

ECONOMICS WORKING PAPER

Human Capital, Amenities and Trade: The Case of Malaysia

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Abstract

Human capital plays an increasingly important role in economies undergoing structural transformation that involves technological upgrading and sustained trade competitiveness. Both production and consumption amenities are essential to develop, attract and support a workforce with high human capital. Different types of production and consumption amenities are relevant for different kinds of activities at various locations. As human capital growth is likely to be accompanied by worsening inequality, complementary policies are needed to promote inclusiveness without dampening human capital development.

Keywords: Trade, Human Capital and Amenities

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1. Introduction

The Malaysian economy has undergone more than five decades of industrialization. The manufacturing sector remains an important contributor to the economy even though the sector's share of output and employment has declined since the early 2000s. This phenomenon of premature deindustrialization – the declining contribution of manufacturing before becoming a developed economy – has raised concerns about the future of manufacturing in Malaysia. In recent economic policy initiatives such as the National Trade Blueprint 2021, there are concerns about the export competitiveness of the country's manufacturing sector. The current policy response is focused on technological upgrading with the goal of producing higher value-added goods. The policy goal of technological upgrading is situated within the context of global value chains (GVCs) (World Bank, 2020).

A key factor in the upgrading of trade and GVC participation is human capital. However, this is not a stand-alone factor as the agglomeration of human capital requires good urban amenities which include opportunities for consumption by workers with high human capital and skills (Glaeser et al., 2001). Such opportunities include consumption amenities that facilitate social interactions (Glaeser and Gottlieb, 2006). One important aspect that merits further investigation is shifts into skill intensive outputs associated with the growth of services (Buera and Kaboski, 2012). Services are related to the upgrading of GVC participation as service inputs are key elements that support production fragmentation as well as the consumption side.

Despite the importance of urban amenities that support production and consumption for upgrading participation in trade and GVCs, this topic has not been researched in Malaysia. The goal of the proposed study is to fill this gap in the research literature by examining this issue empirically. Hence, the main objective of this study is to empirically examine the relationships between human capital, amenities and trade in Malaysia. Some of the research questions that we are interested to explore include: (i) How are trends in human capital driven by production

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and consumption amenities? (ii) To what extent is exporting related to human capital via amenities? This study will use state and district-level data for the empirical analysis.

The outline of the paper is as follows. Section 2 will review the literature briefly. This will be followed by a discussion of the research methodology in Section 3. The empirical results are discussed in Section 4 (state-level) and Section 5 (district-level). Section 6 provides some policy implications. Section 7 concludes.

2. Literature Review

The importance of human capital in economic agglomeration has been articulated by Moretti (2004). Human capital spillovers are theoretically important but the empirical verification of these spillover effects are challenging. Tabuchi and Yoshida (2000) stressed the importance of making the distinction between production and consumption economies in agglomeration. This dichotomy provides a useful way to think about two set of activities that complement each other in their relations to human capital. In so far as consumption activities are related to some urban amenities, the agglomeration of human capital also requires good urban amenities. These amenities provide opportunities for consumption by workers with high human capital and skills (Glaeser et al, 2001).

Another dimension of consumption which plays a role in human capital and agglomeration is product variety (Glaeser et al, 2003). Product variety is an important element in the economic geography literature and their inclusion in the consumption side suggests the importance of urban amenities that increase opportunities for greater product variety in consumption. Another aspect of consumption amenities is their role in facilitating social interactions (Glaeser and Gottlieb, 2006).

A number of recent studies have found positive linkages between human capital and GVC participation. Hing et al. (2020) examine the effects of human capital on small and medium-sized firms (SME) participation in global value chains. Using data from Indonesia, the authors found that SMEs with linkages to global value chain activities are more likely to have a higher level of human capital.

Wang and Thangavelu (2021) provide cross-country evidence on the relationship between domestic value-added trade flows and human capital development in both exporting and

importing countries. In addition, their results suggest that skill intensity has a positive effect on bilateral domestic value-added trade in GVCs.

The literature reviewed clearly suggests linkages between human capital and agglomerations as well as between human capital and GVC participation. One dimension that should be added to the GVC participation analysis is the consumption aspect. The concentration of human capital requires amenities that support both consumption and production activities.

3. Methodology and Data

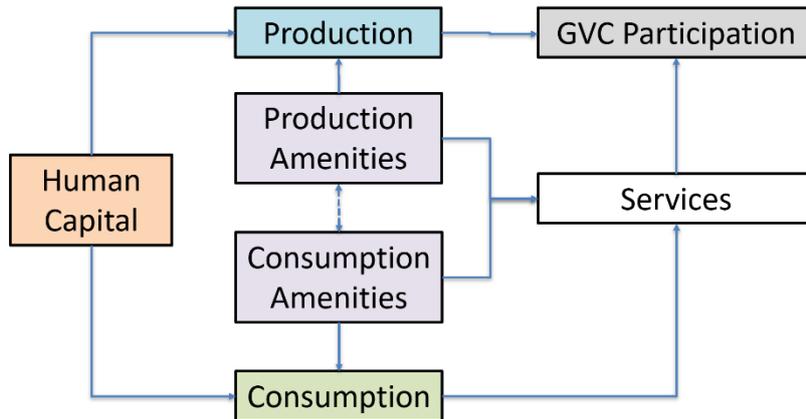
The empirical method used in this study comprises econometric analyses of the relationships between GVC participation and other variables that include human capital, urban amenities, and urban consumption.

The relationship between human capital, amenities and GVC participation can be conceptualised using a framework that comprises two components, namely:

- Component 1: Consumption – which include elements such as human capital, consumption, amenities and services
- Component 2: Production – which covers trade / GVC participation, human capital, amenities, manufacturing and services

These two aspects are depicted in **Figure 1**. In this framework, human capital plays a role in GVC participation and the level of human capital is affected by opportunities for consumption activities that are enabled by consumption amenities. Both production and consumption amenities involve the provision of services that are also important for GVC participation. However, it may not always be possible to separate production amenities from consumption amenities.

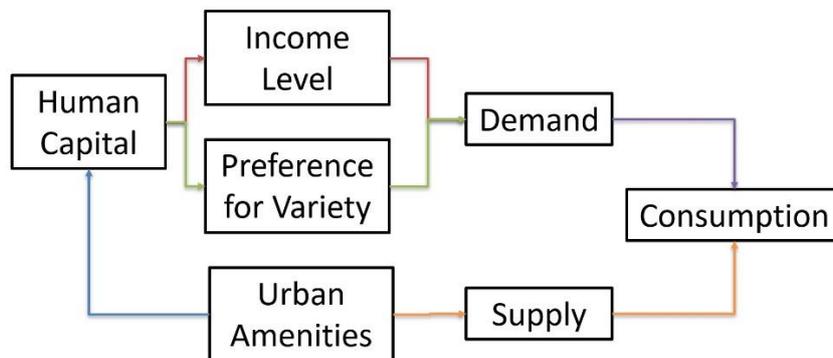
Figure 1: Human Capital – Production and Consumption Amenities



Source: Author

The level of human capital affects the level of income and preference for variety, both of which drive the patterns of consumption (**Figure 2**). The realization of consumption which is driven by these factors will require urban amenities that supply the goods and services that will meet these demands.

Figure 2: Human Capital and Drivers of Consumption



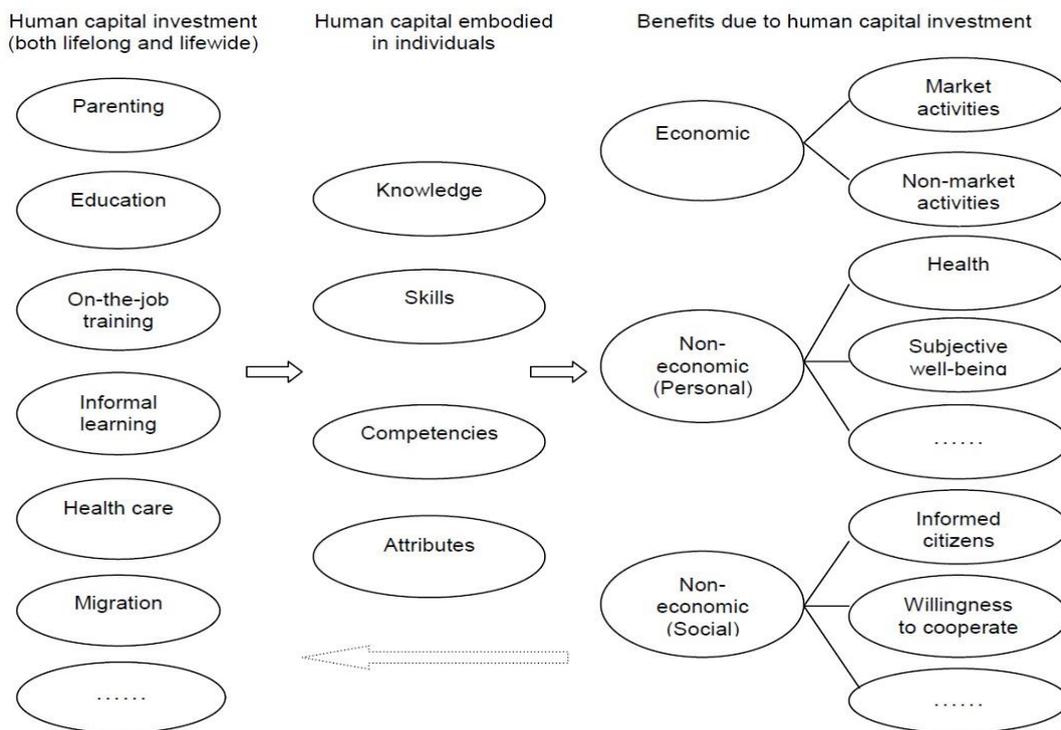
Source: Author

Empirical work on human capital requires an understanding of how it can be measured (Boarini et al, 2012). Human capital has many dimensions (**Figure 3**). The formation of human capital involves various types of activities and sources. These “inputs” into human capital include parenting, education, on-the-job training, informal learning, health care and migration. Human

capital per se can be embodied in individuals in many forms such as knowledge, skills, competencies and attributes. This can be construed as human capital “output” or “stock”. The benefits of human capital are the “effects” from using human capital. These effects can be economic and non-economic in nature. The distinction between inputs, outputs and effects of human capital has important implications for the measurement of human capital in empirical work.

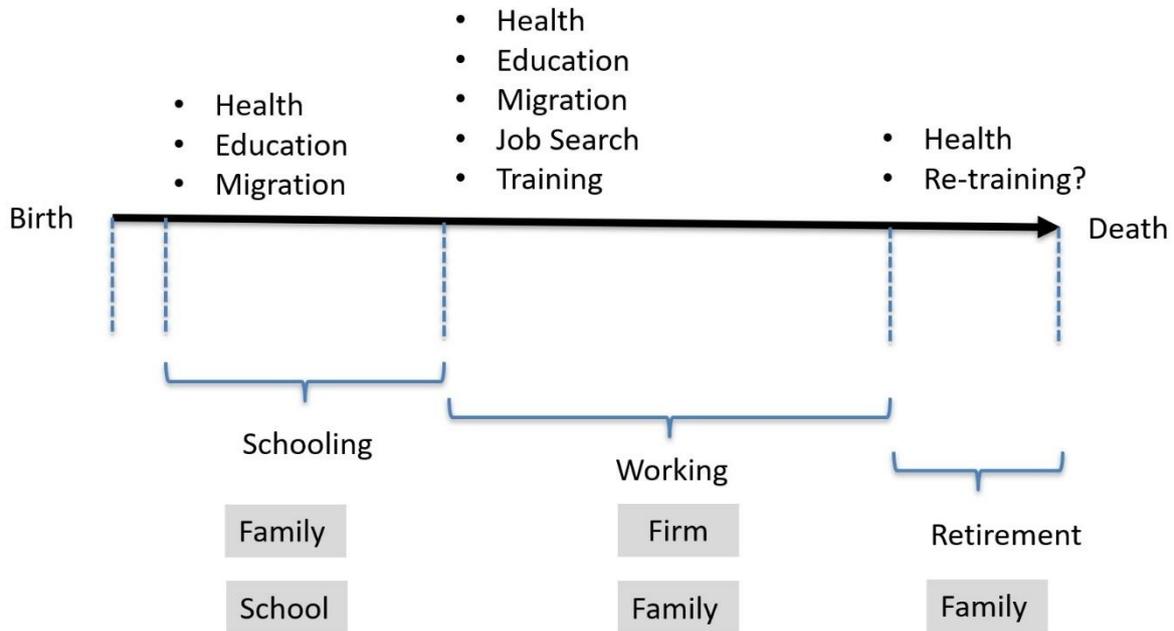
The measurement of human capital is also affected by its formation during the different stages of lifecycle. For example, when human capital is measured at the firm level, the human capital observed is an accumulated stock from previous stages of workers’ lifecycle such as health care, education and migration. This is an important point as the policy interventions to support human capital may need to originate earlier before individuals join the workforce.

Figure 3: Dimensions of Human Capital: Formation, Component and Benefits



Source: Boarini et al (2012)

Figure 4: Human Capital Formation and Lifecycle



Source: Author

Following Borini et al (2012), the empirical and policy approaches to measuring human capital can be divided into 2 major categories:

- **Indirect / Residual Approach:**

$$\text{Total Human Capital Stock} = \text{Total Wealth} - \text{Tangible Wealth}$$

where total wealth = total discounted value of each country's future consumption flows;
and tangible wealth = Produced capital and the market-component of natural capital

- **Direct Approach:**

(a) Cost-Based [Input] - Stream of past investments undertaken by individuals, households, employers and governments

(b) Income-Based [Output] - stream of future earnings that human capital investment generates over the lifetime of a person

4. State-Level Analysis

Malaysia comprises 13 states and three federal territories. Data at the state level are available to undertake an empirical analysis of the relationship between trade, human capital and amenities (for production and consumption).

4.1 Trends and Patterns

The size of the population and population density are very uneven across the states in Malaysia (Figure 5). This suggests that agglomeration effects are concentrated in a few states with high population density such as Kuala Lumpur, Pulau Pinang, Selangor and Melaka. The consequence of this is a tiering of cities where only a few large cities experience higher wages which is a proxy for human capital (i.e. income-based approach) (Figure 6).

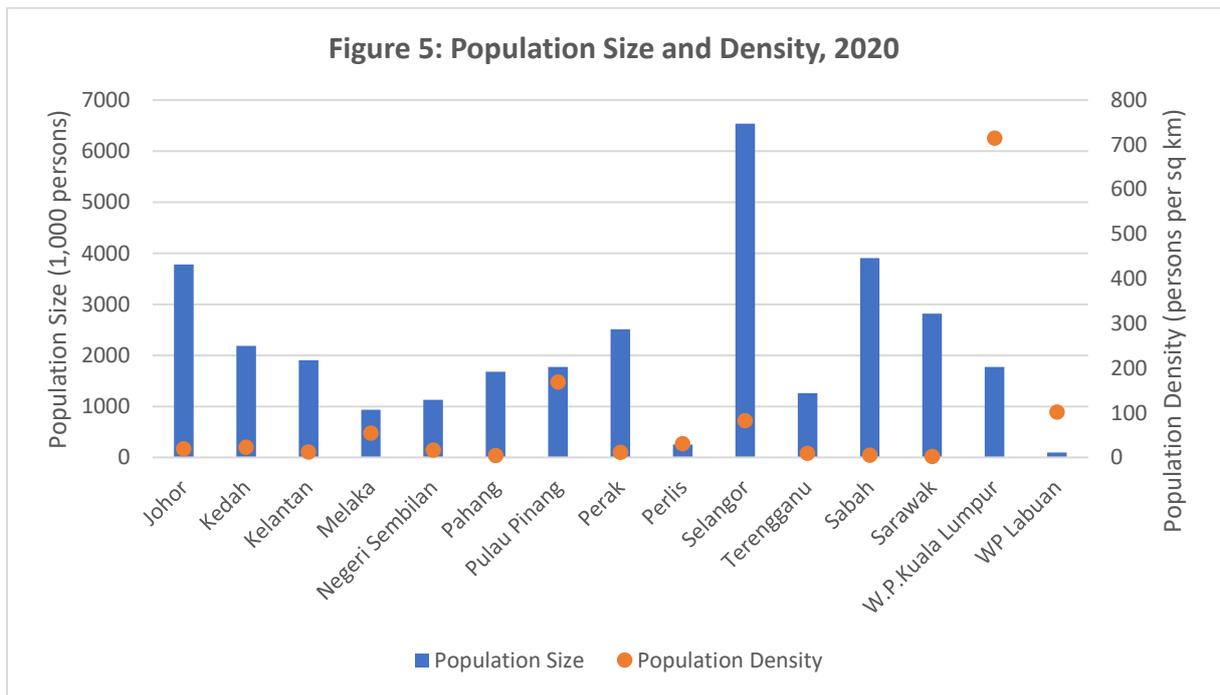
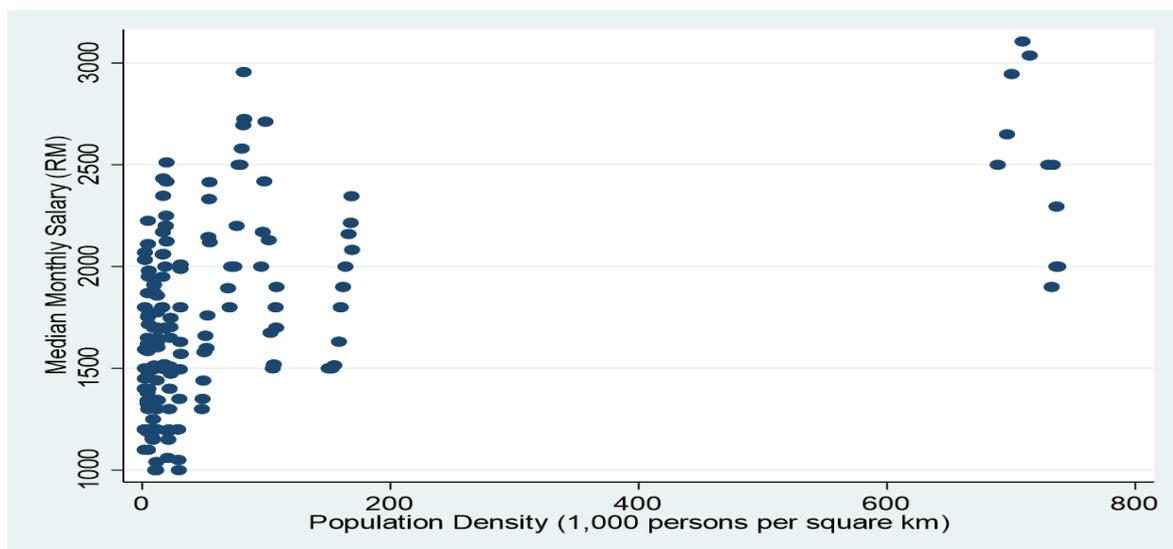
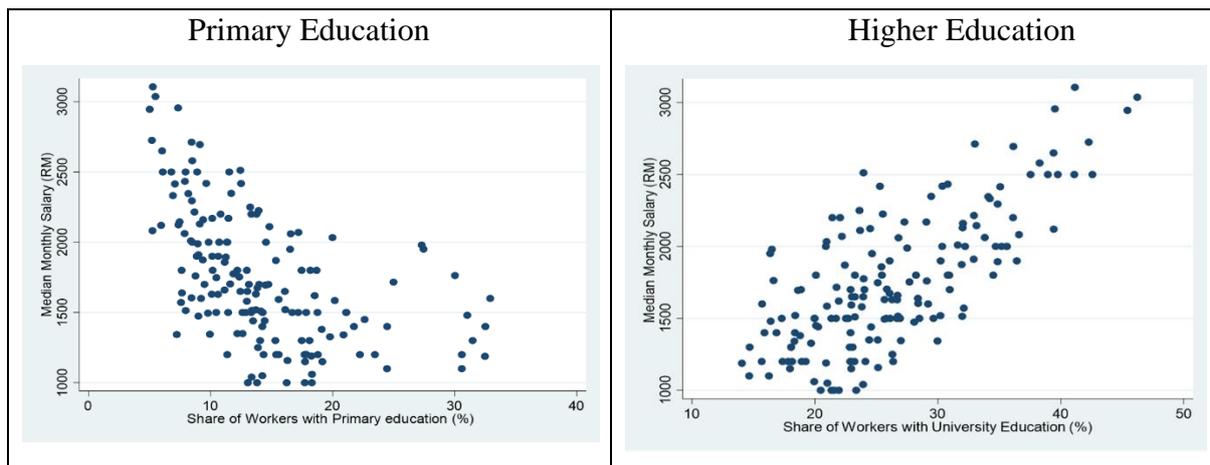


Figure 6: Median Salaries and Population Density



Two good proxies of human capital that are closely related are median wages and level of education. This can be seen in the scatter plots for the level of median wages against percentage of workers with primary education (**Figure 7**). Median wages are lower in states with higher proportion of workers with primary education (as the highest level of education attained). The reverse relationship holds for the share of workers with a university education.

Figure 7: Median Salary and Level of Education



In the research literature on human capital, amenities and cities, the distinction is made between consumption and production amenities. The possible proxies for these two variables are per capita floor size (area) for shopping and office, respectively. The scatter plots of these two variables against human capital (share of workers with university education) are presented in **Figure 8**. The correlation between per capita shopping space and human capital is weak. This could be because the shopping space variable may not be precise enough to capture the consumption amenities that cater for population with high human capital. The office space variable is positively correlated with the levels of human capital indicating that it is a useful variable to proxy production amenities that are relevant to attracting human capital.

Another useful exploration is the relationship between types of economic activities (manufacturing / services) and population density. The monocentric model that is postulated in urban economics predicts that different types of economic activities are distributed across locations from the city centre (central business district). The scatter plots for sectoral share of GDP against population density suggest a tiering of states (**Figure 9**). Kuala Lumpur has a very

high population density – it has low levels of manufacturing activities and very high levels of services activities. In general, the relationship between manufacturing activities and population density appears to be an inverse-U shape one. This is in contrast with services, which have a positive correlation (upward sloping) with population density.

Figure 8: Shopping / Office Spaces and Human Capital

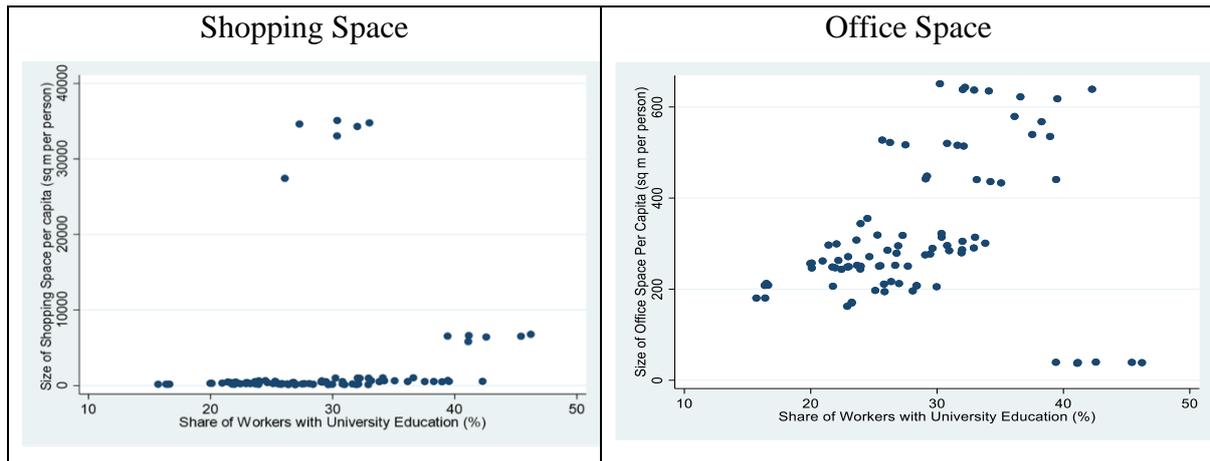
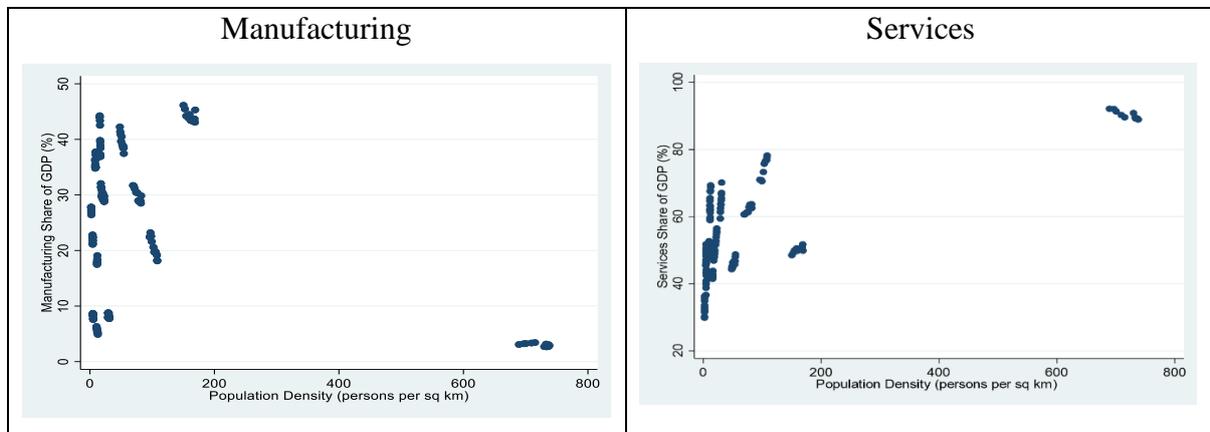


Figure 9: Manufacturing/Services and Population Density



As exporting activities are important for Malaysia, it is also useful to examine how such activities are related to population density. The relationship between exporting activities (measured by exports per capita) and population density is an inverse-U relationship (**Figure 10**). Most of the state in Malaysia lies on the upward sloping portion of the curve – higher levels of manufacturing activities are associated with higher population density. Once again, Kuala Lumpur – a state with very high population density - lies at the right tail extreme.

There appears to be a positive relationship between exporting (measured by exports per capita) and human capital (**Figure 11**). At higher levels of human capital, the relationship appears to bifurcate into two directions – one upward, the other downward. It is possible that this bifurcation indicates a split in the distribution of human capital – one associated with export-oriented manufacturing (upward slope) and the other towards services (downward sloping).

Figure 10: Exports per Capita and Population Density

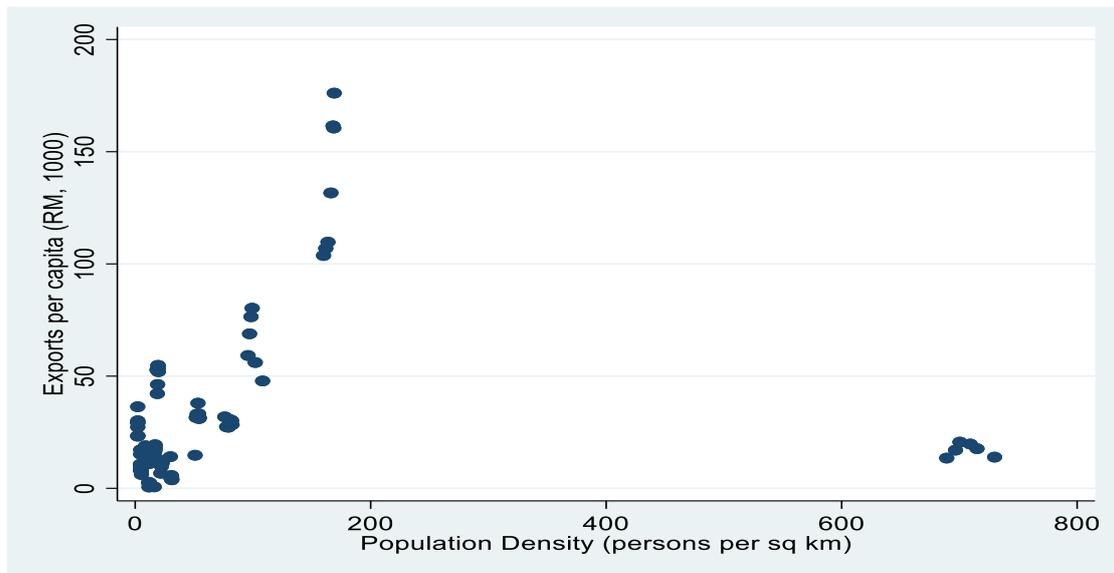
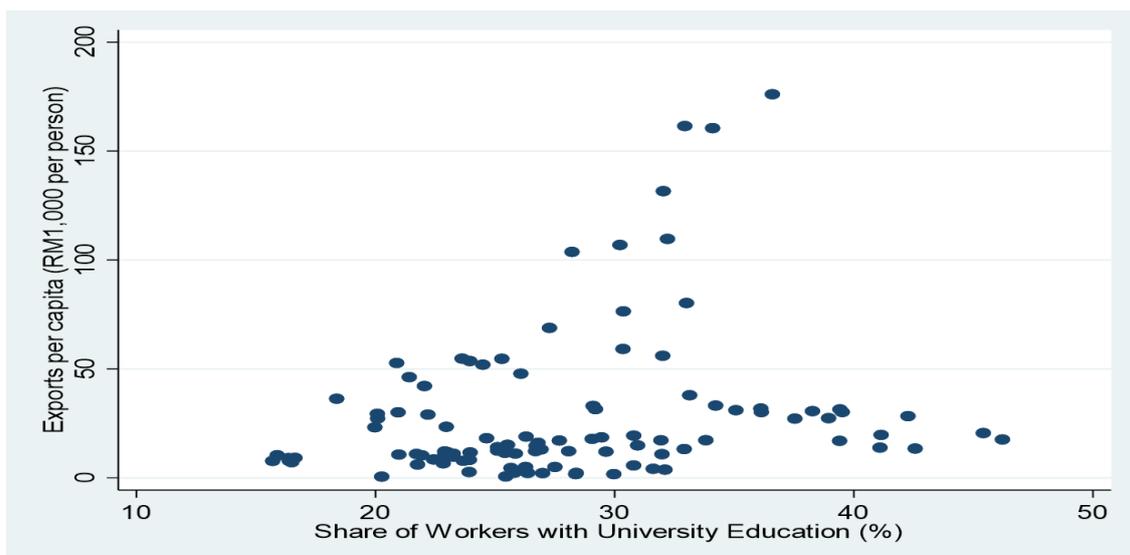
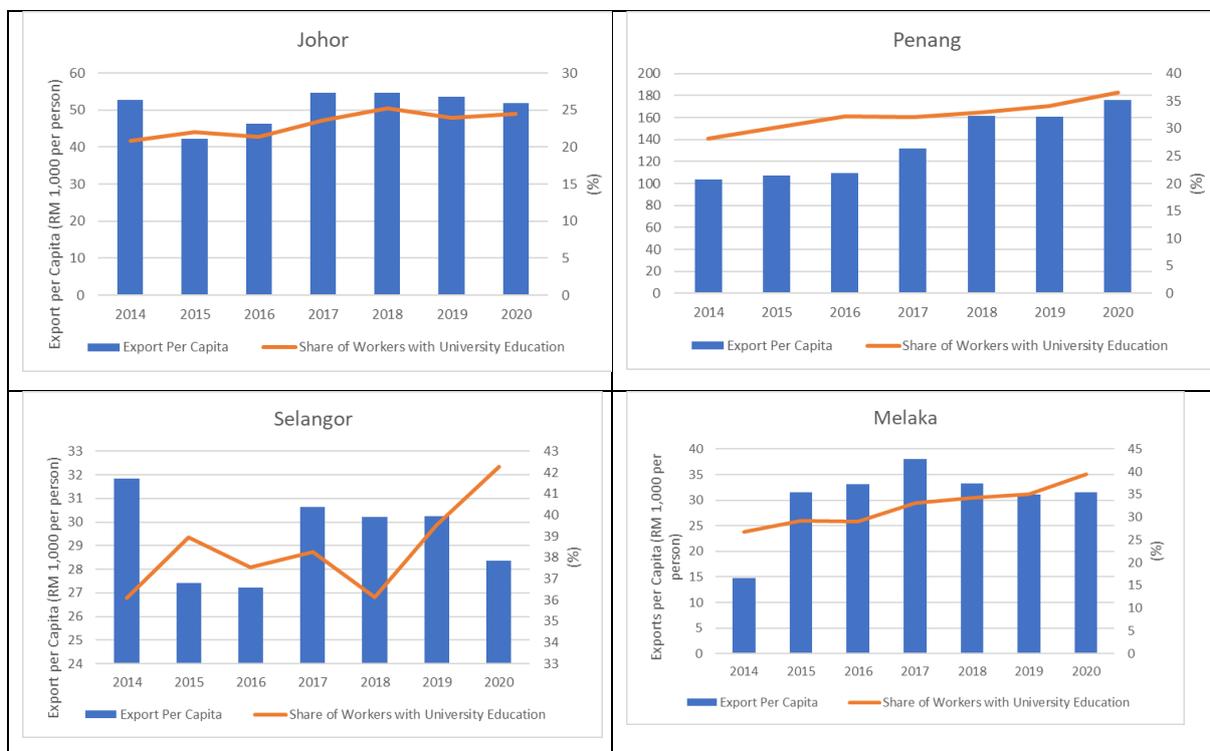


Figure 11: Exports per capita and Human Capital



Finally, there is heterogeneity in the relationship between exporting and human capital across time for the different states. Figure 12 plots the time trends in exporting and human capital for four major states with the highest levels of exporting activities. There appears to be a gradual increase in human capital and exporting over time. However, in states such as Johor, exporting seems to have reached a plateau. One possible complication with Johor is its proximity to Singapore – it is possible that workers with higher levels of education could migrate to Singapore thus constraining the level of human capital available for exporting industries.

Figure 12: Evolution Exports per capita and Human Capital in Selected States



4.2 Econometric Analysis

An econometric analysis can be undertaken to untangle the relationships between human capital, amenities and trade. The agglomeration of human capital (HC) for state i at time t is studied using the following specification:

$$\begin{aligned} \text{GHC}_{i,t} = & \alpha_1 \text{WAGE}_{i,t-1} + \alpha_2 \text{DENSITY}_{i,t-1} + \alpha_3 \text{AGRI}_{i,t-1} + \alpha_4 \text{MANUF}_{i,t-1} + \alpha_5 \text{SERV}_{i,t-1} \\ & + \alpha_6 \text{EXPORT}_{i,t-1} + \alpha_7 \text{SHOP}_{i,t-1} + \alpha_8 \text{OFFICE}_{i,t-1} + \varepsilon_t \end{aligned}$$

where GHC is the growth of human capital (workers with university education), WAGE - median wage level, DENSITY - population density, AGRI – agriculture share of GDP, MANUF – manufacturing share of GDP, SERV – services share of GDP, EXPORT - per capita exports, SHOP – per capita area for shopping facilities, and OFFICE – per capita area for offices.

The data used is state-level data from the Department of Statistics covering the years 2010 to 2020. The panel data estimation method with fixed effects is used to estimate the above equation. The results are presented in **Table 1**.

The population density variable is statistically significant with a negative coefficient. This suggests that the growth of human capital slows down as population density increases. Human capital growth also declines with an increase in the share of services in GDP – indicating that employment shifts away from high human capital as services become more important. The rise in consumption amenities in the form of space for shopping activities is inversely related to human capital growth – indicating that shopping space is not a type of amenities that drive human capital growth. The interactive variables involving shopping amenities and sectoral share of GDP for agriculture and services are statistically significant and have positive coefficients. The role that exports play through interactions with consumption and production amenities is interesting. Shopping amenities support exporting activities to drive human capital growth while the opposite results hold for office space.

Overall, the drivers of the growth of human capital across the states in Malaysia are complex. Human capital grows faster in states with less population density, fewer services and fewer shopping amenities. This suggests that the agglomeration effects involving population density and consumption amenities could be diminishing. However, human capital growth is still positively driven by exporting through the support of consumption amenities.

Table 1: Human Capital, Exporting and Amenities

Dependent Variable: Growth of Workers with University Education

	1	2 (No KL)	3	4 (No KL)	5	6
WAGE	8.19E-05	0.000276	-0.00032	9.31E-05	-0.00092	-0.0005
	0.00076	0.0008	0.00089	0.00097	0.00111	0.00111
DENSITY	-0.00229***	-0.00239***	-0.00229***	-0.00247***	-0.00240***	-0.00202**
	0.00026	0.00027	0.00029	0.00031	0.00062	0.00082
AGRI	-0.0802	-0.0824	-0.0693	-0.144	-0.227	0.763
	0.11	0.111	0.136	0.143	0.294	0.49
MANUF	-0.220***	-0.199**	-0.215**	-0.239**	-0.374	0.0352
	0.0745	0.0758	0.089	0.091	0.225	0.301
SERV	-0.116*	-0.0321	-0.106	-0.0334	-0.427*	-0.567*
	0.0617	0.0753	0.0719	0.0825	0.254	0.313
EXPORT	8.39E-06	8.31E-06	1.06e-05*	9.47E-06	4.28E-05	2.16E-05
	5.3E-06	5.4E-06	6.1E-06	6.2E-06	3.4E-05	4.5E-05
SHOP			-2E-05	6.76E-05	-0.00077	-0.0191**
			7.3E-05	8.8E-05	0.00383	0.00932
OFFICE					-0.108	-0.00105
					0.105	0.128
AGRI X SHOP					5.19E-05	0.000387**
					8.7E-05	0.00019
MANUF X SHOP					-6.3E-06	6.72E-05
					4E-05	4.9E-05
SERV X SHOP					5.1E-06	0.000213*
					4.1E-05	0.00011
AGRI X OFFICE					0.000142	-0.00378*
					0.00121	0.00197
MANUF X OFFICE					0.000699	-0.00089
					0.00105	0.00133
SERV X OFFICE					0.00169	0.00159
					0.00118	0.0014
EXPORT X SHOP					1.96E-08	1.75e-07**
					2.1E-08	7.1E-08
EXPORT X OFFICE					-1.1E-07	-3.59e-07***
					6.7E-08	1.2E-07
Constant	17.33**	12.25	17.21**	14.31*	40.99*	21.63
	6.826	7.415	8.044	8.385	22.23	27.6
Observations	102	96	89	83	89	83
R-squared	0.611	0.63	0.621	0.641	0.695	0.729
Number of state	15	14	15	14	15	14

*** p<0.01, ** p<0.05, * p<0.1

5. District-Level Analysis

There are 144 districts in Malaysia spread across 13 states. The three federal territories are assigned district-status in the data. Data are sourced from the Department of Statistics and cover two years, 2014 and 2016.

5.1 Trends and Patterns

At the district level, population growth does not appear to be related to total population (**Figure 13**). This means that districts with smaller populations are growing faster than their larger counterparts. The distribution of district size in terms of population is also very uneven with a few large dominant districts. There appears to be no relationship between the level of median income and inequality (Gini coefficient) (**Figure 14**). However, if the growth in median income is plotted against the growth in the Gini coefficient, a downward sloping relationship can be discerned (**Figure 15**). This implies that districts with higher growth in median income will also tend to have slower growth in inequality. This implies that districts with higher growth in human capital also tend to have slower growth in inequality. This can also be observed in **Figure 16** which plots the distribution of median income for 2016 and 2016.

The district level data contains some information on consumption in the form of retail sales and the number of retail establishments. There is a linear and positive relationship between retail sales against median income (**Figure 17**). This indicates that consumption and related services are at a higher level for districts with high levels of human capital (proxied by median wage). Retail sales are also strongly correlated with the number of retail establishments (**Figure 18**). Hence, either one can be used to capture the consumption aspects.

There is a suggestion from the research literature that higher levels of human capital can be associated with services that require higher human capital. This can be examined by analysing the average wage in the retail sector and how it varies against median income. The two variables are positively and strongly correlated.

Figure 13: Population Growth and Total Population

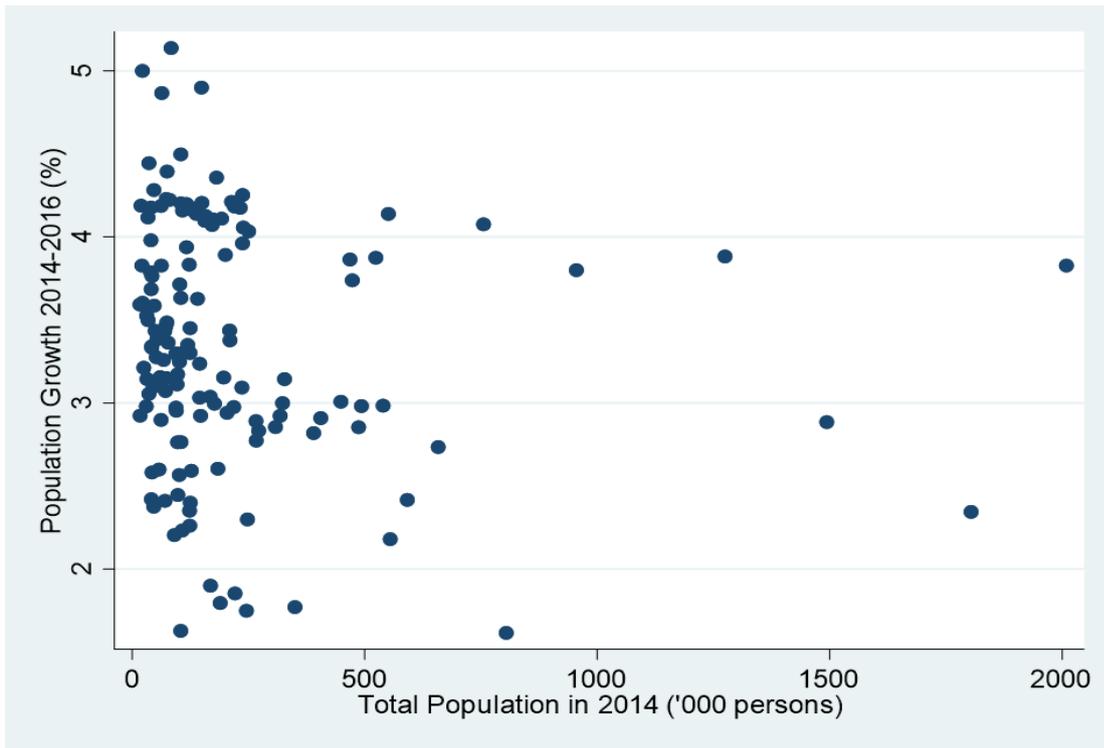


Figure 14: Median Income and Gini Coefficient

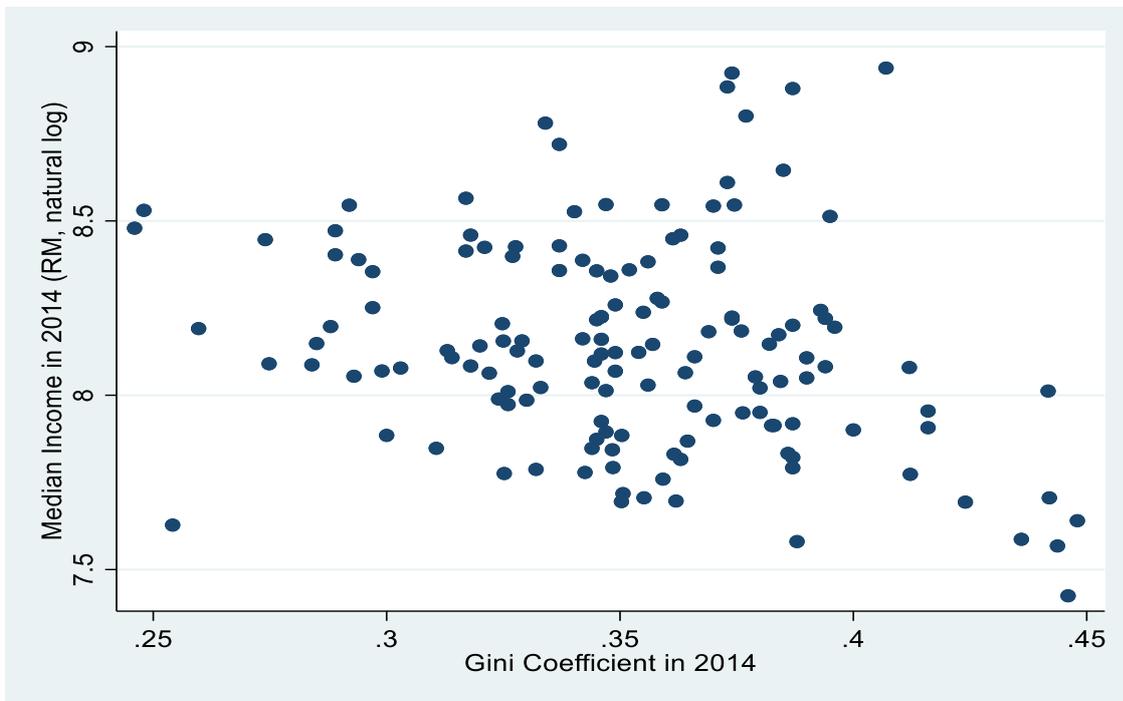


Figure 15: Growth in Median Income and Growth in Gini Coefficient

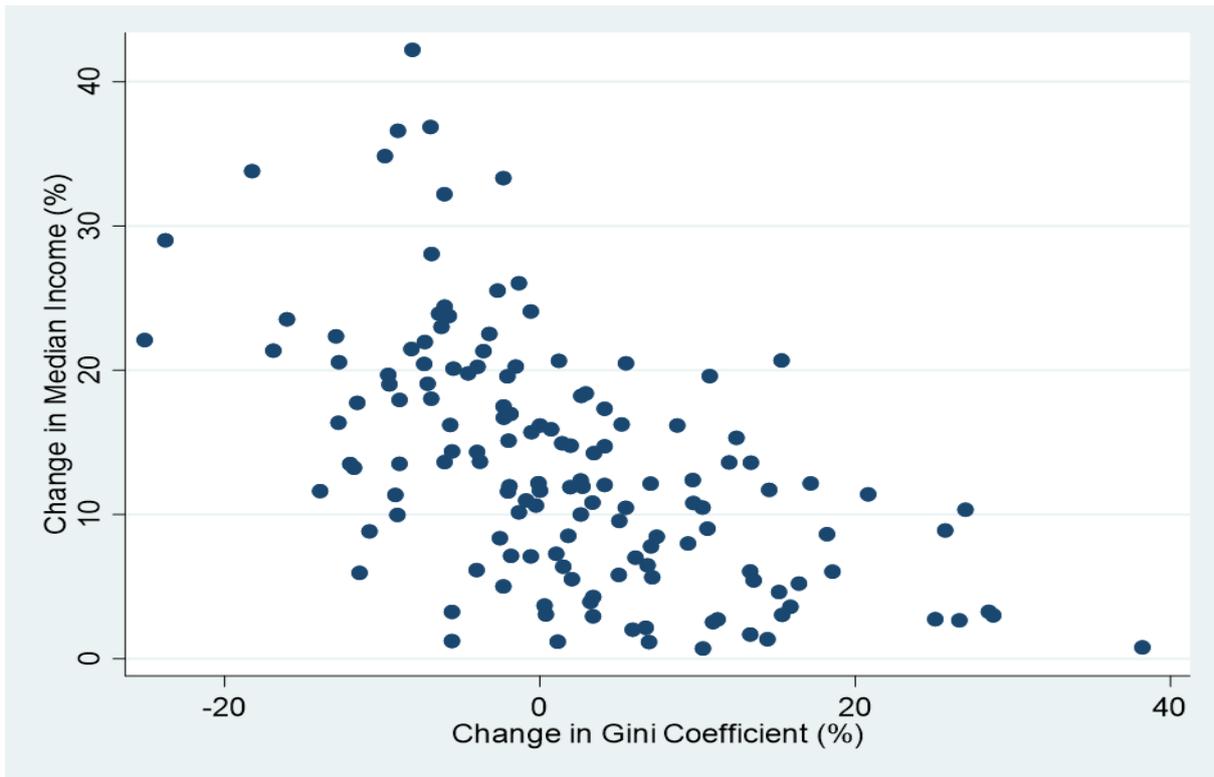


Figure 16: Change in Distribution of Median Income and Gini Coefficient

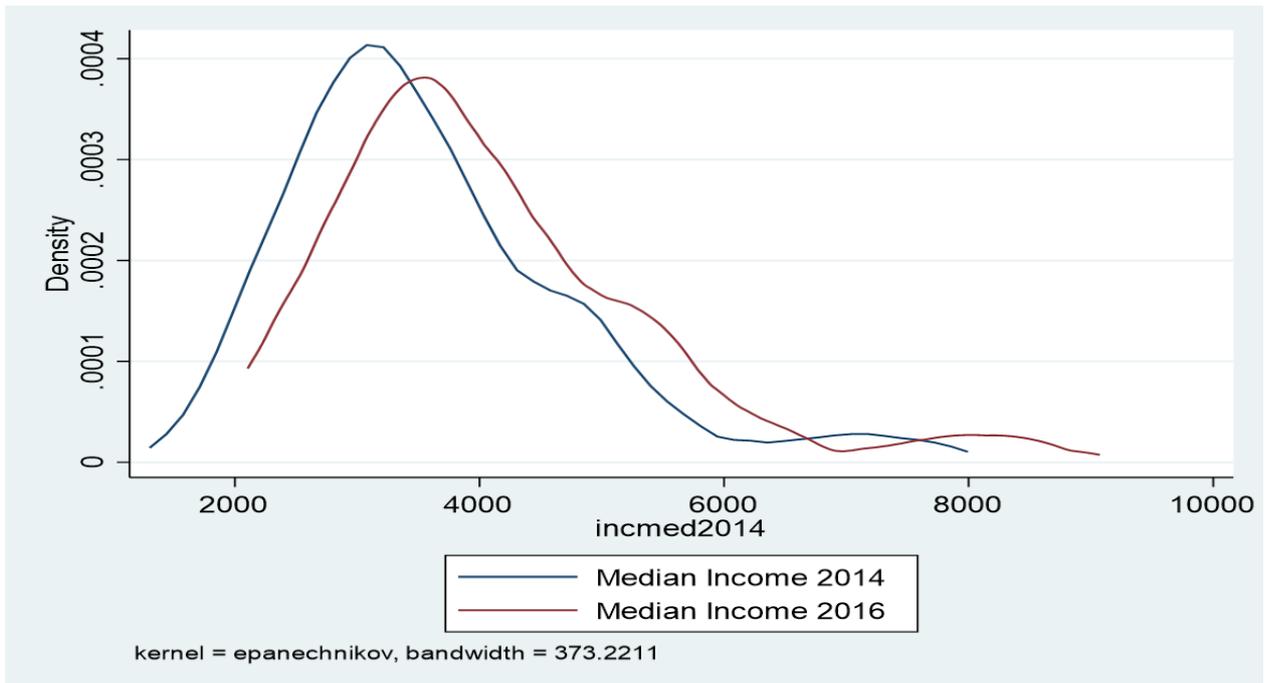


Figure 17: Retail Sales and Median Income

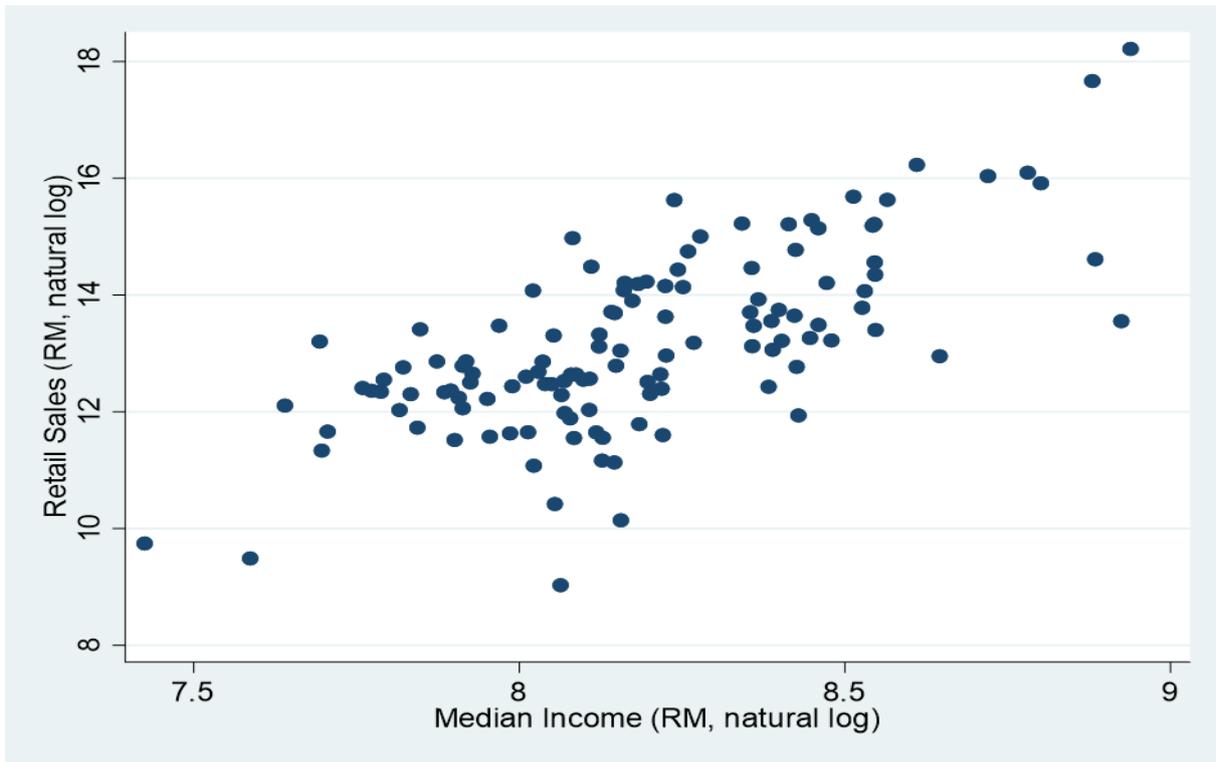


Figure 18: Retail Sales and Number of Retail Establishments

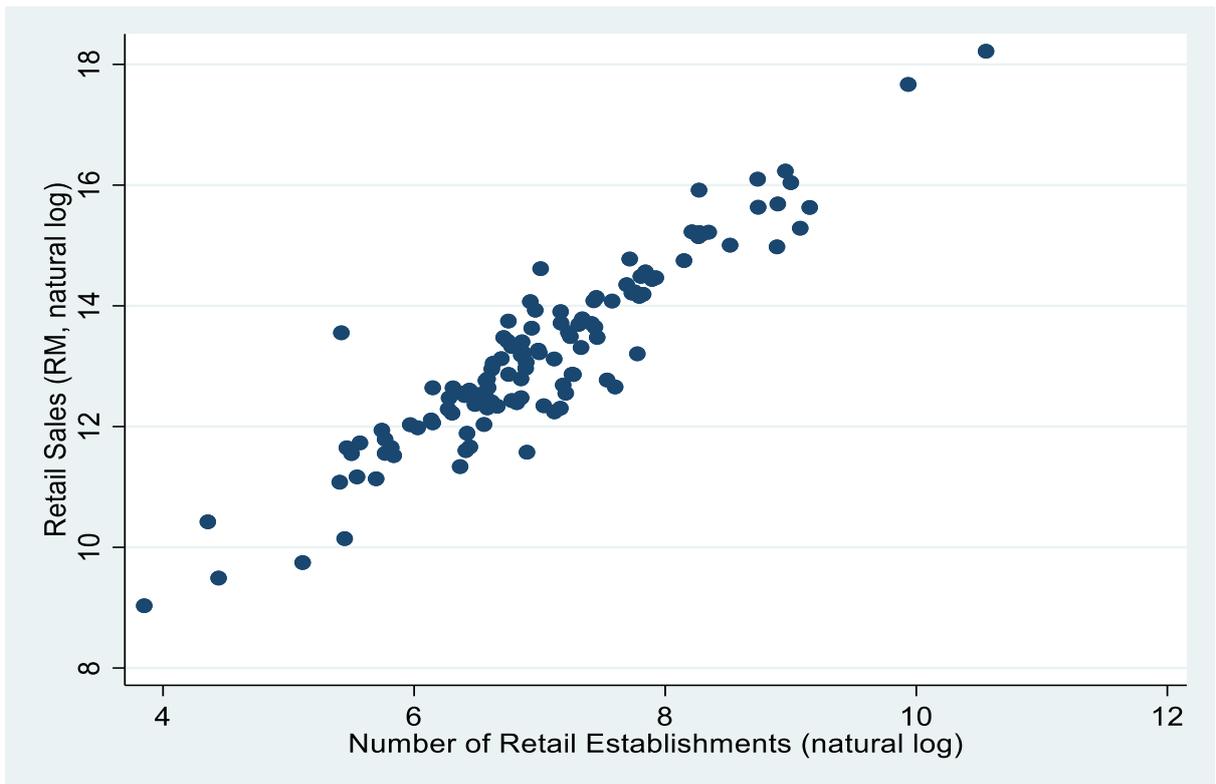
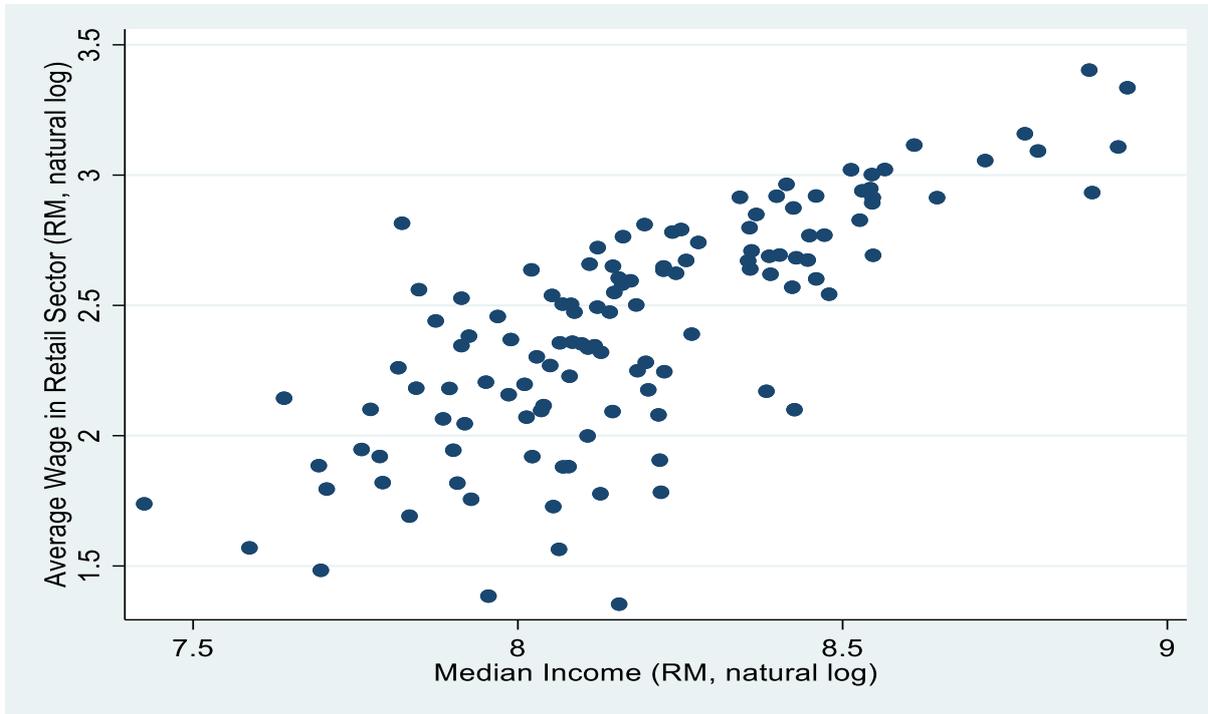


Figure 19: Average Wage in Retail and Median Income



5.2 Econometric Analysis

Trade data are not available at the district-level. To complement the earlier estimations on growth of human capital, this section analyses the drivers of the growth of population. These drivers include median income (which is a proxy for human capital)

The growth of population (GPOP) for district i at time t is studied using the following specification:

$$\begin{aligned}
 GWAGE_{i,t} = & \alpha_1 PUBEALTH_{i,t-1} + \alpha_2 PRIHEALTH_{i,t-1} \\
 & + \alpha_3 PRISCHOOL_{i,t-1} + \alpha_4 SECSCHOOL_{i,t-1} \\
 & + \alpha_5 FOREIGNPOP_{i,t-1} + \alpha_6 POP_{i,t-1} + \alpha_7 GINI_{i,t-1} + \alpha_8 DENSITY_{i,t-1} \\
 & + \alpha_9 RETAILEST_{i,t-1} + \varepsilon_t
 \end{aligned}$$

where PUBHEALTH is the percentage of household with access to public health centre within 5km, PRIHEALTH is the percentage of household with access to private health centre within 5km, PRISCHOOL is the percentage of household with access to primary school within 5km, SECSCHOOL is the percentage of household with access to secondary school within 5km, FOREIGNPOP the share of non-citizens in the population, POP population size, GINI Gini coefficient, and RETAILEST the number of retail establishment.

The above equation is estimated using OLS with lagged independent variables. Subsample regressions are also carried out to cover only districts in Peninsular Malaysia. The results are presented in **Table 2**.

The population size variable is significant with negative coefficient because the growth of human capital are likely to be in locations with smaller total population. The Gini coefficient variable is statistically significant with a positive coefficient. This implies that human capital growth is fastest in districts with more inequality. Human capital growth is also faster in districts with higher density population, and more retail establishments. The results on retail establishments confirms the importance of consumption amenities. However, higher density combined with more retail establishments (e.g. central business districts) could also push human capital growth to less crowded areas. A similar effect is found for secondary schools. Finally, the combination of higher population density and larger population is conducive for human capital growth.

Table 2: Human Capital and Amenities

Dependent Variable: Growth of Median Income

VARIABLES	Malaysia	Peninsular	Peninsular w/o KL
PUBHEALTH	0.0687	-0.0124	-0.0103
	-0.119	-0.248	-0.245
PRIHEALTH	-0.0134	-0.171	-0.151
	-0.0775	-0.112	-0.112
PRISCHOOL	-0.027	0.346	0.479
	-0.279	-0.443	-0.447
SECSCHOOL	0.0466	0.348	0.272
	-0.139	-0.234	-0.237
FOREIGNPOP	-0.0722	0.489	0.465
	-0.0949	-0.48	-0.475
POP	-0.0101	-0.0286**	-0.0507**
	-0.0107	-0.0135	-0.0196
GINI	20.66	62.29*	55.14*
	-24.14	-32.28	-32.3
DENSITY	0.0815	0.239	0.363*
	-0.111	-0.172	-0.188
RETAILEST	0.000369	0.00203	0.00379**
	-0.00112	-0.0014	-0.0018
DENSITY X PUBHEALTH	0.000389	0.000756	0.00113
	-0.00054	-0.000895	-0.000919
DENSITY X PRIHEALTH	0.000276	0.00153**	0.00125*
	-0.000182	-0.000665	-0.000683
DENSITY X PRISCH	-0.000916	-0.0023	-0.00431
	-0.00164	-0.00235	-0.00266
DENSITY X SECSCH	-0.00059	-0.00244**	-0.00175*
	-0.000737	-0.000929	-0.00102
DENSITY X RETAILEST	-3.43E-07	-6.89E-07	-2.96e-06*
	-4.97E-07	-7.59E-07	-1.66E-06
DENSITY X POP	9.17E-06	1.58E-05	4.17e-05*
	-1.12E-05	-1.74E-05	-2.41E-05
Constant	2.501	-54.33	-58.96
	-23.25	-35.63	-35.41
Observations	124	86	85
R-squared	0.073	0.204	0.228

*** p<0.01, ** p<0.05, * p<0.1

6. Policy Implications

The findings of this study have important implications for the spatial dimensions of development strategies that try to levy human capital to upgrade the dynamism and competitiveness of economies. These strategies will involve careful planning, investment and incentivisation of the construction of amenities that support product and consumption activities that can foster human capital development. Recent industrial policies in Malaysia, including the National Trade Blueprint 2021-2025, have emphasised the importance of human capital. More attention needs to be paid to complimentary drivers such as urban amenities as a way to further strengthen the GVC participation.

Another important finding is the role of inequality. The growth of human capital can be accompanied by greater inequality. This implies public policy needs to pay some attention to the issue of inclusiveness in a way that does not discourage human capital development (which can exacerbate inequality). In this regard, reforms in social protection could be an important area in Malaysia that requires further attention.

7. Conclusions

Structural transformation to achieve sustained competitiveness requires human capital development. There is an emerging literature that emphasizes the importance of amenities to human capital development and GVC participation. However, not much is understood about these linkages in Malaysia. This study indicates that highly aggregated data may be less useful in understanding the relationship between human capital, amenities and trade. Compared with the econometric analysis using state-level data, the role of amenities is stronger in district-level data. Both population size and population density are important drivers for the growth of human capital. Consumption amenities as well as private health facilities are also important.

The findings from this study also point to the importance of paying more attention to the amenities - human capital – GVC linkages in policy formulation. Much of the industrial policies in Malaysia have focused on the human capital – GVC linkages but not on the amenities driver. There is also a need for greater attention to the inclusiveness dimensions when formulating policies in this area.

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