Districtwide Employment and Population Growth : the Case of Malaysia

Mohd Dan Jantan* and Rizaudin Sahlan*

Abstract

Since the economic growth has human capital as a source, the objective of this study is to explore the determinants of population and employment growth from a broader interregional perspective and to provide some empirical evidence of the role of human capital as a source of economic growth. Endogenous growth theory suggests that human capital serves not only as a productive input along with labor, but also as an important source of long-run economic growth. Other determinants of population and employment growth are scale of the industry and agglomeration economies. In this investigation, we use time series data for Malaysian economy. We employed a simultaneous equations model where population is related to employment level, agglomeration economies, and some other factors; and employment is related to population level, agglomeration economies, and some other factors.

Keywords: Human capital Agglomeration economies Employment Population Economic growth

* Faculty of Economics Universiti Utara Malaysia 06010 UUM Sintok Kedah Malaysia

การจ้างงานในชนบทและการขยายตัวของประชากร: กรณีศึกษาประเทศมาเลเซีย

โมฮัมหมัด ดัน จันทัน* และ ไรซูดิน ซาลัน*

บทคัดย่อ

การเจริญเติบโตทางเศรษฐกิจเกี่ยวข้องกับทุนมนุษย์ ซึ่งเป็นทรัพยากรที่สำคัญ การศึกษาครั้งนี้จึงมีวัตถุประสงค์เพื่อสำรวจปัจจัยเกี่ยวกับการขยายตัวของประชากร และการเพิ่มอัตราการจ้างงานของประชากรในพื้นที่ภูมิภาคทั้งหมด และหาข้อมูลในเชิงประจักษ์เกี่ยวกับบทบาทของทุนมนุษย์ ซึ่งเป็นปัจจัยสำคัญของการเติบโตทางเศรษฐกิจ ทฤษฎีการเจริญเติบโตอันเกิดจากปัจจัยภายในพอจะเสนอแนะได้ว่า ทุนมนุษย์ไม่เพียงแต่ใช้เป็นแรงงานสำหรับเป็นปัจจัยสำคัญในการผลิตเท่านั้น แต่ยังเป็นแหล่งสำคัญสำหรับการขยายตัวทางเศรษฐกิจในระยะยาว ส่วนปัจจัยอื่นๆ ที่ทำให้มีการเพิ่มอัตราการจ้างงานและการขยายตัวของประชากรคือ ขนาดของอุตสาหกรรม และการรวมตัวกันทางเศรษฐกิจ ในการศึกษาครั้งนี้ได้นำข้อมูลของแต่ละปีในอดีตเกี่ยวกับเศรษฐกิจของประเทศมาเลเซีย และได้นำระบบสมการเกี่ยวเนื่องมาใช้ เพื่อดูว่าการขยายตัวของประชากรเกี่ยวข้องกับระดับการจ้างงานการรวมตัวกันทางเศรษฐกิจ และปัจจัยอื่นๆ หรือไม่ ผลจากการ ศึกษาพบว่าการจ้างงานเกี่ยวข้องกับระดับการศึกษาของประชากร การรวมตัวกันทางเศรษฐกิจ และปัจจัยอื่นๆ เป็นสำคัญ

คำสำคัญ: ทุนมนุษย์ การรวมตัวทางเศรษฐกิจ การจ้างงาน ประชากร การเติบโตทางเศรษฐกิจ

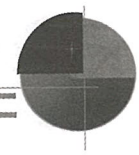
* คณะเศรษฐศาสตร์ มหาวิทยาลัยอุตตาระ มาเลเซีย

Introduction

The literature has stressed that there is a strong relationship between urbanization and modern economic growth. The obvious historical relationship between urbanization and modern economic growth underlies most theories of why modern cities grow. This conventional explanation for the long-term growth of urban areas includes economies of scale, agglomeration economies, transportation improvements, and other external economies related to urbanization. However, endogenous growth theory suggests that human capital serves not only as a productive input along with labor, but also as an important source of economic growth. But, there was no clear and compelling empirical evidence on the relationship between human capital measures and the rate of growth. One reason for the poor performance of human capital in growth equations may be due to the different proxy measures of education that are used in the analyses.

Carlino and Mills studied on the determinants of county growth in the United States, emphasized on population and manufacturing employment growth (1). The focus of their study was on the question of the extent to which people had followed job or the extent to which jobs had followed people. They developed a simultaneous equation model to empirically test the effects of economic, demographic, and climatic variables on population and employment growth. They found that the population and employment measures were highly interactive and had strong positive effects on each other. In another study, Clark and Murphy examined the growth of population and the growth of employment in various sectors (2). Their findings supported the earlier work by Carlino and Mills. DeBartolome and Spiegel investigated changes in manufacturing employment growth in the United States for the periods between 1990 and 1993 (3). In estimating their empirical model, DeBartolome and Spiegel hypothesized that the change in the manufacturing employment was a function of the economic development expenditure, the wage rate, the initial level of employment, and a vector of area characteristics.

Simon studied the role of human capital in explaining the growth of employment in metropolitan areas (4). He argued that cities with greater concentrations of highly educated individuals would become relatively more productive. As a result of this situation, employment would grow at a faster rate. Also, he asserted that the higher the concentrations of educated individuals, the greater the potential for localized knowledge spillovers, which would promote city growth. Simon used an empirical framework where the employment growth was a function of human capital, employment shares of service and



manufacturing industries, initial level of employment, median family income, and regional dummy variables. The initial level of employment variable was included to capture for negative externalities, such as crime rate and congestion, which were related to large cities. Regional dummy variables were included to capture the effect of history and climate. The result showed that human capital variables generally had positive coefficients and were statistically significant in explaining the growth of employment in metropolitan areas.

The growth literature has also identified and discussed the role of geographic production externalities, namely localization economies, urbanization economies, and specialization. Bostic, Gans, and Stern argued that localization economies are captured when a group of firms in the same industry, located in an urban area, have a lower total average cost than a firm in the same industry located elsewhere (5). The arguments for urbanization economies are that it is cheaper to produce in a large city because of improved infrastructure facilities, a large labor market pooling, large consumption possibilities, and a wide variety of public and private services compare to those of a small town. It is expected that urbanization economies have a positive impact on city output. It is also recognize that at some point, urbanization economies exhausted and potential urbanization diseconomies take place. Diseconomies of urbanization are related to urban congestion, pollution, and crime. Specialization is a concept refers to the degree to which a city's output is dominated by closely related sectors. There is no theoretical consensus regarding the effect of specialization on the growth of labor productivity.

Bradley and Gans investigated growth in Australian cities and towns for the year 1981 to 1991 (6). They analyzed the determinants of population growth and employment growth. The authors asserted that employment growth was related to the composition of labor force, city specialization, human capital, and the share of government employment. Their measure of specialization was the city's sectoral composition of employment. This variable captured the degree to which a city had a concentration of a small number of sectors.

The objectives of our study are 1) to explore determinants of population and employment growth from a broader interregional (as opposed to intra-regional) perspective, and 2) to isolate the factors, such as economies of scale in industry, agglomeration economies, and the level of human capital; that affect population and employment growth.

Mathods

Our theoretical framework follows Carlino and Mills in which equilibrium population and employment are simultaneously determined (1). However, population and employment are affected not only by each other, but also by a set of other exogenous variables. Following Carlino and Mills, our simultaneous equations model can be written as below:

$$E_t^* = A_E P_t + B_E S_t \qquad [1]$$

$$P_t^* = A_P E_t + B_P T_t \qquad [2]$$

where *E* and *P* are district employment and population at a particular time period, *t*. *S* and *T* are vectors of exogenous variables that have an influence on *E* and *P*, respectively. Asterisks indicate equilibrium values. Equation [1] is an equilibrium employment, which depends on actual population and other exogenous variables included in *S*. Equation [2] is an equilibrium population, which depends on actual employment and other exogenous variables indicated as *T*. However, Mills and Price; and Carlino and Mills stressed that population and employments are likely to adjust to equilibrium values with substantial lag (7, 1). Following them, we introduced a distributed-lag adjustment:

$$E_t = E_{t-1} + \lambda_E (E_t^* - E_{t-1}) \qquad [3]$$

$$P_t = P_{t-1} + \lambda_P (P_t^* - P_{t-1}) \qquad [4]$$

where λ_E and λ_P are speed of adjustment coefficients. Substituting equation [1] into equation [3] gives equation [5], which is

$$E_t = E_{t-1} + \lambda_E (A_E P_t + B_E S_t - E_{t-1}) \qquad [5]$$

Solve for equation [5] and rearrange terms to produce equation [6].

$$E_t = (1-\lambda_E) E_{t-1} + \lambda_E A_E P_t + \lambda_E B_E S_t \qquad [6]$$

Similarly, substituting equation [2] into equation [4], solving it and rearrange terms to get equation [7] for population equation.

$$P_t = (1-\lambda_P) P_{t-1} + \lambda_P A_P E_t + \lambda_P B_P T_t \qquad [7]$$

Equations [6] and [7] are two simultaneous equations. Equation [6] is an employment equation, which depends on its lagged value, population, and a set of exogenous variables. Equation [7] is a population equation, which depends on its lagged value, the level of employment, and other exogenous variables. The exogenous variables that might have some impacts on population and employment will be discussed next.

The literature has stressed the importance of some exogenous variables such as localization economies, specialization, economies of scale, and workforce composition, on growth. Across urban areas, positive production and consumption externalities generate cost-savings to firms, industries, and consumers. For example, localization economies are positive urban-specific externalities realized by firms in a particular industry. To realize the

cost-savings from localization economies, a firm must be in close proximity to other firms in the same industry. In other words, clustering of firms in the same industry plays an important role because there are likely production costs of the firms to decrease as the total output of the industry increases. Generally the literature mentions three reasons why firms should be in a cluster. They are: 1) scale economies in the production and distribution of intermediate inputs, 2) labor-market pooling, and 3) knowledge spillovers. If the transportation and handling costs of an intermediate input are relatively high, there is a tendency for the firms to be located around a common input supplier. Close proximity is also important if a face-to-face communication and an active interaction between a producer and users of an intermediate input are needed. Clustering of firms around a supplier can exploit the scale economies in the production of an intermediate input. The clustering of firms attracts people with specific technical skills to an urban area. Thus, labor market becomes more efficient when both search costs for firm and workers are lower, compared to if there is no clustering. In addition, the clustering of firms in the same industry promotes the exchange of ideas and information. McDonald and O'Sullivan stressed that knowledge spillover arose from a greater concentration of firms, hence attracted skilled workers into a particular industry in an area (8, 9). These skilled people promote a greater rate of research and development (*R&D*) of a new product, improvement in the existing products, and improvement in the process of producing those products. Any new idea suggested by one individual will promote others to improve that idea. And, this process will continue almost indefinitely. There are several ways knowledge spillover occurs. Among others, through a skilled worker moving from one firm to another, business meetings, education and training programs, industrial spying, and copying a competitor's products. Localization economies are hypothesized to have a positive effect on both productivity growth and employment growth. However, the literature has also mentioned the potential effect of diseconomies of localization as a result of property right issues that restrict the diffusion of technology across an urban area. Empirical measures of localization economies must capture the degree to which urban employment is contained in localized industries.

Specialization refers to the degree at which a city's output is dominated by a small number of closely related sectors. Specialization also generates cost-savings to an urban area. Generally, the potential impact of specialization on urban growth is mixed (10). There are several measures of specialization used in the literature. Glaeser, Kallal, Scheinkman, and Shleifer; and McDonald measure specialization of an industry in a city

as the ratio of the percentage of city employment in a particular industry to the comparable percentage in the national employment (11, 8). They noted that this ratio, also known as location quotient, measures how specialized a city is in a particular industry, relative to what it is expected to be, if the employment in that industry is randomly scattered across the country. If location quotient measure for an industry is greater than one, it suggests that the city exports this particular good. If the measure is less than one, it imports the good. Henderson used Herschman-Herfindahl Index (HHI) to compute the "diversity index," rather than a specialization index (12). The maximum value for HHI is one, which is possible if a city is totally concentrated in one industry. As concentration decreases (or diversification increases), the HHI declines. Bostic, Gans and Stern employed a modified version of the Herschman-Herfindahl Index to calculate specialization measures in their study (5).

In our study, the dependent variables for the two simultaneous equations are the population and manufacturing employment for 69 districts in Peninsular Malaysia for the year 1991 to 2000. The population data are taken from the Census of Population. Manufacturing employment data are retrieved from the Census of Manufacturers. The wage rate is constructed by dividing the total payroll of all employees in the manufacturing sector by the total number of workers. The average size of the establishment is calculated by dividing the number of workers by the number of establishments. The percentage of females in the manufacturing sector is computed by dividing the number of female workers by the total labor force in the manufacturing sector. Human capital measures are represented by the percentage of labor force that has secondary and tertiary education.

In this study, our specialization measures follow Glaeser et al and Henderson (11, 12). There are two steps in computing specialization measures. The first step is to compute the measures of location quotients (LO), in which LQ = $\frac{e_{ij} / e_j}{E_i / E}$, where e_{ij} is the employment in industry *i* in district *j*; e_j is the total employment in district *j*; E_i is the employment in industry *i* in the nation; and *E* is total employment in the nation. If the location quotient for an industry in a particular district is greater than one, this suggests that the district exports the output of that particular industry. Those industries with location quotients less than one are excluded. As such, all industries with location quotients greater then one are defined as specialized industries. In the second step, a measure of the share of the specialized industries in a district is computed. In this regard, those industries that have location quotients greater than one are chosen and their employment levels are

added. Then, the sum of the employment levels of all industries that have location quotients greater than one is divided by the total district employment. This gives us a measure of the share of the specialized industries in a district.

Localization economies are computed in a manner similar to Bostic, Gans, and Stern (5). Localization is related to the clustering of firms in a particular industry in a geographic area. In this study, we arbitrarily chose the industries with a minimum of one percent level of threshold employment for the analysis. If industry *i* in a subject district *j* employs more than one percent of national employment (E_{ij}), then that industry *j* is considered as localized in the subject district *j*. To get the share of localized industry in a district, the employment level of that industry is divided by the total metropolitan employment. Then these shares are added to get a measure of the share of all localized industries in district employment.

Our samples are divided into four regions: Northern, Central, Eastern, and Southern. Regional dummy variables are included in the regression to capture any unexplained portion of regional effect such as history, density of infrastructure, and availability of certain inputs. Central region is used as a base region; therefore, it is excluded from the regional dummy variables. This regional classification follows the Fifth Malaysia Plan classification of regions in Malaysia.

Results

The basic empirical models are specified in equations [9] and [10] as follows:

$$POP_1 = \alpha_0 + POP_{t-1} + \alpha_2\ EMP_t + \alpha_3 LOC_{t-1} + \alpha_4 SPEC_{t-1} + \alpha_5 WAGE_t + \delta \quad [9]$$

$$EMP_1 = \beta_0 + \beta_1 EMP_{t-1} + \beta_2 POP_1 + \beta_3 LOC_{t-1} + \beta_4 SPEC_{t-1} + \beta_5 WAGE_t + \eta \quad [10]$$

Equation [9] expresses the population (POP_t) is related to the initial level of population (POP_{t-1}), employment level (EMP_t), the initial level of localization economies (LOC_{t-1}), specialization ($SPEC_{t-1}$), and wage rate ($WAGE_t$). In equation [10], the employment (EMP_t) is related to the initial level of employment (EMP_{t-1}), population (POP_{t-1}), the initial level of localization economies (LOC_{t-1}), specialization ($SPEC_{t-1}$), and wage rate ($WAGE_t$). The Two Stage Least Squares (2STL) results for these equations are presented in Table 1. The estimates from the first stage regression, which explain the employment is presented in column [1]. The estimates indicate the level of population (POP, 2002) has a positive and statistically significant impact on employment. The coefficient of the level of employment is statistically significant at a one percent confidence level. This finding shows that population in a particular district attracts employment flow into that district. The initial level of employment (EMP, 1991) has a positive and statistically significant impact on current employment, i.e. employment in year 2000. Localization economies (LOC, 1991)

have a positive impact on employment, but it is statistically not significant. Specialization has a positive and statistically significant impact on employment. These findings are in agreement with what is expected. Wage rate (WAGE, 2000) has a positive effect on employment. The coefficient of the wage rate is statistically significant at a one percent confidence level. Recall that the regional dummy variables are capturing the set of other unobserved district characteristics that have played a role in the level of population and manufacturing employment. Regional dummy variable for Eastern region reveals that the growth of employment for this region was less than the Central region.

Table 1 Two-SLS dstimates of population and employment (Basic model)

Independent Variables	Coefficient Estimates	
	Employment [1]	**Population** [2]
Constant	-5.7261 (-3.36)	0.7384 (1.51)
Log POP, 1991		0.8959*** (18.76)
Log POP, 2000	0.7049*** (4.00)	
Log EMP, 1991	0.4505*** (3.00)	
Log EPM, 2000		0.1139*** (3.09)
LOC, 1991	0.3475 (1.00)	-0.0733 (-0.97)
SPEC,1991	1.9449*** (3.15)	-0.3149* (-1.83)
Log WAGE, 2000	0.4834*** (6.59)	-0.0078 (-0.32)
Northern	-0.0361 (-0.19)	-0.1504*** (-3.14)
Eastern	-0.5258** (-2.58)	-0.0389 (-0.69)
Southern	-0.0331 (-0.14)	-0.1594** (-2.63)
N	69	69
Adj R^2	0.8859	0.9661
F-Statistic	66.97	242.99

Note: *** significance at 1% confidence level ** significance at 5% confidence level
* significance at 10% confidence level
The number in parentheses below the estimates are *t*-ratios.

Column [2] of Table 1 presents the second stage regression. The results show the initial level of population (POP, 1991) has a positive and statistically significant impact on population in 2000. This finding is in agreement with what is expected. The level of employment (EMP, 2000) has a positive and significant impact on population. The coefficient of the level of employment is statistically significant at a one percent confidence level. This finding shows that the level of employment in a particular district attracts people to migrate into that particular district. Localization economies (LOC, 1991) have a negative effect on population, which is contrary to what is expected. However, our estimates for localization economies based on conventional significance levels are not statistically significant. The results also reveal that specialization (SPEC, 1991) has a negative effect on the population for this sample of districts. This finding shows that more diversified economic activities attract population. The results show that the growth in population of the Northern and Southern regions was less than those in the central region.

Next, the effects of human capital measures on employment and population are tested. Table 2, columns [1] to [4] present the results of the 2SLS analysis. Two measures of human capital are used in this study. The first measure of human capital is the percentage of population in a district that has attained high school and the second measure is the percentage of people who have graduated from university.

The regression results of Models [1] and [2] in Table 2 show the connection between the presence of high-school graduates, EDUC(HS), on employment and population, respectively. Model [1] shows that the coefficient of EDUC(HS) is negative, but it is not statistically significant. This negative relationship is at odd to what is expected. In contrast, the result of Model [2] reveals a positive relationship between human capital measure and population. The coefficient for EDUC(HS) is statistically significant at a one percent confidence level. This finding is in tandem to what is discussed in the literature. Models [3] and [4] in Table 2 are comparable to Models [1] and [2], except the measures for human capital is now replaced with the presence of college graduates. In column [3] we found that the measure of human capital, EDUC(Coll), has a negative coefficient. However, the same variable is found to have a positive impact on population. The coefficient for EDUC(Coll) is statistically significant at a one percent confidence level. Models [5] and [6] show the effect of scale and female participation rate in the work force. The measure for scale is the number of workers divided by the number of establishments in a particular district. The coefficient for SCALE

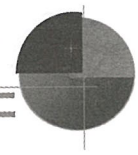
is negative, but it is not statistically significant. This finding suggests that SCALE has no effect on employment. However, scale of operation has a positive and statistically significant impact on population. The measure for female participation rate is the percentage of female in the labor force. It is interesting to find that the female participation rate has a positive impact on both employment and population. However, the coefficient for FEMALE is not statistically significant at conventional levels.

Table 2 Two-SLS estimates of population and employment (Extended Models)

Independent Variables	EMP [1]	POP [2]	EMP [3]	POP [4]	EMP [5]	POP [6]
Constant	-7.2859 (-3.61)	1.6360 (3.45)	-76633 (-3.88)	1.5815 (-3.20)	-5.1097 (-2.38)	0.3661 (0.62)
Log POP, 1991		0.8096*** (17.57)		0.8173*** (17.12)		0.9199*** (17.80)
Log POP, 2000	0.8469*** (4.20)		0.8624*** (4.47)		0.6510*** (3.38)	
Log EMP, 1991	0.4606*** (3.09)		0.4818*** (3.25)		0.4841*** (2.74)	
Log EMP, 2000		0.1104*** (4.33)		0.1149*** (4.36)		0.1074*** (3.67)
LOC, 1991	0.3318 (0.96)	-0.0911 (-1.38)	0.2827 (0.82)	-0.0839 (-1.23)	0.3399 (0.95)	-0.1168 (-1.54)
SPEC, 1991	2.0097*** (3.27)	-0.3497** (-2.32)	2.0158*** (3.32)	-0.3606** (-2.31)	1.9120*** (3.04)	-0.3178* (-1.88)
Log WR, 1991	0.4870*** (6.69)	-0.0137 (-0.64)	0.5126*** (6.96)	-0.0262 (-1.16)	0.4237*** (4.09)	0.0359 (1.16)
EDUC (Coll)			-0.1280* (-1.84)	0.0607*** (3.84)		
EDUC (HS)	-0.0697 (-1.41)	0.0471*** (4.42)				
FEMALE					0.0001 (0.02)	0.0001 (0.47)
SCALE					-0.0006 (-0.82)	0.0004** (2.09)
Northern	-0.1515 (-0.61)	-0.0796* (-1.78)	-0.1727 (-0.87)	-0.0767 (-1.62)	-0.0349 (-0.18)	-0.1619*** (-3.45)
Eastern	-0.5365** (-2.65)	-0.0153 (-0.31)	-0.5547*** (-2.77)	-0.0035 (-0.07)	-0.5301** (-2.57)	-0.0261 (-0.47)
Southern	-0.1804 (-0.72)	-0.0446 (-0.96)	-0.2257 (-0.91)	-0.0560 (-0.92)	-0.0539 (-0.23)	-0.1553** (-2.62)
N	69	69	69	69	69	69
Adj R^2	0.8877	0.9741	0.8902	0.9724	0.8833	0.9678
F-Statistic	60.73	285.02	62.27	266.98	52.47	205.31

Note: *** significance at 1% confidence level ** significance at 5% confidence level
* significance at 10% confidence level
The number in parentheses below the estimates are *t*-ratios.

The next effort in the analysis is to examine the connection between the growth of population and employment. Table 3 reveals the results of 2SLS of the regressions. In model specification [1], we find that the initial level of population (POP 1991) has a negative



impact on population growth (POPGR) as expected, but it is statistically not significant. Employment growth (EMPGR) is found to have a positive impact on population growth (POPGR). This finding is in agreement with what is expected. The estimated coefficient is statistically significant at a one-percent confidence level. Localization economies (LOC) are found to have a positive and statistically significant impact on population growth. Specialization economies (SPEC) have a negative and statistically significant impact on population growth. This finding indicates that a more diversified economy promotes population growth.

In modelspecification [2], the initial level of employment (EMP 1991) is found to have a negative impact on growth. This finding is in agreement with what is expected. However, the coefficient is not statistically significant. We find that population growth (POPGR) has a positive impact on employment growth (EMPGR) as expected. The estimated coefficient is statistically significant at a one-percent confidence level. Localization (LOC) and specialization economies (SPEC) are found to have a positive impact on employment growth, but they are not statistically significant at a conventional level.

Table 3 Two-SLS regression results

Independent Variables	Employment [1]	Population [2]
Constant	0.7484 (1.460)	0.5672 (0.487)
Log POP, 1991	-0.0481 (-1.100)	
Log EMP, 1991		-1.1065 (-0.730)
POPGR		2.4366*** (4.863)
EMPGR	0.1138*** (4.963)	
LOC	0.1418** (1.975)	0.2107 (0.464)
SPEC	-0.4151** (-2.594)	0.4575 (0.548)
N	69	69
Adj R^2	0.3226	0.2314
F-statistic	9.10	6.12

Note: *** significance at 1% confidence level ** significance at 5% confidence level

* significance at 10% confidence level

The number in parentheses below the estimates are *t*-ratios.

Table 4 shows the Ordinary Least Squares (OLS) estimates of the extended employment and population growth equations. In employment specification, other variables such as percentage female in the manufacturing sector (PF), the average size of establishment (SCALE), the wage rate (WR), and the educational level of the manufacturing work force, are included in the analysis. a negative impact on the growth of employment. But, the estimated coefficients are not statistically significant. The population growth (POPGR) has a positive and statistically significant impact on the growth of employment (EMPGR). The average size of employment (SCALE) is found to have a negative impact on the growth of employment. The estimated coefficients are statistically significant at a one-percent confidence level. The wage rate (WR) is found to have a positive and statistically significant impact on employment growth. Localization and specialization economies have positive and negative coefficients, respectively. But these coefficients are not statistically significant.The level of education (EDUC) of the labor force is found to have a negative impact on growth of employment. However, the coefficient is not statistically significant. This finding is at odd compared to what is expected. Columns [3] and [4] reveal the OLS regression results of the extended specification of the population growth equation. In this specification, the level of education is included in the analysis. The initial level of population (POP 1991) is found to have a negative impact on population growth. The employment growth (EMPGR) is found to have a positive impact on the growth of population. It is very interesting to find that the level of education (EDUC) has a positive and statistically significant impact on the growth of population.

Table 4 OLS regression results: employment and population growth

Independent Variables	EMP Growth (1)	EMP Growth (2)	POP Growth (3)	POP Growth (4)
Constant	1.0520 (2.143)	1.0388 (0.953)	0.5915 (1.786)	0.9579 (2.839)
Log EMP,1991	-0.0779 (-1.467)	-0.1592 (-1.154)		
POPGR	1.6323*** (3.654)	1.3929** (2.391)		
Log POP, 1991			-0.0487* (-1.680)	-0.0712 (-2.500)
EMPGR			0.0913*** (4.360)	0.0909*** (4.586)
LOC, 1991		0.3904 (0.954)		

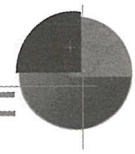


Table 4 OLS regression results: employment and population growth (Con.)

SPEC		-0.6137 (-0.811)		-0.3868*** (-2.939)
SCALE	-0.0027*** (-4.872)			
PF	-0.0002 (-0.032)			
WR	-0.0236* (1.773)	-0.0656*** (4.211)		
EDUC		-0.1039 (-1.406)	-0.0683*** (4.928)	-0.0683*** (5.426)
N	69	69	69	69
Adj R^2	0.5465	0.3833	0.4501	0.5078
F-statistic	17.39	8.04	19.55	18.54

Note: *** significance at 1% confidence level ** significance at 5% confidence level

* significance at 10% confidence level

The number in parentheses below the estimates are t-ratios.

Discussion

This study focused on the growth of population and employment at district level in Peninsular Malaysia. We found that employment and population are affecting each other in a positive manner, as expected. These findings imply that the movement of people follows the movement of job and vise-versa. The larger coefficient of population in the employment equation than those of employment in the population equation supports the notion that jobs follow people more than the other way around. Localization economies have a weak positive impact on employment growth, but they do have a significant impact on the growth of population. Specialization seems to have a negative impact on growth. This implies that a more diversified economy promotes growth.

The wage rate has a positive and significant impact on employment. This finding suggests that as wages increase, the district economies tend to be more labor-saving.

The recent growth literature has also discussed the role of human capital on growth. In this study we tested the role of human capital on the growth of employment and population. Our finding on the role of human capital on the growth of employment is at odd with what is expected. As mentioned earlier, this finding may be due to the different proxy measure of human capital used in the analysis. However, we found that the level of human

capital has a strong positive impact on the growth of population.

Our findings show that northern and southern regions have less population growth than the central region. However, in the employment growth equation show that eastern region growth less than the rest of the country.

References

1. Carlino, G. A. and Mills, E. S. : The determinants of county growth. Journal of Regional Science. 27(1):39-54, 1987.
2. Clark, D. E. and Murphy, C. A. : Countywide employment and population growth: an analysis of the 1980s. Journal of Regional Science. 36(2):235-256, 1996.
3. DeBartolome, C. A. M. and Spiegel, M. M. : Does state economic development spending increase manufacturing employment? Journal of Urban Economics. 41:152-174, 1997.
4. Simon, C. J. : Human capital and metropolitan employment growth. Journal of Urban Economics. 43:223-413, 1998.
5. Bostic, R. W., Gans, J. S. and Stern, S. : Urban productivity and factor growth in the late 19th Century. Journal of Urban Economics. 41:38-55, 1997.
6. Bradley, R. and Gans, J. S. Growth in Australian cities. The Economic Record. 74:266-278, 1998.
7. Mills, E. S. and Price, R. : Metropolitan sub-urbanization and central city problems. Journal of Urban Economics.15:1-17, 1984.
8. McDonald, J. F. : Fundamental of Urban Economics. Upper Saddle River, Prentice Hall, New Jersey. pp. 343-345, 1997.
9. O'Sullivan, A. : Urban Economics (5th ed.). McGraw Hill, New York. pp. 43-48, 2003.
10. Richardson, H. W. : Economies and Diseconomies of Agglomeration. In H. Giersch, (Ed.), Urban Agglomeration and Economic Growth. Springer, New York. pp. 123-155, 1995.
11. Glaeser, E. L. : Kallal, H.D., Scheinkman, J. A. and Shleifer, A. Growth in cities. Journal of Political Economy. 100(6): 1126-1152, 1992.
12. Henderson, J. V. : Medium size cities. Regional Science and Urban Economics. 27:583-612, 1997.