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Second language skills and labor market outcomes: Evidence from the handover of Hong Kong☆

Yonghong Zhou[a], Rong Zhu[b,*], Xian Zheng[c]

[a] Department of Economics and China Center of Economic Development and Innovation Strategy, Jinan University, Guangzhou, China
[b] College of Business, Government and Law, Flinders University, Adelaide, Australia
[c] Department of Economics, Jinan University, Guangzhou, China

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ABSTRACT

This paper analyzes the effects of second languages skills on labor market outcomes in Hong Kong. Using data from the Hong Kong Population Censuses, we find that both Mandarin and English language skills are linked to improved labor market performance, and the premiums for English are much larger than those for Mandarin. We further show that the sovereignty transfer of Hong Kong from the UK to China in 1997 has strengthened the positive role of Mandarin and English language skills in finding a job in Hong Kong. The political change has also increased the earnings of people with the ability to speak Mandarin. As a comparison, the earnings premium for speaking English has declined in magnitude after the sovereignty transfer. Investigating into the mechanisms, we show that the rising premiums for Mandarin language skills are operated through choices of occupations and industry sectors. Our findings suggest that important political changes can affect the economic returns to language skills in the labor market.

1. Introduction

Language skills, as an important form of human capital, may have a positive influence on labor market outcomes. The beneficial impact can be direct in the form of more efficient job research or higher productivity on the job, and it can also operate through indirect channels such as reduced employer discrimination (Chiswick & Miller, 2003). Previous studies have shown that English language skills, widely used in international communication, can generate premiums in the labor market in non-English speaking countries (Chakraborty & Bakshi, 2016; Fabo, Beblavý, & Lenaerts, 2017; Guo & Sun, 2014; Isphording, 2013; Paolo & Tansel, 2015). Other studies have found positive economic returns to speaking the host language among immigrants for whom the host language is not their native language (Bleakley & Chin, 2004; Budría, de Ibarreta, & Swedberg, 2017; Chiswick, 1998; Chiswick & Miller, 1995; Dustmann & Fabbri, 2003; Dustmann & van Soest, 2001; Hayfron, 2001; Paolo & Raymond, 2012; Tam & Page, 2016; Yao & van Ours, 2015). In the Chinese context, previous studies have investigated the economic returns to speaking Mandarin (Dovì, 2019; Gao & Smyth, 2011), English proficiency (Guo & Sun, 2014; Wang, Cheng, & Smyth, 2016; Wang, Cheng, & Smyth, 2019; Wang, Smyth, &

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* Corresponding author.
E-mail addresses: tzhouyhjnu@jnu.edu, cntzhouyhjnu@jnu.edu.cn (Y. Zhou), rong.zhu@flinders.edu, aurongzhu@flinders.edu.au (R. Zhu), tzheng@jnu.edu.cn (X. Zheng).

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Cheng, 2017) and speaking local dialects (Chen, Lu, & Xu, 2014; Wei, Fang, Jiao, & Li, 2019).

Although the importance of language skills in labor market competition has been increasingly realized and studied, the existing studies have not considered the potential impact of the changes in language structure. In the presence of globalization, the spread of languages is common with increased international business activities. Such language spread is related to business opportunities, productivity and then income and employment. The home language of a region is generally stable, but the introduction of second languages into a region may possibly reflect the social changes and generate structural variations in language-skill premiums in labor market. Based on this consideration, this paper studies the effects of language skills on labor market outcomes with a particular interest in the economic premiums for languages associated with important political influence.

We consider the case of Hong Kong, a special administration region of China. Hong Kong is one of the special bilingual regions in the world. Such a unique position provides us with a rare opportunity to compare the effects of different languages skills on labor market outcomes. More importantly, Hong Kong experienced the sovereignty transfer from Britain to China in 1997, which makes the investigation into the changes in language-skill premiums possible based on this event study. The local language of Hong Kong is Cantonese, but with the sovereignty transfer, the proportions of residents speaking two major second languages, English and Mandarin (also called "Putonghua"), have changed. The sovereignty transfer of Hong Kong provides an experiment to investigate the influence of political change on English and Mandarin language skills premium in the labor market. As the existing literature has shown that language can also be considered as a symbol of identify and culture (Bisin, Verdier, Patacchini, & Zenou, 2008; Desmet, Ortuño-Ortín, & Wacziarg, 2017; Falck, Heblich, Lameli, & Südekum, 2012; Pendakur & Pendakur, 2002), this issue of second-language skills is important in policy implications because an adoption of external languages can be a result of the balancing between cultural identity and economic interests.

In this paper, we use data from the Hong Kong Population Censuses 1991, 1996, 2001, 2006 and 2011 for our analysis. As the overwhelming major of residents in Hong Kong speak Cantonese as their native language, we focus on this group of people to obtain a relatively homogenous sample. As the sovereignty transfer can result in important demographic changes such the inflows of immigrant from the mainland of China, we restrict our attention to long-term residents in Hong Kong. Specifically, in our estimation sample we only include those who resided in Hong Kong before the handover and have continued to be a resident in Hong Kong after the sovereignty transfer. This practice helps alleviate the bias from the endogenous population movements induced by the major political change. After imposing these sample restrictions, we identify how their second language skills (Mandarin and English) affect their labor market performance in Hong Kong.

Our empirical analysis show that overall both Mandarin and English language skills are linked to improved labor market outcomes in Hong Kong, and the premiums for English are much larger than those for Mandarin. There is evidence that the sovereignty transfer has strengthened the positive effects of Mandarin and English language skills in finding a job in Hong Kong. Furthermore, the political change in 1997 has improved monthly earnings associated with the ability to speak Mandarin. In contrast, while those who can speak English as a second language can still enjoy an earnings premium for this language skill after the handover, the premium has declined in magnitude when compared with that before the sovereignty transfer. Furthermore, we find evidence of heterogeneity in the premiums to language skills by age groups and gender. Investigating into the mechanism for the increased post-handover premium for Mandarin language skills, we show that, after the handover, industry sectors and occupations that have a comparatively higher demand of employees with Mandarin language skills pay higher wages to workers with Mandarin-speaking abilities.

The rest of the paper is organized as follows. The next section provides the background information on the languages spoken in Hong Kong. Section 3 describes our data. Section 4 presents the results of empirical analysis. The last section concludes.

2. Background: languages spoken in Hong Kong

After the First Opium War (1839–1842), Hong Kong became a British colony, following the cession of governance by the Chinese Qing Empire. In 1984, China and the United Kingdom signed the Sino-British Joint Declaration which paved the way for the transfer of sovereignty of Hong Kong in 1997, when it became a special administrative region (SAR) of the People's Republic of China, with a high degree of autonomy called the "One Country Two Systems". Although Hong Kong natives speak Cantonese as their native language, during the British colonial era, English was the main official language until 1974. After that, Chinese also became the official language in Hong Kong.

According to the Basic Law of Hong Kong SAR, Chinese and English have continued to be the two official languages of Hong Kong since the transfer of sovereignty in 1997. However, Mandarin was seldom spoken in Hong Kong before the handover although it is the official language of the mainland of China.[1] Since the handover in 1997, the huge increase in inbound tourism and immigrants from the mainland of China has led to a much more widespread use of Mandarin. Moreover, as increased business opportunities are related to the mainland markets, Mandarin has been used more frequently out of economic interests. With increasing economic exchanges with mainland China, Mandarin has been accepted and learned by an increasing number of people in Hong Kong.

Fig. 1 illustrates the proportions of Hong Kong residents with the ability to speak English/Mandarin among the economically active population whose home language is Cantonese in each census year. It is clear that before the sovereignty transfer, the proportion of people with ability to speak English was greater than that of those speaking Mandarin. But the difference declined substantially after 1997, with the share of people speaking Mandarin overtaking the proportion speaking English in the 2011 census. It shows that the number of Hong Kong residents with Mandarin language skills have risen dramatically after the political change in

[1] Mandarin and Cantonese share the same Chinese characters but different pronunciations.

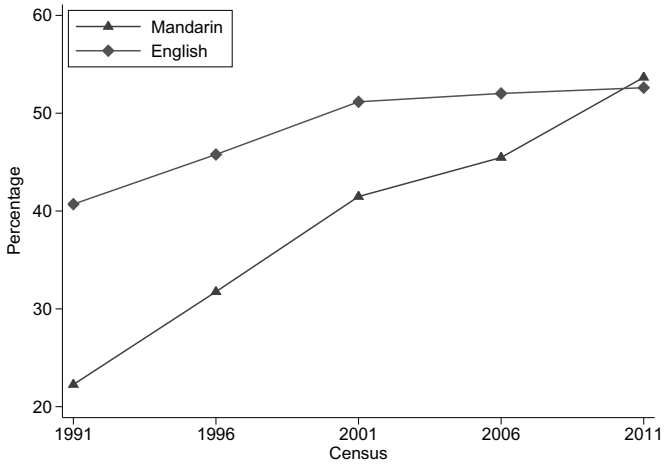


Fig. 1. Proportions of individuals who speak Mandarin/English as the second language. Data source: Hong Kong Population Censuses 1991, 1996, 2001, 2006 and 2011. Economically active population whose home language is Cantonese are included only.

1997. The empirical question we ask is that whether language skills have an impact on the labor market performance in Hong Kong and that whether the handover has affected this potential relationship.

3. Data and variables

3.1. The Hong Kong population censuses

We use the data from the Hong Kong Population Censuses 1991, 1996, 2001, 2006 and 2011 for this analysis. The census surveys are carried out every five years by the Hong Kong Government, covering the Hong Kong resident population. The 2011 and 2006 censuses comprise a simple enumeration on nine-tenths of households to provide basic information and a detailed survey to the remaining one-tenth on a broad range of demographic and socioeconomic characteristics of household members. In 1991, 1996 and 2011 censuses, the simple enumeration is six-sevenths with the remaining one-seventh for detailed enquiry. Our estimation sample is based on residents with detailed demographic and socioeconomic information.

Individuals covered in the censuses reported their native language and other languages they can speak. We focus on Hong Kong residents whose native language is Cantonese, accounting for 85.36% of all the observations in the census data. Cantonese is a language spoken by natives for decades. The analysis with sample of Hong Kong residents speaking Cantonese as their home language can help eliminate bias from our estimates. The sovereignty transfer of Hong Kong from Britain to China in 1997 was a major political change, which may have resulted in important demographic changes such the inflows of immigrant from the mainland of China. Therefore, the observed linkages between language skills and labor market outcomes in our data may reflect demographic changes rather than the true relations between the two factors. To minimize the bias introduced by population movements, we impose an additional restriction that individuals in our estimation sample include only those who resided in Hong Kong before the handover. Simply put, we focus on a group of Hong Kong residents who speak the same native language of Cantonese and whose residential status in Hong Kong has not been affected the handover. Focusing on this group of people, we identify how their second language skills (Mandarin and English) affect their labor market performance in Hong Kong, after experiencing a major political change.

3.2. Variables and descriptive statistics

We analyze two major labor market outcomes among the economically active population in Hong Kong: (i) whether in paid employment or not; and (ii) monthly income from main job among employed individuals.

We generate a dummy variable *Mandarin*, which is equal to one if an individual can speak Mandarin (or equivalently, "Putonghua") and zero otherwise. We define the binary variable *English* in a similar fashion. It is important to note that as we use a sample of individuals whose native language is Cantonese, Mandarin and English are their second-language skills.

Table 1 reports the descriptive statistics of demographic variables. Among the 696,434 economically active observations, about 95% (662,234 observations) are employed and 5% (34,200 observations) are unemployed. Around 40% of Hong Kong residents whose first language is Cantonese can also speak Mandarin as a second language, and 49% can speak English. We find that compared with the unemployed, employed individuals are more likely to be able to speak Mandarin and English. With an average age of 39 years old, 60% of observations are male and 40% are female. In addition, employed individuals generally have higher educational attainments than unemployed ones and they are also much more likely to be married.

Table 2 reports the labor market outcomes by language skills. About 95.7% of individuals who can speak Mandarin as a second language are in paid employment, and the proportion is slightly higher among those who can speak English (96.3%). Those who can

Table 1
Descriptive statistics.

	All	Employed	Unemployed	Mann-Whitney test *p*-value
Mandarin	0.397	0.400	0.348	0.000
English	0.492	0.498	0.366	0.000
Can speak neither Mandarin or English	0.386	0.380	0.489	0.000
Age	38.885	38.991	36.830	0.000
	(11.970)	(11.885)	(13.348)	
Gender				
Male	0.598	0.596	0.643	0.000
Female	0.402	0.404	0.357	0.000
Education				
Pre-primary	0.025	0.025	0.027	0.016
Primary	0.164	0.162	0.200	0.000
Secondary	0.585	0.583	0.635	0.000
Post-secondary, sub-degree or similar	0.079	0.080	0.054	0.000
Degree	0.117	0.119	0.070	0.000
Postgraduate and PhD	0.030	0.031	0.015	0.000
Marital status				
Never married	0.353	0.344	0.513	0.000
Married	0.602	0.612	0.413	0.000
Widowed	0.013	0.013	0.019	0.000
Divorced/separated	0.032	0.031	0.056	0.000
Observations	696,434	662,234	34,200	

Notes: Data source: Hong Kong Population Censuses 1991, 1996, 2001, 2006 and 2011. Economically active population who experienced 1997, speak Cantonese as home language, and are not full-time student are included only. Standard deviations of continuous variables are reported in parenthesis.

Table 2
Descriptive statistics of labor market outcomes by language.

Variable	Mean	SD	Min	Max	Observations
Panel A: Whether in paid employment					
All	0.951	0.216	0	1	696,434
(i) Mandarin	0.957	0.203	0	1	276,577
(ii) English	0.963	0.188	0	1	342,365
(iii) Can speak neither Mandarin nor English	0.938	0.242	0	1	268,625
Panel B: Log monthly income from main job					
All	9.317	0.612	7.786	11.056	619,507
(i) Mandarin	9.474	0.614	7.786	11.056	247,314
(ii) English	9.550	0.610	7.786	11.056	308,311
(iii) Can speak neither Mandarin nor English	9.055	0.511	7.786	11.056	235,385

Notes: Data source: Hong Kong Population Censuses 1991, 1996, 2001, 2006 and 2011. Economically active population who experienced 1997, speak Cantonese as home language, and are not full-time student are included only. When calculating income, we exclude observations in the top and bottom 3% of the distribution of monthly income from main job.

speak neither Mandarin nor Chinese have the lowest employment rate of 93.8%. In terms of monthly earnings from main job, to ensure comparability, they are all measured in 1996 Hong Kong dollar using consumer price indexes obtained from the World Bank. To exclude outliers, we drop observations in the top and bottom 3% of the distribution of monthly income. Table 2 shows that those who can speak English as a second language have a higher level of income than those with the ability to speak mandarin. On average, the income level of those who cannot speak the two languages is the lowest among the three language groups.

4. Empirical analysis

4.1. Overall correlations

In this section, we provide an analysis of the overall associations between second-language skills and labor market outcomes of Hong Kong residents whose native language is Cantonese. Specifically, we estimate the following equation using ordinary least squares (OLS):

$$Y_i = \alpha + \beta_1 Mandarin_i + \beta_2 English_i + \gamma X_i + \theta_i + \varepsilon_i, \quad (1)$$

where Y_i denotes the labor market performance of individual *i*. $Mandarin_i$ is a binary variable indicating whether individual i can speak Mandarin as a second language. $English_i$ is a dummy variable defined in a similar fashion. We are interested in the estimates of

Table 3
The impact of second language skills on employment and income.

	Panel A: employment			Panel B: log monthly income		
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Mandarin	0.006***		0.000	0.078***		0.016***
	(0.001)		(0.001)	(0.001)		(0.001)
English		0.025***	0.024***		0.278***	0.273***
		(0.001)	(0.001)		(0.002)	(0.002)
Adjusted R^2	0.017	0.020	0.020	0.353	0.387	0.387
Observations	696,434	696,434	696,434	619,507	619,507	619,507

Notes: Control variables include age, aged squared, a gender dummy, level of education dummies (pre-primary, primary, secondary, post-secondary/sub-degree/similar, degree, and postgraduate and PhD), marital status dummies (never married, now married, widowed, and divorced or separated), nationality dummies, and census fixed effects. Standard errors clustered at the household level are in parentheses.
*** $p < 0.01$.

β_1 and β_2 which measure the correlations between the two language skills and labor market outcomes. For comparison purposes, $Mandarin_i$ and $English_i$ are also included in regressions separately. X_i is a vector of individual characteristics including age, age squared, a gender dummy, level of education dummies (pre-primary, primary, secondary, post-secondary/sub-degree/similar, degree, and postgraduate and PhD), marital status dummies (never married, now married, widowed, and divorced or separated), and nationality dummies. θ_i refers to census fixed effects. ε_i is the error term. Standard errors are clustered at the household level to account for the possible correlations of labor market outcomes of people from the same household.

Table 3 reports the results from the OLS estimations of Eq. (1), using data from the Hong Kong Population Censuses 1991, 1996, 2001, 2006 and 2011. We focus on two labor market outcomes: (i) whether in paid employment or not; and (ii) logarithmic monthly earnings from main job. When examining the effects of the two language skills separately, Columns (i) and (ii) of Panel A show that both Mandarin and English as a second language can lead to an increased probability of engagement in paid employment among people residing in Hong Kong with Cantonese as the native language. Specially, compared with people who cannot speak Mandarin, those who can is 0.6 percentage points more likely to be employed. English as a second language also results in a higher propensity of employment by 2.5 percentage points. In Column (iii) of Panel A, we include both language skills in our estimation. The employment premium for speaking Mandarin as a second language becomes statistically insignificant, while the impact of English stays almost the same as in Column (ii).

In Panel B of Table 3, we investigate whether second-language skills are related to earnings or not. In the baseline specification including both $Mandarin_i$ and $English_i$, we find that the coefficient estimates of the two language skills are positive and statistically significant at the 1% level, which suggest that both of Mandarin and English language skills are helpful in getting a higher level of earnings. The coefficient estimate of $English_i$ is much larger than that of $Mandarin_i$, which shows that the English language premium in the labor market is greater than that of Mandarin. It is not difficult to interpret this finding because Hong Kong has developed to be an international city since its taking off in the second half of last century. As an international language, English has been more widely used for business opportunities and the communication with customers and business partners all over the world. As a former colony of Britain, English language education had achieved full development in Hong Kong, which enables residents to take advantage of this language skill in work.

Overall, Table 3 shows that both of Mandarin and English language skills are linked to improved labor market outcomes, but the premium for English as a second language is much greater than the premium for Mandarin.

4.2. The influence of the political change on premiums for language skills

In 1997, Hong Kong's sovereignty was transferred from Britain to China. This political change may exert profound impact on the economy, life and society in Hong Kong. The increase in number of residents who can speak Mandarin, as shown in Fig. 1, may due to many reasons like business opportunities related to the mainland of China, cultural identity, and the peer influence of immigrants from the mainland of China. In this section, we analyze that whether the handover of Hong Kong has an impact on the language premiums in the labor market. To this purpose, we estimate with the following difference-in-differences (DID) specification:

$$\begin{aligned} Y_i = \alpha \ & + \beta_1 Mandarin_i \times Handover_t + \beta_2 English_i \times Handover_t \\ & + \beta_3 Mandarin_i + \beta_4 English_i + \gamma X_i + \theta_i + \varepsilon_i, \end{aligned} \tag{2}$$

where $Handover_t$ is equal to 1 for observations in the three censuses (2001, 2006 and 2011) after the sovereignty transfer in 1997, and 0 for the two censuses conducted in 1991 and 1996. Other variables are consistent with those in Eq. (1). We focus on the coefficients of $Mandarin_i \times Handover_t$ and $English_i \times Handover_t$, which measure the influence of the sovereignty change on the premiums for Mandarin and English language skills in the labor market, respectively. For the purpose of comparison, $Mandarin_i \times Handover_t$ and $English_i \times Handover_t$ are also included in regressions separately. Regression results are reported in Table 4.[2]

In Panel A of Table 4, we find that the sovereignty transfer has strengthened the positive effects of Mandarin and English language skills in finding a job in Hong Kong. For example, individuals who can speak Mandarin as a second language is 0.8 percentage points

Table 4
The impact of the handover on premiums for language skills.

	Panel A: Employment			Panel B: Log monthly income		
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Mandarin × Handover	0.011***		0.008***	0.017***		0.008***
	(0.001)		(0.001)	(0.003)		(0.003)
Mandarin	−0.002**		−0.005***	0.067***		0.011***
	(0.001)		(0.001)	(0.002)		(0.002)
English × Handover		0.008***	0.006***		−0.009***	−0.013***
		(0.001)	(0.001)		(0.003)	(0.003)
English		0.019***	0.021***		0.284***	0.281***
		(0.001)	(0.001)		(0.002)	(0.002)
Adjusted R^2	0.017	0.020	0.020	0.353	0.388	0.388
Observations	696,434	696,434	696,434	619,507	619,507	619,507

Notes: Control variables include age, aged squared, a gender dummy, level of education dummies (pre-primary, primary, secondary, post-secondary/sub-degree/similar, degree, and postgraduate and PhD), marital status dummies (never married, now married, widowed, and divorced or separated), nationality dummies, and census fixed effects. Standard errors clustered at the household level are in parentheses.

** $p < 0.05$.

*** $p < 0.01$.

more likely to be in paid employment after the sovereignty transfer, when compared with the pre-handover period of 1991–1996. The corresponding impact of the handover on the employment premium for English is estimated to be 0.6 percentage points.

Panel B of Table 4 also reports positive and significant coefficients of $Mandarin_i \times Handover_t$, showing that the political change in 1997 has improved monthly earnings associated with the ability to speak Mandarin. In contrast, the coefficients of $English_i \times Handover_t$ are negative and statistically significant. While those who can speak English as a second language can still enjoy an earnings premium for this language skill after the handover, the premium has declined when compared with that before sovereignty transfer. Combining the above, the political change has improved the earnings premium for Mandarin language skills but reduced that for the ability to speak English.

4.3. Heterogeneity analysis

In this section, we examine whether the changes to labor market premiums for language skills induced by sovereignty transfer vary with people's characteristics. We explore the potential differential effects across the following two dimensions: (i) age cohorts, and (ii) gender.

4.3.1. Cohort effects

Given the changes in language premiums resulting from political change found for the overall sample, we go further in the analysis of the effects by different age cohorts. Specifically, we modify Eq. (2) to be the following one:

$$Y_i = \alpha + \sum_g \beta_{1,g} Mandarin_i \times Handover_t \times Cohort_{g,i} + \beta_2 English_i \times Handover_t + \beta_3 Mandarin_i + \beta_4 English_i + \gamma X_i + \theta_i + \varepsilon_i, \quad (3)$$

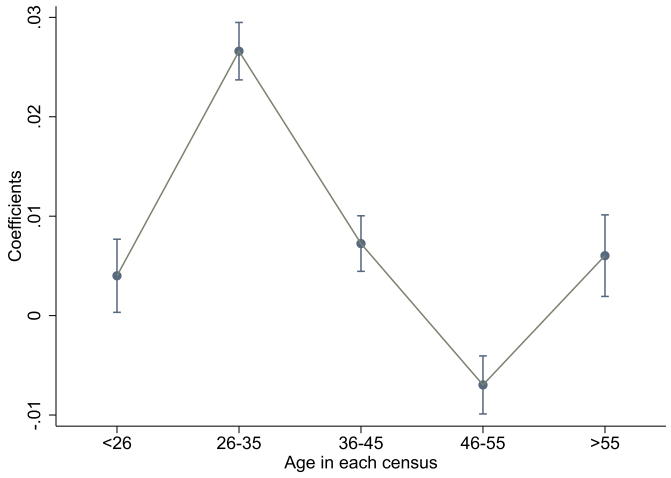
where $Cohort_{g,\,i}$ equals 1 if observation i belongs to age cohort g, and 0 otherwise. We consider five age groups: (i) 25 or below; (ii) from 26 to 35; (iii) from 36 to 45; (iv) from 46 to 55; and (v) 56 or above. Similarly, the analysis of differential cohort premiums for English language skills premiums can be analyzed using the following specification:

$$Y_i = \alpha + \sum_g \beta_{1,g} English_i \times Handover_t \times Cohort_{g,i} + \beta_2 Mandarin_i \times Handover_t + \beta_3 Mandarin_i + \beta_4 English_i + \gamma X_i + \theta_i + \varepsilon_i. \quad (4)$$

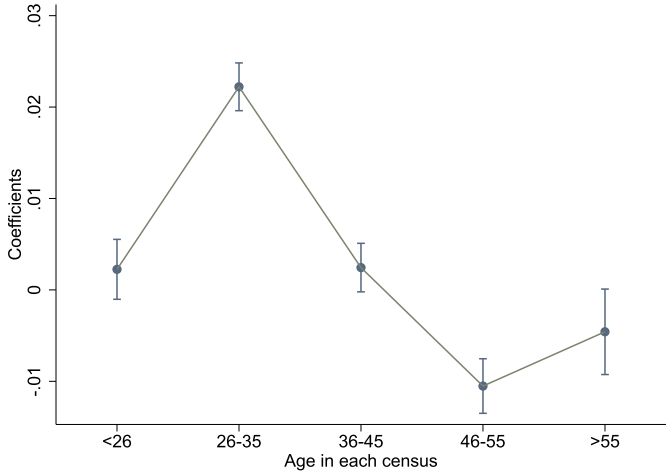
Fig. 2 summarizes the effects on employment by age cohorts where the coefficients of $Mandarin_i \times Handover_t \times Cohort_i$ and $English_i \times Handover_t \times Cohort_i$, and their 95% confidence intervals are reported. As for the impact on employment status, there is no significant difference between the effects of Mandarin and English language skills. Fig. 2 shows that the influence of political change is more favorable for younger cohorts who can speak Mandarin or English, especially among those aged between 26 and 35.

Fig. 3 shows that the effect of the sovereignty transfer on the earnings premiums for language skills is mainly driven by older cohorts. Specifically, the increase in Mandarin-skills premium in the labor market is the strongest for residents aged 36–45. A possible explanation is that people aged 36–45 are at an important stage of their career lives, and they have the most incentives to match their language skills with the demand in the labor market so as to increase their earnings. Besides, compared to Mandarin, the decline in

[2] Full estimation results are displayed in Table A1 in the Appendix.



(a) Mandarin



(b) English

Fig. 2. The influence of handover on the employment premiums of Mandarin/English language skills by age cohorts. Note: The coefficients of $Mandarin_i \times Handover_t \times Cohort_{g,\ i}$, $English_i \times Handover_t \times Cohort_{g,\ i}$, and their 95% confidence intervals are reported in (a) and (b) respectively.

the premium of English skills is mainly driven by younger generations aged below 35.

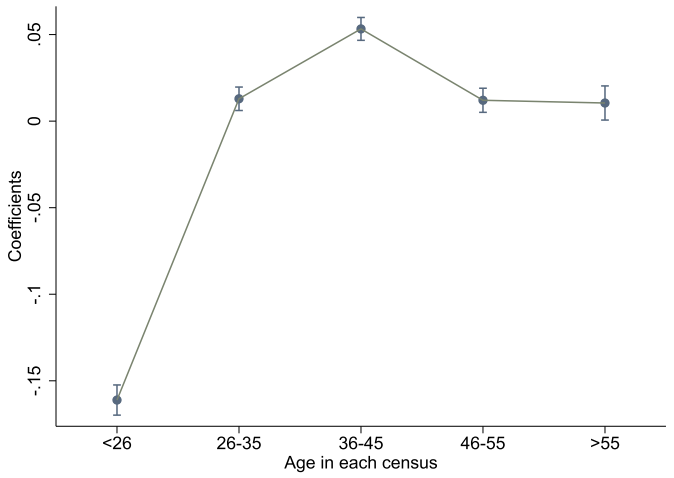
4.3.2. Gender difference

We now proceed to analyze the gender differences in the changes in premiums for language skills. We perform the estimations of Eq. (2) using the samples of males and females separately. Panel A of Table 5 shows the effects on paid employment. There is no significant difference in the effects of handover on premiums for the ability to speak Mandarin between males and females. In contrast, English language skills make it more likely for men to find a job, but we cannot find a statistically significant impact for females.

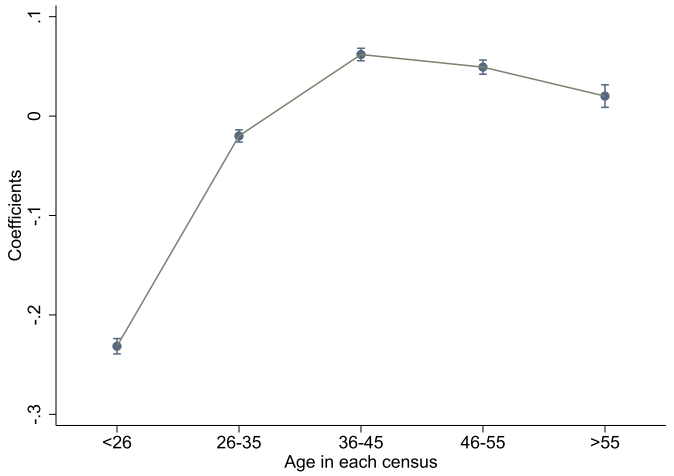
Panel B of Table 5 indicates that the effect of the political change on the earnings premiums for Mandarin language skills premium found for the overall sample is driven by the effect on male workers. The economic returns to Mandarin is similar among females before and after the handover. In contrast, there is no significant gender difference in the premiums for English-speaking skills. While the ability to speak English still rewards employees after the handover in terms of monthly earnings, the premium is comparatively smaller in magnitude when compared with that in the time period before 1997.

4.4. Mechanisms for the increased premium for Mandarin language skills

In this section, we examine the channels for the increased premium for the ability to speak Mandarin in the Hong Kong labor market. Previous studies have claimed that the impact of language skills on labor market outcomes may be mediated by occupational choice (Chakraborty & Bakshi, 2016; Chiswick & Miller, 2010; Isphording, 2013). A language-proficient worker tends to work in a job



(a) Mandarin



(b) English

Fig. 3. The influence of handover on the earnings premiums for Mandarin/English language skills by age cohorts. Note: The coefficients of $Mandarin_i \times Handover_t \times Cohort_{g,\,i}$, $English_i \times Handover_t \times Cohort_{g,\,i}$, and their 95% confidence intervals are reported in (a) and (b) respectively.

requiring that language skills to get a higher level of earnings. Actually, in existing studies, a worker's choice includes the choice of the industry sector to work in and the occupation to take. Following this logic, we investigate into the mechanisms responsible for the influence of the political change on economic returns to speaking mandarin in Hong Kong. An individual would consider both which industry sector to work in and which occupation to choose, which may mediate the effects of Mandarin language skills.

In the census data, we have 3-digit-level industry information, which can be classified into 9 categories, in addition to the remaining one that is not applicable or not classified. Similarly, the 3-digit-level occupation information can also be classified into 9 categories together with an additional one encompassing occupations unidentifiable or inadequately described or not applicable. With these pieces of information, we can analyze the differentials effects of the political change on different industries and occupations. This analysis includes two steps. First, we find out which industries and occupations provide high earnings to the laborers with the skills to speak Mandarin. Second, if these industries and occupations absorb more laborers with Mandarin language skills, we can conclude that the mechanisms of industry choice and occupational choice indeed exist. In other words, since certain industries and occupations have a higher demand of laborers with Mandarin-speaking abilities, they have chosen these industry sectors or occupations to get a higher level of income.

4.4.1. Industry sector to work in

We first investigate the mechanism of the choice of laborers in different industries. We perform an estimation of the following equation modified from Eq. (2) according to industry sectors:

Table 5
Gender differences in the effects of the handover on premiums for language skills.

		Male			Female		
		(i)	(ii)	(iii)	(i)	(ii)	(iii)
Panel A: employment	Mandarin × Handover	0.012***		0.008***	0.009***		0.008***
		(0.001)		(0.001)	(0.002)		(0.002)
	Mandarin	−0.002**		−0.005***	−0.001		−0.005***
		(0.001)		(0.001)	(0.001)		(0.001)
	English × Handover		0.010***	0.008***		0.003**	0.001
			(0.001)	(0.001)		(0.002)	(0.002)
	English		0.019***	0.020***		0.021***	0.022***
			(0.001)	(0.001)		(0.001)	(0.001)
	Adjusted R^2	0.019	0.021	0.021	0.015	0.018	0.018
	Observations	416,707	416,707	416,707	279,727	279,727	279,727
Panel B: Log monthly income	Mandarin × Handover	0.019***		0.012***	0.006		−0.001
		(0.004)		(0.004)	(0.005)		(0.005)
	Mandarin	0.062***		0.015***	0.068***		−0.003
		(0.003)		(0.003)	(0.004)		(0.004)
	English × Handover		−0.013***	−0.018***		−0.012***	−0.011**
			(0.003)	(0.004)		(0.004)	(0.004)
	English		0.254***	0.252***		0.332***	0.333***
			(0.003)	(0.003)		(0.003)	(0.004)
	Adjusted R^2	0.335	0.363	0.363	0.385	0.430	0.430
	Observations	370,588	370,588	370,588	248,919	248,919	248,919

Notes: Control variables include age, aged squared, a gender dummy, level of education dummies (pre-primary, primary, secondary, post-secondary/sub-degree/similar, degree, and postgraduate and PhD), marital status dummies (never married, now married, widowed, and divorced or separated), nationality dummies, and census fixed effects. Standard errors clustered at the household level are in parentheses.
** $p < 0.05$.
*** $p < 0.01$.

$$Y_i = \alpha + \sum_d \beta_{1,d} Mandarin_i \times Handover_t \times Category_{d,i}^{Industry} + \beta_2 English_i \times Handover_t + \beta_3 Mandarin_i + \beta_4 English_i + \gamma X_i + \theta_i + \varepsilon_i, \quad (5)$$

where $Category_{d,\ i}^{Industry}$ equals 1 if observation i works in industry d, and 0 otherwise. As we have found that the handover had an impact on the premium of Mandarin language skills, we investigate the potential heterogeneous effects by industry sector through the analysis of the coefficients of $Mandarin_i \times Handover_t \times Category_{d,\ i}^{Industry}$. Table 6 reports the results.

Table 6 indicates that there are four industries offering the strongest increases in premiums for Mandarin language skills after the

Table 6
The effects of the handover on premiums for mandarin by industry.

	Log monthly income
Mandarin × Handover × Agriculture and fishing	−0.184***
	(0.038)
Mandarin × Handover × Mining and quarrying	0.015
	(0.119)
Mandarin × Handover × Manufacturing	0.049***
	(0.005)
Mandarin × Handover × Electricity, gas and water	0.153***
	(0.014)
Mandarin × Handover × Construction	−0.025***
	(0.005)
Mandarin × Handover × Wholesale, retail and import/export trades, restaurants and hotels	−0.028***
	(0.004)
Mandarin × Handover × Transport, storage and communication	−0.059***
	(0.004)
Mandarin × Handover × Financing, insurance, real estate and business services	0.036***
	(0.004)
Mandarin × Handover × Community, social and personal services	0.066***
	(0.004)
Adjusted R^2	0.389
Observations	619,507

Notes: Standard errors clustered at the household level are in parentheses.
*** $p < 0.01$.

handover: (i) Manufacturing, (ii) Electricity, Gas and Water, (iii) Financing, Insurance, Real Estate and Business Services, and (iv) Community, Social and Personal Services. Similar to the theory of occupational choice as an mediator in language premium (Chakraborty & Bakshi, 2016; Chiswick & Miller, 2010; Isphording, 2013), individuals with that language skills would choose to work in an industry that can provide a higher income linked to that language proficiency. Since we have found the increases in premiums to Mandarin in these four industries, the next empirical question we ask is whether these industry sectors provide more working opportunities to workers mastering Mandarin as a second language.

We further examine this issue by industry-language level analysis. To do that, we calculate the ratio of workers with the ability to speak Mandarin, English and other language at the 3-digit industry level. Thus, for every industry at every census year, there are three observations indicating Mandarin, English and other language skills. Therefore, we construct a panel data at the industry-language level across 5 census years. If an industry has a greater demand for employees with Mandarin-speaking abilities, the proportion of laborers who can speak Mandarin in that industry would increase. To identify the impact of the political change of 1997, we run the following unrestrictive triple-difference estimation.[3]

$$\begin{aligned} Ratio_{ltm} = \alpha \; & + \beta_1 Language_l \times Handover_t \times Treat_m^{Industry} \\ & + \beta_2 Language_l \times Handover_t \\ & + \beta_3 Handover_t \times Treat_m^{Industry} \\ & + \beta_4 Language_l \times Treat_m^{Industry} + \varepsilon_{lti}, \end{aligned} \tag{6}$$

where $Ratio_{ltm}$ refers to the ratio of employees with language skill l in industry m in census year t. The molecule is restricted to the economically active population who experienced 1997, speaking Cantonese as home language, and are not full-time student. The denominator is only restricted to the economically active population. Here we mainly consider the situation where mandarin-speaking individuals are in treatment group, and observations who can speak English (in another treatment group) are used for comparison purposes. In the equation, we introduce some new dummy variables. The dummy variable $Language_l$ refers to $Language_l^{Mandarin}$ in the regression focussing on Mandarin skills, denoting whether that observation is for Mandarin skills. Specifically, $Language_l^{Mandarin}$ is equal to 1 if *Ratio* measures the proportion of workers with Mandarin skills in an industry and 0 otherwise. $Language_l^{English}$ is defined in a similar fashion. $Treat_m^{Industry}$ equals 1 if the 3-digit industry m belongs to one of the four industry sectors ((i) Manufacturing, (ii) Electricity, Gas and Water, (iii) Financing, Insurance, Real Estate and Business Services, or (iv) Community, Social and Personal Services), and 0 otherwise. Table 7 reports the estimation results.

The coefficient of $Language_l^{Mandarin} \times Handover_t \times Treat_m^{Industry}$ is positive and statistically significant at the 1% level. Therefore, after the political change in 1997, the ratios of employees with Mandarin language skills in industries of (i) Manufacturing, (ii) Electricity, Gas and Water, (iii) Financing, Insurance, Real Estate and Business Services, and (iv) Community, Social and Personal Services have increased. In other words, these industries provide more working opportunities for workers with the ability to speak mandarin. Combining the results in Tables 6 and 7, the mechanism of choice in industry sector indeed exists. As a comparison, the coefficients of $Language_l^{English} \times Handover_t \times Treat_m^{Industry}$ is not statistically significant, which helps explain why the earnings return to English language skills have not increased after the handover.

4.4.2. Occupational choice

The framework for analyzing occupational choice is the same as that in the previous section. In the first step, we estimate the following equation modified from Eq. (2) according to occupations:

$$\begin{aligned} Y_i = \alpha \; & + \sum_d \beta_{1,d} Mandarin_i \times Handover_t \times Category_{d,i}^{Occupation} \\ & + \beta_2 English_i \times Handover_t + \beta_4 Mandarin_i + \beta_5 English_i + \gamma X_i + \theta_i + \varepsilon_i, \end{aligned} \tag{7}$$

where $Category_{d,\,i}^{Occupation}$ equals 1 if observation i works as occupation d, and 0 otherwise. Similarly, we pay particular attention to the coefficients of $Mandarin_i \times Handover_t \times Category_{d,\,i}^{Occupation}$. Table 8 reports the results. We find that there are three occupations showing a significant increase in the economic returns to mandarin-speaking skills: (i) Managers and Administrators, (ii) Professionals, and (iii) Associate professionals.

In the second-step analysis, we calculate the ratio of workers with Mandarin, English and other language spoken at the 3-digit occupation level. If an occupation has a greater demand for employees with Mandarin-speaking abilities, the proportion of laborers who can speak Mandarin in that occupation would increase. Following the same approach, we run the unrestrictive triple-difference estimations of the following equation to identify the impact of the sovereignty transfer:

$$\begin{aligned} Ratio_{ltn} = \alpha \; & + \beta_1 Language_l \times Handover_t \times Treat_n^{Occupation} \\ & + \beta_2 Language_l \times Handover_t \\ & + \beta_3 Handover_t \times Treat_n^{Occupation} \\ & + \beta_4 Language_l \times Treat_n^{Occupation} + \varepsilon_{ltn}, \end{aligned} \tag{8}$$

[3] Unrestrictive forms of triple-difference are widely used in previous studies. See, for example, Frazer and Biesebroeck (2010), Cai, Lu, Wu, and Yu (2016), and Curtis, Hirsch, and Schroeder (2016).

Table 7
The change of employment structure: industry-language level analysis.

	(i)	(ii)
	Ratio	Ratio
$Language^{Mandarin} \times Handover \times Treat^{Industry}$	0.189***	
	(0.030)	
$Language^{English} \times Handover \times Treat^{Industry}$		0.034
		(0.046)
$Language^{Mandarin} \times Handover$	Yes	
$Language^{Mandarin} \times Treat^{Industry}$	Yes	
$Language^{English} \times Handover$		Yes
$Language^{English} Treat^{Industry}$		Yes
$Handover \times Treat^{Industry}$	Yes	Yes
Adjusted R^2	0.054	0.053
Observations	440	440

Notes: Standard errors clustered at 3-digit industry level are in parentheses.
*** $p < 0.01$.

Table 8
The effects of the handover on premiums for mandarin by occupation.

	Log monthly income
Mandarin × Handover × Managers and administrators	0.427***
	(0.004)
Mandarin × Handover × Professionals	0.261***
	(0.005)
Mandarin × Handover × Associate professionals	0.132***
	(0.004)
Mandarin × HandoverClerks	−0.112***
	(0.004)
Mandarin × Handover × Service workers and shop sales workers	−0.092***
	(0.004)
Mandarin × Handover × Skilled agricultural and fishery workers	−0.124**
	(0.049)
Mandarin × Handover × Craft and related workers	−0.101***
	(0.005)
Mandarin × Handover × Plant and machine operators and assemblers	−0.166***
	(0.005)
Mandarin × Handover × Elementary occupations	−0.388***
	(0.004)
Adjusted R^2	0.424
Observations	619,507

Notes: Standard errors clustered at the household level are in parentheses.
** $p < 0.05$.
*** $p < 0.01$.

where $Ratio_{ltn}$ refers to the ratio of employees with language l skills in occupation n in census year t.[4] The dummy $Language_l$ refers to $Language_l^{Mandarin}$ and $Language_l^{English}$, denoting whether that observation has Mandarin and English language skills respectively. $Treat_n^{Occupation}$ equals 1 if the 3-digit occupation n is (i) Managers and Administrators, (ii) Professionals, or (iii) Associate Professionals, and 0 otherwise. Table 9 reports the regression results.

The coefficient of $Language_l^{Mandarin} \times Handover_t \times Treat_n^{Occupation}$ is positive and significant at the 1% level. As a comparison, the coefficient of $Language_l^{English} \times Handover_t \times Treat_n^{Occupation}$ is significant only at the 10% level. Therefore, after the sovereignty transfer in 1997, the ratio of employees with Mandarin skills in the occupations of Managers and Administrators, Professionals, or Associate Professionals have increased. In other words, these occupations provide more job opportunities for workers with Mandarin-speaking abilities.[5]

[4] The molecule is restricted to the economically active population who experienced 1997, speaking Cantonese as home language, and are not full-time student. The denominator is only restricted to the economically active population. By doing that, we can observe the dynamic of the demand and supply in overall labor market.

[5] There may be another explanation for the increased premium for Mandarin language skills and the declined premium for English language skills. The political change in Hong Kong in 1997 may have resulted in a massive inflow of immigrant from the mainland of China and some outflow of Hong Kong residents. Those immigrants might have a relatively higher Mandarin ability and the emigrants may have higher English ability due to the self-selection in migration. Consequently, the handover has changed the Mandarin/English concentration defined as the proportion of the

Table 9
The change of employment structure: occupation-language level analysis.

	(i)	(ii)
	Ratio	Ratio
$Language^{Mandarin} \times Handover \times Treat^{Occupation}$	0.081***	
	(0.021)	
$Language^{English} \times Handover \times Treat^{Occupation}$		0.092*
		(0.050)
$Language^{Mandarin} \times Handover$	Yes	
$Language^{Mandarin} \times Treat^{Occupation}$	Yes	
$Language^{English} \times Handover$		Yes
$Language^{English} \times Treat^{Occupation}$		Yes
$Handover \times Treat^{Occupation}$	Yes	Yes
Adjusted R^2	0.059	0.444
Observations	368	368

Notes: Standard errors clustered at 3-digit occupation level are in parentheses.
* $p < 0.1$.
*** $p < 0.01$.

Table 10
The impact of the handover on premiums for language skills: PSM–DID.

	Panel A: Employment			Panel B: Log monthly income		
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Mandarin × Handover	0.006***		0.008***	0.022***		0.009**
	(0.001)		(0.001)	(0.004)		(0.004)
Mandarin	−0.010***		−0.005***	−0.065***		0.017***
	(0.001)		(0.001)	(0.003)		(0.003)
English × Handover		0.004**	0.007***		−0.040***	−0.039***
		(0.002)	(0.002)		(0.005)	(0.005)
English		0.019***	0.016***		0.313***	0.321***
		(0.001)	(0.002)		(0.004)	(0.004)
Adjusted R^2	0.0143	0.0157	0.0158	0.3313	0.3586	0.3588
Observations	431,699	431,699	431,699	387,486	387,486	387,486

Notes: Control variables include age, aged squared, a gender dummy, level of education dummies (pre-primary, primary, secondary, post-secondary/sub-degree/similar, degree, and postgraduate and PhD), marital status dummies (never married, now married, widowed, and divorced or separated), nationality dummies, and census fixed effects. Standard errors clustered at the household level are in parentheses. Stata command *psmatch2* is used when performing matching.
** $p < 0.05$.
*** $p < 0.01$.

4.5. Robustness checks

Our binary measures of language skills (Mandarin or English) are self-reported, which may be prone to error. Self-defined language skills are potentially endogenous in our estimations. In this section, we use three different strategies to check whether our DID estimates reported in Table 4 are likely to be severely impacted by the endogeneity problem.

4.5.1. PSM–DID estimates

Propensity score matching (PSM) has been widely used in evaluation research to estimate average treatment effects (Abadie & Imbens, 2006; Heckman, Ichimura, & Todd, 1998; Rosenbaum & Rubin, 1983). This method summarizes the observed characteristics of each observation into a single index called propensity score, and then matches observations in the treatment group and the control group with similar propensity scores. For the observations with Mandarin or English skills, the control group includes the matched observations who can not speak Mandarin and English. Specifically, we apply the probit model to estimate the propensity score to be in the treatment group for each observation, using the same control variables in Table 4 (including age, gender, level of education, marital status and nationality). After obtaining predicted propensity scores for each individual, we perform DID estimations using observations with matched propensity scores (single nearest-neighbour matching (without caliper)). Compared with the DID approach, the combination of PSM with DID allows for a better controlling of the selection on both observed and unobserved variables.

(*footnote continued*)
population who can speak Mandarin/English in Hong Kong, which might affect the returns to these language skills. However, we are unable to examine this potential channel empirically due to data limitations.

Table 11
The impact of the handover on premiums for language skills: older cohorts.

		35 years old or over			40 years old or over		
		(i)	(ii)	(iii)	(i)	(ii)	(iii)
Panel A: Employment	Mandarin × Handover	0.011***		0.007***	0.012***		0.008***
		(0.001)		(0.001)	(0.002)		(0.002)
	Mandarin	−0.005***		−0.007***	−0.007***		−0.008***
		(0.001)		(0.001)	(0.001)		(0.001)
	English × Handover		0.009***	0.007***		0.009***	0.007***
			(0.001)	(0.001)		(0.002)	(0.002)
	English		0.014***	0.015***		0.013***	0.016***
			(0.001)	(0.001)		(0.001)	(0.001)
	Adjusted R^2	0.014	0.016	0.016	0.014	0.015	0.015
	Observations	418,822	418,822	418,822	320,920	320,920	320,920
Panel B: Log monthly income	Mandarin × Handover	0.055***		0.039***	0.074***		0.047***
		(0.004)		(0.004)	(0.005)		(0.005)
	Mandarin	0.042***		−0.013***	0.025***		−0.021***
		(0.004)		(0.004)	(0.005)		(0.005)
	English × Handover		−0.009**	−0.021***		0.001	−0.014**
			(0.004)	(0.004)		(0.005)	(0.006)
	English		0.349***	0.353***		0.351***	0.357***
			(0.004)	(0.004)		(0.005)	(0.005)
	Adjusted R^2	0.342	0.385	0.385	0.332	0.375	0.375
	Observations	367,030	367,030	367,030	278,974	278,974	278,974

Notes: Control variables include age, aged squared, a gender dummy, level of education dummies (pre-primary, primary, secondary, post-secondary/sub-degree/similar, degree, and postgraduate and PhD), marital status dummies (never married, now married, widowed, and divorced or separated), nationality dummies, and census fixed effects. Standard errors clustered at the household level are in parentheses.

** $p < 0.05$.

*** $p < 0.01$.

Table 10 reports the PSM–DID estimation results of Eq. (2) with the matched sample. Compared with the results reported in Table 4, the coefficients of $Mandarin_i \times Handover_t$ and $Enlish_i \times Handover_t$ are still significant at 1% level. To coefficients estimated are either close to or slightly larger in magnitude than those reported in Table 4, indicating that our main findings regarding the changes of language premium after the handover are robust when our estimation sample includes those in the treatment and control groups with comparable observed characteristics.

4.5.2. Analysis using subsamples of older cohorts

It is possible that people with better labor market performance are more likely to learn and speak Mandarin/English. Previous studies show that younger people has a higher ability and incentive to learn a new language (Bleakley & Chin, 2004; Budría et al., 2017; Dustmann & Fabbri, 2003; Hayfron, 2001; Paolo & Raymond, 2012). But it depends on the ability of an individual to learn a new language. Therefore, younger people would be more likely to have a good mastery of a new second language when they become aware of the potential benefits of the new language. Put it in another way, the elders are less capable of learning a new second language well even when they are aware of the higher premiums for that language skills. Therefore, the potential bias in estimates resulting from reverse causality can be alleviated by conducting regression analysis with observations from older cohorts.

Table 11 reports the estimation results of Eq. (2) using the subsamples consisting of (i) people aged 35 or above, and (ii) people aged 40 or above. Results on employment, reported in Panel A, are very similar to those reported in Panel A of Table 4, no matter for which age group. In addition, when monthly income is used as the dependent variable, the coefficient estimates of $Mandarin_i \times Handover_t$ are larger than those in Panel B of Table 4, confirming the pattern found in Fig. 3 that the effect of the sovereignty transfer on Mandarin skills premium is mainly driven by older cohorts.

4.5.3. Oster (2019)'s bound analysis

To assess the potential impact of unobserved omitted variables on our baseline estimates, we perform the sensitivity test introduced by Altonji, Elder, and Taber (2005) and further developed by Oster (2019). Concerning about omitted variable bias in empirical analysis, researchers explore the sensitivity of treatment effects to the inclusion of observed controls. If a coefficient is stable after inclusion of the observed controls, this is taken as a sign that omitted variable bias is limited (Altonji et al., 2005). However, Oster (2019) argues that the value of R-squared should be taken into consideration since the coefficients would not change massively when an uninformative control is included. She has proposed a method to derive a range from a controlled treatment effect to an unbiased treatment effect, incorporating R-squared into the approach of the (Altonji et al., 2005).

We perform the sensitivity test developed by Oster (2019) and results are reported in Columns (ii) of Panels A and B of Table 12. Columns (i) in Table 12 present the estimates of β_1 or β_2 (denoted by $\widetilde{\beta}$), which were presented in columns (iii) of Table 4. δ is a value measuring the relative degree of selection on observed and unobserved variables. Oster (2019) suggests using $\delta = 1$. R_{Max} denotes the R-squared value from a hypothetical regression of the outcome on treatment and both observed and unobserved controls. Following

Table 12
The impact of the handover on premiums for language skills: Oster (2019)'s bound.

	Panel A: Employment		Panel B: Log monthly income	
	(i)	(ii)	(i)	(ii)
	Controlled effect $\tilde{\beta}$	Oster (2019)'s bound $\delta = 1$, $R_{Max} = 1.3R^2$	Controlled effect $\tilde{\beta}$	Oster (2019)'s bound $\delta = 1$, $R_{Max} = 1.3R^2$
Mandarin × Handover	0.008***	[0.008 0.011]	0.008***	[0.008 0.044]
	(0.001)		(0.003)	
English × Handover	0.006***	[0.004 0.006]	−0.013***	[−0.045–0.013]
	(0.001)		(0.003)	
R^2	0.020		0.388	

Notes: Standard errors clustered at the household level are in parentheses of column (i). Results in Columns (ii) are computed using Stata command *psacalc*, where *Mandarin*, *English*, and Census fixed effects are fully observed.
*** $p < 0.01$.

Dahlen (2016), Delprato, Akyeampong, and Dunne (2017) and Oster (2019), R_{Max} is set to be $min\{1,1.3R^2\}$, where R^2 is the value of R-squared of the regression with controls included in Eq. (2), which are shown in columns (i) of Table 12. Thus, for the bound estimate $\beta^* = \beta^*(R_{Max}, \delta)$, the identified set is $[\tilde{\beta}, \beta^*(min\{1,1.3R^2\}, 1)]$ or $[\beta^*(min\{1,1.3R^2\}, 1), \tilde{\beta}]$. The identified sets in columns (ii) of Panels A and B do not include 0, indicating that the coefficient estimates displayed in columns (i), or equivalently the estimates reported in columns (iii) of Table 4, are robust. Therefore, our main findings reported in Section 4.2 are unlikely to be severely affected by the potential endogeneity problem.

5. Conclusion

In this paper, we investigate the effects of language skills on employment and income, and the influence of the handover of Hong Kong from the UK to China in 1997 on the premiums for language skills in the Hong Kong labor market. Using data from Hong Kong Population Censuses, we focus on the second language skills (Mandarin and English) of long-term Hong Kong residents with Cantonese as the native language. We find that both of English and Mandarin skills have positive effects on individual's income and employment, but the premiums for English skills are much greater. We further show that the Mandarin skills premium has increased after the sovereignty transfer of Hong Kong in 1997, which may be due to more opportunities connected to the mainland of China. In contrast, while those who can speak English as a second language can still enjoy an earnings premium for this language skill after the handover, the premium has declined in magnitude when compared with that before the sovereignty transfer. Moreover, we find evidence that industry choice and occupational choice are two channels through which the sovereignty transfer affects the labor market premiums for Mandarin language skills. Workers who speak Mandarin tend to choose industry sectors and occupations that have a higher demand of employees with Mandarin language skills to get a higher level of earnings. This paper contributes to the literature on the economic returns to language skills, by shifting the focus to the influence of an important political event and subsequent changes in labor market outcomes.

Appendix A

Table A1
The impact of the handover on premiums for language skills (full DID results of Table 4).

	Panel A: Employment			Panel B: Log monthly income		
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Mandarin × Handover	0.011***		0.008***	0.017***		0.008***
	(0.001)		(0.001)	(0.003)		(0.003)
Mandarin	−0.002**		−0.005***	0.067***		0.011***
	(0.001)		(0.001)	(0.002)		(0.002)
English × Handover		0.008***	0.006***		−0.009***	−0.013***
		(0.001)	(0.001)		(0.003)	(0.003)
English		0.019***	0.021***		0.284***	0.281***
		(0.001)	(0.001)		(0.002)	(0.002)
Age	0.005***	0.005***	0.005***	0.062***	0.063***	0.063***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age^2	−0.000***	−0.000***	−0.000***	−0.001***	−0.001***	−0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	0.014***	0.010***	0.010***	0.302***	0.251***	0.250***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)

(*continued on next page*)

Table A1 (*continued*)

	Panel A: Employment			Panel B: Log monthly income		
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Sex: female	0.014***	0.013***	0.013***	−0.140***	−0.160***	−0.161***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Marital status: married	0.030***	0.032***	0.032***	0.124***	0.137***	0.136***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Marital status: widowed	0.003	0.005	0.005	0.050***	0.074***	0.074***
	(0.003)	(0.003)	(0.003)	(0.007)	(0.006)	(0.006)
Marital status: divorced/separated	−0.021***	−0.020***	−0.020***	0.017***	0.033***	0.032***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)
Nationality: Chinese	0.005***	0.002*	0.001	0.162***	0.096***	0.098***
(Hong Kong)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Nationality: Chinese	0.004	0.004	0.004	0.124***	0.131***	0.130***
(other than Hong Kong)	(0.003)	(0.003)	(0.003)	(0.011)	(0.010)	(0.010)
Nationality: British	0.001	0.004	0.004	−0.002	0.054***	0.051***
	(0.005)	(0.005)	(0.005)	(0.018)	(0.017)	(0.017)
Census: 1996	−0.017***	−0.019***	−0.019***	0.063***	0.014	0.016
	(0.003)	(0.003)	(0.003)	(0.011)	(0.011)	(0.011)
Census: 2001	−0.036***	−0.038***	−0.040***	0.165***	0.123***	0.122***
	(0.003)	(0.003)	(0.003)	(0.011)	(0.011)	(0.011)
Census: 2006	−0.043***	−0.045***	−0.047***	0.097***	0.063***	0.062***
	(0.003)	(0.003)	(0.003)	(0.011)	(0.011)	(0.011)
Census: 2011	−0.034***	−0.035***	−0.037***	0.080***	0.056***	0.053***
	(0.003)	(0.003)	(0.003)	(0.011)	(0.011)	(0.011)
Constant	0.799***	0.802***	0.801***	6.998***	6.987***	6.991***
	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.008)
Adjusted R^2	0.017	0.020	0.020	0.353	0.387	0.387
Observations	696,434	696,434	696,434	619,507	619,507	619,507

Notes: For Nationality, we only report Chinese (Hong Kong and other than Hong Kong) and British. Standard errors clustered at the household level are in parentheses.

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$.

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