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Uneven Development: Structural Changes and Income Outcomes across States in Malaysia

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***Abstract*—**This paper looks at the nature of structural changes—the transition of employment from agriculture, to manufacturing, then to different types of services—in different states in Malaysia and links it to income outcomes for households and workers. Specifically, this paper investigates the conditional association between the concentration of different economic activities and income outcomes (household incomes and employee wages) in almost four decades. Using publicly available state-level employment and income data, we found that significant wage premium was associated with "modern" services (finance, real estate, professional, information and communication), which are urban-based services sectors that employ a larger proportion of skilled and educated workers. However, employment in manufacturing and other services subsectors was significantly associated with a lower income dispersion and inequality, alluding to their importance in welfare improvements.

***Keywords*—**Employment, labour market, structural change, wages.

I. Introduction

THE labour market is important for household and individual well-being, and it is one of the key policy areas for Malaysia. It is also closely linked to the country's regional and industrial policies as they play the important role of delivering decent jobs and remuneration. More than half of household income is from paid- and self-employment, illustrating the key linkages between these different policy areas [1].

Regional policies have evolved throughout Malaysia's development. Hutchinson [2] noted that regional policies were initially aspatial, focusing more on rural development rather than regional development. It was only in the 1970s that inter-state income inequality was explicitly mentioned, and the roles of state governments were strengthened as partners of the Federal government to carry out regional development. In the 1990s, overall development focused more on urbanisation and industrialisation, and in the 2000s, regional development was reconceptualised with the creation of economic corridors in different parts of the country. In the Tenth Malaysia Plan, economic corridors were intended to maximise the effects of agglomeration. However, Hutchinson [2] noted that meaningful comparisons between these different economic regions are difficult. This has led to scarce research on the effectiveness of Malaysia's economic corridors and regional development policies. Athukorala and Narayanan [3] attempted to fill this gap and focused on the Northern Corridor Economic Region, which is an economic corridor combining four states in northern Malaysia, namely Penang, Kedah, Perak, and Perlis (see Appendix 1 for the map of Malaysia and other economic corridors). Unfortunately, authors noted that even the corridor's administrators did not maintain detailed investment and employment data and based on macroeconomic figures, the corridor's success appears to be limited.

The Shared Prosperity Vision, which is the supposed foundation of the Twelfth Malaysia Plan (2020-2015), highlights that regional inequality is still a policy focus for the government and each state is targeted to focus on certain economic activities [4]. The re-shifting to state-based development motivates this paper to focus on state-based structural economic change and more importantly, its consequences on the economic well-being. Specifically, we investigate the conditional association between the concentration of certain economic activities and income outcomes i.e. level and inequality of household income and employee wages, in almost four decades.

Section II discusses the economic development of different states in Malaysia for context. Section III summarises the relevant literature related to the determinants of income outcomes, while Section IV specifies our empirical strategies, data and some summary statistics. Section V discusses our findings, while Section VI deliberates more thoroughly on the policy consequences as well as limitations of this paper.

II. Background

Structural changes of the economy underpin the development story of Malaysia. From an agricultural-based economy (66% of employment was in agriculture and fisheries in 1921 [5]), employment structure shifted to be industry-based, especially since the late 1980s as the country embarked on industrialisation [6].

In 2000, manufacturing peaked to be 24% of total employment, before it declined to be around 18% of total employment in 2019. Known as deindustrialisation (and argued to be premature especially for manufacturing, see [7] for discussion), manufacturing employment was replaced by the services sectors, which became the country's main employment and value-added generator for the country in the last decade. By 2019, 63% of employment was in services and it generated 54% of total value added for Malaysia (Fig. 1) [8], [9]. However, development experiences differ for different parts of the country. Divided into nine states and three federal territories, much of the value-added generated in Malaysia was

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concentrated in the advanced and more urban states [10]. In 2019 alone, 39% of total GDP were generated in Selangor and Kuala Lumpur (most populous state and the capital of the country, respectively), and this percentage has been rising since 2005 (Fig. 2). 51% of services GDP and 28% of industrial GDP between 2015 and 2019 were from these two areas, while the shares were 22% and 30% respectively for Johor, Melaka, Negeri Sembilan, Pulau Pinang and Terengganu (Fig. 3). While agriculture made up 10% of total Malaysia's GDP (average 7.6% between 2015 and 2019), it is concentrated in the remaining states—more than half of agriculture GDP was concentrated in Sabah, Sarawak, Labuan, Kedah, Kelantan, Pahang, Perak and Perlis.

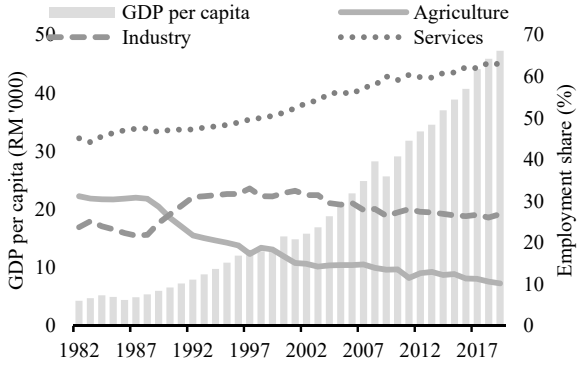

Fig. 1 Gross domestic product (GDP) per capita and employment share by economic activity, 1982-2019

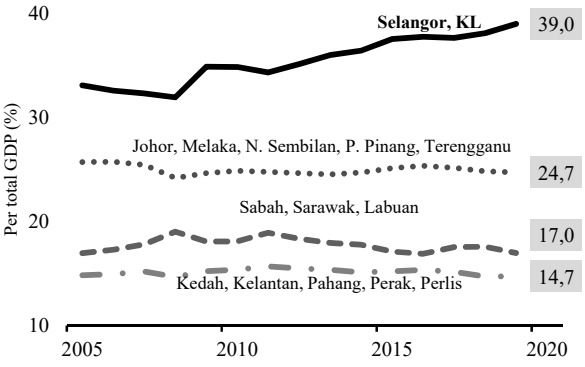

Fig. 2 Total GDP share by state group, 2005-2019; note: states are grouped based on household income in 2019

The primary focus of this paper is income outcomes, which refers to workers' wages and household income. Wages refer to remuneration people earn from their employment, while household income includes wages and other incomes like self-employment income and transfers. Although income alone does not determine well-being, it is still a necessary condition for poverty reduction [11]. The decent work agenda also highlights the importance of decent wages as a necessary condition for sustainable development [12]. The incomes received by workers and households in Malaysia are indeed closely associated with the value added created by the local economy. Between 2010 and 2019, the unconditional correlation between state's average real monthly wages and real GDP per capita was 0.76, whereas the correlation between state's average real monthly household incomes and real GDP per capita was 0.86. Unsurprisingly, the trend of household income (Fig. 4) looks similar to the trend of GDP distribution (Fig. 2), and employee wages in the greater KL conurbation steadily accounted for 40% of total employee wages in the last decade (Fig. 5).

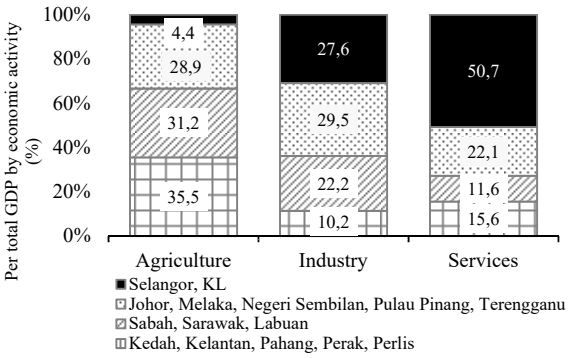

Fig. 3 GDP share by economic activity and state group, 2015-2019; note: states are grouped based on household income in 2019

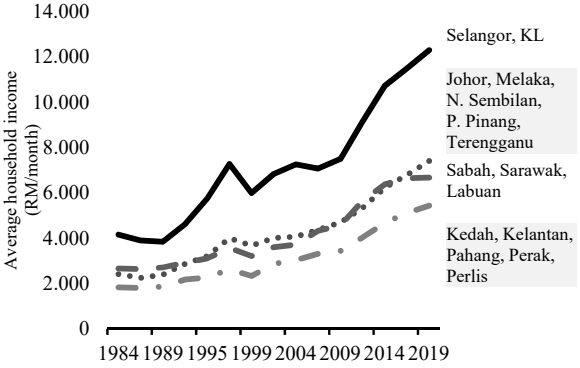

Fig. 4 Average household income by state group, 1984-2019; note: states are grouped based on household income in 2019

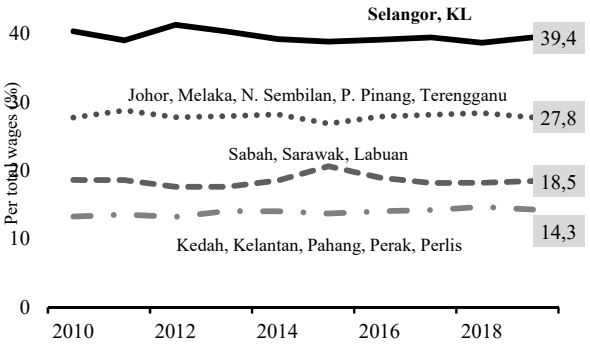

Fig. 5 Share of total employee wages by state group, 2010-2019; note: states are grouped based on household income in 2019

Income is determined by the sector and jobs which employed the workers. In 2019, the mining and quarrying sector paid the most, 91% higher than the national mean monthly wages (Fig. 6). "Modern" services, defined as

services activities in finance and insurance, real estate, information and communication, as well as professional, scientific and technical services tend to pay higher than national mean monthly wages. These services' sub-sectors are urban-based and typically have higher value-added per employment (a measure of productivity), in addition to higher shares of skilled workers [10], [13].

Skilled and better-educated workers were also compensated much higher than the national average. Skilled workers were paid RM5,073 per month on average, 57% higher than national mean monthly wages, whereas the mean monthly income of degree-holders were RM5,903, 83% higher than national figures (Fig. 7).

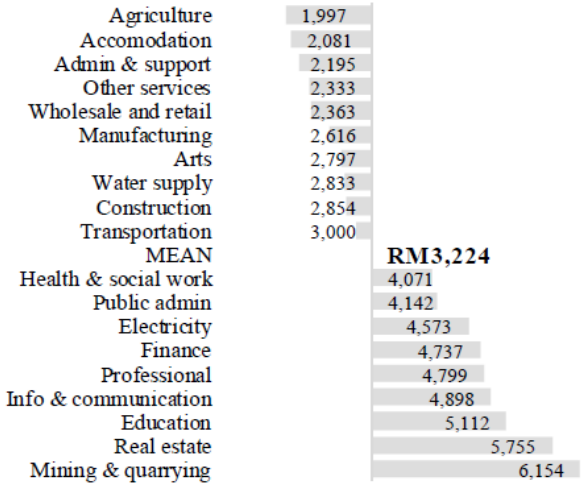

Fig. 6 Mean wages by economic activity, 2019

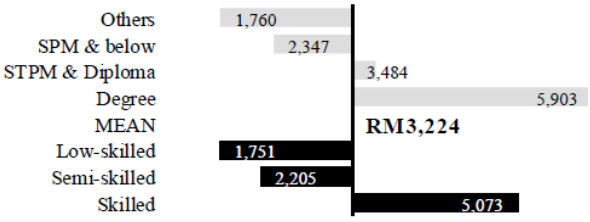

Fig. 7 Mean wages by qualification and skill level, 2019

The extent of wage inequality is also noteworthy, especially for broader discussions on the sources of inequality and its impacts on workers' and household's welfare. The extent of between-industry pay inequality has been rising slightly in the past decade. As the median monthly wages grow, the difference between the least paid economic activity and the median wage shrunk from 48% to 37% between 2010 and 2019. However, the difference between the median wage and the most paid economic activity has expanded, from 87% to 99% in the same period (Fig. 8). While wages have been growing at the bottom and inching closer to the median, but rising wage inequality could also be observed as wages expanded much further away than the median wage at the top.

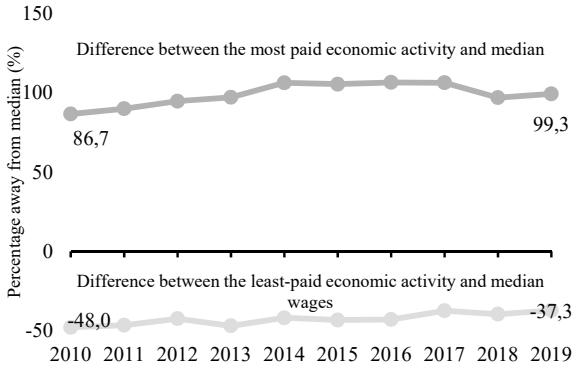

Fig. 8 Difference between median wages and most-paid & least-paid economic activity, 2010-2019

The extent of between-enterprise and within-enterprise inequalities is also increasingly important to explain inequality [14]. Typically, matched employer-employee datasets are required to study within-firm and between-firm remuneration inequality, but data on this are non-existent for Malaysia. However, using the reported income distribution of head of household's employment sector, we can estimate some within-industry inequality measures. Following [15], Fig. 9 maps the Palma ratio (ratio of the top 10% income share to the bottom 40% income share, higher Palma indicates higher inequality) against mean wages in 2019. From this chart, well-paid economic activities also tend to have high within-industry pay inequality. In fact, the four "modern" services sub-sectors charted the highest Palma ratios.

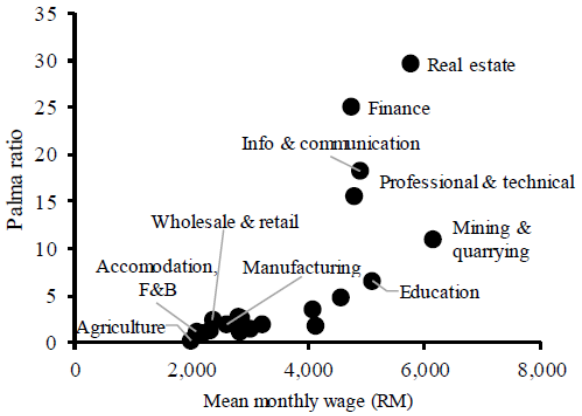

Fig. 9 Palma ratio and mean monthly wages, 2019

These discussions highlight how the structure of the local economy, defined as employment by economic activity and state, matters for the average local income outcomes. As discussion related to industrial and regional polices become more prominent, it is important to understand how economic activities are associated with the income outcomes of workers and households thus far in Malaysia.

III. Literature Review

Earnings are determined by various supply and demand conditions of the labour market. In supply of labour,

individual educational background and qualification could determine the pay one earns from their employment. In this area, the literature on returns to human capital investment is relevant. This typically includes a Mincer-type regression analysis which estimates the association between an additional year of schooling and the level of education or qualification, on individual wages. Milanovic [16] estimated that the returns to schooling for Malaysians in 1984, 1989 and 1997, and found relatively high returns to an additional year of schooling (10%). Kenayathulla [17] estimated the private returns to education for Malaysians in 2007 and found similarly high rates of over 10% for male and female with secondary and tertiary education. Citing several authors, Ismail, Abu Bakar and Saukani [18] noted that the private returns to education are between 12% and 14%, and education explains between 20% and 37% of wage differentials. A more extensive list of literature on returns to education could be found in Arshad and Ghani [19] and their own estimates using 2009 household income survey data found that the average private rate of return to upper secondary education was 11.9%, while university was 11.5%.

There are also demand-side considerations, such as the nature of pay structure of a particular sector or the changing demand for a specific job. Katz [20] summarised key linkages between wage structure and earnings inequality, particularly in the United States. Changes in job demand were linked to skill-biased technological change, complementarity between skills and capital, shifting of product markets as well as globalisation. The effects of labour market institutions as well as regulatory changes on relative wages could also affect workers' wages and the extent of wages inequality.

Microeconomic considerations particularly on the nature of firms matter too. The rise of wage inequality is increasingly linked to inequality between and within enterprises, wherein hyper-productive firms not only pay their workers very high, workers are also more polarised with the concentration of skilled workers in one type of firms, and low-skilled workers are outsourced to concentrate in another type of firms [14]. In the US, Song et al. [21] found that two-thirds of wage inequality was explained by between-firm inequality, while Barth et al. [22] found that rising dispersion of earnings between establishments explained large shares of earnings growth. The pay differential within a firm matters as the wage premium of low-skilled workers in large firms declines and the wages of corporate managers, CEOs and high-skilled professionals rise. ILO [14] compared the average wages across different firms of 22 European countries and found that at the lower end of income distribution, pay tends to be more equitable; but at the top, high-paying firms are not paying higher wages for all workers.

Relevant to this paper, structural economic changes also have some implications on income outcomes. Specifically focusing on the role of changing employment sector, Abdur Rahman and Schmillen [23] found that gains in Malaysia's GDP per capita were explained more by within-sector productivity growth rather than between-sector employment change. However, authors looked at GDP per capita and not individual or household income. In other literatures seeking to explain returns to education, authors typically attempt to control for worker's occupation, sector and location too; which informs the association between these variables (proxy for economic structure and labour demand) with income outcomes. In Milanovic [16], the average earnings for professionals were found to be twice as large as agricultural self-employed workers, though the premium decreased when ethnicity was included in the estimation. Locational premium also increased over time—in 1984, income in Kuala Lumpur as over 40% higher than Kelantan, but by 1989 it was over 60%. In Kenayathulla [17], the male and female wages in the Central West Malaysia were between 35% and 45% higher than wages in the Northern West Malaysia, controlling for human capital characteristics. Ismail et al. [18] included 'job characteristics' variables in their estimation and found significant and the largest association between income and knowledge work occupation (compared to manufacturing and service jobs). The regional differences of human capital and job characteristics also explained about 4.1% and 7.0% of observed wage gaps between developed and less developed states.

The empirical studies related to income outcomes for Malaysians tend to emphasise the role of labour market supply (i.e., human capital) without much focus on labour market demand factors. Given this gap, this paper attempts to unpack labour market demand as a determinant to income outcomes, particularly given the context of changing economic structure. It pivots from existing work on Malaysia because we rely on state-level data, instead of individual-level data, as it highlights the role of labour market demand on average wage outcomes. Using state-level data also provides larger variations and observations, compared to using national-figures; although our number of observations is fewer than studies that use individual-level microdata.

IV. Methodology & Data

A. Empirical Specification

Structural change is defined as the change of economic activities that employ workers. To estimate the conditional association between income outcomes and structural changes, the following regression equation is estimated for each state or federal territory *i*, at time *t*:

$$y_{it} = \alpha + \beta_1(share.mfg_{it}) + \beta_2(share.mod_{it}) + \beta_3(share.nonmod_{it}) + \Pi_k(X_{kit}) + \varepsilon_{it}$$

where y_{it} is the income outcome, $share.mfg_{it}$, $share.mod_{it}$ and $share.nonmod_{it}$ are *manufacturing*, *"modern" services* and *other services* employment shares, to proxy for the relative importance of these sectors in the state's economy at a point in time. We exclude the shares of agricultural, mining & quarrying, as well as construction economic activities due to their lower employment shares. Meanwhile, X_{kit} is a vector of control variables, namely the state's share of skilled

employment to control for labour demand related to workers' education and skill level, and labour force participation rate, to control for other labour market trends.

As a baseline, all estimations used ordinary least squares (OLS) and robust standard errors, but we also estimate regression equation using panel data methods. The main interest of this paper is the estimated size and significance of β_1 to β_3, which shows the association between income outcomes and a certain economic activity in a state or a federal territory.

Two hypotheses are tested in this paper, informed by the discussions in the previous section. (1) *"Modern" services* tend to exhibit higher wage levels, so we hypothesize it will exert a larger premium on state's income outcomes, compared to other economic activities. (2) *Other services* and *manufacturing* tend to have lower within-sector wage inequality, so we hypothesize these sectors will be associated with lower income inequality.

B. Variables and Data Sources

This paper looks at two types of income outcomes for each state and federal territory: (1) income level and (2) income distribution. For income level, we use real mean monthly wages of Malaysian employees between 2010 and 2019, and real mean monthly household income between 1984 and 2019 (pre-1989, income covers citizens and non-citizens; after 1989, income cover citizens only). For income distribution, we use mean-to-median difference between 2010 and 2019 for wages, and between 1995 and 2019 for household income ratio (median wages were only available since 1995) and Gini coefficient between 1984 and 2019. These indicators have different years due to differences of years covered in data sources—annual wages from Wages and Salaries surveys, and non-annual household income data from Household Income surveys.

The independent variables are the employment share by economic activities, for which annual data are available between 1982 and 2019 from the Labour Force survey reports. This is also the data source to estimate labour force participation rates as well as share of skilled employment. In the robustness section, we also use unemployment rates and share of degree-holders as alternative controls.

C. Summary Statistics

Table I shows the summary statistics for the main variables. For easy interpretation, mean values of monthly wages and household income were converted to logged values, while mean-to-median income difference (measure of dispersion) and the Gini coefficients (measure of inequality) were in percentages. Employment shares (per total employment of each state and federal territory) were also presented as percentages.

As household income consists of more than paid employment income, its average logged value was higher than wages. However, their dispersion was similar i.e. the differences between mean and median monthly wages and household incomes were both about 35%. Between 1984 and 2019, *other services* were the main economic activity (50% of total state's employment), and *manufacturing* was about 20% of total employment. Labour force participation rate (LFPR) averaged to 65%, and skilled workforce was 19% of total employment in this period.

TABLE I
SUMMARY STATISTICS

Variable	Mean	Standard deviation	Observations
Wages, 2010-2019			
Mean (logged)	7.84	0.21	160
Mean-median difference (%)	35.4	11.9	160
Household income, 1984-2019			
Mean (logged)	8.3	0.5	222
Mean-median difference (%)[a]	35.0	8.3	150
Gini (%)	37.9	11.1	222
Employment shares, 1984-2019			
Manufacturing (%)	17.5	8.4	229
Modern services (%)	5.1	4.1	229
Other services (%)	50.1	9.3	229
Other activities (%)	27.2	12.8	229
LFPR (%)	64.6	4.4	229
Skilled employment (%)	19.1	9.9	229

[a] Total observations for mean household income and mean-median difference were not the same because data for median household income were only available since 1995.

TABLE II
SUMMARY STATISTICS, BY DECADES

Variable	Mean	Standard deviation	Observations
Household income, 1984-1999			
Mean (logged)	7.9	0.4	98
Mean-median difference (%)	36.6	7.5	42
Gini (%)	42.2	3.4	98
Household income, 2002-2019			
Mean (logged)	8.6	0.4	124
Mean-median difference (%)[b]	34.3	8.6	108
Gini (%)	34.6	13.6	124
Employment shares, 1984-1999			
Manufacturing (%)	18.8	8.5	105
Modern services (%)	4.0	3.0	105
Other services (%)	44.5	6.6	105
Other activities (%)	32.7	13.4	105
LFPR (%)	64.6	3.6	105
Skilled employment (%)	11.3	4.0	105
Employment shares, 2002-2019			
Manufacturing (%)	16.4	8.2	124
Modern services (%)	6.1	4.6	124
Other services (%)	54.9	8.6	124
Other activities (%)	22.6	10.3	124
LFPR (%)	64.6	4.9	124
Skilled employment (%)	25.8	8.4	124

[b] Total observations for mean household income and mean-median difference were not the same because data for median household income were only available since 1995.

Since this paper looks at longer-term structural changes, it is also useful to analyse outcomes by different periods, although this was only possible for household income data and not wages data because the latter were only reported in the last

decade (Table II). We divided years into two periods: The 1980s and 1990s, when industrialisation was rapid at the national level; and the 2000s and 2010s, when deindustrialisation started and the country became more service-based. Over these two periods, household incomes improved, from logged mean household income value of 7.9 between 1984 and 1999, to 8.6 between 2002 and 2019. Both income dispersion and Gini coefficient also declined between 1984-1999 and 2002-2019, by 2.3 and 7.6 percentage points respectively, indicating reduction of inequality across states in the country.

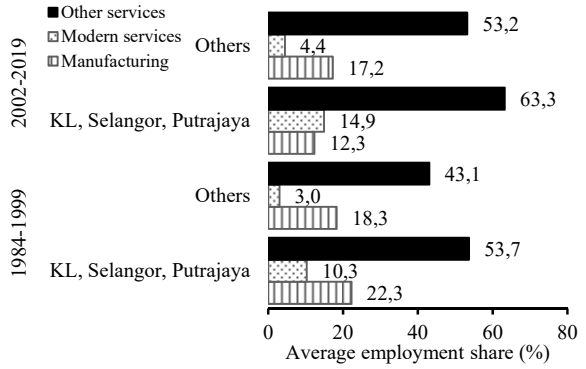

Fig. 10 Average employment share by economic activity, selected state and decade

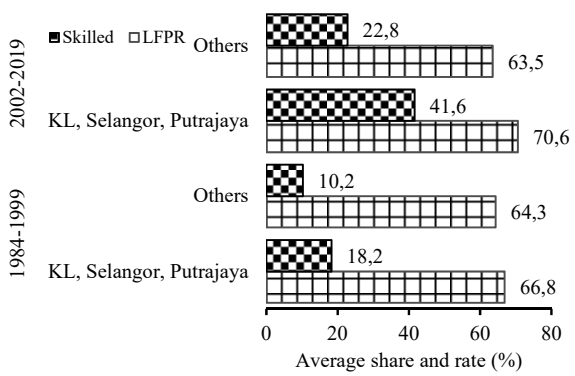

Fig. 11 Average share of skilled employment and LFPR, by selected state and decade

When the country was rapidly industrialising, the national average *manufacturing* employment share was higher at 18.8% per total employment between 1984 and 1999 but declined to 16.4% during deindustrialisation (Fig. 10). Services, instead, expanded, from 4.0% in 1984-1999 to 6.1% in 2002-2019 for *"modern" services*, and from 44.5% in 1984-1999 to 54.9% for *other services*. LFPR remained stable at around 65%, but the share of skilled employment grew as the structure of the economy evolved, from 11.3% in 1984-1999 to 25.8% in 2002-2019 (Fig. 10). Relevant to this paper, additionally, is the differences of employment outcomes between different states. Following analysis in the previous section, we separate Selangor (the most populous state in Malaysia), Kuala Lumpur (capital city) and Putrajaya (Federal government's administrative city) from the rest. In 2019, the mean and median household income in Selangor, Kuala Lumpur (KL) and Putrajaya was more than 30% higher than the national figures. *"Modern" services* employment also increased more prominently for these states, from an average of 10.3% of total employment in 1984-1999 to 14.9% in 2002-2019, whilst the expansion was marginal from 3.0% to 4.4% for other states.

At the back of these different sectoral concentrations, Fig. 11 shows other employment outcomes. Educated workforce shares and LFPRs were also higher for Selangor, KL and Putrajaya compared to other states, and especially after the 2000s.

V. Results

Per the empirical strategy outlined in Section IV, we discuss the conditional association of changing economic structure on the two types of income outcomes, income level and income distribution.

A. Income Levels

Table III shows results of estimating regression equation for logged mean wages using OLS (column i) and fixed effects (column ii). We included years fixed effects and used robust standard errors, based on several specification tests outlined later in this section.

TABLE III
Regression Results for Wages, 2010-2019

Logged mean wages	(i) OLS	(ii) Fixed effects
Manufacturing	-0.001	-0.007*
	(0.001)	(0.003)
Modern services	0.010***	0.007
	(0.002)	(0.007)
Other services	0.002	0.002
	(0.001)	(0.002)
Skilled	0.009***	0.003
	(0.002)	(0.003)
LFPR	0.009***	0.000
	(0.001)	(0.001)
Constant	6.735***	7.598***
	(0.096)	(0.150)
Observations	159	159
R-squared	0.940	0.937
Year fixed effects		Yes

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

In the last decade, higher *"modern services"* was the only economic activity that was significantly associated with higher state wages. For a 1 percentage point increase in *"modern services"* employment share, state mean wages increased by 1%, on average, all else constant. The increase of employment shares in *manufacturing* and *other services* were insignificant, though if we control for state-specific characteristics that do not vary with time (fixed effects in column ii), the association is significantly negative between *manufacturing* employment share and wage levels. This negative association is likely the result of declining importance of the economic activity due to deindustrialisation; average manufacturing employment share was 16.2% across all states in 2010 but declined slightly to

15.5% in 2019.

Table IV shows the results of estimating regression equation for logged household income. Because household income spans a longer time period, there is enough variation to produce significant results for all variables. *"Modern services"* employment still exerts a significant premium to state's household income level. A 1 percentage point increase of *"modern services"* employment was significantly associated with 5% higher household income on average, and if controlling for state fixed effects, this estimate declined to about 4%. Similar percentage point rise in *manufacturing* and *other services* employment shares were only significantly associated with 1% higher household income, both when estimated using OLS and fixed effects.

TABLE IV
REGRESSION RESULTS FOR HOUSEHOLD INCOME, 1984-2019

Logged household income	(i) OLS	(ii) Fixed effects
Manufacturing	0.009***	0.009***
	(0.001)	(0.003)
Modern services	0.047***	0.036***
	(0.003)	(0.006)
Other services	0.011***	0.013***
	(0.002)	(0.002)
Skilled	-0.004	0.002
	(0.003)	(0.003)
LFPR	0.031***	0.012**
	(0.002)	(0.005)
Constant	5.065***	6.214***
	(0.188)	(0.307)
Observations	220	220
R-squared	0.938	0.910[c]
Year fixed effects	Yes	

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.
[c] Refers to overall R-squared.

Table V estimates the regression by different decades for logged household income, to illustrate the changing association between economic activities and household income at different stages of Malaysia's development. The association between 1 percentage point rise in *manufacturing* employment and income outcomes expectedly moderated significantly as states deindustrialised away from manufacturing; from average 0.9% increase of household income levels in 1984-1999 (column i) to only 0.4% in 2002-2019 (column ii) for a 1 percentage point change in manufacturing employment share, all else constant. When restricted to only observations in the last decade (column iii), the significant association between income and manufacturing employment share was insignificant, similar to insignificant association found in column i of Table III.

Even though much of the economy shifted to services, the association between higher income levels and larger employment share was only significant for *"modern services"* instead of *other services*. However, the association moderated over time. For a 1 percentage point increase in *"modern" services* employment share, household income increased by 10.1% in 1984-1999, but only by 3% in 2002-2019. Worryingly, *other services*, which employs the bulk of the workforce, was not significantly associated with improved household income since the 2000s. This means that while these economic activities provided employment for many across the country, they do not drive higher wages.

TABLE V
REGRESSION RESULTS FOR HOUSEHOLD INCOME (OLS), BY DECADES

Logged household income	(i)1984-1999	(ii)2002-2019	(iii)2012-2019
Manufacturing	0.009***	0.004**	0.002
	(0.001)	(0.002)	(0.003)
Modern	0.101***	0.030***	0.028***
	(0.011)	(0.004)	(0.005)
Other services	-0.008**	0.004	0.004
	(0.004)	(0.003)	(0.004)
Skilled	-0.013*	0.008**	0.010*
	(0.007)	(0.004)	(0.005)
LFPR	0.022***	0.023***	0.017***
	(0.004)	(0.003)	(0.004)
Constant	6.297***	6.129***	6.845***
	(0.395)	(0.261)	(0.365)
Observations	98	122	64
R-squared	0.912	0.936	0.919
Year fixed effects		Yes	

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

B. Income Dispersion and Inequality

The distribution of income outcomes can analyse the welfare effects of structural economic change. After all, even if wages are high for some workers but it is not too far away from the average or median worker; it could be said that welfare is improving and there is opportunity to "catch-up" for many. On the flipside, if income becomes more dispersed and unequal, average welfare is either unchanged or becomes worse.

Table VI shows the results of estimating regression equation for mean-median difference (in %) using OLS (column i) and random effects (column ii). We included years fixed effects and used robust standard errors, based on several specification tests discussed in the later part of this section.

TABLE VI
REGRESSION RESULTS FOR WAGES, 2010-2019

Mean-median difference	(i) OLS	(ii) Random effects
Manufacturing	-0.697***	-0.587**
	(0.133)	(0.299)
Modern	-0.353	0.065
	(0.303)	(0.403)
Other services	-0.472**	-0.381
	(0.185)	(0.302)
Skilled	0.109	-0.313
	(0.241)	(0.203)
LFPR	-0.994***	-0.338
	(0.213)	(0.343)
Constant	132.507***	93.774***
	(17.172)	(28.593)
Observations	159	159
R-squared	0.417	0.306[d]
Year fixed effects		Yes

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.
[d] Refers to overall R-squared.

Although wage levels were not significantly associated to *manufacturing* and *other services* employment share in the previous section, they were significantly associated with the reduction of wage dispersion in the past decade. All else constant, a 1 percentage point increase in employment share of these economic activities reduced the mean-median wage differences significantly between 0.5 and 0.7 percentage points, all else constant (column i, Table VI).

OLS and random effects results for household income measures of dispersion and inequality are in Table VII. All else constant, a 1 percentage point increase in *manufacturing* employment is associated to a significant reduction of mean-median income difference of between 0.3 and 0.4 percentage points, and Gini coefficient of between 0.04 (insignificant) and 0.09 percentage points. Results in column iii also shows that larger shares of *"modern" services* employment was significantly associated to the rise in Gini by 0.2 percentage points, through the association is insignificant for random effects estimator and other income distribution measures. To an extent, this means that the larger concentration and growth of *"modern services"* have contributed to rising inequality for some states.

TABLE 7
REGRESSION RESULTS FOR HOUSEHOLD INCOME, 1984-2019

Outcomes	Mean-median difference		Gini	
	(i) OLS	(ii) Random effects	(iii) OLS	(iv) Random effects
Manufacturing	-0.441***	-0.296**	-0.090***	-0.036
	(0.076)	(0.149)	(0.022)	(0.043)
Modern	0.350	0.208	0.237**	-0.002
	(0.278)	(0.352)	(0.091)	(0.128)
Other services	-0.031	0.269	-0.012	0.035
	(0.148)	(0.200)	(0.045)	(0.059)
Skilled	-0.223	-0.299	-0.159***	-0.057
	(0.207)	(0.238)	(0.056)	(0.052)
LFPR	0.442**	0.131	0.154**	0.079
	(0.189)	(0.274)	(0.065)	(0.103)
Constant	120.535***	125.187***	38.083***	39.757***
	(15.915)	(20.764)	(5.504)	(7.943)
Observations	148	148	220	220
R-squared	0.435	0.363[e]	0.519	0.470[f]
Year fixed effects			Yes	

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p<0.
[ef] Refers to overall R-squared.

Similar to earlier analysis on household income levels by selected decades, Table VIII illustrates the estimates for mean-median difference and Gini coefficient by decades. The equalising association between manufacturing employment and income outcomes increased over the past decades. During industrialisation, a 1 percentage point increase in *manufacturing* employment was associated with a 0.4 percentage point decline in mean-median wage difference, and around 0.08 decline in Gini coefficient (column i); but the magnitude was larger during deindustrialisation, 0.6 percentage points decline for mean-median wage difference, and 0.14 percentage points decline for Gini coefficients, all else constant (column ii). This is consistent with the fact that within-industry wage inequality is not too high for this sector (at least in 2019, as illustrated by the sector's Palma ratio in Fig. 9) and it has managed to lift many workers at the bottom end of the wage distribution, even when it employs smaller proportions of the workforce now.

TABLE VIII
REGRESSION RESULTS FOR HOUSEHOLD INCOME (OLS), BY DECADE

Years	(i) 1984-1999	(ii) 2002-2019	(iii) 2012-2019
	A. Mean-median difference		
Manufacturing	-0.434***	-0.564***	-0.456***
	(0.112)	(0.094)	(0.156)
Modern	-0.383	0.015	0.342
	(0.579)	(0.326)	(0.470)
Other services	0.009	-0.258	-0.081
	(0.287)	(0.165)	(0.251)
Skilled	0.614	0.067	-0.033
	(0.468)	(0.229)	(0.371)
LFPR	1.050***	0.179	0.015
	(0.343)	(0.204)	(0.294)
Constant	72.480**	149.964***	141.640***
	(30.152)	(15.528)	(24.606)
Observations	42	106	48
R-squared	0.416	0.464	0.327
Year fixed effects		Yes	
	B. Gini coefficients		
Manufacturing	-0.075**	-0.143***	-0.153**
	(0.031)	(0.034)	(0.060)
Modern	-0.347	0.120	0.064
	(0.220)	(0.109)	(0.157)
Other services	0.171**	-0.138**	-0.179*
	(0.076)	(0.066)	(0.099)
Skilled	0.127	-0.023	0.036
	(0.150)	(0.076)	(0.125)
LFPR	0.401***	0.043	-0.015
	(0.090)	(0.086)	(0.122)
Constant	13.471	49.246***	51.901***
	(8.527)	(7.063)	(10.890)
Observations	98	122	64
R-squared	-0.075**	0.525	0.348
Year fixed effects		Yes	

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Other services, which employs close to half of the workforce, was not significant in reducing wage dispersion, but as equally significant as the *manufacturing* sector to reduce Gini coefficient in the last two decades (column ii). In the earlier years, however, it was significantly and positively associated to higher Gini values (column i). Similar to *manufacturing*, most *other services* also show lower extent of within-sector pay inequality and the expansion of these economic activities play a significant role in reducing inequality for workers and households.

C. Tests and Alternative Specifications

This sub-section explains the econometrics tests used to justify the estimation methods used in this paper. Detailed results of the tests discussed here are in given in Table XII of Appendix II.

In the previous sub-section, estimates on wages and

household income levels use robust standard errors and included year fixed effects. Intuitively, we expect to see heteroskedasticity because analysis is based on state-level observations and it is likely that variance is non-constant because different states behave differently. Most outcomes show the presence of heteroskedasticity, and therefore, require the use of robust standard errors. Meanwhile, the inclusion of time fixed effects accounts for time-specific considerations that affect *all* states; for example, the introduction of or changes in nation-wide policies. To test whether these should be included, we jointly test the significance of estimates on year dummies and failed to reject their insignificance.

As the data allow it, we also used panel data methods. To check whether fixed or random effects estimators were more efficient, we used the Hausmann and overidentification tests. For level outcomes (mean wages and mean household income), fixed effects were found to be the efficient estimator. It is also an intuitive way to specify the regression because it controls for time invariant state-specific factors such as the state's resource endowment. For distribution outcomes, random effects were found to be the efficient estimator. It assumes no correlation between time invariant state-specific factors and other independent variables. While unrealistic, we suspect this is the case because the mean and median percentage difference and the Gini coefficients are relative measures *within the wages and household income distribution*, meaning they remain relatively independent to other labour-market independent variables. Moreover, others who have used these measures also found random effects to be efficient estimator for their specification [24].

Instead of mean income outcomes, we could also use median income as an alternative specification, and Table IX shows the estimated results. There were slight changes to the results when median wages and household income were used instead of mean wages and household income. Median wages were significantly and positively associated to employment shares in all economic activities included in the OLS regression, although the association is still the largest for *"modern services"* (column i). In fixed effects regression, median wages were only significantly associated with employment shares in *other services* (column ii).

The estimated coefficients when regressing median household income on the employment shares of *manufacturing*, *"modern services"* and *other services* are different than when regressing mean household income. However, the positive sign and the significance of the estimates remains, and *"modern services"* coefficient is the largest among the three economic activities. Robustly, states with higher shares of *"modern services"* employment have higher income outcomes for its workers and households.

We also wanted to check if the estimates are robust to using different control variables in its specification. We included estimate for the model by replacing share of skilled employment with share of degree-holders and replacing LFPR with unemployment rate.

TABLE IX
REGRESSION RESULTS FOR MEDIAN OUTCOMES

Outcome	(i) OLS	(ii) Fixed effects
A) Wages level, 2010-2019		
Manufacturing	0.004**	-0.003
	(0.001)	(0.004)
Modern	0.013***	-0.003
	(0.002)	(0.010)
Other services	0.005***	0.006*
	(0.002)	(0.003)
Skilled	0.008***	0.006*
	(0.002)	(0.003)
LFPR	0.016***	-0.000
	(0.002)	(0.003)
Constant	0.004**	-0.003
	5.742***	7.008***
	(0.167)	(0.292)
Observations	159	159
R-squared	0.889	0.544[g]
B) Household income level, 1995-2019		
Manufacturing	0.012***	0.016***
	(0.001)	(0.004)
Modern	0.043***	0.033***
	(0.004)	(0.007)
Other services	0.010***	0.016***
	(0.003)	(0.004)
Skilled	-0.002	0.000
	(0.004)	(0.004)
LFPR	0.027***	0.010*
	(0.003)	(0.005)
Constant	5.081***	5.919***
	(0.261)	(0.244)
Observations	148	148
R-squared	0.922	0.879[h]

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.
[gh] Refers to overall R-squared.

TABLE X
ALTERNATIVE REGRESSION RESULTS FOR WAGES (OLS), 2010-2019

Outcome	(i) Mean	(ii) Mean-to-median difference
Manufacturing	0.003***	-0.853***
	(0.001)	(0.156)
Modern	0.013***	-0.721***
	(0.002)	(0.262)
Other services	0.002**	-0.639***
	(0.001)	(0.152)
Degree	0.020***	-0.013
	(0.002)	(0.248)
Unemployment	0.023***	-1.172
	(0.004)	(0.782)
Constant	7.202***	91.047***
	(0.061)	(12.056)
Observations	159	159
R-squared	0.905	0.311

Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.

When looking at mean wages and mean-to-median wages difference, using alternative controls produces a better specified model as all estimates are significant, but the resulting specification has slightly lower r-squared than that in Table III. The coefficient on degree (0.02) is also larger than

coefficient on any economic activities, which alludes to the significance of qualification on wages, as highlighted by the many works of human capital returns to individual wages found in the literature [16]-[19] (Table X).

Table XI has the results of using alternative controls for household income outcomes. Compared to Table IV, other services employment share was found to be insignificantly associated with mean household income levels. However, it is significantly associated with lower income dispersion and inequality (both insignificant in Table IV). Higher *manufacturing* employment share, however, remains to show robust negative association with income dispersion and inequality, indicating that this economic activity matters for the reduction of income inequality since the 1990s.

TABLE XI
ALTERNATIVE REGRESSION RESULTS FOR HOUSEHOLD INCOME (OLS), 1995-2019

Outcome	(i) Mean	(ii) Mean-to-median difference	(iii) Gini
Manufacturing	0.012***	-0.369***	-0.082*
	(0.002)	(0.109)	(0.043)
Modern	0.032***	-0.712	-0.031
	(0.009)	(0.548)	(0.155)
Other services	0.004	-0.346*	-0.168***
	(0.003)	(0.177)	(0.061)
Degree	-0.002	1.537***	0.318**
	(0.011)	(0.529)	(0.150)
Unemployment	0.033**	1.880**	0.743**
	(0.013)	(0.792)	(0.282)
Constant	4.634***	81.119***	58.516***
	(0.386)	(20.309)	(7.058)
Observations	75	75	90
R-squared	0.927	0.529	0.540

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0$.

VI. DISCUSSION & CONCLUSION

This paper investigates the association between structural changes of the local economy, defined by sectoral employment shift, with level and distributional income outcomes for workers and households in Malaysia. We found as far back as data allow that employment in *"modern services"* is associated significantly with higher income outcomes for states in the country. These economic activities are urban-based, employ larger shares of skilled workers and tend to pay their workers high wages. These economic activities also concentrate in the most advanced parts of the country i.e., Selangor, KL and Putrajaya.

Although the wage premium associated with manufacturing and other services is not as high or even as significant as *"modern services"*, these economic activities play a significant role in reducing the extent of wage dispersion and inequality. In these sectors, within sector wage inequality (proxied by Palma ratio) tends to be much lower and the expansion of manufacturing employment in the 1990s and other services in the 2000s has led to income improvement of many at the bottom of the income distribution. To a limited extend, this paper shows the significant association of structural economic change on welfare.

This analysis may also benefit some policies. Firstly, it lends some support to industrial policies in developing countries as there is some significant association with income outcomes. When the estimates of association between income and economic activities are compared between the period of rapid industrialisation and deindustrialisation, the former produced larger magnitudes of estimates than the latter. These industrial policies are not specific to developing the labour market, rather to develop economic activities that spur growth and thus also include other investment policies.

Secondly, it highlights the need to rethink Malaysia's regional policies cohesively with its industrial policies. Throughout the country's development, the linkages between these two policies do not appear to be strong and may further emphasis path dependency of development, rather than correcting them. For example, a state that is *already* an urban-based modern state is pushed further to develop its position as a leader, but without a clear or tangible strategy to guide other states that are catching up. As noted by Athukorala and Narayanan [3], much work remains to manage inter-state relationships in Malaysia's implementation of regional development. The inability to lift less developed states to reach better income outcomes may harm long-term welfare.

Thirdly, the selection of specialisation of economic activities in industrial and regional policies faces an important trade-off between high value creation and inequality. Although the income outcomes and productivity levels of *manufacturing* and *other services* are not as high as *"modern services"*, they matter significantly to reduce inequality. In addition to the recommendation to improve productivity levels of these economic activities, policymakers must also track its within-industry wage inequalities. Moreover, the large extent of inequality in *"modern services"* should also remind policymakers that increasing these economic activities in other parts of the country is not a clear cut strategy moving forward.

Studies related to within-industry and even within-firm inequality are few and far between for Malaysia, limiting our understanding of the role of structural features of the economy on the overall economic well-being and welfare of individuals and households. To the best of our ability, with publicly available data, we attempt to study this association. This paper remains limited in several ways. Primarily, it did not make any causal claims and did not consider potential dynamics between different economic activities, for e.g., the interaction and potential compounding effects between *manufacturing* activities and *manufacturing-related services* activities. It also ignores within sector productivity growth and views each sector in static by using employment shares. A sector could employ fewer workers, but also become more capital-intensive and produce more, increasing returns to workers too. More research at more detailed levels might help illuminate further the effects of structural features of the economy on workers and households.

APPENDIX I MAP* OF MALAYSIA, MEAN MONTHLY HOUSEHOLD INCOME BY STATE AND REGIONAL ECONOMIC CORRIDOR, 2019

A. West Malaysia

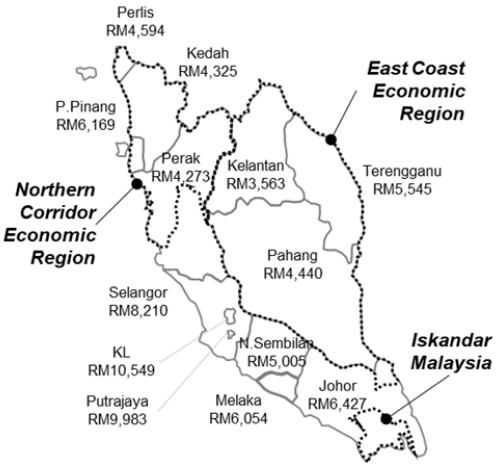

Fig. 11 Mean monthly household income and regional economic corridor in West Malaysia, 2019
*Map is not drawn to scale and for illustrative purposes only

B. East Malaysia

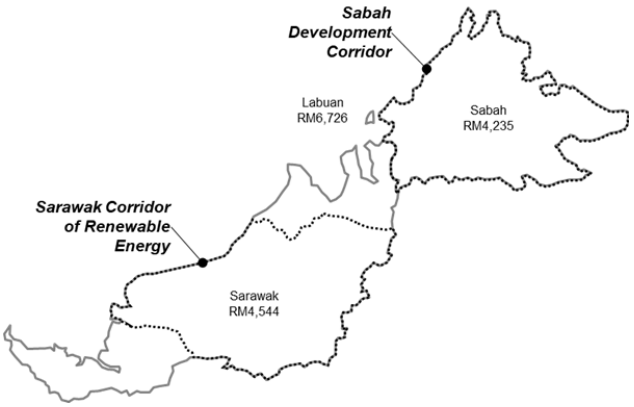

Fig. 12 Mean monthly household income and regional economic corridor in East Malaysia, 2019
*Map is not drawn to scale and for illustrative purposes only

APPENDIX II RESULTS OF SPECIFICATION TESTS

Table XII includes the results of various specification tests for regressions of regression equation with different outcome variables.

TABLE XII
RESULTS OF SPECIFICATION TESTS

(i) Purpose	(ii) Test	(iii) Results	(iv) Conclusion
A) Outcome: Mean wages level			
Inclusion of time dummies i.e. year fixed effects	F-test (OLS & fixed effects)	Prob > F = 0.0000	Reject H0: joint insignificance of year dummies, include year fixed effects
Random versus fixed effects estimator	Hausman test	Prob > chi2 = 0.0030	At 5%, reject H0: No difference between estimators, use fixed effects
	Over-identification restriction test	P-value = 0.0000	Reject H0: No difference between estimators, use fixed effects
Use of robust standard errors for heteroskedasticity	Breusch-Pagan test (OLS)	Prob > chi2 = 0.6211	Do not reject H0: constant variance, no need to use robust standard errors.
	Modified Wald test (Fixed effects)	Prob > chi2 = 0.0000	Reject H0: No groupwise heteroskedasticity, use robust standard errors
B) Outcome: Mean to median wage difference			
Inclusion of time dummies i.e. year fixed effects	F-test (OLS & random effects)	Prob > F = 0.5172 (OLS), 0. 0.4324 (random effects)	Do not reject H0: joint insignificance of year dummies, do not include year fixed effects
Random versus fixed effects estimator	Hausman test	Prob > chi2 = 0.1043	Do not reject H0: No difference between estimators, use random effects
	Over-identification restriction test	P-value = 0.0216	At 5%, reject H0: No difference between estimators, use fixed effects
Use of robust standard errors for heteroskedasticity	Breusch-Pagan test (OLS)	Prob > chi2 = 0.0001	Reject H0: constant variance, use robust standard errors.
	Modified Wald test (Fixed effects)	Prob > chi2 = 0.0000	Reject H0: No groupwise heteroskedasticity, use robust standard errors
C) Outcome: Household income level			
Inclusion of time dummies i.e. year fixed effects	F-test (OLS & fixed effects)	Prob > F = 0.0000 (OLS), 0.0000 (fixed effects)	Reject H0: Joint insignificance of year dummies, include year fixed effects
Random versus fixed effects estimator	Hausman test	Prob > chi2= 0.0000	Reject H0: No difference between estimators, use fixed effects
	Over-identification restriction test	P-value = 0.0000	Reject H0: No difference between estimators, use fixed effects
Use of robust standard errors for heteroskedasticity	Breusch-Pagan test (OLS)	Prob > chi2 = 0.0000	Reject H0: Constant variance, no need to use robust standard errors.
	Modified Wald test (Fixed effects)	Prob > chi2 = 0.0000	Reject H0: No groupwise heteroskedasticity, use robust standard errors
D) Outcome: Mean to median household income difference			
Inclusion of time dummies i.e. year fixed effects	F-test (OLS & random effects)	Prob > F = 0.0000 (OLS), 0.0000 (random effects)	Reject H0: Joint insignificance of year dummies, include year fixed effects
Random versus fixed effects estimator	Hausman test	Prob > chi2= 0.2149	Do not reject H0: No difference between estimators, use random effects
	Over-identification restriction test	P-value = 0.0000	Reject H0: No difference between estimators, use fixed effects
Use of robust standard errors for heteroskedasticity	Breusch-Pagan test (OLS)	Prob > chi2 = 0.0049	At 5%, reject H0: Constant variance, use robust standard errors.
	Modified Wald test (Fixed effects)	Prob > chi2 = 0.0000	Reject H0: No groupwise heteroskedasticity, use robust standard errors
E) Gini coefficient			
Inclusion of time dummies i.e. year fixed effects	F-test (OLS & random effects)	Prob > F = 0.0000	Reject H0: joint insignificance of year dummies, include year fixed effects
Random versus fixed	Hausman test	Prob > chi2= 0.4543	At 5%, reject H0: No difference between estimators, use random effects

effects estimator	Over-identification restriction test	P-value = 0.0000	Reject H0: No difference between estimators, use fixed effects
Use of robust standard errors for heteroskedasticity	Breusch-Pagan test (OLS)	Prob > chi2 = 0.2792	Do not reject H0: constant variance, no need to use robust standard errors.
	Modified Wald test (Fixed effects)	Prob > chi2 = 0.0000	Reject H0: No groupwise heteroskedasticity, use robust standard errors

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