Education and Signaling: Evidence from a Highly Competitive Labor Market in 2001

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Applied Economic Option

An Honours Degree Project Submitted to the School of Business in Partial fulfillment Of the Graduation Requirement for the Degree of Bachelor of Business Administration (Honours)

Hong Kong Baptist University

Hong Kong

April 2006

Acknowledgements

I would like to thank God for helping me to finish this honor project. I forgot how many times I prayed for help from God. God listened to almost my every prayer.

In the process of doing this honor project, I learnt to be humble, since God remind me many times. Second, I understand myself and God better. Third, I experienced to have faith in God is very important in my life. When I try to have faith in God, God gave the Lambda to me. And I will not forget how excited I was when I got the Lambda by help from God. Fourth, I learnt to persist until the last moment, by the experience of doing this honor project, I discovered that the breakthroughs always happen at last moment. Fifth, I felt care and love from my classmates, supervisor and those from the church. I learnt and experienced so many things during doing this honor projects. As a result, I thank God for giving me opportunities to do this honor project. I also thank God for giving me "difficulties" when I do the honor project, the purpose of these "difficulties" is to push me to learn new things.

Last but not least, I thank God for giving me my supervisor, Professor, Joanna Kit Chun LAM, she devoted so much time and effort in helping me to solve the problems. And the experiences of doing this honor project would probably become one of the memories in my life.

Abstract:

In this study, I found that the educational earnings for the employed are greater than the self-employed. It can be concluded that it is in 2001, after the Hong Kong handover, education continues to play a signaling role. And it supports the weak screening hypothesis, but not strong screening hypothesis. Moreover, the higher education returns for those completed the course than the dropouts are at least partly due to signaling value of educational credentials.

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I. Introduction

More education generally enables people to have higher earnings. However, we can explain this phenomenon by human capital theory or screening theory. As a result, there were considerable debate between the supporters of human capital and screening models. Many economists want to do research tests to see if they can empirically confirm the screening hypothesis. John S. Heywood and XiangDong Wei demonstrated that education may serve an important signaling function in the competitive labor market before 1997 (Heywood, J. & Wei, X. (2004) Education and Signaling: Evidence from a Highly Competitive Labor Market, Education Economics, Vol.12, no.1, p.1-16.). So I will follow the work done by John S. Heywood and XiangDong Wei and see if education signal can be empirically confirmed again in Hong Kong after the 1997 Handover.

John S. Heywood and XiangDong Wei chose Hong Kong to do empirical test because they thought Hong Kong is one of the world most competitive labor markets. They estimated the returns to education for both employed and self-employed. The employed are presumably screened and self-employed are presumably unscreened. If education plays a signaling role in Hong Kong, the returns to education should be larger for the employed than for the self-employed (Pascharopolous, 1979).

I will use similar approach that focuses on self-employed as the unscreened and employed to be screened (Wolpin, 1977) in this study.

The weak screening hypothesis (WSH) assumes all individual workers, employed and self-employed invest in education for increasing their productivities (human capital theory). Education not only increases the productivities of the employed, it also signals the employed inherent productivities. So the employed invest in education for these two reasons. Self-employed do not need to signal their productivities. The earnings for the self-employed can purely reflect education's direct influence on productivity rather than the signaling function of education (Brown & Sessions, 1999).

I will present my study in the following sequence. Section 2 reviews the previous literature. Section 3 will be the model specification. Section 4 discusses the data. Section 5 presents empirical result. Section 6 discusses the limitations and Section 7 draws the conclusions.

First, after dealing with the sample selection bias, I do the ordinary least squares (OLS) estimates for the employed and self-employed. Then I estimate the returns separately by gender. Second, I take customer screening into account, so I remove all the doctors and lawyers from the sample, and then I run the earnings regression again by gender. Finally, I find out the distinction of returns between those completed the course and those dropouts.

II. Literature Review

According to human capital theory, education increases one's productivity (Becker, 1975). In contrast, screening hypothesis give evidence that education only signals inherent productivity. And there are two kinds of screening hypothesis, namely, strong screening hypothesis (SSH) and weak screening hypothesis (WSH).

The strong screening hypothesis (SSH) presumes that productivity has no relationship with education, and education is only used for screening (Psacharopoulos, 1979). The weak screening hypothesis (WSH) admitted education increases inherent productivity, and the primary role of education is to signal inherent productivity. According to the signaling theories of Arrow (1973), Spence (1974), and Stiglitz (1975), since education is used to signal inherent productivity, those with higher ability will invest more in education. It is because they want to use education to signal their higher capability.

Most common and fundamental test is to examine the differences in returns to education between a group of workers presumed to be screened and a group presumed not to be screened, such as those done by Wolpin in 1977 and Riley in 1979. The prevalent paper follows this tradition (Heywood & Wei, 2004).

Many studies compared the returns to education in presumably screened and unscreened sectors of economies from all over the world (see Belfield, 2000). Some compared returns of self-employed and employed, some compared the returns of those employed by private firms and those employed by governments. There are even

some to examine the return to educational attainment, not returns to education. However, the reason is the same. If education does not act as a signal of productivity for the self- employed, the self-employed will invest less in education (Heywood & Wei, 2004).

Table 1 provides a summary of about 30 tests using sectoral comparison across different countries (Heywood & Wei, 2004). From these tests, we cannot draw any generalization. And Brown & Session concluded that "the extent to which education is used as a screen depends critically upon the nature of indigenous cultures and institutions" (Brown & Sessions, 1999, p. 398).

Culture and institutions affect the signaling effect of education in different countries, and a highly regulated labor market has less individual variation in earnings (Heywood & Wei, 2004). For example, for the highly corporatist countries of continental Europe, centrally determined earnings are passed on to all employees in private sector (see Slomp, 1996). The dispersion of earnings in these countries is much less than in those with less regulated labor markets (see Addison & Siebert, 1997, Table 10.5).The smaller earnings dispersion in less competitive labor markets proof that there is less signaling in these markets(Heywood & Wei, 2004).

Table 1
Review of signaling tests (from Heywood & Wei, 2004)

Country	Support	Public versus private	Employed versus self-employed	Screened versus unscreened	Method	Gender
Argentina	y		x		R	C
Kugler & Psacharopolous (1989)	n			x	R	C
Australia	y	x			R	M,F
Miller & Volker (1984)						
Equador	y		x		R	C
Gomez-Castellans & Psacharopolous (1990)	n	x			R	C
Greece	n	x			R	C,M
Lambropoulous (1992)						
Israel						
Katz & Zimermann (1980)	y		x		E	M
Zidermann (1992)	n		x		R	M
Italy	y		x		R	M
Brown & Sessions (1999)	y	x			R	M
Kuwait	n	x			R	C
Al-Qudsi (1989)						
Malaysia						
Soon (1987)	y		x		R	M
Lee (1980)	n	x			R	M
Pakistan	y		x		R	M
Guisinger et al. (1984)						
Paraguay	n	x			R	C
Psacharopoulous *et al.* (1994)	n		x		R	M
	y		x		R	F
Spain	n		x		R	M,F
Alba-ramirez & Segundo (1995)	y	x			R	M,F
United Kingdom						
Arabshiebani & Rees (1997)	n	x			R	M
Brown & Sessions (1998)	y		x		R	M
Shah (1985)	y			x	R	M
United States						
Cohn et al. (1987)	n		x		E	M
	n		x		R	M
	n	x			R	M
Grubb (1993) (highschool)	y		x		R	M
(university)	n		x		R	M
Hamilton (2000)	y		x		R	M
Riley (1979)	y			x	R	M
Tucker (1985)	n		x		R	C
Venezuela						
Psacharopolous & Steier (1988)	y		x		R	M
	n	x			R	M

Key: y, supportive of the presence of signaling; n, not supportive of the presence of signaling; R, examines differences in rates of return to education; E, examines differences in amounts of education; M, estimates performed on a sample of only males, F, estimates performed on a sample of only female and C, estimates performed on a mixed gender sample. (Source: Heywood & Wei, Education and signaling, 2004)

Two examples can be cited: in United States, Heywood in 1994 found that signaling only exists in private non-unionized sector of the workforce. And signaling does not exist in private unionized sector and in all government sectors. Besides, Heywood found that when the labor market for the employed is more competitive and flexible, a greater difference in earnings might be expected. Muhlau and Horgan in 2000 found that US and UK have greater dispersion in earnings and educational signals than continental Europe. In addition, in US and UK, the correlations between skills requirements of the jobs and educational signals are greater than continental Europe. To conclude, educational signals are more significant in a more competitive labor markets.

III. Model Specification

A. Earnings Functions

The following Mincerian earnings equation was estimated for the individual workers:

$$Lnmearn = \alpha + \beta_1 e + \beta_2 x + \beta_3 x^2 + \beta_4 m + \beta_5 i + \varepsilon$$

Where Lnmearn = log monthly earnings, α = average wage for reference respondent, e = educational level dummy, x = years of labor market experience (proxied by age), and m = marital status, i = industrial dummy variables. The education level dummies in vector e denote the respondent's highest level of education, namely: (1) primary education, (2) lower secondary education, (3) upper secondary education, (4) post secondary education, (5) university education. The term ε is included to capture random errors. The education level dummies in vector i denote industries in which the respondent work during the seven days before the census moment, namely, (1) agriculture and fishing, (2) manufacturing, (3) electricity, gas and water, (4) construction, (5) wholesale and retail, (6) transport, storage and communication, (7) Financing, insurance, real estate, (8) community, social and personal services, (9) not classified.

B. Selectivity Bias

Men and women can choose to be employed and self-employed. The choice is not random. And it depends on which economic activities status enables them have highest earnings. Some workers have characteristics that make them more likely to be the self-employed workers. Then the estimated returns to different educational level will be affected by this sample selection bias. We can deal with this bias by using method suggested by Heckman (1979). Heckman two-step technique can enable us to create the inverse mill ratio (Lambda) from the first stage probit. And the inverse mills ratio (Lambda) is included in the corrected earnings equations (Le, 1999). If the coefficient for the Lambda is negative, it means there is positive correlation between the choice functions and the earnings function (Wong, 1986).

IV. Data

The data used in this study are from the sample of the 2001 Census. It provides the variables such as age, its square, gender, marital status of the individual worker, and 8 dummy variables for broad industry of employment. From this data set, no one was come from mining and quarrying industry. The individual workers are at the age between 15 and 60 years old. Table 2 is the definitions of data. 2001 Census also provides the information that whether the individual workers are employed or self-employed.

Table. 2
Data definitions

Variable name	Description
Lnmearn	Log monthly earnings
Age	Respondent's age in years
Married	Respondent is married
Primary	Respondent has either no formal education or primary school education
Lower Secondary	Respondent has Form 1 to Form 3 education
Upper Secondary	Respondent has Form 3 to Form 7 or craft level education
Post Secondary	Respondent has post secondary education e.g. diplomas or certificates
University	Respondent has either degree, postgraduate education in University

Table 3 presents the summary statistics for all workers, the employed and self-employed. The resulting sample consists of a total of 46625 individual workers, of which1177, or 2.5%, are self-employed. And we can compare it with 10.5% in Australia, 13.6% in Belgium, 8% in Denmark, 12.6% in Finland, 10.0% in France, 9.7% in Germany, 31.3% in Greece, 16.5% in Ireland, 23.6% in Italy, 8.7% in Luxembourg, 10.0% in Netherlands, 20.2%in Portugal, 18% in Spain, 9.8% in Sweden, 10.9% in United Kingdom, 13.6% in EU (from Eurostat Labour Force Survey, 2000).

Table 3
Summary statistics

	All workers		Employed		Self-employed	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Primary	0.1605	0.3671	0.1580	0.3647	0.2201	0.4145
Lower Secondary	0.1952	0.3964	0.1921	0.3939	0.2702	0.4442
Upper Secondary	0.3859	0.4868	0.3877	0.4872	0.3441	0.4753
Post Secondary	0.0869	0.2817	0.0884	0.2839	0.0518	0.2218
University	0.1714	0.3769	0.1739	0.3790	0.1138	0.3178
Age	36.869	10.297	36.672	10.280	41.514	9.5884
Age Squared	1465.34	782.32	1450.54	779.39	1815.27	770.17
Male	0.5319	0.4989	0.5232	0.4995	0.7383	0.4397
Married	0.5925	0.4914	0.5866	0.4925	0.7324	0.4429
Lnmearn	9.3068	0.7684	9.3110	0.7691	9.2097	0.7454
Sample size	29001		27824		1177	

Note: All data are from selected sample from the 2001 Hong Kong Census.

For the employed, the average age 37 years old, that 52.3% of the employed are male and 58.7% of the employed are married.

For the self-employed, the average age is 42 years old, which 73.8% of the self-employed is male and 73.2% of the self-employed are married.

The average natural log of earnings for the employed is 9.31, approximately 11.63% higher than that for the self-employed at 9.20.

The summary statistics shows that proportion of self-employed with lower education level is higher than that for the employed. For instance, 35% of the employed have attained lower secondary or less while the same statistics for the self-employed is 49%. These results coincide with the screening hypothesis that the self-employed are less concerned and so less interested in investing in education. So they invest less in education (Wolpin, 1977).

V. Empirical Result

A. Overall Picture of Education Signaling

Table 4
OLS Estimates of earnings functions

	Full sample		
	Employed	Self-employed	Difference
Constant	6.3379*	7.1043*	-0.7664
	(108.51)	(21.28)	
Age	0.1034*	0.1358*	-0.0324
	(33.47)	(9.18)	
Age Squared	-0.0012*	-0.0016*	0.0004
	(-29.67)	(-9.16)	
Male	0.3014*	0.2506*	0.0508
	(27.43)	(5.01)	
Married	0.0779*	0.0888	-0.0109
	(6.474)	(1.71)	
Lower Secondary	0.2026*	0.0934	0.1092
	(13.57)	(1.65)	
Upper Secondary	0.5615*	0.2885*	0.273
	(39.21)	(5.06)	
Post Secondary	0.9636*	0.458*	0.5056
	(47.87)	(4.62)	
University	1.249*	0.5246*	0.7244
	(71.158)	(6.57)	
Lambda	1.3104*	-0.3993*	1.7097
	(19.88)	(-5.85)	
Adjusted R-squared	0.4071	0.2242	
Sample size	27824	1177	

Note: The earnings functions include dummy variables for 9 broad industries. t-Statistics presented in parentheses. * Statistically significant at the 1% level.

Table 4 presents ordinary least squares (OLS) estimates of the earnings functions for both employed and self-employed. I corrected for the sample selection bias by including Lambda in the earnings functions. The estimated coefficient for Lambda for the employed is significantly positive. On the other hand, the estimated coefficient for Lambda for the self-employed is significantly negative. It indicates that selection is not random. And the observed earnings of the self-employed are less than the population mean, however, the observed earnings of the employed are larger than the population mean (Wong, 1986, p. 696)

Table 4 shows that age and age-squared are significant in determining the earnings of employed and self-employed. According to Riley (1979), if the education is an effective screening device, then is should be an accurate signal of worker productivity. As a result, the estimated earnings function of employed is expected to fit the data better than that for the self-employed (Brown & Sessions, 1999, p.400). From table 4, we can see that around 41% of the variation in employed earnings can be explained by the regression. On the other hand, it is around 22% of the variation in self-employed earnings can be explained by the regression. It suggested that the null hypothesis that there is no evidence of screening is rejected.

The third column of Table 4 presents the difference in the educational returns between the employed and self-employed. The employed are presumably screened and self-employed are presumably unscreened. If education plays a signaling role in Hong Kong, the returns to education should be larger for the employed than for the self-employed. And from Table 4, we can see that the difference of educational returns between employed and self-employed is positive at different education levels. The

higher the education level, the greater the difference is. For lower secondary level, the difference is 0.1092; for upper secondary, the difference is 0.273; for post secondary, the difference is 0.5056; for university level, the difference is 0.7244. It is very obvious that in a higher education level, the signaling effect is greater.

In Table 4 samples of men and women were combined in a single estimate as shown above. However, the Chow test rejects the null hypothesis that the sectors have same earnings regression. The Chow tests are as follow:

For employed:

H_0: $\beta_{male} = \beta_{female}$

H_1: $\beta_{male} \neq \beta_{female}$

$$F = \frac{(RSS_R - RSS_{UR}) / k}{(RSS_{UR}) / (n_1 + n_2 - 2k)}$$

$$F = \frac{(9745 - 9376) / 18}{9376 / 27788}$$

$F = 60.76$

As the computed F value exceeds the critical F value, I reject the null hypothesis of parameter stability and conclude that the male's and female's regression are different.

For self-employed:

H_0: $\beta_{male} = \beta_{female}$

H_1: $\beta_{male} \neq \beta_{female}$

$$F = \frac{(RSS_R - RSS_{UR}) / k}{(RSS_{UR}) / (n_1 + n_2 - 2k)}$$

$$F = \frac{(494 - 476) / 16}{476 / 1145}$$

$F = 2.71$

As the computed F value exceeds the critical F value, I reject the null hypothesis of parameter stability and conclude that the male's and female's regression are different.

Table 5 and Table 6 show the educational returns by employment status and estimated separately for men and women.

The coefficients on the dummies capturing the 8 broad industries are suppressed but are available from the author.

Table 5
OLS Estimates of earnings functions by gender (Males)

	Males		
	Employed	Self-employed	Difference
Constant	6.4837*	7.8709*	-1.3872
	(93.42)	(20.33)	
Age	0.1151*	0.1169*	-0.0018
	(31.51)	(6.83)	
Age Squared	-0.0013*	-0.0014*	0.0001
	(-29.14)	(-6.87)	
Married	0.1593*	0.0958	0.0635
	(10.47)	(1.55)	
Lower Secondary	0.1701*	0.0844	0.0857
	(10.13)	(1.41)	
Upper Secondary	0.4665*	0.2301*	0.2364
	(27.63)	(3.79)	
Post Secondary	0.8064*	0.3480*	0.4584
	(33.18)	(3.03)	
University	1.2173*	0.5011*	0.7162
	(59.13)	(5.50)	
Lambda	0.9267*	-0.4696*	1.3963
	(14.33)	(-5.66)	
Adjusted R-squared	0.4333	0.1876	
Sample size	14557	869	

Note: The earnings functions include dummy variables for 9 broad industries. t-Statistics presented in parentheses. * Statistically significant at the 1% level.

According to result of Table 5 for the males, the conclusion drawn is similar to that for full sample. We can see that the difference of educational returns between employed and self-employed is positive at different education levels. The higher the education level, the greater the difference is. For lower secondary level, the difference is 0.0857; for upper secondary, the difference is 0.2364; for post secondary, the difference is 0.4584; for university level, the difference is 0.7162. It is very obvious

that in a higher education level, the signaling effect is greater.

Table 6
OLS Estimates of earnings functions by gender (Females)

	Female		
	Employed	Self-employed	Difference
Constant	6.5526*	5.4475*	1.1051
	(66.66)	(8.136)	
Age	0.0922*	0.1913*	-0.09
	(17.27)	(6.37)	
Age Squared	-0.0010*	-0.0024*	0.0014
	(-14.58)	(-6.26)	
Married	0.0059	0.0231	-0.0172
	(0.308)	(0.23)	
Lower Secondary	0.2069*	0.0470	0.1599
	(7.68)	(0.34)	
Upper Secondary	0.6223*	0.4463*	0.176
	(25.73)	(3.28)	
Post Secondary	1.0748*	0.6346*	0.4402
	(32.52)	(3.16)	
University	1.2346*	0.6396*	0.595
	(41.58)	(3.80)	
Lambda	1.9684*	-0.1630	2.1314
	(12.90)	(-1.35)	
Adjusted R-squared	0.3509	0.2403	
Sample size	13267	308	

Note: The earnings functions include dummy variables for 9 broad industries. t-Statistics presented in parentheses. * Statistically significant at the 1% level.

According to result of Table 6 for the females, the conclusion drawn is similar to that for males. We can see that the difference of educational returns between employed and self-employed is positive at different education levels. The higher the education level, the greater the difference is. For lower secondary level, the difference is 0.1599; for upper secondary, the difference is 0.176; for post secondary, the difference is 0.4402; for university level, the difference is 0.595. It is very obvious that in a higher education level, the signaling effect is greater.

B. Customer Screening

I need to modify the assumption that the self-employed are not screened. Since some self-employed workers are screened, like medical doctors and lawyer. It is the customers to see their credentials, when one to see the doctors, they would like to know what qualification did that doctor have, and then decide whether to choose to see that doctor. It is because the customers don't have perfect information about the doctors and lawyers, they just using education attainment as a device to screen different doctors or lawyers.

In this sense, education serves a signaling function. I follow that modification done by J.S. Heywood & X. Wei. I remove all the medical doctors and lawyers from the samples, and then I run the earnings regressions in Table 5 and Table 6 again by gender. The sample size change a little bit. The original sample size has 14557 males are employed; 869 males are self-employed; 13267 females are employed; 308 females are self-employed. After removing the doctors and lawyers, the sample size decreased, there are 14385 males are employed; 853 males are self-employed; 13066 females are employed; 303 females are self-employed.

Table 7
OLS Estimates of earnings functions by gender (Males) excluding professionals

	Males		
	Employed	Self-employed	Difference
Constant	6.5064*	8.0316*	-1.5252
	(95.75)	(21.41)	
Age	0.1145*	0.1134*	0.0011
	(32.01)	(6.84)	
Age Squared	-0.0013*	-0.0014*	0.0001
	(-29.59)	(-6.90)	
Married	0.1619*	0.0587	0.1032
	(10.88)	(0.96)	
Lower Secondary	0.1698*	0.0851	0.0847
	(10.36)	(1.48)	
Upper Secondary	0.4658*	0.2330*	0.2328
	(28.29)	(3.97)	
Post Secondary	0.8038*	0.3535*	0.4503
	(33.78)	(3.19)	
University	1.1918*	0.3347*	0.8571
	(58.74)	(3.66)	
Lambda	0.8760*	-0.4886*	1.3646
	(13.71)	(-6.06)	
Adjusted R-squared	0.4199	0.1681	
Sample size	14385	853	

Note: The earnings functions include dummy variables for 9 broad industries. t-Statistics presented in parentheses. * Statistically significant at the 1% level.

The difference of education returns between employed and self-employed didn't have much changes for the lower secondary, upper secondary, post secondary, university education level. After removing the doctors and lawyers, the difference even decreased slightly. However, since the doctors and lawyers should be those in categories of university education level. As a result, we should focus on difference in university education level. When we compare Table 5 and Table 7, we found that after

we exclude the doctors and lawyers, the difference of educational returns between employed and self-employed is even greater. Before removing doctors and lawyers from sample, the difference of university education returns is 0.7162. However, when we removed the doctors and lawyers, the difference increased to 0.8571.

Table 8
OLS Estimates of earnings functions by gender (Females) excluding professionals

	Females		
	Employed	Self-employed	Difference
Constant	6.5942*	5.9914*	0.6028
	(69.66)	(9.06)	
Age	0.09077*	0.1756*	-0.0848
	(17.64)	(5.97)	
Age Squared	-0.0010*	-0.0022*	0.0012
	(-14.87)	(-5.91)	
Married	0.0047	0.0099	-0.0052
	(0.25)	(0.10)	
Lower Secondary	0.2065*	0.0527	0.1538
	(7.99)	(0.39)	
Upper Secondary	0.6185*	0.4392*	0.1793
	(26.69)	(3.33)	
Post Secondary	1.0597*	0.63*	0.4297
	(33.27)	(3.23)	
University	1.2019*	0.4833*	0.7186
	(41.95)	(2.88)	
Lambda	1.8207*	-0.2596*	2.0803
	(12.48)	(-2.16)	
Adjusted R-squared	0.3357	0.2276	
Sample size	13066	303	

Note: The earnings functions include dummy variables for 9 broad industries. t-Statistics presented in parentheses. * Statistically significant at the 1% level.

The same conclusion applied to females' earnings functions when excluding the doctors and lawyers. The difference of education returns between employed and self-employed didn't have much changes for the lower secondary, upper secondary, post secondary, university education level. After removing the doctors and lawyers, the difference even decreased slightly. Again we should focus on difference in university education level only since the doctors and lawyers should be those in university education level. When we compare Table 6 and Table 8, we found that after we exclude the doctors and lawyers, the positive difference of educational returns between employed and self-employed is even greater. Before removing doctors and lawyers from sample, the difference of university education returns is 0.595. However, when we removed the doctors and lawyers, the difference increased to 0.7186.

C. Signaling Value of Educational Credentials

2001 Census provides the information about the education attainment of the individual workers. In total, there are two education attainment variables, namely, highest level attended and highest level completed.

Highest level attended is defined as the highest level of education ever attained by a person in school or other institution, regardless of whether he had completed the course. And the highest level completed is defined as the highest level of education completed by a person in school or other educational institution, regardless of whether he had passed the examinations or assessments of the course (2001 Population Census 1% Sample Data Set-User Guide, 2002).

These two education attainment variables allow us to identify those who attempted an educational level (such as Form 3) but dropped out (J. S. Heywood & X. Wei, 2004, p.5-6). Those dropouts attended but didn't completed the course should earn less than those attended and also completed the course. It can be explained by human capital theory, since the dropouts received less education, so their productivity is lower than those completed the course, it explained why they earn less. And their education returns are less than those completed the course. However, we cannot deny that those completed the courses have higher education returns than those drop out is partly due to the signaling value of educational credentials (J. S. Heywood & X. Wei, 2004, p.13). That is why J. S. Heywood and X. Wei in 2004 tried to test directly for the differences in returns between those completed and dropouts (J. S. Heywood & X. Wei, 2004, p.2)

I also want to find out the distinction of returns between those completed the course and those dropouts. Table 9 presents OLS estimates of earnings functions for employed, individual workers are grouped in fine categories. This earnings function shows that earnings increased with additional education. It may partly due to human capital theory and partly due to signaling value of educational credentials.

Table 9
OLS Estimates of earnings function

	Employed	
	Coefficient	t-Statistics
Constant	6.27803869*	94.038
Male	0.28309787*	26.164
Age	0.1000869*	33.035
Age-squared	-0.00113323*	-29.067
Married	0.07839621*	6.648
Lower Primary	0.07661765	1.695
Upper Primary	0.14350119*	3.662
FORM 1	0.25340627*	5.614
FORM 2	0.27922664*	6.452
FORM 3 Dropouts	0.30321073*	5.262
FORM 3 Completed	0.3563894*	9.057
FORM 4	0.47769279*	10.683
FORM 5 Dropouts	0.52303457*	7.203
FORM 5 Completed	0.72819212*	18.852
FORM 6	0.4577997*	10.683
FORM 7 Dropouts	0.56830368*	2.497
FORM 7 Completed	0.93119078*	21.041
Polytechnic	0.22727515*	3.611
Higher Polytechnic	0.66647224*	7.405
DIPLOMA 1	0.9556108*	22.107
DIPLOMA 2	1.17916693*	27.062
Teacher Dropouts	1.30687112*	9.867
Teacher Completed	1.64605887*	17.01
Hong Kong Degree Dropouts	1.03931652*	20.124
Hong Kong Degree Completed	1.49770931*	35.965
Foreign Degree Dropouts	0.47324804*	6.116
Foreign Degree Completed	1.1350295*	26.648
Graduate Degree Dropouts	1.52942812*	25.544
Graduate Degree Completed	1.80510095*	38.615
Nurse Training	1.55234149*	10.928
Sub-degree-Distance Learning Course	0.68368284*	5.177
First degree-Distance Learning Degree	1.41742709*	17.517
Agriculture and Fishing	-0.5784176*	-5.225
Electricity, Gas and Water	0.31613569*	5.713
Construction	0.02513207	1.261
Wholesales and Retail	0.00524123	0.345
Transport, Storage and Communication	-0.00384618	-0.218
Financing, Insurance, Retail Estate	0.15392773*	9.362
Community, Social and Personal Services	-0.02709659	-1.773
Not Classified	0.19946177	1.007
LAMBDA	1.29872518*	20.07
Adjusted R-squared	0.4472	
Sample size	27824	

Note: Diploma 1 refers to those not study in university. Diploma 2 refers to those studies in university.

VI. Limitation

First, when we use monthly earnings from the 2001 Census to do the data analysis, we hold the assumption that the self-employed reported their earnings to Hong Kong Government honestly. If the self-employed under reported their earnings, the estimations form the earnings functions will be inaccurate. I just think that actually the self-employed have tendency to under report their earnings. Since nobody can identify the self-employed under report their earnings, only themselves know their real earnings. Then they will tend to under report their earnings to government departments in order to pay less taxes. Lower earnings also enable them to have right to apply for the Public rental housing (PRH).

Second, for table 9, the earnings function shows that earnings increased with additional education. I concluded that the higher education returns for those completed the course than the dropouts are partly due to signaling value of educational credentials. But in reality, we cannot deny the possibility that such higher return merely due to human capital theory. As a result, I concluded this findings support the weak but not strong screening in Hong Kong in 2001.

VII. Conclusion and Summary

In this study, I compare the relative earnings of the employed and self-employed, after correcting for the sample selection bias. The employed are presumably screened and self-employed are presumably unscreened. If education plays a signaling role in Hong Kong, the returns to education should be larger for the employed than for the self-employed. From the empirical results in previous sections, the educational earnings for the employed are greater than the self-employed. I concluded that it is due to the signaling function of education. As a result, in 2001, after the Hong Kong handover, education continues to play a signaling role.

The strong screening hypothesis assumes there is no relationship between the productivity and education. The education is only used for signaling (Psacharopoulos, 1979). The weak screening hypothesis (WSH) admitted that the primary role of education is its signaling function; it also increases one's inherent productivity (Arrow, 1973; Spence, 1973; Stiglitz, 1975). If the empirical results show a higher return for the employed than the self-employed, it support the WSH; but if the empirical results show there is significant return for the employed only, it support the SSH (Brown & Sessions, 1999).

According to the previous empirical results in this study, there is higher return for the employed than the self-employed. As a result, the empirical results in this paper support the weak screening hypothesis, but not strong screening hypothesis.

Moreover, the earnings function shows that earnings increased with additional education. I concluded that the higher education returns for those completed the course than the dropouts are at least partly due to signaling value of educational credentials.

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