

Gender and Income: Finding from CHEERS Data

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9th August 2007

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Abstract

The purpose of this study is to investigate whether income difference between male and female graduates still exist after controlling variables that contributing to income difference. Those variables are types of work, working hours and field of study. The European graduates' data from CHEERS project is utilized in this study. From 2000 respondents in CHEERS dataset, 50.1% are female and 49.8% are male. After controlling the hypothesized influences, the result of t-test analysis showed that there is still income difference between female and male graduates. Female graduate annually earn 17% - 20% less income than their male colleagues.

Introduction

It was obvious that despite the increase of women's participation in higher education and the labour force, they still work in a strongly sex-segregated market and under job condition which men would have rejected (Barbezat, 1987; Currie, 1991). The most apparent gap between female and male in the labour force is the remuneration difference. However, since 1980's, it is reported that the gender pay gap has narrowed dramatically and women have increasingly entered traditionally male occupation (Blau and Kahn, 2000).

Those studies conducted to analyse the income difference between female and male have always shown a difference in remuneration. Female graduates earned less than their male counterparts (Mora, Garcia-Aracil, and Vila, 2007; Glinskaya & Mroz, 2000; Hinze, 2000). Recent studies by Vermeulen-Kerstens (2006) concluded that gender is the best predictor of career earnings. Furthermore Vermeulen-Kerstens noted that in the scope of Netherlands, where the study took place, this finding indicates that attempts by governments and other agencies aimed at decreasing the income gap between males and females are still unsuccessful. Vermeulen-Kerstens also raising a question about what is needed to be done to help female graduates become as successful in their career as their male colleagues.

Most gender studies explain the difference in income between women and men by two themes. The theory of equalizing differences proposes that women might select themselves into less stressful occupation or pick different career paths than men. They also might invest less in acquiring human capital because they experience more interruptions in their career

(i.e., pregnant, raising children). The second explanation is that women are discriminated against, i.e. they are paid less than their male colleagues even if they have the same characteristics and perform the same tasks (Glinskaya & Mroz, 2000).

Even though human capital theory appears in multiple forms, the underlying proposition suggests that people are paid on the basis of their productivity and job performance (Lorence in Hinze, 2000). Hence, if women and men have the same qualification (i.e., education); the same productivity and performance (i.e., type of work and working hour), they will be paid the same regardless of gender or any other individual attributes.

Furthermore, Dutt (1997) explained the perspective of human capital theory in approaching the income difference. The major factor emphasized by human capital theorists as producing gender differences in human capital investment is that, given traditional roles in the family, many women anticipate shorter, more disrupted work lives than do men. These theorists also suggest that women's weaker attachment to the labour force and their resulting lesser amount of labour market experience means that they will acquire less of this valuable on-the-job training. Furthermore, their expectation of spending fewer years in the labour market could result in their making smaller investments in this type of training than men during each year they spend on the job. These theorists argue that women are even expected to select occupations requiring less investment in on-the-job training than those chosen by men. Further, they will seek jobs where depreciation of earning for the time spent out of the labour force is minimized.

Whether human capital theory is applicable or not, in explaining income difference, will be discussed in this paper. Two questions were addressed in this study. First, does income difference still exist after controlling variables that contributing to the difference of income? Variables hypothesized will contribute to the income difference are: types of work, working hours and field of study. Second, if after controlling those variables the income difference still exists, what is the possible explanation?

Methods

The data used in this paper is based on the data collected in CHEERS. CHEERS, "Careers after Higher Education: a European Research Study" was a research project conducted from 1998 to 2000. Graduates were surveyed about four years after graduation. The study is focused on the relationship between higher education and employment four years after graduation. Several themes were carried on the survey such as: socio-biographic background, study paths, transition from higher education to employment, early career, links

between study and employment, job satisfaction and perspectives of the graduates on higher education. This survey covered 3000 graduates each from 9 countries in the European Region, Norway, Czech Republic and Japan. However, because of the accessibility of the data, only 2000 subjects are included in the analysis of this paper. These 2000 subjects were produced by random select cases function in SPSS which considered as a representative sample of the real complete data. The data consist of 1002 (50.1%) female graduates and 995 (49.8%) male graduates.

From this CHEERS data, statistical analysis is conducted. For most of the analysis in this study gender variable (GENDER) will be use as break variable. In comparing the means of selected variables, t-test analysis will be used.

The analysis will be conducted step by step to see whether the theory of equalizing differences is congruent with the data or whether discrimination against women indeed exists. First step, the whole dataset will be analysed to see the difference of salary. The next step will be an analysis on the dataset with controlling the types of work (only full time worker). This step is important because most of women are working part time so it could be argued that the difference of income is because of women working less than men. Afterwards analysis will be conducted with controlling for working-hour variable. Finally, the data will be analysed with controlling graduates' field of study. Different field of study is suspected to contribute in the difference of graduates' income. After controlling these indicators it will be obvious whether there is gender discrimination in income differences or not.

Furthermore, analyses on the competence of graduates will be conducted to see the difference between male and female graduates. This analysis is important to challenge the human capital theory in explaining income difference within gender.

Result

Difference in salary

Table 1 describe the difference in the annual gross income of graduate from the CHEERS data set. There is significant difference between the income of female and male graduates ($t = 9,323$; $p < 0.01$). Significant difference here means that the difference of income in the data is not happening by chance only. Male graduates annually receive more income than female graduates (30,851 Euro versus 24,026 Euro). The result of the analysis shows that difference of income exist in the CHEERS data set. However as mentioned earlier this result is not really reflecting the real condition as all data set are involved in this analysis.

The next step is to control some indicators that assumed to be contributing to the difference of income such as: type of works (full-time or part-time), working hour and field of study.

Table 1: Income difference (All CHEERS dataset)

	t	Sig	Gender	N	Mean	SD	Std. Error Mean
Annual Gross Income	9.323	.000	Male	844	30.8519	15.17828	.52246
			Female	751	24.0266	13.90968	.50757

Note. CHEERS question D11: What is your approximate annual gross income? (thousand).

Controlled for type of work

One possible explanation for income difference between female and male graduates is the difference in the type of work they are engaged in. Female graduates are more engaged in part-time working activity while male graduates are more engaged in full-time work. In the CHEERS data, 68.5% of the entire part-time workers are female and 31.5% are male. Part-time worker normally have less income than full time worker. If we take this base for explaining the income difference between female and male graduates, then it is normal to find difference income between them. Female graduates have less income because they are more engaged in part-time work. However this is still a hypothesis need to be proofed. To test this hypothesis only full-time worker are selected for the analysis. T-test analysis is conducted to this selected data. The result of t-test can be observed in Table 2.

Table 2: Income difference (Controlled by type of work)

	t	Sig	Gender	N	Mean	SD	Std. Error Mean
Annual Gross Income	7.688	.000	Male	758	31.9103	14.92854	.54223
			Female	587	26.1465	11.75906	.48535

Note. CHEERS question. D11: What is your approximate annual gross income? (thousand). C10: Please inform us on your current major activity. Information regarding employment. Full-time or Part-time?

After controlling for full-time workers only, there is still a significance difference in income between female and male graduates ($t = 7.688$; $p < 0.01$). Annually the difference is 5763.8 Euro between female and male graduates. This result shows that the difference in income between female and male graduates is not caused by the type of work that the graduates engaged to.

Controlled for type of work and working hours

After controlling for type of work (full-time worker only) the next analysis will be conducted with controlling for working hours. This hypothesis is mainly based on the same

assumption with before, namely that female graduate are working less hour than their male colleagues. Therefore they get less income. To test this hypothesis, the CHEERS dataset is controlled by their working hours. Only graduates who work full-time and more than 40 hours a week will be included in the analysis. After controlling for the graduates with full-time work and more than 40 hours working hour in a week the dataset consist of 425 (39.4%) female and 653 (60.6%) male graduates.

Table 3: Income difference (Controlled by type of work and working hour)

	t	Sig	Gender	N	Mean	SD	Std. Error Mean
Annual Gross Income	6.708	.000	Male	623	32.6549	15.36097	.61542
			Female	404	26.6361	11.73482	.58383

Note. CHEERS question. D11: What is your approximate annual gross income? (thousand). C10: Please inform us on your current major activity. Information regarding employment. Full-time or Part-time? D7: How many hours per week are you working on average? (Total working hour including self employed).

After controlling for type of work and working hour, there is significance difference in annual income ($t = 6.708$; $p < 0.01$). Annually female graduates earn 6018.8 Euro less than their male colleagues.

Controlled for type of work, working hour and field of study

The last step in testing the theory of equalizing differences and gender discrimination in explaining the difference of income between female and male graduates is to control the field of study. Controlling for field of study is based on the hypothesis that the difference in income is caused by the difference of field study that the graduates had chosen. Female students select more often Arts and Humanity; Education; and Social sciences as their field of study. These field studies usually will leads to less income work compared to other field more occupied by male such as Engineering, Computer or Business. From this point of view it is normal for female graduates to have lower income because they by origin have less-paying work compared to male graduates. To test this hypothesis t-test analysis is conducted to each field of study. The result of t-test can be observed in Table 4.

Table 4: Income difference (controlled by type of work, working hour and field of study)

Field of study	t	Sig	Gender	N	Mean	SD	Std. Error Mean
Education	3.055	.003	Male	30	30.3667	9.09522	1.66055
			Female	55	24.5455	7.99263	1.07773
Arts and humanities	3.518	.001	Male	41	30.3171	9.36333	1.46231
			Female	87	24.1264	9.25455	.99219
Social sciences	2.996	.004	Male	59	31.6271	10.36722	1.34970
			Female	36	25.3889	8.90996	1.48499
Business	1.811	.072	Male	135	33.9852	17.76336	1.52883
			Female	73	29.6438	13.84374	1.62029
Sciences, mathematic and computing	.467	.643	Male	78	29.9872	13.41495	1.51894
			Female	36	28.5556	18.70286	3.11714
Engineering	3.820	.000	Male	210	32.9762	11.41662	.78782
			Female	81	27.3580	10.78461	1.19829

Note. CHEERS question D11: What is your approximate annual gross income? (thousand). C10: Please inform us on your current major activity. Information regarding employment. Full-time or Part-time? D7: How many hours per week are you working on average? (Total working hour including self employed). B1: Please, provide information about all higher education courses you have ever taken (Majors studied).

From table 4 we can see that even after controlling for type of work, working hour and field of study, there is still significance difference in income between female and male graduates within the same fields. Difference of annual income can be observed in the field of Education ($t = 3.05$; $p < 0.01$); Arts and humanities ($t = 3.52$; $p < 0.01$); Social sciences ($t = 2.99$; $p < 0.01$); and Engineering ($t = 3.82$; $p < 0.01$). Whereas there is no significance difference in Business ($t = 1.811$; $p = ns$) and Sciences, mathematic and computing ($t = .467$; $p = ns$). Table 4 shows that the differences in income not only occur in male dominated field of study such as Engineering, but also in female dominated field of study like Education and Arts and humanities.

Biggest difference of annual income is in the field of Social sciences (6238.2 €) followed by Humanities and art (6190.7 €); Education (5821.2 €); and lowest difference is in the field of Engineering (5618.2 €). This figures means that female graduates earn 17% - 20% less annual income compare to male graduates.

Difference in competencies of graduates

Additional analysis on the competencies of graduate is conducted to see whether there is difference in competencies between female and male graduates. The goal of this analysis is to see whether there is, as the human capital theory assume, a difference in competencies among female and male graduates.

Graduates' competencies at the time of graduation are measured with question E1a in CHEERS questionnaire. Graduate were asked to rated their competencies at time of graduation. The rating scale of answer is ranging from 1 = "Not at all" to 5 = "To a very high extent". There are 36 indicators of competencies listed within this question. In order to reduce the complexity of analysis, the comparison based on factors that represent the whole competencies. The factors used in this survey are based on factor analysis that has been conducted before. Patria (2006) conducted factor analysis on graduates' competencies in CHEERS data which yield to 7 factors of graduates' competencies: Leadership, Personal working skills, Organisational skills, Interpersonal skills, Field-related knowledge, Basic communication skills and Special skills.

Table 5: Competencies Differences (all CHEERS dataset)

	t	Sig	GENDER	N	Mean	SD	Std. Error Mean
Leadership	-4.252	.000	Male	964	19.7147	4.40317	.14182
			Female	981	20.5596	4.35981	.13920
Personal working skills	-7.220	.000	Male	961	20.7419	4.32676	.13957
			Female	967	22.1386	4.16649	.13399
Organisational skills	-2.298	.022	Male	960	14.5490	3.68319	.11887
			Female	975	14.9456	3.90626	.12510
Interpersonal skills	-6.401	.000	Male	960	18.1594	3.45606	.11154
			Female	978	19.1452	3.32347	.10627
Field-related knowledge	-1.732	.084	Male	966	10.6294	2.37459	.07640
			Female	976	10.8156	2.36357	.07566
Basic communication skills	-2.825	.005	Male	969	17.6883	3.32501	.10681
			Female	971	18.1133	3.30066	.10592
Special skills	.336	.737	Male	973	5.9024	1.79326	.05749
			Female	984	5.8750	1.80866	.05766

Note. CHEERS question. D11: What is your approximate annual gross income? (thousand). E1: Please, state the extent to which you had the following competencies at the time of graduation in 1994 or 1995 and to what extent they are required in your current work. If you are not employed please answer only(A).

Table 5 showed that there is significant difference in competencies between female and male graduates within 5 factors. Female graduates have higher competencies in Leadership ($t=-4.252$; $p < 0.01$), Personal working skills ($t = -7.22$; $p < 0.01$); Organisational skills ($t = -2.298$; $p < 0.05$); Interpersonal skills ($t = -6.401$; $p < 0.01$); and Basic communication skills ($t = -2.825$; $p < 0.01$). There is no significance difference among female and male graduates in Field-related knowledge ($t = -1.732$; $p < ns$) and Special skills ($t = 0.336$; $p < ns$).

Discussion

The result of this study point out that the difference of income still exist after controlling the type of work, working hour and field of study. This finding shows that there is still discrimination against female worker in the work place. The fact that the data source of this study is from young graduates from developed countries in the world, this finding is disappointing. Developed countries come with long history and policies about gender equity and yet the result showed that gender discrimination in income still exists. This raises doubts about the status of gender equality in the labour market. As Mora et al. (2007) also point out that in Europe women are increasingly delaying marriage and childbirth while attending higher education institutions and establishing working careers. More women are joining the labour force than ever before, and they are more likely to have a continuous lifetime work experience. After all this effort women still being discriminated against in income. One should also bear in mind that the subjects in this study are university graduates. This means that they are highly-educated worker. If the income difference (17% - 20%) still happens in this salaried-professional it can be expected for sure that the income difference in blue-collar worker will be higher. Female blue-collar worker have less control and bargaining position in their occupation compared to the female white-collar worker.

The result of this study is in contrast with the explanation of human capital theorists in explaining income difference between female and male worker. From the result of the analysis it is shown that there is still income difference even when the condition between female and male are equal. This result is similar with prior study conducted by Tsui (1998). The study revealed that after controlling for hours worked, education background, and personal skills self-confidence, men continue to enjoy an income advantage.

It is also interesting to note that there is no annual income difference between graduates in the field of study of Business and Science, mathematic and computing. One possible explanation is that this field of study is more professional than other field which leads to better job appraisal regard less their gender. Another possible explanation is that these fields are less occupied by female compare to other field. Thus, female here might have higher bargaining position compare to other female working in other field. Or it might be the case that female in this field are used to study and working around men. That leads these female worker to consider themselves as men and sacrifice other needs as a woman e.g., marriage, raising children, etc. However further study is needed to confirm this argument.

The findings of this research have implications for understanding the gender role in annual income difference. However, in this study there are some limitations to consider. The

most important is the heterogeneous sample. Participants in this study were drawn from 9 countries in the European Region, Norway, Czech Republic and Japan. Considering the data, it was assumed that all country condition is equal, which it is not the case with global data like CHEERS. It would be interesting to conduct the analysis on country level to overcome this limitation. After controlling for three variables that influence income difference there is only limited number of subjects is involved (see Table 4). There are only 30 to 210 subjects left in each group of analysis. This should be reducing the power of analysis if we compare it to the analysis on the whole dataset.

One might also argued that the difference of income between female and male is because they have different experience in the workplace. Male graduates have better income merely because they have worked longer in his field which leads to better skills, higher experience and better income. However, this argument is not suitable for this study since CHEERS dataset was from graduates which are surveyed 4 to 5 years after graduation. Therefore their experiences in work place are at the same level.

From the additional analysis of graduates' competencies some interested finding should also being noted. The result of this analysis is very interesting because it can be inferred that at time of graduation female graduates have higher competencies than male graduates. Before further discussion it should be noted that this analysis is obtained from self-rated data by graduates themselves. It might be possible that this result is based on the different perception among graduates in viewing their competences. However, statistically it can be inferred that female graduates roughly have better competencies than male graduates. Then, why female graduate have lower income when in fact they have higher competencies compared to male graduates? Generally, employer still see female worker have a lower job performance compared to male worker. This perspective basically refers to the roles of women in the family that create the assumption that women can not fully engaged in their work (e.g., pregnancy, raising children, etc.). Another possible explanation is that the employer considering female worker role in the family. Thus, employer creates less pressure and apply looser rule for female worker in the work process. The employer did this in order to give the female worker more time for their family. This could also mean giving the female worker less complex and less competitive task compare to their male co-worker, which obviously means receiving lower income.

From a psychological perspective, Summer and Brown (1996) have point out some interesting finding. In their paper they discuss about gender differences in salary expectation and come to the conclusion that women tend to expect lower entry and peak salary than men.

According to them, there are five factors that account for gender differences in salary expectation. These factors are: career path (i.e., type of specialization within a particular occupation field); objective job inputs (e.g., qualifications); perceived job inputs (e.g., performance expectations); job facet importance (e.g., money); and social comparison standards (i.e., reference pay comparison group). Complex variation of these factors and their inter-relation created a condition where women have lower expectations in salary. Lower salary expectation eventually will lead to lower income when compared to workers with higher salary expectation.

Another explaining factor regarding salary expectation is pointed out by Martin (as cited in Summer & Brown, 1989) who suggests that men and women may seek or rely on information from different sources when estimating entry and peak salaries. Women might request lower entry salaries because they lack salary information. Women tend to disregard available salary information because they think that the salary information is an average for men and women. Instead, they relied on information they had previously collected regarding entry salaries. As further research suggested, when given choice, individuals prefer information from the same gender others. Thus, women tend to rely on other women for information when forming salary expectations, the same condition also applies for men. This may have serious consequences for women entering today's workforce. As Martin (in Summer and Brown, 1996) said:

Women entering the workforce today may base their salary expectations on the "accurate" information gathered from other working women. However, some of these working women may have experienced unfair salary treatment. Information from working women may therefore inadvertently contribute to differences in salary expectation of a new cohort of women workers. A similar process of expectation formation is presumed for men. (p.826)

This chain of reaction is happening below the consciousness of graduates. And it is proven to be maintained for a long time, even after a lot of gender policies implementation in Europe (considering that the data mainly comes from European countries).

Future research about gender difference in salary expectation and its relation to information gathering and application should be carried on. Further research on this topic could be one of the possibilities of diminishing income difference between female and male graduates. From the insight of this study, promoting training for university students addressing the issue of salary expectation and more global themes on the future-career of graduates should be improved.

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