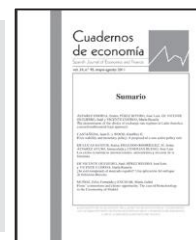




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## ARTÍCULO

### Does minimum wage reduce income inequality? A cross-country evidence

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**Abstract:** In this study, the effects of minimum wage policies on income inequality are examined by looking at cross-country evidences. By estimating the panel data econometric model, the results show that there are insufficient evidences to support the hypothesis that a country with a minimum wage rate policy enjoys a significant reduction in income inequality. However, the results suggest that higher minimum wage rate reduces the inequality gap of countries that are involved. The policy implication arises from the results in that the mere presence of minimum wage policy does not have any bearing on income inequality in a country. However, the level of minimum wage rate must be high enough to have effect on reducing income inequality but low enough so as not to adversely affect employability in the country.

## 1. Introduction

Income inequality exists when there is a significant disparity in the nation's income distribution between high-income earners and the low-income earners of a country. The relationship between income inequality was first highlighted by Kuznets (1955). He pointed out that the relationship between income inequality and economic development is characterized by an inverted-U curve where income inequality tends to decrease when the economy developed. This implies that income inequality will fall as income continues to increase in developing economies. Nevertheless, this relationship is argumentative given the increase in the income inequality throughout the world since the late 1970s (Alvaredo *et al.*, 2017). The inequality does not only occur in developing or emerging economies but also in developed nations.

Following the World Inequality Database (WID.world), the United States of America (USA), the United Kingdom (UK), Germany and France are among the world top 10 percent the countries in the world due to income inequality. This is then followed by the emerging nations such as the Republic of South Africa with inequality risen dramatically from 61.43 percent in 2010 to 65.41 percent in 2019, which is an increase of 6.48 percent as shown by WID.world database. The rise in inequality especially in the emerging countries could not be taken lightly because it will lead to stagnation in the economic growth in a long run as it may result in severe urban and rural migration that subsequently leads to disparity in terms of cost of living and standard of living between the urban and rural areas. Hence, the inequality is stipulated as the main cause for major economic and social problems such as inflation, higher cost of living, lower standard of living and higher crime rate if it is not carefully dealt with.

One of the public policy tools to curb income inequality is the implementation of minimum wage through this, it is believed that it could improve the earning power of lower-income earners. Moreover, it is regarded as a straightforward and costless in budgetary terms to handle poverty and inequality (Sotomayor, 2020). Decision makers and policy makers in many countries generally accept a rise in minimum wage as one option to provide reasonable income for low-wage workers; thus reducing income inequality (Gramlich, 1976; Freeman, 1996; Kuttner, 1997; Sotomayor, 2020).

Nevertheless, there is lack of evidence on increased minimum wage that would reduce income inequality, of which, one study is undertaken by Card and Krueger (1995). The existing literature is mixed on whether the minimum wage has contributed in reducing income inequality. A standard argument by economists is that, higher minimum wage will pose a detrimental effect on employment rate. Typically, the evaluation of minimum wages is measured according to their effects on unemployment rate in standard economic textbook (Ehrenberg & Smith, 2003), in general and specific labor market models (Harris & Todaro, 1970; Mincer, 1976; Gramlich, 1976; Fields, 1997), and through empirical observations (Card & Krueger, 1995, 2000; Neumark & Wascher, 2000).

Thus, this study aims to examine the effects of minimum wage laws on income inequality by looking at cross-country evidences. It is important to look at cross-country evidences of the impact of minimum wage rate on income inequality because, it enables for policy makers to have a better understanding on labour policy implementation when the countries move towards regional collaboration which is increasingly important in this millennium. This is crucial because, integration between different countries could provide differential impact to other countries as the world is getting

more and more interdependent and the economic border fades away due to the role of the internet. Hence, evaluation of minimum wage is no longer valid just for a particular country income inequality but also serves as the guideline for economic collaborations and decision makings among public administrators around the globe. By doing so, this would enable the policy makers to redesign a policy for the betterment of currently implementing minimum wage policies within respective countries and designing their strategic investment plans with other countries.

Empirically, this paper addresses the question on how differing minimum wage policies being observed across countries are likely to affect income inequality. Section 2 reviews related literatures about the effects of minimum wage on income inequality. Section 3 describes the methodology has been employed in studying the effects of minimum wage on income inequality. Section 4 presents and discusses the empirical results, and the final section is wrapped up with some concluding remarks.

## 2. Literature Review

Empirical studies on the effects of minimum wage policies on income inequality are relatively scant and are mostly focused on the effects of employment condition (Belman & Wolfson, 2016). Nevertheless, few studies focus on its role in uplifting the standards of living among low-income earners or families (for example, Machin & Manning, 1994; Card & Krueger, 1995; DiNardo *et al.*, 1996; DiNardo & Lemieux, 1997).

Freeman (1996) presents the role of minimum wage rate in affecting the purchasing power, producers and the employment in the redistribution theory. He pointed out that minimum wages rate increases the price of labour in the production process, which in turn will be translated to an increase in the price of goods and services in the economy. This will inevitably lead to lower purchasing power in the economy given that the individual households need to spend more money to purchase the goods and services. Besides that, the higher cost of production also means lowering of profits and incomes to stakeholders, hence reducing the income that is earned by the higher-end distribution of wage. From an economic point of view, minimum wage rate acts as a price floor to the labour market, which will, resulting into the oversupply of labour and hence increases the unemployment rate in the country (Adams & Neumark, 2005). Nevertheless, the role of minimum wage rate on the employment is still inconclusive.

Similar, impact of minimum wage rate toward inequality is yet to reach consensus. For instance, studies such as Card (1992) and Card and Krueger (1995) discovered insufficient evidences to suggest that the 1990-1991's increased federal minimum wage decreased the country's employment. These studies highlight that only a few consequences of negative employment due to the increase in minimum wage that is spotted whereby an increase in minimum wage would likely reduce poverty and income inequality. Interestingly, Card and Krueger (1995) asserted that increases in the federal minimum wage managed to curb the growing trend of income inequality in the USA over the 1965-1995 period although the effects were transitory. Likewise, it is found that an increase in minimum wage tends to reduce income inequality (for example, DiNardo *et al.*, 1996). If minimum wage earners are uniformly distributed along the distribution of income, the act of decreasing the inequality in wage does not necessarily mean that a reduction in income inequality. Furthermore, higher minimum wage may allure labor supply responses in a positive way from the middle income group that could replace many low-income workers (Freeman, 1996).

On the other hand, [Koeniger et al. \(2007\)](#) examine the role of regulations in moderating the effect of minimum wage and inequality by using data from multiple Organisation for Economic Co-operation and Development (OECD) countries. Consistently, the results from fixed effects estimations reveal that minimum wage is statistically significant in reducing income inequality. Similar findings also found in the UK by [Machin and Manning \(1996\)](#). This is supported by [Engelhardt and Purcell \(2021\)](#) where minimum wage rate reduces the earning inequality, given that it contributes to the increase in the earnings of the male workers at the bottom decile in the USA.

Nevertheless, [Burkhauser et al. \(1996\)](#), [Even and Macpherson \(1996\)](#) and [Sloane and Theodossiou \(1996\)](#) studies found that the effect of minimum wage rates increase income inequality is rather insignificant. One of the reasons is that even the wage payments to the minimum-waged workers substantially increase but the effect would have been small when it is counted into the family income distribution ([Even & Macpherson, 1996](#)). In a similar vein, [Wu et al. \(2006\)](#) analyzed the effects of minimum wage policy on income inequality by looking at urban versus rural populations. Using various measures of inequality, the results contradict with the findings of [Card and Krueger \(1995\)](#). In the urban areas, considerable increases in minimum wage cause unemployment problems especially among low-income workers. In contrast, the minimum wage does not significantly affect income inequality that exists in rural areas.

There is still lack of empirical studies outside the USA. [World Bank \(2006\)](#) found ambiguous effects of minimum wage on income inequality within the Central and South American regions and the results tend to vary by country. By using the Brazilian data, [Neumark et al. \(2006\)](#) unveiled that minimum wage has a mixed effect on the income distribution depending on the percentile. Also, their results are sensitive to different model specifications. Hence, they concluded that there is insufficient evidences to justify that minimum wage reduces income inequality. The study in Mexico by [Bosch and Manacorda \(2010\)](#) revealed that the observed income inequality can be attributed to minimum wage in which a sharp fall in the real minimum wage causes most of the income inequality.

Elsewhere, [Lin and Yun \(2016\)](#) analyzed whether minimum wage contributes to the rising income inequality in China over the 2004-2009 period by using the panel data of a city-level minimum wage. They unveiled that the disparity in earnings exists between the median and the bottom groups, which decreases as minimum wage increases, thereby reducing income inequality. In a similar vein, [Sotomayor \(2020\)](#) also found that evidences also establish an inelastic relationship between the increase in minimum wage rate and the changes in poverty and diminishing returns of labour to the strategy when the legal minimum is high relative to median earnings.

The studies above reveal that the impact of minimum wage rate is rather inconclusive even though this is one of the direct policy tools that is used by the public administration to curb the poverty and reduce income inequality. Hence, this leads us to further study the impact of minimum wage rate on the inequality around the globe in contributing to the scant literature in this area.

### 3. Methodology and Data

The panel data analysis is used to estimate the impact of minimum wages on inequality. The estimation starts with the pooled ordinary least square method (POLS) with the assumption of homogeneity in the dataset. The panel data analysis enables the study to take into consideration of the heteroskedasticity problem via Generalized Least Square (GLS) method for both fixed and random effects. The existence of

heteroskedasticity cannot be taken lightly when dealing with a large panel dataset that may result in inconsistent and biased estimators. The Hausman test is employed to test whether the regressor is correlated with the unobserved variables in the panel data setup. The rejection of null hypothesis favoured fixed effects model where the unobserved variables are allowed to have any associations whatsoever with the regressors (Hausman, 1978). We first estimate the implementation of minimum wage policy on income inequality based on Equation (1). Minimum wage is proxied by a dummy variable taking a value of one if a country has a minimum wage policy and if otherwise, equals to zero.

$$GINI_{jt} = \gamma_0 + \gamma_1 MW_{jt} + \gamma_2 GROWTH_{jt} + \gamma_3 FDI_{jt} + \gamma_4 TRADE_{jt} + \gamma_5 GOV_{jt} + \gamma_6 INFLATION_{jt} + \mu_{jt} \quad (1)$$

where

|                  |   |                                                                                                          |
|------------------|---|----------------------------------------------------------------------------------------------------------|
| $GINI_{jt}$      | = | income inequality measured by Gini coefficient of country $j$ at year $t$                                |
| $MW_{jt}$        | = | dummy variable for a country with minimum wage policy (1 if a country with minimum wage, 0 if otherwise) |
| $GROWTH_{jt}$    | = | growth rate of $GDP$ for country $j$ at year $t$                                                         |
| $FDI_{jt}$       | = | the foreign direct investment-to- $GDP$ ratio for country $j$ at year $t$                                |
| $TRADE_{jt}$     | = | the trade-to- $GDP$ ratio for country $j$ at year $t$                                                    |
| $GOV_{jt}$       | = | natural logarithm of government spending for country $j$ at year $t$                                     |
| $INFLATION_{jt}$ | = | inflation rate for country $j$ at year $t$                                                               |
| $\gamma_i$       | = | coefficients ( $i = 0, 1, 2, \dots, 6$ )                                                                 |
| $\mu_{jt}$       | = | error term                                                                                               |

In this study, income inequality is measured by the commonly used Gini coefficient. It is based on the Lorenz Curve that relates to the percentage share of population against the percentage share of income received. It has a minimum value of 0 (i.e. the case of perfect equality) and a maximum value of 1 (i.e. perfect inequality). The implementation of minimum wage rate is expected to reduce the income inequality levels of the countries involved. If this is true,  $\gamma_1$ , is expected to yield a negative value. Theoretically, the implementation of minimum wage policy will elevate the income level of the poor, thus reducing the inequality gap between the poor and high income groups in a country. In addition to the economic development as measured by  $GDP$ , income inequality is stemmed from other economic and social processes. Hence, the inclusion of control variables such as  $FDI$ ,  $TRADE$ ,  $GOV$ , and  $INFLATION$  means to specifically control on the effect of minimum wage on income inequality. Following the suggestion of Barro (2000), the measures of globalization ( $FDI$  and  $TRADE$ ) are captured in the estimation models. The Stolper-Samuelson theorem argues that the wage gap existed between skilled labour and unskilled labour in developing countries decreases as a country's trade becomes more open, thereby reducing the income inequality. However, for a developed economy in which skilled labour is relatively plentiful, the opposite is expected to be true. Also, trade openness may influence the change in income inequality due to the difference in returns to education and skills ([Stiglitz, 1998](#)). Thus far, there is no concrete theoretical outcome on the established relationship between trade openness and inequality. For instance, [Carneiro and Arbache \(2003\)](#) unveiled that no significant effect of openness to trade on the income inequality is traced from their studies. The role of government in ameliorating inequality is important as the government revenues can be used for redistribution and transfers in favor

of the poor or low-income earners. However, the effectiveness of pro-poor programmes from the government's side depends on fair and smooth transfers.

For example, Papanek and Kyn (1986) tested the inequality ameliorating effect of government intervention, but they did not find evidence to back-up the contention that government intervention contributes to helping the poor group. They argued that the elites and privileged groups such as politicians, bureaucrats and armies which heavily benefitted from the allocation of government spending. Other studies such as MacDonald and Majeed (2010) showed that the role of government spending in ameliorating income inequality is significant.

Inflation is another important cause of income inequality. It hits the poor group in a negative way by decreasing their real incomes. In developing countries, the management of trade unions are typically weak and the minimum wage laws seem dysfunctional to a certain extent especially in the presence of poor governance. For such reasons, the wages movement is observed either to increase less proportionally to increase in prices or to remain unchanged (MacDonald & Majeed, 2010).

Subsequently, to analyze the effect of minimum wage rate on income inequality, Equation (1) is modified to become Equation (2) by substituting the dummy for minimum wage policy with the actual minimum wage rate from respective countries:

$$GINI_{jt} = \delta_0 + \delta_1 MWR_{jt} + \delta_2 MWR_{jt}^2 + \delta_3 GROWTH_{jt} + \delta_4 FDI_{jt} + \delta_5 TRADE_{jt} + \delta_6 GOV_{jt} + \delta_7 INFLATION_{jt} + \sigma_{jt} \quad (2)$$

where  $MWR_{jt}$  represents the actual minimum wage rate in United States Dollar (USD) for the country with a minimum wage policy. In this case,  $\delta_1$  will yield a negative result if higher wage rates help to increase the income level of the poor. However, a positive impact is expected if there is unsuccessful implementation of minimum wage policy. Also, the squared of  $MWR$  is included to consider the possibility of non-linearity in the effect of minimum wage on income inequality. This is consistent with the neo-classical theory that if the minimum wage is set relatively high such that firms are unable to bear the cost of production, there will be a higher employability due to the firm's capacity that is left unutilized.

Fixed Effects (FE) and Random Effects (RE) procedures are employed to measure the relationship between income inequality and independent variables of interest. The choice between these two models depend on whether the error term  $\mu_j$  is correlated to any explanatory variables in the estimated model (Wooldridge, 2002). Equation (3) is rewritten thereafter by using the FE procedure:

$$GINI_{jt} = \gamma_j + \gamma_1 MW_{jt} + \gamma_2 MWR_{jt}^2 + \gamma_3 GROWTH_{jt} + \gamma_4 FDI_{jt} + \gamma_5 TRADE_{jt} + \gamma_6 GOV_{jt} + \gamma_7 INFLATION_{jt} + \mu_{jt} \quad (3)$$

This method assumes that the model is heterogeneous, time invariant and specific to an entity or individual. In Equation (3), the slopes of coefficients are fixed whereas the intercepts are likely to vary for each cross section. FE procedure is often chosen as a precaution against the presence of omitted variable bias. However, if  $\mu_j$  is correlated to any explanatory variables of the model, the resulting variance will be high, thus rendering the statistical inference to be doubtful. Here, a better approach to use is the RE procedure. Equation (4) is presented using the RE procedure:

$$GINI_{jt} = \gamma_0 + \gamma_1 MW_{jt} + \gamma_2 MWR_{jt}^2 + \gamma_3 GROWTH_{jt} + \gamma_4 FDI_{jt} + \gamma_5 TRADE_{jt} + \gamma_6 GOV_{jt} + \gamma_7 INFLATION_{jt} + v_{jt} \quad (4)$$

where  $v_{jt} = \gamma_j + \mu_{jt}$  is the composite error term. In the RE procedure, any variation across countries is randomly assumed and uncorrelated with any independent variables in the model. Additionally, the Hausman (1978) specification test is used to assess the correlation that exists between the unobserved heterogeneity and other explanatory variables in the model.

### 3.1 Data

The estimation is based on a balanced-panel data from 2001 to 2007 (countries with and without minimum wage policies). The sample consists of 64 countries that is based on the availability of data on income inequality (51 economies with minimum wage policies and 13 economies with non- minimum wage policies). Altogether, there is a total of 448 observations. Data such as minimum wage, Gini coefficient, export, import, GDP, government expenditure and inflation are obtained from the World Development Report of World Bank whereas data on Foreign Direct Investment are gathered from Thomson Datastream.

## 4. Results and Discussion

### 4.1 Descriptive statistics

Table 1 displays the summary of descriptive statistics of variables that are used in the estimation models. There are several notable observations from the statistics. One observation is that, the broad range in the values for maximum and minimum intervals as well as the standard deviation of minimum wage. Hence, this suggests that there is no country differs much from the rest. Another interesting observation is that, the values of low minimum and high maximum for all variables as compared to the low standard deviation for the data. Thus, this implies that there is a significant difference in all variables whereby their maximum values are seen to be greater than two standard deviations from their means of distribution.

The statistics also shows that the countries with minimum wage policies reported an average Gini coefficient of 40.08 percent that ranges from 24 percent to 60.60 percent. This indicates that some countries are still characterized by higher income inequality as compared to the others. This is proven to be the case for developing countries. The minimum wage rate for the sample countries from 1996 to 2006 is about USD268.77 on average. Apart from that, the data indicates that the average growth rate of GDP is 4.93 percent.

Table 1: Descriptive statistics

| Variable  | Obs | Mean    | Std. Dev. | Min     | Max       |
|-----------|-----|---------|-----------|---------|-----------|
| GINI      | 357 | 40.083  | 8.528     | 24.000  | 60.600    |
| MW        | 357 | 268.768 | 374.695   | 0.002   | 2182.090  |
| GROWTH    | 357 | 4.928   | 3.943     | -10.894 | 34.500    |
| FDI       | 357 | 4.516   | 6.053     | -14.922 | 52.052    |
| TRADE     | 357 | 83.505  | 38.429    | 20.258  | 182.879   |
| GOV       | 357 | 89.500  | 285.000   | 0.310   | 2,230.000 |
| INFLATION | 357 | 6.787   | 8.394     | -4.084  | 79.535    |

Notes: The descriptive statistics are based on sample of countries with minimum wage. Gini is the Gini coefficient, MW is the minimum wage rate in USD, GROWTH is the growth rate of GDP, FDI is the foreign direct investment-to-GDP ratio, TRADE is the trade-to-GDP ratio, GOV is the government expenditure-to-GDP ratio and INFLATION is the inflation rate of the country.

The correlation matrix in Table 2 shows that the data that are used did not suffer from the multicollinearity problems in which the coefficient of correlation does not exceed 70 percent.

Table 2: Correlation matrix

|                  | <i>MW</i> | <i>GROWTH</i> | <i>FDI</i> | <i>TRADE</i> | <i>GOV</i> | <i>INFLATION</i> |
|------------------|-----------|---------------|------------|--------------|------------|------------------|
| <i>MW</i>        | 1.000     |               |            |              |            |                  |
| <i>GROWTH</i>    | -0.187*** | 1.000         |            |              |            |                  |
| <i>FDI</i>       | -0.095*   | 0.122**       | 1.000      |              |            |                  |
| <i>TRADE</i>     | -0.053    | 0.278***      | 0.413***   | 1.000        |            |                  |
| <i>GOV</i>       | 0.490***  | -0.350***     | -0.154***  | -0.273***    | 1.000      |                  |
| <i>INFLATION</i> | -0.160*** | 0.080         | -0.044     | 0.004        | -0.212***  | 1.000            |

Notes: *MW* is the minimum wage rate in USD, *GROWTH* is the growth rate of GDP, *FDI* is the foreign direct investment-to-GDP ratio, *TRADE* is the trade-to-GDP ratio, *GOV* is the government expenditure-to-GDP ratio and *INFLATION* is the inflation rate of the country.

\*, \*\* and \*\*\* indicate a statistically significant variable at the 10 percent, 5 percent and 1 percent significance levels, respectively

## 5. Regression results and discussion

Equation (1) is estimated by using the pooled ordinary least square method (POLS) with the assumption of homogeneity in the dataset. Further, the heteroskedasticity problem is addressed by using the Generalized Least Square (GLS) method for both *FE* and *RE* in Equation (2) and Equation (3), respectively. The existence of heteroskedasticity cannot be taken lightly when dealing with a large panel dataset that may result in inconsistent and biased estimators. Due to the use of dummy variable in the analysis, the Least Square Dummy Variable (LSDV) method is used to overcome the dummy variable which is being trapped in the *FE* model (FEM).

The estimated results of all models are displayed in Table 3. The coefficient of minimum wage (*MW*) is negative but statistically insignificant in all models. To determine the preferred model, both the Breusch and Pagan LM and Hausman tests are accordingly conducted. The Breusch and Pagan LM test suggests the existence of heterogeneity in the dataset. Hence, the use of POLS may not be appropriate in this case. To choose between *FE* and *RE*, the results of Hausman test suggest that the null hypothesis which is the preferred REM can be rejected. Hence, the FEM is chosen as suggested by the Hausman test. Since the results of FEM show that the coefficient of minimum wage which is statistically insignificant, the results suggest that countries with minimum wage policies do not have a significantly different income inequality with countries without minimum wage policy.

Furthermore, the coefficients of control variables are in line with the theory. The coefficient of trade-to-GDP ratio (*TRADE*) is negative and statistically significant at the five percent significance level in all models. The result is consistent with Chakrabarti (2000). An increase in trade activities reduces the countries' income inequality levels, thereby suggesting that trade activities are important to reduce income inequality by providing jobs for low-skilled workers. Moreover, the coefficient of government spending (*GOV*) is negative and statistically significant at the 10 percent significance level. The result is consistent with Odedokun and Round (2001). This suggests that government spending can have a positive effect on reducing income inequality by increasing income, particularly for the lower-end workers if a proper policy such as targeting income on low-income workers is implemented. Aside from that, the coefficient of inflation (*INFLATION*) is positive and statistically significant for both fixed and random effects models. In this case, an increase in inflation may jeopardize the incomes of lower-end workers, thus leading to a worsened condition of income inequality. Among others, the result is seen to be consistent with Bulir (2001).

Table 3: Estimation results for impact of minimum wage policy on income inequality (Sample consists of both countries with and without minimum wage policies)

| Variable                  | POLS                 | Fixed Effects (LSDV) | Random Effects       |
|---------------------------|----------------------|----------------------|----------------------|
| <i>MW</i>                 | -1.037<br>(0.980)    | -3.423<br>(1.942)    | -3.949<br>(2.515)    |
| <i>GROWTH</i>             | -0.052<br>(0.098)    | -0.017<br>(0.030)    | -0.007<br>(0.030)    |
| <i>FDI</i>                | -0.182**<br>(0.072)  | -0.001<br>(0.017)    | 0.008<br>(0.017)     |
| <i>TRADE</i>              | -0.020**<br>(0.008)  | -0.037***<br>(0.011) | -0.024**<br>(0.009)  |
| <i>GOV</i>                | -1.077***<br>(0.257) | -2.074***<br>(0.402) | -1.299***<br>(0.339) |
| <i>INFLATION</i>          | 0.016<br>(0.049)     | 0.037***<br>(0.014)  | 0.041***<br>(0.014)  |
| CONSTANT                  | 69.687***<br>(6.068) |                      | 16.242***<br>(6.035) |
| R <sup>2</sup>            | 0.300                | 0.374                | 0.391                |
| Adjusted R <sup>2</sup>   | 0.286                | 0.359                | 0.378                |
| F-test/ Chi <sup>2</sup>  | 7.020***             | 72.24***             | 81.050**             |
| Breusch and Pagan LM Test | 1155.210***          |                      |                      |
| Hauseman test             |                      | 43.700**             |                      |

Notes: *MW* is a dummy variable for minimum wage policy (*MW*=1 if the country has a minimum wage policy in-place, *MW*=0 if otherwise), *GROWTH* is the growth rate of GDP, *FDI* is the foreign direct investment-to-GDP ratio, *TRADE* is the trade-to-GDP ratio, *GOV* is the government expenditure-to-GDP ratio and *INFLATION* is the inflation rate of the country.

\*, \*\* and \*\*\* indicate a statistically significant variable at the 10 percent, 5 percent and 1 percent significance levels, respectively

In this study, the effects of minimum wage rates on countries that had implemented minimum wage policies are subsequently estimated. Table 4 presents the results of all models. In this estimation, the sample only consists of countries with minimum wage policies. The squared of minimum wage rate (*MWR*<sup>2</sup>) is included to account for the possibility of non-linearity relationship between minimum wage on income inequality as discussed in the neo-classical theory This enables us to identify the threshold for the positive effect of minimum wage on income inequality.

Table 4: Estimation results for impact of minimum wage rate on income inequality (Sample only consists of countries with minimum wage policies)

| Variable                        | POLS                  | Fixed Effects        | Random Effects        |
|---------------------------------|-----------------------|----------------------|-----------------------|
| <i>MWR</i>                      | -0.003***<br>(0.001)  | -0.002*<br>(0.001)   | -0.002*<br>(0.001)    |
| <i>MWR</i> <sup>2</sup>         | -0.0006*<br>(0.0003)  | -0.0004*<br>(0.0002) | -0.00038*<br>(0.0002) |
| <i>GROWTH</i>                   | -0.126<br>(0.101)     | -0.028<br>(0.034)    | -0.014<br>(0.034)     |
| <i>FDI</i>                      | -0.066<br>(0.067)     | -0.001<br>(0.018)    | 0.015<br>(0.019)      |
| <i>TRADE</i>                    | -0.120***<br>(0.011)  | -0.037***<br>(0.013) | 0.010<br>(0.012)      |
| <i>GOV</i>                      | -2.144***<br>(0.278)  | -2.212***<br>(0.440) | 1.259***<br>(0.372)   |
| <i>INFLATION</i>                | 0.004<br>(0.045)      | 0.038**<br>(0.015)   | 0.044***<br>(0.016)   |
| <i>CONSTANT</i>                 | 102.821***<br>(6.434) |                      | 19.388***<br>(6.425)  |
| <i>R</i> <sup>2</sup>           | 0.342                 | 0.368                | 0.372                 |
| Adjusted <i>R</i> <sup>2</sup>  | 0.329                 | 0.346                | 0.354                 |
| F-test/ <i>Chi</i> <sup>2</sup> | 25.610***             | 26.930***            | 27.010***             |
| Breusch and Pagan LM Test       | 94.000***             |                      |                       |
| Hausman test                    |                       | 71.950***            |                       |

Notes: *MWR* is the minimum wage rate in USD, *GROWTH* is the growth rate of GDP, *FDI* is the foreign direct investment-to-GDP ratio, *TRADE* is the trade-to-GDP ratio, *GOV* is the government expenditure-to-GDP ratio and *INFLATION* is the inflation rate of the country.

\*, \*\* and \*\*\* indicate a statistically significant variable at the 10 percent, 5 percent and 1 percent significance levels, respectively.

Based on the results in Table 4, fixed effect model is chosen as suggested by the Hausman test. The results of Hausman test suggest that the null hypothesis specifies that the preferred model is random effects can be rejected. The use of POLS may not be appropriate in this case as the Breusch and Pagan LM Test suggests that the existence of heterogeneity in the dataset. The fixed effect model suggests that higher minimum wage rate reduces the inequality gap of the countries that are involved. This means that the minimum wage policy successfully increases the income level of the poor, thus reducing the inequality gap between the poor and high income earners. This is consistent with Wang (2013) who empirically found that minimum wage rates reduce the income inequality in China. As suggested by Chen (2012), minimum wage rates help to mitigate the growing income gap between urban and rural areas, thereby lowering the income inequality of involved countries. Also, this is in tandem with Wang (2013) in China and Neumark et al. (2006) in Brazil. As for the coefficient of *MWR*<sup>2</sup>, it is positive and statistically significant at the 10 percent significance level. Thus, this indicates the existence of a certain threshold for the positive effect of minimum wage on income inequality. Beyond this threshold level, further increase in minimum wage rate will have a detrimental effect on income inequality.

Pertaining to the control variables, the coefficients of *GOV* and *TRADE* are negative and statistically significant at the one percent significance level. Hence, increases in government spending and trade activities would lead to considerable reductions in the income inequality levels of involved countries. The results are seen to be in line with the estimation results of the previous estimation of Equation (1) in Table 3 whereby a

dummy variable is used for minimum wage. Likewise, the coefficient of *INFLATION* is positive and statistically significant at the five percent significance level in agreement with the previous estimation of Equation (1) in Table 3.

## 5.1 Robustness Test

Since developing countries tend to have different economic structure from developed countries, it would be necessary to differentiate developing countries. To verify the robustness of the findings of this study, the regression models are estimated with the sampling restriction of developing countries only. The result is depicted in Table 5. From the table, the regression results show not much difference when compared to those in Table 4 except for the observation on the coefficient of minimum wage rate (*MWR*). Here, the coefficient of *MWR* becomes smaller and is only statistically significant at the five percent significance level for both fixed and random effects models. This indicates that the effect of minimum wage rate on income inequality is smaller in the developing countries compared to the developed countries. This is in consistent with the argument that there is a greater imbalance in the labour market of the developing countries.

Table 5: Estimation results for impact of minimum wage rate (sample consist of developing countries only)

| Variable                        | POLS                  | Fixed Effects        | Random Effects       |
|---------------------------------|-----------------------|----------------------|----------------------|
| <i>MWR</i>                      | -0.002**<br>(0.001)   | -0.002*<br>(0.001)   | -0.002*<br>(0.001)   |
| <i>MWR</i> <sup>2</sup>         | 0.0004*<br>(0.0003)   | 0.0003*<br>(0.0002)  | 0.0002*<br>0.0001    |
| <i>GROWTH</i>                   | -0.125<br>(0.102)     | -0.025<br>(0.033)    | -0.012<br>(0.032)    |
| <i>FDI</i>                      | -0.065<br>(0.062)     | -0.0014<br>(0.016)   | 0.013<br>(0.017)     |
| <i>TRADE</i>                    | -0.123***<br>(0.012)  | -0.036**<br>(0.014)  | 0.015<br>(0.013)     |
| <i>GOV</i>                      | -2.146***<br>(0.279)  | -2.216***<br>(0.445) | 1.261***<br>(0.381)  |
| <i>INFLATION</i>                | 0.005<br>(0.043)      | 0.039**<br>(0.016)   | 0.046***<br>(0.018)  |
| <i>CONSTANT</i>                 | 101.456***<br>(7.438) |                      | 20.588***<br>(7.385) |
| <i>R</i> <sup>2</sup>           | 0.356                 | 0.381                | 0.396                |
| Adjusted <i>R</i> <sup>2</sup>  | 0.344                 | 0.367                | 0.378                |
| F-test/ <i>Chi</i> <sup>2</sup> | 25.670***             | 26.780***            | 31.260***            |
| Breusch and Pagan LM Test       | 84.210***             |                      |                      |
| Hausman test                    |                       | 56.440***            |                      |

Notes: *MWR* is the minimum wage rate in USD, *GROWTH* is the growth rate of GDP, *FDI* is the foreign direct investment-to-GDP ratio, *TRADE* is the trade-to-GDP ratio, *GOV* is the government expenditure-to-GDP ratio and *INFLATION* is the inflation rate of the country.

\*, \*\* and \*\*\* indicate a statistically significant variable at the 10 percent, 5 percent, and 1 percent significance levels, respectively

## 6. Conclusion

This paper attempts to examine the effects of minimum wage policies on income inequality by looking at cross-country evidences. The results suggest that there is no significant difference in terms of income inequality in countries with a

minimum wage rate and countries without a minimum wage rate. Nevertheless, our findings found that the amount of minimum wage rate matters. The results suggest that, higher minimum wage rates can reduce the inequality gap of the countries that are being concerned. This means that the minimum wage policy successfully increases the income level of the poor, thus reducing the inequality gap between the poor and high income earners. Therefore, the implementation of minimum wage rates depends on the amount that is passed to the workers. This means that, the policy makers could consider to increase the minimum wage policy to reduce the income inequality of the country which is being concerned. However, this action must be done with caution, given the fact that increase in the minimum wage could directly lead to a reduction in purchasing power, a reduction in the earnings of the entrepreneurs and an increase in unemployment rate (Freeman, 1996). In this context, the increase in the minimum wage is suggested to be subsidized by the government under a fiscal policy in order to reduce the cost of doing business so that, increase in the cost of production could be minimized.

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