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Panel Analysis of Female Labor Force Participation and Income Distribution in 136 Countries

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Abstract

The study questions whether the female labor force participation ratio (FLFP) explains income distribution. Panel data analysis uses an unbalanced panel of 136 countries from 1990 to 2020. The study uses eight different panels based on development status and region. The econometric model uses two-way fixed effects with Driscoll and Kraay standard errors. The study finds that the FLFP improves income distribution in most cases. The study finds that higher FLFP can worsen income distribution in only two instances. The study also finds that democratization increases the percentage of women in government, improving income distribution through promoting FLFP. Finally, FLFP improves income distribution at the labor market and after-tax and redistribution levels in most cases.

Keywords: Income Inequality, female labor force participation,

1. Introduction

This study analyzes the effect of female labor force participation (FLFP) on income distribution. It is an extensive study with data covering 30 years in 136 countries. It is unique in examining developed and developing countries segmented by region. Results demonstrate that FLFP improves income distribution in most cases. Consequently, income inequality can be reduced by promoting and facilitating FLFP in most instances.

Improving gender and income equality are two Sustainable Development Goals (United Nations, 2021). Gender equality is an important human right since it affects individuals' ability to pursue their ambitions. The lack of participation of women in the labor force also deprives a country of production. Specifically, a country's production possibility frontier (PPF) will be lower if female labor inputs are underutilized, ceteris paribus. Low FLFP affects per capita income in two ways. First, they deprive the country of output that could have been produced (IMF, 2018). Second, dividing gross domestic product (GDP) by the combined male and female population (IMF, 2018). Additionally, there are spillover benefits derived from increases in FLFP. Akinyemi, Solanke, and Odimegwu (2018) find increases in FLFP reduce child mortality and improve children's nutrition.

One might expect that an increase in FLFP would reduce household income inequality. The evidence, however, is mixed. Some studies find that FLFP decreases income inequality (Gronau, 1982; Björklund, 1992; Reed and Cancian, 2001; Amin and DaVanzo, 2004; Harkness, 2010). For example, Reed and Cancian (1998) find income distribution improvements as more income accrues to single-mother households. On the other hand, Esping-Anderson (2007; 2009) finds income inequality increases because of the prevalence of assortative marriage. This study sheds light on the FLFP-income distribution nexus. We conduct panel data analysis on how the FLFP explains income distribution. The study also tests how the FLFP explains national pre-tax labor income earned by the lowest 50 percent. The study also explores how the interaction between FLFP and the total fertility rate explains income distribution. Finally, we examine how female participation in parliament affects the FLFP and income distribution.

The study finds increases in the FLFP moderate income inequality, across three different income distribution measures, in the vast majority of cases. As more women participate in the labor force, overall household income increases for lower-income families, improving income distribution. Necessity causes more females from lower-income households to join the labor force

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than females from higher-income households. Additionally, the incomes of single-parent families with female earners will increase, decreasing income inequality. It also reduces the dependence on government and private welfare expenditures. An increase in the FLFP of single-parent-female earners improves the household's standard of living, as the earned income must be, and is, higher than the welfare contributions. Although we do find cases where income inequality increases as FLPF increases, these cases are exceptions. Since the characteristics of groups depend on the region and its economic conditions, the study includes economic and regional control variables. This will be addressed in more detail in the data section.

The study reviews the literature on the relationship between FLFP and income inequality. Section 2 discusses data and methodology. Section 3 presents the panel data analysis findings. Section 4 discusses insights and reflects on the study's contributions.

2. Literature Review

There is no evidence that the entire population aged between 25 and 65 years in any country participates in the labor force regardless of gender (World Bank, 2023). Lack of participation could be due to health, family income, and often in the case of females, having young children (Kim, 2016). Any increase in labor force participation increases GDP and, subsequently, per capita GDP. Since a larger portion of females do not participate in the labor force compared to males, changes in the willingness or opportunity to participate in the labor force by females can substantially increase GDP. Some countries, especially developed countries, have seen increased FLFP (United Nations, 2021). For example, in 1990, over half of the women were employed in the labor force in the United States, while in 1947, it was less than one-third (Maxwell, 1990).

There are several factors affecting the FLFP rate. A significant factor is the opportunity cost of female participation in the labor force. For example, when female earnings are low, say due to poor education, the opportunity cost of not working is low. Contrarily, poverty might require female employment in low-income families even if the opportunity cost is low because of low wages. Further, if a household is making sufficient income to have a reasonable standard of living because of a high-earning husband, females with low income opportunities will not participate in the labor force.

On the other hand, when a female is well-educated and has a high income, the opportunity cost of not working would be high, even for a family with a relatively good standard of living. Consequently, such females are more likely to participate in the labor force. One hindering factor is having young children, especially when quality daycare is lacking or limited. Subsequently, families with well-educated females with the potential to earn high incomes have fewer children (Kim, 2016).

Other factors also influence the FLFP rate. Female employment is influenced by the structure of an economy, such as agriculture, manufacturing, or service (Sinha, 1967; Gaddis and Klasen, 2013). For example, Sinha (1967) finds as the economic structure moves from agricultural to manufacturing, the FLFP rate declines. The reason is the connection between household production and market production diminishes as countries develop from agricultural-based economies (Gladdis and Klasen, 2013). Therefore, as households move from rural to urban areas, the role of female labor production falls along with the FLFP rate. Another factor affecting the FLFP rate, via the fertility rate, is the availability, cost, and cultural views of birth control (Bloom et al., 2009; Hill, Siwatu, and Robinson, 2013). The fertility rate affects the population of women available to work (Bloom et al., 2009).

Additionally, having more children reduces the per capita income of the household (Espenshade, Kamenske, and Turchi, 1983), regardless of whether the household has one or two earners; hence worsens income inequality. Another factor is government policy which can influence a woman's incentives to work (Kim, 2016). For example, the availability of subsidized childcare affects female employment because it increases the opportunity cost of not working. Further, female economic opportunity is influenced by cultural views of women in the workforce (Fernandez, 2007). Government policy and culture can incentivize or disincentivize female employment, affecting the FLFP rate. An example is the decrease in FLFP in Afghanistan after the Taliban took control. Initial reports suggest significant declines in FLFP and subsequent reductions in family income, especially in those families where women were the primary source of income (Nadar, 2022).

The theory of the effects of FLFP on income inequality begins with the feminization U hypothesis (Sinha, 1967). The feminization U hypothesis claims the FLFP is initially high when countries are in the early stages of development (i.e., agricultural-based). The reason is female labor is employed on household farms to increase production. As a country moves from agricultural to manufacturing with economic development, FLFP falls since the need for farm labor decreases. As countries develop from manufacturing to service-based, the FLFP rate increases, with an increase in job opportunities (e.g.,

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retail). Therefore, the feminization U hypothesis claims developing countries experience tradeoffs between economic growth, FLFP, and gender equality (Sinha, 1967; Gaddis and Klasen, 2013). Although many researchers see the feminization U hypothesis as an empirical regularity, Gaddis and Klasen (2013) find the U-shaped relationship between economic development and FLFP fails to materialize in cross-country data from 1980 to 2015. Specifically, Gaddis and Klasen (2013) claim the feminization U hypothesis has little relevance for developing countries.

Further, the U-shaped relationship relies on initial development conditions, not structural changes corresponding to secular development (Gaddis and Klasen, 2013). There are connections between the tradeoff between economic development and income inequality in the Kuznets Curve (1955) and the feminization U hypothesis. The Kuznets Curve (1955) finds an inverted-U relationship between economic development and income inequality, demonstrating that income inequality increases as countries develop and then decreases as countries become wealthier. Significantly, in the early stages of economic development, as countries move from an agricultural economy to manufacturing, they experience both an increase in income inequality (i.e., Kuznets Curve) and a decrease in FLFP (i.e., feminization U hypothesis).

Most studies find increases in FLFP have an income-equalizing effect (Mincer, 1972, Danziger, 1980; Gronau, 1982; Nelissen, 1990; Björklund, 1992; Cancian and Reed, 1998; Del Boca and Pasqua, 2003; Western, Bloome, and Persheski, 2008; Harkness, 2010). Reed and Canian (2001) find increases in FLFP decrease income inequality in the United States. Reed and Canian (2001) find that reducing female employment exacerbates household-level income inequality. Additionally, increases in FLFP improve incomes of single-mother and married couple households, lowering income disparity. Similarly, Pheffer and Ross (1982) attribute narrowing income inequality when FLFP increases to women working that are married to low-wage men.

Esping-Andersen (2007, 2009) claims that the effects of increases in FLFP on income inequality depend on the tendency of couples to marry by income category (e.g., high-high) or profession (e.g., doctor-doctor). Thus, the greater the propensity for assortative marriage in a country will increase income inequality as the FLFP increases. Gregg and Wadsworth (2003) find an increase in household-pairing polarization worsens income distribution in the United Kingdom. Some studies find assortative marriage has little effect on income inequality. For example, Greenwood et al. (2014) study the United States from 1960 to 2005 and find assortative marriage has little impact on the Gini coefficient.

Much literature focuses on a single developed country or cross-country panel of developed countries, not developing countries (Harkness, 2010; Sudo, 2017). For example, Harkness (2010) uses micro-data from 17 OECD countries and finds higher FLFP rates decrease income inequality. This study contributes to the literature by its comprehensiveness, including 136 countries over 30 years. The developing country panel includes 87 countries. In addition, the paper further segments to analyze regional differences (e.g., Middle East and North Africa (MENA) versus Europe). Lastly, the study also uses multiple measures of income distribution.

3. Methods and Data

3.1 Data Description and Variable Selection

Appendix A lists the variable names, sources, and summary statistics. The study tests multiple measures of income distribution. First, the study tests the net and market Gini coefficients from the Standardized World Income Inequality Database (SWIID) (Solt, 2015). The net Gini equals the market Gini minus household income taxes plus income redistribution. The difference between the net and market Gini coefficients indicates the effectiveness of a country in improving income distribution through progressive taxation and income transfer. The market Gini better measures income distribution without policy influence. The SWIID measures income inequality on a scale between (0) and (100). Smaller numbers signify a more equal income distribution. The SWIID data is from the Luxembourg Income Study (LIS), which uses household survey data (Solt, 2015).

The study also uses the percentage of income earned by the bottom 50 percent. Specifically, it represents the pre-tax national income earned by the lowest 50 percent of earned income by adults and is from the World Income Database (WID). Larger numbers signify more income distributed to the lower 50 percent. The WID uses data from different sources beyond survey data to increase observations relative to the SWIID. In the full panel of countries, using the WID increases observations by over 600 compared to the SWIID. Table 1 shows descriptive statistics for income inequality by the panel. The difference between the market and net Gini coefficients (i.e., absolute redistribution) is larger for high income countries compared to

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lower income countries, reflecting a better social safety net. (e.g., 14.7 for developing versus 3.3 for developed countries). High- and lower-income countries have near identical market Gini coefficients (45.8 versus 45.7).

The minimum and maximum market income earned by the bottom 50 percent in high income countries is (6.06) for Chile and (36.5) in Hungary. Therefore, the bottom 50 percent of income earners in Chile earn only 6.06 percent of total income, while they earn 36.5 percent in Hungary. In lower income countries, the minimum and maximum income earned by the bottom 50 percent is (3.52) in Sierra Leone and (28.5) in Bulgaria.

Table 1. Income Inequality Statistics by Panel (order: observations, mean, standard deviation, and min-max)

	Net Gini	Market Gini	Top 10 Percent	Bottom 50 Percent
Full Panel	3,936 38.0 8.81 16.8-65.4	3,936 45.7 6.24 30.7-72.3	5,235 45.6 10.1 16.7-71.6	5,243 14.6 5.21 3.52-36.5
High Income	1,545 31.1 6.00 16.8-50.8	1,545 45.8 4.75 30.8-56.4	1,856 38.3 9.72 16.7-67.8	1,862 18.3 5.41 6.00-36.5
Lower Income	2,391 42.4 7.38 22.6-65.4	2,391 45.7 7.10 30.7-72.3	3,379 49.6 7.77 17.5-71.6	3,381 12.6 3.82 3.52-28.5
Asia	933 37.6 5.14 25.7-48.7	933 42.2 4.82 31.3-53.1	1,406 46.7 6.69 27.4-59.7	1,406 14.2 3.29 8.6-24.2
Europe	1,215 28.9 4.29 16.8-38.9	1,215 45.4 5.25 30.7-56.4	1,324 33.0 4.94 16.7-51.9	1,330 22.2 3.48 7.61-36.5
Americas	798 45.2 5.72 28.1-55.4	798 49.3 4.98 37.4-64.3	1,025 53.4 5.52 34.2-67.8	1,025 9.67 2.53 5.3-19.25
Middle East and North Africa	367 38.0 3.32 29.6-47.0	367 41.7 4.34 32.0-53.1	684 50.1 4.18 38.1-59.6	684 12.2 2.41 8.84-19.0
Sub-Saharan Africa	767 45.9 7.10 32.3-65.4	767 47.6 8.13 34.2-72.3	1,176 52.0 7.10 28.86-71.6	1,178 11.9 2.91 3.52-18.2

Note: Order is observations, mean, standard deviation, and min-max.

The study uses data from the World Bank for FLFP. The measure for FLFP is the annual female percentage of labor force ratio (modeled International Labor Organization (ILO) estimate). The labor force is the proportion of the population working or actively seeking employment in the workforce. There are variations in reporting, but all data sets exclude unpaid workers, family workers, and students from the labor force. Part-time workers and those employed in the underground economy are included in the labor force (World Bank, 2023). Data is collected from censuses, labor force surveys, and establishment surveys (World Bank, 2023). The minimum FLFP is 8.14 in Yemen, while the maximum is 55.9 in Mozambique. The mean FLFP ratios for all countries are between 39.3 to 45.3, except for the Middle East and North Africa panel, with a mean of 21.0. Every panel has a large variance in the individual country minimum and maximum FLFP values. Figure 1 shows FLFP

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distribution. See Appendix B for binscatter of the FLFP and year in the full panel. The study uses binscatter instead of scatterplots since the large number of observations leads to too many points and overcrowding. The binscatter groups x-axis and y-axis variables into equal size bins, creating a scatterplot of the bins. Appendix B shows a general upward trend in the FLFP ratio but a notable drop in 2020, possibly because of the COVID-19 pandemic. Table 2 shows differences by region and the overall trends of increases in FLFP.

Table 2. FLFP by Panel

	Full Panel	High Income Countries	Lower Income Countries	Asia	Europe	Americas	Middle East and North Africa	Sub-Saharan Africa
Countries in Panel	136	49	87	34	35	25	18	31
Observations	4,445	1,565	2,880	1,181	1,120	864	573	1,024
Mean	40.2	41.2	39.7	33.2	45.6	39.7	21.0	45.7
Standard Deviation	10.0	9.59	10.2	12.8	3.04	4.79	8.34	5.84
Min-Max	8.14-55.9	10.9-50.8	8.14-55.9	9.77-50.1	34.5-51.5	28.6-50.2	8.15-47.9	23.9-55.9

Figure 1. FLFP Histogram – Full Panel

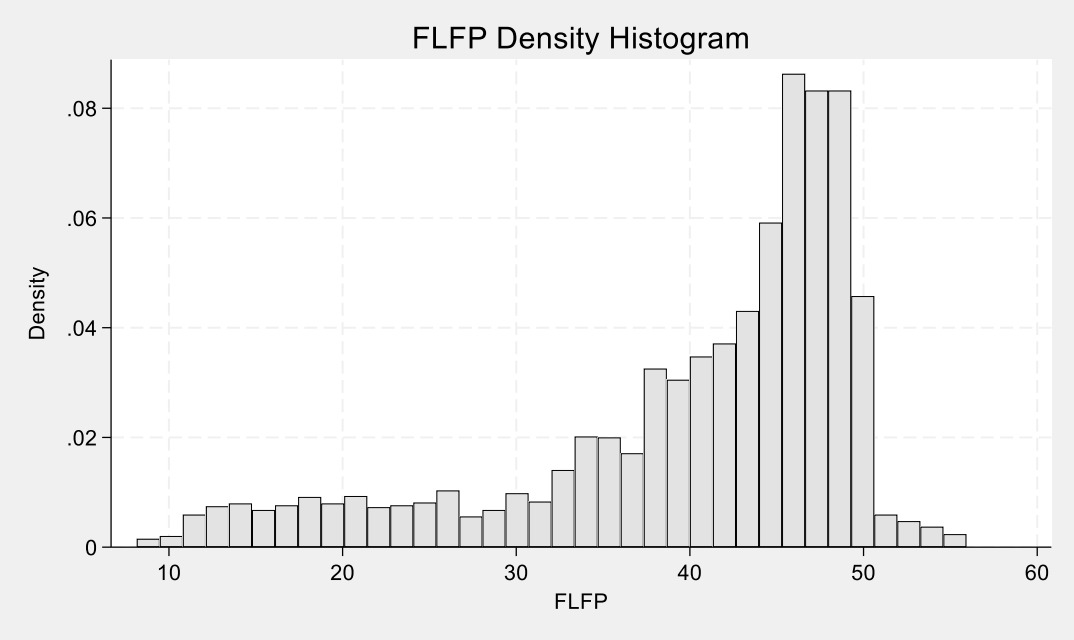

Figure 2 shows differences and overall trends in FLFP by region. Most regions show a general increase other than South Asia and the MENA. Although there were some increases from 1990 to 2000 in MENA, the FLFP rates have remained relatively steady since 2000. Additionally, South Asia has seen a decrease in the FLFP rate since 2010.

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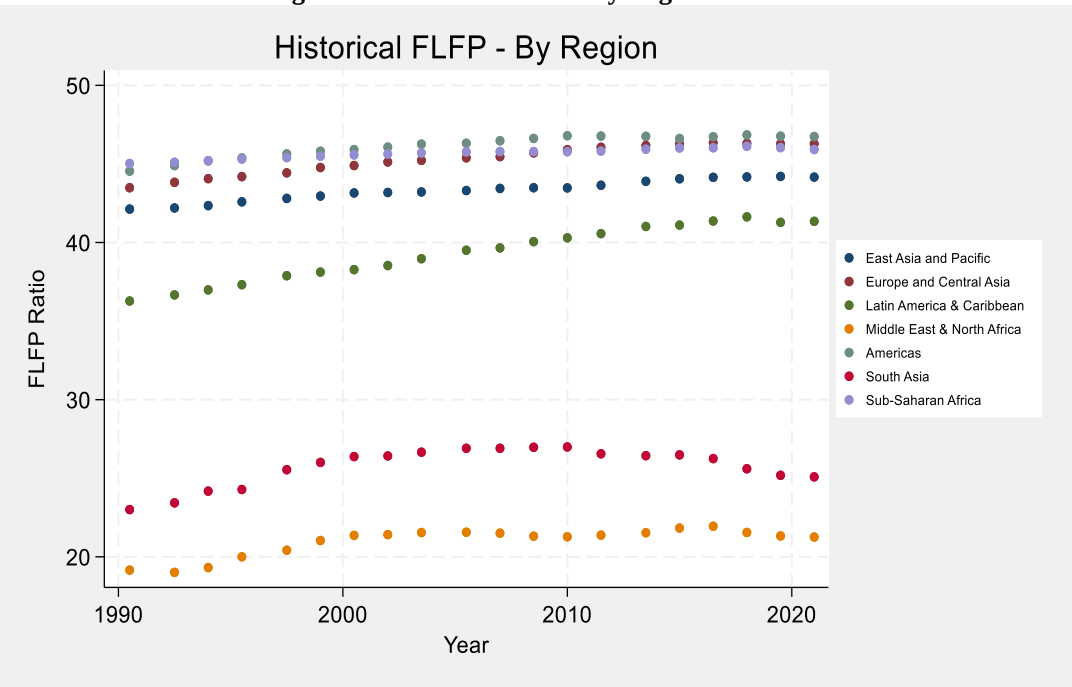
Figure 2. Historical FLFP – By Region



The study uses World Bank data on the total fertility rate to account for fertility. The fertility rate is the average number of births per woman, should they live through childbearing years (World Bank, 2023). Higher fertility rates will lower female employment opportunities, thus the probability of employment (Kim, 2016). Fertility rates decrease as countries develop economically (Sinha, 1967; Kim, 2016). A reason for the decrease in fertility rates as countries develop, is the opportunity cost of children due to higher potential income for females in the service-based economy (Kim, 2016). Lower fertility rates can reduce income inequality (Burtless, 2009; Furceri and Ostry, 2019) and decrease age dependency ratios, which decreases income inequality (Furceri and Ostry, 2019). A smaller, non-working population improves income inequality (Furceri and Ostry, 2019).

The natural log of per capita GDP, its square, and the GDP growth rate are used to account for Kuznets Curve and the feminization U hypothesis. Kuznets (1955) and Kaldor (1957) find economic growth worsens income distribution when a country begins to develop, but further economic growth improves income distribution as economies become more advanced. The feminization U hypothesis claims FLFP fall as countries develop (i.e., from agricultural to manufacturing). Still, FLFP increases as countries develop into more advanced economies (i.e., manufacturing to service) (Sinha, 1967). Thus, it is expected that an increase in the natural log of per capita GDP to increase income inequality (and decrease FLFP) while further economic development from manufacturing to service-based to reduce income inequality (and increase FLFP).

Regime data is from the International Country Risk Guide (ICRG). The polity indicator ranges from (0) for strongly autocratic to (12) for strongly democratic regimes. The score is based on competitiveness, openness, political participation, and checks on executive authority. Democracies may increase female political representation, which can safeguard FLFP policies (Lv and Yang, 2018). It is not just a democracy that affects FLFP and income distribution, but rather the increase in the number of females in government. Therefore, a higher female presence in government could have a larger effect on net Gini than democracy alone. The study tests this in an augmented model using the percentage of women in parliament. The World Bank indicator is the number of women in parliament divided by the number of available parliamentary seats.

Institutional strength and quality of bureaucracy data is from the ICRG. The data is on a scale of (0) low institutional strength and bureaucracy quality to (12) high institutional strength and bureaucracy quality. Countries with stronger institutions, legal frameworks, and regulations that protect female access to education and the labor market, while restricting discrimination, will have higher FLFP, ceteris paribus (World Bank Women, Business and Law Report, 2021).

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The unemployment rate is from the Word Bank and is the percentage of the labor force not working or seeking employment. The unemployment rate affects the FLFP ratio through its effects on economic conditions. Sustained unemployment results in a departure from the labor force due to the "shoe sole effect" (Blundell, Ham, and Meghir, 1998), lowering FLFP. Furthermore, during an economic slowdown, the least qualified workers are laid off first, which often are female, regardless of whether the lower qualification is real or perceived (Blundell, Ham, and Meghir, 1998). When there is a tight labor market, and unemployment is low, employers may seek out more female workers leading to an increase in FLFP (Fabrizio et al., 2020). Unemployment increases income inequality because a larger proportion of the populace earns no employment income (Furceri and Ostry, 2019).

3.2 Empirical Framework

The model consists of exogenous covariates accounting for fertility, economic development, political economy, institutions, economic growth, and unemployment. The covariates are needed to account for confounding variables.

The study includes panel data, from 1990 to 2020, from 136 countries, in the following panels;

1. Full (n=136; 3,771 observations)
2. High Income (n=47; 1,347 observations)
3. Lower Income (n=89; 2,424 observations)
4. Asia (n=36; 995 observations)
5. Europe (n=35; 940 observations)
6. Americas (n=26; 747 observations)
7. Middle East and North Africa - (n=18; 493 observations)
8. Sub-Saharan Africa – (n=31; 866 observations)

Appendix C lists the countries in each specific panel. Different panels isolate group-level differences based on income status and region. For example, cultural differences and norms on the role of women in the workforce lead to sizable differences in the mean FLFP rate of MENA countries as compared to Europe and Central Asia (i.e., 21.0 versus 45.3). The regions are based on either United Nations or World Bank classification. The income category is based on income status classified by the World Bank. The panel data is unbalanced. Although balanced panels are favored for analysis, the dataset is more comprehensive with more observations. Additionally, a larger dataset with additional countries reduces selection bias as sample approaches population.

The study's econometric model (1) is derived from Barro (2000) and Lundberg and Squire (2003). Barro (2000) and Lundberg and Squire (2003) study determinants of income distribution. The panel model regresses income inequality on FLFP and covariates.

$$\text{IncomeInequality}_{it} = \alpha + \text{FLFP}_{it} + X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \text{ and } (i = 1, \dots n; t = 1, \dots T) \qquad (1)$$

$\text{IncomeInequality}_{it}$ is the measure of income inequality for country (i) and time (t). FLFP_{it} measures FLFP that varies across time and country. X_{it} is the vector set of control variables used in the model that vary across time and countries. The parameter α contains a constant and individual-specific variable invariant over time. The μ_i captures unobservable individual-specific effects and λ_t captures unobservable time-specific effects. ε_{it} is the error term.

See Appendix D for model specification testing results which include:

1. the Hausman test (fixed versus random effects),
2. joint test (time fixed effects),
3. Wald test (heteroscedasticity),
4. Pesaran test (cross-sectional dependence),
5. Woolridge (autocorrelation), and
6. Fischer unit root test

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Specification tests support the use of the two-way fixed effects for country and year. Specification tests find heteroskedasticity, autocorrelation, and cross-sectional dependence. The Im-Pesaran-Shin (2003) stationary tests strongly reject the null hypothesis that all panels contain a unit root.

The econometric model uses Driscoll and Kraay (1998) standard errors. Driscoll and Kraay standard errors use cross-sectional averages of nonparametric standard errors to correct for heteroscedasticity, cross-sectional dependence, and autocorrelation. Driscoll and Kraay (1998) standard errors are reliable and use covariance matrix estimators that are independent of the cross-sectional dimensions. Driscoll and Kraay (1998) standard errors are best for more extended time series such as this study. The Driscoll and Kraay model use a two-year lag to account for autocorrelation.

Lags of FLFP are also utilized to safeguard against the possibility that income inequality determines FLFP (Leszcqensky and Wolbring, 2019). Limited data for some countries could cause selection bias when the sample does not represent the characteristics of the population (Qin, 2019). Extensive country inclusion and using the WID income inequality data reduces selection bias. For example, using the WID data increases observations by over 600. If there are large differences in the results between the WID and SWIID data, selection bias becomes more of a concern. The use of fixed effects, the length of the study, the lag, and the panel structure of the econometric model reduce the potential for endogeneity (Wooldridge, 2010; Baltagi, 2013).

4. Results

4.1 Net Gini Coefficient and FLFP

Table 3 provides results for eight different models utilizing different groups of countries and the net Gini as the dependent variable. FLFP is a statistically significant determinant of the net Gini in every panel. In six of the eight panels, increases in FLFP led to a decrease in the net Gini. However, in two panels, Asia and Sub-Saharan Africa, an increase in the FLFP increases the net Gini. In the six panels where an increase in FLFP leads to lower income inequality, a one-point increase in the FLFP decreases the net Gini by as much as 0.364.

Additionally, an increase in the FLFP by one point in the Sub-Saharan Africa panel increases the net Gini of 0.427. For a specific example, Iran has an FLFP ratio of 18.2 in 2022, while for Lebanon, it is 32.2. If Iran had Lebanon's higher FLFP while controlling for all other variables, Iran's net Gini would be 3.06 points lower.

Table 3. Net Gini Coefficient and FLFP

	Full Panel	High Income	Lower Income	Asia	Europe	Americas	Middle East and North Africa	Sub-Saharan Africa
Countries	134	47	87	34	35	25	17	32
Observations	3,147	1,174	1,973	734	932	623	296	674
F-Test	562086***	695601***	4901292***	1.23e+07***	80800***	866***	62853***	3179654***
R^2	.198	.312	.268	.226	.318	.628	.412	.341
FLFP	-.172*** (.040)	-.364*** (.058)	-.082** (.037)	.111*** (.031)	-.331*** (.086)	-.270*** (.044)	-.219*** (.060)	.427*** (.025)
Covariates								
Nat. Log GDP Per Cap	6.75*** (2.02)	10.5** (3.96)	17.4*** (2.90)	14.0*** (3.38)	1.42 (2.58)	22.3*** (1.72)	-2.81 (7.25)	8.20*** (.653)
Nat. Log GDP Per Cap^2	-.356*** (.118)	-.608*** (.200)	-.975*** (.193)	-.774*** (.177)	.068 (.157)	-1.31*** (.088)	.142*** (.396)	-.395*** (.123)
Fertility Rate	1.58*** (.195)	.806** (.380)	1.11*** (.147)	1.54*** (.380)	-1.17 (.530)	1.50*** (.526)	.824** (.325)	.603*** (.184)
GDP Growth Rate	.013 (.014)	.060*** (.021)	-.010 (.010)	.022 (.020)	.053** (.018)	.011 (.048)	.016 (.010)	-.033*** (.011)

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Democratic Accountability	.046 (.035)	.110** (.051)	.038 (.045)	.034 (.043)	.274*** (.074)	-.125 (.153)	.043 (.032)	.169*** (.046)
Quality of Institutions	-.190*** (.049)	.008 (.058)	-.250*** (.052)	.091 (.061)	.141 (.134)	.045 (.115)	-.024 (.060)	-.378*** (.048)
Employed in Industry	-.113** (.023)	-.135*** (.037)	-.074*** (.022)	-.061** (.030)	-.253*** (.066)	-.461*** (.030)	-.063*** (.020)	.022 (.031)
Unemployed	.043*** (.015)	.034 (.030)	.030 (.020)	.010 (.018)	-.013 (.028)	.014 (.114)	.046*** (.016)	-.159*** (.036)

Note: *** p <0.01, ** 0.01<p<0.05, * 0.05<p<0.10. Dependent variable is the net Gini coefficient. Standard Errors in parenthesis.

5.2 Market Gini Coefficient and FLFP

Table 4 provides results when the dependent variable is the market Gini. In five of the eight panels, increases in FLFP decrease the market Gini. Like Table 3, Asia and Sub-Saharan Africa panels have a positive FLFP coefficient. The only statistical significance change is in the Europe panel. FLFP is no longer significant when the dependent variable changes from the net to the market Gini in the Europe panel. It suggests the intervening factor could be redistribution policy in the Europe panel.

A question is why increases in FLFP worsen income distribution in Asia and Sub-Saharan Africa. A contributing factor could be these countries' cultural/religious nature and their effects on both FLFP and assortative marriage (Yasmin et al., 2013). Another factor, specific to both Asia and Sub-Saharan Africa, could be the influence of mineral-based export in many of the countries of these groups, which distort the economic structure, including employment (Gelb, 2010). In addition, in every panel, except sub-Saharan Africa, the coefficient for unemployment is positive and significant, except for the Americas panel, for which it is not significant. The majority of workers are male; therefore, unemployment affects males more. When the "bread earner" of the family is unemployed, the female enters the labor force to help the family. The cases of Asia and Sub-Sahara Africa could be due to the shoe-sole effect. When the head of the household is unemployed, there is so little money available that it is impossible to wear out the shoe sole in search of a job for the wife. Similarly, as the FLFP increases in some Asian and Sub-Saharan African countries, many earn subsistence incomes (World Bank, 2020). Therefore, if FLFP increases among low and high-income households, income difference worsens income distribution.

Table 4. Market Gini Coefficient and FLFP

	Full Panel	**High Income**	**Lower Income**	**Asia**	**Europe**	**Americas**	**Middle East and North Africa**	**Sub-Saharan Africa**
Countries	134	47	87	34	35	25	17	32
Observations	3,147	1,174	1,973	734	932	623	296	674
F-Test	458909***	510573***	2370304***	4841007***	308975***	17929***	194605***	3249075***
R^2	.244	.453	.273	.256	.483	.310	.556	.376
FLFP	-.134*** (.040)	-.259*** (.064)	-.100*** (.033)	.060** (.028)	-.051 (.102)	-.321*** (.064)	-.184*** (.061)	.376*** (.050)
Covariates								
Nat. Log GDP Per Cap	3.70* (2.10)	.294 (5.41)	13.8*** (2.62)	7.16* (4.03)	-.011 (2.26)	1.83 (2.18)	28.2*** (8.73)	6.09*** (1.98)
Nat. Log GDP Per Cap^2	-.148 (.130)	-.083 (.280)	-.691*** (.170)	-.259 (.229)	.047 (.126)	-.006 (.137)	-1.66*** (.485)	-.227* (.121)
Fertility Rate	1.97*** (.161)	1.48*** (.359)	.959*** (.096)	1.27*** (.414)	-1.21* (.642)	.500 (.299)	.513 (.386)	.758*** (.189)
GDP Growth Rate	.016 (.016)	.075** (.028)	-.011 (.008)	.017 (.019)	.056** (.022)	.018 (.085)	.03 (.008)	-.031*** (.008)
Democratic Accountability	.036 (.035)	.168*** (.056)	.033 (.037)	.025 (.042)	.228*** (.069)	-.097 (.178)	-.001 (.032)	.160*** (.048)

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Quality of Institutions	-.162*** (.051)	-.088 (.115)	-.236*** (.050)	.068 (.048)	.212 (.132)	-.175 (.204)	.082 (.065)	-.351*** (.048)
Employed in Industry	-.144*** (.023)	-.117*** (.032)	-.088*** (.028)	-.035 (.033)	-.263*** (.073)	-.644*** (.078)	.016 (.023)	-.008 (.026)
Unemployed	.111*** (.023)	.142*** (.045)	.037* (.020)	.182*** (.015)	.064* (.033)	.002 (.119)	.093*** (.025)	-.169*** (.045)

Note: *** p <0.01, ** 0.01<p<0.05, * 0.05<p<0.10. Dependent variable is the net Gini coefficient. Standard Errors in parenthesis.

5.3 Income of the Bottom 50 and FLFP

Table 5 shows the results when the dependent variable is national pre-tax income earned by the bottom 50 percent. With the bottom 50 measures of income distribution, larger numbers demonstrate better income distribution. In six of the eight panels, increases in FLFP improve income distribution to the bottom 50 percent. Similar to the net and market Gini, increases in FLFP worsen income distribution in Asia (i.e., negative FLFP coefficient). Also, the FLFP in the sub-Saharan Africa panel is no longer significant. To use the same example as Table 3, Iran has an FLFP ratio of 18.2 in 2022, while for Lebanon it is 32.2. If Iran had Lebanon's higher FLFP while controlling for all other variables, income earned by Iran's bottom 50 percent would increase by 1.76 (14 X 0.126).

Analyzing and comparing FLFF coefficients across the net Gini, market Gini, and bottom 50 percent income distribution measures demonstrates consistency and improves overall robustness. Additionally, covariate coefficients generally fit theoretical expectations. For example, the fertility rate increases the Gini and decreases the income distributed to the bottom 50 percent in most cases. An interesting exception is the fertility rate of Europe, where an increase in the fertility rate improves income distribution in the Europe panel. Many European countries have had low fertility rates (World Bank, 2020). The mean fertility rate in Europe is 1.57, while it is 2.60 in Asia. The replacement fertility rate is 2.1 (World Bank, 2023). A fertility rate below the replacement rate results in population declines over time if not for immigration. An increase in the fertility rate will worsen the per capita income distribution. It would not affect income distribution except if the new mothers (presumably working) quit, and consequently, their family income declines. Of course, if the working women who left were from high-income families, which would result in improvements in income distribution. Bar et al. (2018) find fertility increased among high income relative to low income families from 1980 to 2010. Therefore, if the high income families have more children than low income families, and if more children lead to fewer high income women working, increased FLFP could lower income inequality.

Table 5. Bottom 50 percent and FLFP

	Full Panel	**High Income**	**Lower Income**	**Asia**	**Europe**	**Americas**	**Middle East and North Africa**	**Sub-Saharan Africa**
Countries	136	49	87	36	35	26	18	31
Observations	3,771	1,347	2,424	995	940	747	493	866
F-Test	69542***	52175***	2406624***	15298***	136699***	4675***	27171***	35319***
R^2	.094	.251	.128	.105	.391	.440	.415	.207
FLFP	.079*** (.018)	.266*** (.041)	.031** (.015)	-.071*** (.020)	.339*** (.062)	.054*** (.018)	.126*** (.022)	-.039 (.049)
Covariates								
Nat. Log GDP Per Cap	2.66*** (.838)	-4.64* (2.48)	-.837** (.352)	.361 (1.21)	-1.22*** (.619)	-13.6*** (.870)	4.11*** (1.46)	-1.55 (2.62)
Nat. Log GDP Per Cap^2	-.228*** (.838)	.128 (.123)	.151 (.107)	-.045 (.070)	.097*** (.033)	.817*** (.046)	-.224** (.082)	.041 (.185)
Fertility Rate	-.330*** (.091)	.180 (.150)	-.032 (.125)	-.596*** (.155)	1.34*** (.396)	-.531*** (.158)	-.421*** (.138)	-.633*** (.210)

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GDP Growth Rate	.002 (.006)	-.054*** (.010)	.004 (.005)	-.003 (.039)	-.051*** (.016)	.008 (.026)	.001 (.002)	.034** (.014)
Democratic Accountability	-.038* (.020)	-.015 (.027)	-.036 (.023)	-.004 (.039)	-.254*** (.076)	-.148** (.068)	.019 (.021)	.009 (.034)
Quality of Institutions	-.075*** (.023)	.154*** (.026)	.085*** (.028)	-.040 (.031)	.222* (.114)	-.103*** (.029)	.013 (.028)	.138** (.052)
Employed in Industry	.037* (.019)	.097*** (.023)	-.010 (.025)	.024 (.017)	.179*** (.050)	.092*** (.026)	.001 (.011)	.013 (.022)
Unemployed	-.039*** (.011)	-.047*** (.017)	-.034*** (.011)	-.045* (.026)	.018 (.028)	-.045** (.018)	-.127*** (.025)	.266*** (.053)

Note: *** p <0.01, ** 0.01<p<0.05, * 0.05<p<0.10. Dependent variable is adult average split of national income earned by the bottom 50 percent. Standard Errors in parenthesis.

5.4 Panel Regressions with FLFP Categories of Low, Medium, and High as Indicator Variables

The study also examines the effects of different FLFP categories on the net Gini. We generate three indicator variables based on FLFP percentages. The categories include low FLFP with percentages between (0) and (29.9), medium FLFP between (30.0) and (39.9), and high FLFP above (40). Table 6 provides three regressions for the full, high income, and low income panels when the base comparison group is medium FLFP. The results demonstrate a decrease in the net Gini as countries move from medium to high FLFP. The results for the high FLFP are statistically significant for all panels. The other results are mixed. This implies that when FLFP is low, it does not impact income distribution, as expected.

Table 6. FLFP as Low, Medium, and High

	Full Panel	**High Income**	**Lower Income**
No. in Group	134	47	87
Obs.	3,147	1,174	1,973
F	252154***	195234***	7326096***
R^2	.203	.252	.288
High FLFP (40+FLFP)	-1.48*** (.253)	-1.13*** (.299)	-2.00*** (.262)
Medium FLFP (30 to 39.9 Percent FLFP)	**Base Comparison Group**		
Low FLFP (0 to 29.9 Percent FLFP)	.598 (.730)	N/A	-.431*** (.147)
Nat. Log GDP Per Cap	6.52*** (2.16)	15.5*** (.431)	17.2*** (.3.06)
Nat. Log GDP Per Cap^2	-.330** (.126)	-.825*** (.223)	-.969*** (.202)
Fertility Rate	1.55*** (.186)	.777 (.454)	1.14*** (.149)
GDP Growth Rate	.011 (.015)	.067** (.028)	-.011 (.011)
Democratic Accountability	.054* (.032)	.072 (.058)	-.045 (.044)
Quality of Institutions	-.195*** (.051)	-.109 (.092)	-.253*** (.052)
Employed in Industry	-.102*** (.025)	-.079* (.041)	-.070*** (.021)
Unemployment	.045*** (.016)	.028 (.30)	.032 (.019)

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Note: *** p <0.01, ** 0.01<p<0.05, * 0.05<p<0.10. Dependent variable is the net Gini coefficient. Standard Errors in parenthesis.

5.5 Interaction Between Fertility Rate and FLFP

The study also examines how the interaction between FLFP and fertility affects the net Gini. See Table 7 regressions for the full, high, and lower income panels. The negative FLFP coefficients indicate that income distribution improves as more women enter the workforce. We find a positive and negative coefficient for the interaction between FLFP and fertility. The positive FLFP-fertility interaction coefficient in the full and lower income panel indicates although increasing FLFP reduces income inequality; the effect is muted as the fertility rate increase. Specifically, in the lower income panel, an increase in the FLFP reduces the net Gini by (-0.239), but its interaction with the fertility rate increases the net Gini by (0.041).

On the other hand, the negative FLFP-fertility interaction coefficient in the high-income panel shows an increase in FLFP, and its interaction with the fertility rate decreases the net Gini. A contributing factor could be the prevalence of social safety net in the countries in the high income countries that benefits the women with more children, especially at the lower income levels. Like the case of Europe in Table 5, high income countries have lower fertility rates and increases in fertility rates can improve income distribution (Bloom et al., 2008). Subsequently, income distribution improves as the total fertility rate and FLFP increases in high income countries.

Table 7. Interaction Between Fertility Rate and FLFP

	Full Panel	High Income	Lower Income
No. in Group	134	47	87
Obs.	3,147	1,174	1,973
F	1404344***	969330***	9495926***
R^2	.210	.315	.283
FLFP	-.299*** (.059)	-.286*** (.053)	-.237*** (.061)
FLFP##Fertility Rate	.041*** (.007)	-.046** (.021)	.041*** (.009)
Nat. Log GDP Per Cap	8.00*** (2.18)	9.98*** (3.88)	19.7*** (.3.01)
Nat. Log GDP Per Cap^2	-.432** (.124)	.578*** (.197)	-1.13*** (.195)
Fertility Rate	.216 (.247)	2.62*** (.688)	-.243 (.380)
GDP Growth Rate	.015 (.014)	.058** (.021)	-.008 (.009)
Democratic Accountability	.062* (.031)	.104* (.051)	.055 (.043)
Quality of Institutions	-.176*** (.046)	.001 (.060)	-.239*** (.050)
Employed in Industry	-.140*** (.027)	-.115*** (.035)	-.099*** (.024)
Unemployment	.045*** (.013)	.035 (.30)	.030 (.019)

Note: *** p <0.01, ** 0.01<p<0.05, * 0.05<p<0.10. Dependent variable is the net Gini. Standard Errors in parenthesis.

5.7 Percentage of Women in Parliament and the Net Gini Coefficient

The study uses an augmented model to study the effects of the percentage of women in parliament on income inequality. Data on women in parliament began in 1997; therefore, there are fewer observations than in the previous panels. Table 8 shows regressions when the dependent variable is the net Gini. In five of the eight panels, increases in women in parliament decrease

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the net Gini. The coefficient for women in parliament is not significant in Asia and Sub-Saharan Africa, while it increases the net Gini in MENA.

An interesting finding is that regime and democratization are often statistically insignificant or even worsen income inequality (e.g., Tables 3-7). On the other hand, some researchers claim democracies increase female government representation, which can promote FLFP policies (Lv and Yang, 2018).

The study further tests the role of democracies promoting women in government. The Appendix E regression shows regime level of democracy is an insignificant explanatory variable of women in parliament. Alternatively, the Appendix F regression indicates democracy and women in government promote FLFP (i.e., positive coefficients for FLFP). Therefore, regime democracy levels might indirectly improve income distribution via their role in promoting FLFP.

Table 7. Women in Parliament and the net Gini Coefficient

	Full Panel	**High Income**	**Lower Income**	**Asia**	**Europe**	**Americas**	**Middle East and North Africa**	**Sub-Saharan Africa**
Countries	133	46	87	33	35	25	17	32
Observations	2,480	934	1,546	576	766	482	234	520
F-Test	8214449***	396507***	6.68e+07***	1.16e+07***	1224***	647370***	28115***	17.3***
R^2	.199	.155	.314	.118	.463	.767	.434	.214
Women in Parliament	-.045*** (.011)	-.028* (.015)	-.050*** (.011)	.001 (.011)	-.101*** (.016)	-.049*** (.014)	.066*** (.015)	.003 (.008)
Covariates								
FLFP	-.066** (.032)	-.223*** (.040)	.012 (.040)	.151*** (.035)	-.067*** (.013)	.054 (.090)	-.060 (.039)	.316*** (.070)
Nat. Log GDP Per Cap	8.60*** (2.50)	12.4* (6.31)	19.6*** (2.81)	11.9*** (3.12)	.401** (.194)	-64.7*** (10.7)	-7.33 (.602)	9.09*** (1.79)
Nat. Log GDP Per Cap^2	-.545*** (.149)	-.750** (.329)	-1.19*** (.182)	-.761*** (.173)	-1.31*** (.100)	3.44*** (.604)	.307 (.327)	-5.43*** (.110)
Fertility Rate	1.77*** (.189)	1.27** (.449)	1.16*** (.167)	.793*** (.181)	-.582* (.290)	.035 (.451)	-.317 (.411)	1.12*** (.199)
GDP Growth Rate	.014 (.013)	.035** (.016)	-.004 (.011)	.027** (.012)	.082*** (.024)	.058** (.022)	.012 (.014)	-.017** (.008)
Democratic Accountability	.108*** (.031)	.032 (.108)	.113*** (.024)	.082** (.034)	.382*** (.066)	.101** (.049)	.036 (.041)	.139*** (.035)
Quality of Institutions	-.038 (.117)	.078 (.145)	-.151 (.162)	.063 (.218)	-.749*** (.100)	.101* (.072)	.158*** (.042)	-.295** (.135)
Employed in Industry	-.100*** (.018)	-.042 (.025)	-.036** (.015)	-.066** (.032)	-.221*** (.013)	-.166** (.081)	-.082((.041)	.008 (.039)
Unemployed	.035*** (.013)	.066*** (.031)	.020 (.014)	-.029 (.020)	.174*** (.035)	.208*** (.503)	.018 (.022)	-.118*** (.035)

Note: *** p <0.01, ** 0.01<p<0.05, * 0.05<p<0.10. Dependent variable is the net Gini. Standard Errors in parenthesis.

7. Discussion and Conclusion

The study finds that FLFP has an inverse relationship between the FLFP and income distribution in most cases, regardless of development status. The findings hold for three different measures of income distribution. Also, results remain consistent

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when FLFP is a continuous or indicator variable based on FLFP level. The research supports the literature finding income equalizing effects of increases in the FLFP (Mincer, 1972, Danziger, 1980; Gronau, 1982; Nelissen, 1990; Björklund, 1992; Del Boca and Pasqua, 2003; Western, Bloome, and Persheski, 2008; Harkness, 2010). As FLFP increases, household income rises for lower-income families, improving income distribution. More females from lower-income households are likely to join the workforce than those from higher-income households, which lowers income inequality. Additionally, the incomes of families with female earners increase, decreasing income inequality (Cancian and Reed, 1998).

The study also finds limited support for the literature suggesting higher FLFP can worsen income distribution (Gregg and Wadsworth, 2003: Esping-Anderson, 2007, 2009). Only in two panels, Asia and Sub-Saharan Africa, is the relationship direct. This seemingly paradoxical outcome can be because in most countries in those panels, especially Asia, FLFP is low, and the women who join the labor force are disproportionally from more affluent families with better educations. These women may enter the labor force not necessarily for economic earnings but for social recognition or to demonstrate their equality with their husbands and indicate they are "modernized." In such cases, the females' earning exacerbates the income inequality of the haves and the have-nots, as supported by the signs of their coefficients in their respective panels. In the sub-Saharan panel, increases in FLFP may worsen income inequality since the subsistence earnings of low income females do little to increase low income families income. The majority, if not all, of the seemingly paradoxical outcome regarding the signs of FLFP, is explainable using the dominant economic and cultural characteristics of the countries in the respective panels. It is necessary to have more granulated and less aggregated data to demonstrate the hypotheses presented in the paper to explain such outcomes.

The similar findings between the net (after taxes and transfers), market Gini coefficient (before taxes and transfers), and bottom 50 percent are also insightful. The panel data results comparing the coefficients when the dependent variable is the net Gini versus the market Gini or bottom 50 demonstrate that the FLFP ratio is a significant determinant of income derived from labor markets without the influence of taxes and redistribution. The FLFP ratio has similar equalizing effects on labor income as on net income.

The study also finds the fertility rate interacts with FLFP to increase income inequality in most cases, but there are some cases when the interaction can decrease income inequality. For example, FLFP interaction with fertility in Europe can improve income distribution. An additional insight is increases in women in parliament decrease the net Gini in most cases. Finally, women in parliament and its interaction with democracy indicate more women in parliament can promote FLFP. Democratization can improve income distribution by promoting FLFP.

The large scope and comprehensiveness of the study has its advantages and disadvantages. There are benefits to analyzing individual countries versus large panels of countries. For example, Gregg and Wadsworth (2003) find that household-pairing polarization worsens income distribution in the UK. In this study, the UK is in a group of 38 developed countries, and the researcher finds higher FLFP rates decrease income inequality. Thus, policymakers and the article's readers must carefully generalize from the group (panel) to the individual country.

Future research should explore the relationship between the interactions between the FLFP ratio and culture. Policy can influence the FLFP ratio, but the effect of culture, for example, religion, also greatly influences the FLFP ratio. Culture and religion could be included as a covariate or an interaction to find insights.

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Disclosure Statement

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Appendix A – Descriptive Statistics

Variable	Source and Description	Observations	Mean	St. Dev.	Min	Max
net Gini Coefficient	**SWIID** - Dependent Variable – net Gini (after-tax and after-transfer)	3,936	38.0	8.81	16.8	65.4
market Gini Coefficient	**SWIID** - Dependent Variable – market Gini (before-tax and before-transfer)	3,936	45.7	6.28	30.7	72.3
Top decile divided by bottom decile	**WID** – Dependent Variable - Top decile's national income divided by the bottom decile's national income	4,115	587	1246	35.5	5650
Female Labor Force Participation (FLFP) ratio	**World Bank** – Independent Variable - The measure for PLFP is the ratio of female to male labor force participation rate (modeled International Labor Organization (ILO) estimate). The measure is reported annually. The labor force is defined as the proportion of the population active in the workforce. The ratio is calculated by dividing female labor force participation by the male labor force participation, which is then multiplied by 100.	4,445	40.2	10.0	8.14	55.9
Democratic Accountability	**ICRG** – Covariate - The democratic accountability index is on a scale of (0) for autarchy to (12) for alternating democracies. The score is based on competitiveness, openness, political participation, and checks on executive authority.	5,071	7.64	3.31	0	12
Employment in Industry	**World Bank** – Covariate - Percentage of workforce employment in manufacturing.	4,031	20.7	8.51	2.41	59.9
GDP Growth Rate	**World Bank** – Covariate - The percentage annual increase in gross domestic product (GDP).	4,916	3.32	3.97	-64.0	86.8
GDP Per Capita	**World Bank** – Covariate - Natural logarithm of per capita GDP in constant 2015 USD.	4,907	8.53	1.48	5.12	11.6
GDP Per Capita Squared	**World Bank and Computation** - Covariate - Natural logarithm of per capita GDP squared in constant 2015 USD.	4,907	75.0	25.4	26.2	135
Quality of Bureaucracy and Institutions	**ICRG** – Covariate - The measure of institutional strength and quality of bureaucracy is on a scale of (0) low institutional strength and bureaucracy quality to (12) high institutional strength and bureaucracy quality.	5,071	6.47	3.49	0	12
Total Fertility Rate	**World Bank** – Covariate - Total fertility rate represents the number of children that would be born to a woman if she were to live to the end	4,448	3.00	1.66	.772	8.61

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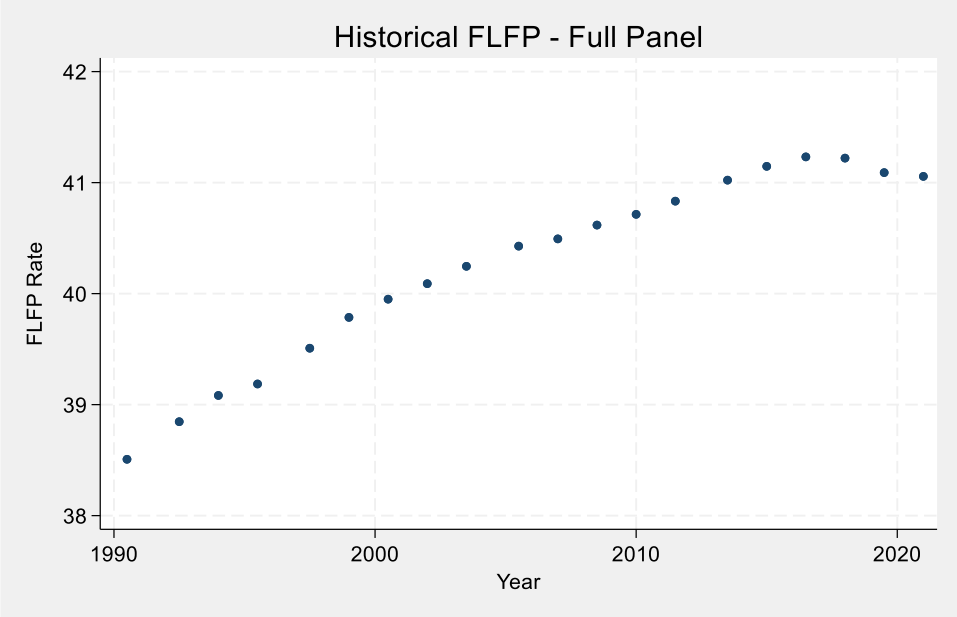
	of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.					
Unemployment Rate	**World Bank** – Covariate - Percentage labor force that is unemployed (ILO).	4,309	7.68	5.40	.1	33.6

Appendix B – Historical FLFP – Full Panel



Appendix C – Panel List – By Country

Full panel: Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bangladesh, Belgium, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Chile, China, Columbia, Congo Democratic Republic, Congo Republic, Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Guinea, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Latvia, Lebanon, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, North Korea, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovakia, Slovenia, Somalia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Syria, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe. **High Income**: Australia, Austria, Azerbaijan, Bahamas, Belgium, Canada, Chile, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, North Korea, Norway, Oman, Panama, Poland, Portugal, Qatar, Saudi Arabia, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom, United States, Uruguay. **Lower Income**: Albania, Algeria, Angola, Argentina, Armenia, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, China, Columbia, Congo Democratic Republic, Congo Republic, Costa Rica, Cote d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Guinea, Haiti, Honduras, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Lebanon, Liberia, Libya, Madagascar, Malawi, Malaysia, Mali, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Myanmar, Nicaragua, Niger, Nigeria, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Russia, Senegal, Serbia, Sierra Leone, Somalia, South Africa, Sri Lanka, Sudan, Syria, Tanzania, Trinidad and Tobago, Thailand, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe. **Asia**: Australia, Azerbaijan, Bangladesh, China, Indonesia, Iran,

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Iraq, Israel, Jordan, Lebanon, Japan, Kazakhstan, Malaysia, Mongolia, Myanmar, New Zealand, North Korea, Oman, Pakistan, Papua New Guinea, Philippines, Qatar, Saudi Arabia, Singapore, South Korea, Sri Lanka, Syria, Thailand, United Arab Emirates, Vietnam, Yemen. **Europe**: Albania, Armenia, Austria, Belarus, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom. **Latin America and the Caribbean**: Argentina, Bahamas, Bolivia, Brazil, Chile, Columbia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexica, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela. **Middle East and North Africa**: Algeria, Egypt, Iran, Iraq, Israel, Jordan, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Yemen. **Sub-Saharan Africa**: Angola, Botswana, Burkina Faso, Cameroon, Congo Democratic Republic, Congo Republic, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Uganda, Zambia, Zimbabwe

Appendix D – Model Specification Testing

Hausman (1978) specification test

	Coef.
Chi-square test value	46.586
P-value	0

Joint Test – test perm

F(28, 2976) = 12.08
Prob > F = 0.0000

Cross sectional independence

Pesaran's test of cross sectional independence = 12.499, Pr = 0.0000
Average absolute value of the off-diagonal elements = 0.592

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i
chi2 (134) = 6.1e+05
Prob>chi2 = 0.0000

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation
F(1, 133) = 1504.479
Prob > F = 0.0000

Fisher-type unit-root test for FLFPtotlabfor

Based on augmented Dickey–Fuller tests
Inverse chi-squared(278) P 330.0692 0.0174
Modified inv. chi-squared Pm 2.2082 0.0136

Appendix E – Regression Women in Government and Democracy

Regression with Driscoll-Kraay standard errors Number of obs = 3227
Method: Fixed-effects regression Number of groups = 138
Group variable (i): CountryNo F(2, 24) = 6.85
maximum lag: 2 Prob > F = 0.0044
within R-squared = 0.0235

Drisc/Kraay

porpwomengov	Coefficient	St. Err	t	P>t	95% Con	Int
demoacct2	0.070	0.194	0.360	0.720	-0.329	0.470
burqual	5.125	1.859	2.760	0.011	1.289	8.962
_cons	6.596	3.015	2.190	0.039	0.373	12.819

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Appendix F – Regression FLFP, Democracy, and Women in Government

Regression with Driscoll-Kraay standard errors Number of obs = 3163
Method: Fixed-effects regression Number of groups = 136
Group variable (i): CountryNo F(4, 24) = 52.32
maximum lag: 2 Prob > F = 0.0000
within R-squared = 0.1762

Drisc/Kraay

FLFPtotlabfor	Coefficient	St. Err	t	P>t	95% Conf	Int.
demoacct2	0.084	0.022	3.900	0.001	0.040	0.129
porpwomengov	0.084	0.015	5.710	0.000	0.053	0.114
unemprateilo	0.054	0.013	4.060	0.000	0.026	0.081
nlgdppercap2015	0.707	0.249	2.830	0.009	0.192	1.221
_cons	31.907	2.005	15.910	0.000	27.769	36.044

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