FEMALE PARTICIPATION IN LABOUR FORCE: THE SUCCESS IN REDUCING INCOME DISPARITY IN MALAYSIA

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ABSTRACT

Malaysia has shown an increasing trend of labour force participation rates across different ages and gender since independence in 1957. This includes a rapid increase in women participation in the labour force across all ages. Female higher participation in labour force has significant impact to economic growth and socio-economic development. World Bank has urged Malaysia to increase women participation in labour force to boost the economic growth. Therefore, it become a national agenda in Twelfth Malaysia Plan (2021-2025) to further increase working female population to 59 percent by 2025. Noting the important of the issue in international and national avenue, this study motivated to investigate the impact of women involvement in the labour market in promoting more equitable income distribution in Malaysia. The study employs the Autoregressive Distributive Lag (ARDL) approach to study the short-run and long-run effects of female participation in the labour force to reduce the income gap in Malaysia. The model includes other macroeconomic factors such as economic growth rate, GDP per capita, inflation rate and unemployment rate. This study uses annual time series data from 1970 up to 2019. The result shows that female participation in the labour market significantly reduces the income gap in Malaysia both in the short and long run. The study proves that working women have significantly contributed to the Malaysian economy over the long run. Women improvement in education level and steady increment in labour participation level has improved their economic standing which consequently narrowed the national income gap.

Keywords: female labour force participation, income disparity, ARDL model

INTRODUCTION

Human capital is, without a doubt, the most important aspect in a country's economic development. Since the Malaysia's independence in 1957, labour participation rates have risen across the board, regardless of age or gender. The most dramatic changes, however, have happened in the participation rate of women of all ages (Milanovic, 2001). Figure 1 depicts the female and overall labour force participation rates in Malaysia. The graph indicates a consistent increase in the working female population, from 45.2 percent in 1984 to 55.6 percent in 2019 and has never decline since 2008. Working men population, on the other hand, have decreased from 85.4 percent to 80.8 percent over the same period.

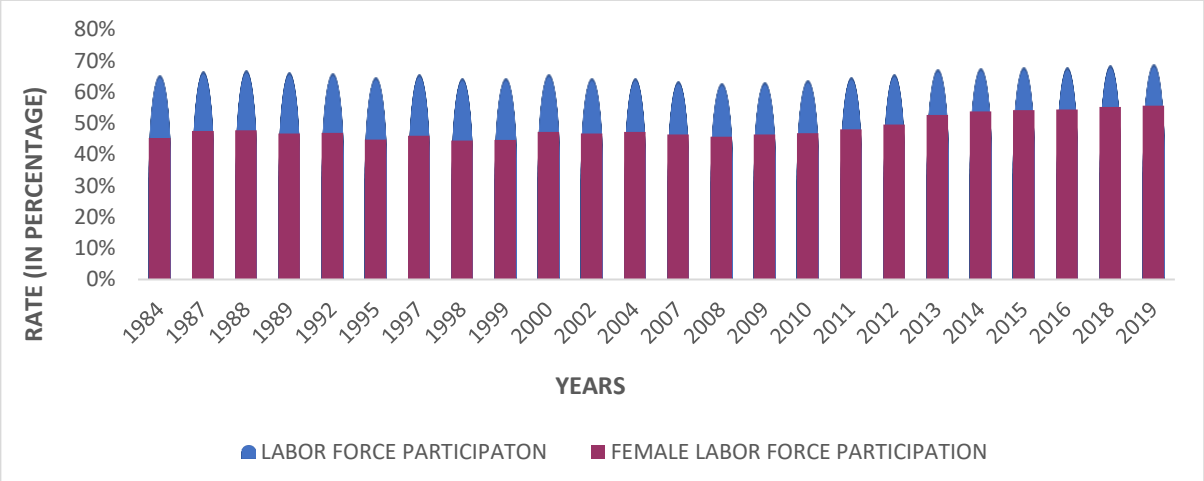

Figure 1: Labour Force Participation and Female Labour Force Participation (1984-2019)
Source: Department of Statistics Malaysia

Malaysia's labour market has improved over the last decade, with more women entering the workforce and the wage gap between men and women narrowing (Milanovic, 2001). Many factors, both on the demand and supply sides, contribute to the increase in women's participation in the Malaysian workforce. Economic expansion and industrialization are significant elements driving the demand for women workers, particularly in social areas including services, retail, tourism, and hospitality. Furthermore, some service sectors are dominated by women, such as nursing, childcare and elderly care, cleaning services, food and beverages, as well as the teaching professions. On the supply side, education attainment is the key factor that improves women's employment opportunities (Roopnarine & Ramrattan, 2012; Nor'aznin & Norehan, 2007). This is consistent with the 18th century Adam Smith's idea of human capital (Burgess, 2016; Čadil, Petkovová, & Blatná, 2014; Diebolt & Hippe, 2019; Elliott & Lewis, 2015). Human capital theory investigates the relationship between education, economic advancement, and social well-being (Netcoh, 2016). Individuals and nations alike are commonly considered as relying on education to adapt to fast economic and social changes (Rustiadi, 2015). Diebolt and Hippe (2019), Jihène (2013), Pelinescu (2015), and Rustiadi (2015) amongst others, concluded that human capital has a positive and significant impact on economic growth.

According to the Malaysian Ministry of Education, women make up 61 percent of public university enrolment, which become the supply for female professional talent. An increase in the number of women in the workforce has contributed to economic development in this contemporary period (Ismail & Sulaiman, 2014). According to Dallakyan and Bakhtavoryan (2012), high female labour force participation increases productivity, reduces poverty, and promotes overall socioeconomic growth. The barriers for women's contribution to economic development have been successfully overcome. For working women, the number of children and marital status, for example, are no longer issues. The country has entered a new social innovation in which married women are no longer viewed as full-time housewives who must entirely care for their children. Mason and Palan (1981) revealed that there was a trade-off for women between working and childbearing in the 1980s. More recent research however, demonstrated that the number of children no longer has an impact on the labour supply of women (Iacovou, 2001; Dallakyan & Bakhtavoryan, 2012). The government's efforts to provide solution and support for working women, particularly those of childbearing age, has successfully encouraged women to participate and stay in the labour market.

Education is the most important factor influencing Malaysian women's participation in the labour force (Alias et al., 2021; Qinfen, 2017; Nor & Said, 2016). Alias et al. (2021) reported that in 2018, 78 percent of Malaysian working women had a tertiary education (certificate, diploma, or bachelor's degree), compared to the 1990s, where majority women only had UPSR or SRP as their highest qualification. Income inequality between the richest and poorest can be narrowed in two ways: first, by lowering the wealthiest economic possessions, and second, by raising the income level of lower income class. The latter method can be accomplished with a shift in women's engagement in the workforce from the informal to the formal sector, from unskilled to skilled work, and from low-wage to high-wage jobs. Having tertiary education boosts women's economic prospects to seek professional careers, elevating their economic status and income level from lower to middle class, hence closing the gender income gap. In aggregate, the benefit would be extended to the whole nation, consequently reducing the income gap between lower and higher income class. These changes can be aided by increased access to education and economic empowerment for women through the development of women's talents and entrepreneurship.

The global wealth disparity has widened in the recent two decades (Asian Development Bank, 2013). In developing countries, which could have benefited from faster growth, the income inequality has risen. However, Asian countries saw a reduction in income disparity, as well as improvements in growth and poverty rates, between 1990 and 2000 (Deyshappriya, 2017). In Malaysia, income disparity has always been a major concern (Shari, 2008; Ragayah, 2008). According to Sulaiman, Yussof & Zaidi (2017), income distribution still shows an unsteady trend, even though the poverty rate has significantly reduced. Income inequality, as measured by the Gini coefficient, has been found to have a detrimental impact on growth and its sustainability (Ostry, Berg, and Tsangarides 2014; Berg and Ostry 2011). In line with earlier findings, a higher net Gini coefficient is linked to slower medium-term output growth. More crucially, Diabla-Norris et al. (2015) discovered an inverse link between the rich's income share (the top 20%) and economic growth. According to Luan and Zhou (2017), while the wealthiest get richer, a huge section of the low-income population gets left behind. Inequality reduces growth by limiting lower-income households' ability to stay healthy and acquire physical and human capital (Galor & Moav 2004; Aghion, Caroli, and Garcia-Penalosa 1999). It can, for example, result in underinvestment in education since disadvantaged students are placed in lower-quality schools and are less likely to attend college. Stiglitz (2012) argued that labour productivity may be lower than it would be if the world were more equitable.

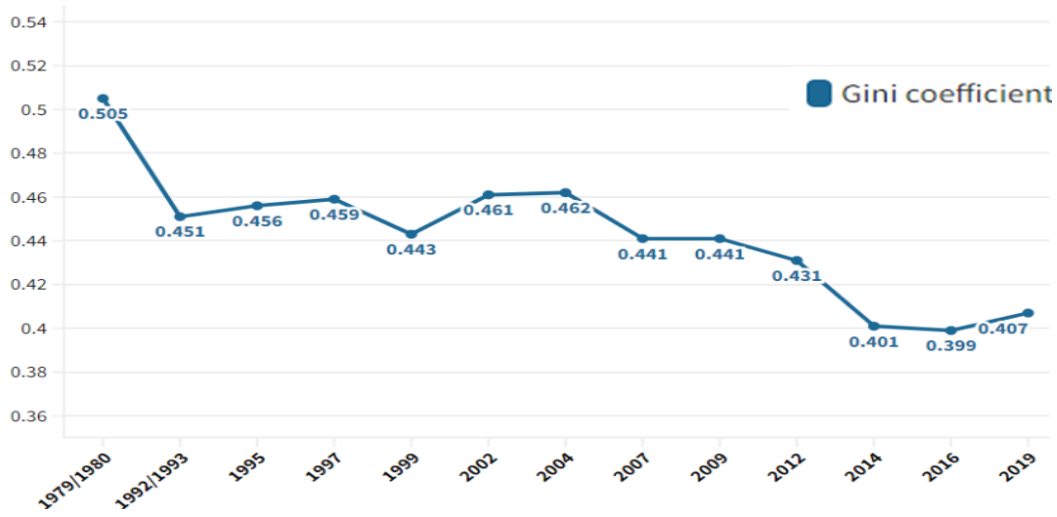

Figure 2: Malaysia's Income Inequality (1979-2019)
Source: Department of Statistics Malaysia

Figure 2 shows the time series plot of the Gini Index, which is the measure of income disparity in Malaysia. It shows that the distribution of income in Malaysia has significantly improved over the years with a declining trend of Gini value. However, according to the Department of Statistics Malaysia's (DOSM) Household Income and Basic Amenities Survey Report 2019, income disparity has increased in 2019 compared to 2016. Malaysia's income disparity (in terms of gross income) has increased, with the Gini coefficient rising from 0.399 in 2016 to 0.407 in 2019 (See Figure 1). Gross income disparity increased in both urban (0.389 to 0.398) and rural (0.364 to 0.367) areas. In addition, income inequality increased for all three major ethnic groups; Bumiputera (0.385 to 0.389), Chinese (0.411 to 0.417), and Indians (0.382 to 0.411).

When compared to the data for labour force participation rate, we can see that the two series move in the opposite direction. As the labour force participation rate shows an increasing trend over the years, the Gini coefficient shows a decreasing trend. To address the very limited study in Malaysia context, it is critical to determine the effect of labour force participation rate on income disparity, especially when female involvement in the workforce is showing a noteworthy change. Based on previous discussions, this paper is interested to extend the study by Deyshappriya (2017) which investigate the determinant of income inequality in 33 Asian countries and relate the findings with female labour force participation rate. The study is motivated to investigate the role of working female in improving Malaysia socioeconomic condition especially on national income inequality. Due to limited past studies in Malaysia on the role of women in shaping the Malaysian socioeconomics landscape, this study examines the relationship between female labour force participation and national income disparity using time series data from 1970 until 2019. The study employs the Autoregressive Distributive Lag (ARDL) approach to study the short-run and long-run effects of female participation in the labour force to reduce the income gap in Malaysia. The model includes other macroeconomic factors such as economic growth rate, GDP per capita, inflation rate and unemployment rate. This paper is divided into five sections. Section 1 discusses the background and objective of the study. Section 2 explains the relevance of other explanatory variables included in the model. Section 3 outlines data and methodology. Section 4 reports the empirical findings, and the last section will give concluding remarks and policy implications.

LITERATURE REVIEW

This section discusses the variables included in this empirical study based on the relevancy from the previous literature.

Income Disparity

In the case of Malaysia, the number of research that directly address the relationship between macroeconomic conditions and inequality is lacking. Furthermore, the scarcity of data on income inequality has hampered income inequality studies in general (Deyshappriya, 2017). The level of income disparity was determined by a variety of criteria, including educational attainment, minimum wages, income, race or ethnicity, GDP, inflation rate, geographic area, occupation, and dualism, among others. Because the data is insufficient, it is difficult to meet the criteria to undertake related study. The new discovery of data on inequality, on the other hand, allows researchers to construct their studies in a more flexible manner. Existing research, according to Deyshappriya (2017), has produced a wide range of outcomes due to the utilisation of different data sets from different periods and nations. As a result, new findings differ from one study to another depending on the methodology used, necessitating further research.

The Relationship between Female Labour Force Participation and Income Disparity

The research on female participation in labour force mainly focuses on understanding the factors that influence women decision to work such as education (Faridi et. al., 2009; Qinfen, 2017), demographic factors (Bibi & Afzal, 2012; Akhtar et al., 2020) and economic development (Cakir, 2008). The other strand of literature focuses on the consequence of higher working female population. For example, the impact of higher working women to demographics factors such as fertility rate (Mishra et al., 2010) and infant mortality rate (Narayan & Smith, 2006; Siah & Lee, 2015), the impact to income disparity such as gender income gap

(Milanovic, 2001), family income disparity (Chevan & Stokes, 2000; Urahn et al., 2014) and national income disparity (Deyshappriya, 2017). From literature of income disparity at national level, Deyshappriya (2017) found that the labour force participation rate tends to reduce the income gap in Asian countries. Increase in female labour force participation may help to lessen economic disparities, given women's earnings are roughly equal to men's. Whereas in terms of family income disparity, higher working female population helps in slowing down the growth in family income disparity (Chevan & Stokes, 2000). Urahn et al. (2014) also proves that working daughters increase their families' financial security by contributing more than half of their families' income Next, research on the gender wage gap demonstrates that greater access to higher education has offered women more opportunities to achieve high-paying jobs, improving their economic status and reducing the average wage differential between men and women (Lee & Choong, 2019). Married women's employment is a social innovation that has reduced financial disparities between husband-and-wife families. In conclusion, these studies reveal that women's participation in improving various aspects of income distribution have risen considerably in recent decades, not only at the family level, but also at the national level.

The Relationship between GDP and Income Disparity

Over the years, a lot of research has been undertaken studying the impact of income per capita or economic growth on income disparity. Several studies have found a positive link between economic growth and income inequality (e.g., Rubin & Segal, 2015; Wahiba & Weriemmi, 2014; Lundberg & Squire, 2003), while others have found a negative relationship (e.g., Majumdar & Partridge 2009; Nissim 2007). Some also produced mixed or inconsequential results (e.g., Fang et al. 2015; Chambers 2010; Anand & Kanbur 1993, Deininger & Squire 1996; Barro, 2000). According to Kuznets (1995), wealth will be evenly divided only after a certain level of long-term development has been reached. In this regard, inequality rises in the early stages of economic development before declining as the economy matures. Deyshappiya (2017) found the same evidence where income inequality eventually increases with increase in GDP, but a further increase in GDP will reduce the income inequality. In contrast, Kozminski & Baek (2017) found that economic development exacerbated income disparity after a particular turning point. These studies demonstrated the parabolic relation between GDP and income disparity.

Unemployment and Inflation Rate Relationship with Income Disparity

According to Jantti and Jenkins (2010), the unemployment rate significantly impacts income disparity. Between 1941 and 2010, Sheng (2012) revealed a strong positive association between unemployment and wealth disparity in the United States. The findings corroborated those of Helpman et al. (2010), who demonstrated that more productive enterprises pay higher wages for a given level of output and exports. According to Deyshappriya (2017), unemployment in Asian countries promotes wealth disparities. In a similar vein, Deyshappriya (2017) discovered that inflation has a direct relationship with income disparity. This corroborated the findings of Maestry and Roventini (2012), who discovered that inflation and income disparity grow in nations like Germany, Sweden, and the United States while decreases in Canada. Unemployment, on the other hand, was proven to reduce income disparity. Unemployment hinders access to revenue sources for lower-income groups who have little or no earned wealth when compared to higher-income groups.

Conceptual Framework

Figure 3 illustrated the conceptual framework for this study based on the aforementioned literature. The framework displays the relationship between income disparity as dependent variable and female participation in labour force as independent variable in addition to other demographic and macroeconomics variables.

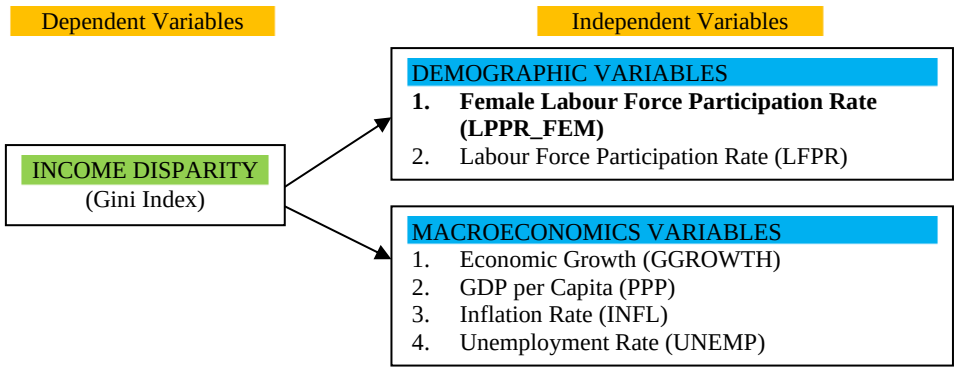

Figure 3: Conceptual Framework on the link between female labour force participation and income disparity

DATA AND METHODOLOGY

DATA

This study uses secondary time series data from the Department of Statistics Malaysia (DOSM) and Macrotrends from 1970 until 2019. This paper employs the ARDL approach to examine the short-run and long-run relationship between female labour force participation rate and income disparity. There is various measurement for income disparity such as the gap between the highest and the lowest income, Kuznets income ratio and Gini coefficient. In this study, the Gini Coefficient is used as a proxy for income disparity as it is widely used in literature (e.g. Sulaiman et. al, 2017; Deyshappriya, 2017) and more stable than other inequality

measures (Maestri & Roventini, 2012). The Gini coefficient value ranges from 0 (perfect equality) to 1 (perfect inequality), where a lower value indicates more equitable income distribution. The model includes other macroeconomic variables (GDP growth, GDP per capita, inflation rate, unemployment rate) and other demographic variables (labour force participation rate) as control variables. Table 1 summarizes the types of dependent and independent variables used in the study and the sources of each data.

Table 1: Description of variable and data sources

Variables	Sources of data	Data Description
Dependent variable		
Income disparity (*Gini Coefficient*)	DOSM	• Gini coefficient is used to measure the degree of income disparities which can take any values between 0 to 1, where 0 indicates a perfectly equal distribution of income within a population, whereas 1 indicates a perfectly unequal distribution of income within a population.
Independent Variables		
Female labour force participation rate	DOSM	• The share of working-age women who report either being employed or being available for work.
Labour force participation rate	DOSM	• The labour force participation rate is the number of persons in the labour force as a percentage of the working-age population. • LFPR (%) = (Labour force/working-age population) x 100%
GDP *(GDP growth and GDP per capita)*	Macrotrends	• GDP growth rate measures how fast the economy improves. • GDP per capita shows how much economic production value can be attributed to each citizen.
Inflation rate	Macrotrends	• Inflation refers to the overall changes in the Consumer Price Index (CPI), which is the weighted average price of different goods.
Unemployment rate	DOSM	• The percentage of unemployed workers in the total labour force.

Time Series Plot

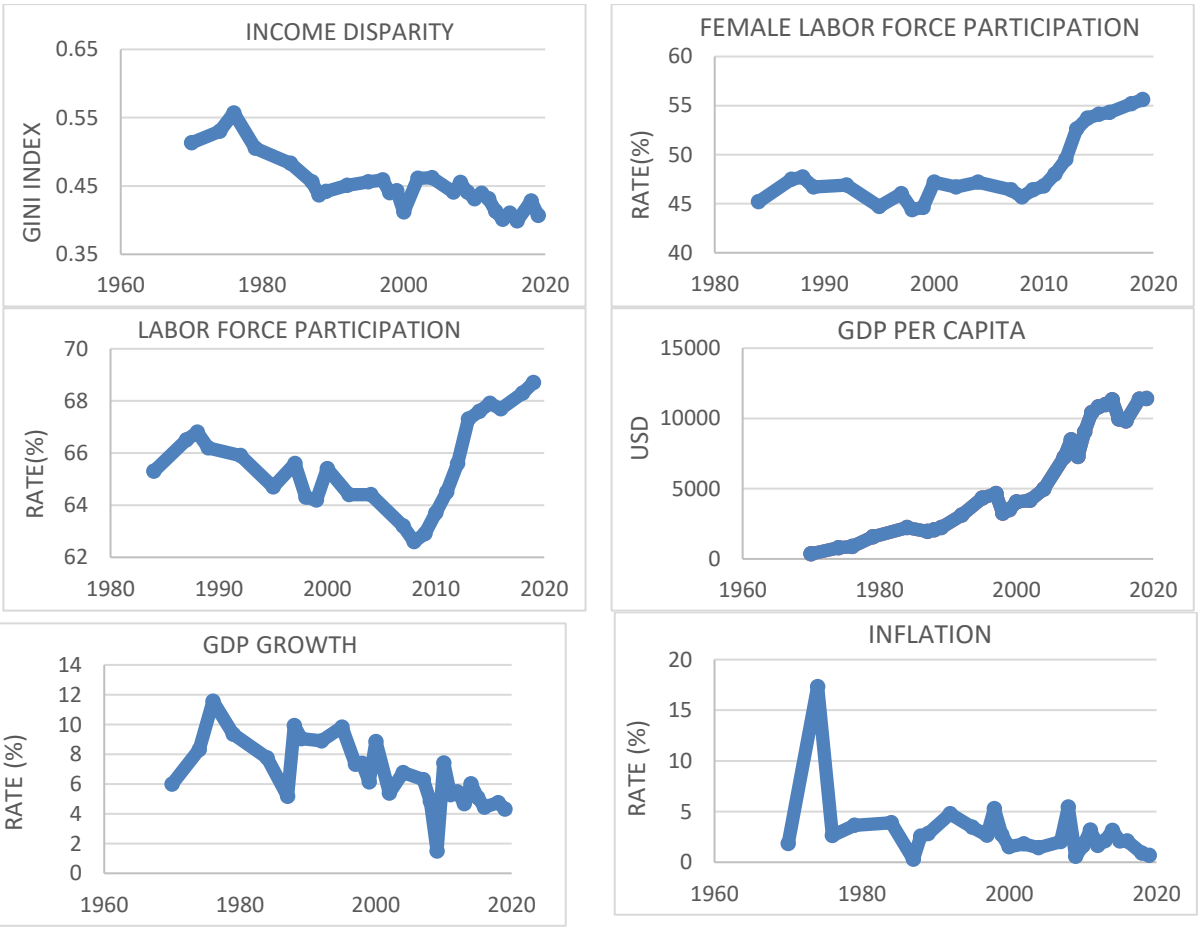

Figure 4: Time Series Plot of Variables (1970-2019)

Descriptive Analysis

Table 2 summarises descriptive statistics for all variables based on annual data collected from 1970 until 2019. The mean of the Gini Index is 0.45, with the lowest value 0.399 in 2016 and the highest 0.557 in 1976. The female labour force participation rate shows a steady increase with a mean of 48.46%, and 2019 has the highest female working population (55.6%). The trend follows the overall labour participation rate that steadily increases over the year with a mean of 65.57%, and 2019 also has the highest working population (68.7%). Malaysia overall economic growth is 6.7%, with the most rapid growth of 11.56% in 1976. In recent years, economic growth has been around 4%. Although the economic growth is slowing down, the GDP per capita has a significant increasing trend, with 2019 reaching 11,415 USD. Overall inflation is 3% which fluctuate between 3% of the mean. The unemployment rate is around 4%, showing a steady trend over 20 years.

Table 2: Descriptive Statistics

	GINI	LFPR_FEM	LFPR	GGROWTH	PPP	INFL	UNEMP
Mean	0.4501	48.4625	65.5708	6.7111	5793.11	3.0050	3.7375
Median	0.4415	47.0500	65.5000	6.2200	4484.00	2.3350	3.3000
Maximum	0.5570	55.6000	68.7000	11.5600	11415.00	17.3300	7.3000
Minimum	0.3990	44.4000	62.6000	1.5100	358.00	0.2900	2.4000
Std.Dev.	0.0383	3.6271	1.7509	2.2081	3855.40	3.0989	1.2686
Skewness	1.1121	0.9048	0.1227	0.1110	0.2242	3.6711	1.9736
Kurtosis	3.9549	2.3207	2.0027	2.8179	1.5141	17.6370	5.7359
Jarque-Bera	6.8349	3.7363	1.0549	0.0962	2.8106	312.8426	23.0650
Probability	0.0327	0.1544	0.5901	0.9531	0.2453	0.0000	0.0000
Sum	12.6030	1163.100	1573.700	187.9100	162207.0	84.1400	89.7000
Sum Sq.Dev.	0.0395	302.5763	70.5096	131.6489	4.01E+08	259.2815	37.0163
Observations	28	24	24	28	28	28	24

METHODOLOGY

The study examines the relationship between female labour force participation rate and income disparity by using time series analysis. Firstly, the stationarity test is conducted using Augmented Dickey-Fuller (ADF) unit root test. ARDL model can be applied regardless whether the series are I(0), I(1) or fractionally integrated which avoid problems caused by nonstationary time series data (Pesaran & Pesaran, 1997). Furthermore, ARDL method produces reliable cointegration results for small sample size (Pesaran et al., 2001; Sulaiman et al., 2017).

The Model

Using the aforementioned variables, the relationship between female labour force participation and income disparity can be explained using the following model:

$$Gini_t = \alpha_0 + \beta_1 lfpr\_fem_t + \beta_2 lfpr_t + \beta_3 ggrowth_t + \beta_4 \log(ppp)_t + \beta_5 infl_t + \beta_6 unemp_t + e_t \quad (1)$$

Where, lpfr_fem represents female labour force participation rate, lpfr represents labour force participation rate, ggrowth represents GDP growth rate, ppp represents GDP per capita, infl represent inflation rate, and unemp represents unemployment rate.

Unit Root Test

The series is stationary if the null hypothesis of a unit root is rejected. Table 3 below shows the result of the Augmented Dickey-Fuller test (ADF) at a level and first difference form.

Table 3: Unit Root Test

Variables	Level form		First Difference		Order of integration
	ADF-statistic	*Reject/ Accept Ho*	*ADF-statistic*	*Reject/ Accept Ho*	
GINI	-0.185464 (0.3928)	Fail to reject	-1.179106 (0.000)	Reject	I(1)
LFPR_FEM	0.013100 (0.9634)	Fail to reject	-0.971894 (0.0016)	Reject	I(1)
LFPR	-0.047573 (0.8887)	Fail to reject	-0.885522 (0.0045)	Reject	I(1)
GGROWTH	-0.535847 (0.0532)	Reject			I(0)
LNPPP	-0.151907 (0.0084)	Reject			I(0)
INFL	-1.059613 (0.0002)	Reject			I(0)
UNEMP	-0.955858 (0.0000)	Reject			I(0)

The results displayed that variables GINI, LFPR_FEM and LFPR are stationary at the first level I(1). Variable GGROWTH, LNPP, INFL and UNEMP are integrated at the level form I(0), and no differencing is needed. Therefore, all variables are either integrated at level or first level; thus ARDL bounds testing model can be extended (Narayan & Smyth, 2004). Using ARDL, the model includes lags that may show how the female labour force participation rate and other control variables affect the income disparity.

Autoregressive Distributed Lag (ARDL) Bounds Test

This study implements the Autoregressive Distributed Lag models (ARDL) bounds testing technique to cointegration to examine the long run relationship between female labour force participation and income disparity, as well as the error correction model (ECM) for the short run relationships. The ARDL cointegration framework was developed by Pesaran et.al. (1999, 2001). The model can be estimated as follow:

$$\Delta Gini_t = \alpha_0 + \sum_{p=1}^{n} \beta_{1p} \Delta lfpr\_fem_{t-p} + \sum_{p=1}^{n} \beta_{2p} \Delta lfpr_{t-p} + \sum_{p=1}^{n} \beta_{3p} \Delta ggrowth_{t-p} + \sum_{p=1}^{n} \beta_{4p} \Delta lnppp_{t-p} + \sum_{p=1}^{n} \beta_{5p} \Delta infl_{t-p} + \sum_{p=1}^{n} \beta_{6p} \Delta unemp_{t-p} + \delta_1 lfpr\_fem_t + \delta_2 lfpr_t + \delta_3 ggrowth_t + \delta_4 lnppp_t + \delta_5 infl_t + \delta_6 unemp_t + \varepsilon_t \quad (2)$$

From Equation (2), the Δ is the first difference operator, and n represents the maximum number of lags of the ARDL model determined by the Akaike Information Criteria (AIC). β_1 until β_6 in the first part of Equation (1) capture the short-run parameters while δ_1 until δ_{16} represent the long-run relationship between lpfr_fem with Gini and other independent variables under study. The presence of a long-run cointegration relationship is indicated when the calculated Wald F-statistics are higher than the upper critical bound (UCB). No long-run cointegration relationship can be established if the computed F-statistics are lower than the lower critical bounds (LCB). Then, the conditional ARDL long-run model is estimated as:

$$\Delta Gini_t = \alpha_0 + \sum_{p=1}^{o} \beta_{1p} lfpr\_fem_{t-p} + \sum_{p=1}^{q} \beta_{2p} lfpr_{t-p} + \sum_{p=1}^{r} \beta_{3p} ggrowth_{t-p} + \sum_{p=1}^{s} \beta_{4p} lnppp_{t-p} + \sum_{p=1}^{u} \beta_{5p} infl_{t-p} + \sum_{p=1}^{v} \beta_{6p} unemp_{t-p} + \varepsilon_t \quad (3)$$

Next, the short run dynamic of the model and a lagged error correction term (ECT) are estimated using Error Correction Model (ECM), expressed as follows:

$$\Delta Gini_t = \alpha_0 + \sum_{p=1}^{n} \theta_{1p} \Delta lfpr\_fem_{t-p} + \sum_{p=1}^{n} \theta_{2p} \Delta lfpr_{t-p} + \sum_{p=1}^{n} \theta_{3p} \Delta ggrowth_{t-p} + \sum_{p=1}^{n} \theta_{4p} \Delta lnppp_{t-p} + \sum_{p=1}^{n} \theta_{5p} \Delta infl_{t-p} + \sum_{p=1}^{n} \theta_{6p} \Delta unemp_{t-p} + \gamma ECT_{t-1} + \vartheta_t \quad (4)$$

The coefficient of ECT, γ represents the short-run speed of adjustment to return to its long-run equilibrium. The value must be less than zero and highly significant to ensure that the series can adjust to its equilibrium. The ϑ_t is the residual term, which is assumed to be identically independent and normally distributed. Lastly, the diagnostic check is performed to check the model's adequacy and ensure that the estimated model is not biased. A few tests conducted are autocorrelation, heteroskedasticity, Jarque-Bera normality, Ramsey RESET and CUSUM test. The table below simplified the null hypotheses for each test.

Table 4: Null Hypothesis of Diagnostic Tests

TEST	Null Hypothesis
Autocorrelation	There is no serial correlation of any order.
Heteroskedasticity	Homoskedasticity is present
Normality	Data is normally distributed
Ramsey RESET	The model is correctly specified
CUSUM	The coefficients in the model are stable

EMPIRICAL RESULTS

The best model is chosen based on the Akaike Information Criteria (AIC) criteria. The model ARDL (1, 0, 2, 2, 0, 2, 0) is the best model because it has the lowest AIC value. The next step is to test the cointegration among the variables. The result of bound tests showed that the F-statistics (9.9890) is larger than the 1 percent upper bound critical value (2.66). The critical value reported in Table 5 is based on Narayan (2004)'s critical value for small size (n=30 to 80). The conclusion is that the variables in the model are cointegrated. There is a long-run equilibrium relationship between female labour force participation and income disparity, in addition to other independent variables.

Table 5: ARDL Bound Test for Testing the Presence of Long-Run Relationship

Test statistics	**Value**	**K=6**
F-statistic	9.98901	
Critical value bounds		
Significance	I(0)	I(1)
10%	1.75	2.87
5%	2.04	3.24
2.5%	2.32	3.59
1%	2.66	4.05
CONCLUSION	COINTEGRATED	

Since there is a long-run relationship between these six variables and this study aims to establish the relationship between female labour force participation and income disparity, the short-run and long-run models of the ARDL equation are further estimated using the standard OLS to get the speed of adjustment. Next, the Error Correction Model (ECM) is employed to estimate the short-run dynamic of the model. These results are shown in Table 6.

Table 6: Short Run and Long Run Estimates of ARDL Model

Variables	**Long-run results**		**Short-run results**	
	Coefficient	**p-value**	**Coefficient**	**p-value**
LFPR_FEM	-0.018268	0.0002*	-0.011982	0.0000*
LFPR	0.014422	0.0128*	0.011703	0.0002*
GGROWTH	-0.003815	0.0541	0.002577	0.3271
LNPPP	0.044587	0.0023*	0.029244	0.0010*
INFL	-0.006352	0.0093*	-0.013706	0.0006*
UNEMP	0.006240	0.1672	0.004093	0.1614
CointEq(-1)	-1.524691	0.0000*		

Table 6 shows the result of short-run and long-run estimates of the ARDL model. The labour force participation rate (LFPR) and female labour force participation rate (LFPR_FEM) variables are classified as demographic factors in this ARDL model. Based on the result, LPFR_FEM is negatively and significantly associated with income disparity in the short run and long run. The variable also is the most significant factors compare to other explanatory variables with p-value 0.0000 for long-run relationship. Hence, a 1% initial increase in LPFR_FEM will decrease Gini Index by 0.011982. The finding indicates that national income disparity will decline when more women participate in the workforce. The finding is similar to Lee & Choong (2019) and Deyshappriya (2017) which also found that increasing female labour force participation rates reduces the income gap in Asian countries. The finding indicates that when women rapidly improve their education level and increase their participation level in the labour market, their economic standing will be improved, which aggregately will reduce the wealth inequality gap. The finding is consistent with numerous empirical evidence that support human capital hypothesis which associates higher education to higher individual income, GDP growth and better wellbeing (Netcoh, 2016).

Meanwhile, LFPR positively impacts the dependent variable for the short and long run. The result is not consistent with previous research by Deyshappriya (2017), which found that the labour force participation rate is inversely related to income disparity. The finding implied that income disparity would increase when the overall working population increases. Therefore, a 1% increase in LFPR will lead to an increase in Gini value by 0.011703. The finding has a few economic implications. First, the increase in overall labour force participation rate has widening the income gap. This could happen if the working population does not receive sufficient income which improve their economic condition and living standard. Hence, the lower income earners will stay in lower income class despite working and contributing to the economy growth. Second, the firms make a huge economic profit by paying lower wage, thus increase the wealth of the top income earners, which mostly own businesses or owner of the capital. Studies show that wages are increasing at a slower growth rate which not in line with inflation. World Bank reported that wage growth rate was 2.6% p.a. in the 2000s as opposed to productivity growth of 6.7%, which implies wages suppression especially for private sector workers (in Elangkovan, 2012).

Apart from that, GGROWTH is negatively and marginally significant at the 10% level in the short run, but the long-run relationship with income disparity becomes negative and insignificant. Another proxy of economic growth, PPP, is positively and significantly associated with income disparity in the short run. Hence, a 1% increase in PPP will lead to an increase in Gini value by 0.044587. The analysis also indicates short- and long-run significant negative relationships between INFL and income disparity at a 1%

significance level. The finding is similar with Maestri & Roventini (2012) and Deyshappriya (2017) which indicates income disparity is negatively correlated with the inflation rate.

The coefficient of the ECM term shows the adjustment speed from the short run to the long-run equilibrium. The sign of the ECM coefficient must be negative, with a high degree of significance. As indicated by Table 6, the ECM coefficient is 1.524691 and significant at a 1% significance level, which shows a stable long-run relationship. This implies the deviation from short-run shock in income disparity is corrected by 152.491 percent over each year in an extended period. Furthermore, the R-squared of the regression model is 0.928712, which mean approximately 93% of the income disparity is explained by the independent variables considered in this study. On the other hand, F-statistics is significantly high as well. It is proved that the variables are cointegrated, and there is a long-run relationship amongst the variables.

Table 7: Diagnostic Results for ARDL Model

TEST	RESULTS (p-value)
Autocorrelation (Breush-Godfrey Serial Correlation LM Test)	1.0508 (0.3989)
Heteroskedasticity (Breush-Godfrey Serial Correlation LM Test)	0.0840 (0.7751)
Normality Test	0.8183 (0.6642)
Ramsey RESET Test	0.0703 (0.7976)

*p-value in parentheses

Table 7 shows the diagnostic results, consisting of the autocorrelation test, heteroskedasticity test, normality test and Ramsey test. Since the p-value is greater than 0.05 for all three tests, it means to accept the null hypothesis. Therefore, the model does not have problems with autocorrelation, heteroskedasticity and normality of the residuals. The Ramsey RESET test show that the model is correctly specified. Besides the diagnostic check that confirms the validity of long-run and short-run models, the study also performs the cumulative sum of recursive residuals (CUSUM) test developed by Brown, Durbin & Evans (1975). This is to measure the stability of long-run and short-run models.

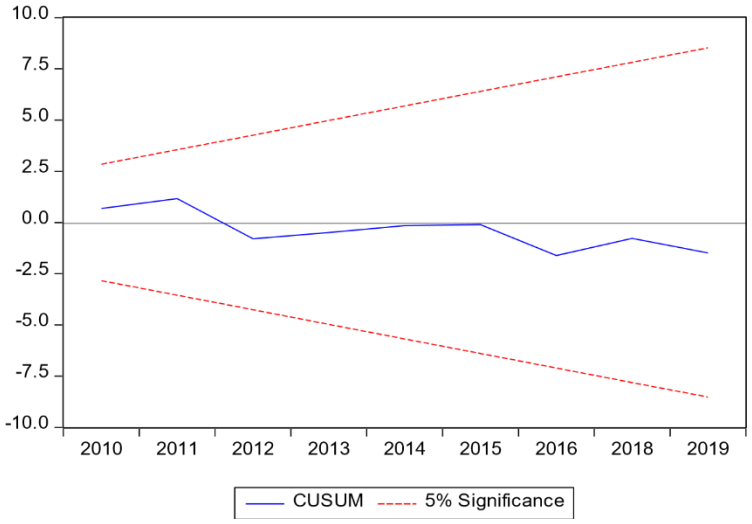

Figure 5: CUSUM test graph

Figure 5 show the graph for the CUSUM test. Since the CUSUM line, which is the blue line, lie between the 5% significance critical line, the ARDL model is concluded to be reliable and stable. In conclusion, there is no misspecification and structural instability in the short and long run during the study period.

DISCUSSIONS AND CONCLUSIONS

The objective of this study is to investigate women contribution in socio-economics development in Malaysia. There is an international urgency by Word Bank for Malaysia to increase women participation in labour force to boost the economic growth (HRM Asia, 2021). In response to World Bank, this issue has become a national agenda in Twelfth Malaysia Plan (2021-2025) which targeted women workforce participation to reach 59% by 2025 (EPU, 2021). Addressing the important of the issue in international and national avenue, the study explores the impact of working women population on income disparity in Malaysia noting a number of literatures that had established the relationship.

This empirical research uses the Autoregressive Distributed Lags (ARDL) bounds testing approach. ARDL approach is chosen since it can be applied when the regressors are at a different stationary level and can accommodate the lag variables. This research established the relationship between income disparity and female labour force participation in the short run and long run, in addition to other macroeconomics variables. All the variables, female labour force participation rate (LFPR_FEM), labour force participation rate (LFPR), GDP per capita (PPP), GDP growth rate (GGROWTH) and inflation rate (INFL), appear to be significantly associated with income disparity in the short run, except unemployment rate (UNEMP). The ARDL results also showed a significant relationship between LFPR_FEM, LFPR, PPP and INFL with income disparity in the long run. The analysis also shows which explanatory variables are negatively and positively associated with income disparity in both the short and long run. LFPR_FEM, GGROWTH, and INFL have inversely and significantly related to the Gini index in the short run, which means that an initial increase of these variables leads to a decrease in income disparity and vice versa. Meanwhile, PPP, GGROWTH and LFPR are positively related to income disparity in the long run. Therefore, an increase in PPP, GGROWTH and LFPR would lead to an increase in income disparity. The unemployment rate has a positive but insignificant relationship with income disparity in the short run and long run.

In conclusion, the econometrics model proves the existence of cointegrated relationship between female participation the labour force and income disparity which show the significant contribution of working women population in lessening the income disparity in Malaysia from 1970-2019. The track record based on the time series analysis has shown that higher women involvement in Malaysia labour market has a positive impact on improving the country socio-economic condition. However, this empirical study has limitation since it used the time series data prior to Covid-19 outbreak. Notably, Covid-19 pandemic has changed the landscape of labour market worldwide and Malaysia is not escaped. The pandemic has post significant detrimental effect to working women population which dominated the social sectors that severely impacted by the pandemic. Therefore, future study could revisit the model established in this study once the data during and post pandemic is made available. The model could have structural break due the pandemic that should be modelled accordingly.

This empirical study can be extended in the future with the use of other econometric model to have a more comprehensive view on the issues related to female participation in labour force. Future studies can employ Structural Equation Model (SEM) to embed both the cause of female participation in the workforce and the consequence of that. For example, previous literature portrays that education attainment is a vital factor that increase women participation in labour force, which consequently boost the economy growth. These interrelated variables can be embedded in one analysis via SEM.

As for the policy implication, the finding of this study could benefit the policy makers in designing a policy to reach the targeted 59 percent of working women population by 2025. The result of the study implied that the government should improve the support system for working women to retain their participation in the labour market. The initiatives like having childcare centres in the workplace especially at the government bodies, giving more tax incentives for working women in their childbearing age and incentive for women back to work after a career break should be continued. Among the government policies that can be extended are Career Comeback Programmes in 2019 and Women@Work initiatives under Belanjawan 2020. The first is tax incentive while the latter is transfer payment which encourages women to return to the workforce after a career break by giving direct incentive to the women returnees and the respective employer (additional RM500 on top of monthly salary for two years and RM300 monthly hiring incentive, respectively). The policy to increase women participation in the workforce should be continuously improvised since the benefit to the country's socioeconomics development is very significant. What is good for women is ultimately good for the national income distribution, economic development, and long-run economic resilience.

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