Does Education-occupation Mismatch Affect Fertility?

- Examining the Correlation between Education-occupation Mismatch and Fertility

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Abstract

Does education-occupation mismatch affect fertility? Education-occupation mismatch (EOM) means that laborers' education qualifications are higher than the job requires. Based on status inconsistency theory and the negative consequences of education-occupation mismatch, this study aims to give evidence that education-occupation mismatch influences fertility at an individual level. This study uses the survey data to demonstrate that mismatched status is associated with lower birth size at the individual level. However, distinguishing slight and serious over-qualification shows gender heterogeneity: For females, both slight and serious over-qualification accounts for birth size decrease. For males, slight over-qualification is still associated with lower birth size, while serious over-qualification increases the birth size. The serious over-qualification relates to a heavier degree of mismatch but also to a willing education-occupation mismatch. This study implicates the influence of education-occupation mismatch on fertility as having gender heterogeneity and degree heterogeneity but does not get evidence of educational heterogeneity. This study provides empirical evidence for EOM as a factor in low fertility. This finding explores the consequence of education-occupation mismatch on fertility.

Keywords: Education-occupation mismatch; Ultra-low fertility; Over-qualification

1. Introduction

Education-occupation mismatch reports negative consequences, and it has become prevalent. Education-occupation mismatch (EOM) means that laborers' education qualifications are higher than the job requires. Enhancing tertiary education is an effective way to provide social and economic advances. However, it is hard for the labor market to develop quickly enough to take increasing tertiary educated labor. Researchers report that EOM has many negative consequences: EOM leads to lower job satisfaction (Voces & Caínzos, 2021), lower income (Vaisey, 2006), and lower mental health (Bracke et al., 2014). Meanwhile, the EOM incidences become prevalent. It

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has happened in many countries. Since Freeman (1976) first discussed EOM in the United States in 1976. The EOM incidence of graduates is beyond 20% in 10 European countries (Verhaest and Van der Velden, 2013), and the EOM incidence in 2016 was around 35% in China (Wu & Li, 2021).

EOM is a significant issue because the role of education and occupation are essential. Social stratification is measured by education, occupation, and income. In addition, they are regarded as two significant modern institutions (Vaisey, 2006).

In addition, the mismatch status is necessary to discuss because mismatch can also be demonstrated to influence socio-economic behavior. When facts do not reach expectations, it could lead to consequences. Status inconsistency theory (SIT) measures status inconsistency as education, occupation, income, and race status do not match each other (Lenski, 1954), while previous research always measures status inconsistency as the average status of the above status. SIT points out that status inconsistency influences behavior. Researches report that status inconsistency influences political preference (Lenski, 1954; Wiedner, 2021), trust in other individuals in society (Zhang, 2008), mental health (Milner et al., 2017), and undermined self-rated health (Zhang, 2008). Considering that education-occupation mismatch is a typical status inconsistency, the mismatch between education and occupation should be an essential factor.

Meanwhile, ultra-low fertility has become a problem. Many countries have kept a TFR lower than the replacement level, especially most developed countries, and South Korea is even lower than one. In our case, the TFR of China is around 1.3 recently.

Previous research has shed light on the issue of EOM being a factor in low fertility. Many consequences of EOM and status inconsistency strongly correlate with fertility, and they could

play as intervening variables to the relationship between EOM and fertility: Social stratification influences fertility. Status inconsistency is the mismatch among factors to social stratification. Therefore, status inconsistency, and so does EOM, influences fertility by social stratification. Over-qualification leads to lower job satisfaction (Battu et al., 2000; Burris, 1983), lower income (Congregado et al., 2016), and lower mental health (Bracke et al., 2014). The above consequences strongly correlate with fertility (Berrington & Pattaro, 2014; Majid et al., 2024), and they could play as intervening variables in the relationship between EOM and fertility. In summary, previous research has shed light on EOM as a factor in low fertility, but they did not provide empirical evidence.

This study attempts to provide evidence of the correlation between EOM and fertility and then discusses the attributes of EOM's influence on fertility. This estimation attempts to explore the consequence of EOM on fertility.

2. Prior Research and Hypothesis

Education-occupation mismatch affects behavior because occupation is lower than expected based on education level (Wiedner, 2021). The occupation quality includes dimensions of income and work time (Schneider et al., 2019). Meanwhile, income for child-rearing capability and time conflict between work and childcare are the factors people consider when they plan to deliver their birth intention (Brewster & Rindfuss, 2000; Byron, 2005; Berrington & Pattaro, 2014). Therefore, EOM leads to lower income, more time conflict on child care, and lower fertility. In addition, prior research also reports empirical evidence that EOM decreases income (Vaisey, 2006; Congregado et al., 2016). The above mechanism points to EOM as associated with lower fertility due to the

occupation not reaching the expectation.

The mismatch in education and occupation makes social stratification lower than expected. Education, occupation, and income are critical determinants of social stratification. EOM leads to an occupation lower than expected (Wiedner, 2021). Then, the mismatch in occupation and education led to a lower social stratification than expected. People might chase social stratification upward. Career promotion is the way to social stratification upward. Career promotion requires working hard. The behavior of working hard will increase the degree of worker-mother conflict, and then the increased role conflict postpones the birth transition. Meanwhile, prior research reports empirical evidence of a social stratification upward correlation between lower fertility intention (Chen and Li, 2021) and a lower probability of giving birth to a second child (Billingsley and Matysiak, 2018).

In addition, over-qualification is reported to influence mental feelings (Bracke et al., 2014). EOM leads to a prospect not approaching expectance, and this prospect hinders the transition to parenthood (Bono et al., 2015). EOM leads to lower job satisfaction (Battu et al., 2000; Burris, 1983) and lower mental health (Bracke et al., 2014). Lower job satisfaction relates to infertility (Majid et al., 2024). Therefore, EOM relates to lower fertility.

In summary, this study hypothesizes that compared to adequate education, over-qualification has a negative effect on fertility. Considering the measurement of fertility behavior, the hypothesis in detail is:

Hypothesis 1 (Negative birth size effect hypothesis) Compared to people with adequate qualifications, people in an over-qualification state have lower family numbers.

Prior research reported gender heterogeneity on over-qualification consequences. Some

research reported that education-occupation mismatch significantly affects income influences females more than males (Sloane et al., 1999; Battu et al., 2000). Meanwhile, some researchers argue that over-qualification has a more significant influence on males than females in terms of income and job satisfaction (Vaisey, 2006). Although prior research does not get a common conclusion on gender differences due to EOM, this study hypothesis gender heterogeneity in influence by EOM:

Hypothesis 2 (Gender heterogeneity hypothesis) Education-occupation mismatch has gender heterogeneity on the effect of education-occupation mismatch influence on fertility.

EOM is a kind of unsatisfied employment, and the attribution of unsatisfied employment could also work for EOM. Employment instability is typical unsatisfied employment. The researchers found that education heterogeneity affects employment instability and fertility. Unstable employment leads high-education females to postpone their fertility, while females with lower education are more likely to transition to motherhood (Clark & Lepinteur, 2020). Because low-education females cannot achieve value from occupation, they turn to achieve their value through family (Friedman et al., 1994). Considering the effect of education level heterogeneity in job characteristics or employment instability on fertility, this study hypothesizes that EOM's effect on fertility may also have education level heterogeneity. Therefore, this study hypothesis that:

Hypothesis 3 (Education level moderating effect hypothesis): Education level moderates education-occupation mismatch's influence on fertility. This study expects that over-education increases fertility in the low-education group, while it is negative for the high-education group.

In addition, serious over-qualification might have the opposite effect on fertility. On the one hand, serious over-qualification might have a heavier negative effect than slight over-qualification.

On the other hand, after the degree of over-qualification reaches serious, serious over-qualification might encourage people to transition to parenthood rather than hinder the transition. This influence could happen in two ways: Transiting to parenthood replaces career development to achieve for people with serious over-qualification; serious over-qualification can also be a willing over-qualification, and it can help people spend more time on their happiness. The above hypothesis comes from the conclusion of research on unstable employment. Researchers report that the transition to parenthood is an achievement (Friedman et al., 1994), and willing unstable employment has a different story than involuntary unstable employment (Vignoli et al., 2020). In detail, the substitution of transition to parenthood often happens to weak women. They are more weakened to achieve life value through career development and more likely to choose to be a mother and get certainty from their partner. This study distinguishes willing over-qualification as the situation in which people volunteer for over-qualification status.[2] The willing over-qualified people feel happy to take this mismatch between education and occupation; the job task is easier to handle, and they can spend more time on their happiness. And willing over-qualification does not take the depressed feeling. Above this, this study gets the hypothesis:

Hypothesis 4a (Education-occupation mismatch Degree heterogeneity) Compared to adequate qualification, serious over-qualification mismatch decreases fertility more than slight over-qualification.

Hypothesis 5b (Education-occupation mismatch Degree heterogeneity) Compared to adequate qualification, serious over-qualification increases fertility while slight over-qualification

[2] Over-qualification part-time work people not report lower job satisfy if they do not prefer full-time job (Maynard et al., 2006), they are willing to take part-time job, they could also willing to take over-qualification job.

decreases fertility.

3. Data and Methods

3.1. Data

This study used CFPS data in 2018. CFPS is a nationally representative longitudinal household survey in China that collects individual- and household-level data. This study used family structure data at a household level to calculate the birth data, including the birth size and the birth timing, and match the information in the household from household level data to individual.

3.2. Measurement and Introduction of Variables

3.2.1. Predictor

3.2.1.1. Education-occupation Mismatch: Over-qualification, Under-qualification, And Adequate Qualification

This study judges whether over-qualification or under-qualification is based on the education gap. The education gap is calculated by the education level of the diploma minus the education level that qualified for the job position.[3] If the education gap is greater than zero, it is defined as over-qualification; if it is equal to zero, it is defined as an adequate qualification; if it is smaller than zero, it is defined as under-qualification.

CFPS data ask, "What education level is the required education level for your first job position as you think?" the question is answered by the education level with a diploma. Based on

[3] Researchers made a series of discussions on the methods of measuring education-occupation mismatch, and this study use the subjective method to measure the mismatch, the subjective method be believed have best accuracy, the others will be discussed in the literature review part.

this answer, this study calculates the education gap, and the variable judges the education-occupation mismatch.

As the literature review section shows, this study needs to distinguish between slight over-qualification and serious over-qualification. This study divided the degree by diploma, considering that CFPS data does not collect education data from the school year. The education gap is one or two diplomas, which can be defined as slight over-qualification; for instance, who has a master's diploma but thinks the position only requires a bachelor's diploma even if a higher secondary diploma is fit. Serious over-qualification is defined as a three-and-above education diploma gap, e.g., a master's diploma owner taking the job position requires a junior secondary diploma. Above all, this study identified four categories of education-occupation mismatch: adequate qualification, slightly over-qualification, seriously over-qualification, and under-qualification.

The further problem is whether the influence of overeducation could disappear after the state of education-occupation mismatch is repaired. Indeed, there is still controversy about whether the effect of overeducation is ephemeral or persistent. Some researchers believe the influence can be covered after the job improves because over-qualification is a step of career development (Sicherman, 1991); while the "Scarring effect" (Horowitz, 2018) is believed to lead to overeducation influence on occupation development persistently, so this study treats the influence of overeducation on fertility as persistent, namely, even if the overeducation is fixed, the influence of overeducation during the first job still leads influence on a person to compare to people who get an adequate-education job. Thus, this study measures overeducation by the job required of the first job. After over-qualification, people improve their job transfer to an adequate-education state, and their situation might have changed compared to those who are still in an over-qualification state,

but this study is not allowed to follow it by the data support.

There is a problem with measuring the occupation in education-occupation mismatch by the information of the first job. The situation of the first job might not represent the job situation during the whole fertility exposure age for some people, so the measurement using the first job might not be accurate. The state of education-occupation mismatch might change during the life of people; namely, it is hard to tell which state is the one that directly influences fertility behavior. So here is the problem: the measurement of education-occupation mismatch meets two challenges when discussing the effect on fertility, which education-occupation mismatch state should be taken as the state influence on fertility, and how to deal with the state change.

As for the first question, which job should be measured as the one that influences their fertility, their current or first job? Actually, all jobs influence their fertility process, and this study chooses to use the education-occupation mismatch state of the first job as the measurement because the first job has a decisive influence on the whole career for most people. This influence could be like a "Scarring effect" (Horowitz, 2018). Once the education-occupation mismatch happens, the influence will be impossible to wipe out. Thus, compared with the current or last job before giving birth, the first job as the measurement should be a better choice.[4]

The state change could be divided into three situations, considering the definition is based on mismatch. Three ways of change could be: 1) The job change leads to mismatch state change, people might change their job after their first job, and it might change the mismatch situation; 2)

[4] Most of prior researches discuss overeducation do not clear that the measure of the job is a current one or some certain job, just some research point out they focus on graduate students. the required education of the job could be regard as one kind of job characters, and lots of research discuss about how job characters effect on fertility, we can learn about the deal with method from these researches. However, most of researchers do not mention which job is be discuss in their measurement section, the current one when collect the survey data or the current one before give birth, few researchers point out they measure as the first job.

Education level change; 3) Period effect change the required education level of the same job, with development of social and economic. The required education for the same job position might change with socio-economic development.

However, the above situation should not influence the measurement of this study because the above change only influences the objective mismatch state, while this study pays attention to the feeling consequence of the period of the first time meeting the over-qualification state. The feeling of overeducation happens when the first education-occupation mismatch state builds at once, and the state could only change after the first state, so whether the state changes or not, the first period has happened and led to some influence before the state becomes to change.

The status of overeducation will change following the occupation change. This status change might lead our analysis to make mistakes, but the proportion of people who change their overeducation status is not high. Wu and Li (2021) calculated and reported that only 13% of people with overeducation status transferred to adequate qualification status in 6 years in 2012-2018 China, namely, the proportion of education-occupation mismatch status change is not that common, in the other word, the status of overeducation might do not change in a not short time, for most of the people. Thus, using the first job attribute to measure the overeducation status is not perfect, but it is also not bad.

3.2.1.2. Education level

The education level in this study is measured by the diploma people have. Education levels can be simplified into some groups: Considering the size of no education has been quite low, this study set primary school, junior high, and no education into the group of compulsory education and set vocational tertiary, bachelor, master, and doctor into a group of tertiary education, while

higher secondary be kept as a group.

3.2.1.3. Description of Predictor Variables

After explaining the measurement of predictor variables, the table below describes the predictor:

Table 3.2.1.3-1 Describe the Predictor

Item	Freq.	Percent	Percent Cum.
Education-occupation mismatch status			
Adequate qualification	6152	41.10	41.10
Under-qualification	2496	16.67	57.77
Over-qualification_slight	2544	16.99	74.76
Over-qualification_serious	3778	25.24	100.00
Gender			
Male	7281	48.64	48.64
Female	7689	51.36	100.00
Education level			
Tertiary (15 years+)	850	5.68	5.68
Higher Secondary (12 years)	1052	7.03	12.71
Compulsory (9 years)	13068	87.29	100.00
Urban-rural resident			
Urban	7464	49.86	49.86
Rural	7506	50.14	100.00
Age group			
Age15-24	605	4.04	4.04
Age25-34	2568	17.15	21.20
Age35-44	3007	20.09	41.28
Age45-54	4866	32.51	73.79
Age55-64	3924	26.21	100.00

3.2.2. Measurement of Outcome

3.2.2.1. Fertility

This study discussed the influence of education-occupation mismatch on fertility by quantity. This study chooses the child number at the survey date (Children ever born) to operationalize fertility quantity.

3.2.2.2. Description of the Outcome Variable

The table below describes the birth size distribution.

Table 3.2.2.2-1 Describe the Birth Size in Data

	. (N=14970)
Child size	
Minimum	0
Median	2
Mean	1.61
Std.Dev	0.95
Maximum	9

Table 3.2.2.2-2 Describe the Birth Size in Data

Item	Freq.	Percent	Percent Cum.
Childbirth parity			
None child	1618	10.81	10.81
One child	5180	34.60	45.41
Two children	6093	40.70	86.11
Above three children	2079	13.89	100.00

3.2.3. Control variables

This study set urban-rural residents and cohort as control variables, considering urban-rural and cohort influence both predictor and outcome variables. The urban-rural resident is measured as the resident situation based on hukou. Since some cities, such as Shanghai, no longer distinguish the rural-urban hukou, this study deals with this kind of hukou as an urban hukou group. The cohort measurement distinguishes the age variable by whether the birth year is earlier than 1988 and the age spilled at 30.

3.3. Methods and Research Strategy

3.3.1. Method

Child ever born is a count variable, so this study chooses the Poisson model.

The data distribution has an under-dispersion problem. This study uses quasi-Poisson to adjust the under-dispersion problem. However, quasi-Poisson does not have an AIC value, so this

study compares the models by comparing the AIC value of their paired Poisson model.

This study checks the interaction valid by ANOVA because the variables are category variables. The test is shown in Table 3.3.1-1, Table 3.3.1-2, and Table 3.3.1-3.

Table 3.3.1-1 ANOVA of Interaction between Education-occupation Mismatch and Gender

	Df	Sum Squares	Mean Square	F	P-value
Education-occupation mismatch	3	377	125.8	143.06	0.0000
Gender	1	54	54.12	61.54	0.0000
Education-occupation mismatch*Gender	3	38	12.67	14.41	0.0000
Residuals	14962	13157	0.88		

Table 3.3.1-2 ANOVA of Interaction between Education-occupation Mismatch and Education Level

	Df	Sum Squares	Mean Square	F	P-value
Education-occupation mismatch	3	377	125.8	153.049	0.0000
Education	2	910	455	553.496	0.0000
Education-occupation mismatch*Education	6	44	7.4	8.969	0.0000
Residuals	14958	12295	0.8		

Table 3.3.1-3 ANOVA of Interaction between Education-occupation Mismatch and Employer Pattern

	Df	Sum Squares	Mean Square	F	P-value
Education-occupation mismatch	3	377	125.8	147.53	0.0000
Employer pattern	2	478	238.77	280.01	0.0000
Education-occupation mismatch*Employer patter	6	17	2.86	3.35	0.0026
Residuals	14958	12755	0.85		

3.3.2. Research Strategy

First, the model only considers the main predictor to show the relationship between education-occupation mismatch and fertility. Then, m0_control adds control variables. Next, three main confounder variables, gender, education level, and employer pattern, will be discussed in the model one by one. Finally, it will discuss three interactions of the confounder variable and EOM to examine whether EOM affects fertility and whether the effect has gender heterogeneity, education heterogeneity, or employer pattern heterogeneity.

4. Results

The model m1 to m3 adds all of the confounder variables step by step, and m5 to m7 adds three interactions of confounder variable and education-occupation mismatch (EOM) step by step. Because the quasi-Poisson model cannot report AIC value, this study decides the best model by comparing the AIC of the Poisson model pair with the quasi-Poisson. The model m5_Interaction_Gender has the smallest AIC 40094.86. The best model is the one that includes all confounder variables and the interaction of EOM and gender. Adding the interaction of EOM and education level or the interaction of EOM and employer pattern does not give a better fit, although the ANOVA test shows that the three confounder variables significantly interact with EOM.

Table 4-1 Effect of Education-Occupation Mismatch on Birth Size in Poisson Regression, Shown in Percent

	m1_Gender				m2_Gender_Education				m3_Gender_Education_Employer pattern			
Term	estimate_pct	conf.low_pct	conf.high_pct	estimate	estimate_pct	conf.low_pct	conf.high_pct	estimate	estimate_pct	conf.low_pct	conf.high_pct	estimate
Education-occupation mismatch												
Adequate-education												
Over-education_slight	**-9.0794**	**-12.8788**	**-5.1501**	**-0.0952**	**-6.3367**	**-10.1876**	**-2.3562**	**-0.0655**	**-5.9660**	**-9.8170**	**-1.9857**	**-0.0615**
Over-education_serious	-0.3016	-3.1004	2.5723	-0.0030	-0.5513	-3.2936	2.2633	-0.0055	-0.3149	-3.0530	2.4950	-0.0032
Under-education	-0.7758	-3.8167	2.3502	-0.0078	-1.2094	-4.1835	1.8464	-0.0122	-1.7670	-4.7141	1.2607	-0.0178
Gender												
Female												
Male	**-5.4128**	**-7.0676**	**-3.7286**	**-0.0556**	**-5.2458**	**-6.8743**	**-3.5890**	**-0.0539**	**-4.3059**	**-5.9543**	**-2.6288**	**-0.0440**
Education level												
Compulsory(9 years)												
Higher secondary (12 years)					**-30.2262**	**-33.4213**	**-26.9171**	**-0.3599**	**-30.3795**	**-33.5545**	**-27.0919**	**-0.3621**
Tertiary(15 years+)					**-38.3557**	**-41.6937**	**-34.8752**	**-0.4838**	**-39.2897**	**-42.5690**	**-35.8704**	**-0.4991**
Occupation pattern												
Private												
Public sector									**11.1248**	**8.7760**	**13.5316**	**0.1055**
Others									6.2484	-2.3263	15.3346	0.0606
Interaction of education-occupation mismatch and gender												
Over-education_slight*Male												
Over-education_serious*Male												
Under-education*Male												
Interaction of of education-occupation mismatch and education level												
Over-education_slight*Higher secondary (12 years)												
Over-education_serious*Higher secondary (12 years)												
Under-education*Higher secondary (12 years)												
Over-education_slight*Tertiary(15 years+)												
Over-education_serious*Tertiary(15 years+)												
Under-education*Tertiary(15 years+)												
Interaction of of education-occupation mismatch and occupation pattern												
Over-education_slight*Public sector												
Over-education_serious*Public sector												
Under-education*Public sector												
Over-education_slight*Others												
Over-education_serious*Others												
Under-education*Others												
Urban-Rural resident												
Rural												
Urban	**-23.9822**	**-26.0565**	**-21.8530**	**-0.2742**	**-20.4033**	**-22.5543**	**-18.1959**	**-0.2282**	**-19.3624**	**-21.5425**	**-17.1251**	**-0.2152**
Interaction of education-occupation mismatch and resident												
Over-education_slight * Urban	-2.2687	-7.6149	3.4017	-0.0229	4.4849	-1.1610	10.4682	0.0439	4.4463	-1.1752	10.4022	0.0435
Over-education_serious * Urban	**4.7507**	**0.2113**	**9.4925**	**0.0464**	1.4804	-2.8471	5.9978	0.0147	1.6559	-2.6617	6.1620	0.0164
Under-education * Urban	**9.8843**	**4.3702**	**15.6748**	**0.0943**	**6.3693**	**1.1186**	**11.8788**	**0.0617**	**6.5069**	**1.2708**	**12.0000**	**0.0630**
Age group												
Age45-54												
Age25-34	**-33.1550**	**-35.1167**	**-31.1437**	**-0.4028**	**-27.5071**	**-29.6433**	**-25.3163**	**-0.3217**	**-25.9467**	**-28.1407**	**-23.6960**	**-0.3004**
Age35-44	**-2.4724**	**-4.8198**	**-0.0721**	**-0.0250**	-0.3969	-2.7553	2.0138	-0.0040	0.5414	-1.8364	2.9718	0.0054
Age55-64	**7.0399**	**4.7507**	**9.3777**	**0.0680**	**6.1958**	**3.9640**	**8.4743**	**0.0601**	**4.9482**	**2.7382**	**7.2046**	**0.0483**
Age15-24	**-88.6725**	**-90.0519**	**-87.1693**	**-2.1779**	**-88.0381**	**-89.4710**	**-86.4787**	**-2.1234**	**-87.5638**	**-89.0501**	**-85.9460**	**-2.0846**
(Intercept)	**105.9627**	**101.3415**	**110.6686**	**0.7225**	**105.5227**	**100.9913**	**110.1356**	**0.7204**	**87.6988**	**82.3438**	**93.1915**	**0.6297**
AIC	40369.5500				40139.8500				40099.8200			
N	14970				14970				14970			

Table 4-1 reports the Poisson model result of EOM effect fertility. Over-qualification is negative to birth size. As the below table shows, slight over-qualification has a significant negative

coefficient value in every model. In the best-fit model m5, changing education-occupation status from adequate qualification to slight over-qualification for females is associated with an expected decrease of 9.98% in birth size. This result supports hypothesis 1, changing from adequate qualification to over-qualification associated with lower birth sizes.

Table 4-1 Effect of Education-Occupation Mismatch on Birth Size in Poisson Regression, Shown in Percent (Continue)

	m5_Interaction_Gender				m6_Interaction_gender_education				m7_Interaction_Gender_Education_Employer pattern			
Term	estimate_pct	conf.low_pct	conf.high_pct	estimate	estimate_pct	conf.low_pct	conf.high_pct	estimate	estimate_pct	conf.low_pct	conf.high_pct	estimate
Education-occupation mismatch												
Adequate-education												
Over-education_slight	**-9.9782**	**-14.6251**	**-5.1175**	**-0.1051**	**-10.8587**	**-15.4845**	**-6.0184**	**-0.1149**	**-11.4663**	**-17.5930**	**-4.9220**	**-0.1218**
Over-education_serious	**-4.7557**	**-8.0328**	**-1.3708**	**-0.0487**	**-4.8988**	**-8.1707**	**-1.5194**	**-0.0502**	0.3351	-5.1477	6.1243	0.0033
Under-education	**-4.9658**	**-8.5279**	**-1.2810**	**-0.0509**	**-5.0129**	**-8.5723**	**-1.3309**	**-0.0514**	-2.3838	-8.9088	4.5660	-0.0241
Gender												
Female												
Male	**-8.9934**	**-11.4126**	**-6.5108**	**-0.0942**	**-8.9541**	**-11.3733**	**-6.4716**	**-0.0938**	**-8.7646**	**-11.1991**	**-6.2661**	**-0.0917**
Education level												
Compulsory(9 years)												
Higher secondary (12 years)	**-30.4205**	**-33.5911**	**-27.1375**	**-0.3627**	**-34.7951**	**-39.6155**	**-29.7064**	**-0.4276**	**-34.7110**	**-39.5374**	**-29.6159**	**-0.4263**
Tertiary(15 years+)	**-39.3256**	**-42.6006**	**-35.9111**	**-0.4996**	**-44.2622**	**-49.0763**	**-39.1345**	**-0.5845**	**-44.3252**	**-49.1323**	**-39.2051**	**-0.5856**
Occupation pattern												
Private												
Public sector	**11.1249**	**8.7766**	**13.5312**	**0.1055**	**11.1256**	**8.7783**	**13.5308**	**0.1055**	**13.3999**	**9.7184**	**17.2255**	**0.1258**
Others	6.1930	-2.3705	15.2669	0.0601	6.0672	-2.4826	15.1264	0.0589	8.1638	-6.3676	24.1889	0.0785
Interaction of education-occupation mismatch and gender												
Over-education_slight*Male	**8.8168**	**3.0285**	**14.9413**	**0.0845**	**8.8558**	**3.0683**	**14.9791**	**0.0849**	**8.7161**	**2.9301**	**14.8382**	**0.0836**
Over-education_serious*Male	**9.9753**	**5.3709**	**14.7835**	**0.0951**	**9.9179**	**5.3148**	**14.7249**	**0.0946**	**9.1958**	**4.5838**	**14.0137**	**0.0880**
Under-education*Male	**7.5961**	**2.5179**	**12.9274**	**0.0732**	**7.5789**	**2.5040**	**12.9066**	**0.0731**	**7.1979**	**2.1063**	**12.5447**	**0.0695**
Interaction of of education-occupation mismatch and education level												
Over-education_slight*Higher secondary (12 years)					**14.4155**	**3.3729**	**26.7008**	**0.1347**	**14.4437**	**3.3970**	**26.7334**	**0.1349**
Over-education_serious*Higher secondary (12 years)					14.3615	-2.6438	33.7375	0.1342	13.5306	-3.3534	32.7702	0.1269
Under-education*Higher secondary (12 years)					-7.7907	-24.5004	11.6562	-0.0811	-7.6960	-24.4201	11.7683	-0.0801
Over-education_slight*Tertiary(15 years+)					**18.1966**	**5.3043**	**32.7831**	**0.1672**	**18.0018**	**5.1311**	**32.5637**	**0.1655**
Over-education_serious*Tertiary(15 years+)					3.3934	-16.1269	26.3739	0.0334	3.0304	-16.4154	25.9223	0.0299
Under-education*Tertiary(15 years+)					8.0431	-38.1502	73.8228	0.0774	8.8549	-37.6784	75.1317	0.0848
Interaction of of education-occupation mismatch and occupation pattern												
Over-education_slight*Public sector												
Over-education_serious*Public sector									1.3047	-4.6401	7.6385	0.0130
Under-education*Public sector									**-5.9411**	**-10.5977**	**-1.0365**	**-0.0612**
Over-education_slight*Others									-3.2156	-9.1583	3.1558	-0.0327
Over-education_serious*Others									-13.4273	-34.4273	13.0832	-0.1442
Under-education*Others									-10.7153	-27.1421	9.3778	-0.1133
Urban-Rural resident									20.1090	-5.0133	51.2782	0.1832
Rural												
Urban	**-19.2401**	**-21.4224**	**-17.0006**	**-0.2137**	**-18.6634**	**-20.8851**	**-16.3832**	**-0.2066**	**-18.4693**	**-20.7084**	**-16.1707**	**-0.2042**
Interaction of education-occupation mismatch and resident												
Over-education_slight * Urban	4.6417	-1.0015	10.6212	0.0454	1.9516	-3.7132	7.9612	0.0193	2.2033	-3.5136	8.2706	0.0218
Over-education_serious * Urban	1.6449	-2.6692	6.1473	0.0163	0.9103	-3.4098	5.4208	0.0091	0.1632	-4.1702	4.6898	0.0016
Under-education * Urban	**6.2918**	**1.0690**	**11.7709**	**0.0610**	**5.9412**	**0.6897**	**11.4528**	**0.0577**	**5.3632**	**0.0765**	**10.9155**	**0.0522**
Age group												
Age45-54												
Age25-34	**-25.8978**	**-28.0919**	**-23.6470**	**-0.2997**	**-25.7632**	**-27.9624**	**-23.5070**	**-0.2979**	**-25.6669**	**-27.8682**	**-23.4086**	**-0.2966**
Age35-44	0.6722	-1.7076	3.1045	0.0067	0.6982	-1.6813	3.1304	0.0070	0.7055	-1.6735	3.1371	0.0070
Age55-64	**4.8225**	**2.6162**	**7.0751**	**0.0471**	**4.8145**	**2.6095**	**7.0658**	**0.0470**	**4.8566**	**2.6514**	**7.1082**	**0.0474**
Age15-24	**-87.5536**	**-89.0400**	**-85.9359**	**-2.0837**	**-87.5086**	**-88.9997**	**-85.8858**	**-2.0801**	**-87.4808**	**-88.9747**	**-85.8550**	**-2.0779**
(Intercept)	**91.8292**	**86.1226**	**97.6889**	**0.6514**	**91.9984**	**86.2883**	**97.8616**	**0.6523**	**88.5825**	**81.6424**	**95.7474**	**0.6344**
AIC	40094.8600				40098.9000				40103.9900			
N	14970				14970				14970			

Gender heterogeneity is discussed in m5_Interaction_Gender. The interaction of gender and EOM is significant. Namely, gender has a moderate effect on the influence of EOM on birth size. This study focuses on gender moderating the effect of EOM on birth size, although we can also discuss EOM moderating the effect of gender on birth size. Males have a smaller birth size gap of slight over-qualification and adequate qualification than females, and the gap becomes (-0.1051) +0.0845= -0.0206, namely, changing EOM status from adequate qualification to slight over-qualification for males is associated with expect of e^(-0.0206)-1= -0.0204 decrease birth size. Meanwhile, males have a different direction birth size gap between serious over-qualification and adequate qualification with females. The EOM gap becomes (-0.0487) +0.0951=0.0464, namely,

changing EOM from adequate qualification to serious over-qualification for males is associated with an increase of 4.75% (e^0.0464-1=0.0475) birth size. Serious over-qualification is negative for fertility for females, and slight over-qualification is also negative for males. In addition, Figure 1 shows how gender moderates the effect of EOM on fertility; we can see gender differences. In summary, this study supports hypothesis 2, that EOM affects fertility, and the effect has gender heterogeneity. This study will discuss why serious over-qualification results in higher birth sizes for males later.

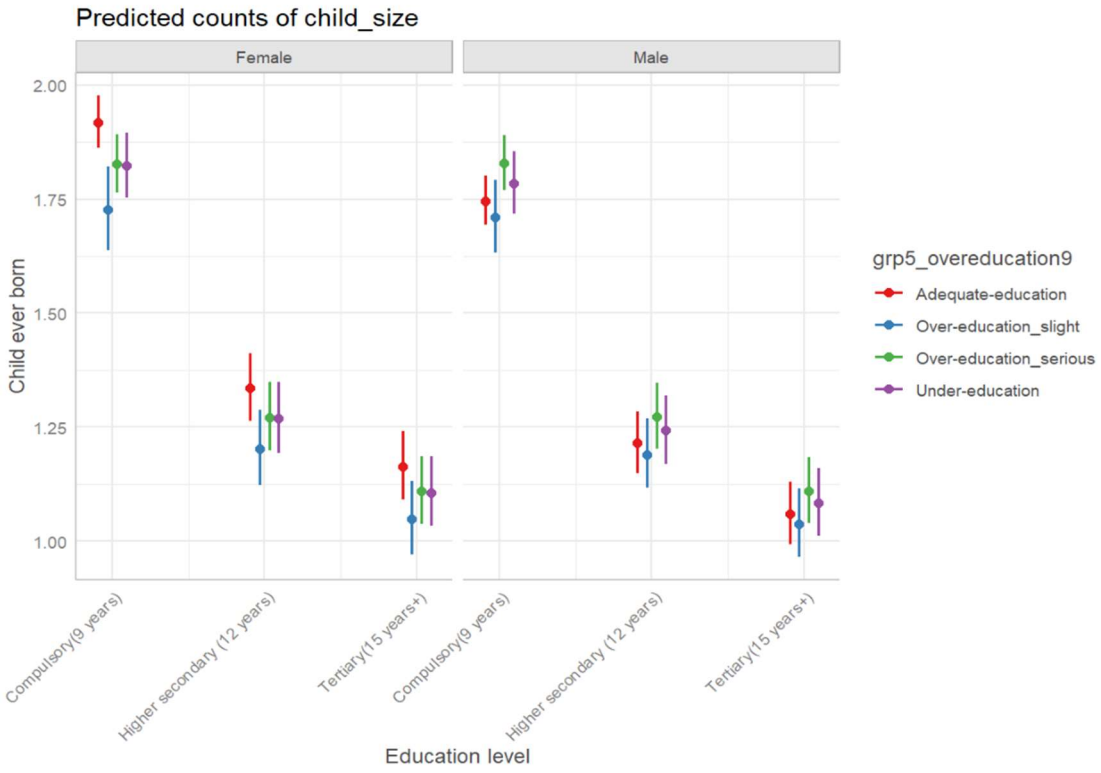

Figure 1 Interaction of Gender and Education-occupation Mismatch in Poisson Model M5

Model m6 examines the education heterogeneity on how EOM affects fertility. However, we can see that in Table 4-1 (Continue), only slight over-qualification and education level have a significant moderate effect, and the AIC value shows that adding the interaction of education level and EOM does not make the model a better fit. Therefore, the result cannot support hypothesis 3, which is that education level moderates the effect of EOM on birth size. However, the interaction

of education and slight over-qualification in m6 is significant, and they show that a higher education moderates the EOM effect on fertility as changing EOM status from adequate qualification to slight over-qualification increases birth size. The theory discussed in the former section cannot explain this influence. This study tries to explain it by how over-qualification makes job tasks easy to handle and offsets the negative effect of job strain, while adequate qualification might put people under heavy job strain. Meanwhile, the job strain leads to lower fertility (Byron, 2005; Begall & Mills, 2011). Of course, this point still needs further study.

Model m5 shows that serious over-qualification increases birth size for males and does not decrease birth size more than slight over-qualification for females. This study thinks it might relate to the fact that although willing over-qualification takes more happy time spent with family, it cannot offset all of the effects of the income decrease. This result supports hypothesis 4 that serious over-qualification has a different effect than slight over-qualification on fertility compared to adequate qualification.

5. Discussion and Conclusion

This study answers the question of whether over-qualification affects fertility and how heterogeneity affects this effect at the individual level through survey data from China to learn about the effect mechanism.

The results support most of our hypotheses. The result of this study supports the hypothesis that education-occupation mismatch (EOM) has a negative effect on fertility size compared to adequate qualification (changing education-occupation mismatch status from adequate qualification to slight over-qualification is associated with an expected decrease in the size of birth

of 9.98%). Serious over-qualification does not play as a heavier degree mismatch; it is much more a willing over-qualification, even encouraging fertility. Meanwhile, EOM effect fertility has gender heterogeneity: Serious over-qualification decreases birth size for females, while serious over-qualification increases birth size for males. In addition, the result encountered our hypothesis of education level heterogeneity, and the evidence is insufficient to prove that education levels have a moderate effect on the influence of EOM on fertility.

This study provides a new perspective on low fertility and extends previous education-occupation mismatch research by focusing on a new social consequence of education-occupation mismatch - fertility. Meanwhile, considering fertility is an important phenomenon, this study proves that education-occupation mismatch is a phenomenon that warrants attention. In addition, because inconsistent education-occupation status is equivalent to education-occupation mismatch, this study could also be regarded as extending the status inconsistent research by developing a new social consequence.

This study meets the problem that when controlling certain variables, the model could show that slight over-qualification results in a higher birth size than adequate qualification. This study tries to explain it by the influence of job strain, that job strain has a negative effect on fertility. The over-qualification job is easy to handle and avoids the job strain. In contrast, an adequate qualification position could not prevent the job strain.

The gender heterogeneity in the serious over-qualification effect of birth size needs further discussion. A serious education-occupation mismatch could be a big gap between fact and expectance or a willing mismatch job. If all serious over-qualification is willing to over-qualification, then it is not easy to explain why serious over-qualification decreases birth size for

females. This study needs to clarify a few questions for further study: Does wiling serious over-qualification proportion have gender difference? Does the willing over-qualification effect on fertility have the same mechanism for different genders?

This study has several limitations that need to be mentioned. This study only discusses the education-occupation mismatch status of the first job. However, education-occupation mismatch status might change during life, and every period of education-occupation mismatch status might influence fertility. So, this binary deal might lose some details.

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