	0.0660**
	(0.102)	(0.105)	(0.0501)	(0.0533)	(0.0256)
Population over the Age of 65	0.361**	0.206	0.251*	−0.292**	−0.140*
	(0.150)	(0.175)	(0.136)	(0.134)	(0.0709)
Observations (five-year averages)	338	208	244	244	244
Countries	97	66	89	89	89
Adjusted R-squared	0.236	0.421	0.359	0.345	0.305

Sources: Barro-Lee education attainment data set; Fraser Institute; IMF, World Economic Outlook; Solt Database; UNU-WIDER World Income Inequality Database; World Bank, World Development Indicators; World Economic Forum; and IMF staff estimates.

1/ Estimated using country and year fixed-effects panel regressions with robust standard errors clustered at the country level shown in parentheses, *p < 0.10; **p < 0.05; ***p < 0.01.

16.   **While there are some common drivers, different aspects of gender inequality matter for different country groups.** Table 3 shows the results of the regressions that disentangle different components of gender inequality by country group, and Figure 10 presents a visual depiction of the different drivers across country groups. When looking at all countries, gender gaps in labor force participation and education are the main drivers of income inequality, in addition to standard determinants (Table 3, column 1). For advanced countries, with gaps in the access to health and education largely closed, the gender gap in labor force participation is the key aspect of gender inequality that affects income inequality (column 2). For emerging markets and low-income countries, gender gaps in opportunities (education and health) are also found to be important drivers of income inequality. In addition, in low-income countries, women's health is an important driver of income inequality as inequality in opportunities translate sharply into income gaps.

Figure 10. Marginal Effects of Gender Inequality across Income and Country Groups

Marginal Effect of GII on Net Gini and Income Percentiles, 2010
(In Points for Gini and Percentage Points Otherwise)

Marginal Effect of Gender Inequality on Net Gini, 2010
(In Gini Points)

Note: AM = Advanced markets; EM = Emerging markets; EMDC = Emerging and developing countries.

17.   **The estimation results are robust to concerns about the direction of causality.** Regressions between income inequality and gender inequality are subject to concerns related to reverse causality, i.e., whether gender inequality causes or is influenced by income inequality. To address this concern, we introduce a novel set of instruments drawing on previous analysis contained in Gonzales and others (2015). We use various legal restrictions on women's economic participation as instruments for the gender gap in labor force participation as this link has been established in previous IMF work (Gonzales and others, 2015). Legal rights appear as valid instruments since they are not expected to affect income inequality directly but only indirectly through the labor force participation gap. Table 4 shows the results of instrumental variables regression. The legal restrictions related to *guaranteed equality* under the law and daughter's inheritance rights are the strongest instruments as seen in the first stage regression. The statistical tests support the validity of the instruments. Using these instruments for the gender gap in labor force participation, the second stage regression highlights that a widening of the gender gap in labor force participation leads to greater income inequality. In addition to the legal restrictions, we use other instruments to test the robustness of the results. Our results also hold when the labor force participation gap is instrumented by other instruments used in the literature. For instance, we include the lag of the share of female tertiary teachers as an instrument for the LFP gap. Further details are available in Annex 2.

Table 3. Income Inequality and Aspects of Gender Inequality by Income Group

	Dependent Variable: Net Gini			
	(1)	(2)	(3)	(4)
VARIABLES	All	AM	EMDC	EM
Labor Force Participation Gender Gap	0.150*	0.239*	0.171*	0.172*
	(0.0857)	(0.130)	(0.0943)	(0.0981)
Education Attainment Gender Gap	2.520***	0.549	4.423***	3.997**
	(0.860)	(0.746)	(1.280)	(1.526)
Parliament Representation Gap	0.0132	−0.0248	0.0387	0.0622**
	(0.0201)	(0.0227)	(0.0279)	(0.0281)
Maternal Mortality	0.0104	−0.129	0.0228*	0.0441
	(0.0116)	(0.0832)	(0.0120)	(0.0313)
Adolescent Fertility	0.0532	−0.0985*	0.0565	0.0759
	(0.0348)	(0.0508)	(0.0406)	(0.0518)
Trade Openness	−0.0167	0.00347	−0.0329*	−0.0219
	(0.0128)	(0.00919)	(0.0184)	(0.0186)
Financial Openness	0.0458***	0.0309**	0.467	0.416
	(0.0115)	(0.0137)	(0.560)	(0.619)
Technology	−11.19	5.066	−27.64	−35.72
	(20.40)	(24.44)	(24.24)	(23.41)
Financial Deepening	0.0186**	−0.00492	0.0236	0.0157
	(0.00867)	(0.00776)	(0.0201)	(0.0182)
Financial Deepening * AM Interaction	−0.0195*			
	(0.0100)			
Educational Attainment	−0.662*	−0.222	−0.385	−0.457
	(0.367)	(0.299)	(0.723)	(0.735)
Labor Market Institutions	0.645***	0.107	0.647*	1.019***
	(0.192)	(0.238)	(0.349)	(0.333)
Government Spending	−0.340***	−0.180*	−0.396**	−0.246
	(0.113)	(0.102)	(0.173)	(0.181)
Population over the Age of 65	0.388**	0.285	−0.344	−0.510
	(0.150)	(0.172)	(0.445)	(0.514)
Observations (five-year averages)	338	139	199	162
Number of Countries	97	32	65	48
Adjusted R-squared	0.279	0.336	0.367	0.357

Sources: Barro-Lee education attainment data set; Fraser Institute; IMF, World Economic Outlook; Solt Database; UNU-WIDER World Income Inequality Database; World Bank, World Development Indicators; World Economic Forum; and IMF staff estimates.

1/ Estimated using country and year fixed-effects panel regressions with robust standard errors clustered at the country level shown in parentheses, *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

18.   **To further explore the effect of policy interventions on gender equality (specifically), female labor force participation, and income inequality, we employ the Synthetic Control Method.** As explained in Box 5, the Synthetic Control Method (SCM) is a methodology to formalize a case-study approach to examine the effect of policy interventions on the variable of interest. This data-driven procedure is used to construct a counterfactual, and the effect of the policy intervention can be discerned by comparing the actual outcome and outcome for the constructed "synthetic" country. Using Chile as an illustrative case, the finding is that changes to the law to guarantee legal equality for women led to a fall in the gender gap in labor force participation, which in turn lowered income inequality. These effects were not seen in the synthetic control group.

CONCLUSIONS AND POLICIES TO FOSTER GENDER EQUALITY

19.   **The main contribution of this paper is to document the strong association between gender-based economic inequalities and a more unequal overall income distribution.** Aspiring to equality of opportunities and removing the obstacles that prevent women from reaching their full economic participation would give them the option to become economically active should they so choose. Working toward gender equity and increasing female economic participation in turn are associated with higher growth, more favorable development outcomes, and lower income inequality.

20.   **Redistribution complements but is not a substitute for gender-specific policies geared to reducing gender and income inequality.** Previous IMF work has shown that redistribution generally has a benign effect on growth, and is only negatively related to growth in the most strongly redistributive countries (Ostry, Berg, and Tsangarides, 2014). Therefore, redistributive policies can help lower income inequality directly and if not excessive be pro-growth. However, in order to ameliorate deeper inequality of opportunities, such as unequal access to the labor force, health, education and financial access between men and women, more targeted policy interventions are needed as a complement to redistribution. Some of these policy options are discussed in the remainder of this section.

21.   **A significant decrease in gender gaps will require work on many dimensions.** Providing women with equal economic opportunities will require an integrated set of policies, including anti-discrimination laws (Elborgh-Woytek and others, 2013) and the revision of tax policies. Some of these policies fall outside of the IMF's core area of expertise and require close collaboration with other organizations, such as the World Bank (IMF, 2013a). Moreover, policy changes are at most necessary conditions for creating a level playing field but may not be sufficient. In addition, cultural, societal, and religious norms are also relevant, but on these, this SDN does not take a normative stance. The following paragraphs give an overview of policies that could help promote gender equality (IMF, 2013; Elborgh-Woytek and others, 2013; Gonzales and others, 2015).

Table 4. Income Inequality and Instrumented Gender Inequality

Dependent Variable: Net Gini (Second stage) and LFP Gap (First stage)

VARIABLES	(1) First Stage	(2) Second Stage
Labor Force Participation Gender Gap		0.257*
		(0.148)
Education Attainment Gender Gap	−1.015	2.646***
	(0.859)	(0.893)
Parliament Representation Gap	0.0644***	0.00706
	(0.0241)	(0.0217)
Maternal Mortality	−0.00611	0.0152
	(0.00936)	(0.0109)
Adolescent Fertility	−0.0387	0.0292
	(0.0399)	(0.0320)
Guaranteed Equality	−6.219**	
	(2.545)	
Daughter Inheritance	−2.203**	
	(0.985)	
Trade Openness	0.0208	−0.0271*
	(0.0200)	(0.0156)
Financial Openness	−0.0784	0.357**
	(0.211)	(0.167)
Technology	9.682	−10.09
	(39.16)	(22.09)
Financial Deepening	0.0304*	0.00622
	(0.0160)	(0.0129)
Financial Deepening * AM Interaction	−0.0491***	−0.00313
	(0.0176)	(0.0157)
Educational Attainment	−1.099**	−0.527
	(0.427)	(0.457)
Labor Market Institutions	0.278	0.488**
	(0.270)	(0.221)
Government Spending	−0.00586	−0.388***
	(0.164)	(0.115)
Population over the Age of 65	−0.312	0.455***
	(0.209)	(0.140)
Observations (five-year averages)	241	241
Number of Countries	64	64
Angrist-Pischke F-test (P-value)	[0.0008]	
Hansen J-test (P-value)		[0.877]

Sources: Barro-Lee education attainment data set; Fraser Institute; IMF, World Economic Outlook; Solt Database; UNU-WIDER World Income Inequality Database; World Bank, World Development Indicators; World Economic Forum; and IMF staff estimates.

1/ Estimated using two-stage least squares (including country and time dummies) with robust standard errors shown in parentheses, *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. The p-values of the Hansen J-test and the Angrist-Pischke F-test are reported in brackets.

Box 5. Synthetic Control Method to Evaluate the Effects of Reform on Gender Gaps and Income Inequality: Application to Chile

Synthetic Control Method. Interventions of interest happen frequently in the policy world. Unfortunately, there are no randomly assigned control groups to gauge the effects of such policies. The Synthetic Control Method Method (SCM; Abadie, Diamond, and Hainmuller, 2010) is a recently developed statistical procedure that attempts to bridge the gap between qualitative case studies and an ideal experiment in order to provide more reliable results. It is a formal procedure to quantify the effect of a policy change or event on the outcome variable. It is data driven and allows a counterfactual to be constructed using information from the affected country and the "control" group. Instead of using all countries in the income or regional group, the method uses the weighted combination of countries that provide the closest fit to the path of the outcome variable in the treated country before the intervention. In addition to previous values of the outcome variable, it also uses values for explanatory variables, which should have ideally been identified in the literature.

Application to Chile. In 1999, an interesting policy intervention occurred in Chile when articles 1 and 19 of its constitution were amended to legally guarantee equality between men and women. Previous empirical studies (Gonzales and others, 2015) found that holding everything else constant, such a change would, on average, be associated with a decrease of 1.3 percent in the labor force participation (LFP) gender gap in emerging markets. Chile's LFP gap was on a similar downward trend to that of its region prior to the constitutional change. The trend in the region continued on a similar path, but Chile's trend seemed to diverge after the constitutional change, which could imply that the intervention had an effect on the LFP gap. However, this is a very informal inference that could be strengthened using the SCM. The SCM would attempt to match the LFP gender gap as closely as possible using both pre-intervention data on LFP gaps as well as explanatory variables such as education and fertility. It is essential that the countries included in the donor pool (candidates to be included in the weighted group) did not undergo the same treatment. If possible, it would also be ideal to exclude countries that have undergone other changes that could influence the outcome variable. In the case of LFP gaps, countries that granted guaranteed equality and removed other legal gender restrictions between 1990 and 2007 (as identified in the World Bank's Women, Business, and the Law database) were excluded.

Results and Caveats. A "synthetic Chile" was built using a weighted average of countries matching the relevant variables when the sample is restricted to emerging markets. The pre-intervention path of the outcome variable has a relatively good fit in relation to Chile's LFP gap. The path of synthetic Chile after the constitutional change appears to follow the same trend, but Chile actually shows a decreasing trend three years following the constitutional change, resulting in a reduction of the LFP gap of almost three percent after five years. Results in Tables 3 and 4 show that LFP gaps are positively associated with income inequality. Using the same methodology as before, we show that the change in LFP gap induced by a constitutional change in Chile (legally granting equality to men and women) had an effect on income inequality in Chile when compared with synthetic Chile. However, results should also be interpreted with caution, given that other factors not controlled for could bias the results. Alternatively, a policy change in redistribution could have been the cause of decreased income inequality. In spite of these caveats, results from this methodology in Chile are encouraging and confirm the findings using other analytical methods.

Figure 11. Constitutional Reform in Chile: A Synthetic Control Approach

Chile's Labor Force Participation (LFP) Gap
(Gap Defined as Male – Female LFP)
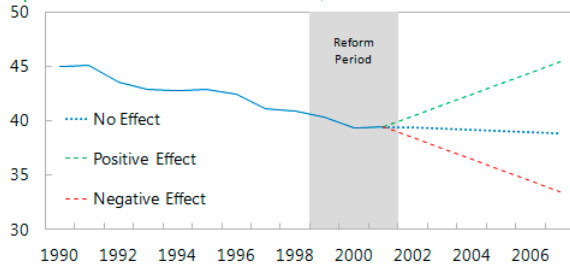
Synthetic Control Method Variable Matching

Variable	Chile	Synthetic
Fertility	0.807	0.808
Education	2.137	1.876
LFP Gap in 1998	40.800	40.838
LFP Gap in 1994	42.700	42.737
LFP Gap in 1991	45.100	45.138

Chile's Labor Force Participation (LFP) Gap
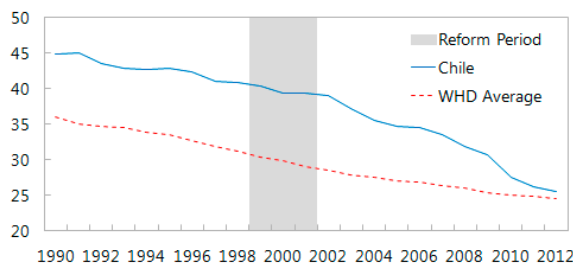
Difference between Chile's LFP Gap and Regional Average
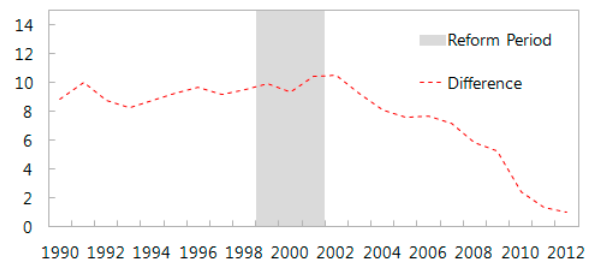
Chile's LFP Gap Compared to Synthetic Chile
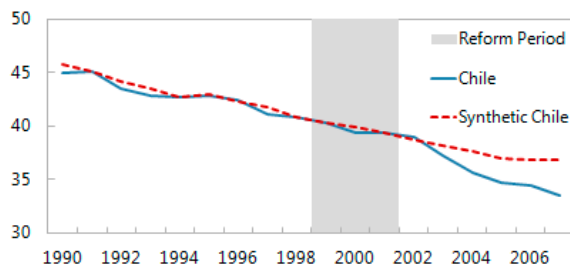
Difference between Chile's LFP Gap and Synthetic Chile
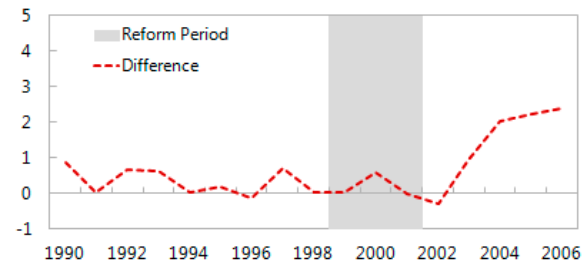
Chile's Income Inequality Compared to Synthetic Chile
(Income Inequality Defined as Net Gini)
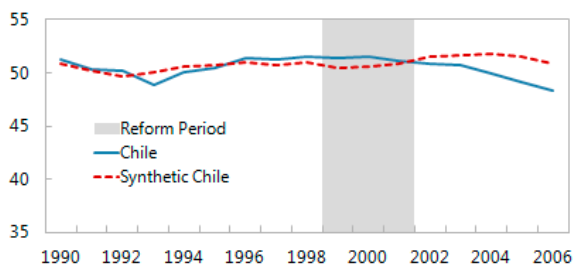
Difference in Income Inequality between Synthetic Chile and Chile
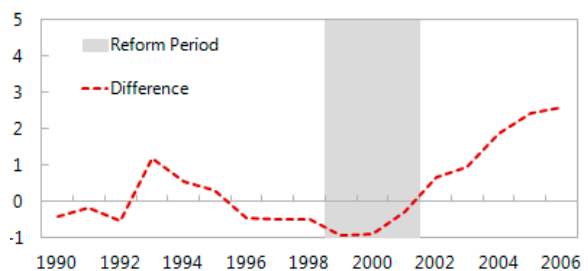
Sources: Barro-Lee Education Attainment Database; SWIID Database v5; World Bank, World Development Indicators; and IMF staff estimates.

22.   **Remove gender-based legal restrictions.** Equalizing laws boost female labor force participation (Gonzales and others, 2015). This note, drawing on a large and novel panel data set of gender-related legal restrictions, finds that restrictions on women's rights to inheritance and property, as well as legal impediments to undertaking economic activities such as opening a bank account or freely pursuing a profession, are strongly associated with larger gender gaps in labor force participation. For example, Namibia equalized property rights for married women and granted women the right to sign a contract, head a household, pursue a profession, open a bank account, and initiate legal proceedings without the husband's permission in 1996. In the decade that followed, Namibia experienced a 10 percentage point increase in its female labor force participation rate. Peru and Malawi invalidated customary law in 1993 and 1994 respectively, and both experienced significant increases in their female LFP rates. Equal access to productive resources for men and women would go a long way to increase productivity and growth in many low-income developing countries (LIDCs).

23.   **Create fiscal space for priority expenditures:**

- *Foster education.* Policies to equalize enrollment rates for boys and girls would significantly boost overall education levels in LIDCs. Das and others (2015) find that female labor force participation in India would rise by 2 percentage points with an increase in spending on education of 1 percent of GDP of Indian states. Broadly speaking, to increase girls' participation in education and thus the human capital stock, cash transfers could be designed to be conditional on sending daughters to school.

- *Develop infrastructure* (World Bank, 2012b). Investments in infrastructure and transportation services reduce the costs related to work outside the home. In India, analysis using detailed household surveys has found that poor infrastructure has a dampening effect on female labor force participation, as women living in states with greater access to roads are more likely to be in the labor force (Das and others, 2015). In rural Bangladesh, upgrading and expanding the road network increased female labor supply and incomes. Access to electricity and water sources closer to home frees up women's time for work outside the house and allows them to integrate into the formal economy. In rural South Africa, electrification was found to have increased women's labor market participation by 9 percent.

- *Improve access to health services.* Adequate health care is crucial for reducing women's obligations to time-consuming informal health care. In Bangladesh, female labor participation has benefited from the government's Health and Community Services, and the participation rate of young women almost doubled in the late 1990s (World Bank, 2012b).

24.   **Revise tax policies.** Reducing the tax burden for (predominantly female) secondary earners by replacing family taxation with individual taxation or other measures aimed at reducing marginal taxes on second earners more broadly can potentially generate large efficiency gains and improve aggregate labor market outcomes. Tax credits or benefits for low-wage earners can be used to stimulate labor force participation.

25.   **Implement well-designed family benefits**. Better access to parental leave and high-quality, affordable child care will make it easier for women to seek employment. Greater parity between paternity and maternity leave could enable women to share the burden with their partners and return to the labor market at an earlier stage. Offering flexible work arrangements and breaking down the barriers between part-time and full-time work would also help.

26.   **Budget gender-responsively.** Gender-responsive budgeting examines the gender impact of government expenditures, policies, and programs and can reduce gender inequalities in education, employment, and health outcomes, among other measures. The incorporation of gender issues in Bangladesh's national budget began in 2005 as part of the government's efforts to promote a more inclusive society; 20 ministries now compile gender budgeting reports (World Bank, 2012a). Morocco has published a gender report since 2006 with involvement from more than 25 ministries and departments.

27.   **Make finance accessible to women.** In many LIDCs, the availability of microfinance has helped to reduce the gender productivity gap (Kabeer 2005), with higher credit repayment rates among women than among men.

ANNEX 1. DEFINITIONS AND DATA SOURCES

A. Gender Inequality

Variable	Description	Source
Account at financial institution (female and male)	Denotes the percentage of respondents with an account (self or together with someone else) at a bank, credit union, another financial institution (for example, cooperative, microfinance institution), or the post office (if applicable) including respondents who reported having a debit card (percentage age 15+).	World Bank, Global Findex
Adolescent fertility rate	Adolescent fertility rate is the number of births per 1,000 women ages 15–19.	World Bank, World Development Indicators (WDI)
Daughter inheritance	Do sons and daughters have equal inheritance rights to property from their parents? This question examines whether there are gender-based differences in the rules of intestate succession (that is, in the absence of a will) for property from parents to children. The answer is "Yes" where the law recognizes children as heirs without any restrictions based on gender with regard to property. The answer is "No" where there are gender-based differences between children recognized as heirs, on inheritance for property.	World Bank, Women, Business, and the Law (WBL)
Guaranteed equality	Does the constitution guarantee equality before the law? The answer is "Yes" if there is an equal protection or a general equality provision in the constitution, and where it is generally applicable to "all citizens" and does not specify women as a protected category; The answer is "No" if there is no equal protection or general equality provision in the constitution.	World Bank, WBL
Labor force participation rates	Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period (female and male).	World Bank, WDI
Literacy rate	Adult (15+) literacy rate (percent). The total is the percentage of the population ages 15 and older who can, with understanding, read and write a short, simple statement on their everyday life. Generally, "literacy" also encompasses "numeracy," the ability to make simple arithmetic calculations (female and male).	World Bank, WDI
Maternal mortality ratio	Maternal mortality ratio is the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births. The data are estimated with a regression model using information on the proportion of maternal deaths among non-AIDS deaths in women ages 15–49, fertility, birth attendants, and GDP.	World Bank, WDI
Proportion of seats held by women in national parliaments	Women in parliaments are the percentage of parliamentary seats in a single or lower chamber held by women.	World Bank, WDI
Secondary education	Percentage of people who completed education at the secondary level (female and male).	Barro-Lee Educational Attainment Data
UNDP Gender Inequality Index	The Gender Inequality Index (GII) measures gender inequalities in three important aspects of human development—reproductive health measured by maternal mortality ratio and adolescent birth rates; empowerment, measured by proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education; and economic status expressed as labour market participation and measured by labour force participation rate of female and male populations aged 15 years and older.	UNDP, Human Development Report

B. Demographic, Economic, and Other

Variable	Description	Source
Completion rate	Completion rate is calculated as the number of new entrants in the last grade of lower primary/secondary education, regardless of age, divided by the population at the entrance age for the last grade of lower (primary and secondary).	World Bank, WDI
Credit (financial deepening)	Domestic credit to the private sector in percent of GDP.	World Bank, WDI
Debt liabilities	External debt to GDP.	Lane and Milesi-Ferretti (2012)
Education Gini	Gini index of distribution of educational attainment.	World Bank Education Statistics
Fertility rate	Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates.	World Bank, WDI
Financial openness	External assets plus liabilities, in percent of GDP.	External Wealth of Nations Database; IMF, WEO
Government spending	Simple average of the three relevant sub-indexes (transfers and subsidies, public consumption and public investment) of the size-of-the-government.	Fraser Institute
Investment	Share of investment.	Penn World Tables
Labor market institutions	Labor market institutions captures extent by which regulations govern issues such as firing and hiring, minimum wages and collective bargaining.	Fraser Institute
Openness	Openness to trade.	Penn World Tables
Political institutions	Measure of political institutions (-10 most autocratic and 10 most democratic).	Polity IV
Population	Population (in millions).	Penn World Tables
Population ages 65 and older (percent of total)	Population ages 65 and older as a percentage of the total population. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship—except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of the country of origin.	World Bank, WDI
Real GDP	Real GDP at constant 2005 national prices (in millions of 2005 US$).	Penn World Tables
School enrollment, tertiary	Gross enrollment ratio. Tertiary (The International Standard Classification of Education (ISCED) 5 and 6). Total is the total enrollment in tertiary education (ISCED 5 and 6), regardless of age, expressed as a percentage of the total population of the five-year age group following on from secondary school leaving.	World Bank, WDI
Technology	Share of information and communication technology capital in the total capital stock.	Jorgenson, Dale, and Khuong Vu (2011)
ToT shock	Large negative terms of trade shock.	IMF, *World Economic Outlook (WEO)*
Trade openness	Exports plus imports (goods and services), in percent of GDP.	IMF, WEO

C. Income Inequality

Variable	Description	Source
Net Gini	Gini index of distribution of income after taxes and transfers.	The Standardized World Income Inequality Database (SWIID) version 5
Shares of income	Share of net income accruing to each decile/quintile of the income distribution.	UNU-WIDER database
Poverty headcount ratio at $2 a day PPP (percent of population)	Population below $2 a day is the percentage of the population living on less than $2.00 a day at 2005 international prices.	World Bank, WDI
Poverty headcount ratio at $1.25 a day PPP	Population below $1.25 a day is the percentage of the population living on less than $1.25 a day at 2005 international prices.	World Bank, WDI

ANNEX 2. ECONOMETRIC METHODOLOGY

For a wider global sample, including advanced countries, emerging markets, and developing countries, fixed effects regression model by estimating the following relationship over the period from 1980 to 2012:

$$Inequality_{it} = \beta'\ Gender\ gap_{it}{}' + \beta_1 Trade\ openness_{it} + \beta_2 Financial\ openness_{it} + \beta_3 Technology_{it} + \beta_4 Financial\ deepening_{it}$$

$$+ \beta_5 Labor\ market\ institutions_{it} + \beta_6 Government\ spending_{it} + \beta_7 Educational\ Attainment_{it}$$

$$+ \beta_8 \mu_{AE} * Financial\ deepening_{it} + \beta_9 Share\ of\ population\ over\ 65_{it} + \mu_i + \vartheta_t + \varepsilon_{it}$$

Country fixed effects control for country-specific drivers of income inequality that are not explicitly controlled for in the regressions and if omitted could result in misleading results. The Hausman test indicates that a fixed effects model is appropriate for both sets of panel regressions.

We also conduct a number of robustness checks in which we run regressions with a number of different specifications:

1. Use alternatives to net Gini, including the Gini from the Luxembourg Income Study and using market Gini. The results still hold using this higher quality income inequality data.

2. We use human capital from the Penn World Tables as an alternative to total years of education to capture the skill premium.

3. As an alternative to government spending (which is intended to capture redistribution), we use education spending for all countries, and social spending for OECD countries.

4. We also control for female mortality as an indicator of health provision.

5. We control for education Gini.

6. To capture the direct effect of gender wage inequality on income inequality, we include the gender wage gap in the regressions on top of inequality in a sample of OECD countries.

While some control variables from the baseline regression were not significant in some of the alternative specifications, the Gender Inequality Index and some subcomponents were always significant, indicating that the results are robust to changes in econometric specification.

To address concerns about the direction of causality between gender and income inequality, we employ instrumental variables regressions. We use a novel set of instruments drawing on previous analysis contained in Gonzales and others, 2015. We use various legal restrictions on women's economic participation as instruments for the gender gap in labor force participation as this link has been established in previous IMF work (Gonzales and others, 2015). The legal restrictions related to guaranteed equality under the law and daughter's inheritance rights are the strongest instruments as seen in the first stage regression. Using these variables to instrument for gender gap in labor force participation, the second stage regression highlights that a widening of the gender gap in

labor force participation leads to greater income inequality. Tests for the validity of the instrument and for over identification suggest that these are valid instruments.

We also use instruments other than the legal restrictions from the World, Business and the Law. We included 1) the lag of the share of female tertiary teachers which has been previously used in the literature as an instrument (the rationale being that girls feel encouraged by a female role model) and 2) the lag of the LFP gap (as the income distribution is only affected by how many women are on the market right now compared to men and not the LFP gap from 5 years ago). Both instruments are individually highly significant in the first stage, the Hansen test indicates that they are valid instruments, and finally both education gap and LFP gap are significant in the second stage.

A good pre-treatment fit is important when applying the Synthetic Control Method (SCM). (For a detailed description of the SCM, see Abadie, Diamond, and Hainmuller, 2010.) This treatment produces more confidence that the changes in the outcome variable in either direction after the intervention can be attributed to that policy. One restriction in the context of LFP gaps is that data are only available starting in 1990. This was also limiting because few changes in guaranteed equality have occurred since 1990. If sufficient countries were available, the SCM could have been used to estimate effects in each country individually and then calculate average treatment effects. The example of Chile was one of the few viable options. This case study was chosen to complement and further strengthen the results obtained using other estimation methods.

The first step in the implementation of the SCM was to construct the donor pool. The donor pool is the group of countries that could be used as potential candidates in the construction of the control group (also referred to as synthetic Chile). Countries that had changes in other legal gender restrictions were excluded as they could bias the results if these legal changes had any effect (positive or negative) on LFP gaps. Another requirement is that countries have data for all values of the outcome variable. For this reason, countries that had any missing values in LFP gaps were dropped. As a result, the size of the donor pool was reduced to 45 countries. To further enhance comparability, the donor pool was restricted to emerging market economies.[5]

The explanatory variables that were used in the case of LFP gaps were average values of fertility and education. The explanatory variables used in the case of net GINI were the ones outlined in Tables 2 and 3. Countries that did not have at least one value to calculate averages of the explanatory variables were dropped. This did not restrict the sample further in the case of LFP gaps, but it did in the case of net GINI. In addition, representative lagged values of the outcome variable were used.[6] Another alternative is to use all lagged values of the outcome variable which, in general, would produce a better fit. Unfortunately, that would cause the weight placed on other explanatory variables to be close to zero.[7]

---

[5] Results are robust to eliminating this restriction and using the global sample of 45 countries in the donor pool.

[6] The years used were the one right before intervention, one in the beginning of the sample, and one in the middle.

[7] Results are robust to using this option.

Results are robust to a series of placebo and sensitivity tests. One of the sensitivity tests was to exclude each country from the selected ones to check if results would change dramatically. This was not the case for the sample of countries used to calculate the effect on LFP gaps. However, the sample of countries used to calculate the effects on net GINI was small, thus removing one of the two countries that received weight in the calculation, would produce a poor fit.

References

Abadie, Alberto, Alexis Diamond, and Jens Hainmuller, 2010, "Synthetic Control Method for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105 (490): 493–505.

Aghion, P., E. Caroli, and C. Garcia-Penalosa, 1999, "Inequality and Economic Growth: The Perspective of the New Growth Theories." Journal of Economic Literature 37 (4): 1615–60.

Aguirre, DeAnne, and others, 2012, "Empowering the Third Billion Women and the World of Work in 2012.": Booze & Co.

Amin, M., V. Kuntchev, and M. Schmidt, 2015, "Gender Inequality and Growth. The Case of Rich vs. Poor Countries." Policy Research Paper 7172, World Bank, Washington.

Barro, R. J., 2000, "Inequality and Growth in a Panel of Countries." *Journal of Economic Growth* 5 (1): 5–32.

Becker, G. S., and B. R. Chiswick, 1966, "Education and the Distribution of Earnings." *American Economic Review* 56 (1/2): 358–69.

Brunori, P., F. Ferreira, and V. Peragine, 2013, "Inequality of Opportunity, Income Inequality and Economic Mobility." Policy Research Working Paper 6304 (Washington: World Bank).

Carvalho, L., and A. Rezai, 2014, "Personal Income Inequality and Aggregate Demand." Working Paper 2014–23, Department of Economics, University of São Paulo, São Paulo.

Castello-Climent, A., and R. Domenech, 2014, "Capital and Income Inequality: Some Facts and Some Puzzles (Update of WP 12/28 published in October 2012)." Working Paper 1228, Economic Research Department, (Madrid: BBVA Bank).

Cuberes, David, and Marc Teignier, 2015, "Aggregate Costs of Gender Gaps in the Labor Market: A Quantitative Estimate.": *Journal of Human Capital*, forthcoming.

———, 2012, "Gender Gaps in the Labor Market and Aggregate Productivity.": Sheffield Economic Research Paper 2012017, Sheffield University.

Dabla-Norris, Era, Kalpana Kochhar, Nujin Suphaphiphat, Frantisek Ricka, and Evridiki Tsounta. 2015a. "Causes and Consequences of Inequality: A Global Perspective." Staff Discussion Note, SDN/15/13, (Washington: International Monetary Fund).

Das, Sonali, Sonali Jain-Chandra, Kalpana Kochhar, and Naresh Kumar, 2015, "Women Workers in India: Why So Few among So Many?" Working Paper 15/55 (Washington: International Monetary Fund).

De Gregorio, J., and and J.W. Lee, 2002, "Education and Income Inequality: New Evidence from Cross-Country Data." Review of Income and Weatlh, Series 48, No. 3.

Demirguc-Kunt, Asli, and others, 2015, The Global Findex Database 2014 (Findex 2014): measuring financial inclusion around the world (English)., 2015. Policy Research Working Pape; no. WPS 7255 (Washington: World Bank).

Duflo, E., 2012, "Women Empowerment and Economic Development." *Journal of Economic Literature* 50 (4): 1051–79.

Elborgh-Woytek, Katrin, Monique Newiak, Kalpana Kochhar, Stefania Fabrizio, Kangni Kpodar, Philippe Wingender, Benedict Clements, and Gert Schwartz, 2013, "Women, Work, and the Economy: Macroeconomic Gains from Gender Equity." Staff Discussion Note, SDN/13/10, (Washington: International Monetary Fund).

Esteve-Volart, Berta, 2004, "Gender Discrimination and Growth: Theory and Evidence from India," LSE STICERD Research Paper DEDPS 42, (London).

Galor, O., and O. Moav, 2004, "From Physical to Human Capital Accumulation: Inequality and the Process of Development." Review of Economic Studies 71 (4): 1001–26.

Galor, O., and J. Zeira, 1993, "Income Distribution and Macroeconomics." The Review of Economic Studies 60 (1): 35–52.

Gonzales, Christian, Sonali Jain-Chandra, Kalpana Kochhar, and Monique Newiak. 2015, "Fair Play: More Equal Laws Boost Female Labor Force Participation." Staff Discussion Note, SDN/15/02, (Washington: International Monetary Fund).

Honohan, P., 2007, "Cross-Country Variation in Household Access to Financial Services."

International Monetary Fund, 2013, "Jobs and Growth—Analytical and Operational Considerations for the Fund." Policy Paper SM/13/73.

———, 2015, "Inequality and Economic Outcomes in Sub-Saharan Africa." October 2015 Regional Economic Outlook: Sub-Saharan Africa. Forthcoming.

———, 2015, "Does Inequality Constrain Economic Outcomes in Sub-Saharan Africa?" Sub-Saharan Africa Regional Economic Outlook, forthcoming, Washington.

Jaumotte, Florence, and Carolina Osorio Buitron, 2015, "Inequality and Labor Market Institutions." Staff Discussion Note, SDN/15/14 (Washington: International Monetary Fund)

Kabeer, Naila, 2005, "Is Microfinance a 'Magic Bullet' for Women's Empowerment? Analysis of Findings from South Asia." *Economic and Political Weekly*, October 29, pp. 4709–18.

Klasen, S., 1999, "Does Gender Inequality Reduce Growth and Development? Evidence from Cross-Country Regressions." Policy Research Report, Engendering Development Working Paper No. 7 (Washington: World Bank).

Klasen, Stephan, and Francesca Lamanna, 2009, "The Impact of Gender Inequality in Education and Employment on Economic Growth: New Evidence for a Panel of Countries." Feminist Economics, Vol. 15(3) pp. 91–132.

Lazear, E., and S. Rosen, 1981, "Rank-Order Tournaments as Optimum Labor Contracts*." Journal of Political Economy* 89 (5): 841–64.

Miller, Grant, 2008, "Women's Suffrage, Political Responsiveness, and Child Survival in American History." The Quarterly Journal of Economics (August): 1287–326.

Mincer, J., 1958, "Investment in Human Capital and Personal Income Distribution." *Journal of Political Economy* 66 (2): 281–302.

Murray, C., A. Lopez, and M. Alvarado, 2013, "The State of US Health, 1990–2010: Burden of Diseases, Injuries, and Risk Factors." *Journal of the American Medical Association* 310 (6): 591–606.

Organization of Economic Cooperation and Development, 2012, Closing the Gender Gap: Act Now: OECD Publishing, 2012.

———, 2015, "In It Together: Why Less Inequality Benefits All, OECD Publishing". Paris. DOI: http://dx.doi.org/10.1787/9789264235120-en

Ostry, Jonathan, Andrew Berg, and Charalambos Tsangarides, 2014, "Redistribution, Inequality, and Growth." Staff Discussion Note, SDN/14/02 (Washington" International Monetary Fund).

Rubalcava, L., G. Teruel, and D. Thomas, 2004, "Spending, Saving and Public Transfers to Women." California Center of Population Research UCLA, On-Line Working Paper Series, CCPR-024-04.

Steinberg, Chad, and Masato Nakane, 2012, "Can Women Save Japan?" Working Paper 12/48 (Washington: International Monetary Fund).

Stotsky, Janet, 2006, Gender and its Relevance to Macroeconomic Policy: A Survey. IMF Working Paper 06/233, Washington: International Monetary Fund).

United Nations, 1999, "Committee on the Elimination of Discrimination against Women Twenty-first session," Supplement No. 38, A/54/38/Rev.1.

Thomas, D., 1990, "Intra-Household Resource Allocation. An Inferential Approach." The Journal of Human Resources 25 (4) 635–64. World Bank, Trinity College and CEPR, prepared for the conference "Access to Finance" Washington DC, March 15-16, 2007.

Van der Weide, R., and B. Milanovic, 2014, "Inequality Is Bad for Growth of the Poor (But Not For That of the Rich)." Policy Research Working Paper 6963 (Washington: World Bank).

World Bank, 2012a, *Accelerating Progress on Gender Mainstreaming and Gender-Related MDGs: A Progress Report*. IDA 16 Mid-term Review. (Washington).

———, 2012b, *World Development Report 2013: Jobs*. (Washington).

———, 2013, Women, Business and the Law 2014 Removing Restrictions to Enhance Gender Equality (Washington).

———, 2015, World Development Indicators. (Washington).

World Economic Forum, 2014, The Global Gender Gap Report 2014. (Geneva: WEF).