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Dynamic Panel Analysis of Construction Accidents in Hong Kong

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Abstract:
The construction industry is one of the riskiest industries with a large number of deaths and injuries every year. Large amounts of money are spent annually on workers' compensation. Thus, it is important to investigate the factors which affect accident compensation in the eyes of judges. In this research paper, we utilized the court case reports available in HKLII from 2000 to 2015. Most of the victims have studied in secondary schools, are aged between 30 and 49 and have a monthly salary of less than HK$20,000. All the data were then analyzed and summarized by the content analysis method. After that, we used the Markov Chain Monte Carlo simulation and System-GMM dynamic panel econometrics method to study the dynamic relationship between these factors and the compensation for accidents. Academically, analysis of accident compensation in the past usually depended on analysis by the labour department. There is a limited number of quantitative court case reports analysis based on economic modelling. Furthermore, none of the previous research utilized the dynamic panel technique to study the relationships. It also fills the gap of the research in identifying whether non-Cantonese speakers are in disadvantage positions when they seek for compensation, longer hearings favour the contractors and whether mental disorder after accident shall lead to larger amount of compensation. Practically, the research offer important information for contractors and employers who may need to pay compensation due to workers' accidents. The results show that non-Cantonese speakers receive less compensation as compared to locals and court cases with longer hearings are usually associated with larger amount of compensation. There is, however, no significant difference between victims with and without mental disorder in terms of compensation.

Keywords: construction accidents, court cases, discrimination, Hong Kong, system-GMM
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"Black Swan events are almost impossible to predict.
Instead of pertuating the illusion that we can anticipate the future."

(Taleb et al. 2009)

1 Introduction

The construction industry is one of the major indicators of economic performance. Economic booms are usually related to high levels of construction output. Although the economic benefits are clear with a multitude of job opportunities, the construction industry in general has a poor safety record around the globe (Irumba 2014). In some developing nations, such as Saudi Arabia, more than half of the total injuries at the work are related to the construction industry (Panuwatwanich, Al-Haadir, and Stewart 2017). In Europe, even though only 10% of the population is employed in the construction industry, 30% of fatal industrial accidents are related to the construction industry. In the US, the incidence rate of accidents in the construction industry is twice the industrial average. The US National Safety Council (NSC) reported that there are nearly 2200 deaths and 220,000 disabling injuries each year. In Japan, construction fatalities account for 30–40% of industrial fatal accidents and 50% in Ireland. In the UK, major injuries reported in the construction sector numbered 3677 in 2005/6 as compared to 4386 in 1999/2000 and 3768 in 2004/5 (Irumba 2014).

In Hong Kong, one major cause of construction fatalities is falls from height (Wong et al. 2016). The number of industrial fatalities in the construction industry was 19 which is lower than 16 in 2006. The fatality rate per

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1000 workers in the construction industry in 2015 was 0.2, which was also lower than 0.3 in 2006 and the average of the past 5 years by 30%. a 39 accident rate per 1000 workers in the construction industry. This is higher than the overall accident rate of all industries which stands at around 18 per 1000 workers. Despite there being a drop in the accident rate per 1000 workers by 25 percent from 64 in 2006 to 39 in 2015, the number of accidents rose from 3400 in 2006 to 3723 in 2015. Having said that, however, the construction industry still recorded the highest number of accident and fatalities rate among all sectors (Occupational Safety and Health Branch Labour Department 2016).

In response to the poor construction records on site, various safety measures have been used on site. For example, Site Safety Working Cycle SWC is used to improving site safety performance. The implementation of the SWC has also been found useful in enhancing the safety awareness of frontline workers, identifying potential hazards and facilitating safety-related communications. Independent Safety Audit Scheme (ISAS) is applied in capital works contracts involving unconventional construction method and mega capital works contracts (contract sums exceeding HK$1000 million) (Secretary for Sustainable Development 2015). Li and Poon (2013) records that the government tried to improve the safety on sites by introducing the safety promotion and occupational health and safety assessment series 18001, has decreased accident rates.

The territory-wide construction industry safety award scheme is jointly organised by the labour department and major stakeholders of the industry to strengthen the occupational safety and health awareness in the construction sector and elevate safety culture on sites since 1999 (Labour Department 2016). Li and Poon (2009a) indicate that recognizing safety concepts and behaviour motivates workers to work safely. Safety goal acceptance and the relationships between workers are less important factors in regard to safety motivation.

2 Factors which Lead to Construction Accidents

Working on construction sites is a risky occupation. Some of the research studies were carried out to identify the associated risks and to contrive mitigation strategies. Roofers are found to be at a high risk of fatality and injury among the construction trades, as they work at high elevations with a danger of falling (Mistikoglu et al. 2014). Besides, a difference in accident rates is noted between developing and developed countries, with usually higher accident rates in the former ones due to lower safety awareness and safety measures (Li 2015).

Accidents are usually caused by failures of people, failures of technology or a combination of both. The causes are seldom singular or simple but are complex constellations of events, existing preconditions and system properties. There are numerous causes of accidents in the construction industry. In general, the causes of accidents can be summarized into eight categories: lack of proper training in recognizing and avoiding job hazards, lack of safety equipment, deficient enforcement of safety standards, unsafe site conditions, unsafe methods of work and/or poor planning of project activities, poor attitude of workers towards safety, workers not using the provided safety equipment, and isolated sudden deviation of a worker from prescribed behaviour (Irumba 2014).

Saracino et al. (2015) found that human factors, workers' behaviour and risk perception are major factors that affect the likelihood of accidents. The Hong Kong Commissioner for Labor identified worker behavior as the major root cause of construction accidents. Behavior-based safety is an effective approach in managing safety issues (Li et al. 2015a). It is argued that safety motivation is an important role which affects safety behaviour. As safety motivation refers to an individual's willingness to exert effort to enact safety behaviour, employees should be motivated to participate in safety activities and to work in a safe manner. An important tool to improve workers' motivation is a reward distribution system where a right definition and implementation could lower occupational accidents' occurrence rate which is in line with Li and Poon (2009a) .

By using a questionnaire survey, Feng and Wu (2015) evidenced that construction workers behave less cautiously when additional risk control measures are implemented. The effect of protective measures may be counteracted by workers' risky behaviour when they perceive they have better protective measures. Besides, construction risk compensation is affected by workers' demographics: workers with higher education, more experience, or who have never been injured at work before have a higher tendency to receive risk compensation than others. Although it is noted that more experienced and educated workers tend to have better safety performance, they are most at risk of receiving risk compensation for their activities. Hence, contractors need to assess the potential influence of workers' risk compensation behaviour when they evaluate the risk control measures on construction sites. Supervisors have to pay more attention to workers who have never been injured and have higher education before after they implement new safety measures on construction sites.

In order to reduce the damages payable for occupational accidents, most industrialized countries have proposed laws to prevent work-related diseases and occupational accidents. Employers' and workers' incentives

improve workplace safety and hence affect the chance of occupational-related diseases and injuries (Liao and Chiang 2015) which can lead to lower accident compensation costs accordingly.

3 Costs of Construction Accidents

The International Labour Organization (ILO) estimated that the cost of work-related illness and injury amounts to 4% of the gross national product of a country. Many of the previous studies show that work-related diseases and occupational accidents are under-compensated. Previous research used workers' compensation to examine the risk of injury for construction workers. By using the information about workers' compensation data, safety risk related to construction work can be assessed. Some studies have found that occupation, industry, legal counsel, union membership, and healthcare costs are associated with claim costs (Liao and Chiang 2015).

In Australia, more than 2000 people die due to their work every year which incurs significant economic, social and personal costs. The previous estimation reflects that more than 5000 close friends and family members of workers become the survivors of traumatic work-related death. Workers' death means their family members children, spouse or other dependents lose income and financial support, and experience grief and other non-monetary suffering (Li and Poon 2009b; 2013; Li 2015; Quinlan et al. 2015). Indeed, the consequences can be awful as traumatic work-related death mostly occurs in industries such as fishing, farming, forestry, construction and road transport, where average earnings are usually low and therefore family budgets are often tight. In Australia and many other countries, most of the workers who die are breadwinners and hence their family members need to rely on the workers' compensation scheme. Some families can also claim on life insurance. Furthermore, whilst 71% of Australian workers aged 15 or above were covered by superannuation by 2007, the median account was quite low with AUS$31,252 for males and AUS$18,489 for females. Workers' compensation schemes support medical and funeral expenses (in the case of death), and expenses for non-dependent family members to attend funerals. A certain level of income is paid to the dependent family members as financial support in the case of death. Workers' compensation policy provides financial support to injured workers and their families as a means of encouragement to return to work. The scheme aims to provide fair compensation which reduces social and economic costs. The scheme requires employers to engage in no-fault insurance cover which is designed for employees who are engaged under a contract of service (Quinlan et al. 2015).

In Australia and New Zealand, there is an exclusion of many self-employed workers from the workers' compensation scheme although they constitute from 15% to 17% of the active workforce. It is also important to note that there are also cases where workers themselves are reluctant to make claims. Workers always face a serious challenge concerning the growth of precarious employment as well as employments which are temporary or undocumented in nature. Flexibility of work arrangements and multiple jobholding are often linked to the high incidence of fatalities which make the resolution of claims even harder. In many cases, there is widespread under-reporting and failure to lodge or succeed in workers' compensation claims despite supporting evidence, even though these cases involve death or serious injuries. For example, from 2008 to 2009, of 400 families of workers who sustained a fatal injury at work, 276 received workers' compensation while the families of 124 did not (Quinlan et al. 2015).

Another option is available in terms of securing monetary redress following death or injury at work in Australia and some other countries. One is especially for the families of those excluded from workers' compensation, which means most self-employed workers, in the case of traumatic work-related death, to pursue a claim for damages. The claim should follow common law under breach of contract or the tort of negligence against the organization or person held responsible for the worker's death. Different from the workers' compensation scheme, this is a fault-based remedy where there is no specific level of entitlement but is decided case by case based on the general rules (Quinlan et al. 2015).

Apart from damages claims or workers' compensation at common law, families may receive financial support through a social security system or voluntary donations by the employer, workmates of the deceased, the union, or the community. Previous research also shows that there is a significant degree of cost shifting from workers' compensation to social security systems when workers are seriously injured. It is unknown whether a similar pattern applies to the families of fatally injured workers, and not much research on the financial impacts on families suggests it does, thereby reflecting that there is a heavy burden on social security by those families denied workers' compensation. There are some notable exceptions, such as funds established following workplace disasters, and employer, workmate, union and community-based funds, which are surely valuable but not a significant source of financial support (Quinlan et al. 2015).

Non-employee work arrangements and the concentration of self-employed workers in some dangerous industries, such as forestry, fishing, farming, construction and road transport are growing; however, workers' compensation is still the most considerable source of financial support for the families of deceased workers

in Australia. Although the common law damages option will be studied, especially that it is important in the industries being considered here, because of the above reason, it is still the main focus of this article. It is worth noting that part of the total costs of work-related illness and death is paid by the employers through compensation premiums. For example, between 2008 and 2009, Australian employers paid about 16% of the total costs associated with work-related disease, injury and fatalities amounting to AUS$6.5 billion in workers' compensation premiums. The community had to bear 10% of total costs and workers and their families needed to bear 74%, which was close to three-quarters of the total costs. Concerning the cases of death or disability due to construction accidents at work, the imbalance in the burden with regard to the average costs to workers, employers, the community and families falls even more heavily for the latter one (Quinlan et al. 2015). The results from a pilot study found that surviving families commented that the correlation between workers' experiences and their corresponding work compensation was negative. Those traumatically bereaved by workplace death have to face an additional burden due to the systemic issues (Quinlan et al. 2015).

4 Is Construction Accident Compensation Another Example of a Black Swan? Our Three Conjectures

Taleb, Goldstein, and Spitznagel (2009) suggested that Black swan events are almost impossible to predict instead of leading to the illusion that we can anticipate the future. Delay is common as many courts have large backlogs of cases (Rock and Kitty 2015). Nevertheless, the use of delay is a common strategic activity to increase the chance of success among the richer party as the poorer party may give up when they are running out of financial support. For example, in the case of law suits between employer and union, a longer time makes it more difficult for the union to retain the loyalty of workers as delay increases employers' chance to dissuade employees and raises the chance of turnover in the workforce. A study conducted between 1952 and 1972 estimated a 0.29% drop in the chance of a labor union's victory for every one additional day added to the median processing time on average (Roomkin and Block 1981).

H1: Longer processing time favours the employer more as the latter group is usually richer. They may pay less in accident compensation.

An unexplained manifestation or prolonged nervous troubles after a physical injury does not in itself warrant the absolute discontinuance of all compensation benefits according to the leading case of Rialto Lead and Zinc Company et al. v. Industrial Commission et al. (Garve 1935). Nowadays, pain and suffering appear to be legalistic tautology, and opinions speak of mental suffering and mental pain as something different from pain and suffering or suffering. Mental suffering may include fright, fear, terror, apprehension and anxiety. And suffering refers to something besides the mental distress which accompanies the shadow of physical pain. McCormick suggested that physical pain and mental suffering should be bracketed together as the elements of damages in personal injury cases and mental suffering is usually accompanied by physical pain, and the difficulty of distinguishing between the two problems has been a valid reason for allowing extra damages for mental suffering. In Illinois, physical pain is not only a sensation which might accompany mental suffering. It is also legally recognized as a source of mental suffering in personal injuries. Hence, the judge held that *"mental suffering was compensable...we cannot readily understand how there can be pain without mental suffering. It is a mental emotion arising from a physical injury. It is the mind that either feels or takes cognizance of physical pain, and hence there is mental anguish or suffering inseparable from bodily injury.... The mental anguish which would not be proper to be considered is where it is not connected with the bodily injury, but was caused by some mental conception not arising from the physical injury."* Nevertheless, in reality, it should be noted that a psychical phenomenon can be induced without physical injury or any sensation of physical pain. For example, a close friend/relatives of workers who fall from height may cause the plaintiff to suffer from mental illness (Proehl 1961). We hereinafter lay down the second hypothesis as follows:

H2: There is no discrimination between mental health problems and physical suffering by the time the judge makes a decision on the amount of compensation in practice in Hong Kong.

Discrimination against foreigners is very common around the globe. Economists have shown their interest in discrimination since Becker's research in 1957. In the 1970s and 1980s, there was an active debate about whether discrimination should be described by Becker's taste-based discrimination model, or Arrow and Phelps' statistical-based discrimination model (Guryan and Charles 2013). Discrimination has been advanced as a vivid explanation for persistent stumbling block among the ethnic minority (Alanya et al. 2015). Zhao and Biernat (2017) adopted a field experiment and lab experiment to study how White Americans react to foreigners

who use their Anglo names or original names. Based on self-categorization theory, the results showed that the use of Chinese names lead to fewer responses when they request graduate training and agreements to meet than using Anglo names (Zhao and Biernat 2017).

H3: Non-Cantonese speakers may have a disadvantage when seeking compensation.

5 Research Method

By using the keyword "construction accidents" in HKILL, we attempted to figure out the factors which affect accident compensation. After identifying the relevant court cases, we then used the content analysis method to extract and evaluate the occurrences of textual material with similar content in a systematic way (Li and Li 2013). Content analysis has been used in other research areas such as sustainable building finance in Latin America (Li and Tsoi 2014), the line of reasoning in competition laws (Li et al. 2015b) and smart home analysis (Li 2013; Li et al. 2016). We analyzed the court cases according to the job nature, worker's age, and number of days between the final decision and the date of accidents.

6 Data and Research Method

We searched through the court cases in the open access Hong Kong Legal Information Institute (HKLII) e-database in 2016. The court cases which reached a decision between 2005 and 2015 took 4628 days to settle (counted from the day of the accident) on average. The mean amount of compensation was HK$2,631,580. The average monthly salary is HK$13,052.2 (Table 1 and Table 2) and since there are missing values for the monthly salary, we used Markov Chain Monte Carlo simulation (MCMC) to fill the missing values.

Table 1: Victims' Age and Income.

Age groups	Number of workers	Income before accidents	Number of workers
17–19	2	Less than 10,000	20
20–29	9	10,000–19,999	45
30–39	22	20,000 or more	9
40–49	22		
50–59	14		
60–69	4		

Table 2: Summary Statistics of the Court Cases.

Variable	Mean	Std. Dev.	C.V.	Skewness	Ex. kurtosis
Total compensation	2631580	16647700	6.32614	9.42817	87.2631
Number of days for a court case to settle (start from the date of accidents)	4628.33	11789.7	2.54728	1.97285	6.52189
Mental suffering	0.100000 (total 5 workers)	0.303046	3.03046	2.66667	5.11111
Non-Cantonese speaker	0.0612245 (total 6 workers)	0.240974	3.93591	3.66040	11.3986
Monthly earnings before accident (MCMC)	12431.5	4351.69	0.350054	0.478722	−0.130948
Before accidents monthly earnings	13052.2	4644.91	0.355870	0.237421	−0.439687

Multiple imputation is usually used to fill in missing data to generate complete sets of data. The MCMC approach consists of imputation and posterior steps. Simulated values are generated to replace missing values for observations independently. The two steps iterate until a stationary distribution is reached (Yin et al. 2016).

As the static panel data have endogeneity, heteroscedasticity and serial correlation problems, the GMM-system panel analysis provides an alternative method to solve the above-mentioned problems. These econometric problems were resolved by Arellano and Bond in 1991, Arellano and Bover in 1995 and Blundell and Bond in 2000 who developed the system GMM estimator (GMM-SYS) and the first difference GMM (GMM-DIF) estimator in dynamic panel data models. The GMM-SYS estimator is a system that contains both the levels and the first difference equations. The GMM-SYS estimator provides an alternative to the standard first difference GMM estimator (Leitão and Shahbaz 2013) (Table 3).

Table 3: Summary of the GMM-SYS Model.

Dependent variable: total compensation			
	Coefficient	**Std. error**	**z**
l_Total (−1)	−0.117245***	0.0424397	−2.763
Constant	13.2738***	0.0873833	151.9
MCMC monthly income before accidents happened	2.09157e–05**	8.60224e–06	2.431
Time	0.000776589***	0.000161590	4.806
Mental suffering	1.22153*	0.634478	1.925
Non-cantonese speaker	−0.982315***	0.126674	−7.755

Consider the first-order autoregressive panel model as suggested by Bun and Windmeijer (2009) :

$$z_{it} = z_{i,t-1} + v_{it} \text{ where } i = 1, \dots, n \text{ and } t = 2, t \dots t_n \tag{1}$$

$$v_{it} = o_i + w_{it} \tag{2}$$

We assume that both o_i and w_{it} encompass error structures of

$$\mathrm{E}(o_i) = 0,\ \mathrm{E}(w_{it}) = 0,\ \mathrm{E}(o_i w_{it}) = \text{ where } i = 1, \dots, i_n \text{ and } t = 2, \dots, t_n \tag{3}$$

$$\mathrm{E}(w_{it} w_{is}) = 0,\ i = 1, ...,\ i_n \text{ and } t \neq s \tag{4}$$

The initial condition fulfils:

$$\mathrm{E}(z_{i1} w_{it}) = 0,\ \text{where } i = 1, \dots i_n \text{ and } t = 2, \dots, t_n \tag{5}$$

Based on these assumptions, $\frac{(t_n-1)(t_n-2)}{2}$, linear moments conditions will be:

$$\mathrm{E}(z_i^{t-2} \Delta v_{it}) = 0,\ t = 3, \dots . t_n \tag{6}$$

where

$A_i^{t-2} = (A_{i1}, A_{i2}, \dots A_{it-2})'$ and $\Delta v_{it} = v_{it} - v_{i,t-1} = \Delta z_{it} - \beta \Delta z_{i,t-1}$

When we define

$$A_{di} \begin{bmatrix} A_{i1} & 0 & 0 & \dots & 0 & \dots & 0 \\ 0 & A_{i1} & A_{i2} & \dots & 0 & \dots & 0 \\ . & . & . & \dots & . & \dots & . \end{bmatrix};\ \Delta v_i = \begin{bmatrix} \Delta v_{i3} \\ \Delta v_{i4} \\ \vdots \\ \Delta v_{i5} \end{bmatrix}$$

The moment condition 5 can be rewritten as:

$\mathrm{E}(A_i' \Delta v_i) = 0$

The GMM estimatior for β will become:

$\widehat{\beta_d} = \frac{\Delta z'_{-1} A_d X_n^{-1} A'_d \Delta z}{\Delta z'_{-1} A_d X_n^{-1} A'_d \Delta z_{-1}}$

where $\Delta z = (\Delta z'_1, \Delta z'_2 \ldots \Delta z'_2)', \Delta z_i = (\Delta z_{i3}, \Delta z_{i4}, \ldots, \Delta z_{it_n})', \Delta z_{-1}$ is the lagged version of

$\hat{\beta}$ refers *ti* LEV − GMM estimator and $\Delta z, A_d = (Z'_{d_1}, Z'_{d_2} \ldots Z_{d_n})'$ *and* X_n refers to a weight matrix that determines the GMM estimator's efficiency. $\widehat{\beta_d}$ refers to the DIF-GMM estimator and moment condition (5) or (6) as the DIF moment conditions. When additional moment conditions from the assumption on the initial condition is considered, such that:

$$\mathrm{E}(n_i \Delta z_{i2}) = 0 \tag{7}$$

Shall hold when it is mean stationary:

$$y_{i1} = \frac{n_i}{1-\beta} + \in_i \tag{8}$$

when $\mathrm{E}(\in_i n_i) = \mathrm{E}(\in_i) = 0$ and if (2)–(4) and (7) hold true, then moment conditions $(t_n - 1)(t_n - 2)/2$ are valid.

$$\mathrm{E}(v_{it} \Delta z_i^{t-1}) = 0, \ \textit{where } t = 3, \ldots, t_n \tag{9}$$

$\Delta z_i^{t-1} = (\Delta z_{i2}, \Delta z_{i3}, \Delta z_{it-1})'$. When we define:

$$A_{mj} = \begin{bmatrix} \Delta z_{i2} & 0 & 0 \ldots & 0 & \ldots & 0 \\ 0 & \Delta z_{i2} & \Delta z_{i3} \ldots & 0 & \ldots & 0 \\ . & . & . \ldots & . & \ldots & . \\ 0 & 0 & 0 \ldots & \Delta z_{i2} & \ldots & \Delta z_{it-1} \end{bmatrix}; v_i = \begin{matrix} v_{i3} \\ v_{i4} \\ v_{it_n} \end{matrix}$$

moment condition (9) can be rewritten as $\mathrm{E}(A'_{mj} v_i) = 0$.

The GMM estimator based on the moment conditions will then be:

$$\widehat{\beta_m} = \frac{z'_{-1} A_m X_n^{-1} A'_m \Delta z}{\Delta z'_{-1} A_m X_n^{-1} A'_m \Delta z_{-1}} \tag{10}$$

$\widehat{\beta_m}$ refers to the LEV-GMM estimator and (9) or (10) as the LEV moment conditions and the linear moment assumption will then become:

$$\mathrm{E}\left(Z_i^{t-2} \Delta v_{it}\right) = 0 \ t = 3, \ldots, t_n \text{ and } \mathrm{E}(v_{it} \Delta z_{i,t-1}) = 0 \ t = 3, \ldots, t_n; \tag{11}$$

Alternatively,

$$\mathrm{E}(Z'_{si} p_i) = 0 \tag{12}$$

Where $A_{tj} = \begin{bmatrix} \Delta z_{i2} & 0 \ldots & 0 \\ 0 & \Delta z_{i2} \ldots & 0 \\ . & . \ddots & . \\ 0 & 0 \ldots & \Delta z_{it_n} \end{bmatrix}; q_i = \begin{matrix} \Delta_{ui} \\ u_i \end{matrix}$

Based on the moment conditions, the GMM estimator is:

$\widehat{\beta_t} = \frac{r'_{-1} A_t X_o^{-1} A'_t r}{\Delta z'_{-1} A_t X_n^{-1} A'_m q_{-1}}$ with $r_i = (\Delta_{z'_i} z'_i)'$

The estimator is SYS-GMM estimator.

7 Results and Discussion

Most of the court cases studied do not mention the educational background of the victims. About 13 had studied in secondary schools. Nevertheless, most of them have had not finished. Two workers finished primary school education. Many of the court cases do not reveal the age of the victims. Among those which reveal their age, many of them fall into the age group of 30–49.

The following table shows the relationship between total amount of compensation and various factors based on our conjectures. A longer time is associated with a higher amount of compensation. Although we may think that this can provide more time for contractors to find a better position, the results go against our conjecture. This may be due to the fact that a longer time also implies a more complicated or serious case, so the court needs extra time to gather suitable evidence. Court cases which have a longer time span seem to have a positive relationship with the amount of compensation. Besides, there is no significant relationship with workers who suffer from mental disorder and total amount of compensation. The previous year of accident compensation has a negative and significant impact on the subsequent year's compensation. Finally, non-Cantonese speakers receive less compensation (as indicated by negative significant figures).

8 Conclusions

Construction accidents lead to non-monetary loss such as grief and monetary loss. They also lead to court hearings every year if there are disagreements with regard to the amount of compensation. To study the impact of various factors which affect the costs of compensation, we studied the previous court case reports in Hong Kong HKILL from 2000 to 2015. Most of the victims had studied in high schools and were aged between 30 and 49.

As time series data often suffer from endogeneity, heteroscedasticity and serial correlation problems, we adopted GMM-SYS which can solve the above-mentioned problems to study the various factors which affect the amount of accident compensation. It was found that there is no significant relationship with workers who suffer from mental disorder and the total amount of compensation. Court cases with longer hearings have a positive and significant relationship with the amount of compensation. Finally, non-Cantonese speakers receive less compensation.

As there are more and more ethnic minority works in construction industry, this piece of research opens up a new area for research to improve safety standard in Hong Kong construction industry. For example, whether there is the same safety standard among locals and non-Cantonese speakers and what are the major factors that lead to the lower compensation among the latter group of workers when Cap. 602 Race Discrimination Ordinance came into effect since July 2009 (Department of Justice 2016).

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