THE EFFECT OF FINANCIAL DEVELOPMENT ON INCOME INEQUALITY: DOES GENDER MATTER?

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ABSTRACT

Over the past three decades, income inequality has increased in most OECD countries, while the same period has witnessed financial development and a declining gender gap in employment. Numerous factors may intensify income inequality. And, the effect of financial development on income inequality has been discussed intensely by scholars and policy makers. But, there is still no consensus on that relationship. This study examines the association between financial development and income inequality, and how female labor force participation affects this relationship for a panel data set of OECD countries over the period 1985-2014. The results show that financial development reduces income inequality. However, the impact of female labor force participation on that relationship is complicated, and improvements in female labor force participation worsen the equalizing effects of financial development.
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INTRODUCTION

The relationship between financial sector development\(^1\) and income inequality has been discussed for decades. The recent financial crisis revealed the importance of the relationship once again. Therefore, income inequality is gaining measured attention in many countries, especially in developed countries. Recent changes in political dynamics have shined a light on growing inequality problems.

Over the past three decades, distribution of income has deteriorated in most Organisation for Economic Co-Operation and Development (OECD) countries, while the same period has witnessed financial development and a declining gender gap in employment. Financial sector has developed rapidly in OECD countries mainly due to technology and globalization since mid-1980s. In the same period, OECD countries enjoyed economic growth and average GDP per capita increased from nearly $8,850 in 1980 to about $41,000 in 2015.\(^2\) At the same time, many OECD countries have experienced a growing female labor force. Female labor force participation rate (FLFP) has increased from an average of 55.7 percent in 1980 to 72.1 percent in 2015. On the other hand, income inequality has risen in many OECD countries. Gini coefficient increased to 0.32 in 2013 from 0.29 in the mid 1980s on average. The increase in inequality in this period has become a concern, and scholars, politicians, and policymakers have hotly debated how financial developments affect inequality.

\(^1\) According to the World Bank, “Financial sector development occurs when financial instruments, markets, and intermediaries do a better job at providing the key functions of the financial sector in the economy.” The World Bank, Financial Development. 

\(^2\) OECD Database, based on market exchange rates.
Economic theory and empirical studies show contradictory estimates. On one hand, there is a general belief that financial development improves economic growth, increases access to finance for both the poor and the rich, and reduces income inequality (Galor and Zeira, 1993; Banerjee and Newman, 1993). On the other hand, parts of society do not benefit equally from financial development, and some parts might even be worse off.

Another important factor that has affected inequality is the increase in FLFP. Increasing FLFP has been one of the most important policy issues related to achieving economic and social goals in many countries. As more women enter the labor force, countries have a larger labor force, and a more diverse skill sets. Greater FLFP can increase the growth rates and reduce gender gap. However, countries have followed different paths for FLFP in this period. Some countries have developed policies helping women to participate in the labor force; for example, Nordic countries provide broader childcare services and cash transfers which help women enter and remain in the labor force, and they have had higher FLFP than other OECD countries.

Equality in access to finance is another crucial issue regarding financial development. Women’s access to finance in an efficient way is very important for them to benefit from the economic and financial development. However, women generally have less access to financial services than men, and this might negatively affect their educational attainment and participation in economic life. Moreover, due to lack of financial literacy, some women cannot use financial instruments well.

Increase in FLFP ratios are expected to improve women’s access to finance, but the net effect on inequality depend on how efficient they can use the financial system. In other words, the effect of financial development on inequality may depend on FLFP, but the
direction of this relation, if exists, might depend on financial access and literacy of women.

In this context, I examine empirically the effect of financial development on income inequality for a panel data set of OECD countries over the period 1985-2014. The main contribution of this study is to examine how FLFP affects the financial development-income inequality nexus in OECD countries.
BACKGROUND

*Income Inequality*

Over the past thirty years, income inequality has been rising in most OECD countries. Figure 1 shows that the Gini coefficient (after taxes and transfers) was 0.29 in the mid 1980s on average across OECD countries, but it increased by 3 points to 0.32 in 2013. However, Gini coefficients vary across OECD countries over the period. Nordic and many continental European countries traditionally have much lower Gini coefficients than the OECD average. Conversely, Gini coefficients are particularly high in Israel, Mexico, Chile, Turkey and the United States.

Over this period, OECD countries have experienced different changes in their Gini coefficients. The Gini coefficient has risen more than 5 points in Finland, Israel, New Zealand, Sweden, Poland, Luxembourg and the United States while, it has decreased in Chile, France, Mexico and Turkey.

There are several factors that contribute to the increasing inequality or gap between rich and poor. The most important factor is the increasing differences in labor force outcomes between skilled and unskilled labor in OECD countries. Technological progress, pressures from globalization and regulatory reforms have been main drivers of economic and employment growth and distribution of income (OECD, 2015). Technological progress has increased the demand for skilled labor while reducing the demand for less skilled labor. As a result, unemployment rates become higher for less skilled workers and wage gap between skilled and less skilled has widened. Also, globalization and decline in unionization have increased the pressure on less skilled workers. In addition, less skilled
workers have been hurt by increasing labor market flexibility while outcomes of high income people have improved (Dabla-Norris et al., 2015).

**Figure 1: Gini Coefficient in 1985, 2007 and 2013 (OECD Countries)**

![Gini Coefficient Chart](image)

Source: OECD and Standardized World Income Inequality Database (SWIID)
Note: Austria, France, Hungary, Ireland, Mexico, Portugal, Switzerland and Turkey do not have data for 1985. I use the earliest year for which data is available for these countries.

Unbalanced distribution of income between rich and poor will cause economic and social problems, and political instability, therefore, addressing widening income inequality has become one of the most important policy issue in many OECD countries.

**Financial Development**

With the technological development, globalization and deregulation, financial service industry has accelerated its growth rate in all OECD countries since mid-1980s. As a result, financial sector has increased its size in the economy remarkably, and become a
part of our daily lives providing a wide range of services. Figure 2 shows the trend in the ratio of average private credit to GDP as a proxy for financial development over the period 1980-2014 for OECD countries. The figure shows a strong increase in private credit to GDP, almost doubling from 53 percent to 101 percent of GDP on average from 1980 to 2014.

Figure 2: The Ratio of Private Credit to GDP (OECD Average)

![Graph showing the ratio of private credit to GDP for OECD countries from 1980 to 2014](image)

Source: World Bank, World Development Indicators

However, financial sector might have a major role in recessions. The 2008 global financial crisis hit all OECD countries and all segments of the society. For low income and low skilled people, the situation was even worse. Many financial institutions collapsed and many others were bailed out by tax payers’ money. Until recently, the problem had been invisible, and the issue did not get the attention it deserved. However, in the post-recession period the plight of many low income people, especially in advanced economies, has raised questions about the impact of finance on income inequality. Regarding this critiques, some OECD countries announced fiscal stimulus
packages such as cuts in income taxes and a rise in social transfers in order to lessen the
effect of falling household income. However, the stimulus packages were temporary.
“As the economic and especially the jobs crisis persist and fiscal consolidation took
hold, there was a growing risk that the most vulnerable in society would be hit harder as
the cost of the crisis increases.” (OECD, 2013).

**Female Labor Force Participation (FLFP)**

Over the past few decades, FLFP has increased from an average of 55.7 percent in 1980
to 72.1 percent in 2015 in OECD countries (Figure 3). According to OECD data, FLFP
has more than doubled in countries such as Netherlands, Spain and Ireland.

Despite the overall increasing trend in FLFP, there are still large differences in the FLFP
across the OECD countries in 2015: the FLFP is below 60 percent in Chile, Greece, Italy,
Korea, Mexico and Turkey, while it is above 75 percent in Denmark, Iceland,
Netherlands, New Zealand, Norway, Sweden and Switzerland.

Country specific structural factors and policies affect the differences in FLFP among
OECD countries. The female labor force is concentrated in the service sector in OECD
countries (Elborgh-Woytek et al., 2013). The shift in the industrial composition in
economies from manufacturing to services has also contributed to the increase in FLFP.
Also, the tax and benefit systems have an important role on FLFP. The tax system which
taxes married women (second earners in the households) more than men and single
women could reduce FLFP by decreasing their earnings in the labor market (Elborgh-
Woytek et al., 2013; Thevenon, 2013).
In addition, family policy regimes vary across OECD countries. Thevenon (2013), classifies the countries according to family policies: Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden) are the most generous and provide broad support to female employment, whereas the Southern Europe Countries (Italy, Portugal, Spain) have allocated lower public resources on policies that support working families.\(^3\)

Partly because of these policy regimes and structure of the economy, over the past 30 years, the gender gaps in employment and earnings have been decreasing (Figure 4). But, FLFP has still remained lower than male participation in all OECD countries, and women have not demonstrated their full economic potential. In 2015, on average in OECD countries, 63 percent of women were in the workforce compared to 79.8 percent of men.

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\(^3\) See Thevenon (2013) for detailed information about the family policy regimes across OECD countries.
Figure 4: Labor Force Participation Gap, Male-Female, 15–64 (Percentage Point)

Source: OECD
LITERATURE REVIEW

A growing number of theoretical and empirical studies that explain the link between financial development and income inequality produce conflicting explanations and results. On the one hand, some scholars suggest that financial development provides wider borrowing opportunities to poor people which increases their income and reduces income inequality (Galor and Zeira, 1993; Banerjee and Newman, 1993). On the other hand, financial development can benefit the rich disproportionately and widen income inequality. Rich people who have more information and financial literacy, benefit more from financial development than poor people.

Greenwood and Jovanovic (1990) suggests a non-linear Kuznets curve relationship (an Inverted U-shaped curve) between financial development and income inequality. At the early stages of economic development, financial development increases the income inequality. However, as the economy and financial markets develop, income inequality declines because the financial system becomes more inclusive and helps a larger portion of the population.

Numerous empirical works test these theories. For example, Clarke et al. (2003) analyze the effect of financial development on income inequality by using panel data set of 91 countries between 1960 and 1995. They find that when economies develop their financial systems, inequality reduces. On the other hand, their results show that there is no an Inverted-U shaped association between financial sector development and income inequality.
Beck et al. (2007) examine the same relationship for a smaller sample (72 developed and developing countries) and for a longer time period (1960-2005). They use the ratio of private credit to GDP to proxy for financial development and estimate Ordinary Least Squares and dynamic panel models. Like Clarke et al. (2003), they find that there is a negative relationship between financial development and the growth of the Gini coefficient.

Kappel (2010) adds poverty into his analysis. She analyzes the association between financial development and income inequality and poverty in 78 developing and developed countries over the period 1960-2006. The paper shows that more developed loan and stock markets reduce income inequality. However, for developing countries the relationship is not strong as developed countries.

Unlike the other studies Enowbi Batuo et al. (2010) analyze only 22 African countries over the period 1990-2004. They find that, financial development improves distribution of income and they suggest a linear relationship rather than an inverted U-shaped relationship. These results indicate that financial development can reduce income inequality even in low income countries.

The relationship between financial development and income inequality might depend on other variables. In this regard, Barugahara (2012) examines how inflation rate affects the relationship between financial development and income inequality by using data for 60 countries over the period 1980-2009. He finds that financial development reduces income inequality, but inflation weakens its effect. This study shows the role of other variables in this relationship.
Another study by Hamori and Hashiguchi (2012) examine the association between financial deepening and inequality by including interactions between financial development and growth, and trade openness and growth. The study covers 126 countries for the period 1963 to 2002. They conclude that financial deepening reduces income inequality, but the effect of financial deepening declines as economy grows.

On the other hand, some other empirical studies find a positive relationship between financial development and income inequality. Denk and Cournède (2015) examine the relationship between finance and income inequality in 32 OECD countries over the 1974-2011 period. They find that financial expansion increases income inequality and higher credit growth and stock markets are both associated with increasing income inequality.

This study examines the effect of crises which has been recently a popular topic. Their results do not support the hypothesis that inequality increases during crises.

However, some other studies find a non-linear relationship. Park and Shin (2015) find that there is a U-shaped relationship between financial development and income inequality for 162 countries over the period 1960 to 2011. Up to a point (nearly the mean level) inequality decreases with financial sector development, but after that point financial development worsens the inequality. The authors also suggest that financial development improves the distribution of income more when primary schooling and institutional quality increase. They also conclude that financial inclusion is more important than financial development for decreasing income inequality.

In addition to direct effects, financial development has indirect effects on the income distribution. For example, Demirguc-Kunt and Levine (2009) suggest that financial development can affect the demand for skilled and unskilled labor. Hence, they conclude,
if expanded financial services increase demand for unskilled (or skilled) labor, then income inequality is likely to decrease (or increase), since the wages of those workers increase.

In studies of the financial development-income inequality nexus, the role of gender as a major source of inequality, has not been broadly discussed. FLFP and income inequality are linked for many reasons. For example, gender wage gaps directly contribute to income inequality. Also, inequalities in financial access among genders may result in higher income inequality. Demirguc-Kunt et al. (2013) examine gender differences in access to finance for 98 developing countries. They show that there is an unequal access to financial services between men and women. They also find that the differences among countries might stem from legal restrictions and social norms.

Some studies examine the relationship between gender inequality and income inequality. Gonzales et al. (2015) analyzes the effect of gender inequality on income inequality for nearly 140 countries covering the period 1980 to 2010. They find that income inequality is highly correlated with gender inequality, and suggest that improving women’s financial access can reduce the income inequality.

The literature shows that the effects of financial development on income inequality remain questionable, and that, there is no agreement on that relationship. Also, it might depend on the level of other variables, such as growth, inflation and FLFP. In addition, effect of FLFP on income inequality might vary across countries and time periods. Differences in family structure between households and time periods might affect the labor market outcomes of women (OECD, 2011).
In this study, I will examine the effect of financial sector development on income inequality in OECD countries over the period 1985-2014. This study will contribute to the literature by testing whether the effect of financial development on income inequality depends on FLFP.
CONCEPTUAL MODEL AND HYPOTHESIS

Economic theory and previous research remain ambiguous about the distributional consequences of financial development. Some studies suggest that financial development provides wider credit access to poor people which helps to improve income equality (Galor and Zeira, 1993; Banerjee and Newman, 1993). However, the others predict that rich people who have better and broader access to credit benefit more from financial development than poor people, and this can widen income disparities (Greenwood and Jovanovic, 1990).

Based on the findings of previous research, I hypothesize that financial sector development is associated with income inequality. If this hypothesis is valid, I will examine the direction of the relationship. I further hypothesize that the effect of financial development on income inequality depends on FLFP. To explain the distribution of income, my model will account for financial development, FLFP, unemployment, government spending, GDP per capita, trade openness, and the inflation rate. These indicators are diagrammed in Figure 5 below.
Growing income inequality is one of the most important economic and social challenges facing many countries. Many factors contribute to this trend. One of these factors that strongly related with income inequality is financial development.

There is no single definition of financial development. Generally, financial development depends on how well it provides its functions. Levine (2005)\(^4\) provides the functions of the financial system in a well organized way:

> …financial development involves improvements in the (i) production of ex ante information about possible investments, (ii) monitoring of investments and implementation of corporate governance, (iii) trading, diversification, and management of risk, (iv) mobilization and pooling of savings, and (v) exchange of goods and services.

\(^4\) See Levine (2005) for detailed information about the definition of financial development and functions of financial system.
However, financial systems do not perform all of these functions properly. Financial development might cause higher inequality in countries with low financial inclusion and literacy among poor people.

In Figure 6, defined as the ratio of private credit to GDP, I explore the relationship between countries’ income inequality and financial development for 2013 in OECD. It indicates that the role of financial development in producing income inequality remains uncertain.

**Figure 6: The Relationship Between Income Inequality and Private Credit to GDP (2013)**

![Graph showing the relationship between income inequality and private credit to GDP](image)

Source: SWIID and World Bank

Income inequality can also vary depending on the gender gap between male and female labor force participation. Higher FLFP could lead to more or less inequality (OECD, 2015). Gender gap in labor force participation might deteriorate the income distribution through the inequality in wage income (Gonzales et al., 2015). In addition, people generally prefer to marry people from similar social class and “assortative mating” increases (OECD, 2015). This effect may increase income inequality.
Another important point is that even in developed countries there are disparities in economic opportunities, information and earnings between women and men. For example, in the US, access to finance depends on individuals’ family structure and gender, and unmarried women are less likely to access to finance (Narain, 2009). Thus, the conditional effect of FLFP on the financial development-income inequality nexus might be changed with financial inclusion, financial literacy and access. Women’s economic opportunities can increase with their broader access to financial services (World Bank, 2008). On the other hand, there are inequalities in access to finance among women. Rich and skilled women have better access to finance, and adequate financial skills and literacy. Thus, they improve their earnings and invest in human capital for themselves and their children more than poor women do, and this may exacerbate the rich-poor gap.

Distribution of income can also vary based on the unemployment rate, economic growth, trade openness, the inflation rate, and government spending (Jauch and Watzka, 2013; Clarke et al., 2003; Denk and Cournede, 2015; Hamori and Hashiguchi, 2012; Mookerjee and Kalipioni, 2010; Barugahara, 2012; Gonzales et al., 2015). The previous literature finds contradictory results about the effects of these control variables on income inequality.

The unemployment rate is one of the main sources of income inequality because households mainly earn their income through wages. The unemployment rate gives the number of unemployed persons as a percentage of the labor force (the total number of people employed plus the unemployed). I expect a positive relationship between the unemployment rate and the Gini coefficient (Conceição et al., 1999; Sheng, 2011) since
the problem of inequality worsen when there is a widening gap between the employed and unemployed parts of the population. Unemployment levels are highest among low-skilled and low-income people. Therefore, higher unemployment and lower real wages deteriorate household income for these people.

The effect of international trade on income inequality is captured by the ratio of total exports and imports to GDP. Trade is an important factor for economic growth in many countries through improving competitiveness and efficiency. However, effects of trade on income inequality is ambiguous. Higher trade openness may reduce income inequality. According to Papageorgiou et al. 2008, there is a negative relationship between trade and income inequality in developed countries since, cheap imported goods might increase the consumption of low-income people. Trade might also affect economic sectors and workers unevenly through different channels, and productivity gaps matter in these relation (Dabla-Norris, 2015). Technological progress and skilled biased technical change have increased the demand for skilled labor while decreasing the demand for less skilled labor. Over the past two decades, increasing productivity has made high skilled workers better off while hurting low skilled workers and deteriorate the distribution of income in OECD countries (OECD, 2011).

In this study, economic growth is measured by the change in annual real GDP per capita. Economic growth can be positively or negatively related with income inequality. The relation might also be non-linear. According to Kuznets (1955), there is an inverse U-shaped relationship between economic development and income inequality.

Inflation is an indicator of macroeconomic stability and measured by the growth rate of the consumer price index. According to OECD, “the consumer price index (CPI) is
defined as the change in the price of a basket of goods and services that are typically purchased by specific groups of households.” In my study, I expect that there is a positive relationship between inflation and the Gini coefficient. According to Easterly and Fischer (2001), rich people have better access to financial sectors and manage their risks, thus, inflation harms poor people relatively more than rich people. In addition, the real return on assets may decrease during inflation periods (Barugahara, 2012), while a rise in inflation may benefit debtors by diminishing their debt burden in real terms (Jauch and Watzka, 2015).

Finally, income inequality can also change depending on the level of Government consumption. Government consumption, measured as a ratio of general government spending to GDP, has likely to have varying effects on income inequality. Government spending can reduce income inequality by progressive taxes and social transfers. However, a large government spending might be captured by powerful elites then it may further deteriorate the distribution of income (Burkhart, 1997; Jauch and Watzka, 2015; OECD, 2015).

5 OECD, Consumer Prices.  
DATA DESCRIPTION

Most of the data in my analysis were obtained from the OECD database, World Bank Development Indicators, IMF, Standardized World Income Inequality Database (SWIID). My unit of analysis is country-year. The sample was selected based on data availability\(^6\). And, observations cover 26 OECD countries which have negligible missing data: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

**Dependent Variable:**

I use net Gini coefficient\(^7\), measure of income inequality, as my dependent variable. The net Gini coefficients are based on households’ income from Solt (2009). The SWIID has the widest possible coverage across countries and over time. The dataset maximizes the comparability of income inequality data.

According to the World Bank, “The Gini coefficient measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution.”\(^8\) It shows

\(^6\) In my sample, some countries have large missing data and fewer than 20 observations on an annual basis. In order to obtain a more balanced data set, I exclude some OECD countries which have fewer than 20 observations, such as Chile, the Czech Republic, Estonia, Hungary, Israel, Latvia, Poland, the Slovak Republic and Slovenia. Totally, I have 698 observations available for analysis.

\(^7\) Both gross income (before taxes and transfers) and net income (after taxes and transfers) measure income inequality. Some studies use gross Gini coefficient while other studies use net Gini coefficient. In this study, I use net Gini coefficient.

how income is distributed unevenly among a population. The Gini coefficient varies between 0 (perfect equality) and 1 (perfect inequality), higher values show greater income inequality.

**Key Independent Variables:**

My key independent variables are financial development and FLFP. The financial sector is the set of institutions, instruments and markets. Financial development takes place when the number and the size of the institutions, instruments, and markets increase and information and transaction costs decline. Several variables are used in previous empirical studies as measures of financial development but I use the most common proxy which is the ratio of private credit to GDP. This measure does not contain credit to the public sector, state-owned enterprises and central banks Rather it contains private sector and households credit from banks and non-bank financial institutions. The private credit/GDP measure has advantages over other financial development measures since it reflects the extent of efficient resources allocation more effectively (Beck et al., 2007) and capturing the amount of credit to private firms and households through financial intermediaries.

My other key independent variable is FLFP. The gender gap is one of the main sources of income inequality, and the FLFP rate is a good indicator of women’s involvement in the economy. The FLFP rate is the proportion of the female population aged 15 and older that is economically active (the sum of employed and unemployed females). Improvement in the FLFP may cause different effects on income inequality. It may decrease the gap in earnings between sexes hence reduce income inequality. But, it may result in heavier inequality, since women may become more active in the economy and
skilled and employed women have better access to financial instruments than poor women.

However, it is clear that income inequality is not solely determined by financial development and the FLFP rate. Therefore, I include several variables in my analysis as control variables that might affect income inequality- i.e., Beck et al., 2007; Clarke et al., 2003. Table 1 provides the definition and the sources of the main variables used in my analysis.

**Table 1: Key Variables and Their Explanations and Sources**

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Explanation</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Gini</td>
<td>Gini index of distribution of income after taxes and transfers</td>
<td>Standardized World Income Inequality Database</td>
</tr>
<tr>
<td>Private Credit to GDP</td>
<td>Domestic credit to the private sector on a percent of GDP</td>
<td>World Bank’s World Development Indicators Database</td>
</tr>
<tr>
<td>Female Labor Force Participation Rate (FLFP)</td>
<td>Ratio of the sum of employed and unemployed to civilian population for females (aged 15 and older)</td>
<td>OECD Database</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>Ratio of the unemployed labor force to the total labor force.</td>
<td>IMF</td>
</tr>
<tr>
<td>Government spending</td>
<td>General government final consumption expenditure (% of GDP)</td>
<td>World Bank’s World Development Indicators Database</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>GDP per capita based on constant USS</td>
<td>OECD Database</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>Exports plus imports (goods and services) as a percent of GDP</td>
<td>World Bank’s World Development Indicators Database</td>
</tr>
<tr>
<td>Inflation</td>
<td>Consumer price index; change on previous year (annual %), base year: 2010</td>
<td>OECD Database</td>
</tr>
</tbody>
</table>
Descriptive Statistics

Table 2 reports the descriptive statistics of my dependent variable and my independent variables. There are large variations in the data. Regarding income inequality, the sample covers countries with Gini coefficients ranging from 17.11 percent to 48.35 percent. The average Gini coefficient across OECD countries is 29.73 percent over the period 1985-2014. There are also large variations in the private credit to GDP ratio which ranges from 11.11 percent to 312.15 percent. Similarly, there are large variations in FLFP as well as control variables.

Table 2: Descriptive Statistics for Dependent and Independent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Observation</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
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<tr>
<td>Gini Coefficient</td>
<td>732</td>
<td>29.73</td>
<td>5.70</td>
<td>17.11</td>
<td>48.35</td>
</tr>
<tr>
<td>Private Credit to GDP</td>
<td>755</td>
<td>92.51</td>
<td>48.47</td>
<td>11.11</td>
<td>312.15</td>
</tr>
<tr>
<td>FLFP</td>
<td>749</td>
<td>61.67</td>
<td>12.60</td>
<td>25.19</td>
<td>84.33</td>
</tr>
<tr>
<td>Unemployment</td>
<td>780</td>
<td>6.99</td>
<td>4.06</td>
<td>0.44</td>
<td>27.47</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>780</td>
<td>33569</td>
<td>12533</td>
<td>7434</td>
<td>90846</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>780</td>
<td>74.4</td>
<td>49.61</td>
<td>15.92</td>
<td>374.15</td>
</tr>
<tr>
<td>Inflation</td>
<td>780</td>
<td>5.45</td>
<td>12.59</td>
<td>-4.48</td>
<td>131.83</td>
</tr>
<tr>
<td>Government spending</td>
<td>780</td>
<td>18.47</td>
<td>4.15</td>
<td>7.52</td>
<td>28.06</td>
</tr>
</tbody>
</table>
EMPIRICAL STRATEGY

My empirical analysis uses panel data to examine the effect of financial sector development on income inequality in OECD countries over the period 1985-2014. And, I examine whether the effect of financial development on income inequality depends on FLFP.

A panel data follows a given sample of cross-sectional units over time, and it has some important advantages over cross-sectional or time-series data sets (Hsiao, 2003). Since it provides more observations and degrees of freedom.

I use panel regression with a fixed effects model, because it is critical to control for unobserved, country-specific variables so as to examine the causal effect of financial development on income inequality. In panel data analysis, the Hausman test can help to compare the parameters of the fixed-effects model and random-effects model. I use the Hausman test for testing the errors (individual effects) that are uncorrelated with the other explanatory variables (Hausman, 1978). The null hypothesis is that the preferred model is the random-effects model in which there is no correlation between the errors and regressors; while the alternative hypothesis is that the preferred model is fixed-effects. According to the results, I reject the null hypothesis (p-value is less than 0.01). Thus I use the fixed-effects model in each of my specifications, (A random-effects model is not preferable because it produces biased results).

In general, I will estimate the following three equations:
Model 1:

\[
Gini \text{ Coefficient} = Financial \text{ Development} + Financial \text{ Development Square} + \text{Control Variables} (\text{Unemployment, GDP per Capita, Government Expenditure, Trade Openness and Inflation}) + \mu_i + u_{it}
\]

Model 2:

\[
Gini \text{ Coefficient} = Financial \text{ Development} + FLFP + Financial \text{ Development}^* FLFP + \text{Control Variables} + \mu_i + u_{it}
\]

Model 3:

\[
Gini \text{ Coefficient} = Financial \text{ Development} + FLFP + High-FLFP^* \text{ Financial Development} + \text{Control Variables} + \mu_i + u_{it}
\]

The subscript $i$ represents each country and the subscript $t$ represents each time period in the analysis. The term $\mu_i$ denotes a country’s fixed effects, capturing unobserved country characteristics that are persistent over time. The last term $u_{it}$ represents the error term in the analysis. High-FLFP is a dummy variable set to one for countries who have FLFP ratio higher than the OECD FLFP average (61.67 percentage) and set to zero otherwise. High-FLFP $*$ Financial Development is an interaction term of these indicator variable and interval variable.

Hence, the focus of this study is to examine the impact of financial development on income inequality and how FLFP influences the marginal effect of financial development on the distribution of income (the interaction term between financial development and FLFP). Also, the coefficient on High-FLFP $*$ Financial Development interaction term is the other coefficient of interest which represents the difference between the change in income inequality over financial development for high-FLFP countries, holding constant all control variables included in the model.
REGRESSION RESULTS

In this study I estimate different specifications to examine the effects of financial development on income inequality. Table 3 presents regression results of Model 1 and Model 2 where my dependent variables are income inequality. To test the robustness of the findings, I also estimate the same regressions using natural logarithms of income inequality as the dependent variable (as shown in Model 3 and Model 4).

In Model 1 and Model 3, I examine whether the data predict a linear or nonlinear relationship between financial development and income inequality by adding the squared term of financial development. Greenwood and Jovanovic (1990) suggest a non-linear Kuznets curve relationship (inverted U-shaped) between financial development and income inequality. If the coefficient of financial development is positive and the coefficient on the squared term of financial development is negative, then the hypothesis of inverted U-shaped relationship is supported, the early stages financial development increase inequality. However, as the economy and financial markets develop, financial development reduces income inequality.

In Model 2 and Model 4, I test whether the effect of financial development on income inequality depends on FLFP. The interaction term between private credit and FLFP is included to examine the compounding effect of FLFP on income inequality. This model assumes a linear relationship between financial development and income inequality.

I first test the inverted U-shaped relationship between financial development and income inequality. The squared term of financial development has insignificant effect on income inequality as presented in Model 1 and Model 3. Therefore, I find no evidence supporting
the inverted U-shaped hypothesis as argued by Greenwood-Jovanovic’s (1993) theoretical model. Hence, since my sample shows no evidence of the inverted U-shaped relationship between the financial development and the Gini coefficient, I do not control the squared term of financial development.

The empirical results of the fixed effect Model 2 and Model 4 show that the coefficient of financial development in both models is negative (-0.0826 for Model 2 and -0.0031 for Model 4) and statistically significant. The negative and significant coefficient on the private credit to GDP ratio implies that financial development improves the distribution of income in OECD countries. These results suggest that, financial development improves the poor’s access to finance; and this helps them to allocate more resources to both human capital, such as education and health, and physical capital. These results support the theory (Galor and Zeira, 1993; Banerjee and Newman, 1993) and several previous empirical studies (Clarke et al., 2006; Beck et al., 2007; Kappel, 2010). But the economic impact appears to be small: a 10 percentage point increase in the private credit to GDP ratio is associated with a decrease in the Gini coefficient by 0.82 percentage point. In addition, in Model 2 and Model 4, there is a significant negative relationship between FLFP and Gini coefficient. The negative and significant coefficient on FLFP shows that as more females participate into the labor force, the distribution of income in OECD countries will improve.


<table>
<thead>
<tr>
<th>Variables/Models</th>
<th>Dependent Variable Gini Coefficient</th>
<th>Dependent Variable Logarithm of the Gini Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Financial Development</td>
<td>-0.0017 (-0.0067)</td>
<td>-0.0826*** (0.0123)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-8.16e-06*** (0.00024)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.0031*** (0.00044)</td>
</tr>
<tr>
<td>Financial Development Squared</td>
<td>0.00003 (0.00003)</td>
<td>1.05e-06 (9.30e-07)</td>
</tr>
<tr>
<td>FLFP</td>
<td>-0.00096 (-0.01769)</td>
<td>-0.0513*** (0.0179)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.00076 (0.00064)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.00265*** (0.00065)</td>
</tr>
<tr>
<td>FLFP * Financial Development</td>
<td>0.0012*** (0.00016)</td>
<td>0.00005*** (0.000)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.1697*** (0.0283)</td>
<td>0.151*** (0.0274)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0061*** (0.0010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0054*** (0.001)</td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td>0.00016*** (0.00002)</td>
<td>0.0016*** (0.0002)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.11e-06*** (7.72e-07)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.04e-06*** (7.40e-07)</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>-0.0215*** (0.0059)</td>
<td>-0.0257*** (0.0574)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.0006*** (0.0002)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.0008*** (0.0002)</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.0588*** (0.0087)</td>
<td>0.0421*** (0.0086)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0016*** (0.00032)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.001*** (0.0003)</td>
</tr>
<tr>
<td>Government Expenditure</td>
<td>-0.1051** (0.0517)</td>
<td>-0.092* (0.0496)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.0033* (0.0376)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.0028* (0.0017)</td>
</tr>
<tr>
<td>R-squared (within)</td>
<td>0.232</td>
<td>0.288</td>
</tr>
<tr>
<td>Observations</td>
<td>698</td>
<td>698</td>
</tr>
<tr>
<td>Number of OECD countries</td>
<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>

Note: Standard errors in parentheses. * indicates significance at 10% level; ** significance at 5% level; *** significance at 1% level. The sample covers 26 OECD countries. The regression results are from a panel regression with fixed effects.
An interaction term between financial development and FLFP is included in the Model 2 and Model 4 to show how FLFP affects the finance-inequality nexus. The coefficient of the interaction terms between the private credit to GDP ratio and FLFP are estimated to be positive (0.0012 for Model 2 and 0.00005 for Model 4) and statistically significant. The positive coefficient suggests that the positive effect of financial development on income inequality weakens as FLFP increases.

There are possible explanations for this effect. First, female employment might have different impacts on rich and poor households. Women are mostly secondary earners in their families. This additional income might affect behavior of high income and low income households differently in terms of how they use the financial sector. High income families are more likely to accumulate savings and make investment through financial assets and services. On the other hand, for low-income families, an increase in FLFP might lead them to consume more than their current incomes. As a result, they might need borrow via credit cards or loans, and the interest rates are generally higher for low income people due to their high risk. Second, rich households often have better access to finance compared to poor households. This inequality in access to finance might widen with female employment. Low income women have generally lower financial literacy, and they might fall further behind high income women in accessing to financial services efficiently. For these reasons, an increase in FLFP can reduce the positive effects of financial development on income distribution.

Among my control variables, trade openness and government expenditure make distribution of income more equal, while unemployment, GDP per capita, and inflation are positively associated with the Gini coefficient and worsen income inequality.
Economic growth increases the Gini coefficient (for Model 2 and for Model 4) and is statistically significant. The results imply that a $1000 increase in GDP per capita increases income inequality by 0.16 percentage point for Model 2. The possible explanation is that in this period economic growth favors high income people more than low income people. The coefficient of unemployment has a positive sign. Income inequality increases as unemployment rises. As expected, an increase in the unemployment rate worsens the distribution of income (Conceição, 1999 and Sheng 2011), since the distribution of wages and salaries is the main driver of the income inequality. Similarly, the coefficients on inflation are estimated to be positive (0.0421 for Model 2 and 0.001 for Model 4) and statistically significant. The regression results suggest that inflation worsens the distribution of income, which is consistent with the empirical findings of Easterly and Fischer (2001). A possible explanation is that rich people have more access to financial sectors and manage their risks, thus, inflation harms poor people relatively more than rich people (Easterly and Fischer, 2001).

On the other hand, government consumption reduces income inequality (-0.092 for Model 2 and -0.0028 for Model 4) and this result is statistically significant at the 10 percent level for both cases. This implies that in OECD countries, a large amount of government spending in the economy can lead to a more even distribution of income. This is reasonable, since government spending might cause lower inequality through the tax and transfer system which benefits low income households (Cingano, 2014).

Table 3 also shows that the coefficient of trade openness is estimated to be significantly negative (-0.0257 for Model 2 and -0.0008 for Model 4). These results indicate that inequality decreases with the globalization in OECD countries in that period. This can be
interpreted as meaning that rising imports from developing countries are actually correlated with declining income inequality in advanced countries (Papageorgiou et al., 2008).

My results show that the effect of financial development on the Gini coefficient depends on the level of FLFP. To test the robustness of this finding, I first split my sample into two groups based on their level of FLFP and test whether the coefficient of financial development is different for the two groups. I defined first group as high FLFP in which countries have a higher FLFP value than the average FLFP of whole sample (61.67 percent). The high-FLFP country group consists of 16 countries and the low-FLFP country group consists of the remaining 10 countries. I chose high-FLFP country to be the base group; that is, high-FLFP = 1 if female participation is higher than 61.67 percent, and high-FLFP= 0 if female participation is lower than 61.67 percent. Then, I added an interaction term between high-FLFP and financial development to the model. I also included the same control variables as before.

Table 4 presents the regression results for Models 5 and 6. The coefficient on financial development remains negative (-0.0213 for Model 5 and -0.0007 for Model 6) and statistically significant; this is consistent with the results obtained in the regressions shown in Table 3. For low-FLFP countries, we can directly use the financial development coefficient. However, when we interpret the financial development coefficient for high-FLFP countries, we should take into account the interaction term between financial development and high FLFP. This interaction term is positive and statistically significant.

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9 Belgium, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Spain and Turkey have FLFP below the OECD average, and the remaining OECD countries (Australia, Austria, Canada, Denmark, Finland, France, Germany, Iceland, Netherlands, New Zealand, Norway, Portugal, Sweden, Switzerland, United Kingdom and United States) have FLFP above the average.
which implies that when FLFP is high (above the average), financial development increases Gini coefficients, while it decreases Gini coefficients when FLFP is low.

For high levels of FLFP, the positive gains from the financial development decline. This indicates that, at high levels of FLFP, financial systems might work more for rich people and generate inequality.

**Table 4: Regression Results of the Effects of Financial Development on Income Inequality (with a High-FLFP * Financial Development Interaction Term)**

<table>
<thead>
<tr>
<th>Variables/Models</th>
<th>Dependent Variable Gini Coefficient</th>
<th>Dependent Variable Logarithm of the Gini Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Financial Development</td>
<td>-0.0213***</td>
<td>-0.0007***</td>
</tr>
<tr>
<td></td>
<td>(0.0043)</td>
<td>(0.00015)</td>
</tr>
<tr>
<td>FLFP</td>
<td>0.041**</td>
<td>0.00068</td>
</tr>
<tr>
<td></td>
<td>(0.0177)</td>
<td>(0.00064)</td>
</tr>
<tr>
<td>High FLFP * Financial</td>
<td>0.033***</td>
<td>0.00113***</td>
</tr>
<tr>
<td>Development</td>
<td>(0.0043)</td>
<td>(0.00016)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.1438***</td>
<td>0.0052***</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td>0.00015***</td>
<td>5.59e-06***</td>
</tr>
<tr>
<td></td>
<td>(0.00002)</td>
<td>(7.47e-07)</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>-0.0208***</td>
<td>-0.0006***</td>
</tr>
<tr>
<td></td>
<td>(0.0057)</td>
<td>(0.0002)</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.0497***</td>
<td>0.0013***</td>
</tr>
<tr>
<td></td>
<td>(0.0083)</td>
<td>(0.0003)</td>
</tr>
<tr>
<td>Government Expenditure</td>
<td>-0.0518</td>
<td>-0.00146</td>
</tr>
<tr>
<td></td>
<td>(0.050)</td>
<td>(0.0018)</td>
</tr>
<tr>
<td>R-squared (within)</td>
<td>0.2933</td>
<td>0.2937</td>
</tr>
<tr>
<td>Observations</td>
<td>698</td>
<td>698</td>
</tr>
<tr>
<td>Number of OECD countries</td>
<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>

Note: Standard errors in parentheses. * indicates significance at 10% level; ** significance at 5% level; *** significance at 1% level. The sample covers 26 OECD countries. The regression results are from a panel regression with fixed effects.
CONCLUSION

Over the past thirty years, income inequality has increased in most OECD countries. Existing theories and empirical studies have failed to reach a consensus on the impacts of financial development on income inequality. This study explores the effect of FLFP on the income inequality-financial development nexus using panel data analysis in OECD countries. My study finds that financial development is negatively associated with income inequality, supporting the theory (Galor and Zeira, 1993; Banerjee and Newman, 1993).

Less developed financial systems might decrease the chances of the vulnerable groups in access to credit, while favor the rich disproportionately. Financial development increases the amount of credits with a lower cost for poor people, thus, poor people can get the opportunity of financing their investment in human and physical capital.

However, the positive effect of financial development on income distribution declines as FLFP increases. Furthermore, my results show that the effect of financial development on the distribution of income might even be negative in high FLFP countries.

FLFP might affect the financial behavior of low income and high income household unevenly. Female employment generally creates secondary income for families, and high income and low income household might have different financial behaviors to use this additional income. High income families are more likely to save and make investment through financial assets and services. However, a permanent increase in family income might lead low-income families to consume more than their incomes. As a result, they might use the financial sector for borrowing, and the interest rates are generally higher.
for low income people due to their high risk. In addition, poor households often have lower access to finance compared to rich households. This inequality in access to finance might increase as female employment rises. High income women have generally more financial literacy and understanding of financial instruments, such as complex investment and saving products, and their management. Individuals’ poor financial decisions might cause saving and investment problems, and negatively affect their financial situations. Thus, poor women might fall further behind high income women in accessing to financial services. For these reasons, positive effects of financial development on income distribution can reduce as FLFP increases.

There are some limitations in my empirical results. First, although my analyses control for unemployment, trade openness, GDP per capita, government expenditures and the inflation rate, some other factors not included in the model might affect the results. Hence, my results may suffer from omitted variable bias. However, this study uses different economic model specifications and control country fixed effects to separate the effect of financial developments, and to reduce omitted variable bias. Second, this study has some limits in evaluating all OECD countries, since some OECD countries are left out of the analysis due to missing data problems. Third, my results may not be generalizable to different populations or locations. Country specific policies reflecting characteristics of countries should be designed and implemented (Dabla-Norris et al., 2015). Fourth, there can be a reciprocal causality between financial development and income inequality, and FLFP and income inequality.

Despite these limitations, my results are robust to the inequality measures (inequality itself and logarithm of inequality), and including further control variables and different
model specifications. The findings support a policy role for improving distribution of income. In both advanced and developing OECD countries, there is a need for a comprehensive set of policies to improve financial access, financial literacy, and consumer protection to strengthen the income equalizing effect of financial development. Financial sector reforms and regulations should further consider vulnerable people, especially women, to ensure that financial development addresses the needs of the population as a whole.

To my knowledge, this is the first study to analyze the effect of FLFP on the relationship between financial development and income inequality. Nonetheless, further research is needed to explore the behavioral differences among low income and high income people to understand the full mechanism between the FLFP and Financial Development and Income Inequality relation.
APPENDIX

Table A reports the correlation matrix between the variables. The correlation coefficient between financial development and the Gini coefficient is negative. I find a positive correlation between the FLFP rate and the financial development indicator. Unemployment, and inflation are positively correlated with income inequality; whereas trade openness, economic growth and government expenditure are negatively correlated with the Gini coefficient.

Table A: Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Gini</th>
<th>Credit to GDP</th>
<th>FLFP</th>
<th>Unemployment</th>
<th>GDP per Capita</th>
<th>Trade to GDP</th>
<th>Inflation</th>
<th>Government Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit to GDP</td>
<td>-0.0822</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLFP</td>
<td>-0.5301</td>
<td>0.4778</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.1044</td>
<td>-0.1590</td>
<td>-0.2231</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP per Capita</td>
<td>-0.4292</td>
<td>0.4142</td>
<td>0.4841</td>
<td>-0.2561</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade to GDP</td>
<td>-0.3228</td>
<td>-0.0192</td>
<td>0.0303</td>
<td>-0.1411</td>
<td>0.6453</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>0.3975</td>
<td>-0.3393</td>
<td>-0.4311</td>
<td>0.0013</td>
<td>-0.3781</td>
<td>-0.1493</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Government Expenditure</td>
<td>-0.6340</td>
<td>0.0574</td>
<td>0.5431</td>
<td>0.1946</td>
<td>0.2309</td>
<td>0.0833</td>
<td>-0.3182</td>
<td>1.0000</td>
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REFERENCES


