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The Impacts of Industry Wage Premiums and Education Levels on Gender Inequality: Evidence from Five Developed Countries

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The Impacts of Industry Wage Premiums and Education Levels on Gender Inequality: Evidence from Five Developed Countries

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March 2022

Abstract

In contrast to most prior studies of gender inequality focusing on a specific country or a specific year, this paper uses cross-nationally comparable data from the Luxembourg Income Study (LIS) to examine the impacts of wage premiums in male- and female-dominated industries and education levels on gender inequality in five developed countries- the United States, the United Kingdom, Germany, Ireland, and Belgium- from 2004 to 2017. To the best of our knowledge, there are no attempts in the prior empirical literature studying the effects of wage premiums in male- and female-dominated industries on gender inequality. To guarantee continuity and stability, we run the regression year by year separately for 14 consecutive periods for each of five advanced countries. The timeline covers the before, during, and after the great recession to rule out the possible effects of historical contingency. Thus, this is the first empirical paper to investigate the causal relationship between male- and female-dominated industries and gender inequality across countries over a continuous period. We raise and answer three research questions: (1) Do the wage premiums among male- and female-dominated industries affect the gender wage gap? (2) Is there a cross-country variation in the relationship between education levels and the gender wage gap? (3) Is there an impact of education levels on the gender employment gap? As for empirical analysis, for the first two questions, we run the multivariate linear regression; for the third question, we estimate the probit model, marginal effects, and the delta method standard errors. We find that: 1) There is a significant correlation between the wage premiums in female- and male-dominated industries and gender wage gap; 2) There is a cross-country variation in the relationship between education levels and the gender wage gap; 3) There is also a cross-country variation in the relationship between education levels and the gender employment gap.

Keywords: Gender inequality, wage, industry, education, employment

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1 Introduction

Many prior studies mention that gender inequality has been entrenched but for heterogeneous reasons and contexts, showing the form of differences across countries (Blau and Kahn, 2007; Blau and Kahn, 2017; Gornick and Jacobs, 1998; Elborgh-Woytek et al., 2013; Bisello and Mascherini, 2017; Karamessini, 2016; Bardasi and Gornick, 2008; Frase and Gornick, 2009; Gornick, 1999).

Some factors, for instance, unionization and occupational segregation, have a certain degree of impact on the nation's gender inequality is widely accepted (Blau and Kahn, 2017; Gornick and Jacobs, 1998; Bardasi and Gornick, 2008; Blau and Kahn, 2017). On the other hand, other factors, for example, noncognitive skills and discrimination, have been debated issues as those factors are hard to measure (Blau and Kahn, 2017).

This paper focus on the gender wage gap and gender employment gap. In contrast to prior research on gender inequality in a specific country across years (inter-country variation) or gender inequality in a specific year across countries, we aim to examine and analyze the underlying causes of the persistent gender wage gap and gender employment gap across countries.

The theoretical study carried out by Bisello and Mascherini (2017) reveals that the decline in gender inequality was contributed by large-scale layoffs in male-dominated industries during the great recession. However, we find that there are no attempts in the prior empirical literature reviewing the impacts of wage premiums in male- and female-dominated industries on the gender wage gap, partly because of over-emphasis on "occupation segregation" leads to neglect a bigger picture, which means, the heterogeneity among male- and female-dominated industries. Consequently, we aim to help fill this gap in the literature, whether the wage premiums entrenched in industry enlarge the gender wage gap. In this sense, we propose the first research question: does wage premium among male- and female-dominated industries affect the gender wage gap?

Atkinson et al. (1995) pinpoint that Nordic countries had the least inequality while the United States had the highest inequality, the continental and the southern European countries, Canada, and Australia was in the middle position of inequality. Based on the cross-national variation in gender inequality, we plan to implement comparable micro-data from the Luxembourg Income Study (LIS) to investigate whether the wage premiums among male- and female-dominated industries impact the gender wage gap across five industrialized countries. In addition, we evaluate the relationship between education levels and the gender wage gap. Furthermore, we also access the relationship between the education levels and the gender employment gap. This study is conducive to helping address gender inequality to some degree, for instance, from the perspective of institutional changes.

We chose five advanced countries- the United States, the United Kingdom, Germany, Ireland,

and Belgium- from 2004 to 2017 to analyze the trends of the gender wage gap across countries. To guarantee continuity and stability, we run the regression year by year separately for 14 consecutive periods for each industrialized country, ruling out the possible effects of historical contingency as it covers the before, during, and after the great recession overall.

In this paper, we first discuss some relevant literature on gender inequality. Then, we introduce the data used in this paper. In the next section, we implement the descriptive analysis and empirical analysis. In the conclusion part, we summarize the results, provide suggestions, point out the uncertainties for the current research, and raise the expectation for future research.

2 Literature Review

Blau and Kahn (2007, 2017) mention that women relative income had enhanced since the late 1970s; specifically, the period of strongest gender wage narrowing was during the 1980s, later, the convergence has been slower and even become widen; After the 1990s, female labor force participation rate has not increased anymore and appear to have stagnated.

Blau and Kahn (2017) concentrate their studies on the United States and suggest that industries and occupations are crucial factors explaining the gender wage gap. In addition, Gannon et al. (2005) find substantial intra-industry wage differentials in five countries in Europe. They observe a positive correlation between inter-industry wage differentials and industry profitability. According to Ryex and Tojerow (2007), it is unclear whether there are intra-industry wage differentials. The authors mention that the outcomes of the intra-industry wage gap are still pending issues.

Gornick and Jacobs (1998) focus on their research on seven developed countries and observe that the average income of public-sector workers is higher than that of private-sector workers. The authors also find that the proportion of female employees in the public sector is too high in most developed countries. Conversely, Navarro et al. (2014) utilizes panel data in Chile and clarify that there are no wage differentials among the private and public sectors after controlling for time-invariant variables.

Elborgh-Woytek et al. (2013) highlight that females have a lower labor force participation rate than males. They also illustrate that female worker earns less than male colleagues. Moreover, Marchand and Olfert (2012) find reductions in the gender employment gap and gender wage gap during the great recession. According to Bisello and Mascherini (2017), the decline in gender inequality was mainly caused by large-scale layoffs in male-dominated industries during the great recession. Karamessini (2016) also points out that male unemployment was worse than female unemployment in Greece during the great recession.

Bardasi and Gornick (2008) stress that women face wage penalties when working part-time in the United States, Canada, Italy, and the United Kingdom. The authors also find a significant

relationship between occupational differences among part-time and full-time employees and the gender wage gap. According to Frase and Gornick (2009), the working hour of male workers in the United States is almost the same compared with that of male workers in most western European countries, while the working hour of female employees in the United States is much longer than that of female employees in other advanced countries. The authors also assert that the decrease in the education levels is associated with a higher number of working hours. Furthermore, Adu Boahenand and Opoku (2021) pinpoint that an increase in the education level is correlated with a lower gender wage gap. A cross-national study by Todd (2001) indicates that an increase in education level is associated with a lower family gap in wages.

Blau and Kahn (2017) also shed light on that the increase in union coverage is significantly correlated with a lower gender wage gap. According to Gornick (1999), the social-democratic countries (except Norway) have higher employment and earnings rates than liberal and conservative countries. The author also demonstrates that conservative countries have lower employment and earnings rates than social-democratic and liberal countries. Moreover, Blau and Kahn (2017) confirm that the noncognitive skills differ between males and females. They also point out that noncognitive skills have a statically significant impact on gender inequality. An experimental study by Blau and Kahn (2017) indicates that gender discrimination and prejudice still exist in the labor market. Furthermore, the empirical research conducted by Goraus and Tyrowicz (2014) suggests that the ongoing transformation and demographic change have no impact on the gender wage gap.

3 Data

We utilize data from the Luxembourg Income Research (LIS) for empirical analysis. Luxembourg Income Study (LIS) is an income database of microdata at the household and individual levels based on household surveys from numerous countries in the world.

We selected five developed countries for cross-country analysis. They are the United States (US), United Kingdom (UK), Germany (DE), Ireland (IE), and Belgium (BE). Our study uses LIS datasets from Wave VI to Wave X (2004 to 2017), which allows us to analyze trends over time because they cover the period before, during, and after the great recession.

Our research only focuses on prime-age people aged 25 to 54 to measure labor market outcomes across countries. We decompose employment by industry to identify male- and female-dominated industries common to the five countries. We define female-dominated industries as the industries in which the proportion of female engagement is higher than that of males. In contrast, we define male-dominated industries as the industries in which the percentage of female employment is lower than that of males. Table 2 in the appendix represents that the female-dominated industry shared by the five countries is "public," while the male-dominated industries shared by the five countries are "agricu," "mining," "construction," and "transp."

The abbreviations for male- and female-dominated industries are:

- agricu: agriculture, fishing, and forestry industries.
- mining: mining, manufacturing, quarrying, and utility industries.
- construction: construction industry.
- transp: transport, communications, and storage industries.
- public: public administration, social work, education, and health industries.

INSERT TABLE 1 ABOUT HERE

We used two LIS variables to measure the highest completed education levels. One is fully standardized based on the International Standard Classification of Education. The other is non-standardized that involves country-specific education level categories. Most of the country-specific categories were translated into the standardized form. We set the rest of the country-specific categories as missing.

In this paper, the standardized highest completed education level categories contain:

- low education level: less than upper secondary education.
- medium education level: post-secondary non-tertiary education or upper secondary education.
- high education level: tertiary education.

4 Methods

4.1 Descriptive Analysis 1

Firstly, we assess the trend in the gender wage gap across countries from 2004 to 2017.

The gender wage gap is calculated using the following equation:

Gender Wage Gap = Median Hourly Wage for Male – Median Hourly Wage for Female

The figure 1 displays that:

- The gender wage gap decreased from 2004 to 2017 in Ireland. Nevertheless, the other four countries show an inverse result with Ireland.
- The United States has the highest gender wage gap among the five countries from 2004 to 2017.
- Belgium has the lowest gender wage gap among the five countries from 2004 to 2017 except 2015. In 2015, the gender wage gap was smaller in Ireland than in Belgium.

INSERT FIGURE 1 ABOUT HERE

Secondly, we study the trend in the gender employment gap across countries from 2004 to 2017.

The gender employment gap is estimated using the equation below:

$$\text{Gender Employment Gap} = \text{Male Employment Rate} - \text{Female Employment Rate}$$

The figure 2 represents the gender employment gap deducted from 2004 to 2017 in the United States, Germany, Ireland, and Belgium. In contrast, the United Kingdom shows the opposite result compared to the other four countries.

INSERT FIGURE 2 ABOUT HERE

4.2 Descriptive Analysis 2

In this section, we measure gender wage inequality by the gender earnings ratio. We only focus on male- and female-dominated industries.

Gender earnings ratio is estimated using the formula below:

$$\text{Gender Earnings Ratio} = \frac{\text{Median Hourly Wage for Female}}{\text{Median Hourly Wage for Male}}$$

Firstly, we calculate the gender earnings ratio by male- and female-dominated industries to examine gender wage inequality for each five countries.

The figure 3 informs that:

- For the United States, the “public” and “mining” industries showed higher gender wage inequality than the “agricu”, “transp”, and construction industries from 2004 to 2016.
- For the United Kingdom, the “public” industry demonstrated higher gender wage inequality than the other four industries from 2004 to 2017 except for 2016.

INSERT FIGURE 3 ABOUT HERE

Secondly, we measure gender earnings ratio to analyze how gender wage inequality in the same industry varies across countries.

Figure 4 presents that Belgium has lower or equal gender wage inequality in “mining” industry than the United States, United Kingdom, Germany, and Ireland from 2004 to 2017. Belgium also has lower or equal gender wage inequality in “public” industry than the United States, United Kingdom, Germany from 2004 to 2017. Nonetheless, the gender wage inequality in the “public” industry was lower in Ireland than in Belgium from 2013 to 2016.

INSERT FIGURE 4 ABOUT HERE

4.3 Descriptive Analysis 3

In this section, we estimate the gender earnings ratio to investigate how gender wage inequality differs by educational level for each of the five countries.

The figure 5 suggests that:

As for the United States, United Kingdom, and Ireland, the high education level presents a lower or equal gender wage inequality than the medium and low education levels. In the United States, the result remained unchanged from 2004 to 2017 except in 2013. The result remained unchanged in the United Kingdom from 2004 to 2015. For Ireland, the finding remained unchanged in Ireland from 2004 to 2017.

By contrast, for Germany, the medium education level shows a lower or equal gender wage inequality than the high and low education levels. Except for 2012 and 2015, the result remained unchanged from 2004 to 2016. Nevertheless, the results were not significant in Belgium from 2004 to 2017.

INSERT FIGURE 5 ABOUT HERE

4.4 Empirical Analysis 1

The first two research questions are:

- Do the wage premiums among male- and female- dominated industries affect the gender wage gap?
- Is there a cross-country variation in the relationship between the education levels and the gender wage gap?

We estimate the multivariate linear regression model separately for men and women in a country and run the following model for each country to identify the causality and cross-country variation:

$$\begin{aligned} \text{Log_wage}_{scit} = & \text{Agricu}_i + \text{Transp}_i + \text{Mining}_i + \text{Constr}_i + \text{Public}_i + \text{Financial}_i \\ & + \text{Realestate}_i + \text{EduMed}_i + \text{EduHigh}_i + \text{Married}_i + \text{Child_Young}_i \\ & + \text{Child_Old}_i + \text{Age}_{sct} + \text{Age_Square}_{sct} + \text{Owner_Home}_i + \text{ptime1}_i \\ & + \epsilon_{scit} \end{aligned}$$

Where Log_wage_{scit} is the natural log of hourly wages for s (men or women) in country c and year t ; Agricu_i is a dummy variable equal to 1 for the person who works in agriculture, fishing, and forestry industries; Transp_i is a dummy variable equal to 1 if the person works in transport, communications, and storage industries; Mining_i is a dummy variable equal to 1 for the person who works in mining, manufacturing, quarrying, and utility industries; Constr_i is a dummy variable equal to 1 if the person works in the construction industry; Public_i is a dummy variable equal to 1 for the person who works in public administration, social work, education, and health sectors; EduMed_i is a dummy variable equal to 1 if the highest level of

education that the person has completed is medium education; EduHigh_i is a dummy variable equal to 1 if the highest level of education completed by the person is high education.

As for the control variables in the model, Financial_i is a dummy variable equal to 1 if the person works in the financial intermediation sector; Realestate_i is a dummy variable equal to 1 for the person who works in real estate, business activities, and renting sectors; Married_i is a dummy variable equal to 1 for the person who is married; Child_Young_i is a dummy variable equal to 1 for the person who has a child less than the age of 6; Child_Old_i is a dummy variable equal to 1 for the person who has a child between the age of 6 and 17; Age_{sct} is the age of men or women in country c and year t; Age_Square_{sct} is age-squared; Owner_Home_i is a dummy variable equal to 1 if the person owns houses; ptime1_i is a dummy variable equal to 1 for part-time employment.

4.4.1 Empirical Results 1

Tables 2 to 5 in the appendix represent that:

"Agricu" Industry VS. "Public" Industry

For the female workers in the United Kingdom and Belgium, the coefficient of the "public" industry is lower than that of the "agricu" industry, confirming that the wage premium in the "public" industry is lower than that of the "agricu" industry. However, for the female workers in the United States, Germany, and Ireland, the coefficient of the "public" industry is higher than that of the "agricu" industry, indicating that the wage premium in the "public" industry is higher than that of the "agricu" industry. As for the United Kingdom, the results were robust in 2006 and 2011. The results were statistically significant for Belgium in 2009, 2012, and 2013. For the United States, the results were robust in 2005 and 2011. In Germany, the results were robust from 2004 to 2013 and in 2016. The results were statistically significant in Ireland in 2010 and 2016.

As for the male workers in the United States, United Kingdom, Germany, and Ireland, the coefficient of the "public" industry is much higher than that of the "agricu" industry, showing that the wage premium in the "public" industry is higher than that of the "agricu" industry. For the United States, the results were statistically significant from 2004 to 2012 and from 2014 to 2017. The results were robust for the United Kingdom in 2004, 2005, 2009, 2013, 2015, and 2017. In Germany, the results were statistically significant from 2004 to 2007 and in 2011. As for Ireland, the results were robust in 2004 and 2009. The results were not robust in Belgium from 2004 to 2017.

"Transp" Industry VS. "Public" Industry

Concerning the female employees in the United States, United Kingdom, Germany, and Belgium, the coefficient of the "public" industry is lower than that of the "transp" industry,

confirming that the wage premium in the "public" industry is lower than that of the "transp" industry. By contrast, for the female employees in Ireland, the coefficient of the "public" industry is higher than that of the "transp" industry, showing that the wage premium in the "public" industry is higher than that of the "transp" industry. For the United States and the United Kingdom, the results were robust from 2004 to 2017. The results for Germany were statistically significant from 2004 to 2015 except for 2006, 2009, 2010, and 2012. In Ireland, the results were robust from 2013 to 2015 and in 2004, 2008, 2011, and 2017. The results were statistically significant in Belgium from 2006 to 2013.

About the male workers in the United States, United Kingdom, and Germany, the coefficient of the "public" industry is lower than that of the "transp" industry, confirming that the wage premium in the "public" industry is lower than that of the "transp" industry. Nevertheless, for the male workers in Ireland, the coefficient of the "public" industry is higher than that of the "transp" industry, indicating that the wage premium in the "public" industry is higher than that of the "transp" industry. The results were robust for the United States from 2004 to 2017. In the United Kingdom, the results were statistically significant from 2011 to 2017 and in 2009. As for Germany, the results were robust from 2012 to 2017 except for 2013 and 2016. The results were robust for Ireland from 2006 to 2016 except for 2007, 2013, and 2015. However, the results were not robust in Belgium from 2004 to 2017.

"Mining" Industry VS. "Public" Industry

As for the female employees in the United States, United Kingdom, Germany, and Belgium, the coefficient of the "public" industry is lower than that of the "mining" industry, showing that the wage premium in the "public" industry is lower than that of the "mining" industry. By contrast, for the female employees in Ireland, the coefficient of the "public" industry is much higher than that of the "mining" industry, revealing that the wage premium in the "public" industry is higher than that of the "mining" industry. In the United States, the results were robust from 2004 to 2017. The results were statistically significant for the United Kingdom from 2006 to 2017 except for 2008 and 2010. As for Germany, the results were robust from 2004 to 2017 except for 2010. The results were robust for Belgium from 2006 to 2010 and from 2012 to 2014.

Regarding the male workers in the United States, Germany, and Belgium, the coefficient of the "public" industry is lower than that of the "mining" industry, attesting that the wage premium in the "public" industry is lower than that of the "mining" industry. In contrast, for the male workers in Ireland, the coefficient of the "public" industry is much higher than that of the "mining" industry, indicating that the wage premium in the "public" industry is higher than that of the "mining" industry. In the United States and Germany, the results were robust from 2004 to 2017. The results were statistically significant for Belgium from 2004 to 2017 except for 2014 and 2016. In Ireland, the results were robust from 2004 to 2016 except for 2013. However, the results were not robust in the United Kingdom from 2004 to 2017.

Construction Industry VS. "Public" Industry

For the female employees in the United States and the United Kingdom, the coefficient of the "public" industry is lower than that of the construction industry, indicating that the wage premium in the "public" industry is lower than that of the construction industry. On the contrary, for the female employees in Germany and Ireland, the coefficient of the "public" industry is higher than that of the construction industry, showing that the wage premium in the "public" industry is higher than that of the construction industry. The results were robust in the United States from 2004 to 2017 except for 2013. For the United Kingdom, the results were statistically significant from 2004 to 2017 except for 2011. The results were robust for Germany in 2010, 2012, 2013, and 2017. In Ireland, the results were statistically significant from 2006 to 2007 and from 2014 to 2015. In contrast, in Belgium, the results were not robust from 2004 to 2017.

Concerning the male workers in the United States, the coefficient of the "public" industry is lower than that of the construction industry, revealing that the wage premium in the "public" industry is lower than that of the construction industry. Nevertheless, for the male workers in the United Kingdom, Germany, and Ireland, the coefficient of the "public" industry is higher than that of the construction industry, showing that the wage premium in the "public" industry is higher than that of the construction industry. As for the United States, the results were statistically significant from 2004 to 2017 except for 2012 and 2013. The results were robust for the United Kingdom from 2004 to 2006 and from 2009 to 2014. The results were statistically significant in Germany in 2013, 2015, and 2017. For Ireland, the results were robust from 2004 to 2009 and from 2011 to 2016. Nonetheless, the results were not robust in Belgium from 2004 to 2017.

As we mentioned in Section 3, the female-dominated industry is "public" while the male-dominated industries are "agricu," "transp," "mining," and construction.

The results reveal a significant correlation between the wage premiums in female- and male-dominated industries and gender wage gap.

INSERT TABLE 2 ABOUT HERE

Education Levels and Gender Wage Gap

Based on the coefficients of high and medium education levels in tables 2 to 6, we calculate the difference in the gender wage premium gap in education levels using the formulae below:

Define:

Gender Wage Premium Gap in High Education =

Female Wage Premium in High Education – Male Wage Premium in High Education (1)

Gender Wage Premium Gap in Medium Education =

Female Wage Premium in Medium Education – Male Wage Premium in Medium Education (2)

Difference in Gender Wage Premium Gap in Education Levels =
 Gender Wage Premium Gap in High Education – Gender Wage Premium Gap in Medium Education (3)

The figure 6 exhibits the trend of the difference in the gender wage premium gap between education levels in various countries.

INSERT FIGURE 6 ABOUT HERE

Based on the results from figure 6, we find a cross-national variation in the relationship between education levels and the gender wage gap.

As for the United States, United Kingdom, and Ireland, the difference in gender wage premium gap in education levels are positive, indicating that an increase in education level, from medium to high, is correlated with a lower gender wage gap. For the United States, the results were robust from 2004 to 2017. In the United Kingdom, the results were robust from 2004 to 2015 except for 2013. As for Ireland, the results were statistically significant from 2004 to 2007 and in 2012.

In contrast, for Germany, the difference in gender wage premium gap in education levels is negative, indicating that an increase in the education level, from medium to high, is correlated with a higher gender wage gap. The results were robust from 2004 to 2017 except for 2006 and 2007. By contrast, there is no statistically significant link between the education levels and the gender wage gap in Belgium.

4.5 Empirical Analysis 2

The third research question is the impacts of education levels on the gender employment gap.

First Step:

We estimate the probit model separately for men and women in a country and run the following model for each country to assess the causality and cross-country variation:

$$\text{Emp}_{sct} = \text{EduMed}_i + \text{EduHigh}_i + \text{Married}_i + \text{Child_Young}_i + \text{Child_Old}_i + \text{age}_{sct} + \text{age_square}_{sct} + \epsilon_{sct}$$

Where Emp_{sct} for s (men or women) in country c and year t is a dummy variable equal to 1 for the persons who are employed; EduMed_i is a dummy variable equal to 1 if the highest level of education completed by the person is medium education; EduHigh_i is a dummy variable equal to 1 if the highest level of education that the person has completed is high education.

As for the control variables in the model, Married_i is a dummy variable equal to 1 if the person is married; Child_Young_i is a dummy variable equal to 1 if the person has a child less than the age of 6; Child_Old_i is a dummy variable equal to 1 if the person

has a child between the age of 6 and 17; age_{sct} is the age of men or women in country c and year t ; age_square_{sct} is age-squared.

Second Step:

We then estimate the marginal effects and delta method standard errors in probit regression separately for men and women in a country.

4.5.1 Empirical Result 2

Based on the marginal effects of high and medium education levels in tables 6 to 8, we calculate the difference in gender employment gap in education levels by the following formulae:

Gender Employment Premium Gap in High Education =
Marginal Effect of Female High Education—Marginal Effect of Male High Education (1)

Gender Employment Premium Gap in Medium Education =
Marginal Effect of Female Medium Education—Marginal Effect of Male Medium Education (2)

Difference in Gender Employment Premium Gap in Education Levels =
Gender Employment Premium Gap in High Education—Gender Employment Premium Gap in
Medium Education (3)

The abbreviations in formulae 1 to 2 above are:

- Marginal Effect of Female High Education:
the marginal impact of one-unit changes in high education level on the probability of female employment.
- Marginal Effect of Female Medium Education:
the marginal impact of one-unit changes in medium education level on the probability of female employment.
- Marginal Effect of Male High Education:
the marginal impact of one-unit changes in high education level on the probability of male employment.
- Marginal Effect of Male Medium Education:
the marginal impact of one-unit changes in medium education level on the probability of male employment.

The figure 6 manifests the changing trend of the difference in the gender employment premium gap between the education levels in five developed countries.

INSERT FIGURE 7 ABOUT HERE

Figure 6 confirms a cross-country variation in the impact of education levels on the gender employment gap.

In the United States, United Kingdom, and Belgium, the difference in the employment premium gap in education levels is positive, indicating that an increase in the education level, from medium to high, is correlated with a lower gender employment gap. The results were robust from 2004 to 2017.

On the contrary, for Ireland in 2008, the difference in the employment premium gap in education levels is negative, indicating that an increase in the education level, from medium to high, is correlated with a higher gender employment gap. In contrast, there is no statistically significant relationship between the education levels and the gender employment gap in Germany.

5 Conclusions

We used microdata from 2004 to 2017 in five developed countries to conduct cross-country studies on the effects of wage premiums in male- and female-dominated industries and education levels on gender inequality.

First Conclusion

We find a significant relationship between the wage premiums in female- and male-dominated industries and gender wage gap.

As we mentioned in Section 3, the female-dominated industry is "public" while the male-dominated industries are "agricu," "transp," "mining," and construction.

"Agricu" Industry VS. "Public" Industry

For the female employees in the United Kingdom and Belgium, the wage premium in the "public" industry is lower than that of the "agricu" industry. However, for the female employees in the United States, Germany, and Ireland, the wage premium in the "public" industry is higher than that of the "agricu" industry. As for the male workers in the United States, United Kingdom, Germany, and Ireland, the wage premium in the "public" industry is higher than that of the "agricu" industry.

"Transp" Industry VS. "Public" Industry

Concerning the female employees in the United States, United Kingdom, Germany, and Belgium, the wage premium in the "public" industry is lower than that of the "transp" industry. In contrast, for the female employees in Ireland, the wage premium in the "public" industry is higher than that of the "transp" industry. For the male workers in the United States, United Kingdom, and Germany, the wage premium in the "public" industry is lower than that of the "transp" industry. Nevertheless, for the male workers in Ireland, the wage premium in the "public" industry is higher than that of the "transp" industry.

"Mining" Industry VS. "Public" Industry

As for the female employees in the United States, United Kingdom, Germany, and Belgium, the wage premium in the "public" industry is lower than that of the "mining" industry. By contrast, for the female employees in Ireland, the wage premium in the "public" industry is higher than that of the "mining" industry. Regarding the male workers in the United States, Germany, and Belgium, the wage premium in the "public" industry is lower than that of the "mining" industry. In contrast, for the male workers in Ireland, the wage premium in the "public" industry is higher than that of the "mining" industry.

Construction Industry VS. "Public" Industry

For the female employees in the United States and the United Kingdom, the wage premium in the "public" industry is lower than that of the construction industry. Nevertheless, for the female employees in Germany and Ireland, the wage premium in the "public" industry is higher than that of the construction industry. Concerning the male workers in the United States, the wage premium in the "public" industry is lower than that of the construction industry. Nevertheless, for the male workers in the United Kingdom, Germany, and Ireland, the wage premium in the "public" industry is higher than that of the construction industry.

Second Conclusion

We also find a cross-national variation in the relationship between education levels and the gender wage gap. As for the United States, United Kingdom, and Ireland, an increase in education level, from medium to high, is correlated with a lower gender wage gap. By contrast, an increase in education level, from medium to high, is correlated with a higher gender wage gap in Germany. In contrast, there is no statistically significant link between education levels and the gender wage gap in Belgium.

Third Conclusion

We discover that the relationship between education levels and the gender employment gap varies across countries. In the United States, United Kingdom, and Belgium, the increase in the education level, from medium to high, is correlated with a lower gender employment gap. In contrast, the rise in the education level, from medium to high, is correlated with a higher gender employment gap in Ireland in the 2008 financial crisis. On the contrary, there is no statistically significant correlation between the education levels and the gender employment gap in Germany.

Suggestions for Public Sector Wage and Employment

As for the United States, United Kingdom, and Germany, the governments can raise public sector wages while increasing public sector employment to reduce the gender wage gap, instead of cutting public sector wages and firing public sector employees. Some people argue that those cuts are necessary if the government faces a budget deficit. However, if the governments cut the employment and pay in the public sector, the quality of student education will decline (Greenstone and Looney, 2012). The budgets saved by those cuts are less than the reduction in children's future wages (Greenstone and Looney, 2012).

The governments can formulate policies to prevent the cuts in wage and employment in the public sector and provide financial support to the local governments with fiscal deficits.

Suggestions for Female Education

For the United States, United Kingdom, Ireland, and Belgium, to reduce gender inequality, the government can provide more financial support for female students to pursue tertiary education.

Future Research

It remains to see if our research findings will be stable during and after the COVID-19 pandemic. It is also not clear whether employment in female-dominated industries crowds out the employment in male-dominated industries. In addition, intra-industry wage differentials, occupational status, and immigration status may also affect gender inequality. We need to examine those issues in future research.

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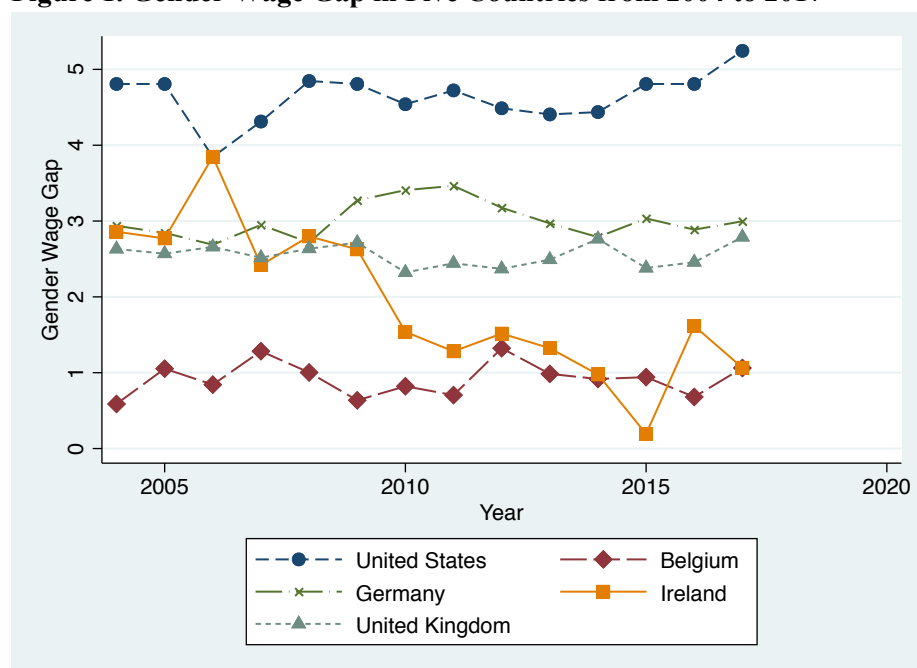
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Appendices

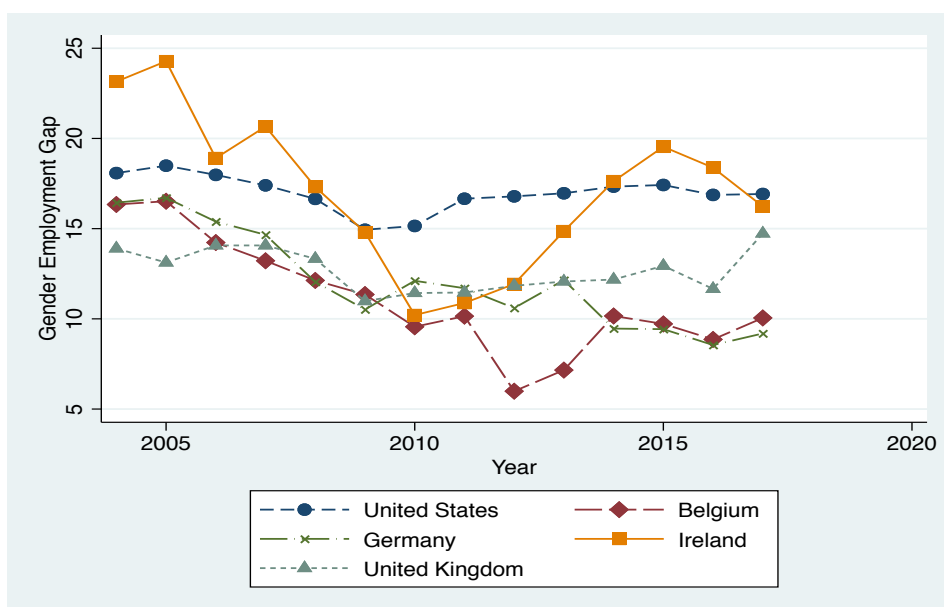
Figure 1. Gender Wage Gap in Five Countries from 2004 to 2017



Notes: The sample includes only people aged 25 to 54; it contains all employed persons; Gender Wage Gap is defined in Section 4.1.

Source: LIS

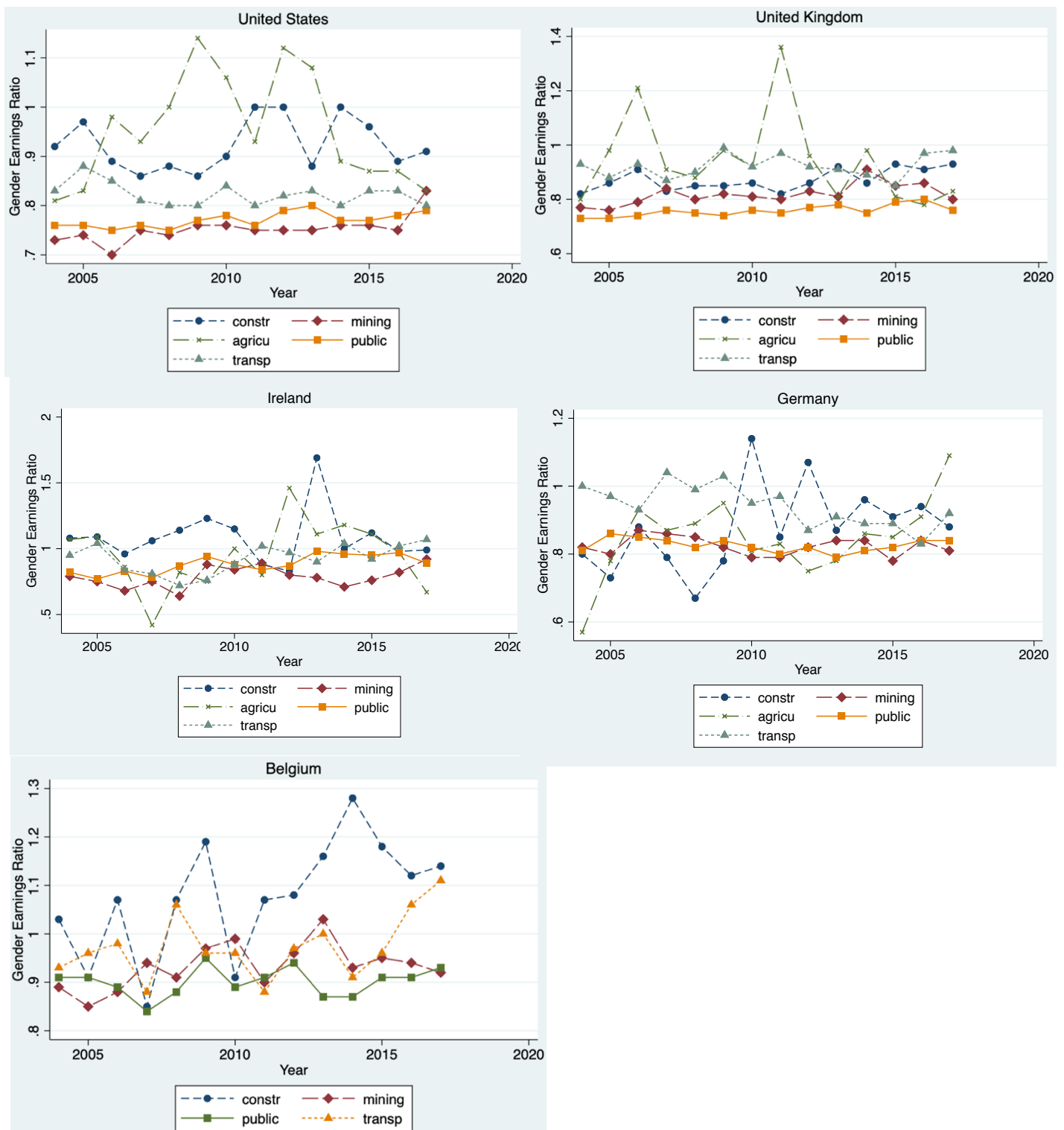
Figure 2. Gender Employment Gap in Five Countries from 2004 to 2017



Notes: The sample includes only people aged 25 to 54; it contains all employed persons; Gender Employment Gap is defined in Section 4.1.

Source: LIS

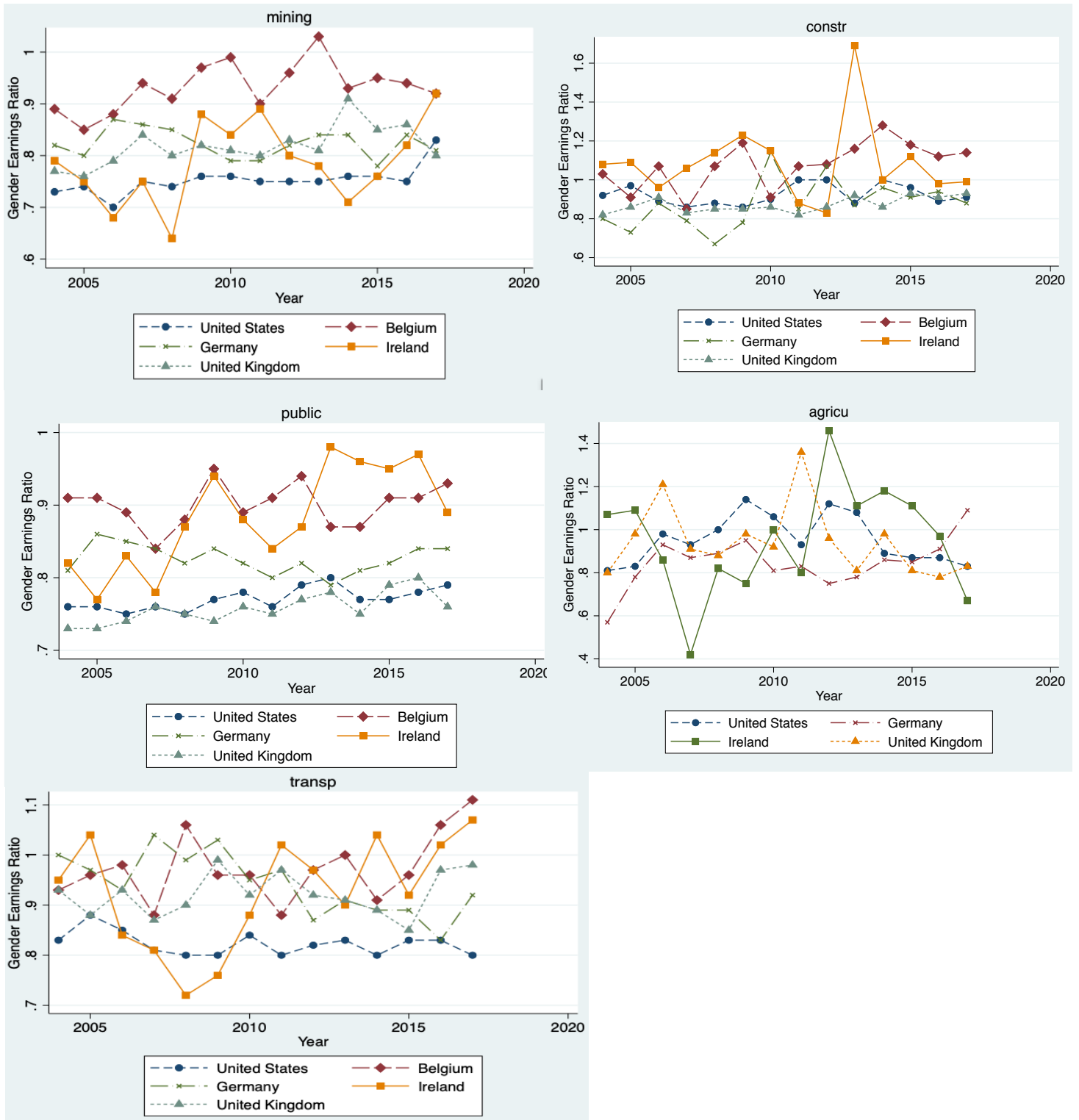
Figure 3. Gender Earnings Ratio by Male- and Female-Dominated Industries in Five Countries from 2004 to 2017



Notes: The sample includes only people aged 25 to 54; the sample contains all employed persons; for abbreviations see Section 3; we removed the "agricu" industry in Belgium because of the data limitations in 2010, 2016, and 2017; Gender Earnings Ratio is defined in Section 4.2.

Source: LIS

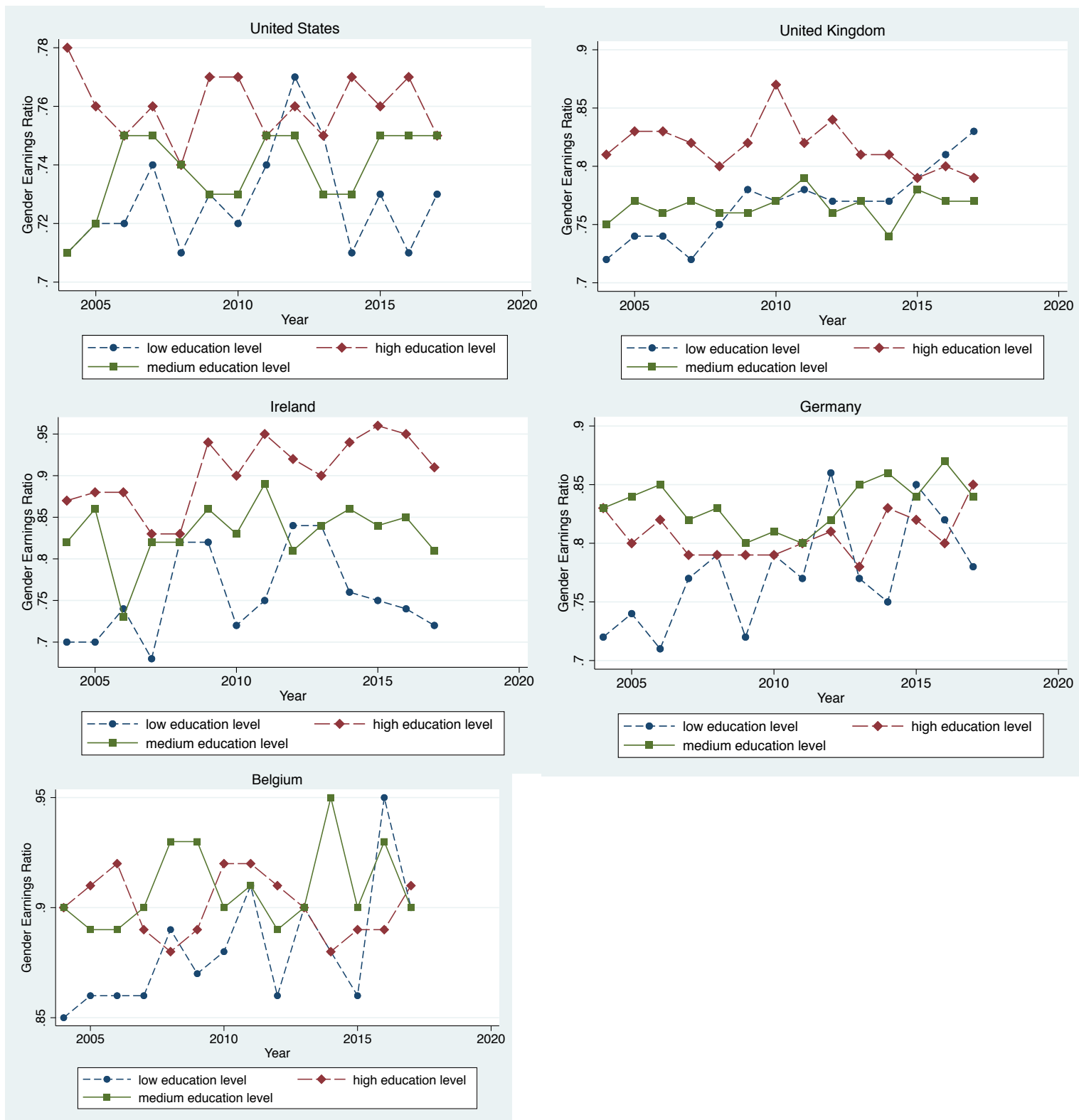
Figure 4. Intra-Industry Gender Earnings Ratio in Five Countries from 2004 to 2017



Notes: The sample includes only prime-age people aged 25 to 54; the sample contains all employed persons; for abbreviations see Section 3; we removed the "argicu" industry in Belgium because of the data limitations in 2010, 2016, and 2017; Gender Earnings Ratio is defined in Section 4.2.

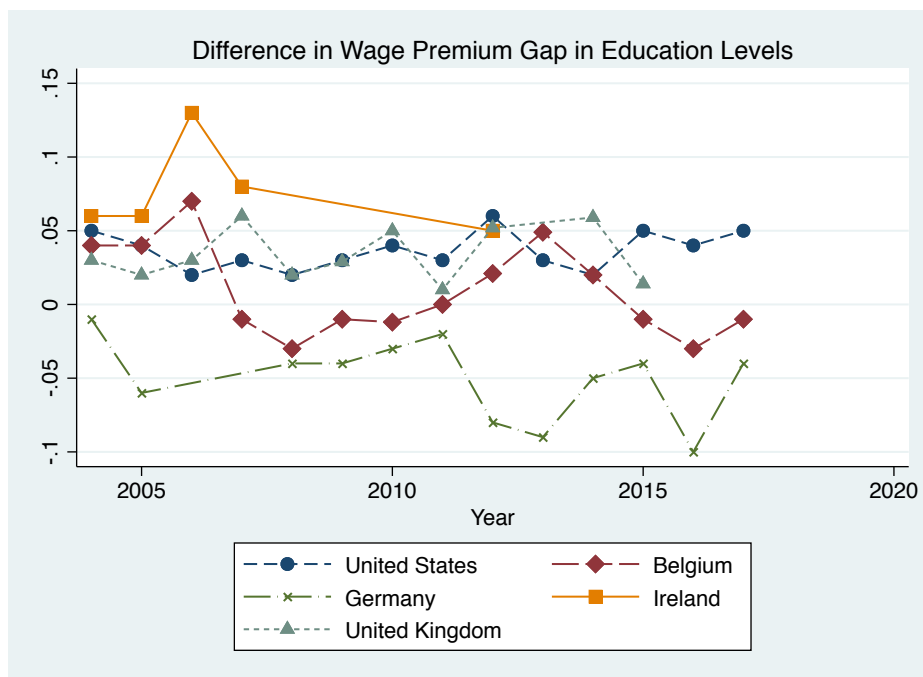
Source: LIS

Figure 5. Gender Earnings Ratio by Education Levels in Five Countries from 2004 to 2017



Notes: The sample includes only people aged 25 to 54; the sample contains all employed persons; for abbreviations see Section 3; Gender Earnings Ratio is defined in Section 4.2.
Source: LIS

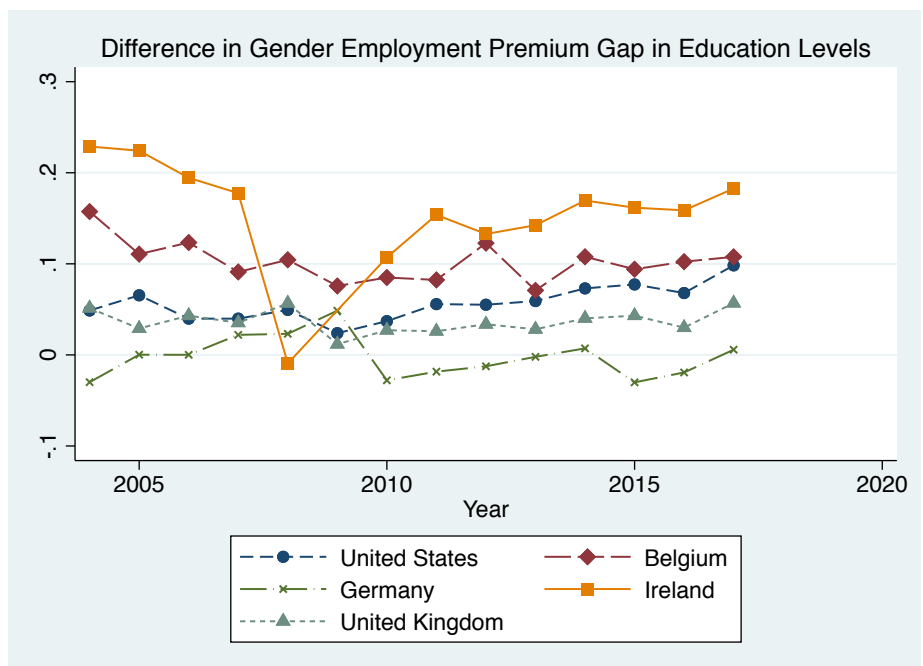
Figure 6. The Difference in Gender Wage Premium Gap in Education Levels in Five Countries from 2004 to 2017



Notes: The sample includes only people aged 25 to 54; it contains all employed persons; the difference in gender wage premium gap in education levels is defined in Section 4.4.1.

Source: LIS

Figure 7. The Difference in Gender Employment Premium Gap in Education Levels in Five Countries from 2004 to 2017



Notes: The sample includes only people aged 25 to 54; it contains all employed persons; the difference in gender employment gap in education levels is defined in Section 4.5.1.

Source: LIS

Table 1. Decompose Employment by Industry in Five Developed Countries (Average 2004-2017)

	Agricu	Mining	Constr	Wholes	Transp	Finance	RealEstate	Public	Other	Total
American Female										
Average Percentage	0.56	8.15	1.51	16.43	4.74	6.94	11.94	42.95	6.77	100
American Male										
Average Percentage	1.7	18.5	12.2	18.47	10.75	4.71	12.14	17.37	4.16	100
British Female										
Average Percentage	0.5	6.97	1.92	16.51	4.26	4.57	12.28	47.46	5.55	100
British Male										
Average Percentage	1.43	18.77	13.01	14.45	12.86	4.63	13.24	17.62	3.99	100
German Female										
Average Percentage	0.74	13.76	1.54	18.47	4.3	3.89	11.1	40.46	5.74	100
German Male										
Average Percentage	1.54	33.48	9.52	11.31	9.57	4	9.29	17.97	3.31	100
Irish Female										
Average Percentage	1.1	8.25	1.15	20.28	4.57	6.2	9.04	42.69	6.73	100
Irish Male										
Average Percentage	5.27	16.67	12.41	16.3	13.04	4.98	11.01	17.08	3.22	100
Belgian Female										
Average Percentage	0.87	8.29	1.35	13.03	4.43	4.5	10.5	51.28	5.74	100
Belgian Male										
Average Percentage	1.61	22.72	10.43	12.76	11.93	4.13	9.36	23.01	4.05	100

Notes: The sample includes only prime-age people aged 25 to 54; the table shows the average proportions of employees in various industries from 2004 to 2017; Wholes: wholesale, retail, repair, restaurants, and hotels industries; Finance: financial intermediation industry; RealEstate: real estate, business activities, and renting industries; Other: other industries; Agricu, Mining, Constr, Transp, and Public: abbreviations see Section 3; the countries are the United States, United Kingdom, Germany, Ireland, and Belgium.

Source: LIS

Table 2. Wage Regression Results for the United States from 2004 to 2017
Dependent Variable: log of hourly wages

	Male							Female						
	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh
2004	-0.17*** (0.036)	0.12*** (0.017)	0.12*** (0.013)	0.093*** (0.015)	0.056*** (0.015)	0.29*** (0.015)	0.67*** (0.016)	-0.14 (0.071)	0.26*** (0.024)	0.20*** (0.017)	0.23*** (0.047)	0.10*** (0.013)	0.31*** (0.018)	0.74*** (0.019)
2005	-0.21*** (0.036)	0.11*** (0.018)	0.16*** (0.013)	0.12*** (0.016)	0.073*** (0.015)	0.29*** (0.016)	0.67*** (0.017)	-0.18** (0.065)	0.26*** (0.025)	0.19*** (0.017)	0.20*** (0.036)	0.10*** (0.013)	0.27*** (0.019)	0.69*** (0.020)
2006	-0.28*** (0.034)	0.11*** (0.018)	0.15*** (0.013)	0.12*** (0.015)	0.075*** (0.015)	0.27*** (0.014)	0.66*** (0.015)	0.014 (0.098)	0.22*** (0.029)	0.20*** (0.018)	0.19*** (0.037)	0.11*** (0.014)	0.31*** (0.021)	0.72*** (0.021)
2007	-0.21*** (0.035)	0.12*** (0.017)	0.15*** (0.013)	0.13*** (0.015)	0.073*** (0.015)	0.30*** (0.015)	0.68*** (0.016)	-0.037 (0.077)	0.26*** (0.024)	0.20*** (0.017)	0.19*** (0.041)	0.13*** (0.013)	0.29*** (0.018)	0.70*** (0.019)
2008	-0.17*** (0.042)	0.22*** (0.016)	0.23*** (0.013)	0.21*** (0.016)	0.12*** (0.015)	0.29*** (0.015)	0.69*** (0.016)	0.0016 (0.098)	0.27*** (0.022)	0.23*** (0.018)	0.21*** (0.032)	0.14*** (0.012)	0.31*** (0.020)	0.73*** (0.021)
2009	-0.13*** (0.039)	0.22*** (0.016)	0.19*** (0.013)	0.18*** (0.017)	0.12*** (0.015)	0.28*** (0.016)	0.67*** (0.018)	0.097 (0.062)	0.30*** (0.022)	0.26*** (0.019)	0.21*** (0.042)	0.16*** (0.013)	0.28*** (0.018)	0.70*** (0.019)
2010	-0.13*** (0.039)	0.23*** (0.016)	0.18*** (0.013)	0.18*** (0.017)	0.12*** (0.015)	0.27*** (0.016)	0.66*** (0.017)	0.09 (0.067)	0.26*** (0.022)	0.19*** (0.019)	0.22*** (0.047)	0.15*** (0.013)	0.27*** (0.019)	0.70*** (0.020)
2011	-0.14*** (0.038)	0.20*** (0.017)	0.19*** (0.014)	0.14*** (0.018)	0.12*** (0.016)	0.29*** (0.018)	0.69*** (0.018)	-0.23* (0.110)	0.30*** (0.022)	0.20*** (0.021)	0.18*** (0.046)	0.14*** (0.014)	0.27*** (0.019)	0.70*** (0.020)
2012	-0.21*** (0.039)	0.24*** (0.018)	0.19*** (0.015)	0.15*** (0.018)	0.15*** (0.016)	0.30*** (0.017)	0.67*** (0.018)	-0.064 (0.084)	0.25*** (0.022)	0.18*** (0.019)	0.24*** (0.044)	0.11*** (0.013)	0.25*** (0.021)	0.68*** (0.021)
2013	-0.072 (0.044)	0.19*** (0.023)	0.21*** (0.018)	0.13*** (0.022)	0.13*** (0.019)	0.28*** (0.019)	0.69*** (0.020)	-0.044 (0.110)	0.21*** (0.029)	0.18*** (0.025)	0.078 (0.042)	0.088*** (0.017)	0.27*** (0.025)	0.71*** (0.026)
2014	-0.082* (0.041)	0.27*** (0.018)	0.20*** (0.015)	0.14*** (0.018)	0.13*** (0.017)	0.28*** (0.017)	0.68*** (0.018)	-0.091 (0.130)	0.28*** (0.026)	0.19*** (0.023)	0.24*** (0.039)	0.13*** (0.016)	0.29*** (0.022)	0.71*** (0.023)
2015	-0.092* (0.038)	0.27*** (0.017)	0.22*** (0.015)	0.15*** (0.018)	0.12*** (0.017)	0.34*** (0.020)	0.74*** (0.021)	-0.088 (0.084)	0.29*** (0.026)	0.16*** (0.021)	0.25*** (0.042)	0.094*** (0.015)	0.28*** (0.023)	0.73*** (0.023)
2016	-0.11*** (0.034)	0.25*** (0.019)	0.18*** (0.016)	0.15*** (0.018)	0.090*** (0.018)	0.22*** (0.017)	0.64*** (0.018)	-0.047 (0.055)	0.30*** (0.026)	0.18*** (0.021)	0.17*** (0.044)	0.11*** (0.015)	0.22*** (0.022)	0.68*** (0.023)
2017	-0.085* (0.039)	0.27*** (0.019)	0.18*** (0.017)	0.14*** (0.019)	0.011*** (0.018)	0.27*** (0.019)	0.68*** (0.020)	-0.17 (0.099)	0.26*** (0.028)	0.23*** (0.022)	0.17*** (0.037)	0.088*** (0.016)	0.25*** (0.022)	0.71*** (0.022)

Notes: Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level; for abbreviations see Section 3.

Source: LIS

Table 3. Wage Regression Results for the United Kingdom from 2004 to 2017
Dependent Variable: log of hourly wages

	Male							Female						
	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh
2004	-0.13*	0.12***	0.14***	0.15***	0.16***	0.20***	0.59***	0.046	0.32***	0.19***	0.30***	0.22***	0.15***	0.57***
	(0.056)	(0.028)	(0.023)	(0.030)	(0.024)	(0.024)	(0.029)	(0.190)	(0.037)	(0.029)	(0.059)	(0.017)	(0.020)	(0.025)
2005	-0.19*	0.17***	0.21***	0.16***	0.21***	0.19***	0.57***	-0.22	0.26***	0.19***	0.30***	0.22***	0.14***	0.54***
	(0.074)	(0.031)	(0.026)	(0.038)	(0.027)	(0.023)	(0.026)	(0.150)	(0.036)	(0.028)	(0.053)	(0.019)	(0.020)	(0.024)
2006	-0.043	0.13***	0.17***	0.15***	0.18***	0.19***	0.54***	0.20*	0.27***	0.26***	0.26***	0.19***	0.14***	0.52***
	(0.055)	(0.028)	(0.024)	(0.028)	(0.025)	(0.023)	(0.027)	(0.100)	(0.041)	(0.027)	(0.050)	(0.020)	(0.023)	(0.029)
2007	-0.099	0.11***	0.17***	0.20***	0.16***	0.17***	0.51***	0.11	0.27***	0.24***	0.28***	0.19***	0.15***	0.55***
	(0.066)	(0.031)	(0.025)	(0.032)	(0.026)	(0.025)	(0.030)	(0.270)	(0.037)	(0.031)	(0.056)	(0.021)	(0.024)	(0.028)
2008	-0.13	0.13***	0.15***	0.14***	0.14***	0.14***	0.43***	-0.18	0.28***	0.19***	0.23***	0.21***	0.12***	0.43***
	(0.079)	(0.027)	(0.024)	(0.034)	(0.025)	(0.019)	(0.021)	(0.180)	(0.045)	(0.036)	(0.056)	(0.020)	(0.019)	(0.022)
2009	-0.17**	0.20***	0.17***	0.13**	0.19***	0.16***	0.50***	0.083	0.33***	0.26***	0.30***	0.22***	0.091***	0.46***
	(0.065)	(0.033)	(0.028)	(0.040)	(0.029)	(0.020)	(0.022)	(0.092)	(0.041)	(0.042)	(0.080)	(0.025)	(0.020)	(0.022)
2010	-0.11	0.15***	0.16***	0.17***	0.19***	0.14***	0.45***	0.35	0.26***	0.15***	0.24***	0.20***	0.12***	0.48***
	(0.073)	(0.032)	(0.027)	(0.033)	(0.026)	(0.020)	(0.023)	(0.210)	(0.054)	(0.043)	(0.049)	(0.022)	(0.020)	(0.021)
2011	-0.14	0.24***	0.20***	0.16***	0.22***	0.17***	0.51***	0.62*	0.33***	0.21***	0.15	0.19***	0.16***	0.51***
	(0.110)	(0.036)	(0.031)	(0.042)	(0.031)	(0.024)	(0.026)	(0.310)	(0.043)	(0.043)	(0.084)	(0.026)	(0.024)	(0.027)
2012	0.014	0.24***	0.20***	0.14***	0.21***	0.11***	0.42***	0.022	0.25***	0.14**	0.29***	0.13***	0.088***	0.45***
	(0.100)	(0.035)	(0.030)	(0.039)	(0.031)	(0.026)	(0.028)	(0.220)	(0.050)	(0.052)	(0.059)	(0.026)	(0.024)	(0.027)
2013	-0.25*	0.23***	0.18***	0.12***	0.14***	0.049	0.41***	-0.1	0.37***	0.28***	0.39***	0.18***	0.067**	0.43***
	(0.120)	(0.034)	(0.032)	(0.037)	(0.031)	(0.029)	(0.030)	(0.120)	(0.043)	(0.038)	(0.088)	(0.022)	(0.025)	(0.027)
2014	-0.01	0.25***	0.21***	0.21***	0.22***	0.13***	0.43***	0.15	0.38***	0.32***	0.42***	0.16***	0.071**	0.43***
	(0.086)	(0.036)	(0.033)	(0.041)	(0.033)	(0.027)	(0.028)	(0.130)	(0.056)	(0.040)	(0.082)	(0.026)	(0.025)	(0.024)
2015	-0.24*	0.18***	0.18***	0.11**	0.081*	0.12***	0.44***	-0.07	0.22***	0.25***	0.30***	0.15***	0.086***	0.42***
	(0.120)	(0.034)	(0.031)	(0.041)	(0.033)	(0.025)	(0.026)	(0.140)	(0.063)	(0.039)	(0.070)	(0.028)	(0.025)	(0.023)
2016	0.015	0.25***	0.22***	0.19***	0.10**	0.15***	0.45***	0.037	0.35***	0.34***	0.24*	0.16***	0.024	0.34***
	(0.120)	(0.040)	(0.035)	(0.044)	(0.039)	(0.030)	(0.032)	(0.130)	(0.047)	(0.037)	(0.100)	(0.023)	(0.024)	(0.025)
2017	-0.16*	0.22***	0.23***	0.19***	0.17***	0.074**	0.40***	-0.17	0.33***	0.27***	0.37***	0.17***	0.036	0.36***
	(0.066)	(0.036)	(0.033)	(0.041)	(0.034)	(0.026)	(0.027)	(0.160)	(0.059)	(0.045)	(0.080)	(0.028)	(0.029)	(0.031)

Notes: Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level; for abbreviations see Section 3.

Source: LIS

Table 4. Wage Regression Results for Germany from 2004 to 2017

Dependent Variable: log of hourly wages

	Male						Female							
	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh
2004	-0.29*** (0.078)	0.06 (0.045)	0.18*** (0.032)	-0.016 (0.040)	0.14*** (0.040)	0.17* (0.080)	0.43*** (0.084)	-0.59*** (0.180)	0.23*** (0.066)	0.23*** (0.043)	0.026 (0.065)	0.20*** (0.037)	0.24** (0.073)	0.49*** (0.077)
2005	-0.22** (0.070)	0.043 (0.052)	0.20*** (0.035)	-0.006 (0.045)	0.12** (0.044)	0.16* (0.069)	0.42*** (0.072)	-0.22* (0.110)	0.21*** (0.062)	0.23*** (0.039)	0.017 (0.075)	0.19*** (0.034)	0.23*** (0.042)	0.43*** (0.049)
2006	-0.27*** (0.063)	0.045 (0.052)	0.20*** (0.034)	-0.038 (0.043)	0.16*** (0.043)	0.12 (0.077)	0.43*** (0.080)	-0.25*** (0.063)	0.13 (0.072)	0.20*** (0.042)	0.11 (0.110)	0.18*** (0.036)	0.17*** (0.042)	0.43*** (0.049)
2007	-0.23*** (0.056)	0.065 (0.050)	0.23*** (0.041)	0.049 (0.043)	0.15*** (0.046)	0.12 (0.062)	0.46*** (0.065)	-0.35** (0.130)	0.22*** (0.061)	0.24*** (0.046)	0.11 (0.084)	0.20*** (0.035)	0.16** (0.058)	0.42*** (0.060)
2008	-0.36 (0.190)	0.099 (0.059)	0.29*** (0.045)	0.088 (0.051)	0.18*** (0.050)	0.27*** (0.070)	0.58*** (0.072)	-0.49*** (0.150)	0.22** (0.074)	0.24*** (0.055)	-0.005 (0.093)	0.20*** (0.042)	0.16** (0.049)	0.43*** (0.054)
2009	-0.16 (0.200)	0.063 (0.052)	0.25*** (0.036)	0.023 (0.038)	0.17*** (0.038)	0.17*** (0.045)	0.46*** (0.047)	-0.32* (0.140)	0.19* (0.084)	0.28*** (0.042)	0.12 (0.120)	0.21*** (0.035)	0.27*** (0.050)	0.52*** (0.056)
2010	-0.21 (0.130)	0.033 (0.056)	0.19*** (0.044)	-0.063 (0.047)	0.14** (0.046)	0.28*** (0.044)	0.61*** (0.046)	-0.17* (0.084)	0.26*** (0.050)	0.24*** (0.037)	0.20** (0.078)	0.26*** (0.030)	0.26*** (0.038)	0.56*** (0.040)
2011	-0.36** (0.120)	0.017 (0.056)	0.17*** (0.044)	-0.079 (0.048)	0.11* (0.046)	0.22*** (0.037)	0.57*** (0.039)	-0.41** (0.130)	0.26*** (0.052)	0.23*** (0.035)	0.089 (0.070)	0.18*** (0.030)	0.28*** (0.041)	0.61*** (0.044)
2012	-0.1 (0.140)	0.15*** (0.044)	0.23*** (0.033)	0.047 (0.038)	0.14*** (0.035)	0.26*** (0.038)	0.65*** (0.039)	-0.25*** (0.071)	0.28*** (0.045)	0.31*** (0.033)	0.22** (0.078)	0.28*** (0.028)	0.29*** (0.035)	0.60*** (0.039)
2013	-0.069 (0.120)	0.17** (0.054)	0.24*** (0.041)	0.10* (0.048)	0.17*** (0.050)	0.22*** (0.050)	0.59*** (0.052)	-0.25** (0.098)	0.32*** (0.047)	0.33*** (0.039)	0.15* (0.063)	0.25*** (0.029)	0.28*** (0.037)	0.56*** (0.041)
2014	0.03 (0.160)	0.21*** (0.047)	0.23*** (0.036)	0.063 (0.046)	0.17*** (0.043)	0.22*** (0.048)	0.58*** (0.049)	-0.18 (0.120)	0.30*** (0.044)	0.27*** (0.036)	0.21* (0.089)	0.19*** (0.030)	0.35*** (0.052)	0.66*** (0.056)
2015	0.064 (0.190)	0.24*** (0.054)	0.26*** (0.047)	0.11* (0.053)	0.21*** (0.056)	0.28*** (0.067)	0.63*** (0.070)	-0.085 (0.110)	0.28*** (0.046)	0.22*** (0.041)	0.083 (0.062)	0.19*** (0.034)	0.29*** (0.055)	0.60*** (0.058)
2016	-0.14 (0.150)	0.13** (0.040)	0.21*** (0.031)	0.038 (0.046)	0.13*** (0.038)	0.30*** (0.057)	0.68*** (0.059)	-0.20* (0.095)	0.19*** (0.053)	0.25*** (0.037)	0.079 (0.120)	0.21*** (0.035)	0.25*** (0.051)	0.53*** (0.054)
2017	-0.11 (0.110)	0.19*** (0.046)	0.26*** (0.035)	0.11* (0.046)	0.15** (0.048)	0.40*** (0.072)	0.75*** (0.075)	-0.063 (0.100)	0.21*** (0.050)	0.24*** (0.038)	0.15* (0.061)	0.21*** (0.029)	0.20*** (0.052)	0.51*** (0.055)

Notes: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level; for abbreviations see Section 3.

Source: LIS

Table 5. Wage Regression Results for Ireland from 2004 to 2017
Dependent Variable: log of hourly wages

	Male							Female						
	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh
2004	-0.36** (0.120)	0.087 (0.052)	0.16** (0.050)	0.23*** (0.056)	0.25*** (0.047)	0.19*** (0.036)	0.52*** (0.037)	0.018 (0.097)	0.21*** (0.063)	0.14** (0.049)	0.33 (0.230)	0.30*** (0.041)	0.24*** (0.042)	0.63*** (0.048)
2005	-0.34 (0.240)	0.061 (0.066)	0.15** (0.048)	0.22*** (0.049)	0.29*** (0.050)	0.14*** (0.041)	0.46*** (0.046)	-0.15 (0.170)	0.38*** (0.075)	0.12* (0.056)	0.39** (0.150)	0.30*** (0.047)	0.25*** (0.049)	0.63*** (0.061)
2006	-0.16 (0.120)	0.16* (0.077)	0.20** (0.062)	0.23*** (0.064)	0.31*** (0.067)	0.18*** (0.042)	0.50*** (0.042)	-0.35 (0.200)	0.038 (0.110)	0.17* (0.067)	0.27** (0.085)	0.30*** (0.054)	0.13* (0.053)	0.58*** (0.071)
2007	0.011 (0.100)	0.067 (0.085)	0.20** (0.060)	0.21** (0.066)	0.34*** (0.076)	0.12* (0.050)	0.42*** (0.047)	-0.54 (0.290)	0.078 (0.110)	0.11* (0.047)	0.26* (0.110)	0.29*** (0.049)	0.18*** (0.052)	0.56*** (0.064)
2008	0.23 (0.220)	0.32** (0.100)	0.21** (0.079)	0.27** (0.097)	0.36*** (0.089)	0.13 (0.084)	0.47*** (0.068)	-0.043 (0.062)	0.20* (0.098)	0.063 (0.064)	0.2 (0.100)	0.35*** (0.085)	-0.052 (0.130)	0.31* (0.130)
2009	-0.24* (0.110)	0.22** (0.071)	0.11* (0.051)	0.19** (0.065)	0.27*** (0.053)	0.21*** (0.051)	0.45*** (0.043)	-0.084 (0.150)	0.18 (0.092)	0.08 (0.072)	0.18 (0.110)	0.32*** (0.048)	0.028 (0.069)	0.38*** (0.062)
2010	-0.23 (0.150)	0.26*** (0.063)	0.16** (0.061)	0.15 (0.079)	0.34*** (0.063)	0.084 (0.054)	0.39*** (0.049)	-0.35* (0.150)	0.082 (0.068)	0.15** (0.051)	0.0079 (0.110)	0.31*** (0.040)	0.11 (0.060)	0.43*** (0.060)
2011	-0.095 (0.120)	0.28*** (0.049)	0.21*** (0.044)	0.13** (0.048)	0.37*** (0.045)	0.073 (0.039)	0.33*** (0.040)	-0.4 (0.270)	0.23** (0.074)	0.14* (0.057)	0.013 (0.081)	0.32*** (0.037)	0.11** (0.042)	0.41*** (0.043)
2012	-0.11 (0.130)	0.34*** (0.054)	0.24*** (0.049)	0.18* (0.079)	0.35*** (0.055)	0.15** (0.048)	0.43*** (0.048)	-0.024 (0.130)	0.32*** (0.080)	0.19*** (0.055)	0.057 (0.079)	0.30*** (0.041)	0.13* (0.058)	0.46*** (0.070)
2013	0.016 (0.099)	0.28*** (0.055)	0.28*** (0.047)	0.17* (0.067)	0.27*** (0.044)	0.12** (0.044)	0.40*** (0.045)	-0.028 (0.091)	0.22** (0.079)	0.18** (0.062)	0.13 (0.170)	0.29*** (0.038)	0.035 (0.042)	0.39*** (0.044)
2014	-0.04 (0.092)	0.27*** (0.063)	0.30*** (0.056)	0.19* (0.076)	0.39*** (0.068)	0.11 (0.057)	0.42*** (0.054)	0.32 (0.220)	0.39*** (0.074)	0.24*** (0.070)	0.30* (0.130)	0.44*** (0.042)	0.1 (0.062)	0.44*** (0.060)
2015	-0.18 (0.110)	0.26*** (0.056)	0.18** (0.054)	0.20* (0.084)	0.25*** (0.067)	0.079 (0.055)	0.36*** (0.053)	-0.078 (0.160)	0.28*** (0.072)	0.073 (0.057)	0.22* (0.090)	0.33*** (0.044)	0.17*** (0.052)	0.52*** (0.052)
2016	-0.072 (0.110)	0.24*** (0.071)	0.23*** (0.057)	0.15* (0.065)	0.31*** (0.070)	0.086 (0.066)	0.38*** (0.057)	-0.20* (0.083)	0.29*** (0.064)	0.11* (0.053)	0.11 (0.110)	0.29*** (0.038)	0.08 (0.064)	0.42*** (0.063)
2017	-0.012 (0.180)	0.17 (0.088)	0.11 (0.081)	0.034 (0.084)	0.17* (0.084)	0.015 (0.072)	0.36*** (0.072)	-0.1 (0.130)	0.30*** (0.063)	0.17* (0.071)	0.39*** (0.100)	0.35*** (0.050)	0.086 (0.056)	0.38*** (0.060)

Notes: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level; for abbreviations see Section 3.

Source: LIS

Table 6. Wage Regression Results for Belgium from 2004 to 2017

Dependent Variable: log of hourly wages

	Male							Female						
	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh	Agricu	Transp	Mining	Constr	Public	EduMed	EduHigh
2004	-0.12 (0.095)	0.079* (0.040)	0.14*** (0.037)	0.057 (0.042)	0.12** (0.037)	0.15*** (0.021)	0.41*** (0.024)	0.0022 (0.093)	0.019 (0.042)	0.091* (0.037)	0.19 (0.120)	0.10** (0.031)	0.13*** (0.028)	0.43*** (0.027)
2005	-0.07 (0.073)	0.056 (0.037)	0.15*** (0.032)	0.035 (0.035)	0.076* (0.033)	0.14*** (0.022)	0.39*** (0.024)	-0.013 (0.092)	0.089* (0.041)	0.064* (0.032)	-0.12 (0.130)	0.090*** (0.024)	0.13*** (0.025)	0.42*** (0.026)
2006	0.048 (0.068)	0.064 (0.038)	0.093** (0.033)	-0.044 (0.038)	0.066 (0.034)	0.13*** (0.022)	0.37*** (0.024)	-0.12 (0.080)	0.15** (0.046)	0.12** (0.035)	0.08 (0.073)	0.068* (0.027)	0.17*** (0.031)	0.48*** (0.031)
2007	-0.34 (0.300)	0.16** (0.051)	0.17*** (0.047)	0.041 (0.053)	0.11* (0.049)	0.12*** (0.029)	0.38*** (0.029)	-0.23 (0.130)	0.16** (0.055)	0.14** (0.048)	-0.12 (0.096)	0.11* (0.045)	0.14*** (0.039)	0.39*** (0.035)
2008	-0.11 (0.065)	0.024 (0.038)	0.11** (0.034)	-0.094** (0.035)	0.029 (0.034)	0.10*** (0.023)	0.39*** (0.022)	-0.038 (0.190)	0.19*** (0.037)	0.096** (0.034)	-0.056 (0.058)	0.083** (0.028)	0.15*** (0.027)	0.41*** (0.026)
2009	-0.013 (0.076)	0.19*** (0.042)	0.17*** (0.035)	0.023 (0.041)	0.12** (0.040)	0.12*** (0.025)	0.42*** (0.027)	0.19* (0.084)	0.18*** (0.038)	0.14*** (0.033)	-0.014 (0.066)	0.13*** (0.025)	0.15*** (0.028)	0.44*** (0.033)
2010	0.17*** (0.037)	0.079* (0.037)	0.12*** (0.030)	-0.03 (0.034)	0.086* (0.033)	0.098** (0.030)	0.36*** (0.032)		0.14** (0.047)	0.14*** (0.033)	-0.066 (0.077)	0.079** (0.026)	0.13*** (0.030)	0.38*** (0.031)
2011	-0.24*** (0.033)	0.11** (0.038)	0.15*** (0.031)	0.054 (0.035)	0.084** (0.031)	0.10*** (0.029)	0.38*** (0.030)	-0.054 (0.034)	0.085* (0.042)	0.057 (0.038)	0.031 (0.044)	0.065* (0.026)	0.12*** (0.034)	0.40*** (0.035)
2012	-0.025 (0.057)	0.059 (0.038)	0.16*** (0.029)	0.021 (0.036)	0.090** (0.029)	0.091** (0.028)	0.36*** (0.030)	0.48*** (0.032)	0.13** (0.044)	0.10* (0.041)	0.062 (0.055)	0.092*** (0.025)	0.10*** (0.028)	0.39*** (0.028)
2013	0.19 (0.100)	0.12*** (0.032)	0.17*** (0.027)	-0.027 (0.037)	0.14*** (0.028)	0.11*** (0.027)	0.36*** (0.028)	0.42*** (0.045)	0.13** (0.046)	0.16*** (0.038)	0.06 (0.077)	0.11*** (0.028)	0.091** (0.030)	0.39*** (0.029)
2014	0.078 (0.100)	0.11*** (0.031)	0.15*** (0.027)	-0.073 (0.058)	0.15*** (0.029)	0.13*** (0.027)	0.38*** (0.033)	-0.33 (0.170)	0.008 (0.043)	0.10* (0.040)	0.0054 (0.060)	0.088** (0.027)	0.14*** (0.032)	0.41*** (0.031)
2015	-0.042 (0.059)	0.12*** (0.035)	0.18*** (0.029)	0.037 (0.036)	0.11*** (0.027)	0.15*** (0.026)	0.42*** (0.027)	0.03 (0.120)	0.058 (0.043)	0.057 (0.041)	0.12 (0.070)	0.094** (0.031)	0.20*** (0.036)	0.46*** (0.037)
2016	0.11** (0.040)	0.14*** (0.033)	0.13*** (0.031)	0.0038 (0.039)	0.14*** (0.032)	0.13*** (0.031)	0.42*** (0.032)	-2E-05 (0.043)	0.083 (0.050)	0.058 (0.043)	0.0012 (0.053)	0.079** (0.029)	0.10** (0.033)	0.36*** (0.035)
2017	0.03 (0.190)	0.091* (0.041)	0.16*** (0.038)	0.022 (0.044)	0.087* (0.038)	0.11*** (0.031)	0.38*** (0.032)	0.037 (0.041)	0.093 (0.054)	0.061 (0.040)	-0.03 (0.067)	0.086** (0.031)	0.15*** (0.036)	0.41*** (0.037)

Notes: Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level; for abbreviations see Section 3; for the "agricu" industry in Belgium, there are data limitations in 2010, 2016, and 2017.

Source: LIS

Table 7. Marginal Effects in Probit Model for the United States and the United Kingdom from 2004 to 2017
Dependent Variable: employment (1 for employed & 0 for not employed)

	United States				United Kingdom			
	Male		Female		Male		Female	
	EduMed	EduHigh	EduMed	EduHigh	EduMed	EduHigh	EduMed	EduHigh
2004	.0483244*** (0.0049963)	.0880208*** (0.0053738)	.1757397*** (0.0083945)	.2641954*** (0.0087256)	.0937211*** (0.0077311)	.1182725*** (0.0095102)	.1975713*** (0.0117953)	.2734974*** (0.0150315)
2005	.0441384*** (0.0048175)	.0788986*** (0.0051488)	.1793053*** (0.0082881)	.2795269*** (0.0086136)	.0836883*** (0.0080811)	.1345676*** (0.0102359)	.22217*** (0.0122069)	.3020647*** (0.0149961)
2006	.0454779*** (0.0047097)	.0867725*** (0.0050994)	.1692581*** (0.0084154)	.2503869*** (0.0086934)	.0792616*** (0.0085925)	.1293333*** (0.0105169)	.2359548*** (0.0134552)	.3290732*** (0.0162758)
2007	.046018*** (0.0049166)	.0957969*** (0.0052765)	.1804786*** (0.0084632)	.2700928*** (0.0087024)	.0903762*** (0.0086921)	.1259708*** (0.0106926)	.2225678*** (0.0139233)	.2934525*** (.0165017)
2008	.055736*** (0.0051973)	.1065809*** (0.0055898)	.1849814*** (0.0085716)	.2852728*** (0.0088291)	.0591251*** (0.0080128)	.0839217*** (0.0081091)	.135246*** (0.0120803)	.2167762*** (0.0130018)
2009	.0695134*** (0.0062237)	.1395248*** (0.0066471)	.1812492*** (0.0089042)	.275152*** (0.0091077)	.0566008*** (0.0093222)	.116854*** (0.0097651)	.1394915*** (0.0123941)	.2115212*** (0.0131015)
2010	.0655823*** (0.0065858)	.1481472*** (0.0069644)	.1902616*** (0.0092270)	.3098561*** (0.0094203)	.0666956*** (0.0087095)	.1006203*** (0.0090518)	.1335755*** (0.0126132)	.1945975*** (0.0130632)
2011	.0498265*** (0.0065542)	.1179103*** (0.0068912)	.1639275*** (0.0095671)	.2877919*** (0.0097325)	.0328931*** (0.0111026)	.0911568*** (0.0106474)	.1342099*** (0.1342099)	.2184608*** (0.0147861)
2012	.0608625*** (0.0062010)	.1318546*** (0.0065052)	.1678448*** (0.0096153)	.293919*** (0.0097469)	.0399478*** (0.0102880)	.0897307*** (0.0111609)	.133873*** (0.0152374)	.2173013*** (0.0162482)
2013	.0498185*** (0.0076597)	.114628*** (0.0080107)	.1787863*** (0.0117944)	.3027394*** (0.0119289)	.0632023*** (0.0100402)	.1055299*** (0.0109323)	.1664065*** (0.0153309)	.2368558*** (0.0159414)
2014	.0431772*** (0.0061245)	.1059944*** (0.0064133)	.1763807*** (0.0095110)	.3122315*** (0.0095919)	.0545192*** (0.0089723)	.0937817*** (0.0087242)	.1498168*** (0.0144885)	.229216*** (0.0139014)
2015	.0372591*** (0.0062421)	.0919897*** (0.0064485)	.155002*** (0.0099598)	.2870798*** (0.0099921)	.0362034*** (0.0098236)	.0581723*** (0.0097877)	.1351344*** (0.0155871)	.2001695*** (0.0151023)
2016	.0408592*** (0.0063472)	.0944962*** (0.0065581)	.175804*** (0.0101960)	.2973821*** (0.0102035)	.0698427*** (0.0120055)	.0873912*** (0.0113980)	.1898269*** (0.0154396)	.2373081*** (0.0148670)
2017	.0423989*** (0.0065675)	.0922528*** (0.0067106)	.1552249*** (0.0104691)	.3033885*** (0.0103947)	.0386956*** (0.0090830)	.0623174*** (0.0090546)	.1322749*** (0.0171904)	.212742*** (0.0165338)

Notes: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level. medium and high education levels: abbreviations see Section 3.

Source: LIS

Table 8. Marginal Effects in Probit Model for Ireland and Belgium from 2004 to 2017
Dependent Variable: employment (1 for employed & 0 for not employed)

	Ireland				Belgium			
	Male		Female		Male		Female	
	EduMed	EduHigh	EduMed	EduHigh	EduMed	EduHigh	EduMed	EduHigh
2004	.1106141*** (0.0220151)	.1094309*** (0.0204706)	.153533*** (0.0288699)	.3811695*** (0.0333966)	.0754398*** (0.0169151)	.1328082*** (0.0180977)	.1933286*** (0.0246243)	.4080716*** (0.025942)
2005	.1161207*** (0.0213350)	.0989618*** (0.0214561)	.2621845*** (0.0336213)	.4692292*** (0.0357304)	.0613269*** (0.0117733)	.1345734*** (0.0133267)	.178754*** (0.0218578)	.3626645*** (0.022959)
2006	.1221908*** (0.0266241)	.1310342*** (0.0265305)	.2198219*** (0.0370104)	.4231242*** (0.0381281)	.0508766*** (0.0128822)	.1254783*** (0.0145232)	.125369*** (0.0217932)	.3233514*** (0.023326)
2007	.1367373*** (0.0276172)	.1930313*** (0.0295362)	.1089947*** (0.0401802)	.3428739*** (0.0419916)	.0671918*** (0.0134739)	.1334427*** (0.0151818)	.142807*** (0.0218516)	.3001606*** (0.022785)
2008	.103747*** (0.0392405)	.3069078*** (0.0392190)	.1544598*** (0.0478186)	.348305*** (0.0488631)	.0844175*** (0.0162861)	.1221772*** (0.0167794)	.1407525*** (0.0224445)	.2829253*** (0.022893)
2009	.1219216*** (0.0404168)	.2723062*** (0.0364202)	.06632752 (0.0442842)	.3162981*** (0.0440565)	.0979352*** (0.0175653)	.1681509*** (0.0188615)	.1528412*** (0.0239453)	.2987569*** (0.024640)
2010	.0893224*** (0.0400013)	.2331697*** (0.0368343)	.1267104*** (0.0450166)	.3775933*** (0.0436804)	.0845541*** (0.0201546)	.136566*** (0.0215745)	.1584946*** (0.0263059)	.2954942*** (0.027154)
2011	.1493507*** (0.0366297)	.1749688*** (0.0334537)	.172192*** (0.0415019)	.3515699*** (0.0408079)	.0923352*** (0.0215901)	.115273*** (0.0223006)	.1896216*** (0.0264344)	.2948913*** (0.026910)
2012	.1447105*** (0.0330102)	.2515217*** (0.0304046)	.1341271*** (0.0386757)	.3737168*** (0.0379166)	.1206473*** (0.0235920)	.1402308*** (0.0240463)	.1597566*** (0.0245601)	.3020775*** (0.025099)
2013	.0731265*** (0.0276504)	.1672188*** (0.0249646)	.1424217*** (0.0381703)	.3788996*** (0.0378800)	.0753858*** (0.0209929)	.1613593*** (0.0229793)	.1310027*** (0.0271471)	.2878208*** (0.027437)
2014	.1377321*** (0.0257767)	.203057*** (0.0234663)	.1773036*** (0.0383538)	.4121422*** (0.0376928)	.0750598*** (0.0184926)	.131706*** (0.0190900)	.1597906*** (0.0268073)	.3241804*** (0.027023)
2015	.135182*** (0.0259444)	.1624754*** (0.0223814)	.2319054*** (0.0403764)	.4208591*** (0.0397322)	.0745142*** (0.0187976)	.1263514*** (0.0201463)	.2006727*** (0.0268636)	.3466051*** (0.027296)
2016	.1391898*** (0.0262068)	.1558665*** (0.0220733)	.242424*** (0.0434869)	.4178678*** (0.0419554)	.051977*** (0.0191969)	.11173*** (0.0206154)	.1523191*** (0.0267500)	.3144135*** (0.027373)
2017	.1324919*** (0.0288609)	.128463*** (0.0235685)	.1474817*** (0.0490031)	.3260791*** (0.0457581)	.0816297*** (0.0178808)	.1337831*** (0.0187960)	.1446053*** (0.0269900)	.3044472*** (0.027218)

Notes: Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level; medium and high education levels: abbreviations See section 3.

Source: LIS

Table 9. Marginal Effects in Probit Model for Germany from 2004 to 2017
Dependent Variable: employment (1 for employed & 0 for not employed)

	Germany			
	Male		Female	
	EduMed	EduHigh	EduMed	EduHigh
2004	.077055*** (0.0234219)	.1552842*** (0.0261236)	.1529408*** (0.0290051)	.2012159*** (0.0342304)
2005	.0790085*** (0.0234409)	.1565166*** (0.0265237)	.2045698*** (0.0270016)	.2823015*** (0.0308552)
2006	.0452447*** (0.0218318)	.1198023*** (0.0244084)	.1608222*** (0.0290281)	.2354697*** (0.0329356)
2007	.0643983*** (0.0196475)	.1289217*** (0.0227752)	.1379059*** (0.0288843)	.2244362*** (0.0337845)
2008	.0592011*** (0.0229891)	.132448*** (0.0254409)	.1738446*** (0.0315662)	.2702667*** (0.0352803)
2009	.0854229*** (0.0230274)	.1462218*** (0.0259687)	.170316*** (0.0280822)	.2797072*** (0.0312051)
2010	.0616115*** (0.0166557)	.1405209*** (0.0182592)	.1719758*** (0.0221600)	.2229893*** (0.0251250)
2011	.0616314*** (0.0172461)	.1365221*** (0.0189596)	.1573256*** (0.0226275)	.213846*** (0.0252617)
2012	.0694811*** (0.0144410)	.152102*** (0.0166610)	.1735419*** (0.0189856)	.2436521*** (0.0219486)
2013	.0948627*** (0.0155678)	.1641881*** (0.0170437)	.1501019*** (0.0214727)	.2173231*** (0.0241904)
2014	.0817988*** (0.0169015)	.1487453*** (0.0185619)	.1336913*** (0.0205056)	.2078196*** (0.0230841)
2015	.0845684*** (0.0172455)	.1503788*** (0.0197710)	.1743028*** (0.0228632)	.2099949*** (0.0254967)
2016	.0811648*** (0.0148868)	.1411083*** (0.0164596)	.1449541*** (0.0203823)	.1856253*** (0.0227961)
2017	.0771472*** (0.0125696)	.126126*** (0.0150749)	.1506007*** (0.0211785)	.2053188*** (0.0236573)

Notes: Standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001; the sample includes only prime-age people aged 25 to 54; it also contains only people whose hourly wage is higher than zero; EduMed: medium education level; EduHigh: high education level; medium and high education levels: abbreviations see Section 3.

Source: LIS