# FDI and Income Inequality in Latin America

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### Abstract

The main purpose of this paper is to determine the relationship between FDI and income inequality in Latin America after Operation Condor. This study uses economic panel data from seven different Latin American countries over a sixteen year time period. This study takes place from 1982 to 1997. Other variables have been included in this study to achieve the most accurate results possible. The results from this study show that FDI is significant to income inequality at the 5% significance level in Latin America during this time period. Also, the results indicate that FDI has a positive effect on income inequality.

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## Introduction

As described, "Income inequality refers to the extent to which income is distributed in an uneven manner among a population"(Mfigueroa, 2016). Essentially, a country that has a large difference between the rich people and the poor people has high income inequality. Income inequality is a major problem that occurs in many different economies throughout the world. However, Latin American countries have faced abnormally high income inequality rates for an extended period of time.

Operation Condor took place in Latin America from 1968 to 1983. Operation Condor was an intelligence operation that was led by a military regime. This military regime was put together by a few different Latin American countries. In an attempt to stop communism, the American government actually helped the military regime in many different ways. First, the American government helped train the military regime so they could correctly fight off communism in Latin America. Second, the American government gave the military regime supplies and money so that Latin America had enough resources to put an end to communism in the area. During Operation Condor, people in Latin America were arrested for protesting against the dictatorships that were in place in their countries. People in Latin America had every right to protest at the time because the dictatorships were not in their best interest. The Operation Condor prisoners were not given any trials so they were always found guilty no matter what. Unfortunately Operation Condor went terribly wrong, and the military regimes tortured and killed many Latin Americans. During this operation, there was about 400,000 political prisoners and about 60,000 people were killed in Latin America. Unfortunately, many Latin Americans also went missing

during Operation Condor. The military regimes also traveled throughout Latin America to find any possible exiles. Unfortunately, during this time period no one was safe in Latin America. Even people who tried to run away were found, tortured, and possibly killed.

Why s it important to study the relationship between FDI & income inequality in Latin America after Operation Condor? Many people do not know about the terrible events that occurred during Operation Condor because it was kept a secret for such a long time. Operation Condor directly affected everyone who lived in Latin America at the time. Meaning, it is also important to see how the terrible events affected the economies in Latin America.

Since Latin America faces high levels of income inequality, it is also extremely important to study the causes of income inequality in Latin America. Many previous studies have indicated that there is a relationship between income inequality and FDI.  During the time period of this study Latin America faced low FDI levels. Poor policies and corruption could lead to low FDI levels for many reasons. As described, "Corruption within the political system is a threat to foreign investment. By enabling people to assume positions of power through patronage rather than ability, it introduces inherent instability into the political process thereby distorting the economic and financial environment"( Dumludag 2012).  Latin American countries have been trying to create policies that benefit FDI in their countries for a long time now. As described, "Many governments in Latin America have taken specific steps to foster FDI in their respective countries" (Tsai 1995). Over time, many FDI policies have failed in Latin America.  However, would higher levels of FDI decrease the huge problem of income inequality in Latin America?

## Literature Review

Mahutga & Bandelj (2008) studied foreign investment and income inequality in central and eastern European countries. In their research, they used many different variables for FDI. As described, "FDI has significantly contributed to the rise in income inequality in Central & Eastern Europe" (Mahutga & Bandel,2008) Their research indicates that at least for the countries that they studied in Europe, FDI did have a positive impact on income inequality. As explained in their paper, "Foreign investment boosts income inequality" (Mahutga & Bandelj, 2008).

It is important to note that developing nations can also be negatively impacted by investing money into countries that are less developed. Some studies have shown that this could lead to higher levels of income inequality across the world. Chintrakarn at al. (2010) describes "Income inequality has widened in both developed and developing countries over the past two decades of deepening globalization. It is widely believed that outward FDI by developed source countries in developing host countries has contributed to inequality."

Herzer at al. (2014) describes that income inequality in Latin America is extremely high and "it is not surprising that income redistribution (e.g. through poverty reduction programs) as well as FDI promotion figure high on the agenda of policymakers in Latin America." Herzer at al. conducted empirical research to find out if increases in FDI in Latin America would help their income inequality problems. Herzer at al. (2014) describes "Our major result on the inequality-increasing effects of FDI involves a policy dilemma for Latin American governments. Many governments in the region promote FDI inflows to benefit from spillovers and stimulate economic growth" Meaning, that there are negative externalities to creating policies that benefit FDI in some countries. Causing increases in FDI in these countries also causes income inequality to increase.

Franco and Gerussi (2013) describe "We hypothesize that both FDI and trade might be significant determinants of income distribution within these countries, due to the increasing level of openness since 1989." Their research was to find out if FDI and trade impacted income inequality in countries that were in the process of major transitions. However, from their research they found that FDI did not significantly impact income inequality in the transition countries that they studied.

Tsai (1995) found that "First, the partial correlation between stocks of FDI and inequality estimated by using the basic model is extremely sensitive to the inclusion of geographical dummies." Meaning, that FDI has different impacts on different places. In some places, FDI could have a positive impact on income inequality. However, in other places FDI may not have any impact on income inequality.

Lin at al (2013) found that " Using the IV threshold regression technique on a panel of developing and developed countries, we find a significant threshold level of human capital, below which FDI exerts a disproportionately positive impact on the relatively poor, hence improving income distribution. However, once beyond this critical level, FDI benefits the nonpoor and hurts the nonrich, thereby exacerbating income inequality" Meaning that FDI actually has different effects on the incomes of different people in different countries.

 "The estimation results of the error correction model show that the deterioration in income inequality is attributed to the increasing values of FDI inflows as a result of the changes in the government policies from the mid- to late 1990s" (Mah 2012). The results from this study show that FDI has a negative impact on income inequality in Korea. Meaning, that policies that are created to benefit FDI would also help decrease income inequality in Korea.

## Data

This study includes seven different Latin American countries including Argentina, Brazil, Bolivia, Chile, Columbia, Venezuela, and Peru. This study uses panel data from 1982 to 1997. To measure income inequality, I collected data for the GINI index for each of the Latin American countries that I chose to study.

To measure FDI, data was collected for FDI, net inflows as % of GDP. To measure other aspects of trade, I collected data for GDP and exports. To measure the health of the financial sector, I collected data for both credit and savings. To measure other aspects of each country data was collected for inflation, life expectancy, government developmental assistance, population growth, and agricultural land. All of the data used for this study was collected from the World Data Bank.  All of the variables and their definitions are shown in table 1.

## Table 1: VARIABLES AND DESCRIPTIONS

| Variables | Definition | Source |
|---|---|---|
| Gini Index | The Gini Index is measured from 0 to 1. This variable is used to measure income inequality in nations. Zero repersents perfect equality wheras one repersents perfect inequality. The higher the gini index, the higher the income inequality in a nation. | Word Data Bank (WDI) 2017 |
| FDI | This variable is FDI, net inflows as a % of GDP. FdI shows the amount of foreign investments in the host country. | Word Data Bank (WDI) 2017 |
| Inflation | This variable is an economic indicator. This indicator shows how the price levels in each of the countries are changing. It is measuered by annual %. Higher inflation could be caused to decreases in the money supply. | Word Data Bank (WDI) 2017 |
| Credit | Is a measure of domestic credit provided by the financial sector. This measure does not include credit that is provided to the government. However, it does include credit provide to the rest of the sectors. | Word Data Bank (WDI) 2017 |
| Exports | Measured by exports of goods and services as a % of GDP. | Word Data Bank (WDI) 2017 |

| Variables | Definition | Source |
|---|---|---|
| Lifeexpect | Measured by life expectancy at birth, total years. | Word Data Bank (WDI) 2017 |
| Assistance | Measured by net official development assistance and official aid received in current US$. Shows how much the government assists those in need. | Word Data Bank (WDI) 2017 |
| Electric | Measured by Electric power consumption in kWh per capita. Shows how much electricity each person in the country uses. | Word Data Bank (WDI) 2017 |
| Savings | Measures gross savings in current US $. This measure includes the savings in each country from individuals, businesses and the governemnt. | Word Data Bank (WDI) 2017 |
| Population | Measured as a % of population growth each year in each country. | Word Data Bank (WDI) 2017 |
| GDP | Measured as GDP in current US$.  GDP stands for gross domestic product. | Word Data Bank (WDI) 2017 |
| Agricultural | Is measured as the % of total land in each country that is used as agricultural land. Agricultural land is land that is used for farming and making food. | Word Data Bank (WDI) 2017 |

## Model

GINI index=B0+B1FDI+B2inflation +B3credit+B4exports+B5lifeexpect+B6assistance

+B7electric+B8savings+B9population+B10GDP +B11agricultural+ U

The model is shown above. The dependent variable is the GINI index to measure income inequality. The independent variables are *FDI*, to measure FDI, net inflows % of GDP, *inflation*, to measure the inflation rate in the economy, *credit*, to measure credit provided by the financial sector, *exports*, to measure the amount of exports as a % of GDP, *lifeexpect*, to measure the life expectancy at birth, *assistance*, to measure developmental assistance provided by the financial sector, electric, to measure electric power consumption, *savings,* to measure the amount of savings, *GDP,* to measure the dollar amount of GDP per a year, *agricultural*, to measure the amount of agricultural land in each country.

## Empirical Results

First, I decided it would be best to summarize the data. As shown in Table 2, the GINI index had mean of 50.95. This means that the mean income inequality in Latin America for the countries that were studied during this time period was high. The minimum GINI index was a 33.15 and the maximum GINI index was 63.3. Meaning, that some of the Latin American countries had much lower income inequalities than the others. For this study, the minimum FDI was -0.52 and the maximum FDI was 9.22. Meaning, that the FDI results ranged from country to country. However, the mean FDI for all of the countries included in this study was very low equaling 1.65. There is a huge difference between the mean Gini Index and the mean FDI for the Latin American countries being studied as shown in table 3.

## Table 2: DATA SUMMARY

| Variable | | Mean | Std. Dev. | Min | Max | Observations | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| gini | overall | 50.95357 | 6.183832 | 33.15 | 63.3 | N = | 112 |
| | between | | 1.71198 | 48.64571 | 54.72143 | n = | 16 |
| | within | | 5.955446 | 35.45786 | 63.855 | T = | 7 |
| | | | | | | | |
| fdi | overall | 1.657669 | 1.915923 | -0.51739 | 9.218144 | N = | 112 |
| | between | | 1.398412 | 0.40042 | 5.293621 | n = | 16 |
| | within | | 1.349412 | -1.41109 | 6.220768 | T = | 7 |
| | | | | | | | |
| inflat~n | overall | 422.6472 | 1422.384 | 0.155696 | 11749.64 | N = | 112 |
| | between | | 614.4872 | 13.62347 | 1839.62 | n = | 16 |
| | within | | 1290.734 | -1405.59 | 10332.67 | T = | 7 |
| | | | | | | | |
| credit | overall | 47.94776 | 33.17716 | 5.716336 | 212.9187 | N = | 112 |
| | between | | 8.120333 | 37.99111 | 67.43675 | n = | 16 |
| | within | | 32.22342 | -0.45517 | 193.4297 | T = | 7 |
| | | | | | | | |
| exports | overall | 18.3008 | 8.238092 | 6.598187 | 39.45002 | N = | 112 |
| | between | | 1.327264 | 16.72098 | 21.57645 | n = | 16 |
| | within | | 8.136323 | 4.924332 | 36.17437 | T = | 7 |
| | | | | | | | |
| lifeexpect | overall | 66.7948 | 5.804346 | 50.9681 | 75.64636 | N = | 112 |
| | between | | 1.687896 | 64.13766 | 69.56846 | n = | 16 |
| | within | | 5.567355 | 53.62523 | 72.8727 | T = | 7 |
| | | | | | | | |
| assistance | overall | 1.91E+08 | 1.82E+08 | -2.58E+08 | 8.28E+08 | N = | 112 |
| | between | | 6.56E+07 | 9.55E+07 | 2.82E+08 | n = | 16 |
| | within | | 1.70E+08 | -2.77E+08 | 7.36E+08 | T = | 7 |
| | | | | | | | |
| electric | overall | 1182.615 | 699.1442 | 232.8015 | 2668.686 | N = | 112 |
| | between | | 147.4203 | 950.7132 | 1464.799 | n = | 16 |
| | within | | 684.284 | 109.3866 | 2620.53 | T = | 7 |
| | | | | | | | |
| savings | overall | 2.02E+10 | 2.94E+10 | 1.50E+08 | 1.52E+11 | N = | 112 |
| | between | | 7.90E+09 | 9.94E+09 | 3.18E+10 | n = | 16 |
| | within | | 2.84E+10 | -1.07E+10 | 1.45E+11 | T = | 7 |
| | | | | | | | |
| population | overall | 1.887406 | 0.362482 | 1.16285 | 2.655089 | N = | 112 |
| | between | | 0.171026 | 1.59737 | 2.119069 | n = | 16 |
| | within | | 0.322063 | 1.236789 | 2.469307 | T = | 7 |
| | | | | | | | |
| gdp | overall | 1.06E+11 | 1.54E+11 | 4.21E+07 | 8.50E+11 | N = | 112 |
| | between | | 4.54E+10 | 5.96E+10 | 2.04E+11 | n = | 16 |
| | within | | 1.48E+11 | -9.02E+10 | 7.52E+11 | T = | 7 |
| | | | | | | | |
| agrigation | overall | 30.16947 | 10.10913 | 14.65156 | 47.05283 | N = | 112 |
| | between | | 0.341768 | 29.66799 | 30.71935 | n = | 16 |
| | within | | 10.10366 | 14.9713 | 47.5543 | T = | 7 |
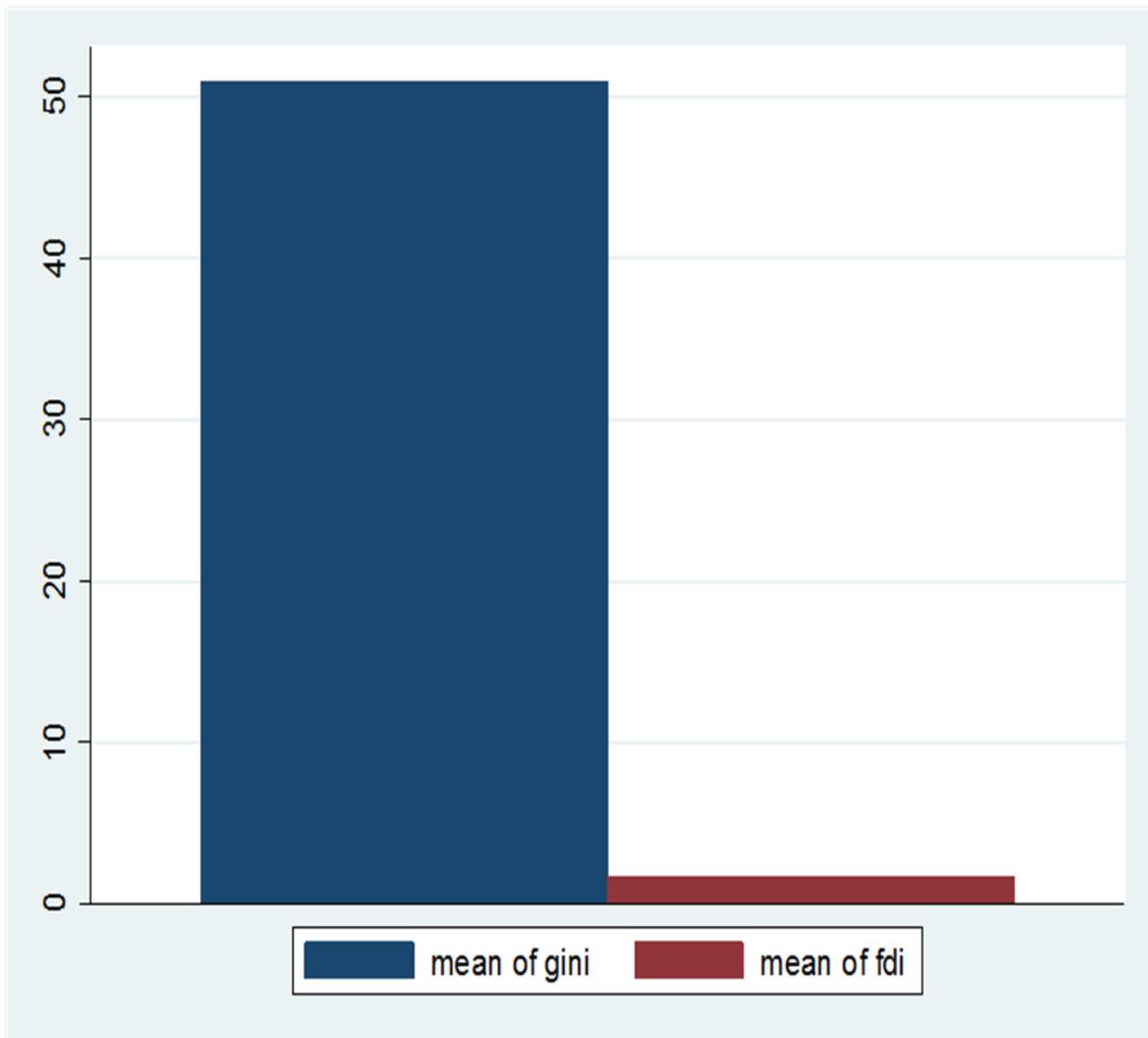
Second, I decided to run a correlation between the variables as shown in Table 4. Here, the results showed that some of the dependent variables were highly correlated with each other. Therefore, in order to receive more accurate results it was necessary to exclude some of the dependent variables from my study. The dependent variables that I decided to keep were FDI, inflation, GDP, assistance, credit, agricultural, and population.

## Table 4: VARIABLE CORRELATION

| | gini | fdi | inflation | credit | exports | lifeexp | assistance | electric | savings | populatio | gdp | agrigational |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| gini | 1 | | | | | | | | | | | |
| fdi | 0.2118 | 1 | | | | | | | | | | |
| inflation | -0.1207 | -0.182 | 1 | | | | | | | | | |
| credit | 0.6436 | -0.0627 | 0.0099 | 1 | | | | | | | | |
| exports | -0.0405 | 0.2419 | -0.1351 | 0.014 | 1 | | | | | | | |
| lifeexpec | 0.2497 | 0.217 | -0.2092 | 0.1563 | 0.0161 | 1 | | | | | | |
| assistance | -0.1636 | 0.2291 | 0.0537 | -0.275 | -0.1482 | -0.5504 | 1 | | | | | |
| electric | 0.1575 | 0.0107 | -0.1458 | 0.2033 | 0.2163 | 0.6474 | -0.5807 | 1 | | | | |
| savings | 0.4608 | -0.1363 | 0.0747 | 0.5387 | -0.4758 | 0.1413 | -0.1089 | 0.32 | 1 | | | |
| population | -0.1532 | -0.303 | 0.0071 | -0.2035 | 0.2753 | -0.4009 | 0.01 | 0.0493 | -0.2955 | 1 | | |
| gdp | 0.3872 | -0.1471 | 0.0572 | 0.389 | -0.5103 | 0.1534 | -0.0979 | 0.2799 | 0.8802 | -0.3308 | 1 | |
| agrigational | -0.0683 | -0.0717 | -0.0208 | -0.0898 | -0.4627 | 0.0633 | -0.1006 | -0.0452 | 0.1213 | -0.3965 | 0.1789 | 1 |

After deciding which variables I should keep, I was able to run my first regression as shown in table 5. The first regression showed that only some of the dependent variables were significant to the GINI index at the 10% significant level. The variables that were significant to the GINI index included FDI, GDP and credit. The variables that were insignificant at the 10% significant level included inflation, assistance, agricultural and population. The r-squared for this regression equaled .5464. The FDI coefficient for this regression was equal to 1.79761.

## Table 5: FIRST REGRESSION

```
Random-effects GLS regression              Number of obs      =        112
Group variable: year                       Number of groups   =         16

R-sq:  within  = 0.5464                     Obs per group: min =          7
       between = 0.4471                                    avg =        7.0
       overall = 0.5392                                    max =          7

                                            Wald chi2(6)       =          .
corr(u_i, X)    = 0 (assumed)               Prob > chi2        =          .
```

| gini | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| fdi | 1.076971 | .2509422 | 4.29 | 0.000 | .5851334 | 1.568809 |
| gdp | 1.03e-11 | 3.13e-12 | 3.30 | 0.001 | 4.21e-12 | 1.65e-11 |
| assistance | -1.67e-09 | 2.45e-09 | -0.68 | 0.496 | -6.47e-09 | 3.13e-09 |
| credit | .1092515 | .0145115 | 7.53 | 0.000 | .0808095 | .1376935 |
| inflation | -.000342 | .0002969 | -1.15 | 0.249 | -.0009238 | .0002399 |
| population | 2.751134 | 1.45472 | 1.89 | 0.059 | -.1000643 | 5.602333 |
| agrigational | .0119564 | .0472473 | 0.25 | 0.800 | -.0806466 | .1045594 |
| _cons | 37.7431 | 4.158866 | 9.08 | 0.000 | 29.59187 | 45.89433 |

| | | |
|---|---|---|
| sigma_u | 0 | |
| sigma_e | 4.4347632 | |
| rho | 0 | (fraction of variance due to u_i) |

Finally, I ran another regression to omit the variables that were insignificant as shown in table 6. The r-squared for the second regression equaled 0.5291. The FDI coefficient from the second regression decreased a little bit from the previous regression to .8971658. However, FDI had a positive impact on income inequality for both regressions. As expected, GDP had a negative coefficient and decreased income inequality. Also, credit had a positive coefficient and increased income inequality.

## Table 6: Second Regression

```
Random-effects GLS regression              Number of obs      =         112
Group variable: year                       Number of groups   =          16

R-sq:  within  = 0.5291                     Obs per group: min =           7
       between = 0.3204                                      avg =         7.0
       overall = 0.5119                                      max =           7

                                           Wald chi2(2)       =           .
corr(u_i, X)    = 0 (assumed)               Prob > chi2        =           .
```

| gini | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| fdi | .8971658 | .2193727 | 4.09 | 0.000 | .4672032 | 1.327128 |
| gdp | 8.08e-12 | 2.95e-12 | 2.73 | 0.006 | 2.29e-12 | 1.39e-11 |
| credit | .1086138 | .013602 | 7.99 | 0.000 | .0819543 | .1352732 |
| _cons | 43.4013 | .8385173 | 51.76 | 0.000 | 41.75784 | 45.04476 |

| | | |
|---|---|---|
| sigma_u | 0 | |
| sigma_e | 4.4456643 | |
| rho | 0 | (fraction of variance due to u_i) |

Table 7 shows the trends between the Gini index and FDI and Latin America during the time period that is being studied. As shown, FDI stays relatively low for the countries that are being studied during the time period. Also as shown, the Gini index is decently high for all of the countries that are included in this study.
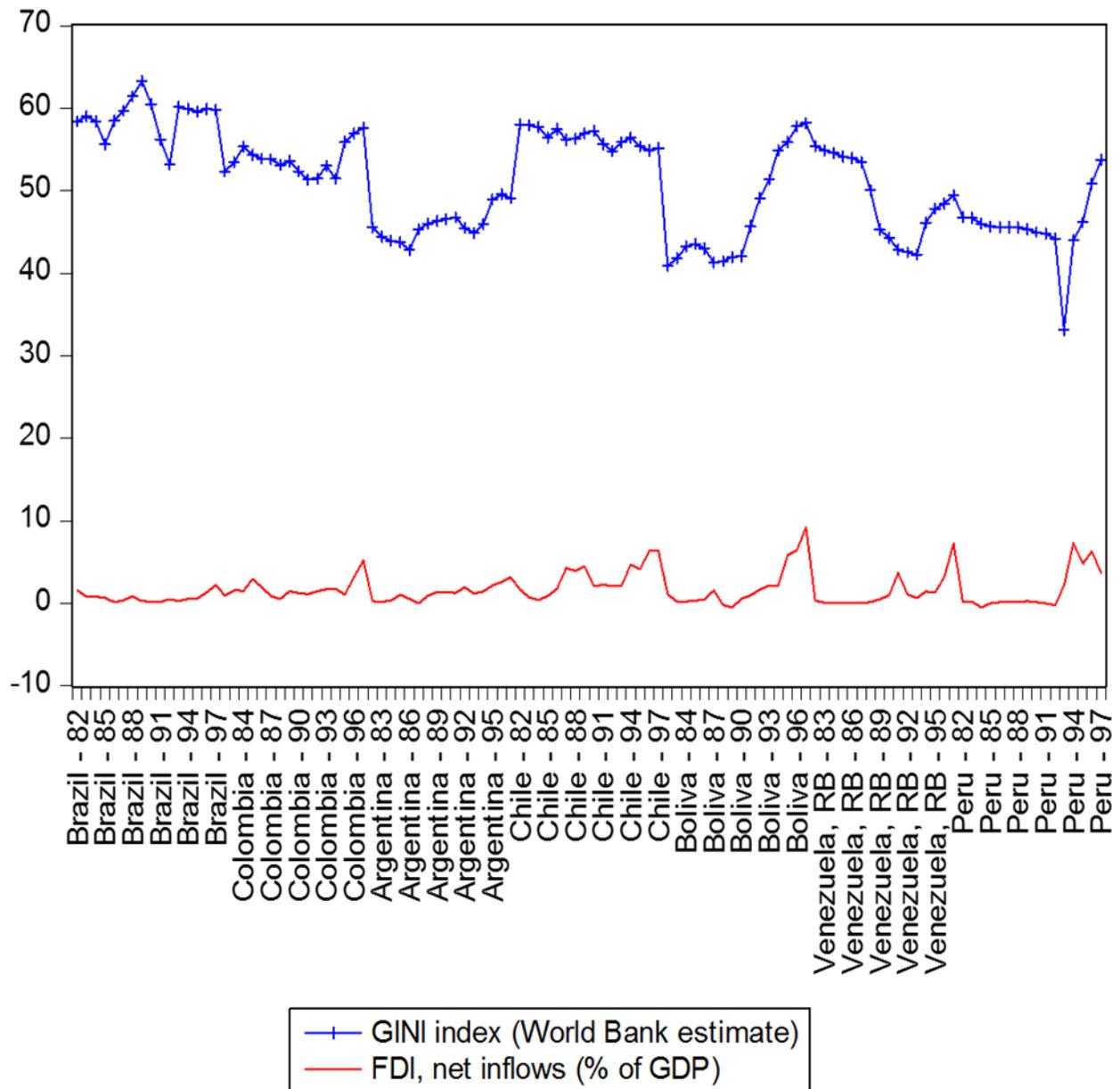
## Conclusion

To conclude, the study shows that FDI does have a positive impact on income inequality in Latin America after Operation condor. Also, the study shows that credit increases income inequality and GDP decreases income inequality. Therefore, it is recommended that countries do not focus on creating policies to increase FDI if income inequality is a major concern in that

country. First, it is recommended that they focus on their income inequality problems because increases in FDI will just increase income inequality more.

In the future, I would like to make my research better by adding more data to this study. First, I would like to make my results a more accurate depiction of all of Latin America. I plan on doing this by adding every Latin American country to my study. Also, I want to do is extend the time period from 1982 to 2016 in the future. Doing this will allow me to see how income inequality in Latin America has changed for 34 years following the terrible events of operation condor. Also, I hope that extending my research for this study will cause my results to be more accurate and cause increases in my r-squared.

Another thing I want to accomplish with this study in the future is to add more variables to see what else impacted income inequality in Latin America. Personally, I find the topic of income inequality in Latin America extremely interesting. Therefore, I am extremely curious to find out what causes income inequality in Latin America to be so high. Unfortunately, I was unsuccessful in adding corruption variables for the purposes of this study. However, I would like to find a way to add corruption variables specifically to my model in the future. I am extremely curious to see if the large amounts of corruption has a significant impact on the high income inequality in Latin America.

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