Graduate Labour Market Analysis in Malaysia

Diana Binti Abdul Wahab

Submitted in accordance with the requirements for the degree of Doctor of Philosophy

The University of Leeds

Leeds University Business School

Department of Economics

February 2017

The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

Abstract

This thesis studies several aspects related to graduate employment in Malaysia. The first chapter examines graduate's transition from education to work which includes the analysis of the first destination choice after study and occupational types using multinomial logit model. Within each occupational category, we use Fairlie's non-linear decomposition technique to compute the differences in the participation rate between gender and ethnic groups. Women and Malay's under-representation in superior occupational types are largely due to their choice of less attractive courses that are associated with low market demand. The second chapter analyzes the wage differentials between the public-private sectors, gender and ethnic groups. The earning equation is adjusted to account for the sample selection bias due to the participation rate. We use the Oaxaca-Blinder decomposition technique to compute the wage differences between the groups. The difference in the sectoral wage is non-significant, and there is no evidence of wage differential in the public sector. Gender and ethnic pay gap only occur in the private sector where male and Chinese consistently earn higher. The third chapter explores another dimensions of graduate's transition from education to work. First, we found that higher ability graduates are more inclined to migrate in order to maximize their employment prospects as well as compensating for their superior human capital. Indeed, graduate's migration results in higher earning but not necessarily reduce education-job mismatch. Second, graduates who possess better characteristics took longer to obtain their first job but they ended up with superior occupational types and higher earning. Yet, social attributes such as being a male, a Chinese, or originating from an urban state increases the probability for faster transition from education to work. Third, using a pseudo-panel data and controlling for cohort heterogeneity shows that the remaining variables that significantly affect earning are family income and locality.

Acknowledgements

All praise is due to Allah for His Mercy and Guidance.

My study is made possible with the funding from the Ministry of Higher Education through the University of Malaya.

I am especially grateful to my supervisors Dr. Kausik Chaudhuri and Dr. Luisa Zanchi for their helpful suggestions and advice throughout my study; and for their trust in me against all odds even though I had only two years to come out with this thesis. To Dr. Rohana Jani for her persistent support and inspiration, and also for providing me with the data which becomes the essential part of this thesis.

My deepest gratitude to my mother who has fought for our education while she was denied entry to the best school in the country during her childhood due to poverty. To my late father, who passed away during my final year, making it the most difficult journey home across the continents. To my husband, for endless and tireless support throughout. To my toddler son, for being the source of joy when life gets most difficult. Finally, to all families and friends who make life colorful.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Thesis structure

The thesis consists three main topics which look into different aspects of graduates transition from education to work. The first topic investigates in great detail the determinants that influence graduates' first destination choices where each graduate either choose to be employed, continue their study, or remain unemployed at the time the measurement is taken. Half of the graduates observed are employed at the time the survey was conducted. Among those who choose to be employed either in full time or part time employment, we further investigate the determinants that influence graduates' choice in different occupational categories. Graduates with higher academic achievement, better proficiency in English language, coming from higher family income and originated from an urban state, being a male or a Chinese, are associated with better employment outcomes such as full time employment (compared to part time or unemployed), permanent job position (compared to contract, temporary, or self-employment), and hold professional job position.

We also investigate gender differences within each occupation types. Women have a preference towards courses such as Education, Pharmacy, and Pure Science which are characterised by low employment prospects. We investigate how this preference affects women's employment pattern within each occupational types. Nevertheless, if women posses the same qualification as men would they improve their employment prospect? Indeed, women's effort to take highly technical courses does not seem to help reduce their under-representation in the labour force participation. Our finding will show that gender differences persist in high industrialised sectors, largely due to unobserved features that may signify discrimination towards women. Malaysia's peculiar case in the labour market composition is that the imbalance in the ethnic share in the country saw the ethnic majority suffers the most in terms of lower participation rate and lower earning. Therefore, a part of this topic is devoted to investigating ethnic differences in employment within each industry. The majority ethnic Malays tend to take less attractive courses which lead to lower occupational status.

The second topic looks at graduate earnings. Specifically, we look at the public-private wage differentials to find evidence of wage premium among public sector worker. Public sectors in developing countries like Malaysia are usually large in terms of its size and provide good remuneration to its workers. They are also associated with less discrimination and every so often provides unnecessary wage premium. To examine whether workers from different sectors are paid equally, we compute the earning difference between high skilled workers in the public and the private sectors and found no evidence of significant wage differential. Our result is consistent with Adamchik (1999) who found that after controlling for characteristics and selection, public-private wage differences among first degree graduates disappeared. This topic further investigates the earning differentials between gender and ethnic groups. We found evidence of gender gap in the private sector which are

attributable to some unmeasured features. There is no evidence of ethnic disparity in the public sector but the Chinese and the other ethnic group earn significant wage premium in the private sector compared to the Malays largely due to the unexplained part. Finally, we examine if full time workers experience wage premium compared to graduates who work part time. In summary, we found that employment patterns and earnings are very interrelated - those who are offered better occupational types are also rewarded more - and they are influenced by the same characteristics.

The third topic looks at another dimension of graduate employment. First, we look into the inter-regional migration pattern and how it is related to the education-job mismatch. The expansion of tertiary education leads to a more diversified composition of graduates which include some low quality students that would not have entered university by the previous standard, and it further leads to education-job mismatch which causes unnecessary wastage when individual's investment in education does not translate into better employment prospect. Indeed, Ismail (2011) found that women in Malaysia may show better participation rate after secondary school compared to those with a university degree. Consistent with the theory of migration, we found that graduates who migrate to another state have successfully increased their earning, but migration does not reduce mismatch. Another relevant aspect of employment is the job search duration. Many studies in graduate employment pattern look at graduate's employment status at one point in time. One aspect that would be interesting is to look at the time it takes to obtain the first job. Characteristics that are related to better employment outcomes are found to have the opposite effect in the job search duration. Graduates with better characteristics tend to spend longer in the transition but they end up with better occupations and earning. The last section attempts to model graduate earning using a pseudo-panel data by taking a cohort average of variables from a set of independent pooled cross sectional data. A cohort is defined as a group of individuals who share the

Figure 1.1: The states in Malaysia. The map is constructed for labelling purpose only, ignoring the real distance between the Peninsular states and the Borneo states as well as actual size comparison.

same fixed membership (i.e. sex, ethnic, course of study). After controlling for the cohort effect, family income and the state of origin remain significant variables in determining a graduate's earning.

In the next sections, we sketch an overview of Malaysia's geographical and demographical features. Then, we describe the data used in the most part of this thesis.

1.2 Overview of Malaysia

Malaysia is an ethnically and religiously diverse developing country governed by constitutional monarchy since its independence in 1957. The economic growth in 2012 is recorded at 5.6%, slightly low compared to two previous years, while the unemployment rate is 3.0% as in March 2013. The labour force is reported at 13 million among the 30 million populations. Figure 1.1 shows that there are thirteen states and three federal territories in two regions separated by the South China Sea. Perlis, Kedah, Penang, Perak, Selangor, Negeri Sembilan, Melaka, Johor, Tereng-

ganu, Pahang, and Kelantan are the eleven states in the eastern side of the country called the Peninsular Malaysia, where Kelantan, Perlis, Kedah and Perak share border with Thailand. Kuala Lumpur is located in the middle of Selangor. On the Borneo island there are two states: Sabah and Sarawak, and a federal territory Wilayah Persekutuan Labuan (Labuan). The services and the manufacturing sectors remained as the key engine to the growth. The performance of Selangor, Kuala Lumpur, Johor, Sarawak and Penang contributed 75% to the national momentum.

The states of Selangor and Kuala Lumpur both dominate a quarter of total percentage share of services sector each, followed by Johor, Sarawak, Perak, and Penang. Selangor on the other hand dominates manufacturing sector (0.297 of total), followed by Pulau Pinang (0.136 of total) and Johor (0.126 of total). Agriculture is more dominant in the states of Sabah, Johor and Sarawak. Labuan, Kuala Lumpur, Selangor, Pahang and Perak are the top five states in economic growth. Table 1.1 shows the gross domestic product per capita for each state in 2012 and 2013.

Population distribution by state in Table 1.2 indicated that Selangor is the most populous state (5.46 million), followed by Johor (3.35 million) and Sabah (3.21 million). The population share of these states to the total population of Malaysia was 42.4 per cent. The least populated states were Putrajaya (72,413) and Labuan (86,908). Population density of Malaysia is at 86 persons per square kilometre in 2010 compared with 71 persons in 2000. Unlike the population distribution, the population density revealed a different picture. Selangor being the most populous state was only ranked fifth in terms of population density with 674 persons per square kilometre. Among the most densely populated states were Kuala Lumpur (6,891 persons per kilometre), Penang (1,490 persons per kilometre) and Putrajaya (1,478 persons per kilometre). The World Bank reported the urban population in Malaysia was last measured at 75 per cent in 2015 while differences exist across

Table 1.1: GDP Per Capita by State, 2012 - 2013 in Ringgit Malaysia (RM)

State	**2012**	**2013**
Kuala Lumpur	74,579	79,752
Labuan	40,668	43,848
Sarawak	40,396	41,115
Penang	36,787	38,356
Selangor	35,916	37,851
Melaka	33,623	34,109
Negeri Sembilan	32,545	33,033
Pahang	26,274	26,759
Johor	24,569	25,302
Terengganu	22,717	23,285
Perak	20,510	21,150
Sabah	18,713	18,603
Perlis	17,990	18,519
Kedah	15,777	16,316
Kelantan	10,568	10,677
MALAYSIA	**31,920**	**32,984**

different states, ranging from 42.4% in the state of Kelantan to 91.4% in Selangor (World Bank, 2015). Unemployment rate in Malaysia averaged 3.26% from 1998 until 2015, reaching an all time high of 4.5% in 1999 and a record low of 2.7% in 2012.

As a consequence of British colonisation in the then Malaya, there was a large migration of Chinese and Indians who were brought to work in tin mining and rubber estates for the British ruler. The Malays remained in the villages with no link to the fast growing economy in the cities because they were reluctant to serve as cheap labour for the colony, leaving the Malay majority had been historically poorer than Chinese and Indian (Chapman and Harding, 1985). As one of the colonial strategy to strengthen their power in the land, they created residential segregation among the different ethnic groups in order to hinder them from achieving national unity and thus overthrowing the British' power. Malays who once regained their

Table 1.2: Urbanisation and population distribution by state

State	**Urbanisation %**	**State**	**Population (in millions)**
Putrajaya	100	Selangor	5.46
Kuala Lumpur	100	Johor	3.35
Selangor	91.4	Sabah	3.21
Penang	90.8	Sarawak	2.47
Melaka	86.5	Perak	2.35
Labuan	82.3	Kuala Lumpur	1.67
Johor	71.9	Penang	1.56
Perak	69.7	Kelantan	1.54
Negeri Sembilan	66.5	Pahang	1.5
Kedah	64.6	Terengganu	1.04
Terengganu	59.1	Negeri Sembilan	1.02
Sabah	54	Melaka	0.82
Sarawak	53.8	Perlis	0.23
Perlis	51.4	Labuan	0.09
Pahang	50.5		
Kelantan	42.4		

power in 1957 had to compete with Chinese and Indians who had a head start in the economy. Government official has tried to correct this since 1971 through the New Economic Policy (NEP) of affirmative action by giving Malays priority in university scholarships and governmental jobs. Although since 1971 Malays have benefited from positive discrimination in business, education, and civil services, ethnic Chinese continue to hold economic power and are the wealthiest community. The consequence of the NEP policy and its New Economic Model have also lead to brain drain, particularly among the educated ethnic Chinese and Indian who leave Malaysia to seek fairer treatment elsewhere. In 2010 the World Bank reported that these groups have now made up the majority of the Malaysian diaspora; estimated to be around 1.4 million people (World Bank, 2011).

In the next section, we discuss educational system in Malaysia highlighting on higher education.

1.3 Educational system in Malaysia

Malaysian education pattern has typically been eleven years of schooling followed by a transition period of pre-university educations before entering higher education to a first degree. The eleven years of schooling is divided in three parts: primary school from age seven at Standard 1 to age twelve at Standard 6, where students sit for the Primary School Achievement Test at the end of Standard 6; followed by lower secondary school from age 13 at Form 1 to age 15 at Form 3, where students sit for Lower Secondary Assessment; and finally two years of higher secondary which ends at Form 5, where students sit for Malaysian Education Certificate equivalent of O-Level.

Pre-university education is offered by matriculation (commonly known to be offered to top students, one year preparation for university education), or taking a two-years Sixth Form, or Diploma. Higher education is offered by either public university, private university, or international universities abroad. Application for entering public university is centralised by the university intake unit who locate the students in any of the preferred course of study and/or university of choice based on availability and students' ability. Top universities usually have the privilege of choosing the highest ranking students arranged by the university intake unit, while less-fortunate students will have to be located to any available courses of studies and/or universities that still have the availability. Students may choose to accept the offer, or choose another institutions such as private universities or studying abroad. Commonly students coming from low to middle income families will tend to accept the offer by studying at a public university due to lower costs.

Table 1.3 shows the number of university graduates for all levels of education produces in the year 2013. Figure 1.2 shows the composition of graduates within each

higher learning institution in 2013.

Table 1.3: Total number of graduates produced by Malaysia higher learning institutions in 2013 based on awarded certificates.

Awarded certificate	**Number of graduates**
Diploma	99292
Professional	343
First Degree	96745
Master's Degree	15550
PhD	1819
Certificates	7182
Total	220931

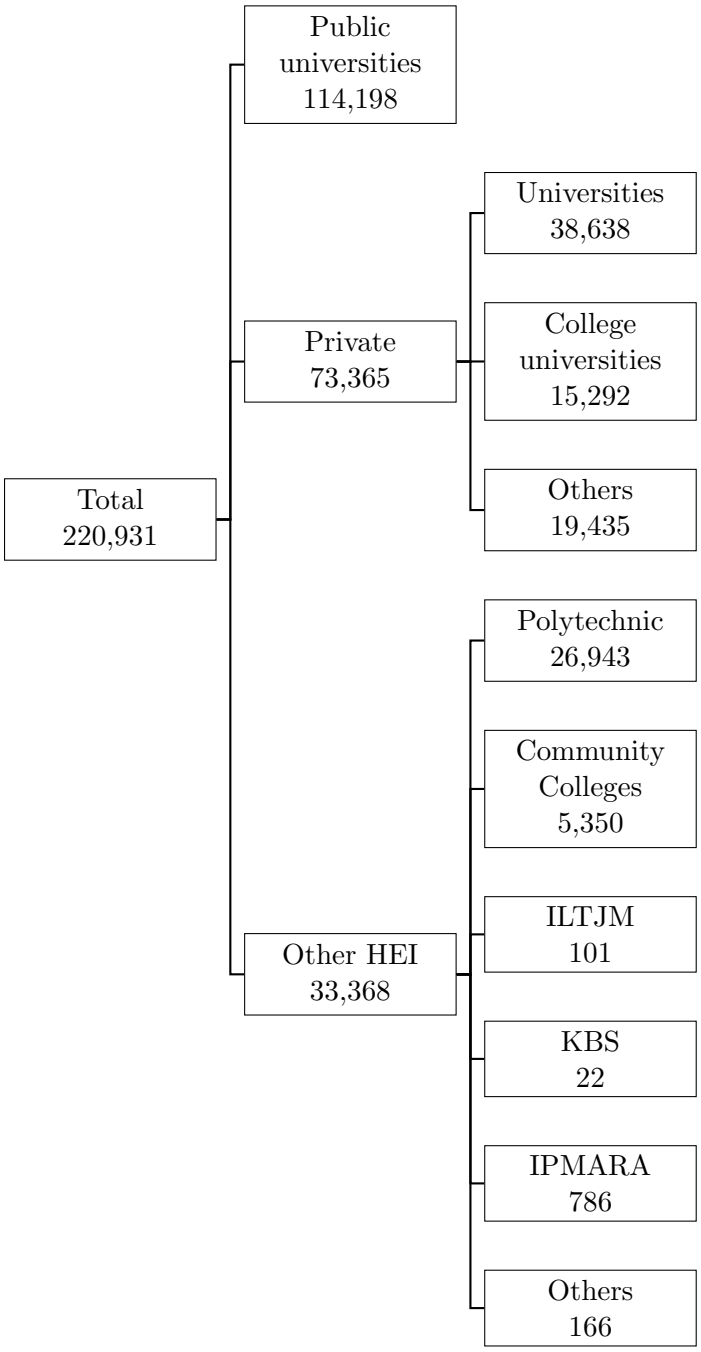

Figure 1.2: Total number of graduates produced by participating higher education institutions in Malaysia including all levels of studies for the year 2013.

1.4 Description of the Graduate Tracer Study data.

In 2002 with the collaboration of the Economic Planning Unit, the Prime Minister's Department, the Public Higher Education Institutions (Public HEI), the Private Higher Education Institutions (Private HEI), and Polytechnics, the government of Malaysia has introduced a university exit survey known locally as the Graduate Tracer Study. The respondents involved are graduates who have finished study and are qualified to receive certification. The study is conducted every year during convocation involving all public universities and almost all private higher educations. The system is open two to three weeks before convocation and closes one week after the convocation. Starting from 2006 the questionnaire were made online to reduce operational cost and data storage while increasing universities' participation rate. The main objective is to study graduate employability and marketability. The survey covers all graduates of all levels - Diploma, first degree, and post-graduate levels.

The response rate for nine years of online operation averages around 81.51%, increasing on yearly basis due to the committee's affirmative action and institutions' benefiting from the report outcome. The most recent data available when this thesis starts is the 2013 survey capturing 220,931 graduates of all levels of studies, 96,745 of those are first degree graduates. This study focuses on first degree graduates employment and earnings, the term 'graduate' henceforth refer to the first degree graduates.

The graduates were asked about their socio-economic background (age, marital status, place of origin, family income, disability status; academic and skill competencies; educational experience (type of university, name of university, courses, field of study, industrial training status, financial assistance or funding, and mode of study); job information (employment status, reasons for unemployed, type of organisation,

income, industry, part time job, job level, address of workplace); and other rating questionnaire: retrospective questions on the satisfaction on university facilities, teaching environments and quality.

The age distribution of the graduates ranges from 19 to 69 with positive skew and clustered between the common age of between 22 and 27. Entry to a first degree requires graduates to pass either one of these after their O level certificate at the age of 17: a one-year matriculation, two-years A level, or a three-years Diploma. Some graduates may have taken up the advance class for the bright student which allow them to skip one year of schooling (e.g. from Year 3 straight to Year 5). Theoretically, the earliest age for first degree graduation is 20, and the occurrence of one respondent with age 19 might be caused by at the date of convocation the respondent has not reached the age of 20. However, in order for this analysis to be representative of fresh graduates, the age has been filtered so the focus is on graduates between the age of 22 to 27.

Graduates with a disability were also filtered out for they may have different attributes of labour market. Most of the foreign students went back to their home country and thus were removed. The academic achievement for most graduates was recorded in a cumulative grade point average (CGPA) ranging from 0.00 to highest score at 4.00. The passing mark is at 2.00 needed for graduation. Some Medical and Dentistry students in several institutions do not have CGPA measure, instead, they were only labeled as "passed". Obviously, all of graduating Medical and Dentistry graduates passed their studies. Analysis involving CGPA for these graduates may be seriously biased because the majority of them have a missing value on CGPA. Considering Medical and Dentistry graduates have the toughest entry level grade where only the brightest was accepted into the course, and the passing mark is exceptionally intensive, then it is natural to impute the missing CGPA with 4.00. It is also

evident that Medical and Dentistry graduates' employment rate is the highest compared to graduates from other fields. Their earning is also significantly higher. The measurement of English language ability is observed through the graduate's score in a national standardised English proficiency test, the Malaysian University English Test (MUET) which was taken prior to admission. Even though the graduates may have spent several years in education but their MUET score remains a significant measure of their English language proficiency until graduation (see Rethinasamy and Chuah (2011)).

A different institution may use a different name for their offered courses of studies, and these have been reduced to 24 major courses of study as in Table 1.4. The details of all the variables being used are shown in Table 1.4 with their descriptive statistics in Table 1.5. Graduates income is observed in monthly income in eight incremental level - the lowest below RM500 and the highest is more than RM5,000, where the graduate's entry level is averaged at RM2,000. Almost half of the graduates were employed by the private local corporation and a quarter was employed by the private multinational corporation. 15% of the graduates were employed in the public sector. Another 11% were self-employed in their business or freelancing activities. The majority of the employed graduates work in professional jobs, followed by clerical support, and sales and services. Half of the employed graduates were employed in permanent job level. The largest economic sector among the graduates was in other services and professional, scientific, and technical occupation type, followed by manufacturing, education, and construction.

Table 1.4: Data description - the Graduate Tracer Study

Variable	Description
Ability	
cgpa	Grade Point Cumulative Average
english	Malaysian University English Score (MUET)
muet1	Band 1 (lowest)
muet2	Band 2
muet3	Band 3
muet4	Band 4
muet5	Band 5
muet6	Band 6 (highest)
Education	
publicuni	Public university
privateuni	Private university
courses	courses of study
courses1	Law
courses2	Arts / Social Science
courses3	Transport
courses4	Administration
courses5	Management
courses6	Economy
courses7	Accountancy
courses8	Marketing
courses9	Finance
courses10	Journalism
courses11	Islamic
courses12	Food/hospitality
courses13	Arts
courses14	Pure science
courses15	Applied science
courses16	Pharmacy
courses17	Medical
courses18	Dentistry
courses19	Nurse
courses20	Environment
courses21	Sports
courses22	Engineering
courses23	Computer Science
courses24	Education
Socio-economic	
male	Dummy, 1 if male

Continued on next page

Table 1.4: Data description - the Graduate Tracer Study

Table 1.4 – continued from previous page

Variable	Description
age	Age of respondent
race	Main ethnic group
malay	1 Malay
chinese	2 Chinese
others	3 Indian and others
faminc	Family income
faminc1	1 Less than RM500
faminc2	2 Between RM501 to RM1000
faminc3	3 Between RM1001 to RM1500
faminc4	4 Between RM1501 to RM2000
faminc5	5 Between RM2001 to RM2500
faminc6	6 Between RM2501 to RM3000
faminc7	7 Between RM3001 to RM5000
faminc8	8 More than RM5000
Job related variables	
employment	1 Full time employment, 2 Part time employment, 3 Continue study, 4 Unemployed.
joblev	Job level
jlev1	1 Permanent
jlev2	2 Contract
jlev3	3 Temporary
jlev4	4 Self-employed
jgroup	Job group
jgroup1	Manager
jgroup2	Professional
jgroup3	Technician
jgroup4	Admin support
jgroup5	Sales
jgroup6	Prof. Agri.
jgroup7	Commerce
jgroup8	Machinery
jgroup9	Basic
public	Dummy, 1 if individual is hired in public sector
industry	Industry
industry1	1 Agriculture, forestry, and fishing
industry2	2 Mining and quarry
industry3	3 Manufacturing
industry4	4 Electric, gas, steam, and air-conditioning supplies

Continued on next page

Table 1.4: Data description - the Graduate Tracer Study

Table 1.4 – continued from previous page

Variable	Description
industry5	5 Water supply, sewerage, waste management, and related activities
industry6	6 Construction
industry7	7 Wholesale and retail trade, repair of motor vehicles
industry8	8 Transport and storage
industry9	9 Accommodation and food services activities
industry10	10 Information and communication
industry11	11 Finance and insurance
industry12	12 Real estate
industry13	13 Professional, scientific and technical
industry14	14 Administrative and support services
industry15	15 Public administration and defense, compulsory social security
industry16	16 Education
industry17	17 Health and social work
industry18	18 Arts, entertainment, and recreation
industry19	19 Other services
industry20	20 Household / domestic personnel
industry21	21 Corporate and organization outside the region
gradinc	Graduates' monthly income
gradinc1	1 Less than RM500
gradinc2	2 Between RM501 to RM1000
gradinc3	3 Between RM1001 to RM1500
gradinc4	4 Between RM1501 to RM2000
gradinc5	5 Between RM2001 to RM2500
gradinc6	6 Between RM2501 to RM3000
gradinc7	7 Between RM3001 to RM5000
gradinc8	8 More than RM5000

Table 1.5: Descriptive statistics - the Graduate Tracer Study.

Item	Variable	N	Percent	Item	Variable	N	Percent
First destination	Full time job	29,954	39%	Job level	Permanent	17,648	49%
	Part time job	5,714	8%		Contract	8,877	25%
	Continue study	5,875	8%		Temporary	8,086	23%
	Unemployed	34,326	45%		Self-employed/family	1,057	3%
Academic score	CGPA	3.16		Job	Manager	2,338	7%
MUET score	Band 1	4,367	7%	group	Professional	18,817	53%
	Band 2	20,577	33%		Technician	2,340	7%
	Band 3	26,046	41%		Admin support	5,383	15%
	Band 4	9,992	16%		Sales	4,584	13%
	Band 5	1,837	3%		Prof. Agri.	164	0.5%
	Band 6	93	0%		Commerce	500	1%
University	Public	58,356	77%		Machinery	138	0.4%
	Private	17,514	23%		Basic	1,404	4%
Courses	Law	1,562	2%	Sector	Public	4758	13%
	Arts/SocSc	4,060	5%		Private	30911	87%
	Transport	249	0.3%	Industry	Agriculture/Forestry/Fishing	553	2%
	Administration	4,420	6%		Mining/Quarry	205	1%
	Management	7,233	10%		Manufacturing	3,699	10%
	Economy	1,620	2%		Electric/Gas/Steam	708	2%
	Accountancy	4,492	6%		Water/Sewerage	157	0%
	Marketing	1,406	2%		Construction	3,155	9%
	Finance	3,468	5%		Wholesale	1,413	4%
	Journalism	1,799	2%		Transport/Storage	768	2%
	Islamic	995	1%		Food/Accom.	1,402	4%
	Food/hospitality	1,404	2%		IT/Comm.	2,630	7%
	Arts	1,905	3%		Finance/Insurance	3,094	9%
	Pure science	1,254	2%		Real estate	514	1%
	Applied science	4,914	6%		Scientific/Technical	4,784	13%
	Pharmacy	820	1%		Admin/Support	1,354	4%
	Medical	2,538	3%		Defence	239	1%
	Dentistry	365	0.5%		Education	3,513	10%

Continued on next page

Table 1.5: Descriptive statistics - the Graduate Tracer Study.

Table 1.5 – continued from previous page

Item	Variable	N	Percent	Item	Variable	N	Percent
	Nurse	1,291	2%		Social work	1,369	4%
	Environment	1,518	2%		Arts	694	2%
	Sports	317	0.4%		Other services	4,656	13%
	Engineering	17,478	23%		Domestic	658	2%
	CompSci	5,229	7%		Extra-territory	103	0.3%
	Education	5,533	7%	Graduate	< RM500	1,540	4%
SES*	Male	27,380	36%	income	RM501 - RM1000	5,523	15%
	Female	48,490	64%		RM1001 - RM1500	5,831	16%
	Malay	51,918	68%		RM1500 - RM2000	7,837	22%
	Chinese	16,298	21%		RM2001 - RM2500	7,445	21%
	Other ethnic	7,654	10%		RM2501 - RM3000	4,533	13%
	Age	23.7			RM3000 - RM5000	2,664	7%
Family income	< RM500	5,511	7%		> RM5000	295	1%
	RM501 - RM1000	13,573	18%				
	RM1001 - RM1500	11,517	15%				
	RM1500 - RM2000	9,716	13%				
	RM2001 - RM2500	7,425	10%				
	RM2501 - RM3000	9,713	13%				
	RM3000 - RM5000	10,598	14%				
	> RM5000	7,817	10%				

SES* =social economic status.

Chapter 2

Graduate's first destination choice and employment.

2.1 Introduction.

Graduate experience in embarking into labour force in recent times is more varied and less standardised compared to the previous decades. Transition from university to labour market is prolonged, and graduates take longer time to establish themselves into the labour market which cause some to experience repeated period of unemployment or attached to marginal form of employment. Some graduates may return to education or training, while others take the time out for leisure.

This chapter is set to answer several questions on the graduates transition from education to work. First, we examine four possible graduates' first destinations after study - they either get a full time employment, part time employment, continue to study, or remain unemployed at the time the survey data was gathered. Second, we examine occupational choices among graduates who are employed. We investigate

the determinants that are associated with different job levels (i.e. permanent, contract, temporary, or self-employment). Third, we explain gender differences within each of the first destination choice. We also investigate gender differences in different occupational types. Women's lower participation in superior occupational types can be explained by their preferences in courses that have less demand in the labour market. In order to investigate if attaining the same qualification with men would reduce women's performance, we compute gender differences in different employment outcome within the same courses. All else equal, we still found that women who possess the same qualification as men are under-represented in the superior occupational types compared to men.

Generally, we found that higher academic performance, better English proficiency, higher family income, the choice of courses of study largely influenced graduate's better employment outcomes. Graduates with better characteristics as mentioned, are more successful in gaining full time employment, permanent job level, and professional job category. However women are found to be consistently under-represented in superior occupational types - some are largely due to their preference in less attractive courses, some are due to unmeasured observations that may signify discrimination or taste. Nonetheless, our result is consistent with the previous literatures in the country who found that women are less preferred in Managerial job positions and instead segregated into Administration Support jobs. Further investigation on taste would be helpful to disentangle the reason of women segregation into lower occupational status.

This paper contributes to the literature in terms of the use of a wider spectrum of analysis that cover large categories of occupational types which is not limited to a binary employed-unemployed category. The detailed categorisation of occupational types allow us to investigate uniquely the impact of graduate's achievement, char-

acteristics, and experiences that influence their settlement into the labour market. The innovative aspect of this paper is when we disentangle the gender differences within each course of study to investigate if women with the same qualification as men would have similar employment opportunity.

Besides contributing to the literature on Malaysian graduate employment, our results may inform the policy of university admission especially related to the Malays and women. Malay and women's inferior employment outcomes are due to their choice of less desired courses, where the sorting into such courses originated from their lower academic performance at schools. One way to reduce unemployment among these groups might be to reduce the intake of courses that are not demanded by the labour market and instead increase the participation into STEM[1] courses. If a student are not qualified to enter university and take up such courses, then vocational training must be promoted. Courses that are less demanded should not be entirely banished (due to their contribution towards social benefits and knowledge creation), but the admission into such courses should be limited in order to reduce the incidence of over-education where graduate receive the wrong signal and they invest in education that do not help them in their career.

The chapter is arranged as follows. In section 2.2 we discussed the underlying theory behind graduate employment. Section 2.3 describes the sample data used in this study. Section 2.4 introduces the econometric framework to analyse graduates employment outcomes. The results are discussed in section 2.5 and finally section 2.6 concludes the findings.

[1]Science, Technology, Engineering, and Mathematics

2.2 Literature review.

Graduate's transition from education to work increasingly gains worldwide attention due to the expansion of higher education institutions and proliferation of tertiary education enrolment across the globe. Worldwide studies on graduate labour market such as the Malaysian's *Graduate Tracer Study*, the United Kingdom's *Higher Education Data and Analysis* (UK HESA), the European's *Careers after Graduation - an European Research Survey* (CHEERS), Canada's *National Graduate Survey* (NGS), and various reports from universities and survey institutions are established to conduct research on the process of transitioning from university to work. They collect data on graduate characteristics, educational choices, achievements, and experiences, and information on first destination choice after study. The studies involved identifying the determinants of graduates employability and earnings, the effect of migration, the incidence of over-education, and the job search duration to gain employment after finished study, and the differences between countries (Müller and Gangl, 2003).

Technological progress in the current times require high skilled workers to fulfil the jobs - which can be achieved through the massification of higher education. Education enhances individuals productivity and reduces social inequality among traditionally disadvantaged group and minimise social disparity. In the emergence of knowledge economy the expansion of higher learning institutions supply high skilled workers into the labour market but it also lead to more diversified composition of graduates which include individuals who would not have attended university by the previous standard. The side effect of higher education expansion may has detrimental consequences for graduate labour market outcomes. High participation rate would lead to credential inflation in which case if there are more highly educated graduates than the labour market can absorb, the labour market value of credentials

will decline. In this case, some individual would be pushed downward to accept jobs that require less educational level than they acquired leading to over-education or under-employment.

Achieving a degree has become a less distinguishing mark among employers. Without parallel improvement in the creation of employment opportunities, higher education expansion would only lead to increased unemployment rate, increased education-job mismatch, and increase over-education - all of which have detrimental consequences to individual's future employment (i.e. loss of human capital), health, and motivation. Graduate jobs in current times are less defined and graduates are experiencing employment in the marginal sectors, positions that were not considered as suitable, more temporary and part time jobs, interrupted and uncommon career path, and new type of self employment. Nonetheless, the demand for higher education continues to grow seeing that as an escape route from low wage job.

Graduates leave educational system to obtain jobs that gives return for their investment in education in terms of monetary or non-pecuniary rewards. Their first job would be a stepping stone for a better future. At the same time, employers looking for applicants who are productive and least costly for the kind of work required by the job. The matching model signify the overall outcome of such simultaneous decisions by both parties that will be reflected in the social stratification.

Despite numerous efforts from the government and universities to increase graduate participation in the labour market, the persistence of graduates' high unemployment rate lead to major concern which is reflected by the numerous studies on the transitional process. Due to rising unemployment many universities turn to more direct form of active intervention into graduate labour market by introducing industrial training and graduate training scheme aiming to increase employment participation (see Pillai et. al. (2012)).

Courses of study are reported to have tremendous effect on employment prospects. Highly technical courses such as Medical and Engineering improves individual's employment prospect compared to graduates from Arts and Social Science studies - but courses of study are also related to ability which then translate into better employment outcomes. One important aspect to give attention is that prospective students should have been informed about what skills are rewarded in the labour market so they can use the information in maximising their employment prospect (Assaad et. al., 2014).

Unemployment can be the result of labour oversupply which lead to limited availability of jobs in the market but if there are constant unfulfilled vacant jobs in the market, as in the case of Malaysia, it may signify a mismatch between graduate qualification and skills required by the labour market. The general theme in Malaysian graduate unemployment studies lingers around the same argument - Malaysian graduates lack of skills necessary for employment (Rahmah, 2011), (Hanapi et. al., 2015), (Nasrudin, 2004)[2].

Another important aspect that take up most researches is graduates' lack of ability to communicate in English - this is especially true among rural female Malay graduates

[2]The general theme of researches of Malaysia graduate unemployment problem focuses on graduates lack of necessary skills for employment. (Rahmah, 2011) reports that graduates posses "unsuitable skill and qualification ... no good working performance". From employers perspective of local graduates, Rahman et. al. suggest that "lecturers are lack of skill and higher education could not produce graduates with skills required in the labour market". A report from the Central Bank in 2002 states that Malaysian graduates are "less skilled as compared to the international graduates". The skills mentioned include technical skills, problem-solving skills and communication skills, especially in English language. (Hanapi et. al., 2015) found ten primary weaknesses of Malaysian graduates are in the aspect of management, problem-solving, communication, leadership, creativity, critical thinking, proactive, self-confidence and interaction skills while (Nasrudin, 2004) stated the eleven factors that lead to the unemployment problem among the graduates are the relationship between capital intensive economy, a rapid increase of graduated workforce, lack of the relationship between educational institutions and the industry, lack of training for work preparation, rapid increase of the population rate and rapid decrease of the mortality rate, educational development, economic recession, quality of education, capability of graduates, and the graduates skills and personalities.

(Ismail, 2011). Gender also plays a role, where women graduates are found to be less employable (Nagaraj, 2014) and an argument is based on simply because there are a lot more women graduates enrolled in tertiary education (Ismail, 2011). In order to improve graduates employability, universities and industries introduced several graduate employment programs (one example is MY Graduate Scheme). Universities are also creating conducive environment for entrepreneurship (Ismail, 2011). Public universities implement industrial training at the end of study period, where graduates are getting temporary unpaid placement in the industry which not only give real life training but also saw many graduates absorbed into employment at the end of internship period (Pillai et. al., 2012).

In their transition from education to settlement in employment, graduates use their qualifications to secure jobs and towards future occupational and professional development. Müller and Gangl (2003) states that initial job outcome is highly influential to shape further development of work careers. Hence, graduates ability to settle smoothly and successfully into labour market would minimise their experience of unemployment and generate subsequent job progress. This implies that graduate's smooth transition also play important role towards shaping social stratification of modern societies. At the same time, another social process take place with this transition in terms of starting a household or family.

Does attending to different type of university affect graduates' employment prospect? Hilmer and Hilmer (2012) found evidence of earning premium among graduates from better universities. Ability is hard to observe, but university credential provide "cheap sorting" to help employers identify better graduates (Hartog et. al., 2010). Graduates from better universities also receive more invitation for interviews (Drydakis, 2016).

Universities differ in terms of ranking, size, establishment type (public or private uni-

versities), and operational focus (research based versus teaching based) - all of which may affect enrolment criteria and learning experiences. There are top tier research based public universities in the country: University of Malaya, National University of Malaysia, Universiti Putra Malaysia, and Science University of Malaysia, all of which reside in the urban states. Not only they obtained larger share for research expenditure from the government compared to all other public universities in the country, they also have priority in choosing potential applicants during student intake through a central processing body (University Application Unit).

To cater for the need for tertiary education among its population without having to rely on excessive spending from the government, under the Education Act 1996 Malaysia establishes more private universities which offer courses that are mostly in demand. Private universities are found to offer professional courses with high private benefit but low social benefit (Assaad et. al., 2014). A study from Malaysia found that public universities spend more in library facilities, but private universities spend more on computer and laboratory (Wilkinson and Yussof, 2005). Wilkinson Yusof reported that: Information Technology courses are mainly offered by private institutions; Medical and Dentistry are expensive investment but give good return and hence are also offered by private universities; Economic and Business subjects require short training and the syllabus are well established and they are also very marketable so it is more likely to be offered by private universities; in contrast Education, Applied Sciences, and Pure Sciences are less likely to be offered due to the lack of demand and they are already sufficiently provided by the public universities. (Wilkinson and Yussof, 2005) also reported that Law are less likely to be offered locally due to students getting law education abroad for international recognition. As comparison to Wilkinson and Yussof (2005), our sample data show that Management are much more likely to be offered public universities; while Engineering, Computer Sciences, Accountancy, Medical, and Administration are more likely to

be offered by private universities.

Yet, Teichler (2000) found that university effect is moderated by subject heterogeneity. Different courses of study might be associated with different level of ability, and certain level of ability lead to successful employment. Certain courses (i.e. Medical, Engineering, Dentistry) put high entry requirement and only the best school leavers would be accepted into such courses. These courses are also associated with high employment and more homogenous employment outcomes. Purcell and Pitcher (1996) found that the subject of study is the single most important determinants of the ease or difficulties to start a career while James et. al. (1989) found that the effect of subject endogeneity towards earnings is larger than the university effect. Many studies on graduate employment ascribed courses of study as the major determinant on heterogeneity in employment outcomes (Dolton et. al., 1989), (Smith et. al., 2000), (Robst and VanGilder, 2016), (Koshy et. al., 2016), (Chevalier, 2011). Certain courses (i.e. Medical, Engineering, Dentistry) put tougher entry requirement and they are also associated with homogenous occupational types and higher earning.[3].

We further consider the influences of social and economic status towards employment. Women's higher education attainment and lower fertility rate should imply better employment prospects. However we found that women are under-represented in full time employment, as well as permanent and professional jobs. The reason for

[3]This lead to the question of hierarchical effect of courses of study. In multilevel model framework, graduates are nested within a higher level organisation (i.e. courses of study) where there is a possible relationship between the outcome variable and the higher level group. In university setting, graduates are clustered within a course of study, which are nested within a university. Significant higher level variance indicates variability in employment outcome which depends on the differences in the course of study (and university). If employment prospect between two individuals taking the same course at the same university are correlated with each other, the covariance in the error terms between these two individuals would not equal to zero. We attempted to model graduate first destination choice and employment pattern using a multinomial multilevel model but the model never converge.

this inferior employment pattern among women can be explained by their choice in course of study. Women graduates in our sample show significant tendency towards courses that are associated with low employment prospects and lesser earnings. Consistent with Hilmer and Hilmer (2012), we found that women are less likely to choose Sciences and Engineering subjects. However in this thesis we do not cover the reason for their preferences into such courses and we keep this for future research. Gender segregations continue to exists even in developed countries where women are found to concentrate on low paid and low productivity industries, part time employment with poor promotional prospects and lower responsibility (Blau and Kahn, 2000), even though women's enrolment in tertiary education increases and gender gap in receiving work related training reduces over the years (Green and Zanchi, 1997). However, Wharton and Baron (1987) describes women's preference towards less demanding jobs in paradoxical way - that women choose these occupations in order to balance between job and family (Glass, 1990), (Bender et. al., 2005). In many Asian countries especially, women are still strongly committed to family responsibility (Abdullah et. al., 2008). Women are less likely to be accepted in male dominated organisational structure, instead, they are more likely to be offered supporting positions (Ng and Chakrabarty, 2005). Osman and Shahiri (2014) found that majority of Malaysian women are concentrated in low paying semi-skilled jobs in the Manufacturing industry.

In the case of Malaysia, another important aspect that require attention is ethnic differences in employment pattern. Unlike many other multiethnic countries, Malaysia is unique in a sense that it is the ethnic majority that have lower employment rate and earning compared to the other ethnic groups. The racial imbalance rooted from the period of British colonisation's divide and rule strategy. Economic sectors were identified with race - the Chinese were located in the fast growing tin mining and commerce, the Indians were placed in rubber plantations, and the Malays were lo-

cated in the rural areas where they concentrated in agriculture, and only a small number of Indians and Malays served in the public sector (Zainudin and Zulkifly, 1982). Chinese and a few Malay aristocrats and Indians were more privileged to attend schools that were available in the cities - leaving a large number of Malays and Indians either uneducated or seriously lagged behind. The Bumiputeras avoided jobs in the commercial industry (i.e. import, wholesale, retail) which are dominated by the Chinese because it was difficult if not impossible to break into the strong network (Salih and Young, 1989). Even after the implementation of the New Economic Policy (NEP) to eradicate poverty and reduce ethnic disparity, the Malays continued to be under-represented in industrial and modern sectors (Osman-Rani, 1982). More recent study found that although Malay's participation in professional and technical jobs increases but they are more likely to be in the lower level occupations such as teachers and nurse (Osman and Shahiri, 2014). Prolonged imbalance in ethnic share in employment coupled with persistent earning inequality and poverty have led to a tragic period of ethnic riot in 1969 (Gomez and Jomo, 1999) and continue to create sparks in the current political arena.

Public university quota and the influence of family economic status become the basis that lead to social stratification within public and private tertiary education institutions in Malaysia. The ethnic group Chinese tend to be more successful in securing jobs after graduating because of strong economic status among Chinese families. For the same reason, they also tend to earn more than the other ethnic groups. Seeing education as a solution to reduce social stratification, public universities regulates a quota for student intake which favours the ethnic group Malay, and in particular in UiTM, where the regulation require that the Malay to non-Malay quota is 9:1. On the other hand, private universities usually have larger proportion of Chinese. Universities like UniKL and UTM which focuses on highly technical courses have higher proportion of male. These differences in the social demographic profiles of

graduates within a particular institution would have a great impact on aggregate level analysis.

2.3 Data.

This section describes the sample used in this study. There are 35,688 employed graduates out of the total 75,870 individuals observed. Table 2.1 shows the descriptive statistics for our data. The employed have slightly higher academic achievement (measured by CGPA) and better proficiency in English (measured by the MUET score). The employed are also associated with coming from family with higher income, slightly older, and originate from an urban state. Courses that are related to the highest employment rate are: Medical, Accountancy, Computer Sciences, and Administrations. At the opposite side, courses that are associated with the lowest employment rate are: Pharmacy, Arts, and Pure Sciences.

Among the employed, the average job search duration is 2.1 months with almost seven out of ten employed graduates obtained their job within the first two months. Six out of ten gained employment in the urban states, while 30% stay at the state where they attended university. 45% worked in local corporations, 24% in a multinational corporation (MNC), 12% in public sector, and 10% in self employment. Half of our employed graduates were offered a permanent job position, almost quarter in contract job and another quarter in temporary jobs. 66% were in professional job category which breaks down to 56% professionals, 6.5% managerial, and 6.5% associated professional and technical jobs.

Table 2.1: Summary statistics for the unemployed and employed graduates.

Variable	Unemployed (mean/sd)	Employed (mean/sd)	Total (mean/sd)
CGPA	3.151	3.183	3.167
	(0.366)	(0.392)	(0.379)
MUET score			
Band 1	0.0817	0.0611	0.0716
	(0.274)	(0.240)	(0.258)
Band 2	0.351	0.317	0.334
	(0.477)	(0.465)	(0.472)
Band 3	0.406	0.423	0.414
	(0.491)	(0.494)	(0.493)
Band 4	0.139	0.165	0.152
	(0.346)	(0.371)	(0.359)
Band 5	0.0211	0.0324	0.0267
	(0.144)	(0.177)	(0.161)
Band 6	0.00102	0.00200	0.00150
	(0.0319)	(0.0446)	(0.0387)
Courses of study			
Law	0.0129	0.0121	0.0125
	(0.113)	(0.109)	(0.111)
Arts/SocSc	0.0702	0.0394	0.0550
	(0.256)	(0.194)	(0.228)
Transport	0.00235	0.00462	0.00347
	(0.0484)	(0.0678)	(0.0588)
Administration	0.0445	0.0687	0.0564
	(0.206)	(0.253)	(0.231)
Management	0.111	0.110	0.110
	(0.314)	(0.312)	(0.313)
Economy	0.0241	0.0229	0.0235
	(0.154)	(0.150)	(0.152)
Accountancy	0.0431	0.0733	0.0580
	(0.203)	(0.261)	(0.234)
Marketing	0.0210	0.0195	0.0203
	(0.143)	(0.138)	(0.141)
Finance	0.0500	0.0529	0.0514
	(0.218)	(0.224)	(0.221)
Journalism	0.0217	0.0254	0.0235
	(0.146)	(0.157)	(0.152)
Islamic	0.0146	0.0152	0.0149
	(0.120)	(0.122)	(0.121)
Food/hospitality	0.0184	0.0197	0.0191
	(0.135)	(0.139)	(0.137)
Arts	0.0326	0.0238	0.0283
	(0.178)	(0.153)	(0.166)
Pure science	0.0225	0.0140	0.0183

Continued on next page

Table 2.1: Summary statistics for the unemployed and employed graduates.

Variable	Unemployed (mean/sd)	Employed (mean/sd)	Total (mean/sd)
	(0.148)	(0.118)	(0.134)
Applied science	0.0848	0.0593	0.0722
	(0.279)	(0.236)	(0.259)
Pharmacy	0.00898	0.00326	0.00616
	(0.0943)	(0.0570)	(0.0782)
Medical	0.0114	0.0400	0.0255
	(0.106)	(0.196)	(0.158)
Dentistry	0.00279	0.00161	0.00221
	(0.0527)	(0.0401)	(0.0469)
Nurse	0.0156	0.0152	0.0154
	(0.124)	(0.122)	(0.123)
Environment	0.0263	0.0219	0.0241
	(0.160)	(0.146)	(0.153)
Sports	0.00578	0.00389	0.00485
	(0.0758)	(0.0622)	(0.0695)
Engineering	0.201	0.223	0.212
	(0.401)	(0.416)	(0.409)
CompSci	0.0541	0.0784	0.0661
	(0.226)	(0.269)	(0.248)
Education	0.100	0.0521	0.0765
	(0.300)	(0.222)	(0.266)
Male	0.316	0.369	0.342
	(0.465)	(0.482)	(0.474)
Malay	0.734	0.664	0.699
	(0.442)	(0.473)	(0.458)
Chinese	0.154	0.248	0.200
	(0.361)	(0.432)	(0.400)
Family income			
$<$ RM 500	0.0908	0.0661	0.0786
	(0.287)	(0.248)	(0.269)
RM 501 - RM 1000	0.220	0.174	0.198
	(0.415)	(0.379)	(0.398)
RM 1001 - RM 1500	0.165	0.161	0.163
	(0.371)	(0.368)	(0.370)
RM 1501 - RM 2000	0.122	0.145	0.133
	(0.327)	(0.352)	(0.340)
RM 2001 - RM 2500	0.0872	0.107	0.0968
	(0.282)	(0.309)	(0.296)
RM 2501 - RM 3000	0.115	0.131	0.123
	(0.318)	(0.338)	(0.328)
RM 3001 - RM 5000	0.122	0.128	0.125
	(0.327)	(0.334)	(0.331)
$>$ RM 5000	0.0781	0.0878	0.0829
	(0.268)	(0.283)	(0.276)

Continued on next page

Table 2.1: Summary statistics for the unemployed and employed graduates.

Variable	Unemployed (mean/sd)	Employed (mean/sd)	Total (mean/sd)
Age	23.61	23.76	23.68
	(0.989)	(0.995)	(0.995)
Urban	0.244	0.380	0.311
	(0.429)	(0.485)	(0.463)
Observations	57972		
mean coefficients; sd in parentheses			

Table 2.2: Summary statistics of the job characteristics among the employed graduates.

Job attributes	(mean/sd)	Job attributes	(mean/sd)
Duration	2.117	Temporary	0.227
	(1.874)		(0.419)
Urban (job)	0.601	Self-employed/family	0.0296
	(0.490)		(0.170)
Unistay	0.307	*Job group*	
	(0.461)	Manager	0.0655
Sector			(0.247)
Government	0.119		
	(0.323)	Professional	0.528
			(0.499)
Statutory body	0.0231		
	(0.150)	Technician	0.0656
			(0.248)
MNC	0.238		
	(0.426)	Admin support	0.151
			(0.358)
Local corp	0.453		
	(0.498)	Sales	0.129
			(0.335)
Self-employed	0.101		
	(0.301)	Prof. Agri.	0.00460
			(0.0677)
GLC	0.0314		
	(0.174)	Commerce	0.0140
			(0.118)
NGO	0.0204		
	(0.141)	Machinery	0.00387
Job level			(0.0621)
Permanent	0.495		
	(0.500)	Basic	0.0394
			(0.194)
Contract	0.249		
	(0.432)		
Observations			35668
mean coefficients; sd in parentheses			

Table 2.3: Employment patterns by universities.

University	N	% employed	% urban	Unistay*	University	N	% employed	% urban	Unistay*
Public Universities					KUHB	46	82%	59%	46%
UIAM	3,068	59%	40%	14%	KUIM	15	21%	27%	7%
UKM	3,366	45%	33%	15%	KUIS	252	66%	45%	22%
UM	1,950	55%	39%	14%	LELC	37	26%	68%	5%
UMK	519	42%	20%	5%	LICT	6	67%	17%	0%
UMP	1,383	44%	25%	3%	LUC	76	65%	46%	7%
UMS	3,315	37%	10%	13%	LUCT	198	15%	55%	5%
UMT	1,629	40%	17%	8%	MAHSA	43	69%	63%	7%
UNIMAS	1,986	42%	11%	16%	MMMC	215	98%	45%	3%
UPM	3,435	52%	37%	20%	MMU	1,916	60%	33%	13%
UPNM	501	30%	29%	13%	MSU	392	76%	47%	31%
UPSI	2,660	28%	11%	3%	MUSM	566	51%	77%	22%
USIM	1,211	57%	25%	7%	NEC	40	50%	70%	25%
USM	2,872	39%	32%	12%	Nilai U	1	100%	0%	0%
UTHM	1,737	54%	23%	9%	OUM	68	79%	32%	22%
UTM	2,394	56%	24%	14%	SEGiU	122	22%	83%	14%
UTeM	1,436	55%	31%	7%	SWINBURNE	396	67%	2%	52%
UUM	4,583	70%	25%	5%	TATiUC	89	22%	7%	15%
UiTM	18,306	48%	39%	18%	TCS	18	25%	0%	17%
UniMAP	1,458	32%	28%	2%	TUC	539	65%	64%	24%
UniSZA	547	49%	18%	8%	TWINTECH	117	75%	38%	29%
Total	58,356	47%	26%	10%	UCSI U	924	74%	64%	28%
Private universities.					UNIRAZAK	1,112	42%	24%	7%
AIMST	213	47%	39%	12%	UNISEL	801	65%	57%	31%
AMU	114	49%	39%	20%	UNITEN	1,471	64%	50%	26%
APU	205	58%	80%	26%	UTAR	3,176	56%	43%	17%
AUCMS	66	7%	39%	0%	UTP	837	54%	35%	1%
CITY U	5	60%	60%	20%	UniKL-BMI	341	62%	45%	30%
CUSM	1	100%	100%	100%	UniKL-BiS	27	33%	52%	19%
HU	426	65%	81%	20%	UniKL-IPROM	159	62%	52%	14%
IBS	10	100%	0%	10%	UniKL-MESTECH	76	26%	36%	11%

Continued on next page

Table 2.3: Employment patterns by universities.

University	N	% employed	% urban	Unistay*	University	N	% employed	% urban	Unistay*
IKIP	17	20%	0%	18%	UniKL-MFI	287	57%	47%	29%
IMU	421	52%	55%	7%	UniKL-MIAT	179	48%	49%	27%
INTI IU	143	69%	28%	6%	UniKL-MICET	197	51%	35%	5%
INTI SUBANG	16	63%	88%	38%	UniKL-MIIT	257	53%	56%	27%
ITP-PERTAMA	4	50%	25%	0%	UniKL-MIMET	154	42%	30%	9%
IUKL	230	70%	69%	37%	UniKL-MITEC	59	72%	15%	27%
KDUPG	102	58%	74%	46%	UniKL-MSI	74	67%	28%	5%
KLMU	139	68%	58%	35%	UniKL-RCMP	81	83%	41%	5%
KOLEJ ASA	2	100%	100%	50%	WOU	30	93%	67%	60%
KOLEJ ASTIN	6	67%	50%	33%	Total	17514	59%	46%	21%

Unistay = percent who are employed at the state where they attended university.*

Table 2.4: Employment patterns by courses of study.

Courses	Percent employed	Percent professional	Percent permanent
Law	50%	90%	29%
Arts/SocSc	40%	46%	30%
Transport	67%	51%	51%
Administration	60%	45%	56%
Management	50%	41%	41%
Economy	49%	38%	41%
Accountancy	65%	80%	67%
Marketing	50%	38%	54%
Finance	51%	52%	45%
Journalism	52%	63%	45%
Islamic	51%	61%	12%
Food/hospitality	55%	40%	54%
Arts	42%	52%	26%
Pure science	39%	59%	36%
Applied science	42%	58%	45%
Pharmacy	32%	70%	47%
Medical	74%	94%	70%
Dentistry	46%	95%	80%
Nurse	49%	72%	45%
Environment	44%	42%	39%
Sports	40%	53%	34%
Engineering	53%	86%	59%
CompSci	58%	79%	53%
Education	34%	61%	18%
Total	51%	66%	49%

Table 2.3 shows employment patterns by university. For each participating public and private university we report the average employment rate, the percentage of urban graduates, and the percentage of those who obtained job at the state where they attended university. The employment rates among different universities are very mixed. Top three public universities (i.e. UM, UPM, UKM) have between 45%-53% of employment rates. Public university in management has 70% employment rate (UUM). The only international public university (UIAM) has 59% employment rate. Employment rates among private universities are more mixed due to small sample observed in some universities.

Table 2.4 shows employment pattern by courses of study. Medical, Dentistry, Law, Engineering, Accountancy report high percentage of employment, professional job (managerial, professional, technical) and higher percentage of permanent job position.

2.4 Econometric framework.

2.4.1 Modelling graduate employment outcomes.

Consider the probabilistic outcomes in which graduates may find themselves in a particular type of destination after study - they either choose to work in full time employment, or work part time, or continue their education, or defer entry into the labour market to a later date. A discrete response model can be modelled as an ordered or nominal response. For an ordered response, we might assign each graduate a particular type of the first destination where the response variable takes the value of 3 for employed, 2 for further study, and 1 for unemployed. Each value is ordered with the assumption that the lowest level (1: unemployed) has the lowest rank, and the highest level is 3:employed. Indeed, we may also assign the value of 4 for full time employment, 3 for part time employment, 2 for further study, and 1 for unemployment with the basis that full time employment is at a higher rank than part time employment.

For an unordered (or nominal) response, the value assigned to each outcome is arbitrary in the sense that none of the destination is at the higher or lower rank than the others. The individual outcome depends on individual characteristics rather than the characteristics of the outcomes. A graduate may choose to obtain full time employment right after study. For some, they may take a part time job in order to gain experience to obtain a better job later on. Another graduate may choose to further their study, and the rest are still actively looking for employment. On the basis that the unemployed graduates are actively waiting for jobs, and those who further study are not any better or worse than those who are working, we decided to model graduate's first destination as an unordered response. Implying a graduate's choice of the first destination after study is discrete (one of the four

mutually exclusive options) and unordered, the dependent variable can be denoted by a categorical variable y which takes the value of

$$y = \begin{cases} 1 & \text{if choose full time employment} \\ 2 & \text{if choose part time employment} \\ 3 & \text{if choose further study} \\ 4 & \text{if waiting for job} \end{cases} \tag{2.1}$$

The potential outcomes y is then parametrised by conditioning vector X that includes a set of covariates such as individual academic achievement, English language ability, and SES[4] variables. A multinomial logit model can be used to model individual choice among the discrete alternatives assuming each individual maximises his or her utility. The probability that an individual i chooses option $j \in \{1, 2, 3, 4\}$ conditioning on covariates X is given by

$$Pr(y = j|X) = P_{ij} = \frac{\exp(X'_{ij}\beta)}{\sum_{j=1}^{J} \exp(X'_{ij}\beta)} \tag{2.2}$$

The above response probability must sum to unity, hence to be able to identify the model, one choice category must be set to become the base category. We choose $y = 4$(unemployed) as the base category in this case, hence the remaining coefficients measure the relative change of each of the first destination outcome to the unemployed category. The response probability now becomes

$$Pr(y = j|X) = P_{ij} = \frac{\exp(X'_{ij}\beta^{(j)})}{1 + \sum_{j=1}^{J-1} \exp(X'_{ij}\beta^{(j)})} \tag{2.3}$$

[4]social and economic status

And the response probability for the base category is

$$Pr(y = 4|X) = P_{i,j=4} = \frac{1}{1 + \sum_{j=1}^{J-1} \exp(X'_{ij}\beta^{(j)})} \tag{2.4}$$

It is difficult however to interpret the magnitude of the resulting coefficient β directly from the above model, instead, we can use marginal effects computed from the response probability with respect to the explanatory variables. The marginal effects can be computed as

$$\frac{\delta P_{ij}}{\delta X_{im}} = [P_{ij}(1(j = m) - P_{im})]\,\beta \quad m = 1, \ldots, J \tag{2.5}$$

We use the same methodology to model graduate's occupational choices among those who are employed. In particular, one model uses four categories of job level as the dependent variable where

$$y = \begin{cases} 1 & \text{if choose permanent job} \\ 2 & \text{if choose contract job} \\ 3 & \text{if choose temporary job} \\ 4 & \text{if choose self-employment} \end{cases} \tag{2.6}$$

and using $Pr(y = 4)$(self-employment) as the base category.

Assumption of independence of irrelevant alternatives.

Multinomial logit model used in the above estimation depends on the assumption of the independence of irrelevant alternatives (IIA) where we make assumption that individual's choice between the alternative outcomes is independent of the inclusion or deletion of another alternatives. For instance, we assume that the probability

of a graduate to choose self-employment is unaffected by the other occupational choices available. This assumption can be tested using the Hausman-McFadden test or the Small-Hsiao test (Hausman and McFadden, 1984),(Small and Hsiao, 1985). However, Cheng and Long (2007) through their simulation experiments concluded that the IIA is not satisfactory for applied analysis due to its dependency on the data structure which give inconsistent results. Hence, we used Amemiya (1981)'s suggestion by making sure that the alternatives are distinct in order to facilitate the usability of a multinomial model.

2.4.2 Modelling gender differences in employment outcomes.

Consider the average employment rates between male and female graduates are denoted by $\bar{Y}_{male}$ and $\bar{Y}_{female}$. The difference $(\bar{Y}_{male}) - (\bar{Y}_{female})$ gives the mean difference in the employment outcome between the two gender groups which can be decomposed into two components: the characteristic effect that explains the differences as caused by the differences in graduate's attributes (e.g. differences in the employment rate caused by the differences in academic achievement); and into a component due to unmeasured or unobserved feature (Fairlie, 2005).

The decomposition technique is prominently used in various studies to explain the differences in the mean level of a variable between any two groups (see Oaxaca(1979) and Blinder(1979)). The original development of the technique uses linear method but the development of non-linear methods allow for decomposition when the dependent variable is in categorical form (see (Fairlie, 1999), (Fairlie, 2005), (Yun, 2004) and (Sinning et. al., 2008)).

The non-linear decomposition adapting (Fairlie, 1999) is given by

$$\bar{Y}_{male} - \bar{Y}_{female} = \left[\sum_{i=1}^{N_{male}} \frac{\phi(X_{i,male}\hat{\beta}_{male})}{N_{male}} - \sum_{i=1}^{N_{female}} \frac{\phi(X_{i,female}\hat{\beta}_{male})}{N_{female}} \right] + \left[\sum_{i=1}^{N_{female}} \frac{\phi(X_{i,female}\hat{\beta}_{male})}{N_{female}} - \sum_{i=1}^{N_{female}} \frac{\phi(X_{i,female}\hat{\beta}_{female})}{N_{female}} \right]$$

where N_{male} and N_{female} are the sample sizes of male and female graduates, and $\phi(.)$ is the average predicted probability. The first term of the equation decomposes gender difference in the employment outcome due to the difference in the distribution of explanatory variables which are included in the model. If male have superior productive attributes and it translates into higher employment rate then this term will capture the said effect. The second term of the equation bear the remaining differences in $(\bar{Y}_{male} - \bar{Y}_{female})$ into parts that cannot be measured by the existing variables in the model.

We use the methodology in various settings. First, gender differences in employment outcomes are computed within each of graduate's first destination choice - full time employment, part time employment, further study, or unemployed. Then, among the employed graduates the gender differences are computed within each occupational types.

To investigate if gender differences exist among women graduates who posses similar qualification as men, we decompose gender differences in employment outcomes within each course of study. We also computed gender differences in employment outcome within each industry and region. Finally, the same methodology is being used to decompose inter-ethnic differences in mean employment outcome within each industry.

2.5 Empirical results.

This section begins by showing the estimation results of the determinants of graduate employment patterns. We first show the outcome of graduate's first destination during convocation which includes choosing to work in full time employment, part time employment, continue study, or remain unemployed either by choice or because they defer entry to a later date. We proceed to describe who decides to take permanent job, contract job, temporary job, or choose self-employment by characterising the options depending on graduate's characteristics. Subsequently, we analyse gender differences in various employment outcomes. Part of women's inferior employment outcome can be based on their preferences for less attractive courses that are associated with low employment rate and low paying jobs. We test the underrepresentation of women graduates by studying the difference in employment outcomes among women and men having similar qualifications. We also test for gender differences within industry. The final part of this section discusses findings in the employment outcome by different ethnic group.

2.5.1 Graduate's first destination and job characteristics.

Table 2.5 presents the estimation results of graduate first destination outcomes. The sample used in this analysis is 62,912 graduates. The marginal effects for the multinomial logit model is presented separately for male and female graduates. For each gender column, we report the effect of each explanatory variable based in four choices of first destination outcomes: a graduate may choose to work full time, part time, or choose to continue study, or remain unemployed. The set of explanatory variables included in the model is: graduate's academic achievement (CGPA), English language ability (MUET score), course of study (Law as base

category), age, ethnic group, family income, and an urban dummy (=1 of a graduate originated from Klang Valley or Penang).

Generally, we found that graduates from certain courses of study who did well academically, with better English proficiency, and coming from higher family income tend to have better employment outcomes. Graduates with better characteristics as mentioned are more successful in gaining full time employment, permanent job level, and professional job category. Detailed analysis is as follows.

The results show that an increase in academic achievement increases the probability to participate in full time employment and decreases the probability to choose part time employment or unemployment for both sexes. Employers look for applicants who are productive and least costly for the kind of work required by the job, and CGPA can be regarded as a human capital trait that demonstrate an individual's commitment and cognitive ability to perform challenging tasks and carrying out responsibilities. The magnitude of CGPA effect for men is found to be larger than women for full time employment showing that men's academic achievement is rewarded more than women. Another rationality for men's more fortunate outcome for their academic achievement is that men are more likely to posses qualification in better courses, and their higher CGPA in those courses are rewarded more than women's higher CGPA in less attractive courses. On the other hand, part time employment and unemployment category are associated with lower CGPA. The impact of lower CGPA towards part time employment is larger for women than for men. However, we found that lower CGPA penalty affect men's unemployment in higher magnitude than women.

Getting a good grade from a good university may have a different effect than getting a good grade from a lesser known university. Employers look for cheaply observed attributes among job applicants and would prefer graduates from more prestigious

universities. Graduates who attended more selective institution went through tough entry requirement and they possess aptitude and talent that made them successful in their studies and subsequently in their jobs. After controlling for graduate's attributes we found that the university effect is moderated by the courses effect and hence is not included in our model. We may, however, run another model by including the university fixed effects.

Various local studies show the lack of English proficiency among the main determinants towards graduate's inability to secure a job. This is especially true among Malay rural females. The effect of English language proficiency is measured by MUET score. Our results show that its impact towards graduate's first destination outcome is found to be moderate compared to the effect of CGPA. MUET score does not have any significant effect on men's full time employment but it reduces part time employment among men. On the other hand, moderate MUET score (Bands 3 - 4) increases female's full time employment and choosing to further study, at the same time reduces female's part time employment.

We move on to discuss the effect of graduate's characteristics. With each additional year of age increases the probability of full time employment, and decreases the probability for all other first destinations. Younger graduates took a faster route in their education without any gaps during their study but older graduates may have had temporary jobs during their study which help them to secure jobs as soon as finishing studies, or they have the urge to get employed as soon as possible right after finishing study.

Compared to the other ethnic group, Malay male coefficient for full time employment is not significantly different but Malay women are less likely to obtain full time employment as comparison to the other ethnic group. Instead, Malay men and women are more likely to be in part time employment, additionally, Malay women

are more likely to further their education. Chinese men and women are more likely to be in full time employment and less likely to choose other first destination choices.

We testify that parental income influences graduate's first destination choice. Parental income and residence are also related to ethnicity in which Malays mostly come from rural areas with low family income. Higher family income increases the probability of choosing full time employment while significantly decreases the probability of unemployment. Higher family income provides means of network and more affluent background to facilitate resources for an individual to attend interview and finding a job, giving graduates from higher family income a competitive edge. Hence a tertiary education may not be a perfect equaliser if social immobility in the country persists. In overall, our finding shows that family income plays an important role in shaping graduates employment.

Similarly, urban graduates are more likely to be in full time employment and less likely to be unemployed. Living in an urban state may signify several features: first, living in an urban state increases family income and family income significantly influences graduate employment pattern. Second, the availability of jobs in the urban state facilitates first job employment where urban graduates do not have to migrate to find job elsewhere. Urban states offers more job availability with competitive wage and access to high skilled jobs.

We further discuss the effect of courses of study. Certain courses are associated with certain employment pattern as shown in Table 2.18 in the appendix. The effect of courses of study using Law as the base category generally shows that women are more advantageous in taking Business subjects[5], Sciences subjects[6], Engineering and Computer Sciences.

[5]Administration, Management, Economy, Accountancy, Marketing, and Finance
[6]Pure Science, Applied Science, Pharmacy, Medical, Dentistry, Nurse, Environment, and Sports.

Firstly, we discuss the pattern of full time employment. Business subjects increases women's probability for full time employment. The effect of Business studies is not as advantageous for men in terms of significance and magnitude. Though the effect of certain Business subjects such as Administration, Accountancy, and Finance are positive and significant but lower in magnitude compared to women. The effect of Food & Hospitality towards full time employment is more gainful for women than for men. Applied Science increases women's probability for full time employment but decreases men's probability for full time employment. The effect of Pharmacy and Dentistry are lower for both sexes with larger magnitude among men. Medical, Engineering, and Computer Science courses increase probability for full time employment, larger in magnitude for women. Considering women's overall lower rate of employment compared to men, this finding show that by taking highly technical courses (i.e. Medical, Engineering, Computer Sciences) women may clearly improve their employment prospects. Women's choice for other Science subjects also found to boost their full time employment prospect, while for men it is not significant.

We further discuss the patterns of part time employment. Using Law as the base category, most other courses of study show significant positive coefficient towards part time employment. Nonetheless, the magnitude of courses effect is much higher among Education, Sports, Arts, Arts & Social Science, and Journalism for male and female graduates. Female graduates who took Food & Hospitality, Pure Science, and Environment are much more likely to choose part time employment, while male graduates who took Nurse are much more likely to be in part time employment.

Table 2.5: Employment outcomes among graduates.

	Male graduates				Female graduates			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Full time	Part time	Study	Unemployed	Full time	Part time	Study	Unemployed
CGPA	0.0624***	-0.0192***	0.0340***	-0.0772***	0.0304***	-0.0227***	0.0364***	-0.0440***
Band 2	0.0193	-0.0104	0.00720	-0.0161	0.0141	0.00171	0.00341	-0.0192
Band 3	0.0258	-0.0271***	0.00936	-0.00807	0.0306**	-0.0149**	0.0121*	-0.0279**
Band 4	0.0205	-0.0374***	0.0112	0.00569	0.0253*	-0.0204**	0.0142*	-0.0192
Band 5	-0.000296	-0.0390**	0.0223	0.0170	0.0212	-0.0128	0.0233*	-0.0317
Band 6	0.0809	0.00618	-0.0596***	-0.0275	0.0333	-0.0532	-0.0151	0.0350
Age	0.0445***	-0.00536**	-0.0111***	-0.0281***	0.0425***	-0.00529***	-0.00978***	-0.0274***
Malay	0.00104	0.0138*	0.000635	-0.0155	-0.0222**	0.0146**	0.0121*	-0.00442
Chinese	0.117***	-0.0225**	-0.00402	-0.0901***	0.104***	-0.00905	0.0132*	-0.108***
RM 501 - RM 1000	0.0244	0.00153	0.00219	-0.0281	0.0245**	0.00567	-0.00642	-0.0237*
RM 1001 - RM 1500	0.0575***	0.00113	-0.00292	-0.0557***	0.0488***	0.000139	-0.0108	-0.0381***
RM 1501 - RM 2000	0.0855***	-0.0102	-0.0118	-0.0635***	0.0725***	-0.00118	-0.00848	-0.0628***
RM 2001 - RM 2500	0.0756***	0.00459	-0.00223	-0.0779***	0.0645***	-0.00472	-0.00959	-0.0501***
RM 2501 - RM 3000	0.0838***	-0.00818	-0.00369	-0.0720***	0.0494***	-0.00287	-0.00488	-0.0417***
RM 3001 - RM 5000	0.0638***	-0.0162*	-0.00658	-0.0410**	0.0342***	-0.00404	0.00669	-0.0368***
> RM 5000	0.0816***	-0.0307***	0.00739	-0.0583***	0.0382***	-0.00697	0.00820	-0.0395**
Urban	0.107***	0.00519	-0.00474	-0.108***	0.126***	0.000267	-0.0119***	-0.114***
Observations	21280	21280	21280	21280	41632	41632	41632	41632

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Graduate employment pattern.

We further analyse the job characteristics among those who are employed. Graduates may took a permanent job, temporary job, contract job, or self-employment. Permanent job is defined as a type of long term employment where a worker is eligible for full employment benefits, usually until the worker reaches the age of retirement. Contract employment is defined as a fixed period employment where the continuity of the employment depends on whether further extension is being made. Temporary employment is defined as provisional placement that is either seasonal (i.e. due to absence of permanent staff) or at the beginning of employment contract during probation before become permanent. Self-employment is defined as freelance, sole-proprietor or by partnership where contract of employment does not apply. The expansion of the higher education enrolment that lead to greater competition to enter labour market gives rise to new type of graduate occupations such as self employment. Table 2.7 presents the marginal effects of each explanatory variable separately for men and women graduates. The sample size is 28,570 graduates who are employed.

In general, the same determinants that lead to getting employed and reduce unemployment are found to be leading to good occupational category (such as permanent instead of contract and temporary). Interestingly, the effect of CGPA towards a permanent job is not significant. In fact, higher CGPA increases the probability to work on a contract basis. This is not very surprising considering the sample is composed of fresh graduates in their first jobs, where they obtained jobs within the short time period between finish study and recruitment, many of them were accepted in contract jobs before becoming permanent, which is the normal practice in the country usually offered by large companies by giving new employees a probation period before continuation towards permanent status. Higher CGPA, however, reduces the

probability of temporary jobs or self-employment.

Higher MUET score on the other hand significantly increases the probability of permanent job and decreases the probability of temporary job. That means, controlling for all other factors, academic achievement included, graduates with better English proficiency may increase probability to work on a permanent basis.

In general, the effect of graduates attributes on job level is similar to that of the first destination in which higher age, Chinese, and higher family income significantly increase the probability of permanent job, decreases the probability of all other job levels.

Universities have been urged to introduce entrepreneurship programs to graduates to create an opportunity for self-employment in the informal sector as an alternative to the other first destinations to handle high unemployment rate among graduates. We found that higher family income may increase the probability to choose self-employment. The self-employed graduates may be composed of two distinct segments: one segment composed of graduates who work with a family business which gives them higher wage compared to working in the formal sector; another as the last option when they are unable to secure jobs elsewhere and had to do freelance jobs to escape unemployment. Table 2.6 shows that those who work with family business earn higher than those who conduct their own business or trade. This group chooses self-employment because they have the comparative advantage by working in the family businesses instead of in the formal sector.

Finally, urban graduates are more likely to hold permanent or contract jobs while non-urban graduates are more likely to hold a temporary job or become self-employed. Our finding shows that non-urban graduates' tendency towards temporary job or self-employment in comparison to urban graduates is due merely because of regional differences.

Table 2.6: Self-employment and working with family.

Graduate's monthly income	Working with family (percent)	Other type of self-employment (percent)	Total percent
RM500 and below	24	76	100
RM501 - RM1000	22	78	100
RM1001 - RM1500	27	73	100
RM1501 - RM2000	29	71	100
RM2001 - RM2500	26	74	100
RM2501 - RM3000	36	64	100
RM3001 - RM5000	45	55	100
RM5001 and above	41	59	100
Total	27	73	100

Several patterns of the courses effect on employment type are also discussed. The coefficients are reported in Table 2.19 in the appendix. Law graduate is used as the base category. Medical, Dentistry, Accountancy and Engineering graduates are more likely to obtain permanent job[7]. The effect of Dentistry and Medical degree in increasing the probability of permanent job and decreases all other job levels are found in both sexes. However the same cannot be said about Engineering and Accountancy - even though the magnitude of Engineering and Accountancy towards increasing the probability of permanent job are almost similar across genders, but Accountancy and Engineering female graduates are also likely to obtain contract employment or choose self-employment. Further analysis is needed to determine whether female from these courses are more likely to choose self-employment (and what's their motivation) or they are pushed to choose self-employment because it is harder to get a permanent job.

Most graduates who took Business subjects have the tendency towards perma-

[7]In the previous model these graduates are also more likely to obtain full time jobs.

nent job or self-employment. The striking difference within Business subjects is that women have a significant tendency towards contract employment (compared to men). In general, we certify the existence of courses effect on employment outcome but the there is no obvious gender differences with the exception of Accountancy and Engineering graduates.

Table 2.7: Job levels among graduates.

	Male graduates				Female graduates			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Permanent	Contract	Temporary	Self-employed	Permanent	Contract	Temporary	Self-employed
CGPA	-0.00222	0.0497***	-0.0318**	-0.0157**	0.0136	0.0382***	-0.0362***	-0.0156***
Band 2	0.0291	0.0226	-0.0440**	-0.00765	0.0185	0.00547	-0.0195	-0.00441
Band 3	0.0687**	0.00980	-0.0655***	-0.0130	0.0699***	-0.00477	-0.0562***	-0.00893
Band 4	0.102***	-0.00556	-0.0856***	-0.0106	0.0781***	0.00656	-0.0689***	-0.0158*
Band 5	0.0823*	-0.00313	-0.0655*	-0.0137	0.0607*	0.0403	-0.0730**	-0.0280***
Band 6	-0.0424	0.184	-0.0954	-0.0463***	0.0368	-0.0977	0.0966	-0.0357***
Age	0.0272***	-0.0000167	-0.0244***	-0.00277	0.0409***	-0.00476	-0.0349***	-0.00129
Malay	-0.0901***	0.0845***	-0.00524	0.0108	-0.0971***	0.0572***	0.0371***	0.00277
Chinese	0.112***	-0.0333	-0.0559***	-0.0225**	0.139***	-0.0611***	-0.0552***	-0.0231***
RM 501 - RM 1000	-0.0265	0.0326	-0.0225	0.0164*	-0.00309	0.00813	-0.00941	0.00436
RM 1001 - RM 1500	0.00243	0.00981	-0.0236	0.0113	0.0234	0.0156	-0.0509***	0.0119**
RM 1501 - RM 2000	0.0226	0.0132	-0.0509**	0.0151*	0.0583***	0.0140	-0.0800***	0.00767
RM 2001 - RM 2500	0.0300	-0.00993	-0.0453*	0.0252**	0.0580***	0.00916	-0.0701***	0.00295
RM 2501 - RM 3000	0.0445*	-0.000546	-0.0657***	0.0217**	0.0398*	0.00385	-0.0618***	0.0181***
RM 3001 - RM 5000	0.0594**	-0.00117	-0.0781***	0.0198**	0.0392*	0.0187	-0.0748***	0.0168**
> RM 5000	0.100***	-0.0293	-0.0835***	0.0124	0.0697***	0.0210	-0.115***	0.0244***
Urban	0.0237*	0.0294***	-0.0411***	-0.0120**	0.0595***	0.0288***	-0.0749***	-0.0135***
Observations	10532	10532	10532	10532	18038	18038	18038	18038

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.5.2 Gender differences in employment pattern.

This section analyses gender differences in employment outcomes in various settings. The binary outcome variable takes a value of 1 for an individual who participated in a particular type of occupation and 0 otherwise. For each of graduate's first destination outcome (Table 2.8), job level (Table 2.9), and job group (Table 2.10), we estimate a logit model of graduate's participation in a particular type of occupation separately for men and women and then estimate the difference in their participation rate. The raw probability for men and women is given in the top two rows of each table, the third row shows the difference in the probabilities. The differences are then further decomposed into a part that can be explained by graduate's characteristics and a part that cannot be explained by the explanatory variables in the study. We only report the percentage of the explained part (e.g. how much of the difference can be explained by the variables included in the model)[8]. The finding helps us to understand the existence of gender differences in a particular type of occupation and where the differences arise.

Earlier we discussed the determinants of graduates' first destination choices and how graduates characteristics, their educational choices and experiences affect male and female graduates quite differently. To investigate the gender differences in each of the first destination choice and how it is influenced by the observed attributes, we use non-linear decomposition to calculate the difference (Fairlie, 1999). The results are shown in table 2.8 together with the detailed decomposition. The top part of the table shows the gender proportion in each of the first destination choice and the difference in the proportion. The bottom part shows the contribution of each observed variable towards the explained part of the difference.

[8]The total explained is the sum of all contributing variables that may have direct or indirect effect, which may have positive or negative sign depending on which group has the higher value.

Generally, gender differences are largest in better occupational categories: men are more likely to be in full time, permanent, and professional jobs[9], while women are under-represented in all those occupational categories. The overall contributing factor is men-women distinct choice of courses of study. Men are more likely to choose courses associated with better occupational outcomes.

Table 2.8: Gender differences in the employment outcomes.

	(1) Full time	(2) Part time	(3) Study	(4) Unemployed
Male	0.419	0.076	0.069	0.436
Female	0.354	0.079	0.084	0.483
Difference	0.065	-0.004	-0.015	-0.047
Total explained	0.041	-0.013	-0.009	-0.018
N(male)	12,017	1,975	1,807	11,581
N(female)	17,937	3,739	4,068	22,746
N(total)	29,954	5,714	5,875	34,327
Detailed decomposition				
CGPA	-0.00738***	0.00186***	-0.00452***	0.00871***
	(0.00108)	(0.000503)	(0.000757)	(0.00105)
English	-0.000209	-0.00235***	0.000107	0.00117*
	(0.000624)	(0.000487)	(0.000202)	(0.000571)
Courses	0.0231***	-0.0120***	-0.00314***	-0.0129***
	(0.00166)	(0.000997)	(0.000934)	(0.00171)
Age	0.00673***	-0.000599**	-0.000430**	-0.00402***
	(0.000526)	(0.000193)	(0.000137)	(0.000476)
Malay	-0.000103	0.000137	-0.0000604	0.000850
	(0.000931)	(0.000116)	(0.000337)	(0.000626)
Chinese	0.00932***	-0.000852***	-0.000383	-0.00653***
	(0.00104)	(0.000204)	(0.000365)	(0.000725)
Faminc	0.00408***	0.000344	-0.0000144	-0.00242***
	(0.000596)	(0.000342)	(0.000223)	(0.000531)
Urban	0.00582***	0.000199	-0.000131	-0.00338***
	(0.000372)	(0.000241)	(0.0000819)	(0.000225)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[9]Managerial, Professional, Associate Professional and Technician

Gender differences in full time employment is positive and large, while it is negative for all the other destinations, showing that men are more likely than women to be in full time employment. A large portion (63%) of the differences in full time employment is due to the explained part - the largest contribution is the courses of study. In previous models we testified that men are more likely to choose courses that offer better employment prospects. Gender differences in part time employment is negligible but courses of study remain an important factor[10]. Women tend to have higher proportion in choosing to study and choosing self-employment. 60% of the gender differences in choosing to continue study can be explained by the observed variables (particularly CGPA and courses) while only 38% of women's over-representation in unemployment can be explained by the observed variable (courses of study). Our finding confirms that women's inferior employment outcome is partly due to their choice of courses of study. We may also refute the idea that women's lower employment rate is caused by fiercer competition simply because there are more women in high education. Instead, if women choose Medical, Engineering, and Computer Science they are more likely to improve their employment prospects.

We proceed with the analysis of gender differences in different job levels among the employed graduates in Table 2.9. Gender differences is found to be largest within permanent job level. Again, the largest portion of the difference is due to the observed characteristics. 74% of the differences can be attributed to graduates' characteristics and educational attributes. Courses of study contributes more than half of the explained part. The differences in contract job and self-employment is negligible. Within temporary jobs, women's proportion is higher than men where

[10]The difference between men and women's participation in part time employment is negative, showing women's over-representation in that particular occupation by 4% point. There may be the case where the total explained is larger than the gap itself, for example in column 2. The sum of all contributing variables is a mix of positive and negative coefficients. For example, the sum of all the coefficients for part time employment is is -0.013 with the courses of study as the largest contributing factor (-0.012/-0.013).

only 40% of the explained part can be ascribed to the observed variables. In all cases, courses of study remain as the major source of contribution towards the differences. Men's higher proportion in permanent job is associated to their choice of more attractive courses of study, but a large portion of gender differences in temporary jobs is due to some unobserved characteristics.

Table 2.9: Gender differences in the job levels.

	(1) Permanent	(2) Contract	(3) Temporary	(4) Self-employed/family
Male	0.521	0.257	0.186	0.036
Female	0.444	0.250	0.278	0.028
Difference	0.077	0.007	-0.092	0.008
Total explained	0.057	-0.016	-0.036	-0.004
N(male)	7,630	3,486	2,404	472
N(female)	10,018	5,391	5,682	585
N(total)	17,648	8,877	8,086	1,057
Detailed decomposition				
CGPA	0.000417	-0.00554***	0.00274**	0.000967**
	(0.00134)	(0.00147)	(0.000871)	(0.000334)
English	0.00363***	-0.00157*	-0.00291**	-0.000411
	(0.000882)	(0.000775)	(0.000907)	(0.000372)
Courses	0.0300***	-0.00302	-0.0292***	-0.00554***
	(0.00258)	(0.00242)	(0.00213)	(0.00116)
Age	0.00408***	-0.0000256	-0.00290***	-0.000380
	(0.000730)	(0.000690)	(0.000460)	(0.000239)
Malay	0.00555***	-0.00276***	0.0000506	0.000500*
	(0.00117)	(0.000773)	(0.000120)	(0.000254)
Chinese	0.00816***	-0.00265**	-0.00262***	-0.000560
	(0.00123)	(0.000876)	(0.000407)	(0.000316)
Faminc	0.00461***	-0.00153*	-0.000821	0.00146**
	(0.000831)	(0.000668)	(0.000533)	(0.000516)
Urban	0.000687*	0.00145**	-0.00000507	0.000393*
	(0.000296)	(0.000451)	(0.0000940)	(0.000172)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Nine categories of job groups are observed. Three job groups - Managerial, Pro-

fessional, Associate Professional and Technician - are considered as 'higher' quality compared to the rest. The differences in the male-female proportion is computed and detailed decomposition is calculated in Table 2.10. Women are consistently under-represented in all three superior job groups. Instead, women are found to be segregated into Administration Support jobs. The proportion of women in Sales are also higher than men. Half of the gender differences in Professional and Technical jobs are due to the observed variables such as course of study and CGPA. There is a significant magnitude of the contribution of courses of study towards gender differences in professional job group, which help to justify men's higher proportion in professional jobs. Fascinatingly, the coefficient for the explained part of gender differences in Managerial job is negative. The peculiarity can be described by women's tendency to take Business subject courses which is supposed to strengthen their share in Managerial job positions. Instead, we find that women are still under-represented in this particular job group. Our result is consistent with the finding in Ng and Chakrabarty (2005) and Abdullah et. al. (2008) who found that women is less preferred in Managerial job positions compared to men. Women are more likely to be accepted to work as Administration Support workers rather than being positioned at the centre of organisation (Ng and Chakrabarty, 2005). Women's segregation into Administration & Support and Sales jobs are largely due to their courses of study. The gender difference in Professional Agriculture, Commerce, and Machinery are negligible. Yet, women are found to be over-represented in basic jobs.

Table 2.10: Gender differences in the job groups.

	(1) Manager	(2) Professional	(3) Technician	(4) Admin support	(5) Sales
Male	0.072	0.576	0.083	0.077	0.109
Female	0.064	0.469	0.043	0.220	0.147
Difference	0.007	0.108	0.040	-0.143	-0.038
Total explained	-0.012	0.057	0.024	-0.032	-0.023
N(male)	969	8,224	1,301	962	1,492
N(female)	1,369	10,593	1,039	4,421	3,092
N(total)	2,338	18,817	2,340	5,383	4,584
Detailed decomposition					
CGPA	0.00129*	-0.0181***	0.00235***	0.00149**	0.00221***
	(0.000588)	(0.00120)	(0.000396)	(0.000504)	(0.000369)
English	-0.00214*	0.00735***	-0.00195	-0.00306**	-0.00206*
	(0.000854)	(0.000984)	(0.00103)	(0.000949)	(0.000890)
Courses	-0.0146***	0.0644***	0.0157***	-0.0306***	-0.0277***
	(0.00152)	(0.00243)	(0.00150)	(0.00179)	(0.00178)
Age	0.00104*	0.00161*	-0.000279	0.000233	-0.000487
	(0.000524)	(0.000650)	(0.000270)	(0.000476)	(0.000298)
Malay	0.000685	0.00157	0.000698	0.000569*	-0.000804
	(0.000492)	(0.00115)	(0.00214)	(0.000288)	(0.00171)
Chinese	-0.000542	-0.00319*	0.00584**	-0.000824**	0.00435*
	(0.000429)	(0.00129)	(0.00226)	(0.000283)	(0.00191)
Faminc	0.00240***	0.00272***	0.000113	-0.000168	0.00117*
	(0.000722)	(0.000724)	(0.000387)	(0.000447)	(0.000569)
Urban	-0.0000593	0.000884***	0.00110**	0.000354	0.000334*
	(0.000134)	(0.000220)	(0.000348)	(0.000355)	(0.000142)

	(6) Prof. Agri.	(7) Commerce	(8) Machinery	(9) Basic
Male	0.009	0.022	0.005	0.048
Female	0.003	0.010	0.004	0.041
Difference	0.006	0.012	0.001	0.007
Total explained	-0.002	0.001	0.000	-0.010
N(male)	100	295	65	584
N(female)	64	205	73	820
N(total)	164	500	138	1,404
Detailed decomposition				
CGPA	-0.0000739	0.000626*	0.000117	0.000836***
	(0.000271)	(0.000265)	(0.000123)	(0.000243)
English	-0.000616	-0.000980*	0.0000145	-0.00142**
	(0.000380)	(0.000417)	(0.0000889)	(0.000519)

Courses	-0.00305***	0.000413	-0.000813	-0.00895***
	(0.000715)	(0.000878)	(0.000479)	(0.00125)
Age	-0.000181	-0.000158	0.0000668	-0.000840**
	(0.000249)	(0.000194)	(0.000143)	(0.000263)
Malay	0.000132	-0.000468	-0.0000342	0.000218
	(0.000195)	(0.000579)	(0.000162)	(0.000184)
Chinese	-0.000101	0.000233	-0.00000873	-0.000420
	(0.000112)	(0.000630)	(0.000228)	(0.000245)
Faminc	0.000726**	0.000392	0.000326	0.000339
	(0.000279)	(0.000223)	(0.000182)	(0.000317)
Urban	0.000908***	0.000477**	0.000222	0.000715***
	(0.000269)	(0.000174)	(0.000136)	(0.000211)

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.5.3 Gender differences within course of study.

Up to this point, courses of study appear to be the strongest factor that explain gender differences in graduates first destination choices and employment pattern. Women's preference for less attractive courses of study such as Pharmacy, Education, and Pure Science[11] has detrimental effect on their employment opportunity. If women posses the same qualification as men, would she be more likely to improve her employment prospect and reduce their gender differences? Another reason for women inferior employment rate in our sample is because there are twice the number of women graduates compared to men (see Ismail (2011)). But if women have the same qualification, undergone the same training, while controlling for other factors (i.e. academic achievement, English, SES) the prevailing gender differences may either signify statistical discrimination towards women or may indicate taste. The policy implication of women enrolment into higher education by merit alone may just do more harm, encouraging unnecessary investment in tertiary education for some women if there is no action taken to rectify gender differences in employment opportunity.

To test whether gender differences exist among graduate possessing similar qualification, we compute gender differences in full time and part time employment within each course of study. Table 2.11 shows the result for full time employment and Table 2.12 for part time employment. We found evidence of gender differences between courses of study and its variation is more profound in the full time employment as shown in Table 2.11. In full time employment, men are found to be over-represented in courses such as: Law, Transport, Computer Sciences and Engineering while women are over-represented in Arts & Social Science, Manage-

[11]The employment rates for Pharmacy, Education, and Pure Science are 32%, 34%, and 39%, respectively and the ratio women to men is almost 4:1.

ment, and Administration. The over-representation of men in Computer Science can be ascribed by the observed variables which make up 40% of the differences, leaving a large portion to some unexplained part. The worse can be seen in Law, Transport and Engineering where the observed variables only explains between 17% (Engineering) to 22% (Transport) of the variation. Women's over-representation in Administration is largely ascribable to their characteristics. But only 11% of the women's over-representation in Art & Social Science and 27% in Management can be explained by the observed variables, the larger portion remain unexplained.

The magnitude of gender differences in part time employment is small compared to full time employment, indicating that the pattern for part time employment is more uniformly distributed among men and women. We found moderate differences in several courses, particularly men are found to be over-represented in Nurse, Journalism, and Education with very low percentage of the explained part - indicating that within these courses the propensity for men who took part time jobs are due to some unmeasured attributes. Women who took Transport and Pure Science courses are over-represented in part time employment, largely due to their characteristics which explain 89% and 51% of the variation, respectively.

The finding shows that even though women have the same qualification as men, they are still under-represented in full time employment despite their investment in highly technical courses such as Engineering and Computer Sciences. The differences in full time employment are attributable to some unmeasured components - which may also be a potential discrimination towards women with these qualifications. The situation is worse for women with Engineering qualification. Indeed, women have higher participation in full time employment when they took courses such as Art & Social Science and Management - which are characterised by low employment prospect and low pay.

Table 2.11: Gender differences within each course of study - full time employment

	Law	Arts/SocSc	Transport	Administration	Management	Economy	Accountancy	Marketing
Male	0.355	0.195	0.636	0.485	0.368	0.379	0.571	0.420
Female	0.243	0.219	0.526	0.498	0.388	0.351	0.550	0.346
Difference	0.113	-0.024	0.110	-0.013	-0.021	0.028	0.021	0.073
Total explained	0.023	-0.003	-0.025	0.011	-0.005	0.022	0.005	0.043
% explained	20%	11%	22%	83%	27%	78%	26%	59%
N(male)	346	879	77	1002	1594	414	837	379
N(female)	799	2485	133	2411	5126	1040	2687	858
N(total)	1145	3364	210	3413	6720	1454	3524	1237
	Finance	Journalism	Islamic	Food/hospitality	Arts	Pure science	Applied science	Pharmacy
Male	0.449	0.416	0.288	0.424	0.244	0.288	0.091	0.326
Female	0.390	0.421	0.278	0.379	0.226	0.239	0.097	0.281
Difference	0.059	-0.006	0.010	0.045	0.018	0.049	-0.006	0.045
Total explained	0.036	0.006	0.021	-0.024	0.024	0.046	-0.026	0.021
% explained	61%	104%	205%	55%	136%	93%	421%	46%
N(male)	853	385	243	295	594	267	154	1233
N(female)	2289	1037	659	850	1118	904	505	3301
N(total)	3142	1422	902	1145	1712	1171	659	4534
	Medical	Dentistry	Nurse	Environment	Sports	Engineering	CompSci	Education
Male	0.639	0.188	0.370	0.360	0.258	0.479	0.548	0.182
Female	0.583	0.145	0.373	0.303	0.221	0.387	0.451	0.159
Difference	0.056	0.043	-0.004	0.057	0.036	0.092	0.098	0.023
Total explained	0.025	-0.022	-0.033	0.000	0.053	0.016	0.039	0.025
% explained	46%	49%	878%	0%	146%	17%	40%	109%
N(male)	626	69	165	491	159	7319	1658	1241
N(female)	1219	207	790	999	131	5802	2405	3877
N(total)	1845	276	955	1490	290	13121	4063	5118

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.12: Gender differences within each course of study - part time employment.

	Law	Arts/SocSc	Transport	Administration	Management	Economy	Accountancy	Marketing
Male	0.058	0.181	0.107	0.182	0.151	0.175	0.075	0.155
Female	0.026	0.146	0.159	0.151	0.129	0.130	0.091	0.119
Difference	0.032	0.035	-0.052	0.031	0.022	0.045	-0.016	0.035
Total explained	0.011	-0.004	-0.046	-0.020	-0.004	-0.002	-0.002	-0.024
% explained	34%	12%	89%	65%	18%	4%	13%	69%
N(male)	223	708	28	516	1008	257	359	220
N(female)	605	1942	63	1211	3136	675	1209	561
N(total)	828	2650	91	1727	4144	932	1568	781
	Finance	Journalism	Islamic	Food/hospitality	Arts	Pure science	Applied science	Pharmacy
Male	0.119	0.204	0.283	0.194	0.223	0.100	0.086	0.122
Female	0.128	0.138	0.279	0.157	0.212	0.129	0.039	0.111
Difference	-0.009	0.066	0.004	0.037	0.011	-0.029	0.046	0.011
Total explained	0.003	0.004	0.011	0.025	-0.015	-0.015	-0.021	-0.001
% explained	31%	7%	288%	69%	133%	51%	46%	5%
N(male)	470	225	173	170	449	190	140	831
N(female)	1396	600	476	528	865	688	456	2373
N(total)	1866	825	649	698	1314	878	596	3204
	Medical	Dentistry	Nurse	Environment	Sports	Engineering	CompSci	Education
Male	0.040	0.500	0.192	0.137	0.203	0.086	0.101	0.198
Female	0.045	0.500	0.119	0.147	0.167	0.082	0.130	0.137
Difference	-0.005	0.000	0.073	-0.010	0.037	0.004	-0.029	0.062
Total explained	-0.018	.	-0.011	-0.008	-0.001	-0.003	0.000	0.004
% explained	331%		15%	78%	1%	92%	1%	6%
N(male)	226	2	104	314	118	3812	749	1015
N(female)	508	2	495	696	102	3554	1321	3260
N(total)	734	4	599	1010	220	7366	2070	4275

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.5.4 Gender segregation by industry.

This part examines industrial variations in gender segregation among our sample graduates. Twenty one industries were included in the the analysis. The differences in the employment outcomes between male and female graduates within each industry are reported in Table 2.13 for full time employment and Table 2.14 for part time employment.

Consistent with the finding in (Osman and Shahiri, 2014), the evidence for discrimination for women graduates within Manufacturing sector is prevalent. Women are under-represented in Construction, Manufacturing, Scientific / Technical, IT / Communication, and Electric / Gas / Steam industries - all of which are heavily industrialised sector associated with high skilled workers and high paying jobs. Interestingly, a large portion of the differences in the full time employment within these sectors are ascribable to some unmeasured factors which may signify discrimination or taste (considering these jobs are very demanding). The situation is worse for Construction and Manufacturing industries. Instead, we found women are segregated towards Education, Finance / Insurance, Administration Support, and other services. Again, large portion of male-female difference in full time employment within these sectors are unexplained (probably unmeasured taste). These sectors are also found to be associated with low employment rate, more heterogenous job prospects and low paying jobs.

The magnitude of gender differences is even bigger in part time employment shown in Table 2.14 where women are inclined to have part time employment more than men in industries such as Agriculture / Forestry / Fishing, Food / Hospitality, and Transport / Storage. In the other hand, men have higher proportion in part time employment in industries such as IT / Communication, Social work, and Wholesale - which are largely explained by graduates' characteristics.

Table 2.13: Gender differences within each industry - full time employment.

Employed	Agriculture / Forestry / Fishing	Mining / Quarry	Manufacturing	Electric / Gas / Steam	Water / Sewerage	Construction	Wholesale
Male	0.025	0.008	0.128	0.025	0.005	0.119	0.034
Female	0.014	0.004	0.091	0.012	0.004	0.068	0.048
Difference	0.012	0.004	0.038	0.013	0.001	0.051	-0.014
Total explained	-0.003	0.000	0.003	0.002	0.000	0.004	-0.002
% explained	30%	4%	9%	14%	26%	7%	13%
N(male)	10532	10532	10532	10532	10532	10532	10532
N(female)	18038	18038	18038	18038	18038	18038	18038
N(total)	28570	28570	28570	28570	28570	28570	28570
	Transport / Storage	Food / Accom.	IT / Comm.	Finance / Insurance	Real estate	Scientific / Technical	Admin / Support
Male	0.021	0.038	0.086	0.076	0.017	0.154	0.029
Female	0.020	0.044	0.064	0.096	0.015	0.118	0.044
Difference	0.000	-0.005	0.022	-0.020	0.001	0.036	-0.015
Total explained	0.000	-0.003	0.006	0.003	0.000	0.004	0.000
% explained	7%	67%	28%	13%	35%	11%	1%
N(male)	10532	10532	10532	10532	10532	10532	10532
N(female)	18038	18038	18038	18038	18038	18038	18038
N(total)	28570	28570	28570	28570	28570	28570	28570
	Defense	Education	Social work	Arts	Other services	Domestic	Extra-territory
Male	0.009	0.059	0.029	0.020	0.103	0.012	0.003
Female	0.006	0.123	0.036	0.018	0.148	0.026	0.003
Difference	0.003	-0.064	-0.007	0.002	-0.045	-0.014	0.000
Total explained	-0.001	-0.007	-0.002	0.000	0.001	-0.001	0.000
% explained	26%	11%	26%	19%	1%	9%	12%
N(male)	10532	10532	10532	10532	10532	10532	10532

N(female)	18038	18038	18038	18038	18038	18038	18038
N(total)	28570	28570	28570	28570	28570	28570	28570

Table 2.14: Gender differences within each industry - part time employment.

FT / PT	Agriculture / Forestry / Fishing	Manufacturing	Electric / Gas / Steam	Construction	Wholesale	Transport / Storage	Food / Accom.	IT / Comm.	Finance / Insurance
Male	0.679	0.928	0.919	0.923	0.704	0.872	0.553	0.911	0.932
Female	0.848	0.917	0.922	0.955	0.686	0.956	0.684	0.875	0.932
Difference	-0.169	0.011	-0.003	-0.032	0.018	-0.085	-0.131	0.035	0.000
Total explained	-0.043	0.006	0.022	0.008	0.050	0.001	-0.017	0.023	0.008
% explained	25%	60%	710%	25%	280%	1%	13%	65%	6874%
N(male)	265	1353	259	1250	358	218	405	906	797
N(female)	244	1634	218	1223	866	365	788	1153	1724
N(total)	509	2987	477	2473	1224	583	1193	2059	2521
	Real estate	Scientific / Technical	Admin / Support	Defense	Education	Social work	Arts	Other services	Domestic
Male	0.880	0.948	0.820	0.828	0.560	0.887	0.648	0.768	0.661
Female	0.921	0.930	0.818	0.830	0.547	0.855	0.729	0.787	0.674
Difference	-0.041	0.018	0.002	-0.002	0.013	0.032	-0.082	-0.019	-0.013
Total explained	-0.009	0.003	0.031	0.048	0.025	0.041	-0.017	0.013	0.038
% explained	22%	15%	1556%	2332%	190%	129%	21%	70%	297%
N(male)	175	1623	306	99	621	309	213	1081	124
N(female)	277	2127	787	112	2210	656	329	2667	460

2.5.5 Ethnic differences by industry.

One continuous dilemma in Malaysia is due to the imbalance proportion of ethnic share in the country where ethnic groups are still identified with economic activities (Osman and Shahiri, 2014), (Osman-Rani, 1982). Unlike other socially heterogenous countries where the ethnic minority usually have lower employment rate, in Malaysia it is the ethnic majority, the aborigine that lack participation in the labour market and are associated with lower earning. This section investigates ethnic share in different types of occupations especially among high technological industries which require high skilled workers to carry out the job tasks. Theoretically we suppose that education, particularly higher education, should be able to remedy the imbalance for ethnic differences in the employment outcome and enhance social mobility within high technological industries. Our results shows that Malays remain at the economic disadvantage by working in the low-skilled industries compared to Chinese who are over-represented in high-skilled industries.

The results for ethnic differences in the employment outcome within each industry is given by Table 2.15-Table 2.17. The top part shows ethnic differences in employment status within each industry between the Malays and all other ethnic groups, while the lower part shows ethnic differences between the Chinese and all other ethnic groups. The result is almost parallel to each other - Malay's over-representation in one industry is related to Chinese's under-representation in that industry, and vice versa. The Chinese are over-represented in high skilled industries such as Scientific / Technical, Manufacturing, Finance / Insurance, and IT / Communication sectors. These sectors are also associated with higher average income. Ethnic differences in IT / Communication and Finance / Insurance are largely explained by graduates' attributes but only 21% of the differences in Manufacturing and 41% in Scientific / Technical can be explained by the observed variables. One important variable

that may explain the variation is parental education and occupations, otherwise the difference may signify potential discrimination. On the other hand, Malays are over-represented in industries such as Education, Administration Support, Wholesale, and other services. Malay's segregation into Education and other services industries are largely explained by their characteristics. However, their over-representation in Administration Support is largely due to some unmeasured observations. In general, we found evidence of ethnic segregation to some extent within industries - the Chinese show tendency towards highly skilled and high paying industries, while the Malays show tendency towards low skilled and low paying industries.

Table 2.15: Ethnic differences within each industry.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Agriculture / Forestry / Fishing	Mining / Quarry	Manufacturing	Electric / Gas / Steam	Water / Sewerage	Construction	Wholesale
Other	0.015	0.006	0.132	0.015	0.003	0.084	0.032
Malay	0.019	0.006	0.091	0.018	0.005	0.088	0.048
Difference	-0.005	0.000	0.042	-0.002	-0.001	-0.004	-0.017
Total explained	-0.007	0.001	0.009	-0.004	-0.001	-0.004	-0.005
% explained	1.450	2.605	0.210	1.642	0.993	0.872	0.277
N(other)	165	72	1,498	227	42	1,114	396
N(malay)	388	133	2,201	481	115	2,041	1,017
N(total)	553	205	3,699	708	157	3,155	1,413
	Agriculture / Forestry / Fishing	Mining / Quarry	Manufacturing	Electric / Gas / Steam	Water / Sewerage	Construction	Wholesale
Other	0.020	0.006	0.089	0.018	0.005	0.087	0.048
Chinese	0.010	0.006	0.151	0.014	0.003	0.085	0.026
Difference	0.011	0.000	-0.062	0.004	0.002	0.003	0.023
Total explained	0.003	-0.003	-0.006	0.000	0.000	0.008	0.009
% explained	0.290	7.963	0.104	0.116	0.048	3.070	0.421
N(other)	469	155	2,452	558	130	2,299	1,157
N(chinese)	84	50	1,247	150	27	856	256
N(total)	553	205	3,699	708	157	3,155	1,413

Table 2.16: Ethnic differences within each industry.

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Transport/Storage	Food / Accom.	IT / Comm.	Finance / Insurance	Real estate	Scientific / Technical	Admin / Support
Other	0.019	0.032	0.077	0.104	0.012	0.170	0.026
Malay	0.021	0.047	0.070	0.080	0.018	0.112	0.044
Difference	-0.003	-0.015	0.007	0.024	-0.006	0.058	-0.018
Total explained	-0.001	-0.010	0.010	0.022	0.003	0.024	-0.001
% explained	0.438	0.629	1.523	0.928	0.478	0.409	0.045
N(other)	255	432	963	1,250	146	2,050	355
N(malay)	513	970	1,667	1,844	368	2,734	999
N(total)	768	1,402	2,630	3,094	514	4,784	1,354
	Transport/Storage	Food / Accom.	IT / Comm.	Finance / Insurance	Real estate	Scientific / Technical	Admin / Support
Other	0.021	0.048	0.070	0.080	0.016	0.111	0.043
Chinese	0.017	0.023	0.079	0.113	0.014	0.191	0.023
Difference	0.004	0.025	-0.009	-0.033	0.003	-0.080	0.021
Total explained	0.000	0.009	-0.012	-0.023	0.000	-0.040	0.009
% explained	0.111	0.348	1.339	0.702	-0.123	0.506	0.429
N(other)	597	1,135	1,904	2,113	392	3,105	1,120
N(chinese)	171	267	726	981	122	1,679	234
N(total)	768	1,402	2,630	3,094	514	4,784	1,354

Table 2.17: Ethnic differences within each industry.

	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	Defense	Education	Social work	Arts	Other services	Domestic	Extra-territory
Other	0.003	0.079	0.035	0.020	0.119	0.014	0.004
Malay	0.010	0.109	0.033	0.018	0.137	0.024	0.002
Difference	-0.007	-0.030	0.002	0.002	-0.019	-0.009	0.001
Total explained	-0.004	-0.023	0.010	-0.004	-0.018	-0.005	-0.001
% explained	0.630	0.772	4.909	2.044	0.946	0.503	-0.866
N(other)	35	989	529	278	1,564	165	47
N(malay)	204	2,524	840	416	3,092	493	56
N(total)	239	3,513	1,369	694	4,656	658	103
	Defense	Education	Social work	Arts	Other services	Domestic	Extra-territory
Other	0.009	0.111	0.033	0.019	0.138	0.023	0.003
Chinese	0.001	0.063	0.035	0.020	0.111	0.013	0.003
Difference	0.008	0.048	-0.001	-0.001	0.027	0.010	-0.001
Total explained	0.003	0.026	-0.005	0.002	0.007	0.005	0.000
% explained	0.361	0.541	3.379	1.458	0.250	0.473	0.800
N(other)	228	2,926	992	484	3,547	544	70
N(chinese)	11	587	377	210	1,109	114	33
N(total)	239	3,513	1,369	694	4,656	658	103

2.6 Conclusion.

The expansion of higher learning institution which leads to the proliferation in tertiary education enrolment is motivated by the need for high skilled workers to fulfil the demand for high technological jobs, but also bring with it problems with rising unemployment among its graduates. Universities and the policy makers have collaborated to understand the determinants of graduate's employability. Many studies found various factors that influence individual's success in obtaining his first job after education. This paper contributes to the literature in terms of the use of a wider spectrum of analysis that cover large categories of occupational types which are not limited to a binary employed-unemployed category. The innovative aspect of this paper is when we disentangle the gender differences within each course of study to investigate if women with the same qualification as men would have similar employment opportunity.

In this chapter, we confirm many studies that found that graduate academic achievement, English language ability, and other social and economic status such as family income, locality, and ethnic also play a major role in determining graduate's first destination choice as well as their employment pattern. Higher academic achievement and better English proficiency, which is also related to individual's ability are also associated with better employment outcomes. Older age, Chinese, and higher family income - lead to high full time employment and decreases unemployment. But higher family income also lead to self-employment among graduates who work in family businesses. Generally, we found that courses of study play a major role in graduate's employment outcomes.

We found the evidence of gender differences in full time employment but within part time employment the distribution of men and women graduates are almost

uniform, though women tend to have a higher proportion in choosing to study and self-employment. Women's under-representation in superior occupations (full time, permanent, professional, and managerial) is due to their chosen course of study (Pharmacy, Pure Science, Education)[12]. Women's segregation into Administration & Support and Sales jobs are largely due to their courses of study. Women are also found to be over-represented in basic jobs.

The finding shows that even though women have the same qualification as men in highly technical courses such as Engineering and Computer Sciences, they are still under-represented in full time employment. The differences in full time employment are attributable to some unmeasured components - which may also be a potential discrimination towards women with these qualifications.

We also found evidence of discrimination for women graduates within Manufacturing sector which is consistent with the finding by Osman and Shahiri (2014). Women are under-represented in heavily industrialised sector associated with high skilled workers and high paying jobs. Indeed, women are found to be segregated into services sectors. The gender inequality in employment opportunity may signify either discrimination or taste - that women may have chosen less demanding jobs in order to balance between family and work.

The policy implication of women enrolment into higher education by merit alone may just do more harm if it is only encouraging unnecessary investment in tertiary education for some women when there is no action taken to rectify gender differences in employment opportunity. In the case of women who possess similar qualification as men but end up in the lower occupational category, we haven't been able to measure whether the pattern is due to taste/preference or discrimination. In the

[12]The employment rates for Pharmacy, Education, and Pure Science are 32%, 34%, and 39%, respectively and the ratio women to men is almost 4:1.

case of taste, qualified women may take attractive courses such as Engineering but intentionally choose low demanding jobs. But if it is due to discrimination, especially in the case of the private sector (i.e. Manufacturing), necessary actions need to be taken to devise a policy that will reduce the imbalance participation rate by encouraging female labour force participation in those industries. In the case of Malaysia, women have the same right as men (same working hours, no employment ban) but women's lower employment rate in high skilled industries is perhaps due to restrictions such as maternity leave, small children, avoiding dangerous jobs, and cultural expectation. If that is the case, we need to reinforce policies to support women's employment such as the implementation of maternity and paternity leave (so that childcare is distributed equally between parents), encourage flexible working hours, and the provision of childcare facilities.

Finally, we also found evidence of ethnic segregation within industries - the Chinese show tendency towards highly skilled jobs in the high paying industries, while the Malays show a tendency towards low skilled and low paying industries. The continuity of imbalance proportion of ethnic share in the country where ethnic groups are identified with economic activities still remains among graduates of tertiary education. Theoretically, we suppose that education should be able to remedy the imbalance for ethnic differences in the employment outcome, especially in high technological industries. We showed that Malay's inferior employment outcome due to their choice of courses which may stem from their under-achievement at schools - high scorers among school leavers were accepted in selective universities and selective courses. Family influence also plays a significant role where families who see the importance of education will emphasis school achievement which leads to gaining entry to superior education which will eventually lead to successful employment.

Generally, we found Malay's and women's inferior employment outcomes because

of their choice of courses, where sorting into such courses originated from their lower academic performance at schools. Malays generally come from rural origin where education quality is lower, the physical environment is poor, low parental education and occupation which affect they way individual behave for their choice of education and work. University quota in student intake does not seem to help because Malay tends to take less attractive courses associated with less demanding jobs, which is also conditional on their poorer performance in school. Majority Malays took Malay studies, Islamic studies, and Arts & Social Sciences which have limited practicability in the economy. One way to reduce unemployment among these groups might be to reduce the intake of courses that are not demanded by the labour market and instead increase the participation into STEM courses. If a student is not qualified to enter university and take up such courses, then vocational training must be promoted. Courses that are less demanded should not be entirely banished due to their contribution towards social benefits and knowledge creation, but the admission into such courses should be limited in order to reduce the incidence of over-education where graduate receive the wrong signal and they invest in education that does not help them in their career.

2.7 Appendix.

Table 2.18: Employment outcomes among graduates.

	Male graduates				Female graduates			
	(1) Full time	(2) Part time	(3) Study	(4) Unemployed	(1) Full time	(2) Part time	(3) Study	(4) Unemployed
Arts/SocSc	-0.107***	0.0827***	-0.243***	0.267***	0.0135	0.0862***	-0.341***	0.242***
Transport	0.266***	-0.00486	-0.248***	-0.0136	0.262***	0.0525*	-0.347***	0.0318
Administration	0.118***	0.0519***	-0.253***	0.0836**	0.239***	0.0548***	-0.350***	0.0563**
Management	0.0491	0.0385**	-0.242***	0.155***	0.171***	0.0511***	-0.349***	0.126***
Economy	0.0461	0.0607**	-0.229***	0.122***	0.125***	0.0595***	-0.334***	0.150***
Accountancy	0.192***	-0.00834	-0.250***	0.0661*	0.283***	0.0218**	-0.348***	0.0431*
Marketing	0.0491	0.0531**	-0.243***	0.141***	0.0911***	0.0564***	-0.337***	0.189***
Finance	0.106***	0.0199	-0.248***	0.123***	0.165***	0.0523***	-0.340***	0.123***
Journalism	0.0460	0.0761***	-0.244***	0.122***	0.143***	0.0625***	-0.356***	0.150***
Islamic	-0.000116	0.115***	-0.253***	0.138***	0.0842***	0.163***	-0.353***	0.107***
Food/hospitality	0.0921*	0.0585**	-0.250***	0.0994**	0.149***	0.0736***	-0.364***	0.142***
Arts	-0.0709*	0.0934***	-0.241***	0.218***	0.0195	0.126***	-0.353***	0.207***
Pure science	-0.0583	0.0325	-0.199***	0.225***	0.0369	0.0711***	-0.314***	0.206***
Applied science	-0.0103	0.0405**	-0.226***	0.196***	0.0625***	0.0568***	-0.322***	0.202***
Pharmacy	-0.264***	0.0550	0.146**	0.0630	-0.146***	0.0192	0.0429	0.0843**
Medical	0.215***	-0.0116	-0.127***	-0.0764*	0.306***	0.0118	-0.238***	-0.0789***
Dentistry	-0.211***	0.0171	0.0761	0.118	-0.103***	-0.0129	0.0507	0.0652
Nurse	0.00866	0.0903**	-0.273***	0.174***	0.123***	0.0612***	-0.329***	0.145***
Environment	0.0364	0.0385*	-0.243***	0.168***	0.0924***	0.0788***	-0.336***	0.164***
Sports	-0.0590	0.0824**	-0.257***	0.234***	0.0212	0.0972***	-0.365***	0.246***
Engineering	0.121***	0.000290	-0.229***	0.107***	0.153***	0.0269***	-0.324***	0.144***
CompSci	0.173***	0.00575	-0.233***	0.0545	0.204***	0.0496***	-0.340***	0.0856***
Education	-0.143***	0.106***	-0.184***	0.221***	-0.0629***	0.0994***	-0.266***	0.229***
Observations	21280	21280	21280	21280	41632	41632	41632	41632

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.19: Job levels among graduates.

	Male graduates				Female graduates			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Permanent	Contract	Temporary	Self-employed	Permanent	Contract	Temporary	Self-employed
Arts/SocSc	0.0232	0.00180	-0.0803	0.0553**	-0.00868	0.122***	-0.156***	0.0427***
Transport	0.272***	0.0882	-0.366***	0.00525	0.208***	0.155**	-0.359***	-0.00486
Administration	0.290***	-0.0124	-0.303***	0.0253	0.211***	0.118***	-0.355***	0.0257***
Management	0.185***	0.0478	-0.259***	0.0262*	0.166***	0.134***	-0.316***	0.0158**
Economy	0.0785	0.0717	-0.202***	0.0522*	0.111**	0.130***	-0.274***	0.0337**
Accountancy	0.361***	-0.0243	-0.339***	0.00184	0.326***	0.0551*	-0.393***	0.0123*
Marketing	0.187***	0.0629	-0.318***	0.0681**	0.180***	0.138***	-0.321***	0.00351
Finance	0.180***	0.0946*	-0.288***	0.0138	0.159***	0.174***	-0.363***	0.0296***
Journalism	0.154**	0.0839	-0.264***	0.0259	0.122***	0.192***	-0.328***	0.0150
Islamic	-0.00529	0.0557	-0.111	0.0604*	-0.134***	0.128***	-0.0498	0.0557***
Food/hospitality	0.265***	-0.0799	-0.235***	0.0498*	0.214***	0.0507	-0.294***	0.0295**
Arts	0.122*	-0.0396	-0.137**	0.0543**	-0.00761	0.0896**	-0.136***	0.0544***
Pure science	0.183**	-0.0105	-0.181**	0.00816	0.0648	0.0911**	-0.189***	0.0335**
Applied science	0.173***	0.0534	-0.266***	0.0390**	0.137***	0.0848**	-0.251***	0.0294***
Pharmacy	-0.101	-0.120	0.191	0.0288	0.0593	-0.0690	-0.0784	0.0881*
Medical	0.350***	-0.145***	-0.191***	-0.0139	0.308***	-0.0466	-0.268***	0.00660
Dentistry	0.357*	-0.245***	-0.359***	0.247	0.382***	-0.118**	-0.386***	0.121
Nurse	0.169**	0.0535	-0.221***	-0.00154	0.128***	0.0919**	-0.274***	0.0549***
Environment	0.224***	0.0190	-0.286***	0.0426*	0.113**	0.0835**	-0.232***	0.0358***
Sports	0.155*	0.00272	-0.169*	0.0112	0.0890	0.0795	-0.183*	0.0144
Engineering	0.314***	0.0139	-0.341***	0.0130	0.263***	0.110***	-0.385***	0.0117*
CompSci	0.265***	0.0628	-0.346***	0.0176	0.186***	0.192***	-0.390***	0.0123*
Education	-0.00271	-0.0427	0.00267	0.0427**	-0.121***	0.0501	0.0327	0.0381***
Observations	10532	10532	10532	10532	18038	18038	18038	18038

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Chapter 3

Wage differentials across sectors, gender, and ethnic groups.

3.1 Introduction.

There are large empirical literatures in studying the public-private sector wage differences with mixed findings supporting the evidence of public sector wage premium (Bender, 2003),(Bender and Elliot, 1999),(Disney and Gosling, 2008),(Azam et. al, 2013),(Tansel, 2005),(Terrel, 1993),(Seshan, 2013); or the evidence of wage premium in the private sector (Heitmueller, 2004); the evidence that the public sector pay less than the private sector especially among university graduates (Adamchik, 1999); and the greater emphasis in investigating the *variance* of the differential distribution instead of the overall differences (Melly, 2005)(Bender, 2003). To date there has been very little studies on the public-private sector wage differential in the Southeast Asia. Specifically, there was only two studies conducted in Malaysia - Mazumdar (1981) using 1975 data, and more recent study by Seshan (2013) us-

ing 2007 Malaysian Household Income Survey. One aspect of this chapter seeks to contribute to the literature by addressing the public-private sector wage differential among the high skilled workers in Malaysia and investigate the evidence of public sector wage premium among university graduates in the country. My finding shows distinct discovery than Seshan (2013) in a sense that there is no evidence of public sector wage premium among university graduates. The different outcomes from both studies can be attributed to the different sample being used. My study is rather consistent with (Adamchik, 1999) who found no evidence of public pay premium among university graduates.

Despite the increasing number of women in tertiary education, gender gap still persists even in developed countries. Nonetheless, it is also important to note that there has been reduction in gender pay gap over the years. Women enrolment in Malaysian tertiary education is doubled compared to men, but women's participation in employment and their remuneration still lag behind. Several reasons can be used to explain the disparity: first, women have tendency to choose less attractive courses of study that are usually associated with blurred employment prospect and low pay compared to men's preferences towards highly technical and attractive courses of study. Second, women face greater competition simply because there are greater number of women in tertiary education in the country. In order to investigate whether gender pay gap exists among Malaysian university graduates, we investigate male-female wage gap in different settings. The finding shows that the gender pay gap exists in the private sector labour market, where male graduates earn significantly higher than females and the difference is accounted for by some unexplained factors, suggesting potential evidence of discrimination towards women in the private sector. We also found evidence of discrimination towards women in Manufacturing and Defence industries, while men face discrimination in Food / Accommodation industry.

Ethnic polarisation is still a heated argument in the country. Due to historical division by ethnic group prior to Independence, one common assumption that continues to hold is that the Malays and the indigenous are more preferable to gain employment and better remuneration in the public sector; while Chinese are more preferable in the private sector labour market. One aspect of this paper investigates the wage differential by ethnic groups in the public and private sector labour market to test if the assumption holds. My finding informs that, consistent with the public policy that do not practice discrimination, we found no evidence of ethnic wage differential in the public sector. However, we found significant wage premium between all other groups compared to the Malays in the private sector. The difference is found to be largely due to some unexplained factors.

The measurement of graduate earning in this study was taken a few months after finishing study. Some graduates have experienced a very successful transition into full time employment, but due to the narrow time frame between finishing study and the time the survey was conducted, a fraction of graduates found themselves land on a transitory, rather than perpetual job to begin their career. The last part of this chapter investigates wage premium among graduates who obtained full time employment at the time the survey was conducted compared to those who work part time. The finding shows the evidence of wage premium among full time workers with male premium larger than female. The difference is however largely accounted for by full time worker's superior characteristics.

The chapter is related to a literature that points toward the earning differences in the public-private sector labour market among youth. This paper also speaks to the literature on graduate's gender and ethnic pay gap. As mentioned before, there is little empirical studies done in Southeast Asian due to the lack of data availability. This paper contributes to the literature by correcting the selectivity bias

in the earning equation where the earning is only observed among those who are employed. Estimating a pooled earning equation by including a dummy variable for each group (i.e. sector, gender, and race) restrict all other coefficients to be the same for all groups which is unlikely, hence alternative method should be applied. Indeed, separate wage equation can be estimated for both group and then use the results to decompose the differences in the average income into two portions. One portion represents the difference in the average worker characteristics and job attributes, another represents the difference in the returns to workers characteristics and their job attributes. The former explains the differences in wages between two workers having different characteristics, where we would expect worker with higher productive ability and/or job that compensate for equalising difference to earn more. The latter explains the differences in the earning among two workers possessing similar characteristics and job attributes and hence may provide potential evidence of discrimination. To my knowledge this is the first study of graduates that extensively analyse graduate earning in various ways. Previous literatures in the research on Malaysian graduates rarely examine the earning and instead largely focused on graduate's employability.

The chapter will be organised as follows: Section 3.2 discusses theoretical issues related to the earning function (Section 3.2.1), previous studies on public-private labour market (Section 3.2.2), gender pay gap (Section 3.2.3), and a short historical description related to economic share of different ethnicity in Malaysia (Section 3.2.4). Section 3.4 introduces the econometric framework, and finally Section 3.5 discusses the results. The chapter is closed with a conclusion.

3.2 Background and previous researches.

3.2.1 Earning function, equalising difference, and wage determination.

The human capital earning function pioneered by Mincer in 1974 has work so well in the empirical regularities to study the effect of investment in schooling and on-the-job training on productivity-related earnings. Workers who invest more to acquire skills through schooling have to face opportunity costs in terms of forgone earning and direct costs of school tuition and hence it is highly relevant for these workers to be compensated with a higher lifetime earnings for their increased productivity through the investment in schooling and training. A possible deficiency in the human capital theory can be explained by the positive relationship between ability and years of schooling where individual who spent more years in schooling also possess higher ability, and ability translates into higher productivity and hence higher earning which then places an upward bias in rate of return to schooling. In the case of university graduates, years of schooling alone is inadequate to explain the return to education because of the existence of different effect of different course of study (Walker and Zhu, 2001). Heterogenous returns across different course of study can be explained by certain course of study that is associated with higher ability. These courses offer distinct and high skilled workers for labour market. Individuals with more intensive course of study possess higher ability which translate into higher productivity. Medical, Dentistry, and Engineering graduates for example already posses higher ability before starting university and their courses are more intense compared to others.

In the study of earnings differences between individuals the theory of equalising differences may explain the equalisation of monetary and non-monetary gain (or

lose) among different job attributes. In the labour market transaction workers and employers each simultaneously choose job attributes and worker's attributes, respectively, to achieve an acceptable match where preferred choice of workers and employers are met. In a situation where productively homogenous workers are choosing between two jobs - one is pleasant, and one is unpleasant - in making the decision the workers are taking the rational and optimal choice for a preferred job based on how much income must be compensated so that the worker may be indifference to take up the less preferred job. This level of income is called the *reservation wage* or the shadow price to compensate for the unpleasantness of the job attributes associated with the less desirable job. The unpleasant job attributes may be explained by hazardous working conditions, unusual working hours, and jobs that require specific set of skills that have to be acquired through years of training and high level of intensity such as medical and law professions. The undesirable attributes of jobs can also be explained by the geographical location where certain location may provide better living conditions such as amenities and lower living costs compared to other locations (Rosen, 1999).

The persistence of wage difference due to discrimination can be observed in systematic and consistent disparity of income between groups of workers that may be attributed by gender, race, and other social attributes. In the economic discrimination concept, the term *minority* describes a group who experience lesser economic rewards, and the term *majority* describes the favourable group. Discrimination is defined as two workers possessing similar productivity-related attributes but getting paid differently, and the difference is persistent based on the minority's demographic profile. Employers and other worker's taste for discrimination which translate into unequal employment and earning opportunity among minority workers is what is termed as prejudice. Workers within the same firm may practice prejudice if they abstain from working with the minority workers, which may cause job segregation

where the minorities are more concentrated in different type of jobs. Consumer may also be another source of discrimination when they abstain from being served with minority workers (Cain, 1999).

3.2.2 Public-private sector labour market.

In the study of wage differential in the public-private sector labour market, Gregory and Borland (1999) provides an extensive discussion on the unique nature of public sector labour market in terms of its objective, ownership, production, and operation. Governments are generally the largest employer of a country. Its operation involves large expenditure which is financed primarily through taxes and borrowing, hence calling for the public concern over the efficiency (Bender, 2003).

There are a number of possibility that public-private differences and how it may affect the earning determination between those sectors might be of interest. Wage determination between the two sectors are different, due to the difference in the functionality and size of both establishments. Unlike their private sector counterparts, governments are lack of profit motives. They do not only produce goods and services, Borjas (1980) also believed that bureaucrats are also involved in electoral process and producing votes, hence may justify higher pay (Gunderson, 1980). Public sector may produce goods and services not available elsewhere, allowing for monopolistic market for its production.

The political environment provide means for achieving specific government objectives, while the private sector's objectives is restricted by the market environment. While the private sector objective is to minimise production costs, the public sector objectives can be classified into three types of concentration. Public sector that concern with the maximisation of social welfare will seek to resolve labour market

imperfection by introducing equal policy and affirmative action to reduce discrimination. Bureaucrats will seek to maximise budget allocation. Politicians may seek for vote maximisation. Hence, hiring and earning decision made by politicians would be different than if the decision is made to maximise efficiency (Gregory and Borland, 1999).

As a model employer the government may also offer low-skilled workers with higher rates, but might be adverse to paying too high if the public does not like to see government workers earning too much. Women and minority often benefit most by being employed in the public sector (Bender, 2003). Bender (2003) also suggest that overpaying government workers results in waste in public budget, but offering too low results in incapability to recruit and retain skilled and productive workers. It is difficult to identify attributes of workers who seek employment in the public sector from those who obtain the job. Bellante and Link (1981) found evidence of public sector workers being more risk averse. However Gregory and Borland (1999) provides another perspective that perhaps the employers in the public sector are more keen to hire workers who are risk averse and more loyal. Public sector labour market also allow scope for welfare-type activities. The consequence is it make it difficult to identify the unobserved motivation of workers who seek employment in the public sector for reasons related to the welfare goals.

There are evidence of public sector employees being paid more than equally productive private sector employees at the lower earning distribution, while the reverse is observed at the higher earning distribution (Katz and Krueger, 1992). Studies found that there is a double imbalance in the public-private sector pay comparison. Workers at the lower end of the occupational hierarchy receive higher pay in public sector, but earn less at the upper end of the earnings compared to private sector workers (Bender, 2003)(Katz and Krueger, 1992)(Elliott, Robert and Duffus, 1996).

There are a number of reasons why the public sector may provide better pay scheme to its workers. Certain types of public sector occupations do not exist in the private sector hence the government uses the highest wage in order to attract workers who would otherwise choose private sectors. For certain occupations, it is impossible to appropriately classify and survey the jobs in other sector hence lead to an upward bias in public sector wage. While deciding wage structure, public sector often do not consider the non-monetary benefits that is being offered to their workers, resulting in the government 'paying compensating differentials when they are not needed' (Fogel and Lewin, 1974). However, given the persistence of the unexplained portion of wage differentials between public-private sector wages which is 'too unlikely', Moore and Raisian (1981) suggested that the premiums are due to skill differentials between workers of both sectors.

Many previous literatures attempted to decompose wage differential into a portion accounted for by differences in productivity-related factors that individuals bring to the labour market and a residual that presumably represents labour market discrimination (Daymont and Andrisani, 1984). Borland, Gregory and Sheehan (2001) provides an extensive cross-country analysis on the differentials. The overall finding from various literatures found that the results depend on country differences and model specifications. Some studies provided mixed results on the overall wage differences, another focused on the differences in the *distribution* of the wage and found that the variance is an important element that needs to be included in studying public-private wage differential because public sector wage is more compress (Melly, 2005). This is important especially in the case of a double imbalance in pay distribution where government workers are paid more at the lower end of the wage distribution, and less at the higher end of the distribution (Katz and Krueger, 1992).

Private sector is a key driver of economic growth in most Southeast Asian countries. However at the moment, there has been very little research done on public-private wage differentials in Southeast Asia. Recent study in Malaysia using Malaysia Household Income Survey from 1995 to 2007, Seshan (2013) reported that in 1995 the average public-private wage ratio is 1.12, and by 2007 it has grown to 1.29. After controlling for individual characteristics, public sector employees were found to earn some unexplained wage premium, particularly higher starting wage. Instead of rewarding its workers based on productivity, public sector is found to reward its workers for the length of service. Public sector employees are found to be older, with more work experience, and better educated. Women in both sectors posses better education than men, and women's wage premium working in a public sector is higher than men. There is greater gender wage gap in the private sector favouring men, in contrast, the gender wage gap is lower in the public sector. The large unexplained gender pay gap in the private sector suggesting wage discrimination against women.

3.2.3 Gender pay gap

Gender pay gap and job discrimination against women have received a lot of attention and continue to gain widespread attention across the world. The exclusion of women in male occupations leads to an "overcrowding" of women in certain jobs, at the same time create job segregation for women in certain occupation. Following this, the devaluation theory suggests that women's lower status contribute to the lower wage setting in "female" jobs. The devaluation theory implies employer's view on occupation with high proportion of women as less valuable, resulting in low pay determination (England, Allison and Wu, 2007). Because of employer's preference for men in most jobs, women were forced to choose less attractive occupations hence explaining their lower earning. Based on a study using Current Population Survey

in 2007, England, Allison and Wu (2007) show that given workers' preference, employers is more likely to take men for high paying jobs since they can easily able to get men. On the other hand for low paying occupations employers is more likely to take women since men are already more likely to be accepted for high paying jobs. Women face obstacle to high paying jobs and are blocked from receiving equal pay especially at the higher end of income distribution, creating a condition which is called as the "glass ceiling" (Albrecht et. al., 2001) especially at managerial job position (Jurajda and Paligorova, 2006).

From sociological perspective women are viewed to play important role as a carer in the family, not a breadwinner. Becker (1985) and Polachek (1976) suggested that women's rational decision for family care and child bearing lead them into investing less in human capital accumulation. Women also choose to seek less demanding job since house works undertaken by women is quite an intensive energy consuming labour. Interruptions due to child birth which cause human capital decay among women also causes women to have less labour market experience compared to men. However, following massive expansion of higher education it is found that women are now more educated than men. McDaniel (2012) reported that young women perform better in academic achievement than young men. Indeed, UNESCO (2012) reported that young women's aspiration is now higher than young men in terms of career progression. With the deceleration of marital institution women are now taking shorter break from employment and hence should have close their wage gap with men especially in full-time employment (Makepeace and Pal, 2004). Nonetheless the persistence of gender wage gap causes some women to be more vulnerable to over-education (Figueiredo et. al, 2015).

A meta-analysis on gender pay gap by Weichselbaumer (2005) utilising more than 260 published papers from 63 countries between 1960s to 1990s found that the raw

wage differentials have fallen from 65% to 30%, largely characterised by women's progressive attributes such as better education and work attachment. From the sources of the published papers being investigated, the unexplained component shows no decline over time. However, the meta-regression analysis uses specification for a standardised method including data selection suggested an actual discrimination is actually lower. They also found that data restrictions seriously affect statistical result of gender pay gap. Studies using data of a particular group of respondent who are never married, new entrant to the job market, or workers in narrow occupations provide better comparability and result in lower wage differential. However, omitted variables such as complete record of human capital characteristics (i.e. on-the-job training and job tenure) can result in serious bias. Studies that do not include work experience can seriously overestimate the unexplained wage gap.

One major mis-specification in the existing empirical literatures is the inability of human capital function to measure ability, which is also correlated with schooling (Griliches, 1977). Using schooling as a measure of attributes assumes all individuals have similar distribution of the courses taken at the university while in fact men were more likely to study in engineering and business, while women were more likely to study education, liberal arts, and social sciences (Brown and Corcoran, 1997). Courses of study play an important role in the structure of wage in specialised human capital. Investing in specialised human capital require more relinquishment than ordinary human capital and hence we would expect workers with acquisition of specialised human capital should receive higher return (Becker, 1971). Another important measure that may explain wage differentials is inter-industry characteristics. Firm characteristics exert influence on discrimination against women (Tam, 1997)(Becker, 1975). Firm specific information may provide better measures of workers ability hence may better explain wage differentials (Altonji and Blank, 1999)(Zanchi, 1998). We overcome these mis-specification by controlling for dif-

ferent courses of study. We also compute wage differential within each industry to obtain finer results in the wage differentials.

In Malaysia, Nagaraj (2014) studied 120 establishments in manufacturing industry within the region of Klang Valley (most industrialised and developed region in the country) found evidence of raw difference in the male-female earnings but the result is doubtful due to omitted variable and sample selection bias using the restricted data. An earlier study in Malaysia by Chapman and Harding (1985) suggested that there has been very low studies involving developing countries, and surprisingly the finding is somewhat similar to that of the developed countries. Using data from the Economic Planning Unit, the study found that there was a systematic difference in education and experience among men and women and hence women earned less because they had lower skills (but keep in mind that the study was conducted more than 30 years ago). But it was also evident that employers practiced wage discrimination within particular job where women were rewarded at a lower rate. Women were also found to be employed in relatively low-paying jobs. Chapman and Harding (1985) offered two reasons on the difficulty to concur with the existence of discrimination. First, it is difficult to determine to what extent does the employer practice discrimination towards women workers. Women high turnover can be the cause towards their lower earning, however if it becomes the determinant towards the overall women's wage then women at large might be statistically discriminated. Secondly, if certain occupation offer lower pay, it is also difficult to look at the difference between employer's allocation and worker's own choice. It is possible that women socialisation processes such as tradition and education before entering the labour market influence their decision to choose certain types of occupations that are characterised by low wage.

In his paper Chapman and Harding (1985) concluded that women received higher

rate of returns for their primary and secondary schooling, while men received higher rate of return for tertiary education. Each year increase in experience gave higher return for men. Men also received higher return for on-the-job training and each hour worked. Married men earned 6% increase in wage, but for married women the change in wage was insignificant. However migration to the capital city Kuala Lumpur benefited women more than men. Based on these finding, Chapman and Harding (1985) reckoned that by providing women with more education will not necessarily reduce their pay gap. Chapman and Harding (1985) conceded that since the study focused on young workers (average age is 27) hence it may not be possible to generalise the result to the whole population.

3.2.4 Ethnic wage gap.

Malaysia is a special case of a segmented plural society with persistent ethnic inequality in terms of societal rewards such as earning (dominated by Chinese) and political power (dominated by Malays). Chronically, as a consequence of British colonisation in the then Malaya between 1786 to 1957, a large number of Chinese and Indians were brought to work in tin mining and rubber estates for the British ruler. Residential location and occupations were stratified by ethnic group. The Chinese established small towns for tin mining, wage labourers, artisans, traders, and merchants. The Indians were located around rubber estates and oil palm plantations. Malays remained in agriculture as farmers and fishermen, further hamper their possibility to gain education in the cities, where education may cause uprising. Rather, Malays attended orthodox religious schools in their villages. English schools were introduced in the towns where Chinese, Indians and a minority Malay aristocrats had had better access to English education. English-language was also a prominent language in trade and industry and hence those who attended English

schools have an upward occupational mobility (Ong, 2012).

Malays once regained their power in 1957 (Independence) had to compete with Chinese and Indians who had a head start in economy. Residential segregation during the British colonisation persisted after the Independence. Strong intergenerational occupation immobility shows that father's occupation played an influential role in their offsprings' success. Intergenerational occupational inheritance is strong in all ethnic group. Chinese were more likely to follow their fathers in non-agricultural jobs and succeeding their fathers' occupations in the cities. Malays were more likely to stay in the agriculture following their birth of origin and their fathers' occupation. The trend for Indians were intermingled between the two, some were still working in the rubber estates and plantations, and some moved the city. Location of birth and fathers' occupation were the main determinant of children's occupations. Hirschman (1983) found strong intergenerational immobility leading to job segregation and ethnic stratification. Occupational attainment depended largely on social origin. The structural opportunity block in ethnic-based recruitment in sales and retail restrained the Malays from entering such occupations. Hirschman (1983) also found that Malays were also under-represented in commerce, manufacturing, and prestigious white collar occupations (i.e. professional, administration, and clerical) where Chinese were more privileged to take up such occupations due to living in an urban state and family ties (i.e. ownership and management of shops and factories).

It is a common knowledge that less advantageous group is thought to be lacking in motivation and aspiration. If this is the case then policy need to be established to increase their values and aspirations. However Hirschman (1983) found no evidence for a certain group's lacking in motivation or ambition to be the cause for their being less advantageous in economy rather than their intergenerational mobility limitation and place of origin. If ethnicity alone become the barrier towards employment in

certain type of occupation then no any kind of intervention can remedy the problem (Hirschman, 1983), as in the case for sales occupations. Hence Hirschman (1983) suggested that direct policy in terms of setting quotas to assure ethnic proportions would lessen the discrimination.

Intervention action should be looking at the adjustment criteria in recruiting and promoting. To make sure that socioeconomic status is not linked to ethnicity, educational opportunity and training should be expanded for the less advantageous group (Hirschman, 1983). Indeed, equalising socioeconomic for all ethnic actually neutralise the intergenerational process. The availability of jobs in the urban/rural setting has a major impact on the job opportunity for certain ethnic group due to geographical segregation. If the job creation in the rural setting is implausible then it is important to promote migration to the city. In small establishments kin recruitment is common. When economic unit grow and become more bureaucratic, the hiring pattern become more universalistic (Hirschman, 1983).

Persistent ethnic inequality coupled with structural poverty will seriously harm the country. The serious ethnic-economic disparity reached its peak when the tension caused an ethnic riot in 1969. To remedy the problem of economic disparity, the government introduced a New Economic Policy (NEP) targeting to eradicate poverty among all ethnic groups and "to restructure society to abolish the identification of race with economic function" (see Second Malaysia Plan (1971)). The NEP coined the term "Bumiputera" to acknowledge Malays and the indigenous of Sabah and Sarawak as the *sons of the soil* which grant them special rights in economy and education. The plan included preferential treatment towards the Bumiputeras in terms of education, employment, business, and ownership. In education an elite *Majlis Amanah Rakyat* (MARA) Junior Science Colleges, Fully Residential Schools, Science Secondary Schools, and a number of pre-university and tertiary education

institutions were opened exclusively for the Bumiputeras (Ong, 2012). Enrolment into public university also increased dramatically due to ethnic quota into university. Intervention in employment saw the establishment of Industrial Coordination Act (1975) which regulates 30% of Bumiputera employment quota in private sector. The legislation transformed private sector in terms of ownership, workers recruitment, and licensing under the purview of Ministry of Trade and Industry.

However the result of implementation NEP received various responses. NEP was found to be able to reduce ethnic gap and reduce Malay poverty to a certain extent where it is evident over a generation we observed the occurrence of Malay urban middle class entering professional occupations. On the other hand, NEP received heavy criticism from the non-Malays who are being recognised as second class citizen due to the Malay supremacy. Some opined that NEP was Malay's agenda to making sure Malay's special position in the land for their acknowledgement of Chinese and Indians as citizen. However, instead of benefiting the low income Bumiputeras, Selvaratnam (1988) found that the NEP has indeed benefitted the mostly urban middle class especially in education. Then again Jomo (2004) found that government special consideration on Malays have actually benefited among the politicians and politically-connected businessmen. Only in the public sector that NEP seems to be able to eradicate Malay's poverty - employment in the public sector increased to almost double with the creation of public enterprises in various industries. Even though public sector offer lower wages but it is compensated for greater job security and better pension plan. The lower proportion of non-Malays in the public sector is due to common perception of unequal chances in recruitment and promotion (Ong, 2012). The trend sees Malays dominating the public sector, while Chinese dominating the private sectors (Jomo, 2004). Nevertheless, Nagaraj (2014) found that after the NEP the intra-ethnic wage gap worsened especially among Malays. It is also found that education, employment and politic remain entangled with ethnicity.

NEP's preferential treatment towards Malays in public university and public sector jobs created brain drain where a lot of non-Malays choose to study or work abroad.

A study on ethnic economic gap and the impact of NEP by Shahiri (2012) found that occupation segregation have reduced for all ethnic group by the end of NEP implementation. However, ethnic wage gap continue to rise especially between Malays and Chinese in all types of occupations. The study utilises various sources of data from West Malaysian Family Survey, First Malaysian Family Life survey, Second Malaysian Family Life Survey, Population Census of Peninsular Malaysia, and Population and Housing Census of Malaysia. Using Oaxaca decomposition technique, the study concludes that NEP does not succeeded in reducing ethnic wage gap between all ethnic groups except between Malay and Indians in professional and agricultural sectors. Chinese remains benefitting highest income in every type of occupations.

3.2.5 Full time wage premium.

The final part of this chapter discusses the wage premium among the employed graduates. Graduate's employment status is observed within the narrow time frame after they finished their studies. Some graduates found themselves landed on a temporary job before they obtain more suitable job with their qualification. During this *waiting room effect* some graduates found themselves experiencing over-education by taking up part-time or temporary jobs at the beginning of their career (Dekker et. al., 2002). We computed the difference between graduates who work full time compared to those who work part time. Obviously, wage premium among full time workers is significant and large. However we cannot conclude the subsequent effect of part time job penalty because we do not observe graduate's career mobility for several years ahead. The part time workers among graduates may accept the first

job offer in order to gain experience and then use this job as a stepping stone before they take up more suitable job in the future (Rosen, 1972).

3.3 Data.

The data used in this chapter is obtained from the 2013 Graduate Tracer Study conducted by the Ministry of Higher Education Malaysia. The data is described earlier in Section 2.3. We remove non-first degree graduates, disabled graduates, and non-citizen from the data, leaving us with 69,995 graduates with 35,668 reported as employed at the time the survey data is taken. Table 3.1 shows the observed wage among our sample graduates - public sector wage is bimodal at RM501-RM1,500 and RM3,001-RM5,000, while private sector wage distribution is located in the middle income group (RM1,501-RM2,501).

Table 3.1: Public and private sector wage distribution among sample graduates.

Graduate income	Public	Percent	Private	Percent
< RM 500	249	0.05	1,291	0.04
RM 501 - RM 1000	1,057	0.22	4,466	0.14
RM 1001 - RM 1500	1,072	0.23	4,759	0.15
RM 1501 - RM 2000	568	0.12	7,269	0.24
RM 2001 - RM 2500	285	0.06	7,160	0.23
RM 2501 - RM 3000	299	0.06	4,234	0.14
RM 3001 - RM 5000	1,150	0.24	1,514	0.05
> RM 5000	78	0.02	217	0.01
Total	4758	1.00	30,910	1.00

Table 3.2 shows some descriptive statistics on courses of study. The largest group in our sample is graduates who took Engineering course which make up a quarter of all individuals. The top five courses of study are: Engineering, Management, Computer Sciences, Education, and Applied Science. The average employment rate is 51%.

Courses with the highest employment rate are: Medical, Transport, Accountancy, Administration, and Computer Science. Courses that are associated with the lowest employment rate are: Pharmacy, Education, and Pure Science.

Do men/women graduates have any preference towards certain course of study, where such course of study is associated with certain level of income? Based on columns 4 - 7 of Table 3.2, men are more likely to be majoring in courses that are associated with high income such as Engineering and Computer Science. Conversely, women are more likely to be majoring in courses such as Management and Education, which are associated with low paying jobs. Top courses that are found to give highest return to education are: Dentistry, Medical, Pharmacy, and Engineering. The analysis in this paper does not cover the preference of male/female graduates into choosing the courses they took hence limiting our understanding of possible discrimination in the subject choices.

Table 3.3 shows the relationship between gender and income group with each industry. Industries that are associated with a higher income group are: Electric/Steam/-Gas, Scientific/Technical, Social work, IT/Communication, Manufacturing, and Construction - all of which males have larger share than women except in Social work. Industries that are associated with the lowest earning are: Education, Food/Accommodation, Wholesale, and Domestic - all of which females have greater share. The finding confirms our suspicion that men and women do have preferences in the choice of courses of study and industry by which men are more inclined towards courses and and industries that are associated with higher pay.

Table 3.2: Graduate's employment, gender, and income level by courses of study.

Courses	N	% Employed	Male	Female	% < RM2,000	% > RM2,000
Law	969	0.50	1.25	1.46	0.42	0.58
Arts/SocSc	3,860	0.40	3.91	6.44	0.32	0.68
Transport	240	0.67	0.36	0.33	0.42	0.58
Administration	4,243	0.60	5.29	6.51	0.36	0.64
Management	6,899	0.50	6.64	11.71	0.37	0.63
Economy	1,519	0.49	1.78	2.4	0.33	0.67
Accountancy	4,293	0.65	4.32	7.18	0.40	0.60
Marketing	1,336	0.50	1.73	2.01	0.31	0.69
Finance	3,286	0.51	3.65	5.29	0.32	0.68
Journalism	1,727	0.52	1.8	2.85	0.30	0.70
Islamic	954	0.51	1.05	1.54	0.48	0.52
Food/hospitality	1,355	0.55	1.54	2.17	0.43	0.57
Arts	1,818	0.42	2.5	2.65	0.38	0.62
Pure science	1,139	0.39	1.05	1.96	0.28	0.72
Applied science	4,542	0.42	4.92	7.39	0.29	0.71
Pharmacy	457	0.32	0.43	0.78	0.15	0.85
Medical	2,059	0.74	2.8	3.02	0.08	0.92
Dentistry	189	0.46	0.23	0.29	0.04	0.96
Nurse	1,218	0.49	0.84	2.26	0.30	0.70
Environment	1,425	0.44	1.89	2.12	0.33	0.67
Sports	307	0.40	0.69	0.29	0.34	0.66
Engineering	16,400	0.53	37.95	15.07	0.21	0.79
CompSci	4,948	0.58	8.79	6.08	0.25	0.75
Education	4,812	0.34	4.6	8.18	0.30	0.70
Total	69,995	0.51	100	100	0.30	0.70

Table 3.3: Gender and income level by industries.

Industry	N	Male	Female	% < RM2,000	% > RM2,000
Agriculture/Forestry/Fishing	553	2.07	1.21	0.73	0.27
Mining/Quarry	205	0.81	0.42	0.25	0.75
Manufacturing	3,699	12.77	8.82	0.44	0.56
Electric/Gas/Steam	708	3.04	1.31	0.40	0.60
Water/Sewerage	157	0.51	0.4	0.57	0.43
Construction	3,155	11.99	6.82	0.45	0.55
Wholesale	1,413	3.16	4.48	0.85	0.15
Transport/Storage	768	2.25	2.09	0.59	0.41
Food/Accom.	1,402	3.64	4.12	0.86	0.14
IT/Comm.	2,630	8.86	6.41	0.43	0.57
Finance/Insurance	3,094	7.51	9.43	0.45	0.55
Real estate	514	1.47	1.42	0.67	0.33
Scientific/Technical	4,784	15.44	12.11	0.40	0.60
Admin/Support	1,354	2.87	4.39	0.74	0.26
Defense	239	0.79	0.6	0.79	0.21
Education	3,513	5.79	12.47	0.88	0.12
Social work	1,369	3.19	4.25	0.42	0.58
Arts	694	1.99	1.91	0.73	0.27
Other services	4,656	10.41	14.76	0.70	0.30
Domestic	658	1.12	2.31	0.82	0.18
Extra-territory	103	0.31	0.28	0.60	0.40
Total	35,668	100	100	0.58	0.42

3.4 Econometric framework.

The basic approach to study wage differentials between any two groups of interest (e.g. public sector workers against private sector workers) is to estimate a pooled wage equation by including a dummy variable identifying the group (Rees and Shah, 2000). However, estimating a single wage equation restricts the coefficients of the other explanatory variables to be the same for both groups, which may be unlikely. Alternatively, separate wage equation can be estimated for both groups. The results from these estimations can be used to decompose the difference in the average income into two portions: one portion represents the difference in the average worker characteristics and job attributes, another represents the difference in the returns to workers characteristics and their job attributes (Oaxaca, 1973)(Blinder, 1973). The former explains the difference in wages between two workers having different characteristics, where we would expect individual with higher productive characteristics to earn more. The latter explains the difference in the earning among two workers possessing similar characteristics and job attributes and hence may provide potential evidence of discrimination.

The wage equation can be estimated separately by

$$W_{ij} = X'_{ij}\beta_j + \epsilon_{ij} \tag{3.1}$$

where $i = 1, 2, \ldots, n$ denotes individual worker belonging to either of the two sectors denoted by $j = 1$ for public sector and $j = 2$ for private sector. The error is normally distributed with zero mean variance σ_j^2. The dependent variable W_{ij} is the monthly wage received by the graduates working in the public and private sectors. The explanatory variables X_{ij} are matrix of individual and job characteristics, while ϵ_{ij} are vectors of errors. Note that the wage W_{ij} is not observed, instead we have a

latent unobserved variable for eight ordinal category of graduate income

$$W_{ij}^{*} = k \text{ if } \mu_k \leq W_{ij} \leq \mu_{k+1},\ k = 1, \ldots, K \tag{3.2}$$

the unknown points $\mu_1 < \mu_2 < \ldots < \mu_8$ are estimated along with β. The response probability should be

$$Pr(W_{ij}^{*} = k|X_{ij}) = \Lambda(\mu_{k+1} - X_{ij}'\beta) - \Lambda(\mu_k - X_{ij}'\beta) \tag{3.3}$$

After the estimation results of wage equation for each sector is obtained, the next step would be decomposing the wage differential into several components.

The Oaxaca-Blinder (OB) decomposition is a commonly used technique to compute differences between groups. Standard OB package are commonly applied in the case where the dependent variable is in linear or log-linear form (Oaxaca, 1973)(Blinder, 1973). As a matter of fact, OB can also be applied in a non-linear case such as binary, ordered, or multinomial (Fairlie, 2005)(Yun, 2004)(Bauer and Sinning, 2006); and quantile regression (Mata and Machado, 2005). However, standard packages to compute OB decomposition in limited dependent variable models are only restricted to the computation of the average differences in the probabilities. There is no available packages to allow the computation of the contribution of each explanatory variables towards the differences in the probabilities. The complication in computing OB decomposition in an ordered model is due to the sign of the estimated coefficient which does not necessarily determine the direction of the effect for intermediate outcomes (Madden, 2010). Since we are more interested in examining the effect of each contributing variables, linear model seems more suitable. In this case, we make assumption that the graduate income is observed in cardinal measure, hence

analysis using linear OB seems more plausible.

The decomposition can be computed as

$$\bar{W}_A - \bar{W}_B = (\bar{X}_A - \bar{X}_B)\hat{\beta}^* + \{\bar{X}_A(\hat{\beta}_A - \hat{\beta}^*) - \bar{X}_B(\hat{\beta}_B - \hat{\beta}^*)\} \tag{3.4}$$

The above standard decomposition analysis separate the partitions of wage differential into (i) differences due to group A and group B's differences in characteristics such as education, family background, and job characteristics; and (ii) differences due to the differences in group A and B's earning in the regression coefficients. The coefficient β_A represents group with higher average income (i.e. public sector worker's) and β_B represents group with lower average income. Assuming β^* is the returns to workers characteristics in the absence of discrimination, the decomposition of the earning differences between employees in the two groups $\bar{W}_A - \bar{W}_B$ can be broken down into a component representing the effect of inter-group differences in the average worker's characteristics and job attributes (the first term in the right hand side of Equation 3.4), and into a component representing the inter-group differences in the *returns* to worker's characteristics and job attributes (the second term in the right hand side of the equation). We assume that the resulting wage structure in the absence of inter-group differences would be the existing earning structure of either public or private sector and hence let $\beta^* = 0.5\beta_A + 0.5\beta_B$ following (Reimers, 1983). By using similar weightage to both groups, we did not make any assumption on the potential existence of discrimination on any groups.

The complexity of the above calculation of wage differences is when the earning of the graduates depends on some unobserved characteristics which relates to the sorting of employees into different sector, where the sorting is based in the worker's characteristics. Note that the pool of employees are non-random since participation

decision is endogenous on an individual reservation wage. Workers who possess specific human capital to be hired may choose to work or not to work depending on the minimum wage that they may accept. If the offered wage is at least equal to or larger than the reservation wage, they would choose to participate in the labour market. Otherwise, they would choose not to participate in the labour market. In addition, given the participation decision, individuals have to decide on which sector to work. Again, if the reservation wage for working in the public sector is higher than working in the private sector, they would choose to work in the public sector, vice versa. If the choice to labour market participation and public-private sector is endogenously related to the reservation wage, estimates of wage equation are biased and further correction term for this type of self-selection is required.

These unobserved productivity-related characteristics can be represented by

$$E(W_A|S = \text{public}) = \bar{X}_A\hat{\beta}_A + E(u|S = \text{public})$$
$$E(W_B|S = \text{private}) = \bar{X}_B\hat{\beta}_B + E(u|S = \text{private})$$

If the sorting of workers into sectors and choice of labour market participation depend on some unobserved characteristics of the workers i.e. when $E(u|S = \text{public}) \neq 0$ and $E(u|S = \text{private}) \neq 0$, then the estimates of $\hat{\beta}_A$ and $\hat{\beta}_B$ would be biased (Heckman, 1979)(Tunali, 1986). As a consequence, the differences in the returns to worker's characteristics in the calculation of wage differences decomposition will be affected by the unobserved characteristics of the sorting algorithm. Hence, the evidence of wage differences might only be the effects of an unobserved characteristics in the participation choice and selection of workers into different sectors.

One possible approach to deal with the issue of selectivity is to jointly estimate the

earning equation for graduates earning together with the participation decision and sectoral choice. This approach can be implemented in two stages where the presence of selection bias due to participation decision and sectoral choice is commonly addressed by including an additional regressor in the wage equation which corrects the estimates (see Heckman (1979) andYavuzoglua et. al. (2008)). In the first stage an equation is specified for a person's decision whether to participate in the labour market, and whether to work in the public sector or private sector:

Let ζ^* and η^* are the latent variables identifying, respectively, participation in the labour force and choosing to work in the public sector. B and Z are vector parameters of individual characteristics that are supposed to predict the decision to participate in the labour market and choosing to work in the public sector respectively. The participation and working in the public sector can be determined by the following two equations:

$$\zeta^* = B_i'\theta + \upsilon \text{ where } \zeta = 1 \text{ if } W^* > W^R \tag{3.5}$$

$$\eta^* = Z_i'\vartheta + \nu \text{ where } \eta = 1 \text{ if } W_A^R > W_B^R \tag{3.6}$$

where W^R is the minimum reservation price and W^* is the offered wage. We make the assumption that: $E(\upsilon) = E(\nu) = 0$ and $E(\upsilon, \nu) = \sigma_{jj'}$ with joint density of υ, ν is $h(\upsilon, \nu)$. Obviously, η can only be observed if $\zeta = 1$. The relationship between two processes ζ^* and η^* is independent if the error correlation term $\rho_{\upsilon,\nu} = 0$, indicating no connection between choosing public sector and choosing to work. Our data shows that the correlation term is very small and not significantly different from zero (-0.001). For the case when the correlation term is not significant, the estimated inverse Mills ratio for public sector is given by

$$\lambda_{A1} = \varphi(B'\hat{\theta})\Phi(B'\hat{\theta})$$
$$\lambda_{A2} = \varphi(Z'\hat{\vartheta})\Phi(Z'\hat{\vartheta})$$

Similarly for the private sector, it is given as:

$$\lambda_{A1} = \varphi(B'\hat{\theta})\Phi(B'\hat{\theta})$$
$$\lambda_{A2} = \varphi(Z'\hat{\vartheta})\Phi(-Z'\hat{\vartheta})$$

where the inverse Mills ratio λ_{kj} for participation and sectoral choice $k = \zeta, \eta$, and for public and private employment $j = 1, 2$, with φ the normal density function, and Φ the cumulative normal distribution function (Colella, 2014). Note that the estimated inverse Mills ratio for participation decision $\lambda_{A1}, \lambda_{B1}$ are same for both public and private sector because their wages are observed only for those who are employed.

The above correction for sample selection will absorb the unobserved productivity related attributes due to selection; if this is not taken into account, the unobserved productivity related attributes would then be absorbed in the unexplained portion which would then exaggerate the conjecture towards discrimination. However, the specification depends on identification assumption where the employment and sectoral decisions each must contain at least one variable that is not in the wage equation.

For identification in labour force participation, many studies used the number of children as identification strategy (Heitmueller, 2004) which cannot be applied in

our case, since we are observing male and female graduates who have invested in education to increase their human capital in order to gain employment and earning. Moreover, our sample graduates are rather homogenous among youth, and the incidence of having a child would be very little. Instead, we observe graduates who have some part time working experience during their study (i.e. semester break temporary jobs or part time jobs while studying) and we found that those who have some working experience by the time they graduated are more likely to be employed regardless of the quality of the job they had. Their part time job during study is however do not affect their subsequent job in the wage equation and thus making this variable fit to be used as identification.

On the hand, identification in the sectoral decision is more complicated and depends on country specific criteria. In the case of Malaysia, we would expect increased participation in the public sector labour market among graduates whose parents are or have worked with the public sector. Since we do not observed parent's occupation, instead, we observe graduates who are already attached with a public sector employer. They are sponsored by these employers[1] with the expectation that after study they return to work at the said employers. These graduates have obvious tendency towards working with the sponsoring public sector employers. Thus, we use this information as the identification strategy for sectoral choice.

Given the above construct, consistent estimate can be achieved. First, the participation and sectoral choice are estimated to obtain the inverse Mills ratio. Assuming normal distribution of the error term, equation 3.5 can be estimated by the Maximum Likelihood (MLE). Then the sample selection corrections factors are constructed and are used to estimate equation 3.1 for public/private (two equations) via ordinal probit, including the inverse Mills ratio as additional regressor. The inverse

[1]Department of Public Services, the Ministry of Education, the Ministry of Health, and public universities.

Mills ratio in equation 3.1 can be included into the wage equations.

$$W_{pub} = X'_{pub}\beta + \sigma_{11}\rho_{1\nu}\lambda_{A1} + \sigma_{11}\rho_{1v}\lambda_{A2} + \epsilon_A$$
$$W_{pri} = X'_{pri}\beta + \sigma_{22}\rho_{2\nu}\lambda_{B1} + \sigma_{22}\rho_{2v}\lambda_{B2} + \epsilon_B$$

By including the selection term, the wage decomposition can be re-written as such

$$\begin{aligned}\bar{W}_A - \bar{W}_B =&(\bar{X}_A - \bar{X}_B)\hat{\beta}^* + \{\bar{X}_A(\hat{\beta}_A - \hat{\beta}^*) - \bar{X}_B(\hat{\beta}_B - \hat{\beta}^*)\} \\ &+ \left[\hat{\sigma}_{11}(\hat{\rho}_{1\nu}\hat{\lambda}_{A1} + \hat{\rho}_{1v}\hat{\lambda}_{A2}) - \hat{\sigma}_{22}(\hat{\rho}_{2\nu}\hat{\lambda}_{B1} + \hat{\rho}_{2v}\hat{\lambda}_{B2})\right]\end{aligned}$$

Note that public sector may tend to compress the distribution of wages among its employees, while wages in the private sector vary quite considerably. Intuitively, the decomposition should be able to compare the difference of wages at each possible levels of income, hence yield the development of quantile regression wage differentials (see Melly (2005) Disney and Gosling (2008)(Mata and Machado, 2005)). We do not address the issue in this paper due to the limitation in the income observed in categorical form and not in linear form.

3.5 Empirical results.

The primary aim of this chapter is firstly to examine inter-sectoral wage differential in the public and private sector labour market among fresh graduates. This chapter also seeks to investigate potential evidence of gender and ethnic pay gap after controlling for educational and social background. Wage differentials are calculated after controlling for graduates academic ability (CGPA) and English-language skill ability; courses of study; social background such as gender, race, and family income; and job characteristics. The results will be discussed in the following sections.

3.5.1 Public-private wage differentials.

The first stage of analysis involves the double selection process of estimating probit models on participation decision and sectoral choice. These estimates are used to construct the correction for selectivity issues. The correlation coefficient of residuals from both models is $\rho = -0.0135$ showing weak relationship in the simultaneity in the estimation of participation and sectoral choice. Nonetheless, patterns related to the employment status and choosing to work in the public sector are discussed. Results are shown in Table 3.4 in terms of marginal effects. The sample size for the employment model is 69,995 and for the sectoral choice model is 35,669.

Academic achievement significantly increases the probability of obtaining higher earning. Graduates with higher CGPA are more likely to be employed and choose to work in the public sector. The magnitude of CGPA's contribution towards employment is found to be similar to the magnitude to increase public sector employment.

Table 3.4: Estimation results of participation choice and public sector employment (marginal effects).

	(1) Employed		(2) Public sector	
	Coef.	s.e.	Coef.	s.e.
CGPA	0.105***	(0.0143)	0.108***	(0.0307)
Arts/SocSc	-0.176***	(0.0456)	0.784***	(0.101)
Transport	0.408***	(0.0938)	0.198	(0.187)
Administration	0.208***	(0.0452)	0.412***	(0.102)
Management	0.0626	(0.0434)	0.580***	(0.0982)
Economy	0.00316	(0.0521)	0.492***	(0.115)
Accountancy	0.377***	(0.0453)	-0.00732	(0.105)
Marketing	-0.0555	(0.0535)	0.295*	(0.126)
Finance	0.0898	(0.0463)	0.266*	(0.106)
Journalism	-0.0341	(0.0509)	0.411***	(0.111)
Islamic	0.121*	(0.0579)	0.921***	(0.112)
Food/hospitality	0.103	(0.0532)	0.274*	(0.121)
Arts	-0.171***	(0.0506)	0.196	(0.115)
Pure science	-0.170**	(0.0560)	0.872***	(0.115)
Applied science	-0.150***	(0.0450)	0.646***	(0.101)
Pharmacy	-0.484***	(0.0757)	1.799***	(0.146)
Medical	0.526***	(0.0529)	2.537***	(0.108)
Dentistry	-0.330**	(0.105)	3.001***	(0.247)
Nurse	-0.0126	(0.0546)	0.348**	(0.118)
Environment	-0.0646	(0.0530)	0.656***	(0.114)
Sports	-0.222**	(0.0822)	0.608***	(0.166)
Engineering	0.0622	(0.0418)	-0.0563	(0.0968)
CompSci	0.197***	(0.0445)	0.277**	(0.100)
Education	-0.349***	(0.0453)	0.985***	(0.100)
Male	0.0623***	(0.0107)	-0.0871***	(0.0220)
Age	0.0978***	(0.00499)	0.0737***	(0.0105)
Malay	-0.00247	(0.0164)	0.101**	(0.0338)
Chinese	0.275***	(0.0190)	-0.255***	(0.0400)
RM 501 - RM 1000	0.0882***	(0.0213)	-0.0234	(0.0458)
RM 1001 - RM 1500	0.145***	(0.0219)	0.0375	(0.0466)
RM 1501 - RM 2000	0.200***	(0.0226)	0.00658	(0.0483)
RM 2001 - RM 2500	0.184***	(0.0240)	0.0432	(0.0508)
RM 2501 - RM 3000	0.175***	(0.0227)	0.0347	(0.0486)
RM 3001 - RM 5000	0.141***	(0.0224)	0.0489	(0.0479)
> RM 5000	0.150***	(0.0242)	0.0638	(0.0505)
Urban	0.300***	(0.0107)	-0.114***	(0.0214)
Experience[a]	0.278***	(0.0103)		

Full time			-0.443***	(0.0264)
Permanent			-0.544***	(0.0238)
Professional			0.380***	(0.0251)
Sponsored[b]			0.605***	(0.0391)
Constant	-3.082***	(0.140)	-3.488***	(0.302)
ρ	0-.0135*			
Observations	69995		35669	

Standard errors in parentheses
(a, b) are identifications for employment and sectoral choice, respectively.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The patterns of courses of study are discussed using Law as the base level. Medical, Transport, Accountancy, and Computer Science graduates are much more likely to be employed. With the exception of Medical, all other science graduates are less likely to participate in the labour market. Indeed, Pharmacy and Dentistry are among the least likely to be employed - at par with Education. The coefficients for the Business subjects[2] are not as severe as the Sciences graduates[3]. In choosing job sector, Science graduates show more tendency towards public sector employment while the reverse is observed among Technical courses (i.e. Engineering and Computer Science) and Business subjects. Unsurprisingly Education graduates are also more likely to choose public sector due to the consistent demand for teachers in public schools. Graduates who took Business subjects have moderate coefficient except Accountancy which shows negative coefficient towards choosing public sector employment. Arts & Social Science graduates and Arts graduates are less likely to be employed, but they are more likely to choose public sector.

Male graduates are more likely to be employed, but female graduates are more likely to work in the public sector. Slightly older graduates are more likely to be employed and choose to work in the public sector. Using other ethnic group as base,

[2]Administration, Management, Economy, Accountancy, Marketing, and Finance.
[3]Pure science, Applied science, Pharmacy, Dentistry, Nurse, Environment, and Sports.

Malay coefficient is not significantly different than the other ethnic in their labour market participation but Malays are more likely to choose public sector employment. Chinese is more likely to be employed, but less likely to work in the public sector compared to the other ethnic group. Higher family income is associated with greater probability to be employed. The magnitude is especially high among graduates with moderate family income (RM1,500 - RM3,000). However, family income does not affect the probability to choose public sector employment. Originating from an urban state increases graduate's employment probability due to the availability of suitable jobs offered in the urban states - but urban graduates are less likely to work in the public sector compared to non-urban graduates. Graduates who attended public university are less likely to be employed but more likely to choose public sector.

Graduates' experience of part time jobs during study is used as the identification for labour force participation estimation. The coefficient is positive and significant, which indicates that these graduates are more employable than those who did not have a part time or temporary job during or before study. Other the other hand, graduates who were employed or attached with a public sector employer[4] before or during their study are naturally more likely to work with the public sector.

Job characteristics such as full time employment, permanent position, and professional jobs are used as controls in the sectoral choice model. Full time employment and permanent position are negatively associated with public sector employment but public sector workers are more likely to have professional jobs.

[4]Department of Public Services, the Ministry of Education, the Ministry of Health, and various higher learning institutions.

Separate public and private wage equations.

The second step involves the estimation of separate wage equation for public and private sector by including the inverse Mills ratio as the correction for selectivity issues. The response variable for the ordinal logit is eight incremental monthly income level observed in Ringgit Malaysia. The marginal effects for the public and private sector wage equations are given in Tables 3.5 and 3.6. The sample size for public sector workers is 3,954 and private sector workers is 24,616. The overall pattern shows that the determinants that led to better occupational category in the previous chapter also lead to higher income. Generally, graduates who performed better academically, have better English proficiency, and took more attractive courses of study are rewarded more. Detailed analysis of earning found that entry level earning between public and private sectors is not significantly different, but men may earn more in the private sector while Malays may earn more in the public sector. Higher earners in the public sector generally have higher CGPA, indicating that graduates with better academic achievement may seek public sector employment for its monetary reward. English language is not an important element in the public sector earning determination. Business subjects are rewarded more in the private sector, while graduates who took Sciences subjects, Arts and Social Sciences may earn more if they work in the public sector. More detailed analysis is further discussed.

Higher academic achievement increases the probability for higher income. For both sectors, graduates with higher CGPA tend to earn more. The mean CGPA for public and private sector workers are (3.40, 3.12) respectively. A one unit increase in CGPA may additively increases public sector worker's earning by 1.14 percentage point to earn between RM1,001 - RM1,500 but decreases private sector worker's earning by 1.9 percentage point for the same income band. Higher CGPA increases the probability for higher earning in the public sector starting from an income level of

RM1,000 but for private sector the positive effect of CGPA is observed at RM2,000. Employers use CGPA to rank candidates and they are more likely to hire graduates with better grades considering academic performance can be easily observed to indicate innate ability, commitment, and potential productive characteristics. The estimation result shows evidence of wage premium among those with higher CGPA, after controlling for other factors in consideration including courses of study.

Local studies on Malaysian graduate unemployment often cited graduate's inability to use English proficiently lead to unsuccessful job interviews (Devadason et. al., 2010),(Ismail, 2011). This is especially true among graduates from public universities and rural female Malay graduates (Ismail, 2011). Apart from the interview process to assess graduate's English proficiency, MUET score can also be used during a screening process even before the interview take place. Much as the same way the CGPA is used to indicate potential ability, MUET score is used to demonstrate English language ability. The results show that MUET is only positively associated with earning in the private sector, in view of the fact that English is the main language in business and private practices and hence requirement for good English proficiency is an essential factor during recruitment. However, MUET is only significant between the middle score (Band 3 - 5) and its positive effect is detected starting at the income level of RM2,000. MUET score is barely significant in the public sector wage equation.

Table 3.5: Estimation results of graduate earnings in the public sector employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CGPA	-0.0250**	-0.0467**	0.0114**	0.0231**	0.0118**	0.00163	0.0161**	0.00775**
Band 2	-0.000563	-0.000999	0.000283	0.000494	0.000233	0.00000419	0.000411	0.000136
Band 3	-0.00540	-0.0100	0.00255	0.00493	0.00241	0.000153	0.00398	0.00142
Band 4	-0.0104	-0.0204	0.00449	0.00993	0.00504	0.000562	0.00774	0.00299
Band 5	-0.0178*	-0.0376	0.00626*	0.0181*	0.00978	0.00181	0.0134	0.00593
Band 6	-0.0133	-0.0268	0.00536	0.0130	0.00675	0.000943	0.00993	0.00404
Arts/SocSc	-0.187	-0.0796	0.0925**	0.0764***	0.0439***	0.0311**	0.0223*	0.000330
Transport	0.0576	-0.00863	-0.0237	-0.0133	-0.00611	-0.00372	-0.00210	-0.0000239
Administration	-0.110	-0.0155	0.0517	0.0353	0.0183	0.0120	0.00772	0.0000988
Management	-0.167	-0.0560	0.0824*	0.0637**	0.0355***	0.0245***	0.0170**	0.000239*
Economy	-0.177	-0.0669	0.0875**	0.0698**	0.0395***	0.0275**	0.0194**	0.000280*
Accountancy	-0.0728	-0.00391	0.0333	0.0215	0.0108	0.00690	0.00428	0.0000528
Marketing	-0.110	-0.0157	0.0519	0.0355	0.0184	0.0121	0.00777	0.0000996
Finance	-0.0845	-0.00670	0.0390	0.0256	0.0129	0.00836	0.00524	0.0000653
Journalism	-0.157	-0.0459	0.0768*	0.0577**	0.0317**	0.0216**	0.0147**	0.000203*
Islamic	-0.183	-0.0745	0.0906**	0.0737**	0.0421**	0.0296*	0.0211*	0.000309
Food/hospitality	-0.0824	-0.00614	0.0379	0.0248	0.0125	0.00808	0.00506	0.0000629
Arts	-0.0120	0.000681	0.00522	0.00314	0.00150	0.000936	0.000553	0.00000651
Pure science	-0.180	-0.0712	0.0893*	0.0720**	0.0410**	0.0287**	0.0204*	0.000296
Applied science	-0.163	-0.0520	0.0802*	0.0614**	0.0340**	0.0233**	0.0161*	0.000224
Pharmacy	-0.274*	-0.383***	-0.115	0.0819	0.147***	0.196***	0.328***	0.0196
Medical	-0.276*	-0.402***	-0.194***	-0.0683**	-0.0133	0.0358	0.638***	0.279*
Dentistry	-0.276*	-0.402***	-0.193***	-0.0648**	-0.00548	0.0567	0.661***	0.223
Nurse	-0.132	-0.0275	0.0637	0.0453	0.0241*	0.0161	0.0106	0.000140
Environment	-0.180	-0.0702	0.0889**	0.0715***	0.0406***	0.0284***	0.0201**	0.000292*
Sports	-0.194	-0.0909	0.0962*	0.0819**	0.0478*	0.0342*	0.0249	0.000377
Engineering	0.0422	-0.00555	-0.0176	-0.0100	-0.00463	-0.00283	-0.00161	-0.0000185
CompSci	-0.0974	-0.0107	0.0455	0.0305	0.0156	0.0101	0.00644	0.0000814
Education	-0.191	-0.0855	0.0945*	0.0793**	0.0460**	0.0327*	0.0237	0.000354

Male	-0.00866	-0.0162	0.00393	0.00799	0.00408	0.000563	0.00558	0.00268
Age	-0.0193**	-0.0361**	0.00879**	0.0179**	0.00911**	0.00126	0.0125**	0.00599**
Malay	-0.0200***	-0.0374***	0.00909**	0.0185***	0.00943***	0.00130*	0.0129**	0.00619**
Chinese	0.00821	0.0153	-0.00373	-0.00758	-0.00387	-0.000534	-0.00529	-0.00254
Family income								
RM 501 - RM 1000	-0.00612	-0.00854	0.00374	0.00442	0.00171	-0.000502	0.00432	0.000972
RM 1001 - RM 1500	-0.0165	-0.0255	0.00956	0.0130	0.00545	-0.000911	0.0119	0.00307
RM 1501 - RM 2000	-0.0277	-0.0477*	0.0143	0.0239	0.0110*	-0.000352	0.0202	0.00625*
RM 2001 - RM 2500	-0.0287	-0.0500*	0.0146	0.0251*	0.0116*	-0.000225	0.0210	0.00661*
RM 2501 - RM 3000	-0.0284*	-0.0494*	0.0145	0.0248*	0.0115*	-0.000258	0.0208*	0.00652*
RM 3001 - RM 5000	-0.0240	-0.0398*	0.0130	0.0201*	0.00893*	-0.000690	0.0174	0.00505*
> RM 5000	-0.0407**	-0.0811***	0.0156*	0.0399***	0.0208***	0.00276	0.0305**	0.0123***
Urban	0.000457	0.000853	-0.000207	-0.000422	-0.000215	-0.0000297	-0.000294	-0.000141
Full time	-0.00824	-0.0154	0.00374	0.00761	0.00388	0.000536	0.00531	0.00255
Permanent	-0.0158	-0.0294	0.00716	0.0146	0.00743	0.00103	0.0102	0.00488
Professional	-0.109***	-0.204***	0.0497***	0.101***	0.0516***	0.00712*	0.0705***	0.0339***
λ_A	-0.0198	-0.0371	0.00901	0.0183	0.00935	0.00129	0.0128	0.00614
λ_B	-0.162***	-0.303***	0.0737***	0.150***	0.0765***	0.0106*	0.105***	0.0502***
Observations	3954	3954	3954	3954	3954	3954	3954	3954

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.6: Estimation results of graduate earnings in the private sector employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CGPA	-0.0157***	-0.0295***	-0.0199***	-0.00828***	0.0222***	0.0319***	0.0162***	0.00315***
Band 2	0.000428	0.000790	0.000515	0.000146	-0.000672	-0.000800	-0.000346	-0.0000615
Band 3	-0.00680***	-0.0131***	-0.00883***	-0.00331***	0.0106***	0.0139***	0.00634***	0.00115***
Band 4	-0.0138***	-0.0278***	-0.0194***	-0.00905***	0.0211***	0.0310***	0.0151***	0.00282***
Band 5	-0.0188***	-0.0391***	-0.0279***	-0.0150***	0.0278***	0.0452***	0.0232***	0.00447***
Band 6	0.00224	0.00410	0.00265	0.000693	-0.00352	-0.00411	-0.00175	-0.000310
Arts/SocSc	-0.0795***	-0.117***	-0.0572***	0.0237**	0.106***	0.0859***	0.0322***	0.00554***
Transport	-0.0313	-0.0390	-0.0117	0.0203	0.0352	0.0198	0.00580	0.000901
Administration	-0.0631***	-0.0871***	-0.0369***	0.0293***	0.0805***	0.0557***	0.0186***	0.00304***
Management	-0.0735***	-0.105***	-0.0490***	0.0270***	0.0967***	0.0734***	0.0262***	0.00440***
Economy	-0.0792***	-0.116***	-0.0568***	0.0240***	0.106***	0.0853***	0.0319***	0.00547***
Accountancy	-0.0157	-0.0187	-0.00456	0.0110	0.0165	0.00862	0.00243	0.000372
Marketing	-0.0869***	-0.132***	-0.0687***	0.0171*	0.117***	0.104***	0.0419***	0.00746***
Finance	-0.0790***	-0.116***	-0.0565***	0.0241***	0.105***	0.0849***	0.0317***	0.00543***
Journalism	-0.0868***	-0.132***	-0.0685***	0.0173*	0.117***	0.104***	0.0416***	0.00742***
Islamic	0.0287	0.0300	0.00276	-0.0220	-0.0249	-0.0112	-0.00294	-0.000441
Food/hospitality	-0.0335***	-0.0421***	-0.0131***	0.0215**	0.0381***	0.0217***	0.00640***	0.000997***
Arts	-0.0736***	-0.105***	-0.0491***	0.0270***	0.0968***	0.0736***	0.0263***	0.00442***
Pure science	-0.0892***	-0.137***	-0.0727***	0.0143	0.120***	0.111***	0.0457***	0.00826***
Applied science	-0.0899***	-0.139***	-0.0739***	0.0135	0.121***	0.112***	0.0468***	0.00849***
Pharmacy	-0.0457	-0.0595	-0.0212	0.0266**	0.0545	0.0333	0.0102	0.00162
Medical	-0.00116	-0.00133	-0.000256	0.000852	0.00114	0.000566	0.000155	0.0000235
Dentistry	0.0145	0.0158	0.00220	-0.0109	-0.0133	-0.00626	-0.00167	-0.000252
Nurse	-0.0846***	-0.127***	-0.0649***	0.0196*	0.114***	0.0979***	0.0384***	0.00677***
Environment	-0.0805***	-0.119***	-0.0587***	0.0230**	0.108***	0.0882***	0.0333***	0.00575***
Sports	-0.0881***	-0.135***	-0.0708***	0.0157	0.119***	0.107***	0.0438***	0.00787**
Engineering	-0.0945***	-0.150***	-0.0827***	0.00629	0.127***	0.127***	0.0562***	0.0106***
CompSci	-0.0836***	-0.125***	-0.0634***	0.0205***	0.112***	0.0955***	0.0372***	0.00651***
Education	-0.0813***	-0.120***	-0.0599***	0.0224*	0.109***	0.0901***	0.0343***	0.00594**

Male	-0.00756***	-0.0142***	-0.00955***	-0.00398***	0.0107***	0.0153***	0.00777***	0.00151***
Age	0.00990***	0.0186***	0.0125***	0.00521***	-0.0140***	-0.0201***	-0.0102***	-0.00198***
Malay	0.00630***	0.0118***	0.00796***	0.00332***	-0.00888***	-0.0128***	-0.00648***	-0.00126***
Chinese	0.00347	0.00652	0.00439	0.00183	-0.00490	-0.00705	-0.00357	-0.000695
Family income								
RM 501 - RM 1000	0.0101***	0.0196***	0.0134***	0.00561**	-0.0151***	-0.0211***	-0.0105***	-0.00202**
RM 1001 - RM 1500	0.0115***	0.0221***	0.0151**	0.00607*	-0.0172***	-0.0236**	-0.0117**	-0.00224**
RM 1501 - RM 2000	0.0114**	0.0219**	0.0149**	0.00602*	-0.0170**	-0.0234**	-0.0115*	-0.00221*
RM 2001 - RM 2500	0.00775*	0.0152*	0.0105*	0.00469	-0.0115*	-0.0166	-0.00839	-0.00163
RM 2501 - RM 3000	0.00436	0.00871	0.00612	0.00297	-0.00642	-0.00972	-0.00503	-0.000988
RM 3001 - RM 5000	-0.00337	-0.00707	-0.00514	-0.00297	0.00478	0.00827	0.00458	0.000930
> RM 5000	-0.00964**	-0.0212**	-0.0159***	-0.0105***	0.0129**	0.0258***	0.0153***	0.00323***
Urban	0.0179**	0.0336**	0.0226**	0.00942**	-0.0252**	-0.0363**	-0.0184**	-0.00358**
Full time	-0.0706***	-0.133***	-0.0892***	-0.0372***	0.0996***	0.143***	0.0726***	0.0141***
Permanent	-0.0254***	-0.0477***	-0.0321***	-0.0134***	0.0358***	0.0515***	0.0261***	0.00508***
Professional	-0.0387***	-0.0726***	-0.0489***	-0.0204***	0.0545***	0.0784***	0.0398***	0.00774***
λ_A	0.180***	0.337***	0.227***	0.0945***	-0.253***	-0.364***	-0.185***	-0.0359***
λ_B	-0.00951	-0.0178	-0.0120	-0.00500	0.0134	0.0193	0.00978	0.00190
Observations	24616	24616	24616	24616	24616	24616	24616	24616

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Male dummy coefficient is non-significant in the public sector wage equation, but is positively associated with higher earnings in the private sector. The finding is consistent with the public sector's practice in maximising welfare, particularly in providing similar wage structure regardless of gender. However, we do keep in mind that male wage premium in the private sector may not be the evidence of discrimination against women, instead, men higher earning in the private sector may be due to their choice of more specialised and technical courses of study which translate into higher earning because private sectors reward productivity. Female graduates, on the other hand, who are generally associated with courses of study that are related to low paying jobs - may earn better if they work in the public sector instead of private sector. We will investigate the matter in greater details in the subsequent analysis.

Slightly older graduates are associated with higher earning in the public sector, but slightly younger graduates are associated with higher earning in the private sector. Compared to the other ethnic group, Malays tend to earn more in the public sector but tend to earn less in the private sector. Chinese coefficient in both sectors are non-significant. Higher family income is barely significant in the public sector wage equation, except for the highest family income group (>RM5,000) where graduates from this family income level tend to earn higher in the public sector. The result for family income is more mixed in the case of private sector wage equation. Using the lowest family income level as the base, only the highest family income level (>RM5,000) tend to earn more, while slightly higher family income from low to mid income level (between RM501 - RM2,000) tend to earn less. The result may show evidence that graduates with the lowest family income may perform well to increase their intergenerational mobility.

Graduate originated from the urban states tend to earn less than the non-urban

graduates in the private sector indicating wage premium for non-urban who are willing to migrate. The coefficient is non-significant in the public sector wage equation. Job characteristics such as full time employment and permanent position are only significantly related to higher earning in the private sector, and non-significant in the public sector considering public sector's entry wage does not vary greatly. Graduates with professional jobs tend to earn higher in both sectors. Finally, the selection into employment is significant in the private sector wage equation, while the selection into sectoral choice is significant in the public sector wage equation.

Coefficients for courses of study is given in the appendix on Table 3.16 and Table 3.17. Using Law as the base category for courses of study, Arts and Social Science course increases graduate's probability for higher earning by 9.2 percentage point in the public sector, while decreasing it by 5.7 percentage point in the private sector. The positive effect of Art and Social Science course is observed starting from RM1,500 for public sector employment, RM2,000 for private sector employment. However, the magnitude for higher income is large in the private sector for these graduates. The overall results for other courses of study are quite mixed but courses such as Management, Economy, Journalism, and Environment show similar pattern. Several Business subjects (i.e. Management, Economy, Marketing, and Finance) show larger magnitude towards higher earning in the private sector. Islamic study is only significant in the public sector. The effect of Pure and Applied Science courses gave quite similar inter-sectoral pattern but the private sector workers have higher tendency for higher earning. Pharmacy, Medical and Dentistry courses are only significant in the public sector - which is not surprising because large majority of them obtained jobs in the public sector. On the contrary, Nurse is only significant in the private sector.

Decomposing public-private wage differential.

Using the results of the public and private wage equation presented earlier, the inter-sectoral wage difference can be consistently estimated. Apart from calculating the mean wage difference between public and private sector and decomposing them into several components, more meaningful result can be discussed based on the contribution of explanatory variable towards the wage difference. However, the computation of wage difference in based on the assumption of cardinality of the graduate's wage. This is because the computation of Oaxaca-Blinder (OB) decomposition in a non-linear standard packages[5] are only limited to the computation of the average differences in the probability of earning especially in the case of an ordinal variable, restricting the computation of contribution from other explanatory variables. The available packages also lack the ability to adjust for selectivity issue. Therefore, we make assumption of the cardinality of the our response variable and report the public-private decomposition analysis in Table 3.7. The assumption of cardinality is supported by the fact that the wage indicator has cardinal meaning: the change from the lowest category 1(<RM500) to the second lowest category 2(RM501 - RM1,000) has equivalent magnitude to the change from any of the subsequent wage indicator (a difference of RM500). The mid point within each category has the same interval for all categories[6].

The sample size n =28,570 is composed of both the public and private sector workers. Column 2 of Table 3.7 reports the OB decomposition without considering the issue of selectivity due to the sorting of graduates into employment and sectoral choice, while column 4 reports the decomposition result after the adjustment in the wage equation. The difference between the average probabilities between groups

[5] *nldecompose,fairlie*

[6] Analysis based on the wage indicator (i.e. $1, 2, \ldots, 8$) has the same results as analysis based on the wage mid-point (i.e. $750, 1250, \ldots, 5250$).

is computed from the wage equation, and the decomposition method compute part that can be explained by the included variables and part that is due to the difference between group A and B's earning in the regression coefficients. For the **Adjusted** part of the table, the average probabilities obtained by the separate wage equation for public and private sectors are given by 0.635 and 0.763 respectively, with private sector slightly higher by 12 percentage points. The difference (-0.128) composed of the explained and unexplained components - the explained component (-0.176) is the sum of all the contributing coefficients listed under the *Explained* part, while the unexplained component (0.0487) is the sum of all the contributing coefficients listed under the the *Unexplained* part. Out of the total difference of -0.128, 137% of the difference is attributable to the *Explained* part while -38% is attributable to the *Unexplained* part. The sum of contributing factors are larger under the *Explained* part, which signifies that the private sector's higher earning due to their better characteristics such as the choice of courses of study.

The average earning of public sector workers is found to be slightly lower than private sector workers. Our preliminary result has some resemblance with the finding in (Adamchik, 1999) who found that after controlling for characteristics and selection, public sector pay less than private sector, especially among university graduates. However in our case, the difference is not significant, both before and after adjustment for selectivity. Unlike the previous study in Malaysia by Seshan (2013), we cannot conclude the evidence of wage premium among public sector workers in our sample. The result may be due to a homogenous sample of high skilled university graduates who all possess tertiary education. Results for larger population as in Seshan (2013) may give different outcome (evidence for public sector wage premium). Nonetheless, the difference is found to be accounted for by a mixed contribution from the characteristic effects (the explained part) and the unexplained component. Courses effect is negative indicating private sector workers generally possess quali-

fications that have high market value and it is rewarded in the private sectors. The largest contribution towards the explained factor is job characteristics such as full time employment and permanent job level. It is found that the proportion of private sector workers in these occupational type is higher than the public sector but they have lower proportion in professional jobs.

We next discuss the gender disparity in earning.

Table 3.7: Decomposition results for earning differentials in the public and private sector employment.

	(1) Unadjusted Coef.		(2) Adjusted s.e.	
Decomposition				
Public	3.969***	(0.0323)	3.969***	(0.0323)
Private	4.009***	(0.00993)	4.009***	(0.00993)
Difference	-0.0399	(0.0338)	-0.0399	(0.0338)
Explained	-0.0296	(0.0283)		
Unexplained	-0.0103	(0.0243)		
Adjusted				
Public			0.635	(0.374)
Private			0.763***	(0.129)
Difference			-0.128	(0.396)
Explained			-0.176	(0.0941)
Unexplained			0.0487	(0.334)
Explained				
CGPA	0.0660***	(0.00780)	0.0337***	(0.00913)
Muet	0.0184***	(0.00347)	0.00983***	(0.00277)
Courses	0.119***	(0.0182)	-0.00369	(0.0680)
Age	0.0139***	(0.00226)	-0.0147**	(0.00460)
Faminc	0.00150	(0.00251)	0.00984***	(0.00225)
Urban	-0.0126***	(0.00197)	0.0173***	(0.00345)
Full time	-0.160***	(0.00826)	-0.160***	(0.0104)
Permanent	-0.151***	(0.00764)	-0.144***	(0.0122)
Professional	0.0750***	(0.00612)	0.0746***	(0.00692)
Unexplained				
CGPA	-1.243***	(0.201)	-1.850***	(0.242)
Muet	-0.136*	(0.0687)	-0.0305	(0.0680)
Courses	-0.674**	(0.237)	-1.726***	(0.272)
Age	2.111***	(0.450)	-2.102*	(1.040)
Faminc	-0.0198	(0.0658)	-0.106	(0.0756)

Urban	-0.0493***	(0.0135)	-0.0566*	(0.0284)
Full time	-0.242***	(0.0343)	0.245***	(0.0666)
Permanent	0.140***	(0.0193)	0.494***	(0.0422)
Professional	-0.0245	(0.0296)	-0.384***	(0.0522)
Constant	0.127	(0.571)	5.564***	(1.207)
Observations	28570		28570	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.5.2 Gender pay gap.

Male-female wage equation.

In the previous chapter we showed that men and women graduates in our sample have different first destination outcomes which men are found to be associated with better occupational patterns compared to women. Better job category naturally corresponds to higher pay, thus in this section we are investigating the source of difference in men and women's income controlling for various factors. To compute the wage differential between men and women after controlling for their ability, socio-economic status, and job attributes, the first step is to estimate the wage equation separately for men and women. However, the wage equation lead to biased estimates if the selection into employment is not taken into account. This may especially true for women, since women are less likely to choose to participate into employment / labour market, and more likely to choose lower paying job. However, for university graduate we may expect the preference gap may reduce compared to women with no higher education. We would expect women who spend longer time in education would expect higher salary, perhaps similar to men. Since the wage equation for men and especially women depend on some unobserved characteristics that lead them into employment, we first construct a probit model for employment probability to compute the inverse Mills ratio which is then included in wage equation to correct for selection bias.

We discuss briefly the results of separate male-female wage equation. The marginal effects of male and female wage equation is reported in Table 3.18 and 3.19 in the appendix. The sample sizes are $n = 10,532$ for male and $n = 18,038$ for female . Higher academic achievement increases earning for both sexes. The magnitude is however, different - men is rewarded more for each unit increase in CGPA compared to women. Proficiency in English is however only associated with higher earning

among female graduates. For male graduates, MUET score has barely significant effect on earning. The overall pattern of the courses of study show that men generally have higher earning in comparison i.e. the magnitude of coefficient within each course is higher for men than women for higher income groups. Transport, Accountancy, Food & Hospitality courses only increase women's probability to earn higher but are not significant in the male wage equation. Compared to the other ethnic group, only Malay male graduates show significant coefficient towards lower earning. Chinese coefficient in the female wage equation is not significant implying that the ethnicity does not play a role in the case of female wage. Hence, the effect of ethnic group is only prevalent in the case of male graduates. Naturally, better job characteristics are associated with higher earning for both gender groups.

Decomposition of gender pay gap.

Based on the above results, the decompositions of gender pay gap can be computed and are reported in Table 3.8. The first three columns display the results for gender pay gap in the pooled sample (column 1), among public sector workers (column 2), and among private sector workers (column 3). The unadjusted wage gap show that male graduates consistently earn more in all the three model specifications. After adjusting for participation into employment, only the private sector shows persistent wage gap (men earn significantly higher by 92 percentage point in the private sector with the difference due to the explained and unexplained components is 31.4% and 68.6% respectively). The gap is largely due to the unexplained portion of the wage differential, suggesting potential evidence of discrimination in the private wage setting towards female graduates. Male significant higher earning in the private sector can be attributable to their higher MUET score, the choice of courses of study, and better job characteristics (men have higher proportion in full time employment, permanent position, and professional jobs). The unexplained portion is due to the

fact that women generally have higher CGPA than men. However, we can argue that male earn their wage premium by taking more attractive courses of study even if they scored lower academic achievement in those courses. Conversely, female superior academic achievement did not contribute for better remuneration in the case where they took less attractive courses of study. Furthermore, we have established in the private sector wage equation that the MUET score is a significant factor towards higher earning. Thus, women's inferior MUET score becomes a penalty for them to earn higher earning in the private sector labour market.

Table 3.8: Decomposition results for gender pay gap in the public and private sectors.

	(1) Pooled	(2) Public	(3) Private	(4) Male	(5) Female
Decomposition					
Group_1	(M) 4.415***	(M) 4.386***	(M) 4.418***	(Pub) 4.386***	(Pub) 3.788***
	(0.0160)	(0.0604)	(0.0163)	(0.0604)	(0.0377)
Group_2	(F) 3.764***	(F) 3.788***	(F) 3.760***	(Pri) 4.418***	(Pri) 3.760***
	(0.0117)	(0.0377)	(0.0121)	(0.0163)	(0.0121)
Difference	0.651***	0.598***	0.659***	-0.0329	0.0282
	(0.0198)	(0.0712)	(0.0203)	(0.0626)	(0.0396)
Adjusted					
Group_1	(M) 2.237***	(M) 3.530***	(M) 2.110***	(Pub) 3.530***	(Pub) 3.201***
	(0.132)	(0.409)	(0.139)	(0.409)	(0.264)
Group_2	(F) 1.442***	(F) 3.201***	(F) 1.195***	(Pri) 2.110***	(Pri) 1.195***
	(0.0965)	(0.264)	(0.102)	(0.139)	(0.102)
Difference	0.795***	0.328	0.915***	1.420**	2.007***
	(0.163)	(0.487)	(0.173)	(0.432)	(0.283)
Explained	0.276***	0.374***	0.287***	-0.0759	-0.0267
	(0.0128)	(0.0590)	(0.0133)	(0.0513)	(0.0267)
Unexplained	0.519**	-0.0457	0.628***	1.496***	2.033***
	(0.163)	(0.478)	(0.172)	(0.419)	(0.280)
Explained					
CGPA	-0.0291***	0.000647	-0.0322***	0.0760***	0.0296***
	(0.00258)	(0.00146)	(0.00281)	(0.0196)	(0.00784)
Muet	0.0158***	0.00578	0.0159***	0.0112	0.0104**
	(0.00185)	(0.00709)	(0.00190)	(0.00686)	(0.00330)
Courses	0.117***	0.195***	0.145***	0.0919*	0.112***
	(0.00600)	(0.0336)	(0.00683)	(0.0400)	(0.0170)
Age	-0.0182***	0.00664	-0.0234***	-0.0170**	-0.00849*

	(0.00207)	(0.00416)	(0.00255)	(0.00558)	(0.00335)
Faminc	0.00995***	0.00490	0.0116***	0.00829	0.0109***
	(0.00196)	(0.00397)	(0.00222)	(0.00490)	(0.00262)
Urban	-0.00875***	-0.00132	-0.00901***	0.0163**	0.0114***
	(0.00189)	(0.00172)	(0.00216)	(0.00555)	(0.00316)
Full time	0.0337***	0.0425**	0.0229***	-0.176***	-0.150***
	(0.00514)	(0.0142)	(0.00532)	(0.0173)	(0.00925)
Permanent	0.0424***	0.0889***	0.0303***	-0.105***	-0.152***
	(0.00357)	(0.0147)	(0.00326)	(0.0115)	(0.00922)
Professional	0.113***	0.0312**	0.126***	0.0178	0.110***
	(0.00491)	(0.0104)	(0.00548)	(0.00914)	(0.00787)
Unexplained					
CGPA	0.552***	0.0406	0.554***	-0.997*	-0.470
	(0.136)	(0.464)	(0.141)	(0.395)	(0.251)
Muet	-0.158**	0.0875	-0.199***	0.138	-0.137
	(0.0559)	(0.135)	(0.0604)	(0.123)	(0.0827)
Courses	-0.169	0.311	-0.199	-0.0907	-0.670*
	(0.123)	(0.503)	(0.127)	(0.433)	(0.282)
Age	-0.429	-1.929	0.103	3.951***	5.945***
	(0.443)	(1.235)	(0.471)	(1.100)	(0.728)
Faminc	0.0920	0.0270	0.113	0.0973	0.187*
	(0.0549)	(0.140)	(0.0588)	(0.128)	(0.0818)
Urban	-0.000812	-0.0330	0.00747	0.0690	0.107***
	(0.0179)	(0.0445)	(0.0194)	(0.0450)	(0.0283)
Full time	0.242***	0.287***	0.210***	-0.142*	-0.264***
	(0.0353)	(0.0623)	(0.0407)	(0.0694)	(0.0390)
Permanent	-0.0378*	-0.0569	-0.0165	0.138***	0.167***
	(0.0149)	(0.0305)	(0.0166)	(0.0375)	(0.0223)
Professional	0.0146	-0.0761	0.0306	-0.0915	0.0179
	(0.0224)	(0.0687)	(0.0238)	(0.0646)	(0.0322)
Constant	0.412	1.296	0.0230	-1.576	-2.849***
	(0.462)	(1.328)	(0.492)	(1.189)	(0.770)
Observations	28570	3954	24616	10532	18038

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Column 4 and 5 of Table 3.8 shows the result for public-private wage differential within each gender group. There is evidence of public pay premium for both gender, with public pay premium among female graduates is larger than male. Courses of study and job characteristics play major role in the explained part of the wage differential. However, major contribution towards the pay premium is found to be

largely accounted for by the unexplained part of the wage differential which may due to some unmeasured characteristics that are not included in the current model. It may also due to some unexplained wage premium among public sector workers, probably public sector's better treatment towards low quality graduates.

Gender pay gap within different industry.

In the previous chapter we showed women are found to be under-represented in heavily industrialised sectors associated with high skilled and high paying jobs (i.e. Construction, Manufacturing, Scientific / Technical, IT / Communication, and Electric / Gas / Steam). However, we are unable to conclude if women's under-representation in those sectors is due to taste or discrimination. In this section we are going to investigate if women who take up jobs in these industries face discrimination in terms of lower wage than men. Perhaps if women earn significantly lower after controlling for SES and education, any evidence of a gender wage gap may become an explanation on why women may avoid seeking jobs in these sectors if their expected wage does not compensate for their human capital in the same way as men.

The decomposition results for the gender differences within each industry are shown in Tables 3.9-3.11. The adjusted decomposition results show that the gender gap persists in Manufacturing, Food & Accommodation, and Defence. The large gender gap in the Manufacturing industry where men earn significantly higher than women shows that women employment and earning prospects in the Manufacturing industry has not improved even when they have a degree qualification. Indeed, after controlling for educational background and achievement, as well as graduates' background and job characteristics, men-women pay gap in the Manufacturing industry is still largely accounted for by the unexplained factor (96% of the total unexplained part). Similar result is found in the Defence sector, where men have more preference for higher earning. In contrast, women tend to earn more than men in the Food & Accommodation. This industry is the third lowest paying industry in our sample, while Manufacturing is the seventh higher paying industry.

Table 3.9: Decomposition results for gender pay gap within each industry.

	(1) Agriculture / Forestry / Fishery	(2) Mining / Quarry	(3) Manufacturing	(4) Electric / Gas / Steam	(5) Water / Sewerage	(6) Construction	(7) Wholesale
Decomposition							
Male	3.657***	5.690***	4.829***	4.811***	4.365***	4.835***	3.184***
	(0.114)	(0.155)	(0.0358)	(0.0957)	(0.213)	(0.0375)	(0.0814)
Female	3.250***	4.810***	4.134***	4.445***	3.863***	4.316***	2.640***
	(0.0960)	(0.182)	(0.0348)	(0.119)	(0.153)	(0.0356)	(0.0416)
Difference	0.407**	0.880***	0.695***	0.366*	0.502	0.519***	0.545***
	(0.149)	(0.239)	(0.0500)	(0.152)	(0.262)	(0.0517)	(0.0914)
Adjusted							
Male	2.122	4.005**	3.049***	3.022***	3.001	1.727***	-0.888
	(1.092)	(1.414)	(0.300)	(0.897)	(2.684)	(0.375)	(0.696)
Female	0.960	3.115	1.022***	2.224	1.189	0.755*	-1.056**
	(0.899)	(1.712)	(0.271)	(1.177)	(1.322)	(0.362)	(0.385)
Difference	1.161	0.890	2.027***	0.798	1.812	0.972	0.168
	(1.415)	(2.220)	(0.405)	(1.480)	(2.992)	(0.521)	(0.796)
Explained	-0.0880	0.624**	0.364***	0.369**	0.292	0.140***	0.0843
	(0.113)	(0.208)	(0.0352)	(0.131)	(0.255)	(0.0329)	(0.0593)
Unexplained	1.249	0.266	1.662***	0.429	1.521	0.832	0.0841
	(1.427)	(2.199)	(0.404)	(1.483)	(3.094)	(0.520)	(0.784)
Observations	509	166	2987	477	125	2473	1224

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.10: Decomposition results for gender pay gap within each industry.

	(8) Transport / Storage	(9) Food / Accom.	(10) IT / Comm.	(11) Finance / Insurance	(12) Real estate	(13) Scientific / Technical	(14) Admin / Support
Decomposition							
Male	4.083***	2.822***	4.781***	4.716***	4.137***	5.185***	3.598***
	(0.104)	(0.0683)	(0.0469)	(0.0484)	(0.122)	(0.0386)	(0.0811)
Female	3.926***	2.864***	4.324***	4.350***	3.812***	4.676***	3.328***
	(0.0662)	(0.0438)	(0.0411)	(0.0324)	(0.0781)	(0.0364)	(0.0486)
Difference	0.157	-0.0420	0.458***	0.366***	0.325*	0.510***	0.270**
	(0.124)	(0.0812)	(0.0623)	(0.0583)	(0.144)	(0.0531)	(0.0945)
Adjusted							
Male	1.644	-2.151**	2.821***	3.076***	0.610	3.657***	2.195*
	(1.116)	(0.716)	(0.442)	(0.462)	(1.490)	(0.326)	(0.899)
Female	0.464	0.607	2.403***	2.516***	-1.330	3.359***	0.657
	(0.621)	(0.401)	(0.384)	(0.313)	(0.750)	(0.280)	(0.550)
Difference	1.180	-2.757***	0.418	0.560	1.940	0.299	1.539
	(1.277)	(0.821)	(0.586)	(0.558)	(1.668)	(0.430)	(1.054)
Explained	-0.0326	-0.106	0.220***	0.135***	-0.00150	0.212***	0.113
	(0.0760)	(0.0565)	(0.0404)	(0.0361)	(0.0959)	(0.0374)	(0.0596)
Unexplained	1.213	-2.651**	0.199	0.425	1.942	0.0863	1.426
	(1.282)	(0.826)	(0.582)	(0.556)	(1.664)	(0.429)	(1.052)
Observations	583	1193	2059	2521	452	3750	1093

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.11: Decomposition results for gender pay gap within each industry.

	(15) Defence	(16) Education	(17) Social work	(18) Arts	(19) Other services	(20) Domestic	(21) Extra-territory
Decomposition							
Male	3.828***	3.196***	5.388***	3.484***	3.842***	3.266***	4.742***
	(0.126)	(0.0562)	(0.115)	(0.108)	(0.0513)	(0.155)	(0.386)
Female	3.384***	2.808***	4.575***	3.505***	3.426***	2.867***	3.500***
	(0.149)	(0.0259)	(0.0784)	(0.0846)	(0.0292)	(0.0623)	(0.297)
Difference	0.444*	0.389***	0.814***	-0.0210	0.416***	0.399*	1.242*
	(0.195)	(0.0619)	(0.139)	(0.137)	(0.0590)	(0.167)	(0.487)
Adjusted							
Male	6.940*	2.727***	4.260***	1.411	1.537***	-1.505	11.94*
	(2.876)	(0.604)	(0.831)	(1.114)	(0.447)	(1.551)	(4.681)
Female	-4.108	1.837***	3.355***	1.468	0.767**	-0.988	-1.025
	(3.492)	(0.272)	(0.571)	(0.774)	(0.250)	(0.613)	(5.044)
Difference	11.05*	0.889	0.906	-0.0575	0.770	-0.517	12.96
	(4.523)	(0.662)	(1.009)	(1.356)	(0.512)	(1.667)	(6.882)
Explained	0.246	0.0512	0.355**	-0.00588	0.119**	0.0982	0.866
	(0.274)	(0.0352)	(0.113)	(0.0839)	(0.0366)	(0.112)	(1.074)
Unexplained	10.80*	0.838	0.550	-0.0516	0.652	-0.615	12.09
	(4.473)	(0.660)	(0.991)	(1.357)	(0.509)	(1.662)	(6.963)
Observations	211	2831	965	542	3748	584	77

t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.5.3 Wage differential by ethnic groups.

The ethnic wage differentials are computed between major ethnic groups in the country - Malays, Chinese, and all the other ethnics which are classified into one group due to large diversity and significantly lower representative proportion of the smaller groups. We make separate analysis among public and private sector workers. Table 3.12 reports the decomposition results for ethnic wage differential in the public sector. Detailed source of difference is given in the appendix (Table 3.20). The unadjusted wage difference is positive and significant between all groups, with Chinese earning significantly higher than all the other groups combined, and other ethnic group earn higher than Malays. The gap disappears however, after correcting for selectivity issue. All the wage differences between all ethnic groups are now insignificant. The result is consistent with public sector's non-discriminatory policy in the recruitment process. Nonetheless, the existence of the ethnic wage difference in the public sector is found to be largely due to graduates' characteristic effects. Particularly, the course of study bear 50% contribution towards the explained part of the wage difference. The other contributing factor are the type of job characteristics possessed by those with higher earning.

Table 3.13 reports the ethnic wage differential in the private sector labour market. Detailed source of difference is given in the appendix (Table 3.21). The unadjusted wage differential shows similar result as in the unadjusted public sector outcome. However, after adjusting for participation decision, ethnic wage gap in the private sector is found to be persistent between Chinese and Malays, and between the other ethnic group and Malays, with Malays consistently earn lower. Furthermore, the ethnic wage differential in the private sector are largely accounted for by the unexplained part. 76% of the Chinese-Malay wage difference is due to the unexplained part, while 89% of the wage difference between the other ethnic group and Malays

are due to the unexplained part, even though the difference between the other ethnic group and Malays is not significant. One important factor that we are not able to use in this analysis is father's occupation. In the case of Malaysia, children's occupation and earning have a strong link with their father's occupation (see Hirschman (1983)). The large differences in the unexplained part may account for the unmeasured father's occupation. But if father's occupation does not bear large magnitude of change, then the remaining unexplained part may signify discrimination. On the other hand, the wage difference between Chinese and the other ethnic group is not significant, even though large part of the difference can be attributed to the explain part such as CGPA, MUET score, and job characteristics.

Table 3.12: Decomposition results for ethnic polarization in the public sector.

	(1) Chinese v. Malay	(2) Others v. Malays	(3) Chinese v. others
Decomposition			
Group_1	(Chi) 5.348***	(Oth) 4.067***	(Chi) 5.348***
	(0.0835)	(0.106)	(0.0835)
Group_2	(Mal) 3.676***	(Mal) 3.676***	(Oth) 4.067***
	(0.0350)	(0.0350)	(0.106)
Difference	1.672***	0.392***	1.280***
	(0.0905)	(0.112)	(0.135)
Adjusted			
Group_1	(Chi) 4.210**	(Oth) 3.292*	(Chi) 4.210**
	(1.596)	(1.570)	(1.596)
Group_2	(Mal) 1.953***	(Mal) 1.953***	(Oth) 3.292*
	(0.526)	(0.526)	(1.570)
Difference	2.257	1.339	0.918
	(1.681)	(1.656)	(2.239)
Explained	1.234***	0.348***	0.993***
	(0.154)	(0.0839)	(0.220)
Unexplained	1.023	0.992	-0.0758
	(1.583)	(1.653)	(2.262)
Observations	3554	3353	1001

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.13: Decomposition results for ethnic polarization in the private sector.

	(1) Chinese v. Malay	(2) Others v. Malays	(3) Chinese v. others
Decomposition			
Group_1	(Chi) 4.837***	(Oth) 3.797***	(Chi) 4.837***
	(0.0170)	(0.0345)	(0.0170)
Group_2	(Mal) 3.702***	(Mal) 3.702***	(Oth) 3.797***
	(0.0119)	(0.0119)	(0.0345)
Difference	1.135***	0.0951**	1.040***
	(0.0208)	(0.0365)	(0.0385)
Adjusted			
Group_1	(Chi) 1.181*	(Oth) 1.009	(Chi) 1.181*
	(0.485)	(0.711)	(0.485)
Group_2	(Mal) -0.619*	(Mal) -0.619*	(Oth) 1.009
	(0.258)	(0.258)	(0.711)
Difference	1.800**	1.628*	0.172
	(0.550)	(0.756)	(0.860)
Explained	0.428***	0.166***	0.310***
	(0.0223)	(0.0296)	(0.0415)
Unexplained	1.373*	1.462	-0.137
	(0.546)	(0.769)	(0.874)
Observations	22501	18119	8612

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Does working in the public sector gives wage premium differently among the difference ethnic groups? The earlier result on public-private wage differential shows that the private sector workers earn slightly more than the public sector workers, even though the difference is not significant. The public-private wage differential within each ethnic group is reported in Table 3.14. Detailed source of difference is given in the appendix (Table 3.22). By taking into account the selection into employment, only public-private sector wage difference among Malays are found to be positive and significant. The difference is found to be largely accounted for by the unexplained part of the wage difference. The results for Chinese and the other ethnic group is not significant. In summary, we found evidence of ethnic disparity in earning within the private sector labour market where Malays earn significantly

lower than all the other ethnic groups. However, Malays may choose to work in the public sector to improve their earning prospect even though there is no evidence that the public sector practices ethnic-based recruitment by giving preferential treatment to the Malays. This finding sparks another question on factors that cause Malay's inferior earning compared to the others having similar qualifications. We found that Malays are slightly over-represented in less attractive courses such as Management, Islamic studies, Education, and Arts (even though Malay are also found to be slightly over-represented in Engineering). On the other spectrum, Chinese are slightly over-represented in courses such as Computer Science, Accountancy, and Administration (even though Chinese are also slightly over-represented in Marketing and Applied Science). However, course differences have been taken into account in the decomposition of the Malay-Chinese wage gap. Hence, we would recommend the study of Malay-Chinese persistent wage gap in the future research to gain a thorough understanding, particularly by observing the influence of parental occupation and education.

Table 3.14: Decomposition results for public-private earning differentials within each ethnic group.

	(1) Malay	(2) Chinese	(3) Others
Decomposition			
Public	3.676***	5.348***	4.067***
	(0.0350)	(0.0835)	(0.106)
Private	3.702***	4.837***	3.797***
	(0.0119)	(0.0170)	(0.0345)
Difference	-0.0261	0.511***	0.271*
	(0.0370)	(0.0852)	(0.111)
Adjusted			
Public	1.953***	4.210**	3.292*
	(0.526)	(1.596)	(1.570)
Private	-0.619*	1.181*	1.009
	(0.258)	(0.485)	(0.711)
Difference	2.572***	3.028	2.283
	(0.586)	(1.668)	(1.723)
Explained	-0.0543*	0.00143	-0.0277
	(0.0245)	(0.125)	(0.0868)
Unexplained	2.626***	3.027	2.311
	(0.585)	(1.582)	(1.695)
Observations	18957	7098	2515

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.5.4 Full time pay premium.

Table 3.15 shows the results for the wage differential between full time workers and part time workers with detailed source of difference is given in the appendix (Table 3.23). Consistent with our expectation, we found evidence of wage premium among full time workers in our sample for both gender groups. In the case of male graduates, 68% of the difference is due to the unexplained portion of the wage difference. Full time workers among male graduates have higher CGPA, higher family income, and higher probability for permanent position and professional jobs. But the unexplained part is also largely due to the choice of courses of study. Wage premium among female full time workers is not as big as male. Indeed, large and significant portion of the wage difference is due to the explained part of the wage difference (higher CGPA, higher MUET score, higher family income, and better job characteristics).

Even though we found significant difference between full time - part time workers among first degree graduates, but we do not expect that this will continue especially because the survey is done within a very short period right after finishing study. Some graduates, in particular those with part time jobs, may use the first job offer as a stepping stone to gain experience before they begin their career. It would be interesting to see the progress of part time workers over the years to test the hypothesis if first job affect subsequent jobs. However, since we do not have the tracer study data hence we keep this for future research.

Table 3.15: Decomposition results for earning differential between full time / part time workers.

	(1) Pooled	(2) Male	(3) Female
Decomposition			
Full time	4.358***	4.779***	4.104***
	(0.00973)	(0.0152)	(0.0122)
Part time	2.298***	2.399***	2.249***
	(0.0155)	(0.0295)	(0.0181)
Difference	2.060***	2.381***	1.855***
	(0.0183)	(0.0332)	(0.0218)
Adjusted			
Full time	1.766***	2.637***	1.646***
	(0.0781)	(0.141)	(0.106)
Part time	0.672***	0.436	0.940***
	(0.182)	(0.391)	(0.237)
Difference	1.094***	2.201***	0.706**
	(0.198)	(0.416)	(0.259)
Explained	0.553***	0.685***	0.503***
	(0.0290)	(0.0567)	(0.0353)
Unexplained	0.541*	1.516***	0.202
	(0.213)	(0.449)	(0.278)
Observations	28570	10532	18038

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.6 Conclusion.

Previous studies in Malaysia have been focusing on graduate employability and they generally criticize graduates for their lack of skills to fulfill the market demand. Among the many issues is Malaysian graduate's English language proficiency. Our study shows that English plays an important role in obtaining a job and a high income, but we found another key finding: the courses of study. Unemployment is higher within certain courses of study. Malays and women generally have lower labour force participation and lower earning, they are also found to have some preference towards these less attractive courses.

In studying the public-private wage gap, we arrived at the conclusion that there is no evidence of public sector wage premium among our graduates. The result is different than the earlier finding in the country due to the different composition of sample characteristics. Seshan (2013) found an evidence of public pay premium in which the private sector in the country was found to be lagged behind in wage determination that may lead to uncompetitiveness. The sample in our study is composed of a group of high skilled workers who possess university qualification and hence cannot be comparable to the larger population.

Due to the restriction in the type of response variable from the tracer study, we cannot test for the existence of double imbalance in the distribution of the wage distribution. Even though the private sector workers earn slightly higher than the public sector workers, the difference is found to be non-significant. Higher earning among private sector workers is largely due to their better choice of courses of study. The connection between courses of study and sectors is also prevalent - private sector restricts employee recruitment from those who took courses that have higher private benefits such as Engineering, Management, and Accountancy; while

there is a higher proportion of public sector recruitment among graduates who took Medical and Education.

Gender pay gap is only significant in the private sector labour market. The gap is largely due to the unexplained part of the difference - female graduates have higher CGPA but the superior academic achievement does not translate into better remuneration in the private sector, hampered by their choice of less attractive courses of study. Unlike the private sector, the public sector does not show evidence of gender pay gap. Women in our study have a tendency to choose less attractive courses of study that are usually associated with blurred employment prospect and low pay compared to men's preferences towards highly technical and attractive courses of study. We found that even if women have similar qualification as men such as in the case of Engineering, they still have lower earning. It is difficult to ascertain the reason for Engineering women's avoidance of getting a better job and higher earning unless we have a suitable instrument to measure whether the difference is due to their preference or discrimination. We also found evidence of gender pay gap in industries such as Manufacturing and Defence (favouring males), and Food & Accommodation (favouring females).

We found no evidence of pay differences among the different ethnic groups in the public sector, nonetheless, the small wage difference is found to be associated with the explained part of the wage gap, particularly, the choice of courses of study. The opposite can be said about the private sector. We found evidence of significant wage differential between all other ethnic groups and Malays, largely due to the unexplained part. In studying wage differential between ethnic groups in Malaysia, previous literatures showed that intergenerational inheritance in terms of father's occupations plays a very strong influential role in their children's employment pattern. Indeed, across all ethnic group, the intergenerational occupation inheritance

is a strong predictor of their offspring's type of occupation and earning. However, in the tracer study we do not have information on father's occupation and hence with the available data, we could not be able to make further investigation related to the ethnic wage differential.

The increase in the number of Malay student intake into university does not help to reduce ethnic inequality because they entered courses that do not alleviate their economic status (most of them come from a rural area with low family income). This finding sparks another question on factors that cause Malay's inferior earning compared to the others having the same level of qualifications. We found that Malays are slightly over-represented in less attractive courses such as Management, Islamic studies, Education, and Arts (even though Malay are also found to be slightly over-represented in Engineering). On the other spectrum, Chinese are slightly over-represented in courses such as Medical, Computer Science, Accountancy, and Administration (even though Chinese are also slightly over-represented in Marketing and Applied Science). However, courses differences have been taken into account in the decomposition of the Malay-Chinese wage gap. Hence, we would recommend the study of the Malay-Chinese persistent wage gap in the future research to gain a thorough understanding, particularly by observing the influence of parental occupation and education.

Full time workers evidently earn higher than the part time workers due to their superior characteristics. Even though we found significant difference between full time - part time workers among first degree graduates, but we do not expect that this will continue. Some graduates, in particular, those with part time jobs, may use the first job offer as a stepping stone to gain experience before they begin their career. It would be interesting to see the progress of part time workers over the years to test the hypothesis if the first job affects their subsequent jobs. Because

we only observe the employment status and earning at one point of time within a short period after finishing study, we are unable to see if part time workers will continue to earn lower than those who have secured full time employment at the time of graduation.

3.7 Appendix.

Table 3.16: Estimation results of graduate earnings in the public sector employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Arts/SocSc	-0.187	-0.0796	0.0925**	0.0764***	0.0439***	0.0311**	0.0223*	0.000330
Transport	0.0576	-0.00863	-0.0237	-0.0133	-0.00611	-0.00372	-0.00210	-0.0000239
Administration	-0.110	-0.0155	0.0517	0.0353	0.0183	0.0120	0.00772	0.0000988
Management	-0.167	-0.0560	0.0824*	0.0637**	0.0355***	0.0245***	0.0170**	0.000239*
Economy	-0.177	-0.0669	0.0875**	0.0698**	0.0395***	0.0275**	0.0194**	0.000280*
Accountancy	-0.0728	-0.00391	0.0333	0.0215	0.0108	0.00690	0.00428	0.0000528
Marketing	-0.110	-0.0157	0.0519	0.0355	0.0184	0.0121	0.00777	0.0000996
Finance	-0.0845	-0.00670	0.0390	0.0256	0.0129	0.00836	0.00524	0.0000653
Journalism	-0.157	-0.0459	0.0768*	0.0577**	0.0317**	0.0216**	0.0147**	0.000203*
Islamic	-0.183	-0.0745	0.0906**	0.0737**	0.0421**	0.0296*	0.0211*	0.000309
Food/hospitality	-0.0824	-0.00614	0.0379	0.0248	0.0125	0.00808	0.00506	0.0000629
Arts	-0.0120	0.000681	0.00522	0.00314	0.00150	0.000936	0.000553	0.00000651
Pure science	-0.180	-0.0712	0.0893*	0.0720**	0.0410**	0.0287**	0.0204*	0.000296
Applied science	-0.163	-0.0520	0.0802*	0.0614**	0.0340**	0.0233**	0.0161*	0.000224
Pharmacy	-0.274*	-0.383***	-0.115	0.0819	0.147***	0.196***	0.328***	0.0196
Medical	-0.276*	-0.402***	-0.194***	-0.0683**	-0.0133	0.0358	0.638***	0.279*
Dentistry	-0.276*	-0.402***	-0.193***	-0.0648**	-0.00548	0.0567	0.661***	0.223
Nurse	-0.132	-0.0275	0.0637	0.0453	0.0241*	0.0161	0.0106	0.000140
Environment	-0.180	-0.0702	0.0889**	0.0715***	0.0406***	0.0284***	0.0201**	0.000292*
Sports	-0.194	-0.0909	0.0962*	0.0819**	0.0478*	0.0342*	0.0249	0.000377
Engineering	0.0422	-0.00555	-0.0176	-0.0100	-0.00463	-0.00283	-0.00161	-0.0000185
CompSci	-0.0974	-0.0107	0.0455	0.0305	0.0156	0.0101	0.00644	0.0000814
Education	-0.191	-0.0855	0.0945*	0.0793**	0.0460**	0.0327*	0.0237	0.000354
Observations	3954	3954	3954	3954	3954	3954	3954	3954

s.e. in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.17: Estimation results of graduate earnings in the private sector employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Arts/SocSc	-0.0795***	-0.117***	-0.0572***	0.0237**	0.106***	0.0859***	0.0322***	0.00554***
Transport	-0.0313	-0.0390	-0.0117	0.0203	0.0352	0.0198	0.00580	0.000901
Administration	-0.0631***	-0.0871***	-0.0369***	0.0293***	0.0805***	0.0557***	0.0186***	0.00304***
Management	-0.0735***	-0.105***	-0.0490***	0.0270***	0.0967***	0.0734***	0.0262***	0.00440***
Economy	-0.0792***	-0.116***	-0.0568***	0.0240***	0.106***	0.0853***	0.0319***	0.00547***
Accountancy	-0.0157	-0.0187	-0.00456	0.0110	0.0165	0.00862	0.00243	0.000372
Marketing	-0.0869***	-0.132***	-0.0687***	0.0171*	0.117***	0.104***	0.0419***	0.00746***
Finance	-0.0790***	-0.116***	-0.0565***	0.0241***	0.105***	0.0849***	0.0317***	0.00543***
Journalism	-0.0868***	-0.132***	-0.0685***	0.0173*	0.117***	0.104***	0.0416***	0.00742***
Islamic	0.0287	0.0300	0.00276	-0.0220	-0.0249	-0.0112	-0.00294	-0.000441
Food/hospitality	-0.0335***	-0.0421***	-0.0131***	0.0215**	0.0381***	0.0217***	0.00640***	0.000997***
Arts	-0.0736***	-0.105***	-0.0491***	0.0270***	0.0968***	0.0736***	0.0263***	0.00442***
Pure science	-0.0892***	-0.137***	-0.0727***	0.0143	0.120***	0.111***	0.0457***	0.00826***
Applied science	-0.0899***	-0.139***	-0.0739***	0.0135	0.121***	0.112***	0.0468***	0.00849***
Pharmacy	-0.0457	-0.0595	-0.0212	0.0266**	0.0545	0.0333	0.0102	0.00162
Medical	-0.00116	-0.00133	-0.000256	0.000852	0.00114	0.000566	0.000155	0.0000235
Dentistry	0.0145	0.0158	0.00220	-0.0109	-0.0133	-0.00626	-0.00167	-0.000252
Nurse	-0.0846***	-0.127***	-0.0649***	0.0196*	0.114***	0.0979***	0.0384***	0.00677***
Environment	-0.0805***	-0.119***	-0.0587***	0.0230**	0.108***	0.0882***	0.0333***	0.00575***
Sports	-0.0881***	-0.135***	-0.0708***	0.0157	0.119***	0.107***	0.0438***	0.00787**
Engineering	-0.0945***	-0.150***	-0.0827***	0.00629	0.127***	0.127***	0.0562***	0.0106***
CompSci	-0.0836***	-0.125***	-0.0634***	0.0205***	0.112***	0.0955***	0.0372***	0.00651***
Education	-0.0813***	-0.120***	-0.0599***	0.0224*	0.109***	0.0901***	0.0343***	0.00594**
Observations	24616	24616	24616	24616	24616	24616	24616	24616

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.18: Estimation results of male graduate earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CGPA	-0.0166***	-0.0247***	-0.0237***	-0.0230***	0.0119***	0.0390***	0.0306***	0.00650***
	(0.00271)	(0.00401)	(0.00377)	(0.00362)	(0.00206)	(0.00618)	(0.00490)	(0.00113)
Band 2	0.00234	0.00351	0.00336	0.00318	-0.00192	-0.00555	-0.00413	-0.000798
	(0.00240)	(0.00361)	(0.00346)	(0.00334)	(0.00188)	(0.00576)	(0.00434)	(0.000849)
Band 3	0.0000124	0.0000189	0.0000181	0.0000176	-0.00000958	-0.0000302	-0.0000229	-0.00000447
	(0.00240)	(0.00364)	(0.00349)	(0.00340)	(0.00185)	(0.00582)	(0.00441)	(0.000862)
Band 4	-0.00559*	-0.00881*	-0.00844*	-0.00878*	0.00352	0.0143*	0.0115*	0.00231*
	(0.00259)	(0.00407)	(0.00390)	(0.00395)	(0.00189)	(0.00657)	(0.00510)	(0.00101)
Band 5	-0.00756*	-0.0121*	-0.0116*	-0.0123*	0.00432*	0.0197*	0.0162*	0.00331*
	(0.00332)	(0.00544)	(0.00519)	(0.00562)	(0.00198)	(0.00889)	(0.00741)	(0.00151)
Band 6	-0.0140*	-0.0236	-0.0225	-0.0257	0.00467	0.0388	0.0348	0.00746
	(0.00701)	(0.0133)	(0.0125)	(0.0160)	(0.00259)	(0.0217)	(0.0231)	(0.00530)
Arts/SocSc	-0.0614***	-0.0774***	-0.0702***	-0.0303**	0.0729***	0.0998***	0.0591***	0.00763**
	(0.0107)	(0.0120)	(0.00965)	(0.0106)	(0.0125)	(0.0149)	(0.0148)	(0.00287)
Transport	0.00183	0.00203	0.00139	-0.000502	-0.00226	-0.00171	-0.000706	-0.0000731
	(0.0236)	(0.0261)	(0.0178)	(0.00660)	(0.0290)	(0.0218)	(0.00904)	(0.000938)
Administration	-0.0371**	-0.0437**	-0.0367**	-0.00409	0.0480**	0.0477**	0.0233***	0.00264***
	(0.0122)	(0.0152)	(0.0124)	(0.00368)	(0.0170)	(0.0157)	(0.00673)	(0.000710)
Management	-0.0508***	-0.0618***	-0.0545***	-0.0156***	0.0639***	0.0743***	0.0398***	0.00481***
	(0.00997)	(0.0120)	(0.00905)	(0.00366)	(0.0137)	(0.0113)	(0.00521)	(0.000855)
Economy	-0.0601***	-0.0753***	-0.0681***	-0.0281***	0.0720***	0.0962***	0.0561***	0.00718***
	(0.0102)	(0.0125)	(0.00983)	(0.00662)	(0.0136)	(0.0134)	(0.00907)	(0.00170)
Accountancy	0.00575	0.00636	0.00425	-0.00174	-0.00705	-0.00521	-0.00213	-0.000220
	(0.0190)	(0.0208)	(0.0137)	(0.00583)	(0.0229)	(0.0170)	(0.00703)	(0.000733)
Marketing	-0.0599***	-0.0750***	-0.0678***	-0.0278***	0.0719***	0.0957***	0.0557***	0.00712***
	(0.0103)	(0.0122)	(0.00953)	(0.00747)	(0.0133)	(0.0133)	(0.0103)	(0.00197)
Finance	-0.0504***	-0.0613***	-0.0540***	-0.0152***	0.0635***	0.0735***	0.0392***	0.00473***
	(0.0103)	(0.0126)	(0.00978)	(0.00413)	(0.0141)	(0.0125)	(0.00581)	(0.000873)
Journalism	-0.0566***	-0.0701***	-0.0628***	-0.0229***	0.0693***	0.0875***	0.0493***	0.00616***
	(0.0102)	(0.0122)	(0.00951)	(0.00657)	(0.0133)	(0.0130)	(0.00887)	(0.00160)

Islamic	-0.00217	-0.00242	-0.00170	0.000529	0.00271	0.00208	0.000872	0.0000910
	(0.0145)	(0.0162)	(0.0114)	(0.00356)	(0.0182)	(0.0140)	(0.00582)	(0.000605)
Food/hospitality	-0.00894	-0.0101	-0.00735	0.00169	0.0113	0.00906	0.00388	0.000410
	(0.0135)	(0.0153)	(0.0112)	(0.00287)	(0.0173)	(0.0137)	(0.00574)	(0.000598)
Arts	-0.0471***	-0.0568***	-0.0495***	-0.0118	0.0600***	0.0665***	0.0346**	0.00410*
	(0.0112)	(0.0126)	(0.0103)	(0.00808)	(0.0127)	(0.0151)	(0.0108)	(0.00169)
Pure science	-0.0665***	-0.0857***	-0.0784***	-0.0397**	0.0752***	0.114***	0.0716***	0.00966*
	(0.0111)	(0.0134)	(0.0112)	(0.0133)	(0.0133)	(0.0178)	(0.0192)	(0.00388)
Applied science	-0.0675***	-0.0873***	-0.0801***	-0.0417***	0.0754***	0.117***	0.0743***	0.0101**
	(0.0101)	(0.0113)	(0.00856)	(0.00964)	(0.0135)	(0.0124)	(0.0145)	(0.00329)
Pharmacy	-0.0798***	-0.111***	-0.103***	-0.0740*	0.0684**	0.156***	0.124*	0.0199
	(0.0137)	(0.0215)	(0.0197)	(0.0321)	(0.0255)	(0.0300)	(0.0577)	(0.0145)
Medical	-0.0806***	-0.113***	-0.105***	-0.0765***	0.0671***	0.159***	0.128***	0.0209***
	(0.0108)	(0.0195)	(0.0171)	(0.0175)	(0.0123)	(0.0254)	(0.0277)	(0.00468)
Dentistry	-0.0969***	-0.170***	-0.171***	-0.177***	-0.0533	0.134***	0.361***	0.174*
	(0.0100)	(0.0121)	(0.0120)	(0.0154)	(0.0291)	(0.0384)	(0.0242)	(0.0691)
Nurse	-0.0597***	-0.0748***	-0.0675***	-0.0275**	0.0717***	0.0953***	0.0554***	0.00707**
	(0.0112)	(0.0142)	(0.0120)	(0.0101)	(0.0138)	(0.0178)	(0.0135)	(0.00232)
Environment	-0.0673***	-0.0869***	-0.0797***	-0.0412***	0.0753***	0.116***	0.0737***	0.0100***
	(0.0101)	(0.0119)	(0.00918)	(0.00813)	(0.0137)	(0.0129)	(0.0120)	(0.00269)
Sports	-0.0699***	-0.0914***	-0.0841***	-0.0468**	0.0756***	0.124***	0.0815***	0.0114*
	(0.0115)	(0.0144)	(0.0123)	(0.0158)	(0.0140)	(0.0200)	(0.0237)	(0.00498)
Engineering	-0.0700***	-0.0916***	-0.0843***	-0.0470***	0.0755***	0.124***	0.0818***	0.0114***
	(0.00962)	(0.0120)	(0.00904)	(0.00337)	(0.0139)	(0.0114)	(0.00470)	(0.00157)
CompSci	-0.0561***	-0.0693***	-0.0620***	-0.0222***	0.0689***	0.0863***	0.0484***	0.00602***
	(0.0107)	(0.0142)	(0.0116)	(0.00528)	(0.0151)	(0.0156)	(0.00687)	(0.000841)
Education	-0.0682***	-0.0886***	-0.0813***	-0.0432*	0.0755***	0.119***	0.0765**	0.0105
	(0.0121)	(0.0144)	(0.0126)	(0.0180)	(0.0134)	(0.0216)	(0.0265)	(0.00544)
Age	0.00958***	0.0143***	0.0137***	0.0133***	-0.00689***	-0.0225***	-0.0177***	-0.00375***
	(0.00255)	(0.00382)	(0.00366)	(0.00357)	(0.00186)	(0.00599)	(0.00475)	(0.00104)
Malay	0.00532**	0.00793**	0.00759**	0.00737**	-0.00383**	-0.0125**	-0.00981**	-0.00209**
	(0.00198)	(0.00295)	(0.00281)	(0.00273)	(0.00143)	(0.00463)	(0.00365)	(0.000787)

Chinese	0.00856	0.0128	0.0122	0.0119	-0.00615	-0.0201	-0.0158	-0.00335
	(0.00711)	(0.0106)	(0.0102)	(0.00988)	(0.00511)	(0.0167)	(0.0131)	(0.00280)
Family income								
RM 501 - RM 1000	0.00785*	0.0121*	0.0117*	0.0113*	-0.00629**	-0.0190*	-0.0148*	-0.00292*
	(0.00308)	(0.00499)	(0.00481)	(0.00521)	(0.00197)	(0.00805)	(0.00690)	(0.00145)
RM 1001 - RM 1500	0.0104*	0.0159*	0.0153*	0.0144*	-0.00888**	-0.0246*	-0.0188*	-0.00367*
	(0.00424)	(0.00666)	(0.00642)	(0.00664)	(0.00282)	(0.0106)	(0.00884)	(0.00183)
RM 1501 - RM 2000	0.00972	0.0148	0.0143	0.0135	-0.00813*	-0.0231	-0.0177	-0.00347
	(0.00533)	(0.00824)	(0.00794)	(0.00792)	(0.00383)	(0.0130)	(0.0105)	(0.00215)
RM 2001 - RM 2500	0.00958	0.0146	0.0141	0.0134	-0.00800*	-0.0228	-0.0175	-0.00343
	(0.00499)	(0.00774)	(0.00746)	(0.00752)	(0.00352)	(0.0122)	(0.0100)	(0.00205)
RM 2501 - RM 3000	0.00120	0.00194	0.00187	0.00196	-0.000778	-0.00311	-0.00255	-0.000523
	(0.00458)	(0.00740)	(0.00713)	(0.00754)	(0.00285)	(0.0119)	(0.00988)	(0.00203)
RM 3001 - RM 5000	-0.00449	-0.00759	-0.00727	-0.00815	0.00211	0.0123	0.0108	0.00229
	(0.00386)	(0.00639)	(0.00613)	(0.00659)	(0.00239)	(0.0103)	(0.00856)	(0.00177)
$>$ RM 5000	-0.0103**	-0.0184**	-0.0175**	-0.0210**	0.00228	0.0300**	0.0286**	0.00636**
	(0.00395)	(0.00678)	(0.00646)	(0.00714)	(0.00250)	(0.0109)	(0.00934)	(0.00200)
Urban	0.0217**	0.0324**	0.0309**	0.0301**	-0.0156**	-0.0509**	-0.0400**	-0.00851**
	(0.00750)	(0.0112)	(0.0107)	(0.0105)	(0.00544)	(0.0176)	(0.0139)	(0.00301)
Full time	-0.0633***	-0.0943***	-0.0902***	-0.0876***	0.0455***	0.148***	0.117***	0.0248***
	(0.00271)	(0.00278)	(0.00366)	(0.00437)	(0.00294)	(0.00566)	(0.00494)	(0.00190)
Permanent	-0.0227***	-0.0338***	-0.0323***	-0.0314***	0.0163***	0.0532***	0.0418***	0.00888***
	(0.00142)	(0.00207)	(0.00176)	(0.00173)	(0.00124)	(0.00290)	(0.00254)	(0.000787)
Professional	-0.0358***	-0.0534***	-0.0511***	-0.0496***	0.0258***	0.0841***	0.0661***	0.0140***
	(0.00181)	(0.00254)	(0.00217)	(0.00245)	(0.00165)	(0.00378)	(0.00334)	(0.00115)
λ	0.174***	0.259***	0.248***	0.241***	-0.125***	-0.408***	-0.321***	-0.0681***
	(0.0407)	(0.0608)	(0.0582)	(0.0569)	(0.0298)	(0.0954)	(0.0757)	(0.0167)
Observations	10532	10532	10532	10532	10532	10532	10532	10532

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.19: Estimation results of female graduate earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CGPA	-0.0137***	-0.0268***	-0.0113***	0.00378***	0.0189***	0.0161***	0.0116***	0.00143***
	(0.00290)	(0.00565)	(0.00237)	(0.000873)	(0.00397)	(0.00339)	(0.00244)	(0.000332)
Band 2	-0.00167	-0.00308	-0.00114	0.000797	0.00229	0.00162	0.00107	0.000104
	(0.00272)	(0.00499)	(0.00182)	(0.00133)	(0.00372)	(0.00260)	(0.00172)	(0.000166)
Band 3	-0.0143***	-0.0286***	-0.0120***	0.00525***	0.0211***	0.0164***	0.0111***	0.00113***
	(0.00272)	(0.00517)	(0.00199)	(0.00133)	(0.00386)	(0.00275)	(0.00183)	(0.000211)
Band 4	-0.0226***	-0.0481***	-0.0218***	0.00597***	0.0347***	0.0293***	0.0203***	0.00218***
	(0.00291)	(0.00591)	(0.00257)	(0.00134)	(0.00437)	(0.00343)	(0.00236)	(0.000317)
Band 5	-0.0267***	-0.0590***	-0.0279***	0.00531***	0.0419***	0.0372***	0.0262***	0.00289***
	(0.00367)	(0.00857)	(0.00447)	(0.00150)	(0.00594)	(0.00585)	(0.00433)	(0.000552)
Band 6	0.0455	0.0662*	0.0148***	-0.0300	-0.0485*	-0.0283**	-0.0181**	-0.00153**
	(0.0260)	(0.0305)	(0.00266)	(0.0191)	(0.0215)	(0.0109)	(0.00677)	(0.000528)
Arts/SocSc	-0.0978***	-0.127***	-0.0241***	0.0579***	0.0951***	0.0632***	0.0307***	0.00158**
	(0.0126)	(0.0119)	(0.00549)	(0.00878)	(0.00855)	(0.00901)	(0.00730)	(0.000507)
Transport	-0.0582**	-0.0615*	-0.00227	0.0393*	0.0468*	0.0251*	0.0102*	0.000485*
	(0.0225)	(0.0285)	(0.00476)	(0.0161)	(0.0215)	(0.0119)	(0.00494)	(0.000241)
Administration	-0.0879***	-0.108***	-0.0160***	0.0549***	0.0814***	0.0506***	0.0232***	0.00116***
	(0.0135)	(0.0178)	(0.00426)	(0.0103)	(0.0135)	(0.00692)	(0.00258)	(0.000178)
Management	-0.0962***	-0.123***	-0.0226***	0.0575***	0.0927***	0.0609***	0.0293***	0.00150***
	(0.0119)	(0.0125)	(0.00236)	(0.00937)	(0.00966)	(0.00414)	(0.00241)	(0.000241)
Economy	-0.101***	-0.134***	-0.0274***	0.0584***	0.100***	0.0682***	0.0339***	0.00177***
	(0.0121)	(0.0129)	(0.00364)	(0.00930)	(0.00986)	(0.00590)	(0.00436)	(0.000361)
Accountancy	-0.0405*	-0.0396	0.000995	0.0278	0.0300	0.0151	0.00588*	0.000274*
	(0.0198)	(0.0216)	(0.00189)	(0.0147)	(0.0161)	(0.00771)	(0.00285)	(0.000133)
Marketing	-0.111***	-0.157***	-0.0395***	0.0580***	0.115***	0.0856***	0.0462***	0.00254***
	(0.0120)	(0.0124)	(0.00455)	(0.00958)	(0.00941)	(0.00711)	(0.00690)	(0.000600)
Finance	-0.104***	-0.140***	-0.0304***	0.0586***	0.104***	0.0726***	0.0368***	0.00195***
	(0.0120)	(0.0138)	(0.00339)	(0.00936)	(0.0107)	(0.00516)	(0.00295)	(0.000309)
Journalism	-0.112***	-0.158***	-0.0403***	0.0579***	0.116***	0.0866***	0.0470***	0.00259***
	(0.0119)	(0.0123)	(0.00388)	(0.00951)	(0.00956)	(0.00599)	(0.00578)	(0.000543)

Islamic	0.00761	0.00609	-0.00115	-0.00516	-0.00460	-0.00203	-0.000730	-0.0000330
	(0.0169)	(0.0135)	(0.00252)	(0.0114)	(0.0102)	(0.00458)	(0.00167)	(0.0000759)
Food/hospitality	-0.0566***	-0.0595***	-0.00187	0.0384***	0.0452***	0.0241***	0.00980***	0.000464***
	(0.0142)	(0.0152)	(0.00218)	(0.0106)	(0.0113)	(0.00537)	(0.00206)	(0.000110)
Arts	-0.0943***	-0.120***	-0.0210***	0.0571***	0.0902***	0.0585***	0.0278***	0.00142**
	(0.0128)	(0.0127)	(0.00538)	(0.00867)	(0.00924)	(0.00892)	(0.00671)	(0.000452)
Pure science	-0.104***	-0.139***	-0.0301***	0.0586***	0.104***	0.0721***	0.0365***	0.00193**
	(0.0128)	(0.0134)	(0.00675)	(0.00922)	(0.00933)	(0.0106)	(0.00903)	(0.000648)
Applied science	-0.108***	-0.149***	-0.0353***	0.0585***	0.110***	0.0796***	0.0417***	0.00225***
	(0.0121)	(0.0108)	(0.00517)	(0.00958)	(0.00778)	(0.00830)	(0.00833)	(0.000657)
Pharmacy	-0.121***	-0.185***	-0.0568**	0.0527***	0.131***	0.109***	0.0662*	0.00393
	(0.0152)	(0.0273)	(0.0196)	(0.0155)	(0.0129)	(0.0268)	(0.0292)	(0.00237)
Medical	-0.138***	-0.249***	-0.107***	0.0171	0.147***	0.170***	0.148***	0.0120***
	(0.0120)	(0.0236)	(0.0161)	(0.0117)	(0.0105)	(0.0182)	(0.0220)	(0.00229)
Dentistry	-0.146***	-0.307***	-0.180***	-0.0718**	0.0917***	0.199***	0.349***	0.0650*
	(0.0120)	(0.0121)	(0.0118)	(0.0225)	(0.0259)	(0.0141)	(0.0457)	(0.0272)
Nurse	-0.104***	-0.140***	-0.0307***	0.0586***	0.105***	0.0730***	0.0371***	0.00197***
	(0.0121)	(0.0130)	(0.00439)	(0.00933)	(0.00981)	(0.00677)	(0.00545)	(0.000442)
Environment	-0.0929***	-0.117***	-0.0198***	0.0567***	0.0883***	0.0567***	0.0267***	0.00136***
	(0.0122)	(0.0120)	(0.00395)	(0.00892)	(0.00899)	(0.00671)	(0.00490)	(0.000347)
Sports	-0.108***	-0.149***	-0.0354**	0.0585***	0.110***	0.0797***	0.0418**	0.00226*
	(0.0151)	(0.0232)	(0.0125)	(0.00969)	(0.0152)	(0.0184)	(0.0148)	(0.00102)
Engineering	-0.115***	-0.166***	-0.0447***	0.0569***	0.121***	0.0928***	0.0519***	0.00291***
	(0.0117)	(0.0130)	(0.00318)	(0.00929)	(0.0104)	(0.00460)	(0.00341)	(0.000462)
CompSci	-0.107***	-0.146***	-0.0339***	0.0586***	0.109***	0.0776***	0.0404***	0.00216***
	(0.0125)	(0.0173)	(0.00540)	(0.00926)	(0.0131)	(0.00746)	(0.00301)	(0.000296)
Education	-0.0989***	-0.129***	-0.0251**	0.0581***	0.0966***	0.0647***	0.0316**	0.00164*
	(0.0147)	(0.0179)	(0.00958)	(0.00852)	(0.0122)	(0.0151)	(0.0115)	(0.000749)
Age	0.00678*	0.0133*	0.00562*	-0.00187*	-0.00935*	-0.00801*	-0.00573*	-0.000707*
	(0.00278)	(0.00543)	(0.00232)	(0.000761)	(0.00383)	(0.00329)	(0.00236)	(0.000298)
Malay	0.00352	0.00689	0.00292	-0.000974	-0.00485	-0.00416	-0.00298	-0.000367
	(0.00202)	(0.00395)	(0.00168)	(0.000561)	(0.00278)	(0.00238)	(0.00171)	(0.000214)

Chinese	-0.00430	-0.00842	-0.00357	0.00119	0.00593	0.00508	0.00364	0.000449
	(0.00776)	(0.0152)	(0.00643)	(0.00216)	(0.0107)	(0.00916)	(0.00656)	(0.000811)
Family income								
RM 501 - RM 1000	0.00966**	0.0192**	0.00811**	-0.00306***	-0.0137**	-0.0113**	-0.00802*	-0.000908*
	(0.00316)	(0.00668)	(0.00315)	(0.000707)	(0.00466)	(0.00429)	(0.00316)	(0.000388)
RM 1001 - RM 1500	0.00987*	0.0196*	0.00826*	-0.00315**	-0.0140*	-0.0115*	-0.00818	-0.000924
	(0.00454)	(0.00927)	(0.00417)	(0.00107)	(0.00652)	(0.00576)	(0.00420)	(0.000499)
RM 1501 - RM 2000	0.00813	0.0163	0.00698	-0.00246	-0.0116	-0.00967	-0.00690	-0.000785
	(0.00575)	(0.0116)	(0.00511)	(0.00149)	(0.00820)	(0.00708)	(0.00513)	(0.000598)
RM 2001 - RM 2500	0.00190	0.00398	0.00179	-0.000454	-0.00280	-0.00244	-0.00177	-0.000206
	(0.00524)	(0.0110)	(0.00499)	(0.00118)	(0.00772)	(0.00681)	(0.00494)	(0.000580)
RM 2501 - RM 3000	0.00353	0.00731	0.00325	-0.000908	-0.00517	-0.00445	-0.00320	-0.000372
	(0.00505)	(0.0105)	(0.00475)	(0.00116)	(0.00739)	(0.00650)	(0.00472)	(0.000554)
RM 3001 - RM 5000	-0.00387	-0.00844	-0.00399	0.000645	0.00585	0.00538	0.00395	0.000474
	(0.00417)	(0.00899)	(0.00415)	(0.000911)	(0.00630)	(0.00559)	(0.00405)	(0.000480)
$>$ RM 5000	-0.0119**	-0.0276**	-0.0140**	0.000461	0.0185**	0.0186**	0.0141**	0.00176**
	(0.00425)	(0.00955)	(0.00456)	(0.00100)	(0.00665)	(0.00603)	(0.00441)	(0.000553)
Urban	0.0126	0.0247	0.0105	-0.00349	-0.0174	-0.0149	-0.0107	-0.00132
	(0.00819)	(0.0160)	(0.00683)	(0.00224)	(0.0113)	(0.00970)	(0.00696)	(0.000866)
Full time	-0.0731***	-0.143***	-0.0606***	0.0202***	0.101***	0.0863***	0.0618***	0.00763***
	(0.00229)	(0.00312)	(0.00239)	(0.00130)	(0.00305)	(0.00278)	(0.00238)	(0.000774)
Permanent	-0.0354***	-0.0694***	-0.0294***	0.00980***	0.0489***	0.0419***	0.0300***	0.00370***
	(0.00150)	(0.00257)	(0.00103)	(0.000754)	(0.00176)	(0.00168)	(0.00139)	(0.000388)
Professional	-0.0483***	-0.0945***	-0.0401***	0.0134***	0.0666***	0.0570***	0.0408***	0.00504***
	(0.00163)	(0.00266)	(0.00122)	(0.000935)	(0.00190)	(0.00187)	(0.00164)	(0.000515)
λ	0.167***	0.326***	0.138***	-0.0461***	-0.230***	-0.197***	-0.141***	-0.0174***
	(0.0423)	(0.0826)	(0.0355)	(0.0116)	(0.0585)	(0.0502)	(0.0362)	(0.00474)
Observations	18038	18038	18038	18038	18038	18038	18038	18038

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.20: Decomposition results for ethnic polarization in the public sector - source of contribution.

	(1) Chinese v. Malay	(2) Others v. Malays	(3) Chinese v. others
Explained			
CGPA	-0.0305	0.00429	0.0236
	(0.0354)	(0.00509)	(0.0449)
Muet	0.0615	-0.00454	0.0262
	(0.0460)	(0.0213)	(0.0398)
Courses	0.666***	0.177***	0.549***
	(0.107)	(0.0503)	(0.142)
Age	-0.000768	0.00527	-0.000815
	(0.0135)	(0.0171)	(0.00317)
Faminc	0.0133	-0.00108	0.0319
	(0.0141)	(0.00680)	(0.0200)
Urban	-0.00523	0.0228	-0.00699
	(0.00638)	(0.0356)	(0.0495)
Full time	0.197***	0.00337	0.168***
	(0.0235)	(0.0158)	(0.0327)
Permanent	0.203***	0.0993***	0.129***
	(0.0233)	(0.0252)	(0.0285)
Professional	0.130***	0.0409**	0.0734***
	(0.0214)	(0.0152)	(0.0210)
Unexplained			
CGPA	-0.326	1.110	-1.495
	(0.723)	(0.765)	(1.026)
Muet	0.414	0.121	0.333
	(0.445)	(0.242)	(0.513)
Courses	1.172	0.688	0.425
	(0.801)	(1.120)	(1.349)
Age	0.311	1.598	-1.293
	(3.205)	(3.581)	(4.565)
Faminc	0.238	0.0499	0.171
	(0.231)	(0.282)	(0.351)
Urban	0.0749	0.0870	-0.0331
	(0.125)	(0.117)	(0.148)
Full time	0.543***	-0.170	0.738***
	(0.109)	(0.0978)	(0.150)
Permanent	-0.143**	0.0134	-0.182*
	(0.0468)	(0.0462)	(0.0794)
Professional	-0.225	-0.164	-0.0448
	(0.139)	(0.108)	(0.185)
Constant	-1.037	-2.342	1.304
	(2.755)	(3.015)	(3.881)
Observations	3554	3353	1001

s.e. in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.21: Decomposition results for ethnic polarization in the private sector - source of contribution.

	(1) Chinese v. Malay	(2) Others v. Malays	(3) Chinese v. others
Explained			
CGPA	0.0237***	-0.00975**	0.0435***
	(0.00323)	(0.00298)	(0.00867)
Muet	0.0940***	0.0466***	0.0522***
	(0.0106)	(0.00645)	(0.00980)
Courses	-0.0283	0.0203	-0.0230
	(0.0145)	(0.0140)	(0.0234)
Age	0.0439***	-0.0406***	0.0642***
	(0.00527)	(0.00814)	(0.0133)
Faminc	-0.0372***	-0.0173***	-0.00698
	(0.00590)	(0.00463)	(0.00907)
Urban	0.0103*	0.0790***	-0.0649***
	(0.00525)	(0.0162)	(0.0158)
Full time	0.141***	0.0146	0.127***
	(0.00671)	(0.00888)	(0.0126)
Permanent	0.111***	0.0417***	0.0736***
	(0.00581)	(0.00616)	(0.00770)
Professional	0.0690***	0.0319***	0.0438***
	(0.00467)	(0.00916)	(0.00730)
Unexplained			
CGPA	0.501**	0.306	0.185
	(0.164)	(0.289)	(0.306)
Muet	-0.0693	-0.0336	-0.0405
	(0.151)	(0.101)	(0.180)
Courses	0.914***	0.405	0.483*
	(0.145)	(0.223)	(0.245)
Age	1.306	4.980**	-3.654*
	(1.062)	(1.644)	(1.795)
Faminc	0.0158	0.162	-0.159
	(0.0872)	(0.117)	(0.138)
Urban	0.0383	0.152*	-0.117
	(0.0510)	(0.0692)	(0.0731)
Full time	0.581***	0.0771	0.503***
	(0.0556)	(0.0659)	(0.0843)
Permanent	-0.110***	-0.0132	-0.102**
	(0.0207)	(0.0271)	(0.0384)
Professional	-0.308***	-0.0283	-0.286***
	(0.0253)	(0.0384)	(0.0457)
Constant	-1.495	-4.546***	3.051*
	(0.832)	(1.320)	(1.432)
Observations	22501	18119	8612

s.e. in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.22: Decomposition results for public-private earning differentials within each ethnic group - source of contribution.

	(1) Malay	(2) Chinese	(3) Others
Explained			
CGPA	0.00894	0.0327	0.0784*
	(0.00827)	(0.0438)	(0.0364)
Muet	0.0147***	0.0519**	0.00821
	(0.00278)	(0.0195)	(0.0151)
Courses	0.0917***	0.0995	0.0451
	(0.0171)	(0.0953)	(0.0675)
Age	-0.0213***	-0.0639*	-0.00544
	(0.00484)	(0.0315)	(0.0136)
Faminc	0.00799***	0.0183*	0.00781
	(0.00232)	(0.00886)	(0.00928)
Urban	0.0408***	0.0139	0.0119
	(0.00774)	(0.0102)	(0.0201)
Full time	-0.145***	-0.155***	-0.138***
	(0.00900)	(0.0256)	(0.0243)
Permanent	-0.127***	-0.0762***	-0.115***
	(0.00813)	(0.0136)	(0.0226)
Professional	0.0749***	0.0805***	0.0791***
	(0.00770)	(0.0184)	(0.0183)
Unexplained			
CGPA	-0.543*	-1.448*	0.205
	(0.248)	(0.685)	(0.754)
Muet	-0.0442	0.370	0.0657
	(0.0692)	(0.484)	(0.257)
Courses	-0.499*	0.446	-0.0133
	(0.254)	(0.789)	(1.110)
Age	7.566***	6.569*	4.214
	(1.227)	(3.129)	(3.751)
Faminc	0.233*	0.495*	0.137
	(0.0926)	(0.235)	(0.290)
Urban	0.165**	0.213	0.0733
	(0.0566)	(0.133)	(0.105)
Full time	-0.170***	-0.143	-0.436***
	(0.0357)	(0.134)	(0.121)
Permanent	0.141***	0.150*	0.213**
	(0.0194)	(0.0693)	(0.0673)
Professional	-0.0662*	0.0727	-0.197
	(0.0303)	(0.139)	(0.107)
Constant	-4.155***	-3.698	-1.951
	(1.003)	(2.698)	(3.135)
Observations	18957	7098	2515

s.e. in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.23: Decomposition results for earning differential between full time / part time workers - detailed contribution.

	(1) Pooled	(2) Male	(3) Female
Explained			
CGPA	0.00776***	0.0150***	0.00766***
	(0.00158)	(0.00393)	(0.00195)
Muet	0.0129**	-0.00449	0.0228***
	(0.00412)	(0.00918)	(0.00442)
Courses	-0.000983	0.0185	-0.00201
	(0.0119)	(0.0242)	(0.0147)
Age	-0.0168***	-0.0193***	-0.0116***
	(0.00251)	(0.00484)	(0.00272)
Faminc	0.0163***	0.0331***	0.0103**
	(0.00314)	(0.00694)	(0.00345)
Public sector	-0.000951	0.00788	-0.00704
	(0.00319)	(0.00513)	(0.00400)
Urban	-0.0387***	-0.0338***	-0.0323***
	(0.00470)	(0.00843)	(0.00589)
Permanent	0.364***	0.351***	0.368***
	(0.0197)	(0.0359)	(0.0235)
Professional	0.210***	0.317***	0.148***
	(0.00773)	(0.0182)	(0.00779)
Unexplained			
CGPA	0.594***	1.157***	0.401
	(0.167)	(0.304)	(0.212)
Muet	0.318***	0.288**	0.349***
	(0.0545)	(0.0934)	(0.0676)
Courses	1.377***	1.431***	1.318***
	(0.197)	(0.320)	(0.253)
Age	-2.340***	-0.729	-2.888***
	(0.567)	(1.094)	(0.712)
Faminc	-0.0506	-0.0104	-0.0737
	(0.0582)	(0.110)	(0.0700)
Public sector	-0.0248**	-0.00986	-0.0337**
	(0.00834)	(0.0135)	(0.0105)
Urban	-0.0339	-0.00869	-0.0318
	(0.0214)	(0.0437)	(0.0266)
Permanent	-0.107***	-0.100*	-0.109***
	(0.0225)	(0.0422)	(0.0265)
Professional	0.115***	0.0383	0.133***
	(0.0196)	(0.0402)	(0.0219)
Constant	0.693	-0.541	1.139
	(0.580)	(1.077)	(0.728)
Observations	28570	10532	18038

s.e. in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Chapter 4

Interregional migration, time to obtain the first job, and cohorts earning.

4.1 Introduction.

In the previous chapters, we analysed factors affecting graduate's first destination after graduation and their earnings. Another interesting aspect of graduate employment is the patterns of interregional migration and how it affects education-job (mis)match and earnings. Some graduates moved from their state of origin to another state to attend university education, and may subsequently moved to another state to acquire a job. In the case of Malaysian graduates, it would be interesting to examine graduate migration decision in a dualistic economy where the country is divided into two major regions: the urban and the non-urban regions, which differ very much in terms of their economic activity and growth. Migration from

non-urban states to urban states is hypothesised to increase graduate's employment outcomes. Therefore, we are set to answer the question of whether the decision to migrate translates into better education-job match and higher earning.

For graduates who have spent years of investment in education, the incidence of skill mismatch would not only turn out to be a waste in their education but also may result in lower remuneration because they took the wrong job with the wrong qualification i.e. an Engineering graduate who choose to become a teacher. There are various measures of mismatch in the literatures, in this paper we define the mismatch as the degree of practical usefulness of graduate's course of study towards their job. Therefore, mismatch can indicate how graduate's qualification being helpful or unhelpful in carrying out their job tasks. The first section of this chapter will tackle the issue of migration and we will discuss in great detail the link between different interregional movements on the education-job mismatch and earning. Our analysis shows that interregional migration significantly increases graduate earning, but does not necessarily reduce education-job mismatch. This paper contributes to the literature in which there have been no studies on graduate migration pattern in the country, whilst graduates are highly mobile.

As we have covered in the first chapter, being employed, or specifically, being in full time employment within a year after finished studying is regarded as a success. However, another dimension that is crucial in determining success in employment outcome among graduates is the shorter job search duration, or the shorter time taken to obtain the first job after graduation. For this purpose, the second section of this chapter uses a hazard model to understand factors affecting faster/slower transition from unemployment to employment. Interestingly, we find contrasting discovery in the transition model where some determinants that are associated with better employment outcomes in the previous chapters are found to be give contrast-

ing result in this section. Higher academic achievement and more attractive courses are associated with longer transition, but they eventually end with more successful employment (i.e. higher pay, better occupational status). However, graduates' background consistently has the same effect as in the employment and earning analyses - male, Chinese, urban origin are all associated with a faster transition. Another interesting result shows that family income does not have any significant impact in graduate's transition period which signifies that graduates from all background obtained jobs at the same rate, although we have evidence that graduates from lower social class generally obtained less advantageous jobs (i.e. lower pay, non-permanent, part time).

The innovative aspect of this paper is the construction of a pseudo-panel from a set of independent pooled cross sectional data through cohort averaging. Studying graduates earning would be more meaningful if we have a panel data set, so we can control for individual heterogeneity and see the effect of time-varying variables on earnings. Panel data allows us to make an inference of the impact of dynamic changes in graduates' characteristics on the same individual, hence provides more accurate representation of the impact of certain variables. However, the Graduate Tracer Study do not collect panel data of graduates, instead, they collect an independent cross sectional data on an annual basis where they observe graduate earning for different individuals every year. Using Deaton (1985)'s concept of *cohort averaging* however, we are able to construct a set of pseudo-panel based on these independent cross sectional data. We take cohort averages based on a group of graduates with similar sex, ethnic, and course of study, since we have previously established that these variables have consistently become the major factors that differentiate graduates employment outcomes (i.e. employment status and earning). We use fixed effects model to control for cohort heterogeneity and ordered logit model to model the graduate's income. There are developing literatures on finding an efficient esti-

mators for fixed effects ordered logit models which will be discussed in more detailed in Section 4.4. After controlling for cohort heterogeneity, we found that the remaining characteristics that have the significant impact on earning are family income and residential location. Due to the data as well as the model restriction that will be discussed in Section 4.4 however, we need to exercise considerable caution while interpreting this result.

My empirical findings may be summarised by three broad conclusions. First, the overall impact of migration increases graduate's income and other superior job characteristics. Higher ability graduates are more inclined to migrate in order to maximise their employment potential as well as compensating for their superior human capital. There is a strong link between the location of a university and the job location, where graduates who attended an urban university are more likely to stay in that region for work. There is also a correlation between high ability graduates attending selective universities since all the top universities are located in the urban states. Second, graduates who possess better characteristics took longer to obtain their first job but they ended up with superior occupational types and higher earning. Yet, social attributes such as being a male, a Chinese, or originating from an urban state increases the probability for a faster transition from education to work. Third, after controlling for cohort heterogeneity the remaining variables that significantly affect earning are family income and locality.

The chapter is arranged as follows. Section 4.2.2 discusses the graduate migration patterns and how it affect education-job mismatch and earning. Section 4.3 analysed the time it took to obtain the first job. Section 4.4 analyses cohort earning. Finally, section 4.5 concludes the findings.

4.2 Interregional migration and education-job mismatch.

One important aspect of graduate employment is their spatial mobility from education to finding a job. Following several literatures suggested that the geographical aspect of graduate employment has a significant impact on their employment outcome (Iammarino and Marinelli, 2007)(Nakosteen and Zimmer, 1980)(Venhorst and Corvers, 2015), this section is set to examine graduate's interregional movement across the country and how their migration pattern affect their employment outcome, specifically, on their education-job (mis)match and earning. The study of education-job mismatch is important in such a way that if interregional migration significantly reduces education-job mismatch, then the country benefits in avoiding internal brain drain.

There are several definitions for education-job mismatch and various ways to measure it. Essentially, education-job mismatch can be defined as an incidence in which an educational attainment does not match with the job requirement. One aspect of education-job mismatch is over-education, although we do not use the term in this paper due to the lack of specificity. Over-education is one spectrum of education-job mismatch in which an education attainment is higher than the job requirement (Rumberger, 1981). Over-education can be further divided into two categories: the real over-education where graduate experiences under-utilisation of skills; and the formal over-education where education may not match the job requirement yet graduate experiences full utilisation of their ability. Under the screening theory, individual use qualification as a credential to obtain a job. Since employers cannot observe the real productivity at the time of recruitment, they accept workers based on credential alone, even though the individual has lower required ability than the

job they obtained.

However, in this paper we use a broader definition of education-job mismatch in which we asked the graduate how helpful their education is towards their jobs. This measurement may include a larger spectrum of conformity or contradiction between education and job. A graduate may experience a total match between their education and job. On the other hand, graduates who experience education-job mismatch can be either over-educated or under-educated for their job. In this paper, we define the mismatch as the degree of practical usefulness of graduate's course of study towards their job. Therefore, mismatch can indicate how graduate's qualification being helpful or unhelpful in carrying out their job tasks.

Previous literatures in discussing the education-job mismatch issue suggested that the increase in education attainment does not necessarily translate into an increase in skills (Sloane, 2003). The side effect of the expansion of tertiary education is a more broaden and mixed quality of students entering higher education level, which includes those who would not have entered university by the previous standards. Thus, attaining university education in current time may not necessarily be associated with better remuneration. The limitation imposed by the geographical constraint in graduates job search leads to the education-job mismatch when graduates accept jobs that are offered to them in those limiting circumstances. By accepting jobs that contradict with their qualifications, these graduates experience worse employment conditions (e.g. lower salary, employee dissatisfaction, lower firm productivity, higher labour turnover (Iammarino and Marinelli, 2007) simply because they invested in the wrong education or obtained the wrong job for the qualification they possess which is reflected in their lower wage. These graduates may increase their job-qualification match if they move to another location. Various studies have found a negative association between migration and education-job mismatch (Iammarino

and Marinelli, 2007), (Büchel and Van Ham, 2003). It is found that even though the over-educated earn higher than non-over-educated within the same job, but they earn lower than those with correctly educated or matched (Duncan and Hoffman, 1981).

What is the main motivation to migrate? According to Hicks (1963), an individual migrates to increase his earning. Indeed, Sjaastad (1970) who viewed migration as another facet of human capital stated that an individual makes a rational decision to maximise their present value of their net gain by moving to another location. An individual would choose to migrate if the gain in the migrated location is larger than the total one-time costs involved in their migration (Nakosteen and Zimmer, 1980). This voluntary act of choosing to move to another location by comparing the costs and benefits of migration induces the self-selection process where individuals with higher ability are more likely to migrate to compensate for their human capital investment where jobs with better pay are more sparsely distributed. Moreover, the probability to migrate increases with educational level and potential productivity (Molho, 1987). Quinn and Rubb (2005) found that the over-educated are more likely to migrate in order to apply the skills they possess.

There are several theories to describe the occurrence of education-job mismatch. First, the job search and match theory stated that graduate experiences education-job mismatch or particularly over-education at the beginning of their career as a transitory phenomenon. Due to the imperfect and costly information in the labour market during the search period, these graduates may accept jobs which are mismatched with their qualification in order to gain experience and time to obtain more information for the subsequent jobs (Hartog et. al., 2010). Second, the career mobility theory suggested that graduate may accept jobs that are mismatched with their qualification of the jobs offer better promotional prospects rather than accepting

a matched job with a lesser promotional prospect for career upgrade (Sicherman, 1991) but this theory was disproved by Büchel and Mertens (2004) who found that the over-educated remained mismatched for several years after. Third, the signalling theory stated that since employers have imperfect information on the potential workers, they generally hire individuals by using education as a signal. This leads to individuals, which include those with lower ability, to increase their investment in education to some unnecessary extent in order to stand out in the competition with the other job applicants (Spence, 1973). Fourth, the job competition theory stated that employers choose job applicants with higher education attainment because it reduces the costs associated with job training (Thurow, 1975).

This paper examines the effect of spatial mobility on education-job mismatch and graduates income. First, we examine the factors affecting graduate's decision to migrate. To better understand the net effect of migration, we do not only analyse a pool of migrating graduates, since there are different significantly distinct migration patterns. Instead, we analyse separately the migration behaviour among graduates who originated from an urban/non-urban state and then moved to another urban/non-urban state. Second, we investigate the impact of interregional migration on graduate's education-job (mis)match and examine if such factors differ according to geographical regions based on the state of origin and the destination state. We are also interested to see if education-job mismatch varies across different regions between urban and non-urban states. Third, we examine the effect of migration on graduates income. We anticipated that those who migrated to urban states may increase their wages and reduce education-job mismatch due to a more vibrant economy in the urban states which require a large number of highly skilled workers to fill up the jobs.

Geographically, Malaysia is divided into two main parts - the Peninsular and the

Borneo states[1], which are separated by the South China Sea. Malaysia is a newly industrialised market economy, with its main economic activity have moved from 1970's predominantly agriculture towards industrialised sectors. However, most developments only occur in certain parts of the country causing a large disparity between the urban and the non-urban states.

The dualistic economic structure in the country causes significant interregional differentiated skills where highly innovative regions in Klang Valley and Penang (KVP) attract high skilled workers to work in highly industrialised sectors, while the less developed regions are characterised mainly by agriculture, self-employment, traditional and low-technology industries which offer low skilled jobs[2]. On the higher end - Klang Valley (Kuala Lumpur and part of more developed Selangor[3]) and Penang are the most innovative states with superior scientific and technological infrastructure, the centre for public sectors administration offices, and the location all of the top public universities in the country. Klang Valley also receives inflows of workers from the other states. In particular, Selangor is the main migrant destination in the country followed by Penang (Dept. of Statistics, 2011). At the lower end, the Eastern states (Kelantan and Terengganu) experience increasing internal brain-drain due to its population moving out to obtain more suitable jobs. One question of interest is if migration towards wealthier Klang Valley regions increases Eastern graduates.

There are large differences in the employment opportunities in different parts of the country. The regional environment (i.e. economic, technology, social) provide a

[1]The Borneo states Sabah and Sarawak joined the federation of Malaya in September 1963 to gain independence from the British colonisation, resulting in the formation of Malaysia.

[2]With the exception of public sector employment such as hospitals and schools which are more sparsely distributed across the country and may require high skilled workers i.e. doctors.

[3]Klang Valley constitutes Kuala Lumpur and part of Selangor e.g. Shah Alam, Klang, Subang Jaya, Cheras, Ampang, Kajang, and Selayang. The Klang Valley part of Selangor is also the most developed in the state and constitute the larger part of Selangor. Since we do not have the data to differentiate between non-Klang Valley Selangor then we categorise the whole Selangor as Klang Valley.

platform for further economic growth and in order to develop, these regions require skilful workers and hence these regions tend to attract more inflow of migration. More innovative states offer more learning opportunity through the establishment of good ranking universities. Moreover, highly industrious regions are more able to integrate various skills in the labour market. This phenomenon leads to a self-reinforcing mechanism of skills creation and retaining skills for work, which leads to further development in the urban states and a larger disparity between the urban and the non-urban regions. The sub-national economic disparity leads us to question if migration to urban states increases graduates wages. At the same time, does migrating to urban states decreases education-job mismatch because graduate moves to another state in order to increase wages and find a more suitable job.

Demographically, the Bumiputera consists of the Malays and the indigenous tribes in Sabah and Sarawak, who possess special rights as *the son of the soil*. There is also a sub-national disparity in the ethnic distribution. The Bumiputeras are more populated in less developed regions. Eastern states (Kelantan and Terengganu) are mainly populated by Malays and are the least developed states in the country. The main economic activity in the Eastern states is agriculture (fishing, forestry, farming). The two states are also under the left wing political party. Sabah and Sarawak are populated by various groups of Bumiputeras and there is lesser migration between the Borneo states and the Peninsular states because of the further distance between the two lands which are separated by the South China Sea. Chinese population had been historically coinciding with the fast development of the urban states when they started to work in the then booming tin mining in Kuala Lumpur (now the capital city). The second most developed region in the country is Penang where the Chinese had been affiliated with merchant activities in the import and export of goods through the Penang port. Penang's historical success is due to its strategic location in the Strait of Malacca which became the main port for trades, while

Indians work in rubber plantations in various regions, with a small fraction works with the public sector (Zainudin and Zulkifly, 1982).

Another important question is whether graduates stay in the state where they attended university. The top public universities are all located in the Klang Valley and Penang regions. If graduates moved to these cities for their education, there is a high probability that they will adjust themselves in those cities and stay there for a better prospect of employment instead of going back to where they originated from, especially if they come from a non-urban state.

We should acknowledge that this paper is examining graduates in their first job after graduation within a very short time frame. For some graduates in our study, their current job might probably be a transitory phenomenon (Rosen, 1972) where they accept the first job offers that require less qualification in order to gain experience and use this job as a stepping stone before they take up more suitable job in the future. Dekker et. al. (2002) called this as the *waiting room effect* - graduates found themselves experiencing education-job mismatch at the beginning of their career by taking up part-time or temporary jobs.

This paper speaks to the literature aimed at explaining the impact of migration on education-job mismatch. According to (Venhorst and Corvers, 2015), education-job mismatch depends on certain types of course of study. The finding in Iammarino and Marinelli (2007) showed, in general, the significant effect of migration on reducing education-job mismatch and increasing the likelihood of being employed. Ciriaci (2014) showed that the most important decision is actually where the education takes place. They found that large majority of Italian graduates tend to stay at the location where they attended university[4]. In another study, using geographical

[4]The study of Italian graduate migration is also interesting because of the dualistic economy between the centre and the north/south provinces.

information system in their three-stage simultaneous equation model, Faggian and McCann (2009) studied the connection between regional mobility and the innovation dynamism of a region, where they found that higher education plays an important role in fostering local and regional economic development.

4.2.1 Graduates migration patterns.

Education-job (mis)match can be measured objectively where the mismatch is evaluated by professionals or by using statistical matching in which an individual's education is compared to the average requirement of that particular job. A subjective measure such as in the case of our study, on the other hand, uses individual's self-reported response and is the easiest to observe compared to a more objective measure. However, a subjective measure may subject to measurement errors based on individual perception and expectation. This is especially so because our sample is composed of inexperienced fresh graduates in their first jobs. These young workers may also choose jobs that are not related to the courses of study and they may report that their education is not helpful in carrying their job tasks. The phenomenon is especially true among graduates from certain type of courses where the employment prospects are rather varied compared to courses such as Medical (in each specific specialisation) and Dentistry in which their trainings are specifically designed to perform specific tasks for the job.

Question 49d of the tracer study provides information on graduates' self-assessment on whether or not their course of study helps to carry out their job tasks. The optimal condition is when a graduate responded with "highly matched", indicating the effectiveness of their education towards carrying out the job tasks. The incidence of education-job mismatch occurs when a graduate responded with "mismatched" or "highly mismatched". The response is recorded as in Table 4.1. We use this

information as the measurement of education-job (mis)match in our subsequent analyses. Majority of the graduates responded positively, where only 13.7% said their course of study are does not contribute to the productivity of their current job.

Table 4.1: Q49d: Education-job (mis)match

	Frequency	Percent
Highly mismatched	1,067	2.22
Mismatched	5,515	11.50
Matched	24,754	51.61
Highly matched	16,627	34.67
Total	47,963	100.00

Interregional migration is defined as individual who migrated to another state other than their state of origin. Graduate's state of origin and state of which they are employed is given in table Table 4.2. Urban states such as Selangor, Kuala Lumpur, Putrajaya, and Penang see the inflow of graduates while the rest of the regions are losing out graduates to urban states.

In order to analyse the effect of migration in Malaysian dualistic economy, we need to differentiate the movement between the urban and the non-urban states. We categorise the urban states to include Klang Valley (Selangor, Kuala Lumpur, and Putrajaya) and Penang. The East Coast Peninsular states Kelantan and Terengganu are grouped into the Eastern states. The rest of the Peninsular states are grouped together into the North/South states. Finally, Sabah and Sarawak are grouped into the Borneo states.

We identify graduates who originated from non-urban states and moved to urban states for work, and call this group `urb2urb`. Conversely, among those who originated from urban states and moved to non-urban states for work is identified as `urb2non`. We identify graduates originated from Klang Valley and Penang and

Table 4.2: Graduates' state of origin and job state.

	State of origin	Job state	Net migration
Johor	5,110	3,898	-1212
Kedah	3,002	1,882	- 1120
Kelantan	2,946	1,539	- 1407
Melaka	1,630	1,331	-299
Negeri Sembilan	2,076	1,349	- 727
Pahang	2,245	1,420	- 825
Pulau Pinang	2,803	3,132	+ 329
Perak	3,923	2,211	- 1712
Perlis	400	302	- 98
Selangor	12,283	13,897	+ 1614
Terengganu	2,019	1,452	- 567
Sabah	2,169	1,925	- 244
Sarawak	2,826	2,394	- 432
Wilayah Persekutuan Kuala Lumpur	4,023	9,317	+ 5294
Wilayah Persekutuan Labuan	91	162	+ 71
Wilayah Persekutuan Putrajaya	418	892	+ 474

remain working in the same area as `stayKVP`. We also identify graduates who originated from any of the urban states and moved to another urban states and call this group `urb2urb` and those originated from any of the non-urban states and moved to another non-urban states `non2non`. Finally, we identify graduates who remained in their state of origin excluding those from Klang Valley region as `remain`. For the purpose of analysis, the `stayKVP` group is dropped from our estimation so that we can be able to use `remain` as the baseline, therefore we can analyse the effect of all migration patterns. The intuition behind dropping the `stayKVP` group is that they did not need to migrate out to maximise their net gain because they can just remain in their state of origin. Table 4.3 shows different migration pattern among our sample graduates.

Majority of graduates remain in their state of origin. Only about four out of ten graduates migrated to another states. 20% of all employed graduates moved from

Table 4.3: Graduate migration patterns.

Item	Number	Per cent
non2urb	7,980	21.39
urb2urb	4,361	11.69
non2non	2,320	6.22
urb2non	850	2.28
stayKVP	8,640	23.16
remain	13,158	35.27
Total	37,309	100.00

non-urban states to urban states. There are larger fraction of Law and Computer Science graduates who move within the urban states urb2urb. A percentage of 2% moved from an urban origin to non-urban states. Out of 850 graduates who reported as urb2non, half of them were from Medical and Engineering. 12% moved from an urban state to another and 5% moved from a non-urban state to another.

The cross tabulation between graduate income and migration pattern in Table 4.4 confirms our initial assumption that graduates who remain in their states (excluding those from Klang Valley region) have more tendency of getting lower pay. There may be several reasons for this. It could be because of their lower characteristics, where they couldn't compete with those who migrated out and hence they choose to remain. It could be that they prefer to remain, at the cost of lower remuneration.

However we can't say similar things to those who originated and remained employed in Klang Valley region because they are more likely to earn middle income between RM 1500 to RM 2500. Another pattern can be seen among those who migrated but stay within the urban regions - half of these graduates earn a little bit higher than those who remained in the Klang Valley, they earn between RM2000 to RM 3000.

We would expect graduates who moved from the non-urban states to show more tendency towards the highest earning, instead our graduates sample show that those

who moved from non-urban regions to an urban state are more likely to earn moderately between RM 1500 to RM 2500. Interestingly, 37% those who migrate from urban states to non-urban states earn RM 3000 and more. The explanation for this peculiarity is that a large portion of Medical and Dentistry graduates move from urban states towards non-urban states due to their job assignment that are sparsely distributed across the country.

Table 4.4: Graduate income by migration patterns.

	< RM 500	RM 501 - RM 1000	RM 1001 - RM 1500	RM 1501 - RM 2000	RM 2001 - RM 2500	RM 2501 - RM 3000	RM 3001 - RM 5000	> RM 5000	Total
non2urb	2.0	9.4	14.6	25.6	25.6	16.8	5.6	0.3	100.0
urb2urb	1.5	5.0	12.0	22.5	28.1	19.9	10.4	0.6	100.0
non2non	3.3	13.3	13.1	17.0	18.1	12.0	17.0	6.2	100.0
urb2non	3.9	8.1	7.6	12.8	16.4	14.2	30.2	7.0	100.0
stayKVP	2.8	9.5	16.1	25.7	25.6	14.1	5.8	0.3	100.0
remain	7.8	27.2	20.1	18.7	13.4	7.0	5.6	0.3	100.0
Total	4.8	17.2	16.4	20.9	19.5	12.3	8.0	1.0	100.0

Table 4.5 presents the cross tabulation between graduate income and education-job mismatch. Consistent with our assumption, education-job mismatch is related to lower wage. The pattern of migration and education-job mismatch in Table 4.6 seems do not display any significant pattern.

Table 4.5: Graduate income by education-job (mis)match.

Graduate income	Highly matched	Matched	Mis-matched	Highly mis-matched	Total
< RM 500	24.9	47.7	20.9	6.5	100.0
RM 501 - RM 1000	26.6	49.2	18.8	5.4	100.0
RM 1001 - RM 1500	30.0	54.3	13.3	2.3	100.0
RM 1501 - RM 2000	29.8	56.4	11.9	1.8	100.0
RM 2001 - RM 2500	25.5	60.1	12.7	1.6	100.0
RM 2501 - RM 3000	26.5	60.9	11.2	1.5	100.0
RM 3001 - RM 5000	40.1	50.8	7.6	1.5	100.0
> RM 5000	33.2	54.2	10.5	2.0	100.0
Total	28.6	55.5	13.3	2.6	100.0

Table 4.6: Education-job (mis)match by migration patterns.

	Highly matched	Matched	Mis-matched	Highly mis-matched	Total
`non2urb`	27.7	57.4	12.9	2.0	100.0
`urb2urb`	27.7	57.4	12.9	2.0	100.0
`non2non`	29.7	55.9	12.4	1.9	100.0
`urb2non`	38.4	49.9	10.1	1.6	100.0
`stayKVP`	28.0	56.6	13.1	2.3	100.0
`remain`	28.9	53.3	14.6	3.2	100.0
Total	28.6	55.5	13.3	2.6	100.0

4.2.2 Modelling migration and education-job mismatch.

A graduate makes a choice between two alternatives: $y = 1$ denotes the decision to choose a particular type of migration, and $y = 0$ denotes the decision to remain at the same state of origin. Assuming a rational individual maximises his utility in making a decision within the information constraint that he has, we can estimate the migration pattern using a logit model with a latent variable y^* as following

$$y_{1i}^* = X_{1i}'\beta_1 + \epsilon_{1i} \tag{4.1}$$

where instead of observing y_{1i}^*, we observe the individual decision y_{1i}

$$y_{1i} = \begin{cases} 1 & \text{if } y_{1i}^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{4.2}$$

$$Pr(y_{1i} = 1|X_1) = \frac{\exp(X_1'\beta)}{1 + \exp(X_1'\beta)} \tag{4.3}$$

$$Pr(y_{1i} = 0|X_1) = \frac{1}{1 + \exp(X_1'\beta)} \tag{4.4}$$

The above binary choice model is subject to selectivity bias because we only observe the migration pattern among graduates who are employed. Due to the non-random assignment of migration, similar characteristics that influence graduate's decision to participate in the labour market may also influence their decision to migrate. We specify a selection equation using an employment equation

$$y_{2i}^* = X_{2i}'\beta_2 + \epsilon_{2i} \tag{4.5}$$

where the employment status is given by

$$y_{2i} = \begin{cases} 1 & \text{if } y_{2i}^* > 0 \text{ (employed)} \\ 0 & \text{unemployed} \end{cases}$$

The Heckman's inverse Mills ratio is computed from the employment equation and used for the subsequent analyses (Heckman, 1979). We only report the estimation result of a probit model on employment in the Appendix section of this chapter.

The main discussion is on the migration behaviour. Results for migration models is reported in Table 4.7. The dependent variable for the first model in column 2 is `migrate` - which includes all graduates who move away from their place of origin. Higher academic achievement increases the probability to migrate among graduates who want to compensate for their better characteristic within the limited constraint of the local job market. However, higher English language ability reduces the probability of migrating. Keep in mind that we are estimating the whole migration pattern hence the result may display mixed conclusions. In the overall, higher family income plays an influential role in migrating behaviour, but again, the coefficient is negative for higher income. Graduates are more likely to stay in the state where they attended university. By choosing to remain at the state of education, they are more likely to migrate from their state of origin thus signify the significance of university location. Better job characteristics increase the probability to migrate regardless of the pattern. Self-employment has a negative significant coefficient, as we expected, and they would be better off by staying in their place of origin to reduce the starting up cost.

However this model groups together all patterns of migration (urban to non-urban, non-urban to urban, etc.) and hence produces mixed results. Since we are par-

ticularly interested in studying the effect of migrating into the urban areas (especially those from non-urban states), we further estimate another four specifications: `urb2urb, urb2non, non2non, non2urb`. The results are given in columns 3-6 in Table 4.7. Academic achievement increases the probability of migration towards the urban states (among those coming from both urban and non-urban states) showing that graduate with better academic performance migrates to the urban states to increase their job prospects (i.e. earnings, quality of life). The innovativeness and competitiveness in the urban state also allow the graduates to fully utilise their skills. In the case where CGPA is assumed to be a signal to display a graduate's potential ability, we see here that graduates use this as another form of a human capital trait to increase their employment prospects. Nonetheless, the higher academic achievement also increases the migration within the non-urban states. Based on the same explanation, graduates with better academic achievement will be more likely to move because they need to be compensated for their better characteristics. We build on Sjaastad (1970)'s theory that states the probability to migrate increases with educational level, and here we show that the probability to migrate also increases with individual's superior performance in CGPA.

Table 4.7: Estimation results for migration models based on different migration patterns

	(1) migrate	(2) urb2urb	(3) urb2non	(4) non2non	(5) non2urb
y=migrate					
CGPA	0.108*	0.259***	0.00750	0.443***	0.282***
	(0.0485)	(0.0738)	(0.150)	(0.0849)	(0.0552)
Band 2	-0.148*	0.302*	0.476	-0.188	-0.190**
	(0.0668)	(0.131)	(0.289)	(0.114)	(0.0726)
Band 3	-0.231***	0.672***	0.647*	-0.207	-0.217**
	(0.0684)	(0.131)	(0.289)	(0.116)	(0.0749)
Band 4	-0.183*	0.963***	0.935**	-0.290*	-0.152
	(0.0781)	(0.142)	(0.303)	(0.133)	(0.0874)
Band 5	-0.308**	1.127***	0.996**	-0.677***	-0.398**
	(0.112)	(0.178)	(0.340)	(0.194)	(0.133)

Band 6	0.165	1.772***	1.315*	0.0675	0.699
	(0.332)	(0.495)	(0.652)	(0.563)	(0.447)
Arts/SocSc	-0.246	-0.249	1.674	-0.271	-0.514**
	(0.165)	(0.229)	(1.061)	(0.334)	(0.185)
Transport	0.300	-0.292	1.980	-1.268	0.0133
	(0.268)	(0.385)	(1.183)	(0.787)	(0.301)
Administration	-0.0271	-0.373	1.674	-0.0243	-0.255
	(0.155)	(0.207)	(1.029)	(0.313)	(0.177)
Management	-0.234	-0.364	1.417	-0.142	-0.486**
	(0.150)	(0.195)	(1.027)	(0.307)	(0.170)
Economy	-0.0592	-0.518*	1.620	0.194	-0.281
	(0.174)	(0.255)	(1.074)	(0.334)	(0.195)
Accountancy	-0.129	-0.283	1.006	-0.298	-0.332
	(0.155)	(0.201)	(1.037)	(0.317)	(0.176)
Marketing	-0.372*	-0.216	0.968	0.0942	-0.556**
	(0.182)	(0.245)	(1.131)	(0.341)	(0.204)
Finance	-0.105	-0.138	1.140	0.0148	-0.285
	(0.156)	(0.205)	(1.049)	(0.317)	(0.177)
Journalism	0.0463	0.847***	1.607	-0.612	0.177
	(0.171)	(0.219)	(1.091)	(0.405)	(0.198)
Islamic	-0.00436	-0.910**	2.050	0.266	-0.257
	(0.189)	(0.306)	(1.069)	(0.355)	(0.212)
Food/hospitality	-0.153	-0.121	2.159*	-0.0949	-0.442*
	(0.180)	(0.238)	(1.049)	(0.353)	(0.204)
Arts	-0.000492	-0.127	1.889	-0.397	-0.262
	(0.175)	(0.252)	(1.085)	(0.371)	(0.197)
Pure science	0.0997	-0.167	1.497	-0.159	-0.162
	(0.190)	(0.273)	(1.133)	(0.395)	(0.213)
Applied science	-0.216	-0.145	2.006	-0.196	-0.508**
	(0.156)	(0.204)	(1.029)	(0.320)	(0.177)
Pharmacy	-0.0615	0.0756	3.673***	-0.992	-0.596
	(0.303)	(0.425)	(1.116)	(0.797)	(0.362)
Medical	-0.0896	-1.949***	2.697**	0.142	-1.338***
	(0.175)	(0.244)	(1.039)	(0.336)	(0.210)
Dentistry	-0.461	-1.616**	3.746***	-0.0636	-2.328***
	(0.388)	(0.596)	(1.114)	(0.591)	(0.649)
Nurse	0.258	-0.105	2.133*	-0.142	0.0101
	(0.183)	(0.251)	(1.066)	(0.391)	(0.209)
Environment	-0.292	-0.768**	2.267*	0.517	-0.628**
	(0.176)	(0.250)	(1.041)	(0.327)	(0.200)
Sports	0.530	-0.0180	2.884*	-0.812	0.258
	(0.275)	(0.458)	(1.182)	(0.792)	(0.310)
Engineering	0.00554	-0.538**	2.082*	0.431	-0.233
	(0.143)	(0.186)	(1.012)	(0.297)	(0.164)
CompSci	0.488**	0.434*	1.782	0.161	0.559**
	(0.150)	(0.197)	(1.029)	(0.315)	(0.173)
Education	-0.690***	-1.405***	1.810	0.0164	-1.103***

	(0.167)	(0.245)	(1.043)	(0.321)	(0.188)
Male	0.0835*	0.237***	0.350***	0.343***	0.164***
	(0.0352)	(0.0534)	(0.0987)	(0.0598)	(0.0403)
Age	-0.0156	-0.00226	-0.109	-0.00727	-0.00100
	(0.0196)	(0.0293)	(0.0588)	(0.0342)	(0.0222)
Malay	0.502***	1.068***	0.355*	0.203*	0.749***
	(0.0585)	(0.0946)	(0.165)	(0.0968)	(0.0644)
Chinese	0.593***	0.111	0.163	0.751***	0.758***
	(0.0750)	(0.119)	(0.207)	(0.125)	(0.0839)
RM 501 - RM 1000	-0.0635	-0.243	-0.710***	-0.160	-0.0876
	(0.0671)	(0.126)	(0.213)	(0.110)	(0.0747)
RM 1001 - RM 1500	-0.0560	0.0268	-0.389	-0.252*	-0.0826
	(0.0691)	(0.125)	(0.202)	(0.113)	(0.0772)
RM 1501 - RM 2000	-0.107	0.167	-0.363	-0.266*	-0.103
	(0.0723)	(0.127)	(0.207)	(0.118)	(0.0813)
RM 2001 - RM 2500	-0.171*	0.467***	-0.238	-0.306*	-0.145
	(0.0763)	(0.128)	(0.214)	(0.126)	(0.0863)
RM 2501 - RM 3000	-0.140	0.667***	-0.342	-0.382**	-0.0561
	(0.0730)	(0.123)	(0.209)	(0.124)	(0.0826)
RM 3001 - RM 5000	-0.254***	0.800***	-0.253	-0.454***	-0.143
	(0.0733)	(0.121)	(0.204)	(0.126)	(0.0833)
> RM 5000	-0.367***	1.152***	0.0431	-0.416**	-0.166
	(0.0822)	(0.127)	(0.211)	(0.147)	(0.0965)
Unistay*	0.800***	0.530***	-0.349**	0.0253	1.015***
	(0.0347)	(0.0577)	(0.134)	(0.0699)	(0.0401)
Full time	0.542***	0.921***	0.326*	0.401***	0.731***
	(0.0494)	(0.0813)	(0.149)	(0.0815)	(0.0533)
Permanent	0.0754*	0.0449	0.114	0.0696	0.104**
	(0.0343)	(0.0516)	(0.101)	(0.0599)	(0.0390)
Professional	0.262***	0.520***	0.374**	0.252***	0.392***
	(0.0368)	(0.0564)	(0.118)	(0.0636)	(0.0404)
Self-employed	-1.113***	-1.533***	0.179	-0.737***	-1.671***
	(0.134)	(0.223)	(0.238)	(0.189)	(0.164)
λ	0.393*	-0.833**	-1.502**	-0.0301	0.443*
	(0.178)	(0.269)	(0.537)	(0.309)	(0.200)
Constant	-2.111**	-4.055***	-2.254	-3.560**	-3.059***
	(0.668)	(1.005)	(2.206)	(1.167)	(0.757)
Observations	21952	13464	11302	12521	16768

Standard errors in parentheses
Unistay* = Obtain job at the state where they attended university.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results for English language score is more meaningful when we separate the analysis by different migration pattern. Higher MUET score clearly increases mi-

gration of graduates within the urban states but it also increases the migration from an urban state to a non-urban state. The peculiarity of the relationship between higher English score and moving from an urban state to work in the non-urban state can be explained by the courses of study. We found that at least seven out of ten Medical and Dentistry graduates attained a MUET score of at least Band 3, compared to the other graduates (except Law) who averages about three out of ten. Medical and Dentistry graduates also have the highest fraction of graduates who move from an urban state to non-urban states (15% of Medical and 23% of Dentistry), compared to the average of all other graduates at 2.9%. The explanation of higher MUET and choosing to move from an urban state to a non-urban state must therefore be taken with precaution. On the other hand, graduates who scored Band 2, Band 3, and Band 5 reduces the migration pattern from a non-urban state to an urban state. Similarly, Band 4 and Band 5 graduates reduces `non2non` migration. One explanation is that due to the competitiveness in the urban job market, graduates with better signalling (both CGPA and MUET) have better chance to obtain jobs in the urban state, pushing the remaining with lower CGPA and lower MUET score to work in the non-urban states.

We use Law as the base category to discuss the effect of courses of study. Journalism and Computer Science graduates are much more likely to choose `urb2urb` migration. Courses such as Economy and Engineering are less likely than Law, but their pattern to choose `urb2urb` is higher than the rest. For `urb2non` migration we found mostly the graduates who took Science subjects[5] are more likely to migrate in this pattern. 60% of Pharmacy graduates, 84% of Medical graduates, and 93% of Dentistry graduates work with the public sector which randomly assign them towards more sparsely distributed job location across the country. We also found that Engineering and Food & Hospitality are also more likely to move `urb2non`. Engineering

[5]Pharmacy, Medical, Dentistry, Nurse, Environment, Sports

graduates constitute the largest group in our sample, a quarter of all the observed graduates. The migration pattern of Engineering graduates who are more likely to choose `urb2non` can perhaps be explained by the competition dimply because there are a lot of Engineering graduates in the market and the jobs availability in the urban states are limited.

We found none of the courses of study are significantly different than Law in the case of migration from a non-urban state to another. For `non2urb`, again, Medical, Dentistry, and Education graduates are less likely to choose this migration pattern - on account of their employment with the public sector (hospitals, health departments, schools) that allocate them more sparsely into the larger region of non-urban states. In contrast, Computer Science graduates are more likely to move from a non-urban state to an urban state which corresponds to the availability of high technological jobs in the more developed states.

Male graduates are more likely to migrate in all migration circumstances, which may help explain their better remuneration and job characteristics. Women, on the other hand, are less likely to move and rather remain at the state of origin. Age has no significant effect on graduates' migration. The result for age in this sample should not be generalised to the larger sample because we only observe a homogenous group of youth in their early careers. We further look at the contribution of family income. Higher family income increases the migration within the urban states, understandably due to the costs associated with migration, and particularly, migrating towards urban states require higher costs of living. However, higher family income reduces the migration within the non-urban states. Graduates among the lowest family income may choose to migrate within the non-urban states so they can increase their employment prospects better than staying. Compared to all the other ethnic groups, Malays are more likely to migrate in all directions. Chinese's

coefficients are only significant in the migration from the non-urban states - signify the movement patterns of Chinese towards the urban states. The coefficients of Chinese migration from the urban states are not significant.

As we have expected, those who attended universities in an urban state are more likely to migrate from their state of origin and stay at the location of their study. The place of education is found to be a strong link for migration behaviour - those who choose to study at an urban institution tend to stay there for employment, conversely, those who studied at non-urban areas did not choose to stay. The result is similar to the Italian graduates (Iammarino and Marinelli, 2007) in which graduates who attended universities in the urban areas are more likely to be absorbed by the local labour market. There is some correlation between attending selective universities in the urban areas and high ability graduates. This is because the top universities are located in the urban states[6]. More prestigious universities choose potential applications from a pool of high school leavers who scored exceptional achievements. These highly competitive students possess better attributes to perform well in those selective institutions and then perform better to secure superior occupations after graduating. Regardless of where they come from, these graduates who have already resided in an urban state during their study have already accustomed themselves to those states and hence making the transition to obtain a job in those states is much easier than those who attend institutions in non-urban states. The correlation between migration and high ability graduates creates an endogeneity problem where only those with high expectation for higher income coupled with the higher confidence that they can do better (due to their better quality) will move. This opens up an opportunity for new research using an appropriate instrument to handle the endogeneity issue created by the sorting algorithm.

[6]Top public universities such as UM, UKM, and UPM are located in the Klang Valley; USM in Penang; and all renowned private institutions are located in Klang Valley.

This finding suggests that an urban state may continuously creating a self-reinforcing mechanism in which they offer education for skills creation, and at the same time offer jobs to utilise those skills, thus making an urban state continues to grow while leaving the remaining states losing out both in terms of retaining skills and growth. Our analysis shows that better job characteristics are associated with all migrating patterns, which only strengthen our assumption that graduates choose to migrate to obtain better jobs. As we have expected, the self-employed are less likely to move into another state in all model (except `urb2non` where the coefficient is not significant).

Education-job mismatch and migration.

Turning to the core research question on the impact of migration towards education-job (mis)match. Consider the model of education-job mismatch in an ordered dependent variable of a 4-Likert scales from `1:highly matched` to `4:highly mismatched` listed in the Table 4.1. The model can be estimated by a latent variable $y_i^* = X'\beta + \epsilon$ where the observed variable y is related to the latent variable as $y = 1(y^* \leq j)$ with $j = 1, 2, 3, 4$ denotes the four levels of education-job (mis)match. Let $\alpha_1 < \alpha_2 < \alpha_3$ be the threshold parameters to be estimated with β where

$$
\begin{aligned}
y &= 1 \text{ if } y^* \leq \alpha_1 \\
y &= 2 \text{ if } \alpha_1 < y^* \leq \alpha_2 \\
y &= 3 \text{ if } \alpha_1 < y^* \leq \alpha_3 \\
y &= 4 \text{ if } y^* > \alpha_3
\end{aligned}
$$

Then, the response probability is defined as

$$Pr(y = j) = \Lambda(\alpha_j - X'\beta) \tag{4.6}$$

where $\Lambda(.)$ is a logistic function. A set of factors such as SES variables, education, and job characteristics, may explain the education-job (mis)match. We take into account the selectivity bias by including the inverse Mills ratio from the employment equation, which is reflected in the λ coefficient in the estimation result.

The results of an ordered model are presented in Table 4.8 for four regions: Klang Valley and Penang (KVP), North and South, Borneo, and Eastern states. The

following patterns occur: migration towards an urban state is only observed in Model (1) in the Klang Valley region and Penang. Migration from both the urban and the non-urban states towards KVP do not significantly affect job-education mismatch. The effect of migration is only significant in the case reducing education-job mismatch among those who move from an urban state towards North / South regions. The reduction in the mismatch is influenced by the movement of Medical and Dentistry graduates moving towards the non-urban states who are less likely to experience education-job mismatch.

Table 4.8: Estimation results for the education-job mismatch.

	(1) KVP	(2) North/South	(3) Borneo	(4) Eastern
y=Mismatch				
non2urb	-0.0606	0	0	0
	(0.0637)	(.)	(.)	(.)
urb2urb	-0.0528	0	0	0
	(0.0704)	(.)	(.)	(.)
urb2non	0	-0.302**	0.282	0.0664
	(.)	(0.0942)	(0.317)	(0.299)
non2non	0	-0.0941	-0.340	-0.224
	(.)	(0.0574)	(0.212)	(0.175)
CGPA	-0.352***	-0.342***	-0.604***	-0.229
	(0.0613)	(0.0701)	(0.162)	(0.165)
Band 2	0.225*	0.0181	0.165	0.256
	(0.0973)	(0.103)	(0.184)	(0.138)
Band 3	0.428***	0.0962	0.157	0.326*
	(0.0986)	(0.105)	(0.188)	(0.157)
Band 4	0.625***	0.174	0.179	0.164
	(0.109)	(0.121)	(0.215)	(0.240)
Band 5	0.759***	0.0871	0.287	-0.0517
	(0.147)	(0.174)	(0.307)	(0.590)
Band 6	0.640	1.040*	0.915	-0.152
	(0.471)	(0.450)	(1.033)	(1.698)
Arts/SocSc	0.792***	0.833**	1.214*	-0.523
	(0.200)	(0.261)	(0.615)	(0.803)
Transport	0.724*	0.944*	2.754*	0.147
	(0.326)	(0.405)	(1.315)	(1.220)
Administration	0.585**	0.389	0.843	-0.221
	(0.182)	(0.245)	(0.641)	(0.808)
Management	0.759***	0.619**	1.057	0.219

	(0.175)	(0.239)	(0.602)	(0.789)
Economy	1.075***	0.518	1.216	-0.163
	(0.216)	(0.269)	(0.644)	(0.819)
Accountancy	0.238	0.210	0.627	0.00437
	(0.179)	(0.246)	(0.623)	(0.809)
Marketing	0.225	0.199	0.339	-0.286
	(0.218)	(0.274)	(0.627)	(0.854)
Finance	0.601**	0.461	0.938	0.335
	(0.183)	(0.248)	(0.615)	(0.804)
Journalism	0.557**	0.282	1.152	-0.605
	(0.195)	(0.287)	(0.684)	(0.866)
Islamic	0.624*	0.177	0.463	0.140
	(0.251)	(0.284)	(0.762)	(0.815)
Food/hospitality	0.373	0.325	0.692	-0.795
	(0.218)	(0.281)	(0.634)	(0.855)
Arts	0.690**	1.038***	1.557*	0.0233
	(0.217)	(0.290)	(0.634)	(0.818)
Pure science	1.454***	1.082***	2.378**	0.697
	(0.226)	(0.312)	(0.799)	(0.849)
Applied science	1.240***	1.120***	1.606**	0.788
	(0.183)	(0.249)	(0.609)	(0.802)
Pharmacy	0.415	0.422	-0.886	-0.543
	(0.398)	(0.443)	(1.332)	(1.129)
Medical	-0.594**	-0.103	0.987	0.134
	(0.228)	(0.269)	(0.659)	(0.849)
Dentistry	0.797	0.0559	0.0692	-1.507
	(0.774)	(0.493)	(1.300)	(1.350)
Nurse	0.134	0.822**	0.870	-0.441
	(0.219)	(0.310)	(0.723)	(0.856)
Environment	0.729**	1.015***	1.410*	0.585
	(0.226)	(0.266)	(0.660)	(0.822)
Sports	0.571	0.873	1.389	2.261
	(0.362)	(0.447)	(1.257)	(1.200)
Engineering	0.820***	1.027***	1.720**	0.646
	(0.165)	(0.233)	(0.590)	(0.786)
CompSci	0.863***	0.914***	1.455*	0.588
	(0.172)	(0.250)	(0.628)	(0.813)
Education	0.606**	0.228	0.609	-0.257
	(0.209)	(0.253)	(0.616)	(0.801)
Male	-0.0839	-0.166**	-0.141	0.340**
	(0.0453)	(0.0511)	(0.106)	(0.112)
Age	-0.0639*	-0.128***	-0.0298	-0.0296
	(0.0254)	(0.0284)	(0.0584)	(0.0603)
Malay	0.0909	-0.0577	-0.249*	-0.684
	(0.0862)	(0.100)	(0.120)	(0.475)
Chinese	0.669***	0.717***	0.839***	0.424
	(0.105)	(0.119)	(0.172)	(0.549)

RM 501 - RM 1000	0.140	0.0775	0.185	0.0732
	(0.0949)	(0.101)	(0.181)	(0.157)
RM 1001 - RM 1500	0.0661	-0.00871	0.169	0.116
	(0.0965)	(0.102)	(0.195)	(0.176)
RM 1501 - RM 2000	-0.0677	-0.0262	0.0991	-0.00576
	(0.0993)	(0.106)	(0.204)	(0.208)
RM 2001 - RM 2500	0.166	-0.156	0.334	0.0883
	(0.104)	(0.112)	(0.224)	(0.217)
RM 2501 - RM 3000	0.0801	-0.0347	0.347	-0.174
	(0.0991)	(0.108)	(0.206)	(0.222)
RM 3001 - RM 5000	0.0374	0.000248	0.117	-0.00252
	(0.0988)	(0.111)	(0.209)	(0.197)
> RM 5000	0.118	-0.136	0.650**	-0.145
	(0.108)	(0.124)	(0.248)	(0.240)
Married	-0.570	-14.01	0	0
	(1.687)	(1057.2)	(.)	(.)
Unistay*	-0.102*	0.118	-0.0891	-0.471**
	(0.0445)	(0.0670)	(0.104)	(0.167)
Full time	-0.133	-0.142*	0.0630	0.109
	(0.0709)	(0.0624)	(0.119)	(0.105)
Permanent	-0.193***	-0.212***	-0.182	-0.167
	(0.0434)	(0.0508)	(0.109)	(0.130)
Professional	-0.780***	-0.999***	-0.918***	-1.236***
	(0.0495)	(0.0528)	(0.109)	(0.107)
λ	-0.709**	-0.539*	0.324	0.390
	(0.233)	(0.253)	(0.523)	(0.510)
κ_1	-3.762***	-5.635***	-2.059	-2.554
	(0.879)	(0.969)	(2.062)	(2.185)
κ_2	-0.872	-2.880**	0.511	-0.189
	(0.878)	(0.967)	(2.061)	(2.185)
κ_3	1.237	-0.833	2.394	1.713
	(0.879)	(0.968)	(2.063)	(2.187)
Observations	10108	8167	1863	1814

Standard errors in parentheses
Unistay* = Obtain job at the state where they attended university.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Academic performance in general significantly reduces education-job mismatch in all regions. Realistically, graduates with better academic performance find the practicability of their courses of study towards carrying out job tasks. It show that those who did better in academic, also find the usefulness of their courses. We found

an unexpected output for MUET score which shows graduates with higher MUET (Band 2 - Band 5) are more likely to experience education-job mismatch in the case of KVP region. What is more interesting however, this finding is especially true among the private sector workers. Even though higher MUET score lead to better occupational types and higher earning, MUET does not necessarily affect the usefulness of courses of study in the job sector.

Using Law as the base category, we found a larger number of courses taken by graduates working in the KVP region that are associated with significant tendency to obtain jobs that do not match with their specialised qualification. Only Medical courses significantly reduce the probability to obtain a mismatched job. Among the courses that have the highest impact on increasing education-job mismatch in all regions are generally: Pure Science, Applied Science, Engineering, and Computer Science. In Eastern region, none of the courses are significantly different than Law, but Applied Science, Pure Science, Engineering, and Computer Science consistently have the largest impact (although non-significant). We analyse the incidence of an education-job mismatch with precaution because there are various ways to measure education-job mismatch and over-education. Since we use a secondary data from the Graduate Tracer Study provided by the ministry, we have no control to construct a question that can precisely differentiate between the incidence of over- and under-education. Graduates' response to the question if their qualification helps in their current job may have a mixed combination of the two categories of mismatch.

Nonetheless, we discuss the influence of SES variables towards education-job mismatch. Higher age significantly reduces the mismatch in the KVP and the North / South regions. Malays are less likely to be mismatched if they work in Borneo regions. Chinese are experiencing significant education-job mismatch in all the three regions excluding the Eastern state (because Chinese are less likely to be originated

from the Eastern states). Family income does not have any significant impact except in the case of the Borneo region where the highest family income increases the incidence of education-job mismatch. The impact of staying in the state where a graduate attends their university reduces job mismatch in the KVP and the Eastern states, intuitively because urban states consist of more selective universities attended by better quality graduates. These graduates find the practicable usefulness of their courses of study. Professional jobs significantly reduce job mismatch in all regions, but full-time and permanent jobs show a more mixed findings.

The results are very mixed, partly considering the inadequacy of the question to capture the distinction between over-education and under-education. Nonetheless, graduates' self-assessment on how helpful their courses are towards carrying out their job tasks may explain who benefits most from their education by looking at the contrast of the above results. Medical and Dentistry graduates are found to benefit most because their courses of study are tailored to the market demand for highly specialised skill in their field. Other courses are reported to have a lower degree of practical usefulness of their degree towards carrying our their job tasks. The high mismatch in courses such as Arts and Social Science is expected due to their varying nature of practicability. However, the biggest concern is among the more attractive and highly technical courses such as Engineering and Computer Science graduates who have a similar pattern of a mismatch with the other courses. In another aspect, CGPA and MUET are not significant in the model, hence suggesting that there is no difference between the high scorer and the low scorer in terms of benefitting from their education. However, graduates who work in professional job groups reported a significant positive effect on the usefulness of their education towards their jobs.

The effect of migration on income.

Consider individual anticipated wage at current location is W_s^* and their anticipated wage if move to new location is W_m^* as given in the following

$$W_s^* = Z_s'\beta_s + u_s \tag{4.7}$$

$$W_m^* = Z_m'\beta_m + u_m \tag{4.8}$$

Say the one-time cost of migration is $C^* = Z_c'\beta_c + u_c$ and the average realisable earning gain across individual is given by $\Delta^* = W_m^* - W_s^*$ (Tunali, 2000)(Greene, 2000). The systematic sorting / migrating decision $M = 1(W_m^* - W_s^* - C^* > 0)$ is made on the basis of whether $W_m^* - W_s^*$ is larger than the costs of migrating. However note that $\Delta^* > 0$ is not necessary condition for migration to take place.

$$M^* = W_m^* - W_s^* - C^* \tag{4.9}$$

$$= Z_m'\beta_m - Z_s'\beta_s - Z_c'\beta_c + (u_m - u_s - u_c) \tag{4.10}$$

$$= X'\beta + \epsilon \tag{4.11}$$

where a graduate's choice to migrate is denoted as $M = 1(M^* > 0)$ which is influenced by the explanatory variables X. If the factors affecting employment also affect migration decision, then we must take into account selectivity issues (Heckman, 1979). Thus, first we estimate employment equation where we calculate the inverse Mills ratio and included it in the second step to estimate the earning equation.

We only report the effect of migration as presented in Table 4.9. The baseline category is `remain`. The overall impact of migration in all regions are positive and significant, signifies that by moving to another state regardless of origin or destination being urban or not, increases graduates income, although it does not have same effect on education-job (mis)match. This confirms our expectation that graduates may move out of their state of origin to another states to maximise their earnings regardless of whether the job matches with their qualification. We also look at the effect of staying at the same location as the university. Surprisingly, we found that the effect of working at the same state as the university reduces income among those working in KVP and North/South regions.

Table 4.9: Estimation results for modelling the migration effect on graduate income.

	(1) KVP	(2) North/South	(3) Borneo	(4) Eastern
y=Graduate income				
`non2urb`	0.562***	0	0	0
	(0.0590)	(.)	(.)	(.)
`urb2urb`	0.805***	0	0	0
	(0.0653)	(.)	(.)	(.)
`urb2non`	0	0.787***	1.247***	0.650*
	(.)	(0.0900)	(0.310)	(0.302)
`non2non`	0	0.830***	0.774***	0.890***
	(.)	(0.0550)	(0.204)	(0.175)
Unistay*	-0.177***	-0.253***	-0.0676	-0.280
	(0.0412)	(0.0620)	(0.0986)	(0.169)
Observations	10108	8167	1863	1814

Standard errors in parentheses
Unistay* = Obtain job at the state where they attended university.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.2.3 Summary on migration pattern and education-job mismatch.

The empirical findings on the effect of migration on education-job mismatch and earning may be summarised by three broad conclusions. First, higher ability graduates are more likely to migrate and their migration reflects in their higher earnings. Second, better job characteristics are associated with all migrating patterns, which only strengthen our assumption that graduates choose to migrate to obtain better jobs and to compensate for their higher ability (human capital). Third, migration does not necessarily reduce education-job mismatch especially among some attractive courses such as Engineering and Computer Science. The finding informs us that these graduates reported that their courses of study were not helpful in their current job. On the surface, this finding may indicate the lack of quality in the teaching of Engineering and Computer Science courses in Malaysian universities, but a more accurate measure of education-job match is necessary to make a conclusion of the usefulness of these courses offered in the country. The model however clearly distinguishes Medical and Dentistry graduates who were found to benefit the most from their education. This is not surprising since their training is highly specialised towards the needs of their labour market.

In the next section, we look at another dimension of graduate's transition from education to work by investigating the determinants influencing the time it took to obtain their first job.

4.3 Transition time from higher education to employment.

Despite the occupational adjustment in the labour market to cater for the increasing supply of graduates, the unemployment rate among university graduates is still very high and their transition from university to work is distinctly long. Due to the significant increases in the tertiary education, we may find newer cohorts facing difficulties in securing jobs after spending years of education, and they took much longer time to settle down on a job, compared to university graduates several years back. Considering university education is a long and expensive investment, longer transition period can be both devastating to graduates' labour market opportunity and motivation.

Graduates' job search duration has become longer and is less defined now than before. Longer job search period may have a direct effect on the graduate's earnings - in some cases due to prolonged unemployment, some graduates may opt to lower their reservation wages. Some graduates, due to the difficulty to find a proper job, coupled with the stress to pay up the education loan, may choose to lower their expectation after some period elapsed and took up any jobs available, which may result in over-qualification and being under-paid. By taking too long to start work, they also lose in terms of skill accumulation that is necessary for a subsequent job opportunity and remain at the back of the line compared to graduates who already spent a longer time in employment.

In the first chapter, we have established the factors that lead to graduates successful transition from university to work. However, the distribution of the length of duration to obtain the first job itself it rather interesting. Hence, this section is devoted to understand the factors that lead to shorter or longer job search period until a

graduate land on his first job. The period of job search is characterised by the time it took between finishing study and the time that the tracer study was conducted during convocation. Obviously, there are still some graduates who remained unemployed when the measure is taken, which causes some observation to be regarded as *censored*.

Considering graduates' first job have a significant impact on their subsequent transition in the labour market, it is important to understand what causes the long job search duration. An interesting question to be asked is can it be plausible to say that the longer the unemployment period, the harder for that individual to get employed? Among graduates who remained unemployed several months after graduation, what is the likelihood that the event (unemployment) will end in the next period for individuals who have lasted that long? Are there factors affecting the shorter/longer job search duration that can be explained by graduates' choice of education or simply due to their characteristics such as SES factors, academic performance, and English language ability?

The screening hypothesis states that employers use cheaply observed characteristics such as sex, ethnic group, academic performance, and course of study (some of which is believed to correlate with productivity) during recruitment (Arrow, 1973). Employers prefer those with superior characteristics, leaving job seekers with less attractive attributes remained unemployed and have longer transition compared to those with more attractive attributes. The job search theory states that both workers and jobs are heterogenous - therefore, information about them becomes valuable and hence, both employers and job seekers spend time and money in order to acquire that information. Some graduates may refrain from accepting the first job offers they received if they think they can do better in maximising their expected lifetime earnings (Fallon and Verry, 1988). We will see later that Medical, Dentistry, and

Engineering graduates in this study show their tendency to delay working due to this particular reason, considering their first job plays an important role for a subsequent job in their career path. For Medical and Dentistry, their prolonged transition may also be explained by their waiting for placement at one of the public organisations which are scattered all over the country. Our data shows that longer transition is also associated with public sector employment. We suspect that graduates who seek employment with a larger firm such as multinational companies (MNC) may prolong their employment due to the fact that MNC generally offers jobs at a certain time within a year, but the data shows that there is no difference in the transition time between those seeking employment with the MNC with those seeking job elsewhere.

4.3.1 Survival analysis of transition.

Appropriate method to model duration data is survival analysis. The duration is defined as the time elapsed until a transition occur i.e. the event of employment. The model was originally used in the medical field to analyse patient's mortality rate, hence called 'survival', but it is now widely applied in econometric settings such as the study of unemployment duration. The dependent variable of interest is the length of time that elapsed beginning from the time of finishing study until the time the measurement is taken (survey) which may precede termination among those who remain unemployed at the time the survey is conducted.

Given that an individual have remained unemployed until time t, let $T \geq 0$ be the length of time before the first spell of employment took place. The probability that the respondent will be employed in the next short interval of time is given by a

hazard rate

$$\lambda(t) = \lim_{h \to 0} \frac{Pr(t \leq T \leq t + h | T \geq t)}{h} \tag{4.12}$$

where $\lambda(t)$ is the hazard function at which the spells are completed after duration t and h is a small change in t. However the limitation of the above function is that it does not take into consideration the effect of covariates that may explain the transition process itself.

Indeed, we are more interested in the hazard function conditional on a set of covariates X which is available for each individual and may have the predictive capability of an individual subsequent failure time. Thus the hazard function is defined conditional on the covariates. One way is to estimate an accelerated failure time (AFT) model which allows for non-monotonic hazard function. We may assume that the longer the unemployment spell, the less of a risk that the individual will remain unemployed in the next short time period. This may due to several reasons. The longer an individual spent in their job search, the more information they gain about employment. Due to their longer wait, they may also reduce their reservation wage by widening up their range of occupational choices. Considering majority of the graduates took a study loan, they may feel an urge to seize any employment opportunity to be able to pay up the debt. There may be circumstances where an individual may be more susceptible to remain unemployed after a long spell of unemployment due to preference (i.e. married, child-bearing) or loss of motivation (Salas-Velasco, 2007).

However, because parametric approach requires a certain degree of structure imposition for modelling the distribution of baseline hazard which if not specified correctly may distort the estimated hazard rate (see Greene (2000) Ch. 19 pp. 909).

The simplicity of a semi-parametric approach is that it imposes fewer restriction and allow for more meaningful interpretation of coefficients. The most widely used semi-parametric model to analyse the effect of covariates on the hazard function is the Cox's (1972) proportional hazard model. The model is specified as a function of two components

$$\lambda(t|X) = \exp(X'\beta)\lambda_0(t) \tag{4.13}$$

where $\exp(X'\beta)$ is the relative hazard function. Another component, $\lambda_0(t)$ is the underlying baseline hazard to control for individual heterogeneity which involves t but not x. The model estimates β without requiring parametrisation of the baseline hazard, hence λ_0 is not estimated, allowing the exclusion of the assumption regarding the shape of the hazard function. The model assumes that the shape of hazard function is same for all observations, i.e. the probability of getting employed in the subsequent short period of time is rather stable over time.

We may linearise $\lambda(t|X)$ with respect to $\exp(X'\beta)$ using

$$\log \lambda(t|X) = X'\beta + \log \lambda_0(t) \tag{4.14}$$

where a unit increase in X_j increases the hazard of employment by a factor of $\exp(\beta_j)$ which is constant over time.

The analysis will be discussed in the following part.

4.3.2 The transition from university to work in Malaysia.

The graduates were asked about the length (in months) of their job search period before they obtain first employment after graduation. Nevertheless, some observations are censored due to the on-going process of job search while the study is conducted, leaving some respondents remained unemployed at the time they answered the questionnaire. Table 4.10 display the frequency of employment spell among our graduates. Within a twelve months timeframe, around 55% of the graduate was reported to be employed. More than 80% among those whose employment spell occurred at the time the survey is conducted were employed within the first three months after graduation.

The average month it took for employed graduates from a different course of study to obtain their first job is shown in Table 4.11. The overall waiting period is 2.18 months. Graduates from Arts, Sports, Transportation, and Environment were reported to have the fastest transition from university to work. As a matter of fact, graduates who studied Transportation do not only display the fastest transition to work, 70% of them were reported to be employed when the survey is conducted. At the end of another spectrum, graduates from Dentistry, Pharmacy, Medical, and Education are reported to have the longest average waiting period, consistent with our assumption that these graduates refrain from accepting their first job offer when they think they can do better. They are followed by graduates who studied Education, Islamic, Management, and Engineering. Medical graduates are the most employable, but they are among those who spent the longest in the search period. Analysis later will show that professional and permanent job have a longer transition. Hence it is reasonable that Medical, Dentistry, Engineering take longer to obtain their first job because of their bias towards a permanent or professional position.

Table 4.10: Time (in months) to obtain first job.

Item	Number	Per cent
0 month	6,464	17.33
1 month	7,922	21.23
2 months	11,080	29.70
3 months	5,713	15.31
4 months	3,403	9.12
5 months	1,018	2.73
6 months	601	1.61
7 months	519	1.39
8 months	153	0.41
9 months	106	0.28
10 months	58	0.16
11 months	55	0.15
12 months	17	0.05
13 months	58	0.16
14 months	142	0.38
Total	37,309	100.00

The total observation in this study is 85,213 graduates including 37,249 graduates who remain unemployed at the time the survey is conducted, leaving 47,964 graduates who completed their employment spell. The job search duration ranges from minimum 0 month (obtained first job right within the month of or before graduation) to 14 months.[7] Using Cox's proportional hazard model where we assume the hazard function is constant over time, the result is reported in terms of hazard coefficient in Table 4.12.

[7]Stata ignores $t = 0$ but because we want graduates with 0 month duration to enter the model, we changed the value of 0 to a very small value (i.e. .001) to designate that they took the least time to get a job after graduation.

Table 4.11: Time (in months) to obtain first job by different course of study.

Courses	**Duration**	**% Employed**
Law	1.94	0.50
Arts/SocSc	1.83	0.40
Transport	1.91	0.67
Administration	2.20	0.60
Management	2.10	0.50
Economy	1.88	0.49
Accountancy	2.14	0.64
Marketing	1.99	0.51
Finance	2.18	0.52
Journalism	1.92	0.53
Islamic	1.60	0.51
Food/hospitality	1.88	0.57
Arts	1.49	0.42
Pure science	1.94	0.39
Applied science	1.97	0.42
Pharmacy	3.13	0.32
Medical	2.92	0.74
Dentistry	4.02	0.46
Nurse	1.92	0.49
Environment	1.87	0.44
Sports	1.53	0.40
Engineering	2.26	0.53
CompSci	2.20	0.58
Education	1.98	0.34
Total	2.13	0.51

Table 4.12: Estimation results of hazard ratio using Cox's proportional hazard model.

	(1) Pooled	(2) Male	(3) Female
CGPA	1.031	1.065**	1.018
	(0.0161)	(0.0258)	(0.0214)
Arts/SocSc	0.954	1.057	0.911
	(0.0510)	(0.0967)	(0.0608)
Transport	1.044	1.082	1.033
	(0.0969)	(0.160)	(0.123)
Administration	0.879*	0.945	0.850*
	(0.0451)	(0.0797)	(0.0551)
Management	0.898*	0.982	0.867*
	(0.0451)	(0.0823)	(0.0547)
Economy	0.949	1.047	0.905
	(0.0572)	(0.105)	(0.0684)
Accountancy	0.941	0.985	0.918
	(0.0476)	(0.0837)	(0.0583)
Marketing	1.000	1.098	0.958
	(0.0618)	(0.111)	(0.0750)
Finance	0.876*	0.885	0.870*
	(0.0465)	(0.0786)	(0.0580)
Journalism	0.982	1.005	0.963
	(0.0567)	(0.100)	(0.0690)
Islamic	1.018	1.022	1.013
	(0.0668)	(0.117)	(0.0819)
Food/hospitality	0.968	1.000	0.950
	(0.0582)	(0.101)	(0.0713)
Arts	1.099	1.121	1.076
	(0.0653)	(0.109)	(0.0810)
Pure science	0.912	0.907	0.910
	(0.0611)	(0.111)	(0.0740)
Applied science	0.924	1.058	0.872*
	(0.0484)	(0.0922)	(0.0574)
Pharmacy	0.635***	0.670*	0.620***
	(0.0612)	(0.119)	(0.0716)
Medical	0.734***	0.756**	0.728***
	(0.0425)	(0.0709)	(0.0539)
Dentistry	0.564***	0.554**	0.576***
	(0.0688)	(0.110)	(0.0892)
Nurse	1.015	1.203	0.967
	(0.0633)	(0.147)	(0.0726)
Environment	0.931	1.083	0.866
	(0.0578)	(0.111)	(0.0677)
Sports	1.101	1.055	1.201
	(0.113)	(0.147)	(0.190)
Engineering	0.909*	0.954	0.883*
	(0.0437)	(0.0737)	(0.0548)

CompSci	0.894*	0.968	0.850*
	(0.0452)	(0.0782)	(0.0554)
Education	0.928	0.961	0.911
	(0.0498)	(0.0870)	(0.0611)
Age	0.969***	0.974**	0.964***
	(0.00543)	(0.00848)	(0.00708)
Malay	1.103***	1.122***	1.092***
	(0.0213)	(0.0347)	(0.0271)
Chinese	1.205***	1.195***	1.211***
	(0.0258)	(0.0402)	(0.0339)
Urban	1.041**	1.056**	1.032
	(0.0142)	(0.0222)	(0.0185)
Married	1.238	1.089	1.318
	(0.620)	(1.091)	(0.762)
Family income			
RM 501 - RM 1000	0.982	1.020	0.964
	(0.0251)	(0.0448)	(0.0305)
RM 1001 - RM 1500	0.961	0.980	0.950
	(0.0248)	(0.0427)	(0.0306)
RM 1501 - RM 2000	0.972	0.999	0.958
	(0.0256)	(0.0437)	(0.0317)
RM 2001 - RM 2500	0.950	0.970	0.937
	(0.0262)	(0.0436)	(0.0330)
RM 2501 - RM 3000	0.956	0.964	0.954
	(0.0253)	(0.0420)	(0.0319)
RM 3001 - RM 5000	0.951	0.967	0.943
	(0.0250)	(0.0420)	(0.0314)
> RM 5000	0.955	0.953	0.962
	(0.0267)	(0.0434)	(0.0343)
Graduate income			
RM 501 - RM 1000	0.853***	0.829***	0.871***
	(0.0255)	(0.0450)	(0.0313)
RM 1001 - RM 1500	0.783***	0.678***	0.828***
	(0.0244)	(0.0377)	(0.0313)
RM 1501 - RM 2000	0.737***	0.638***	0.780***
	(0.0237)	(0.0362)	(0.0306)
RM 2001 - RM 2500	0.747***	0.657***	0.779***
	(0.0249)	(0.0380)	(0.0322)
RM 2501 - RM 3000	0.760***	0.660***	0.801***
	(0.0269)	(0.0395)	(0.0360)
RM 3001 - RM 5000	0.690***	0.607***	0.713***
	(0.0273)	(0.0393)	(0.0372)
> RM 5000	0.834**	0.759**	0.817
	(0.0571)	(0.0714)	(0.0891)
Full time	0.844***	0.834***	0.856***
	(0.0153)	(0.0267)	(0.0190)
Urban (job)	0.995	0.999	0.993

	(0.0140)	(0.0221)	(0.0182)
Professional	0.934***	0.955	0.925***
	(0.0125)	(0.0229)	(0.0150)
Permanent	0.975*	0.979	0.971
	(0.0122)	(0.0195)	(0.0157)
Observations	34687	13595	21092

Exponentiated coefficients; Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A coefficient greater than zero indicates a positive impact on the hazard rate, which means shorter job search duration. The second column of Table 4.12 is the result for pooled model, while separate estimates were obtained for male (column 3) and female graduates (column 4). By using Cox model, we assume that the explanatory variables do not affect the shape of the overall hazard function. Instead, they only affect the risk of transition.

Previous analyses showed that graduates with higher academic achievement, better English language ability, and took certain courses of study conjointly lead to better occupational outcomes with high paying jobs. However, the analysis of the transition time between finishing study and obtaining the first job reveals another finding. Graduates with better academic achievement, better English proficiency, and took more attractive courses prolong their entry into the labour market, but they end up with better occupational categories and higher earning. Detailed analysis follows.

Academic achievement has a significant impact on men's employment survival. Higher CGPA is associated with longer transition time, indicating that male graduates may delay entry into the labour market to wait for jobs that can compensate for their higher ability. Women's academic performance does not affect their transition time. For courses of study: using Law as the base category, we found an almost symmetrical association between more attractive courses with longer job search duration. Courses that are in general associated with longer transition are Dentistry,

Pharmacy, Medical, and Computer Science. Graduates from these courses are found to have better remuneration, showing that they would rather wait longer to obtain their first job when they can do better than accepting the first job offer. The coefficients for these courses are quite similar between men and women except for Computer Science course where women experience longer transition than men. 35% of men graduates who took Computer Science obtained their job within the first month after finishing study, compared to 29% of women graduates. On the other hand, courses that are associated with shorter transition are Sports, Arts, Transport, Islamic, and Nurse - which is also associated with low employment rate and lesser pay. In sum, graduates with better academic performance and took more attractive courses may take longer to establish themselves in the labour market and they end up with better jobs.

Age significantly lengthen the waiting period. Malay and Chinese have faster transition than the other ethnic group. Indeed, Chinese coefficient is larger in its magnitude. Living in an urban state also leads to faster transition due to the vast availability of jobs in the local setting. Marital status does not have a significant effect on transition process in our sample. Interestingly, family income is found to bear no significant effect towards the transition period. Unlike the previous analysis of employment and earning where greater family income increases better employment prospect and remuneration, in the transition model we found that graduates from all social class background do not differ in terms of the time it took to obtain a job, even though graduates from lower family income may have embarked into lower occupational types (e.g. part time) compared to those with higher family income.

We found that job characteristics significantly affect the transition period. Verifying the job search theory, graduate income significantly lengthen the transition and this is more prominent among men than women. Men wait longer and they end up with

higher pay. The coefficient is monotonically decreasing in terms of hazard coefficient shows that each increment in income level is associated with a longer transition to employment. Full time employment significantly lengthens the transition process for both genders. Interestingly, obtaining a job in an urban state do not affect the transition process. Graduates seeking jobs in the urban and non-urban states enter the labour market at the same rate. Professional jobs lengthen the wait, but only among women. This may suggest that the time it took for men to seek a professional job is not significantly longer than non-professional jobs.

4.3.3 Summary on transition time to gain employment.

While the analysis of employment and earning in the previous chapters provide some understanding of the relationship between graduate's achievement, characteristics, social background, and their job attribute towards their occupational status; this section reveals another dimension of graduate employment. The characteristics that correspond to graduate's success in better occupational type and high paying jobs do not necessarily lead to faster transition. With the exception of SES variables, determinants that lead to better occupational categories and higher income are found to be associated with a longer transition. Indeed, we found that graduates with higher CGPA and took more attractive courses are more likely to prolong their job search which results in attaining better job characteristics. Older graduates with higher academic achievement and who took more attractive courses associated with higher earning eventually have a longer transition from education to work. Computer Science is one of the more attractive courses in which graduates generally have a longer transition, but women from these courses took much longer than men to obtain her first job. However, SES variables such as Chinese and urban have a faster transition. Family income does not affect the transition period - graduates from all economic background find a job at the same rate, except that graduates from lower family income find jobs in the lower occupational category and generally have lower income.

4.4 Estimating graduate earnings - pseudo-panel approach.

We have established in the previous chapters that sex and ethnic group consistently influence a graduate's choice of education as well as employment i.e. Chinese or male graduates are generally more successful in employment and earning. The choice of education matters, as graduates from certain courses are more successful than another. In fact, the choice of course of study is related to ability, which is unobserved. If we can control these variables (sex, ethnic group, and course of study) and observe graduate earnings over the years, we can therefore see the effect of changes in the other characteristics such as academic performance, English language ability, the effect of state of origin, and the effect of job characteristics i.e. sector, job level, job category, and location - and how they affect earning.

The fundamental issue related to the unobserved ability differences among graduates is that the ability bias would disappear if we can compare the earnings of two individuals of the same sex, ethnic group, and course of study. The two individuals would face the same wage-education locus and face similar job opportunity, and the difference in their earnings would reflect the other characteristics of interest. This could be done if panel data is available, in which the data contain information on graduate's earnings and other characteristics for several years. However, the panel data of graduate is not available and the only choice we have is a set of independent pooled cross section units. Nonetheless, a pseudo-panel approach which is constructed by taking cohort average based on work by (Deaton, 1985) allows us to track these cohorts for several years.

My previous analyses in this thesis were based on a single year data taken from all participating universities in the country. For this section, however, due to the

limited accessibility, the data is taken from one particular university in the country. The focus of this analysis will be from the University of Malaya (UM) graduates. UM is the oldest and most prestigious university in the country, even though the status quo is frequently challenged in recent years by other competing top public universities. The university is the only public university located in the heart of Malaysia capital city, Kuala Lumpur. Student enrolment is managed centrally, and UM has the privilege to choose its students among the best applicants. Hence, results from this section may not be generalised to the larger graduates body in the country.

The data for this particular section is different from all the other chapters and sections that we have covered earlier. The data is collected between 2007 to 2014, each year consisting different set of individuals graduating in a particular year. For each individual observation, there exists a cohort version of the same relationship, but instead of observing individual characteristics, we observe the cohort means (Deaton, 1985). We created a set of pseudo panel data from these independent cross sectional data so that each cohort consists of individuals with fixed shared membership (i.e. time invariant variables like sex, ethnic, and course of study). Individuals in genuine panel data are replaced with subgroups of means and analysed as if they are a panel. These cohorts are observed over the years so we are able to trace cohorts earnings over time while controlling for the impact of cohorts heterogeneity.

For the purpose of the analysis, we only observe employed graduates thus removing the unemployed and those who further their education. Disabled, non-first degree, and non-citizen graduates were also removed. Age is rather scattered, and we remove those outside of the range [21,26]. The remaining observations are then reported in Table 4.13 showing the number of individual employed graduates, while Table 4.14

shows the tabulation of graduate income by year.[8] The ratio of women to men graduates is around 2:1 although the population ratio is 1:1.02 female to a male between the ages of 25 to 54 years old (Department of Statistics, Malaysia). The biased representation of female graduates in the sample is due university intake based on merit.

Table 4.13: University of Malaya first degree graduates who were reported to be employed at the time of the survey.

Year	Female	Male	Malay	Chinese	Other Ethnic
2007	3,051	1,408	2,200	1,788	471
(Percent)	(68.42)	(31.58)	(49.34)	(40.1)	(10.56)
2008	3,112	1,570	2,537	1,708	437
(Percent)	(66.47)	(33.53)	(54.19)	(36.48)	(9.33)
2009	2,953	1,472	2,506	1,481	438
(Percent)	(66.73)	(33.27)	(56.63)	(33.47)	(9.9)
2010	2,551	1,337	2,292	1,206	390
(Percent)	(65.61)	(34.39)	(58.95)	(31.02)	(10.03)
2011	2,433	1,327	2,169	1,209	382
(Percent)	(64.71)	(35.29)	(57.69)	(32.15)	(10.16)
2012	2,026	1,102	1,843	968	317
(Percent)	(64.77)	(35.23)	(58.92)	(30.95)	(10.13)
2013	1,096	695	1,107	512	172
(Percent)	(61.19)	(38.81)	(61.81)	(28.59)	(9.6)
2014	1,690	843	1,591	695	247
(Percent)	(66.72)	(33.28)	(62.81)	(27.44)	(9.75)

We then take cohort means for academic performance, language competency, family income, and job characteristics as described in Table 4.15. We have two gender groups, three ethnic groups, and sixteen courses of study, henceforth hypothetically we should have $2 \times 3 \times 16 = 96$ cohorts observed across 8 years. Our data have

[8]Note that we cannot deflate the wage because it is observed in categorical form. Note that wage category increases over the years may not necessarily reflect superior earnings among newer graduates because we did not take into account the inflation rate.

Table 4.14: Graduate earnings observed in 2007 to 2014. The income in Ringgit Malaysia is observed in an ordered categorical form. The minimum wage in the country is RM1500.

Year	Less than RM500	RM501 - 1000	RM1001 - 1500	RM1501 - 2000	RM2001 - 2500	RM2501 - 3000	RM3001 - 5000	More than RM5001
2007	65	336	490	840	594	323	165	19
(Percent)	(2.3)	(11.86)	(17.3)	(29.66)	(20.97)	(11.41)	(5.83)	(0.67)
2008	72	257	455	620	676	318	248	29
(Percent)	(2.69)	(9.61)	(17.01)	(23.18)	(25.27)	(11.89)	(9.27)	(1.08)
2009	46	261	457	519	532	196	252	17
(Percent)	(2.02)	(11.45)	(20.04)	(22.76)	(23.33)	(8.6)	(11.05)	(0.75)
2010	85	256	269	367	352	210	326	35
(Percent)	(4.47)	(13.47)	(14.16)	(19.32)	(18.53)	(11.05)	(17.16)	(1.84)
2011	117	352	302	419	451	374	399	35
(Percent)	(4.78)	(14.37)	(12.33)	(17.11)	(18.42)	(15.27)	(16.29)	(1.43)
2012	168	301	236	286	246	237	265	36
(Percent)	(9.46)	(16.96)	(13.3)	(16.11)	(13.86)	(13.35)	(14.93)	(2.03)
2013	53	101	103	143	151	156	252	68
(Percent)	(5.16)	(9.83)	(10.03)	(13.92)	(14.7)	(15.19)	(24.54)	(6.62)
2014	67	178	267	236	279	279	263	38
(Percent)	(4.17)	(11.08)	(16.61)	(14.69)	(17.36)	(17.36)	(16.37)	(2.36)

a total number of 686 cohorts, with some cohorts are not observed. For example there are no Chinese studying Islamic studies which reduces our cohort observation by 16. Cohort occurrences is summarised in Table 4.16. 70% of the cohorts occur for all eight years of our observations. The dependent variable is graduate income in an ordered form. We would model the earning as if we are observing genuine panel. Table 4.17 shows the mean of graduate income (ranges between 1 to 8) across different course of study and year.

Table 4.15: Definition and measurement of variables.

Variable	Cohort averaging process	Measurement
gradinc	Cohort means of income.	Observed in eight categories with the lowest (<RM500) and the highest category (>RM5,000).
cgpa	Cohort means of CGPA.	Cumulative grade point average (CGPA) to measure academic performance.
muet	Cohort means of MUET score.	Six bands of MUET score, the lowest Band 1 to the highest Band 6 indicating proficiency in using English in writing, listening, and speaking.
faminc	Cohort mean of family income.	Observed in eight categories with the lowest (<RM500) and the highest category (>RM5,000).
age	Cohort mean age.	
urban	Proportion of cohorts living in urban states.	Urban states include Klang Valley and Penang.
joburban	Proportion of cohorts working in urban states.	Urban states include Klang Valley and Penang.
public	Proportion of cohorts working in the public sector.	
permanent	Proportion of cohorts working as permanent.	
professional	Proportion of cohorts working as professional.	
year	Years fo when the survey is conducted or when the cohorts graduated.	

Table 4.16: The pattern of cohort participation across eight years of survey. Cohorts are defined as individual graduate from the same sex, ethnic group, and course of study. 70% of cohorts appear each year.

Freq.	Percent	Cumulative	Pattern
66	70.21	70.21	11111111
3	3.19	73.4	.1111111
3	3.19	76.6	111111.1
2	2.13	78.72	1.111111
2	2.13	80.85	11111.1.
2	2.13	82.98	111111..
1	1.06	84.04	..1.1111
15	15.96	100	(other patterns)
N=94			

Table 4.17: The mean of cohorts income across course of study and years of graduation.

Courses	2007	2008	2009	2010	2011	2012	2013	2014	Total
Islamic Studies	3.58	3.23	3.08	2.63	2.33	2.48	2.39	2.74	2.79
Malay Studies	2.07	2.88	2.45	1.95	2.34	2.46	2.67	2.67	2.44
Architecture	3.45	4.31	3.66	3.89	4.55	4.19	4.75	5.11	4.25
Language	3.27	3.66	2.8	3.14	3.05	3.46	3.94	4.46	3.45
Economics	3.79	3.82	3.74	3.53	4.55	3.37	4.52	5.23	4.07
Engineering	4.68	4.85	4.82	4.85	5.2	4.99	5.33	5.07	4.97
Education	2.93	3.75	3.94	3	2.77	2.68	3.11	3.13	3.17
Dentistry	5.93	6.64	6.75	6.73	6.95	6.44	6.77	6.6	6.62
Business	4.05	4.5	4.05	4.18	4.67	4.21	4.86	4.74	4.41
Medical	5.88	6.21	6.36	6.62	6.38	6.6	6.79	6.67	6.44
Cultural Studies	2.44	3.2	2.58	2.82	4.29	3	3.58	3.64	3.25
Sports	3.72	4.4	3.95	3.78	3.77	3.66	3.67	3.91	3.87
Science	3.86	4.35	4.11	3.85	3.93	3.64	4.18	4.12	4
IT/Comp. Sci.	4.22	4.22	4.49	4.93	4.78	4.89	5.52	6.02	4.83
Arts Social Sci.	2.97	3.22	3.05	2.96	2.82	2.74	3.58	3.71	3.12
Law	5.13	3.3	3.66	4.03	3.54	3.78	3.51	4.5	3.96
Total	3.96	4.24	4.02	4.05	4.18	3.87	4.46	4.58	4.16

4.4.1 Fixed effects ordered logit model of graduates earnings.

The main purpose of this section is to look at the possibility of tracking cohorts and model them as genuine panel. Estimation by pooled ordered model suffers from unobserved cohort heterogeneity. Another alternative is to use Mundlak's correlated random effect approach but this method requires a strong assumption on the time invariant unobserved component (see Wooldridge (2010) Ch 16 pp. 662). Instead, we use the new proposed estimator by modelling cohort earning using a fixed effects ordered logit model (FEOL). There are several estimators being introduced in the literature, in this paper we focus on two estimators which will be described later.

Using FEOL, we can obtain the treatment effect of other variables while controlling for stable characteristics of cohorts. We know for example that Chinese, male and graduates from certain courses tend to earn higher wage, now that we can control for the cohort effect (gender, ethnic, course of study) we can estimate the effect of academic performance, English competency, and other job characteristics on cohort incomes. By using fixed effects model we can also control for more difficult variables such as intelligence, upbringing, and heredity that coincide with cohort effects that might also influence earnings. FEOL allows these unobserved variables to have correlation with the observed variables (Allison, 2009).

The drawback of fixed effects model is that it cannot estimate the time-invariant variables. Furthermore, if the differences within individual is small, while the differences between individual is great, then fixed effects model may give imprecise estimates. From computational aspect, the development of fixed effects estimation for ordered variable is ongoing and there is no standard package available for analysis. While there is no available program to run FEOL, there are developing

literatures on finding estimators that is efficient. Efficient estimators such as blow-up and cluster (BUC) (Baetschmann et al., 2015), Das van Soest (DvS) (Das and Van Soest, 1999), and conditional likelihood estimator (CLE) (Muris, 2016) will be discussed in the following.

For each cohort i observed in time t, the earning is given in ordered scale y^*_{it}, which is related to a latent variables y_{it} as

$$y^*_{it} = k \text{ if } \mu_k < y_{it} \leq \mu_{k+1} \text{ and } k = 1, \ldots, K. \tag{4.15}$$

where μ are unknown parameters to be estimated with β, and are strictly increasing ($\mu_k < \mu_{k+1} \ \ \forall k$). The error term $\epsilon_{it} \sim$ IID and standard logistic. The probability of observing the outcome k for cohort i at time t is

$$Pr(y^*_{it} = k|X_{it}, \alpha_i) = \Lambda(\mu_{k+1} - X_{it}\beta - \alpha_i) - \Lambda(\mu_k - X_{it}\beta - \alpha_i) \tag{4.16}$$

where $\Lambda(X) = \exp(X)/(1 + \exp(X))$ is CDF of the logistic distribution and we set $\mu_0 = -\infty$ and $\mu_K = \infty$. The MLE is affected by the incidental parameter problem since the number of parameter in the likelihood function grows with the sample size n. The estimator β based on this will be inconsistent for $n \to \infty$ if T is fixed. However in this case we have $T = 8$ hence the incidental parameter problem is minimised.

For the binary choice panel data model, Chamberlain (1980) suggested an approach based upon a conditional likelihood, conditioning on sufficient statistics for the nuisance parameters a_i. Then the minimum sufficient statistics for a_i is y_{it}. It does not depend on the incidental parameter a_i and the conditional MLE of β is, under mild regularity conditions, consistent and asymptotically normal. However, this approach

cannot be directly extended to an ordered panel data model where the dependent variables has $p > 2$ possible outcomes.

As a solution, Winkelmann and Winkelmann (1998) suggested to collapse y_{it}^* to binary. The ordered dependent variable is dichotomised at cutoff $k : d_{it}^k = \mathbb{1}(y_{it}^* \geq k)$[9]. Next, we use Chamberlain's estimator for fixed effects binary logit model. Chamberlain's binary logit fixed effect estimator uses the fact that conditioning the individual likelihood contribution on the sum of the outcome over time provides an expression which is independent of the fixed effects. The effect of time-varying regressors can be estimated by conditional maximum likelihood.

Chamberlain show that maximising the conditional log-likelihood gives consistent estimate of β. If the estimator β at each cutoff is consistent, we can estimate for all each possible $K - 1$ cutoffs. Then, we can combine the estimation results by minimum distance estimation, taking into account the weight given by the inverse of their variance. The solution is proposed by Das and Van Soest (1999) and is called DvS estimator. However, if there is only a small overlap between sample contributing to the conditional maximum likelihood logit estimator, then the small sample problem may lead to convergence problem.

To overcome this, Baetschmann et al. (2015) proposes estimating all dichotomisation jointly subject to the restriction $\beta^k = \beta \quad \forall k = 2, \ldots, K$. The proposed estimator called the Blow-up and Cluster (BUC) - first generate data set where each individual is repeated $K - 1$ times (blowing up the sample size). Then dichotomise every $K-1$ copies of individual at different cutoff points. Next, estimate using conditional maximum likelihood using the entire sample. The standard error should be adjusted for clustering (by using sandwich variance estimator) as some individual contribute

[9]But any particular choice of cutoff leads to some observation been discarded because individual with constant d_{it}^k do not contribute to the likelihood function.

to several terms in the log-likelihood function. Unlike DvS, BUC do not suffer from small sample size problems.

However, the existing estimators (i.e. DvS, BUC) do not estimate the cut point differences. For this reason, the model cannot compute the partial effects of explanatory variables hence prevent the examination of the magnitude of regression coefficients. The model's inability to compute marginal effect hamper its usability in the empirical applications (Muris, 2016). In light of this, Muris (2016) proposed a new estimator that can simultaneously estimate the cut point differences and use the information to bound a marginal effect.

Muris (2016) proposed to convert an ordered logit model with J outcomes, T observations into binary choice logit in $(J-1)^T$ ways before applying Chamberlain's conditional MLE to each binary choice model. The ordered variable is transformed into binary by $y_{it} \leq \pi(t)$ for any time series of cutoff categories $\pi(t), t = 1, \ldots, T$. The resulting binary time series after applying transformation $\pi = (\pi(t))_{t=1}^{T}$ is $d_{i,\pi} = (d_{i,t,\pi} = 1\{y_{it} \leq \pi(t)\}, t = 1, \ldots, T)$ or $d_{i,t,\pi} = 1[\alpha_i + X_{it}\beta + u_{it} < \mu_{\pi(t)}]$. The additional information that we obtained from the cut point differences can inform us of how far apart the categories are (Muris, 2016).

4.4.2 FEOL result.

The preceding part discusses the estimation results of two chosen fixed effects ordered logit models - the BUC and the CLE. We investigate the relationship between cohort's academic achievement, English language ability, cohort's characteristics and their job attributes. To date, there have been no studies done on graduates cohort earning due to the data limitation and this analysis is the first to examine this phenomenon. We take cohort average from 28,666 individuals to create theoretically 96

cohorts that appear at least once in the 8 years period. A total number of cohort × year is 686 will be used in the analysis. Cohort's income is observed in an ordered category similar to individual earning that we have consistently used in the previous chapters.

A precaution in using cohorts is that it is not a genuine panel. For a genuine panel, we observe the same individual graduates from the first year they finished study and we observe their career progression for at least several years in which we would expect that they would increase their earnings by either moving into better occupational category, or among those who are unemployed we would expect them to end their unemployment period. However, careful interpretation should be taken when analysis is done on cohorts because each year we are still observing cohort characteristics in their first year after finishing study. Any changes in their earning reflect the changes of graduate's other time-changing variables such as academic achievement, English language ability, family income, age, location, and job attributes. Between cohorts with the same sex and race, and took the same course, any changes in the time-changing variables would affect their earning. A significant coefficient in any of the included variables signifies the impact of such variable towards changes in earning.

Controlling for cohort heterogeneity, we found that the effect of academic achievement and English language ability disappear and becoming insignificant in the FEOL model. Indeed, only family income and locality remain significant - higher family income and originating from an urban state increase graduates' earning. Our result is consistent with Chapman and Harding (1985) who found that intergenerational inheritance and residential location play a very important role in Malaysia. Our finding shows that the situation still occurs among those who have invested in education which is suppose to moderate the effect of intergenerational inheritance.

Among all the job characteristics included in the model, only permanent position is significantly associated with higher graduate earning.

The results show that among graduates of the same sex and race and took the same courses of study, only family income and locality play important roles in changes of earning surpassing the other cohort characteristics. Family income and residing in an urban area are also related to each other, since families who live in the urban areas generally earn higher than those from the rural.

Nevertheless, the interpretation of the result must be taken with caution. First, we only observe a group of individuals who share the same fixed membership where these individuals are correlated to each other. Yet, they are not identical. We would recommend to collect data on the same individual for several years. From here, we can actually see the trend in the earning of the same individuals that may help to gain better understanding on graduates career mobility after several years leaving their education. With the current data we only observe graduates' employment and earning within a very short time frame which may not provide complete picture of graduate employment since there are graduates who are still embarking on successive education, took a transitory jobs, or remain in the job search process - which limit our understanding on the graduates careers as a whole.

Table 4.18: Estimation results for different estimators of fixed effects ordered logit model of graduate earnings.

	(1) BUC	(2) CLE
CGPA	0.69	0.61
	(0.69)	(0.75)
MUET	-0.058	-0.049
	(0.20)	(0.20)
Family income	0.25*	0.27*
	(0.11)	(0.12)
Age	–0.046	–0.041
	(0.15)	(0.15)
Urban	1.34**	1.37**
	(0.52)	(0.50)
Urban (job)	-0.61	-0.57
	(0.55)	(0.53)
Public	0.42	0.58
	(0.63)	(0.63)
Permanent	1.82***	1.55***
	(0.42)	(0.47)
Professional	0.84	0.86
	(0.59)	(0.58)
$\kappa_2 - \kappa_1$		0.41
		(.)
$\kappa_3 - \kappa_2$		18.09***
		(0.27)
$\kappa_4 - \kappa_3$		2.3***
		(0.43)
$\kappa_5 - \kappa_4$		2.9***
		(0.81)
Observations	1020	5362

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.5 Conclusion.

This chapter shed a light on several aspects that is under-explored in the literature of graduate employment, particularly in Malaysia. The first section dealt with examining factors that lead to the decision to migrate and how those decision affect employment outcomes such as education-job match and earning. By separating the analysis based on four migration patterns we are able to see motivation behind movement from and to an urban or non-urban states. Consistent with our assumption, migration from non-urban to an urban state significantly increases earning. In fact, all migrating graduates earn significantly more than non-migrating graduates. However, the relationship between migration and education-job mismatch is more mixed.

The second chapter analysed the time taken to obtain the first job using survival analysis. The same attributes that are associated with better employment outcomes do not necessarily lead to faster transition, indeed, higher CGPA and more attractive courses correspond to longer transition on the basis that graduates prolong their job search period if they think they can do better.

The third part looks at the possibility to track the cohort of graduates and observe cohort's earning over the years. While controlling for the unobserved heterogeneity of cohort effects, we use fixed effects ordered logit model to estimate the impact of several cohorts averaged variables towards their earning. The result shows that family income and locality consistently contributes to the estimation of cohort earning.

4.6 Appendix.

	(1) y=Employed	
CGPA	0.137***	(0.0178)
Band 2	0.0206	(0.0237)
Band 3	-0.00114	(0.0245)
Band 4	-0.0368	(0.0287)
Band 5	-0.0277	(0.0451)
Band 6	0.0545	(0.159)
Arts/SocSc	-0.289***	(0.0587)
Transport	0.322**	(0.115)
Administration	0.202***	(0.0584)
Management	0.0133	(0.0558)
Economy	-0.0533	(0.0648)
Accountancy	0.270***	(0.0581)
Marketing	-0.112	(0.0662)
Finance	0.0362	(0.0587)
Journalism	-0.0335	(0.0650)
Islamic	0.0761	(0.0705)
Food/hospitality	0.0402	(0.0668)
Arts	-0.209**	(0.0637)
Pure science	-0.239***	(0.0681)
Applied science	-0.217***	(0.0568)
Pharmacy	-0.629***	(0.0929)
Medical	0.685***	(0.0673)
Dentistry	-0.451***	(0.128)
Nurse	-0.0533	(0.0696)
Environment	-0.0661	(0.0640)
Sports	-0.290**	(0.0996)
Engineering	0.0252	(0.0542)
CompSci	0.173**	(0.0574)
Education	-0.386***	(0.0577)
Male	0.0740***	(0.0127)
Age	0.0854***	(0.00611)
Malay	-0.0313	(0.0195)
Chinese	0.355***	(0.0228)
RM 501 - RM 1000	0.0749**	(0.0237)
RM 1001 - RM 1500	0.120***	(0.0245)
RM 1501 - RM 2000	0.170***	(0.0257)
RM 2001 - RM 2500	0.159***	(0.0276)

RM 2501 - RM 3000	0.122***	(0.0264)
RM 3001 - RM 5000	0.0749**	(0.0264)
> RM 5000	0.0758*	(0.0295)
Married	0.914	(0.700)
experience	0.272***	(0.0121)
Constant	-2.882***	(0.172)
Observations	50703	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Chapter 5

Conclusion

5.1 Summary of results

This thesis studies several aspects related to graduates transition from education to their first destinations after study. The first chapter confirms previous studies related to graduate employment outcomes in which graduates with better academic achievement, better English proficiency, took certain courses of study, and coming from certain socio-economic background (i.e. older, Chinese, higher family income, and originating from an urban state) generally have better occupational outcomes such as being able to secure full time, professional, and permanent jobs. Further analysis shows that gender differences exist between different sexes - men generally have better employment outcomes than women, but men are also more likely to take up more challenging courses which are associated with superior job categories. Women have the tendency to choose less attractive courses which are associated with low employment rate, more heterogenous occupational categories, and low income. To some extent, this tendency may rationalise women's under-representation in high

skilled jobs associated with high remuneration. Moreover, there is a paradoxical theory stating that women intentionally prefer less demanding jobs to balance between work and families.

However, the situation may be reasonable for the whole women population, but we would expect the situation would be different in the case of women graduates who have invested a huge sum of money, sacrifice their forgone earning, time and effort to gain a qualification at the tertiary level of education. This progressive action to improve productivity and investment in their human capital should translate into women's equal share in the labour force participation and equal earning with men. Rationally after controlling for courses of study the effect of women should disappear but we found persistent gender segregation within different occupation types especially those in highly industrialised sectors.

We even investigated further the gender difference in gaining full time employment among female graduates who have similar qualification as men and found that women in Engineering, Computer Sciences, and Transport studies have lower employment rate, all else equal. Due to the inter-connection between taking Engineering course and working in the Manufacturing industry, both parts show that women are seriously under-represented and the differences are largely due to some unobserved features which may be ascribed to discrimination or taste (women might prefer less demanding jobs). Our result is consistent with another study among women workers in the Manufacturing industry (Osman and Shahiri, 2014)(Osman-Rani, 1982).

Not only women are under-represented in the better occupational categories, the second chapter shows that women are under-paid after controlling for SES, educational, and job attributes. Women generally have higher CGPA but they took less attractive courses which hamper their wage determination. We found evidence of gender gap where women earn significantly lower especially in the case of the private sector

(i.e. Manufacturing). Necessary actions need to be taken to devise a policy that will reduce the imbalance participation rate by encouraging female labour force participation in those industries. In the case of Malaysia, women have the same right as men (same working hours, no employment ban) but women's lower employment rate in high skilled industries is perhaps due to restrictions such as the determination of maternity leave, small children, avoiding dangerous jobs, and cultural expectation. If that is the case, we need to reinforce policies to support women's employment such as the implementation of maternity and paternity leave (so that childcare is distributed equally between parents), to promote for flexible working hours, and the provision of childcare facilities at work. There should be a policy intervention among women graduates who took Engineering course because if they perform as good as men and having the same qualification, their under-representation in labour force participation can be a huge waste of talent. Universities should then send the right signal so that prospective students taking Engineering courses have complete information of their employment prospects after graduation. The policy implication of women enrolment into higher education by merit alone may just do more harm if it encourages unnecessary investment in tertiary education for some women if there is no action taken to rectify gender differences in employment opportunity.

Another major finding of this thesis is the persistence of ethnic imbalance in the economy among Malaysian youth in which the Malays are under-represented in better occupational categories and earn lower than the other ethnic groups. Malay's under-performance in securing better jobs is due to their choice of less attractive courses, lower academic achievement, and come from families with low income and low education. Malays are also more likely to be originated from non-urban states with limited job availability which require Malay graduates to migrate, but migration is costly. If the imbalance in the ethnic share persists while the intergenerational inheritance is strong, the disparity will continue to deteriorate - Malays will remain in

the lower income trap and the Chinese will continue to be economically progressive.

The National Economic Policy which was introduced to eradicate poverty did not achieve its intended goal. Due to poor implementation, the NEP does not show improvement in social mobility among Malays except very few aristocrats; it rather creating a serious intra-ethnic gap within the Malay community. Another critic for the poor execution of NEP is ignoring the minority ethnic Indian who remain in poverty (among those living in the estates). The intervention in the public university quota does not efficiently remove the gap, partly because even though Malay's participation in tertiary education has increased but the admission is offered to less attractive courses that have low market demand. The finding suggests that offering certain types of courses that have low marketability may lead to skill wastage in a sense that graduates spend their time and money for their study but they end up with jobs that may not compensate for their educational investment. One way to intervene this issue is to reduce the intake for less attractive courses that have heterogenous marketability, instead, offer more STEM and vocational courses that can be more practical in the labour market. The admission to courses that are less profitable but have high social benefit should be reduced to cater for the need of knowledge creation but not as an investment for human capital. Another aspect that should be taken care of is the educational achievement among the rural Malays so they can perform better and consequently able to take up more challenging courses which lead to better jobs. Seeing education as the key to upgrade the socio-economic status of an individual, more equally distributed resources for education should be enhanced to includes the children of the disadvantages. Awareness of the importance of education should be promoted among low-income families in the rural.

The third chapter covers a different aspect of graduate's transition from education to work. The analysis of migration shows that higher ability graduates are more

likely to migrate and their migration reflects in their higher earnings. There is also some sort of correlation between attending selective universities in the urban areas and high ability graduates because the top universities are located in the urban states hence urban and non-urban graduates who attend urban institutions are more likely to stay at the location of their education. We also found that better job characteristics are associated with all migrating patterns, which only strengthen our assumption that graduates choose to migrate to obtain better jobs and to compensate for their higher ability (human capital).

An analysis on the transition time elapsed between finishing study and obtaining the first job show that with the exception of SES variables, the determinants that lead to better occupational categories and higher income are associated with a longer instead of faster transition. Graduates with higher CGPA and took more attractive courses are more likely to prolong their job search which results in attaining better job characteristics. Older graduates with higher academic achievement and who took more attractive courses associated with higher earning eventually have a longer transition from education to work. The finding confirms the job search theory which states that an individual with high ability may lengthen their job search period if they think they can do better by not accepting the first job offer. We found that graduates from all economic background find a job at the same rate, but graduates from lower family income find jobs in the lower occupational category and generally have lower income.

The final part of the thesis shows that for a cohort with similar sex and ethnic group and took the same course, the change of their first job earning is attributable to their family income, originating from an urban state, and holding a permanent job. Family income and residing in an urban area are also related to each other since families who live in the urban areas generally earn higher than those from the

rural. Intergenerational inheritance is found to be persistent even among graduates who have obtained a high level of education in which family's economic background and locality still play a role in determining an individual's earning hence education, even at tertiary level, has not successfully moderated the effect of social immobility.

5.2 Limitation and future recommendation

This thesis leaves open important avenues for future research. First, parent education is probably more relevant than parent income because children with higher parent education tend to have upward mobility than those with lower parent education (i.e. upbringing, connection, genetic heredity). A graduate that comes from lower parent education is the first generation of university student so they are surviving in the professional world without guidance from their parents. Second, if the income is observed in an interval form then more analysis can be done such as the quantile regression analysis to examine the effect of the variance in the wage decomposition. Third, women's and Malay's preference for certain type of courses and jobs could be an interesting subject to study that may explain their inferior performance in their employment outcomes hence school performance would help to understand their choice of courses of study. Fourth, if a graduate's earning can be observed for several years after graduation then we can study the effect of part time jobs in graduate's subsequent earning whether the part time job is transitory or have a permanent effect on graduate's career.

Bibliography

Abdullah, K., Noor, N. M., & Wok, S. (2008). *The perceptions of women's roles and progress: A study of Malay women.* Social indicators research, 89(3), 439-455.

Adamchik, V. (1999). *The Effect of Unemployment Benefits on the Probability of Re-employment in Poland.* Oxford Bulletin of Economics and Statistics, 61(1), 95-108.

Albrecht, J., Björklund, A., & Vroman, S. (2003). *Is there a glass ceiling in Sweden?.* Journal of Labor economics, 21(1), 145-177.

Allison, P. D. (2009). Fixed effects regression models (Vol. 160). SAGE publications.

Altonji, J. G. & Blank, R. M. (1999). R*ace and Gender in the Labor Market.* Handbook of Labor Economics. Vol. 3, Chapter 48, pp. 3144-3213.

Arrow, K. J. (1973). *Higher education as a filter.* Journal of public economics, 2(3), 193-216.

Amemiya, T. (1981). *Qualitative response models: A survey.* Journal of economic literature, 19(4), 1483-1536.

Angrist, J. D., & Pischke, J. S. (2008). *Mostly harmless econometrics: An empiricist's companion.* Princeton university press.

Arulampalam, W., Booth, A. L., & Bryan, M. L. (2007). *Is there a glass ceiling over Europe? Exploring the gender pay gap across the wage distribution.* Industrial & Labor Relations Review, 60(2), 163-186.

Assaad, R., Krafft, C., & Salehi-Isfahani, D. (2014). *Does the type of higher education affect labor market outcomes? A comparison of Egypt and Jordan.* In Economic Research Forum Working Paper Series No (Vol. 826).

Azam, M., Chin, A., & Prakash, N. (2013). *The returns to English-language skills in India.* Economic Development and Cultural Change, 61(2), 335-367.

Baetschmann, G., Staub, K. E., & Winkelmann, R. (2015). *Consistent estimation of the fixed effects ordered logit model.* Journal of the Royal Statistical Society: Series A (Statistics in Society), 178(3), 685-703.

Bauer, T. K., & Sinning, M. (2006). *An Extension of the Blinder- Oaxaca Decomposition to Non-Linear Models*, RWI Discussion Papers, No. 49.

Becker, Gary S., (1971). *The Economics of Discrimination,*University of Chicago Press Economics Books, University of Chicago Press, edition 2.

Becker, G. S. (1975). *Front matter, human capital: a theoretical and empirical analysis, with special reference to education.* In Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, Second Edition(pp. 22-0). NBER

Becker, G. S. (1985). *Human capital, effort, and the sexual division of labor.* Journal of Labor Economics, 3(1), S33-S58.

Bellante, D. and Link, A.N. (1981), *Are public sector workers more risk averse than private sector workers?*, Industrial and Labor Relations Review 34(3), 408-412.

Bender, K. A. and R. F. Elliot (1999), *Relative earnings in the UK public sector: the impact of pay reform on pay structure?*, in R. Elliot, C. Lucifora and D. Meurs (eds.), Public sector pay determination in the European Union, London: McMillan Press Ltd., pp. 285-339.

Bender, K. A. (1998). *The central government private sector wage differential.* Journal of Economic Surveys, 12(2), 177-220.

Bender, K. A. (2003), *Examining Equality Between Public and Private Sector Wage Distributions*, Economic Enquiry, Vol. 41, No. 1, pp. 62-79.

Bender, K. A., Donohue, S. M., & Heywood, J. S. (2005). *Job satisfaction and gender segregation.* Oxford economic papers, 57(3), 479-496.

Biggeri, L., Bini, M., & Grilli, L. (2001). *The transition from university to work: a multilevel approach to the analysis of the time to obtain the first job.* Journal of the Royal Statistical Society: Series A (Statistics in Society), 164(2), 293-305.

Blau, F. D., & Kahn, L. M. (2000). *Gender differences in pay* National bureau of economic research.

Blinder, A. S. (1973). *Wage discrimination: reduced form and structural estimates.* Journal of Human resources, 436-455.

Borjas, G. J. (1980). *Wage determination in the federal government: The role of constituents and bureaucrats.* The Journal of Political Economy, 1110-1147.

Borland, J., Gregory, R. G., & Sheehan, P. (2001). *Work rich, work poor: inequality and economic change in Australia.*

Brown, C. & Corcoran, M. (1997). *Sex-Based Differences In School Content And The Male/Female Wage Gap,* Journal of Labor Economics, v15(3,Jul), Part 1, 431-465.

Büchel, F., & Mertens, A. (2004). *Overeducation, undereducation, and the theory of career mobility.* Applied Economics, 36(8), 803-816.

Büchel, F., & Van Ham, M. (2003). *Overeducation, regional labor markets, and spatial flexibility.* Journal of Urban Economics, 53(3), 482-493.

Cain, G. G. (1986). *The economic analysis of labor market discrimination: a survey.* in Handbook of Labor Economics, by Ashenfelter, O & Card, D. Elsevier Science.

Chamberlain, G. (1979). *Analysis of covariance with qualitative data*, Review of Economic Studies, 47, pp. 225-238.

Chapman, B. J., & Harding, J. R. (1985). *Sex differences in earnings: An analysis of Malaysian wage data.* Journal of Development Studies, 21(3), 362-376.

Cheng, S., & Long, J. S. (2007). *Testing for IIA in the multinomial logit model.* Sociological methods & research, 35(4), 583-600.

Chevalier, A. (2011). *Subject choice and earnings of UK graduates.* Economics of Education Review, 30(6), 1187-1201.

Ciriaci, D. (2014). *Does university quality influence the interregional mobility of students and graduates? The case of Italy.* Regional Studies, 48(10), 1592-1608.

Colella, F. (2014). *Women's Part-Time/Full-Time Wage Differentials in Europe: An Endogenous Switching Model.*

Das, M., & Van Soest, A. (1999). *A panel data model for subjective information on household income growth.* Journal of Economic Behavior & Organization, 40(4), 409-426.

Daymont, T. N. and Andrisani, P. J. (1984), *Job Preferences, College Major, and the Gender Gap in Earnings*, Journal of Human Resources, pp. 408-428.

Deaton, A. (1985). *Panel data from time series of cross-sections.* Journal of econometrics, 30(1), 109-126.

Dekker, R., De Grip, A., & Heijke, H. (2002). *The effects of training and overeducation on career mobility in a segmented labour market.* International Journal of Manpower, 23(2), 106-125.

Malaysian Department of Statistics: Population and Demography. *https://www.dosm.gov.my/v1/index.php?r=column/ ctwoByCat&parent_id=115 &menu_id= L0pheU43NWJwRWVSZklWdzQ4TlhUUT09* (Accessed on 27/2/2017).

Devadason, E. S., Subramaniam, T., & Daniel, E. G. S. (2010). *Final year undergraduates? perceptions of the integration of soft skills in the formal curriculum: a survey of Malaysian public universities.* Asia Pacific Education Review, 11(3), 321-348.

Disney, R., and Gosling, A. (2008), *Changing public sector wage differentials in the UK*, (No. 08/02). IFS Working Papers, Institute for Fiscal Studies.

Dolton, P. J., Makepeace, G. H., & van der Klaauw, W. (1989). *Occupational choice and earnings determination: The role of sample selection and non-pecuniary factors.* Oxford Economic Papers, 41(3), 573-594.

Drydakis, N. (2016). *The effect of university attended on graduates' labour market prospects: A field study of Great Britain.* Economics of Education Review, 52, 192-208.

Duncan, G. J., & Hoffman, S. D. (1981). *The incidence and wage effects of overeducation.* Economics of Education Review, 1(1), 75-86.

Elliott, R. F., & Duffus, K. (1996). *What Has Been Happening to Pay in the Public Service Sector of the British Economy? Developments over the Period 1970-1992.* British Journal of Industrial Relations, 34(1), 51-85.

England, P., Allison, P., & Wu, Y. (2007). *Does bad pay cause occupations to feminize, does feminization reduce pay, and how can we tell with longitudinal data?* Social Science Research, 36(3), 1237-1256.

Faggian, A., & McCann, P. (2009). *Human capital, graduate migration and innovation in British regions.* Cambridge Journal of Economics, 33(2), 317-333.

Fairlie, R. W. (1999). *The absence of the African-American owned business: An analysis of the dynamics of self-employment.* Journal of Labor Economics, 17(1), 80-108.

Fairlie, R. W. (2005). *An extension of the Blinder-Oaxaca decomposition technique to logit and probit models.* Journal of economic and social measurement, 30(4), 305-316.

Fallon, P., & Verry, D. (1988). *The economics of labour markets.* Philip Allan Publishers, Oxford.

Figueiredo, H., Rocha, V., Biscaia, R., & Teixeira, P. (2015). *Gender pay gaps and the restructuring of graduate labour markets in Southern Europe.* Cambridge Journal of Economics, bev008.

Fogel, W., & Lewin, D. (1974). W*age determination in the public sector.* Industrial and Labor Relations Review, 410-431.

Glass, J. (1990). *The impact of occupational segregation on working conditions.* Social Forces, 779-796.

Gomez, E.T. and Jomo, K.S. (1999) *Malaysia's Political Economy: Politics, Patronage and Profits,* Cambridge: Cambridge University Press.

Greene, W. H. (2000). *Econometric analysis*, 4th ed. International edition, New Jersey: Prentice Hall.

Green, F., & Zanchi, L. (1997). *Trends in the training of male and female workers in the United Kingdom.* British Journal of Industrial Relations, 35(4), 635-644.

Gregory, R.G. and Borland, J. (1999), *Recent developments in public sector labor markets?*, Handbook of Labor Economics 3, 3573-3630.

Griliches, Z. (1977). *Education, Income, and Ability: Rejoinder to Cardell and Hopkins.* Journal of Political Economy, 85(1).

Gunderson, M. (1980). *Probit and logit estimates of labor force participation.* Industrial Relations: A Journal of Economy and Society, 19(2), 216-220.

Hanapi, Z., Nordin, M. S., & Khamis, A. (2015). *Challenges faced by engineering lecturers in integrating technical and employability skills in the curriculum: A case study in Community College, Malaysia.* International Journal of Social Science and Humanity, 5(5), 483.

Hartog, J., Van Praag, M., & Van Der Sluis, J. (2010). *If you are so smart, why aren't you an entrepreneur? Returns to cognitive and social ability: Entrepreneurs versus employees.* Journal of Economics & Management Strategy, 19(4), 947-989.

Hausman, J., & McFadden, D. (1984). *Specification tests for the multinomial logit model.* Econometrica: Journal of the Econometric Society, 1219-1240.

Heckman, J. J. (1979), *Sample Selection Bias for a Specification Error*, Econometrica, Vol. 47, No. 1, pp 153-161.

Heitmueller, A. (2004), *Public-Private Sector Wage Differentials in Scotland: An Endogenous Switching Model*, IZA Discussion Paper No. 992.

Hicks, J. (1963). *The theory of wages*. Springer.

Hilmer, M. J., & Hilmer, C. E. (2012). *On the relationship between student tastes and motivations, higher education decisions, and annual earnings.* Economics of Education Review, 31(1), 66-75.

Hirschman, C. 1983. *Labor markets and ethnic inequality in Peninsular Malaysia.* Journal of Developing Areas 18: 1-20.

Iammarino, S., & Marinelli, E. (2015). *Education-Job (Mis) Match and Interregional Migration: Italian University Graduates' Transition to Work.* Regional Studies, 49(5), 866-882.

Ismail, N. A. (2011). *Graduates' characteristics and unemployment: A study among Malaysian graduates.* International journal of business and social science, 2(16).

James, E., Nabeel, A., Conaty, J., & To, D. (1989). *College quality and future earnings: where should you send your child to college?* American Economic Review, 79, 247-252.

Jomo, K. S. (2004). *The new economic policy and interethnic relations in Malaysia identities, conflict and cohesion* (Vol. 7). Geneva, Switzerland: United Nations Research Institute for Social Development.

Kanapathy, V. (2006). *Migrant workers in Malaysia: an overview.* In Country paper prepared for Workshop on East Asian Cooperation Framework for Migrant Labour, Kuala Lumpur. Retrieved from *http://www.cpiasia.net/v3/images/policy_papers/Migrant%20Workers %20in%20Malaysia_An%20Overview.pdf.* (Accessed 21/2/2017).

Katz, L. F., & Krueger, A. B. (1992). *The effect of the minimum wage on the fast-food industry.* Industrial & Labor Relations Review, 46(1), 6-21.

Koshy, P., Seymour, R., & Dockery, M. (2016). *Are there institutional differences in the earnings of Australian higher education graduates?.* Economic Analysis and Policy, 51, 1-11.

Jurajda, S., & Paligorova, T. (2006). *Female managers and their wages in Central Europe.*

Lee, K. H., & Nagaraj, S. (1995). *Male-female earnings differentials in Malaysia.* Journal of Development Studies, 31(2), 467-480.

Müller, W., & Gangl, M. (2003). *The transition from school to work: a European perspective.* Transitions from education to work in Europe. The integration of youth into EU labour markets, 1-22.

Maddala, G. S. (1986). *Limited-dependent and Qualitative Variables in Econometrics* No. 3, Cambridge university press.

Madden, D. (2010). *Gender differences in mental well-being: a decomposition analysis. Social indicators research*, 99(1), 101-114.

Makepeace, G. & Pal, S., 2004. *Understanding the Effects of Sibling Composition on Child,* Labor and Demography 0402004, EconWPA.

Mata, J. & Machado, J. A. F., *Counterfactual decomposition of changes in wage distributions using quantile regression.* Journal of Applied Econometrics, 20(4):445-465, 2005.

Mazumdar, D. (1981). *The urban labor market and income distribution: A study of Malaysia.* A World Bank Research Publication.

McDaniel, A. (2012). *Women's advantage in higher education: towards understanding a global phenomenon*, Sociology Compass, vol. 6, 581-95

Melly, B., *Decomposition of differences in distribution using quantile regression.* Labour Economics, 12(4):577-590, August 2005.

Migration Survey (2011), Malaysian Department of Statistics. Retrieved from *https://www.dosm.gov.my/v1/images/stories/files/LatestReleases/findings/Summary_findings_Migras2011.pdf* (Accessed on 25/2/2017).

Molho, I. (1987). *The migration decisions of young men in Great Britain.* Applied Economics, 19(2), 221-243.

Moore, W. J., & Raisian, J. (1981). *A time series analysis of the growth and determinants of union/nonunion relative wage effects,* 1967-1977 (Vol. 115). US Dept. of Labor, Bureau of Labor Statistics, Office of Research and Evaluation.

Muris, C. (2016). *Estimation in the fixed effects ordered logit model.* Review of Economics and Statistics.

Nagaraj, S. (2014). *Gender imbalance in educational attainment and labour market dynamics: Evidence from Malaysia.* Malaysian Journal of Economic Studies, 51, 127.

Nakosteen, R. A., & Zimmer, M. (1980). *Migration and income: the question of self-selection.* Southern Economic Journal, 840-851.

Nasrudin, M. (2004). *Graduate Unemployment; Perspectives & Brief Analysis.* Journal of Administrative Science.

Ng, C. W., & Chakrabarty, A. S. (2005). *Women managers in Hong Kong: Personal and political agendas.* Asia Pacific Business Review, 11(2), 163-178.

Oaxaca, R. (1973), *Male-female Wage Differentials in Urban Labor Markets*, International economic review, pp. 693-709.

Ong, E. (2012). *Education and Labor Market Outcomes of Malaysia's Affirmative Action Policies.*

Osman, Z., & Shahiri, H. (2014). *Ethnic and gender inequality in employment during the new economic policy.* Institutions and Economics, 6(1), 57-72.

Osman-Rani, H. (1982) *Manufacturing Industries*, in E. K. Fisk and Osman- Rani, H. (ed.) The Political Economy of Malaysia, Kuala Lumpur: Oxford.

Pillai, S., Khan, M. H., Ibrahim, I. S., & Raphael, S. (2012). *Enhancing employability through industrial training in the Malaysian context.* Higher Education, 63(2), 187-204.

Polachek, S. (1976) *Occupational Segregation: An Alternative Hypothesis,* Journal of Contemporary Business 5:1-12.

Polavieja, J. G. (2006). *The incidence of temporary employment in advanced economies: why is Spain different?.* European Sociological Review, 22(1), 61-78.

Purcell, K., & Pitcher, J. (1996). *Great Expectations: the new diversity of graduate skills and aspirations.* CSU.

Quinn, M. A., & Rubb, S. (2005). *The importance of education-occupation matching in migration decisions.* Demography, 42(1), 153-167.

Rahmah et, al (2011). *Employer Perceptions on Graduates in Malaysian Services Sector.* Medwell Journals, 5(3):184-193.

Rees, H., and Shah, A. (2000), *An empirical analysis of self-employment in the UK*, Small Business: Critical Perspectives on Business and Management, Vol. 4, Issue 1, pp. 1414.

Reimers, C. W. (1983). *Labor market discrimination against Hispanic and black men.* Review of Economics and Statistics 65: 570-579.

Rethinasamy, S., & Chuah, K. M. (2011). *The Malaysian University English Test (MUET) and its Use for Placement Purposes: A Predictive Validity Study.* Electronic Journal of Foreign Language Teaching, 8(2), 234-245.

Robst, J., & VanGilder, J. (2016). *Salary and job satisfaction among economics and business graduates: The effect of match between degree field and job.* International Review of Economics Education, 21, 30-40.

Rosen, S. (1972). *Learning and experience in the labor market.* Journal of Human Resources, 326-342.

Rosen, S. (1986). *The theory of equalizing differences.* in Handbook of Labor Economics, by Ashenfelter, O & Card, D. Elsevier Science.

Rumberger, R. W. (1981). *The rising incidence of overeducation in the US labor market.* Economics of Education Review, 1(3), 293-314.

Salas-Velasco, M. (2007). *The transition from higher education to employment in Europe: the analysis of the time to obtain the first job.* Higher Education, 54(3), 333-360.

Salih, K., & Young, M. L. (1989). *Changing conditions of labour in the semiconductor industry in Malaysia.* Labour and Society, 14(1989), 59-80.

Second Malaysia Plan. Retrieved from *http://www.epu.gov.my/en/second-malaysia-plan-1971-1975.* (Accessed on 21/2/2017).

Selvaratnam, S. (1988). *Population and status of women.* Asia-Pacific Population Journal, 3(2), 3-23.

Seshan, G. K., (2013). *Public-Private-Sector Employment Decisions and Wage Differentials in Peninsular Malaysia,* Emerging Markets Finance and Trade, M.E. Sharpe, vol. 49(S5), pages 163-179, November

Shahiri, H. (2012). *An Analysis of the Reduction of the Ethnic Economic Gap in Malaysia under the New Economy Policy: Evidence from Ethnic Occupation Segregation and Wage Differential.* Jurnal Ekonomi Malaysia, 46(2), 127-139.

Sicherman, N. (1991). *"Overeducation" in the Labor Market.* Journal of labor Economics, 9(2), 101-122.

Sinning, M., Hahn, M., and Bauer, T. K. (2008), *The Blinder-Oaxaca Decomposition for Nonlinear Regression Models*, The Stata Journal, Vol. 8, No. 4, pp. 480-492.

Sinning, M., Hahn, M., & Bauer, T. K. (2008). *The Blinder-Oaxaca decomposition for nonlinear regression models.* The Stata Journal, 8(4), 480-492.

Sjaastad, L. A. (1970). *The costs and returns of human migration.* In Regional Economics (pp. 115-133). Palgrave Macmillan UK.

Sloane, P. J. (2003) *Much ado about nothing? What does the over-education literature really tell us?*, in Buchel F., Degrip A. and Mertens A. (Eds) Overeducation in Europe: Current Issues in Theory and Policy, pp. 11-48. Edward Elgar, Cheltenham.

Small, K. A., & Hsiao, C. (1985). *Multinomial logit specification tests.* International economic review, 619-627.

Smith, J. P., Naylor, R. A., & McKnight, A. A. (2000). *Graduate employment outcomes and university performance measures. Economic Journal, 110(464),* F382-411.

Spence, M. (1973). *Job market signaling.* The quarterly journal of Economics, 87(3), 355-374.

Tam, T. (1997). *Sex segregation and occupational gender inequality in the united states: devaluation or specialized training?* American Journal of Sociology, 102(6), 1652- 1692.

Tansel, A. 2005. *Public-Private Employment Choice, Wage Differentials, and Gender in Turkey.* Economic Development and Cultural Change 53, no. 2: 453-477.

Teichler, U. (2000). *Graduate employment and work in selected European countries.* European Journal of Education, 35(2), 141-156.

Terrell, K. (1993). *Public-private wage differentials in Haiti Do public servants earn a rent?.* Journal of Development Economics, 42(2), 293-314.

Thurow, L. C. (1975). *Generating Inequality: The Distributional mechanisms of the economy.* National Technical Information Service.

Tunali, I. (1986). *A general structure for models of double-selection and an application to a joint migration/earnings process with remigration.* Research in labor Economics, 8(Part B), 235-282.

Tunali, I. (2000). *Rationality of migration.* International Economic Review, 41(4), 893-920.

UNESCO (2012), *Graduate Employability in Asia*, UNESCO Bangkok, Asia and Pacific Regional Bureau for Education.

Venhorst, V., & Corvers, J. G. F. (2015). *Entry into working life: Spatial mobility and the job match quality of higher-educated graduates.* Maastricht University School of Business and Economics, GSBE.

Walker, I., & Zhu, Y. (2001). *The returns to education: Evidence from the Labour Force Surveys..*

Weichselbaumer, D., & Winter-Ebmer, R. (2005). *A Meta-Analysis of the International Gender Wage Gap.* Journal of Economic Surveys, 19(3), 479-511.

Wharton, A. S., & Baron, J. N. (1987). *So happy together? The impact of gender segregation on men at work.* American Sociological Review, 574-587.

Wilkinson, R., & Yussof, I. (2005). *Public and private provision of higher education in Malaysia: A comparative analysis.* Higher Education, 50(3), 361-386.

Winkelmann, L., & Winkelmann, R. (1998). *Why are the unemployed so unhappy? Evidence from panel data.* Economica, 65(257), 1-15.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data.* MIT press.

World Bank (2011). *Malaysia Economic Monitor - Brain Drain.* Washington, D.C.: The World Bank. April. Retrieved from *http://documents.worldbank.org/curated/en/282391468050059744/pdf/614830WP0malay10Box358348B01PUBLIC1.pdf.* (Accessed 21/2/2017).

The World Bank, World Urbanization Prospect (2015). Urban population. Retrieved from *http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS* (Accessed 21/2/2017).

Yavuzoglua, B., Tunali, I., & Ceyhanc, E. (2008). *Correction of Selectivity Bias in Models of Double Selection* (Doctoral dissertation, Koc University).

Yun, M. S. (2004), *Decomposing Differences in the First Moment*. Economics letters, Vol. 82, Issue 2, 275-280.

Zainudin, S. M. and Zulkifly, O. (1982) *The Economic Structure*, in E. K. Fisk and Osman-Rani, H. (eds.), The Political Economy of Malaysia, Kuala Lumpur: Oxford University Press.

Zanchi, L. (1998). *Interindustry wage differentials in dummy variable models.* Economics Letters, 60(3), 297-301.