Informal employment and work health risks: Evidence from Cambodia

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Abstract

Workplace safety is a topical issue in public policy debates in industrializing countries like Cambodia where high economic growth rates have yet to translate into higher job quality. This paper studies the relationship between informal employment and occupational health using the 2012 Cambodia Labour Force Survey. I estimate probit models and find that informal employment on its own is associated with a significant increase in the probability of work injury/illness. However in the most complete specification with controls for personal, job and firm characteristics, the effect of informal employment turns out to be small in magnitide and statistically insignificant. I discuss possible explanations for this finding. Results from this analysis suggest that in a context of weak administrative capacity for the enforcement of labour regulations, as is the case in Cambodia, work health risks are a concern across the board, not just in the informal sector.

JEL codes: J28, J46

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1 Introduction

Work is a key aspect of people's lives. This is reflected in the 2013 *World Development Report* which depicts jobs as 'the cornerstone of economic and social development' (World Bank, 2012, p. 2). By raising living standards and productivity and strengthening social cohesion, the social returns to certain jobs may even exceed the individual returns. But some jobs may not be as beneficial. This includes jobs that expose workers to injury and/or illness thus diminishing their health human capital. In this regard, there is evidence that work injuries are the cause of a significant number of deaths globally. However, as reported by Wu, Schwebel, and Hu (2018), Low and Middle Income Countries (LMICs) accounted for over 92% of unintentional occupational injury mortality in 2016.

The higher occupational health risk in LMICs may be ascribed at least partly to their employment structure and general economic structure. A major characteristic of developing countries (DCs) is the large proportion of workers who are engaged in informal employment (ILO, 2018). Informal employment performs a crucial distributional function, providing a means of livlihood for many in a context of low social protection coverage which rules out unemployment as an option for most people. However, the general picture of informal employment points to increased health risks for informal workers. This stems from the fact that informal employment takes place outside of the purview of government regulation and control (Forastieri, 1999). But also important is the small nature and short-term focus of the typical informal enterprise such that competitive pressures and financial constraints obviate meaningful investments in workplace safety (Cohn & Wardlaw, 2016). Against the foregoing background, I estimate probit models using data from the 2012 Cambodia Labour Force Survey and find that informal employment is associated with up to a 4.29-percentage point increase in the probability suffering a work injury/illness. However, in the most complete specification of the probit model controlling for a set of individual, job and firm characteristics, the size of the effect of informal employment drops and loses its significance.

This paper is related to the analysis of 'health shocks' and its role in the dynamics of poverty which has in recent years received significant attention in

development theory and policy (Alam & Mahal, 2014). Sudden health problems may lower earned income due to reduced work-days or the complete inability to work. This, combined with the attendant increase in out-of-pocket health expenditures, can push households into poverty which they might find difficult to escape from. In a context where labour is the chief source of income for most people, it is therefore important to look into employment conditions as a source of health shocks. Establishing whether certain forms of employment harm workers' health will also help policy makers to prioritize those sections of the working population most susceptible to occupational hazards (Fletcher, Sindelar, & Yamaguchi, 2011).

A vast empirical literature in economics considers whether there is an earnings differential between formal and informal employment with mixed evidence (Gindling, Mossaad, & Newhouse, 2016). However, in this paper, I consider whether there is an occupational injury/illness differential between informal and formal employees using data from Cambodia, an industrializing developing country. Cambodia is an interesting and relevant context to study the health implications of informal employment due to the socioeconomic transformation taking place in the country which arguably have implications for workers' health. Over the past two decades, industrialization in Cambodia has gathered pace particularly with the rise of the garment industry which boosted per capita income growth[1] and welfare especially for poorer households (Mejia-Mantilla & Woldemichae, 2017). While trade agreements that linked access to the United States market to compliance with international labour standards appear to have improved working conditions in licensed exporting firms (Neak & Robertson, 2009), concerns remain for workers in informal cottage factories to which licenced factories routinely sub-contract production (Human Rights Watch, 2015). Moreover, labour standards are known to be less favourable in other manufacturing activities in Cambodia with higher levels of informality such as the brick and tile and salt production (Neak & Robertson, 2009). The economic expansion in Cambodia is also happening in tandem with rapid urbanization and the attendant increase in construction activity (Sievleang, 2015). Concerns

[1]From USD 300 in 1994 to about USD 1,070 in 2015 when the country entered the LMIC group of countries (World Bank, 2017, p. 12).

have also been raised in the academic literature and popular media in Cambodia about health and safety standards in the construction sector which is considered to be one of the most hazardous sectors even in advanced economies (Durdyev, Mohamed, Lay, & Ismail, 2017; Abdalla, Apramian, Cantley, & Cullen, 2017). Notwithstanding the emergence of garment manufacturing and construction, agriculture remains a major source of employment and income in Cambodia (World Bank, 2017) and with large-scale commercial agricultural projects gaining ground, farmers in Cambodia are also being increasingly exposed to the health risks that come with agricultural intensification (Speller et al., 2017; Lam, Pham, & Nguyen-Viet, 2017). High growth rates have also yet to translate into higher-quality jobs. A large proportion of the workforce in Cambodia remain engaged in informal employment and most business establishments are unregistered thus limiting the reach of labour regulations concerning occupational health and safety and other aspects of working conditions (ADB, 2015). Previous work on aspects of working conditions in Cambodia such as Oka (2016) has focused on the garments manufacturing sector given its centrality in the economic life of the country. However the contribution of this paper is a broader consideration of employment conditions and workers' health in all sectors of the economy as contained in the CLFS.

This paper proceeds as follows. In section 2, I provide an overview of the economics of workplace health and safety including the theory compensating wage differentials. In section 3, I discuss some aspects of informal employment that may heighten occupational health risk for informal workers. I then describe the empirical methodology in section 4. In section 5, I describe the data set and provide descriptive statistics of the study sample. I discuss the results in section 6 and briefly conclude in section 7.

2 Related Literature

2.1 Theoretical Background

The theoretical framework of Dorman (2000), which links occupational health and safety (OHS) in a firm to its choice of production strategy and personnel,

is instructive for understanding how informal employment might pose adverse health effects. Some firms, say type A firms, offer a good of average quality sold at the cheapest possible price while keeping production costs as low as possible. They enjoy this low-cost producer status for as long as they can maintain it and promptly exit the market when it is no longer possible. Other firms, say type B firms, are more concerned about quality. They aim for a modest market share to which they sell their higher quality product at a premium and intend to remain in the industry indefinitely. The difference in market strategies has implications for personnel policies. Consistent with its strategy of low cost production, A-type firms offer low wages and make the barest minimum, if any, investment in workers' health and morale. B on the other hand, in line with its own market strategy, pays a wage premium and prioritizes the maintenance of a safe working environment among other personnel policies. These two cases given by Dorman (2000) are obviously polar opposites. In reality, firms will pursue mixed strategies and fit somewhere in the spectrum of firm types in a given economy. The relevance of Dorman's model to OHS is that good working conditions are closely linked to other personnel choices and the extent to which the firm is B-type. Informal sector firms are arguably closer to type A than type B.

In the analysis of Pouliakas and Theodossiou (2013), the level of OHS in an economy is the outcome of the incentives faced by workers and firms in labour and insurance markets as well as government regulation. In a perfectly competitive setting, workers are assumed to be rational and would therefore demand a wage premium as compensation for health and safety risks. Their regard for safety on the job and how long they stay out of work once ill or injured is also affected by whether or not they are covered by social insurance and compensation benefit schemes. Firms on the other hand choose a level of safety considering the marginal costs of investing in health and safety measures and its benefits which include a lower wage bill due to the lower risk of injuries and illnesses, reduced disruptions in production due to absent workers among other benefits pointed out by Pouliakas and Theodossiou (2013).

The theory of compensating wage differentials (CWD) is a central aspect of the economic analysis of workplace health and safety. The theory predicts

a positive association between wages and the risk of injury or death on the job, or any other unpleasant job characteristic for that matter,[2] *ceteris paribus*. This tradeoff between risk and money has formed the basis for estimating the value of a statistical life (VSL) or the willingness to pay (WTP) for safety in several countries across the world (Viscusi & Aldy, 2003). The CWD theory assumes a perfectly competitive labour market with no information asymmetries regarding job risks as well perfect mobility such that workers have a range of jobs to choose from.[3] Guo and Hammitt (2009) however argue that the standard CWD theory does not consider how the compensation for risk depends on the level of unemployment (or underemployment) which limits a worker's options. Workers may choose to remain in high-risk jobs when alternative employment is not available thus negating the assumption of perfect worker mobility.

Some studies have also considered the validity of the CWD theory in the context of a segmented labour market which is a more realistic characterization of labour markets in countries like Cambodia. Segmented models typically make a formal/informal (or primary/secondary) distinction with different wage determination mechanisms and employment policies and limited mobility between the segments (Fields, 2009; Dickens & Lang, 1992). Formal wage employment pays higher wages and offers better working conditions which contradicts the main prediction of the CD theory of an inverse relationship between wages and (good) working conditions. The key point here is that in a segmented market, the degree to which a worker is able to choose between jobs and trade off job disamenities depends on which strata of the labour market the worker is positioned.

[2]According to Adam Smith who originated the concept: "the wages of labour vary with the ease or hardship, the cleanliness or dirtiness, the honourableness or dishonourableness of the employment" (Adam Smith 1776, p.112 as cited in Viscusi & Aldy, 2003, p.7). Some scholars have thus criticized the focus on job safety in the analysis of compensating differentials. Construction workers and call centre operators for example would not attach the same level of importance to job safety (Daw & Hardie, 2012).

[3]For a textbook treatment of compensating wage differentials see Ehrenberg and Smith (2012, p. 241-273).

2.2 Empirical Evidence

The foregoing discussion of the economic theory of occupational health and safety considered whether the market compensates workers for performing risky jobs. But the insights also help to understand occupational injury differentials. In a segmented labour market, a key empirical question is how differences in employment or working conditions across sectors relate to health outcomes such as the relative prevalence or probability of occupational injury. The level of workplace safety is jointly determined by the actions of workers, firms and government. The government, on its part, performs its crucial regulatory role through a system of inspections and penalties imposed on establishments for contravening health and safety regulations (Wei, Russell, & Sandy, 2005). The informal economy however, by definition, operates outside the purview of regulatory authorities. Thus it is likely the case that working conditions, the quality of which depends significantly on the enforcement of health and safety laws, are relatively riskier in the informal sector. Formal and informal firms face common health and safety issues, but informal firms are less capable of addressing these issues. Frick and Walters (1998) attribute the poor health and safety record of small and medium-sized enterprises, most of which in Cambodia are informal/unregistered (Tanaka & Keola, 2017), to factors including, *inter alia*, undervaluation of the economic benefits of health and safety, limited management resources and short-term economic pressure. But formal sector employment may not necessarily shield a worker from occupational hazards particularly in the context of weak administrative or institutional capacity for the enforcement of labour regulations. As Almeida and Ronconi (2016) point out, enforcement is crucial to create the urgent incentive for establishments to comply with regulations.[4]

Macro-level analyses have established a positive relationship between a country's share of informal employment in total employment and health indicators such as 'years of life lost' and 'disability-adjusted life years' (DALYs)

[4]For further evidence on the effect of government enforcement on compliance with a range of labour regulations see for example Ronconi (2010) for Argentina and Almeida and Carneiro (2012) which considers the effects of stricter enforcement on the level of formal and informal sector employment and wages in Brazil.

(Muntaner et al., 2010). There is also a descriptive literature in disciplines including occupational medicine and sociology that examines the relationship between employment conditions and health outcomes at the micro level. But as these studies are mostly occupation or workplace specific, their conclusions are to be interpreted in context. Multivariate studies include Alfers and Rogan (2015) who find using data from South Africa that the effect of formality in employment on self-reported general health status becomes insignificant after controlling for a range of factors including income. A similar finding is reported by Santana and Loomis (2004) for Brazil thus suggesting the presence of health and safety concerns across the employment spectrum and not just in informal work. However in an experimental study conducted in Ethiopia which randomly placed workers into low-skill industrial wage jobs, a control group, and an entrepreneurship program, Blattman and Dercon (2016) find that income gains from industrial wage jobs were little and the health risks substantial compared to the control group while informal self-employment increased incomes without significant health costs. In their experiment, many participants placed in factory wage jobs quit after a few months.

A closely related empirical literature looks at the health effects of atypical employment more generally[5], such as fixed-term or temporary contracts, part-time work, on-call work or 'zero-hour contracts' and the like. Most of the literature on atypical employment focuses on advanced economies where an increased emphasis on labour market flexibility in response to economic crises or as a means of retaining competitiveness in the global economy (Lang, Schömann, & Clauwaert, 2013; European Commission, 2007) has raised questions about its effect on workers' health and wellbeing. The explanations given in this literature for the higher risk of work accidents in temporary employment might very well apply to informal employment in developing countries. Guadalupe (2003) for example notes that employers have a lower incentive to invest in firm-specific human capital (which includes detailed health and safety training)

[5]Atypical employment refers to employment arrangements that differ from the standard model of full-time or open-ended employment with a single employer over a long duration. This definition follows the Eurofund industrial relations dictionary available at https://www.eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/atypical-work

for workers on temporary contracts. But if it is the case that low quality workers are systematically hired on temporary contracts, then the difference in accident probability compared to workers on permanent contracts might be due to unobserved difference in worker quality. The empirical analysis of Guadalupe (2003) addresses this issue and show a 'pure contractual effect' of fixed-term contracts on the probability of work accidents in Spain. Hernanz and Toharia (2006) provide evidence to the contrary for Spain (using a different dataset) and Italy with their finding that in both countries the difference in probability of work accident between fixed-term and permanent workers vanishes when personal and job characteristics are accounted for. Sanwald and Theurl (2014) in a meta-analysis of 52 studies covering 26 countries find a higher risk of work injury in addition to poorer mental and physical health for atypical employees.

3 Potential Risk Factors in Informal Employment

In addition to identifying a link between informal employment and negative health outcomes, it is also necessary to explore specific factors that could arguably heighten health and safety risks for informal workers.

The absence of a binding contractual obligation on the part of the employer for the safety of the worker and the fact that regulatory authorities do not inspect informal or unregistered firms is a key factor linking informal employment to health risks. Experimental studies elsewhere show that randomized safety inspections reduce injury rates (Levine, Toffel, & Johnson, 2012). Operating outside the radar means that there is no urgency on the part of some employers to actively maintain safe working environments. Observational studies on the health implications of informal employment in other developing countries support this proposition.[6] Informal establishments lack the incentive to make long-term investments with uncertain returns in the face of more immediate concerns of staying afloat. Enterprise owners and managers may be well aware of the occupational hazards in their operations but the lack of permanent workplaces may discourage active investment in health and safety (Rongo,

[6]See for example Loewenson (1998), Mock, Adjei, Acheampong, DeRoo, and Simpson (2005) and Akinbami and Momodu (2013).

Barten, Msamanga, Heederik, & Dolmans, 2004).

Related to the foregoing point is the low level of technology that characterises informal work in, for example, pollution-intensive industrial activities like artisanal and small-scale mining. The rudimentary technologies for extraction and processing for instance can lead to environmental, health and safety problems which reduce the quality of life of workers engaged in such activities (Hilson, 2002; Spiegel, 2016). At the same time, the process of technology adoption, though essential for learning-by-doing and economic growth as the experience elsewhere in Asia shows, also brings about new occupational risks in the workplace especially in the early stages of the use of new technology. For large informal firms that can afford to acquire foreign technology, it is not uncommon for them to import outdated or second-hand machinery. As Savchenko (2012) observes, garment manufacturers in Cambodia utilize old technology: machines are mostly obtained second-hand after use in more advanced economies like China and Hong Kong.[7] The process of technology adoption can affect the health and safety of workers if knowledge transfer focuses only how the machines or processes work with little or nothing on how they affect the health and working life of the people who use them or if there is no adaptation of imported machinery to the characteristics of local users (ILO, 1988; Jafry & O'Neill, 2000). The health risk in the use of new production technology adoption is indeed not peculiar to the informal sector. But large formal firms such as multinational corporations are more likely to have standardized technologies in their operations across the world or be under more pressure to give attention to health and safety issues in technology transfer.

Another factor behind the higher occupational health risk in informal work is the weak, if any, influence of labour unions in the informal sector thus limiting the ability of workers to push for the prioritization of health and safety issues in the workplace. Independent labour unions are a key part of any effective system of industrial relations that aims to reconcile the objective of enterprises to remain competitive with workers' desire for better pay and working conditions (World Bank, 1995, p. 79). Unions can, at least in theory,

[7] A similar route was taken by Taiwan and Korea who adopted Japan's slightly outdated production techniques as a launch pad for their own industrial development (Brautigam, 1997)

reduce an employee's risk of injury by solving the externality problem that may result in a case where workers individually bargain over safety measures. Job safety can be regarded as a 'non-rival public good' (World Bank, 1995, p. 80). It will be costly for workers to personally monitor and effect changes in health and safety procedures. Other workers cannot be excluded from 'consuming' any resulting improvement in job safety which an individual worker is able to bring about with personal financial resources. Unions address this externality problem by providing information on job hazards, which they can gather more cheaply, thus enhancing the ability of their members to achieve safe working environments (Fenn & Ashby, 2004; Donado & Wälde, 2012). However, organizing informal workers presents distinct challenges. As documented by Bonner and Spooner (2011), these challenges stem from the heterogeneity of economic acivities that fall under the informality umbrella as well as competing interests both within the informal economy and between formal and informal sector worker groups. According to Ward and Mouyly (2016), in Cambodia, union membership outside the garment manufacturing sector is as low as 1% of the total labour force.[8] Chhengpor and Retka (2015) point out that only 2.7% of informal workers in Cambodia are directly or indirectly involved in a labour union. The increasing use of casual or short-term contracts by employers in Cambodia further reduces workers' capacity for collective action to improve working conditions. As argued by Arnold and Han Shih (2010) the increasing informalization of labour relations is the biggest barrier to unionization in Cambodia. Informal workers in Cambodia and elsewhere in the developing world are nevertheless increasingly organising in different forms detailed by Eaton, Schurman, and Chan (2017) for representation in relevant policy making and negotiation processes in the workplace.

The final factor linking informal employment to poor health outcomes is the piece rate which is a common payment scheme in informal work especially in activities where it is easy to measure output such as agriculture and factory production. Labour costs are lower in developing countries relative to advanced

[8] In an interview granted to Union Aid Abroad-APHEDA, Tola Moueun, a prominent labour rights activist in Cambodia, estimates union membership at 'less than 5%' of the total labour force compared to over 60% in the garment sector. Interview available at `https://www.apheda.org.au/trade-union-repression-in-cambodia/`: Accessed 2/20/2019.

economies because of their much lower piece rates and additional labour payments (Borino, 2018). Piece-rate compensation has been found to increase productivity (Lazear, 2000; Guiteras & Jack, 2018). However, incentives that increase work speed may lead to disregard for safety procedures by individual workers if such measures appear to reduce the pace of work. Moreover, workers under a piece-rate regime might consider health-promoting practices such as work breaks costly when they have targets to meet thereby increasing the risk of fatigue and injury. Studies in both developing and advanced economies have found an increased risk of workplace injury for piece-rate workers (Davis, 2016; Bender, Green, & Heywood, 2012).

4 Hypothesis and Estimation Method

The aim of this section is to evaluate empirically the relationship between informal employment and occupational health in terms of the probability of getting injured or falling ill due to work-related causes. On the basis of the discussion in previous sections, the hypothesis is as follows:

H1: *In Cambodia, informal employment increases the probability of sustaining a work injury/illness.*

To test this hypothesis, assume that work injury/illness is determined by a latent variable,

$$Y_i^* = X_i\beta_1 + Inf_i\delta + u_i \tag{1}$$

for person i, $i = 1, \ldots, N$. Y_i, which is observed, equals 1 if $Y_i^* > 0$, meaning that person i suffered an injury; Y_i equals 0 if $Y_i^* \leq 0$. In equation 1, X_i is a set of variables including individual, job and firm characteristics, Inf_i is the main independent variable indicating whether the individual is an informal employee. β_1 and δ are the parameters for estimation and u is the error term that captures the unobserved determinants of occupational injury. Assuming that u has a normal distribution with zero mean and unit variance, the relationship

between informal employment and occupational injury can be estimated using the following probit model:

$$Prob(Y_i = 1) = \Phi(X_i'\beta + Inf_i\delta) \tag{2}$$

where Φ is the standard normal cumulative distribution. Equation 1.2 is a standard approach in the empirical literature on differences in injury probability by employment or contract type (e.g Hernanz and Toharia (2006) and Donado (2015)). The expectation is for the estimate of δ to be negative.

However, as highlighted by Deadman and MacDonald (2004), the univariate probit model above might yield a biased estimate of the effect of informal employment on occupational injury if, as is likely the case, there is an overlap in unobserved characteristics that determine both informal employment and occupational injury. This potential for unobserved heterogeneity will manifest in form of a correlation between the error term in equation 1 and the variables that determine informal employment. In this situation, informal employment will be endogenous and the estimate of β will be biased, showing not only the effect of informal employment but also the effect on work injury/illness of having this unobservable characteristic. These concerns can be addressed using a bivariate probit model in which the probability of sustaining an occupational injury/illness and the probability of being an informal employee are jointly estimated. According to Fairlie (2005), this procedure is equivalent to an instrumental variables or two-stage least squares model and is suitable when the dependent variable and the endogenous explanatory variable are binary.

As in equation 1, assume that informal employment is determined by a latent variable which is unobserved,

$$Inf_i^* = X_i'\gamma + Z_i'\pi + \varepsilon_i \tag{3}$$

where only Inf_i is observed as either 0 or 1, Z_i is a vector of identifying restrictions containing variables that are not included in (1.1) and ε_i is the error term. The two error terms, u_i in (1.1) and ε_i in (1.3), have a joint bivariate normal distribution with zero mean, unit variance and correlation ρ. The bivariate probit model is used when $\rho \neq 0$.

The choice identifying restrictions is crucial. In this instance, the choice is also constrained by the richness of the data set being used. Thus, the identifying restriction included in Z_i is the number of household members in informal employment. This variable is strongly associated with the probability of informal employment and highlights the importance of social capital in the labour market, perhaps more so for informal employment opportunities. Because there are no formal channels for recruitment into informal jobs, firms and workers depend on word of mouth and referrals to connect with each other. Information on informal job openings is mostly spread around through a social network of family and friends (Arbex & O'Dea, 2011).

4.1 Control Variables

The control variables include individual, job and firm characteristics identified in the literature as determinants of the probability of occupational injury such as age, gender, education, industrial sector, region and union membership, firm size and others. On age, some studies show that injury rates decrease with age as older workers are more experienced and therefore more aware of job-specific risks (Salminen, 2004). On the other hand, the physical effects of ageing such as poor vision, hearing difficulties and reduced bodily coordination could make older workers more prone to occupational accidents. Moreover, older workers might be assigned to more dangerous tasks requiring more experience making them more likely to sustain an injury (Bande & López-Mourelo, 2015). Age will also capture the impact of cumulative exposure to job hazards as some job-related health problems become evident with age (Fletcher et al., 2011).

Controlling for gender accounts for the difference in physical capacity between men and women. Employers may assign women to less dangerous duties or women sort themselves into less dangerous jobs (Lavetti & Schmutte, 2018). Moreover, women have been found to be less likely to engage in risky behaviour such as excessive alcohol consumption or drug abuse which reduces the probability of occupational injury (Leeth & Ruser, 2006). On the other hand, the possibility that workplace designs are better suited to men than women or that women may be more likely to report an injury incident to the management can

result in higher injury rates for women (Kelsh & Sahl, 1996).

The sector and occupation variables account for the fact that injury risk differs across jobs (Mock et al., 2005). A builder, for example, faces a higher risk of injury than a teacher. The industrial and occupation dummies also capture the distribution of workers and working conditions in the labour market. I include dummies for eight industrial and nine occupational categories. The region dummy controls for particular features of labour markets across the country such as the relative availability of formal wage employment and institutional capacity for the enforcement of health and safety regulations.

The education variable brings the human capital perspective into the analysis in the sense that exposure to high-risk jobs is in part determined by the individual's level of schooling attainment. One possible channel for the human capital effect is that more and better education increases access to relatively safer white-collar jobs or to move up the ladder to safer supervisory roles within the various occupational groups. Another channel is that more educated workers are better equipped to navigate potentially risky situations on the job or may have a more cautious approach to work (Oh & Shin, 2003; Piha, Laaksonen, Martikainen, Rahkonen, & Lahelma, 2012). Thus, an association between informal employment and occupational injury may reflect low educational attainment among informal workers. Earnings are also included as an indicator of job quality and socioeconomic status since labour standards are less likely to be upheld in low-paid jobs. Low pay has been linked to job dissatisfaction which increases the risk of work accidents (Gyekye & Salminen, 2006). The size and the registration status of the firm in which the individual works is also controlled for. Workers in larger firms may face a lower risk of injury since larger firms have a greater incentive and financial capacity to actively promote a safe working environment. Moreover, large and registered firms are more likely to be inspected by regulatory authorities given their visibility (Poland, 2017).

5 Data and Descriptive Statistics

5.1 2012 Cambodia Labour Force and Child Labour Survey

The combined Cambodia labour force (LFS) and child labour survey was conducted by the National Institute of Statistics (NIS) of Cambodia with technical assistance from the International Labour Organization in 2012. The LFS data is used in the present study. The LFS obtained information in different dimensions of people's economic activity. It gathers national and regional statistics on employment, unemployment and underemployment among other dimensions of working life in Cambodia. The specific objectives of the survey as detailed by NIS (2013) include, inter alia, to collect information on employment and informal employment across occupational groups and industrial sectors and education levels. Other specific objectives include the provision of data on decent work in terms of earnings from employment, hours of work, quality of employment, safety at work and a host of other issues.

The data was collected between February and April 2012 and is a nationally representative survey based on a stratified sample covering 9,600 households from 600 enumeration areas (EAs) located across all 23 provinces of the country and the capital Phnom Penh. All types of households, including single-person households, in both urban and rural areas were involved in the survey. Further details about the sample design and survey implementation are provided in NIS (2013). The complete data set as obtained from the NIS contains a total of 48,290 individuals including children. My analysis is however based on wage employees with complete information on all the variables resulting in 8,577 observations.

The occupational health outcome for this study is based on survey question J.1 in section J which collects information on occupational injuries within the last 12 months. Question J.1 asks: '*In the last 12 months, was (NAME) hurt in any accident while working that caused him/her injury or illness?*', to which the worker provides a yes or no answer. The employment section contains indicators which enable the classification of employment as formal or informal. In this study, all workers hired without a written contract are classified as informal. On

the other hand, all workers hired on the basis of a written employment contract and/or public sector employees are classified as formal workers. Following ILO guidelines as presented in (Williams & Lansky, 2013), it is important to note that informal employment includes all informal jobs regardless of whether such jobs are conducted in formal enterprises, informal enterprises or households. This considers the fact that formal firms do engage workers on an informal basis so as to avoid social security contributions, severance payments and other liabilities in the event of dismissal. Table A.1 in the appendix presents summary statistics of selected variables.

5.2 General Sample Characteristics

The study focuses on working individuals in Cambodia who are 15 years old and above. Informal and formal wage employment constitute 80.60% and 19.40% of total employment respectively. Table A2 in the appendix presents some key characteristics workers in informal and formal employment and the sample as a whole. There are more men than women in informal employment (62.14% vs 37.86%). The reverse is the case in formal employment where women predominate at 65.53%. Most workers are in the are in the 25-34 age group and have only primary education or less. The level of education is considerably higher among formal employees with a total of 58.10% of them having at least secondary education compared to 35.76% for informal employees. The manufacturing sector has the highest wage employment share (30.40%) followed by agriculture (29.28%) and construction (17.40 %). Most formal wage employment (73.56%) is in the manufacturing sector. While the majority of informal employees work in micro and small firms (a total of 84.37%), most formal employment is in medium-sized firms as defined in Cambodia.[9] Table A3 in the appendix presents these general characteristics according to employment type and gender. It shows that the level of education is slightly lower among women, 62.74% of whom have completed only primary education or below as against 57.77% for men. Also slightly more men than

[9]In Cambodia, micro firms are those with fewer than 10 employees, small firms have 11-50 employees, medium firms have 51-100 employees and large firms are those with over 100 employees (Baily, 2008, p. 6).

women have received post-primary education. Almost the same percentage of women and men (29.52% vs 28.98%) are employed in agriculture. The percentage of women working in manufacturing is almost triple that of men (47.91% vs 17.07%), reflecting the high concentration of women in garment factories which is the mainstay of the manufacturing sector in Cambodia. The reverse is the case in construction which employs 27.15% of men and just 4.61% of women.

5.3 Prevalence of Non-fatal Occupational Injury or Illness

8.55% of individuals in the sample had suffered an occupational injury/illness in the last 12 months. The prevalence rate was however higher in informal employment compared to formal employment- 9.14% vs 6.07%. Table A4 in the appendix shows the prevalence rates in the informal and formal employment across socio-demographic characteristics. The prevalence of injury/ illness was almost two times higher among men (10.56%) than women (5.90%) in the total sample and in informal employment (11.01% vs 6.07%) but the difference was smaller for men and women in formal employment (7.17% vs 5.50). The 35-44 age group had the highest prevalence of injury while persons with primary education or less had the highest prevalence in the total sample and among informal workers. Individuals with a job tenure of 10 years or more had a higher prevalance of injury/illness than those with a job tenure of less than three months (10.83% vs 5.83%). This pattern holds in the full sample and the two employment types. At the occupational level in the full sample, 'craft and related trades' had the highest prevalance of 12.75% followed by 10.07% among workers in 'elementary trades' while 'professionals' had the lowest prevalance at 4.70%. At the sectoral level, mining had the highest prevalence (12.82%) followed by construction (11.60%) and transportation (10.84%). This pattern of injury/illness prevalence at the sectoral level also holds among informal employees. Among informal employees and the sample as a whole, the prevalence of injury/illness (4.71% and 4.75% respectively) is lowest among those in medium-sized enterprises and much higher in smaller firms.

6 Discussion of Results

Tables A4 and A5 in the appendix present the results of the bivariate and univariate probit estimates of the relationship between informal employment and the probability of suffering a work injury/illness. As the test for the null hypothesis (at the bottom of Table A1) that $\rho = 0$ (i.e that the error terms of equations (1) and (3) are correlated) cannot be rejected, the univariate probit model will yield consistent estimates which I discuss in what follows. Table 1 below presents the main results from the estimation of different specifications of equation 1.

Table 1: Effect of informal employment on the probability of suffering a work injury or illness, Cambodia 2012 (probit estimates based on CLFS data)

	Marginal effect	***t*-statistic**
Without any controls	0.0338	4.08
Controls for personal characteristics	0.0429	4.90
Controls for job characteristics	0.0034	0.32
Controls for firm characteristics	−0.0101	−0.94
Controls for personal, job and firm characteristics	0.0015	0.13

Without any controls, informal employment significantly increases the probability of occupational injury/illness, as hypothesis H1 posits, by 3.38 percentage points. Controlling only for personal characteristics in the second specification increases the probability of injury/illness by 4.29 percentage points which, as in the initial case of informal employment with no control variables, is significant at the 1% level. Controlling only for job characteristics in the third specification and only for firm characteristics in the fourth specification, the marginal effect of informal employment is lower in magnitude and statistically insignificant. This is also the case in the fifth and most complete specification of the probit model with all control variables included. Here, informal employment increases the probability of suffering a work injury/illness by 0.15 percentage points but this effect is insignificant. The results in table 1 therefore show that the positive association between informal employment and occupational health is not robust to the inclusion of a range of personal, job and firm characteristics. Once these factors are considered, informal employees are not at a higher risk

of sustaining a work injury at least in the context of Cambodia. That is, the fact that a worker is not employed on a formal contract does not appear on its own to expose them to a higher risk of work injury/illness. The higher health risk for informal employees relative to formal employees obtained in the initial specification may be linked largely to the kind of jobs they do in terms of the level of accident risk involved. Summary statistics from Table A1 in the appendix for example indicate that informal employment is highest in 'elementary occupations' and 'craft and related trades' both of which tend to be manual occupations with tend to have a higher risk of accidents. The initially higher health risk for informal employees may also be explained by the kind of firms they work in. Firms differ in the efficiency with which they 'produce' workplace safety through the acquisition of safety technology (Wei et al., 2005). In the full result of the estimation with all control variables included (column 5 of table A5 in the appendix), firm size is in fact one of the few significant determinants of occupational health. Workers in smaller size categories are significantly more likely to have a work injury/illness compared with those in the reference category of 50 or more employees.

The finding that informal employees (and other workers thought to be disadvantaged such as those on fixed-term contracts) are not significantly more likely to have an accident or work-related illness is not uncommon in empirical studies (e.g Alfers and Rogan (2015); Cioni and Savioli (2016); Hernanz and Toharia (2006)). So, in the context of a developing country like Cambodia, what could possibly explain this finding? One plausible explanation is that due to limited state administrative capacity, workplace safety is as much a problem in the formal sector as it is in the informal sector. There are laws such as *Prakas*[10] 124 on indoor air quality in factories but as Down (2016) notes, enforcement is weak or non-existent. According to the Ministry of Labour and Vocational Training in Cambodia, in 2011[11], there were 91 occupational safety and health inspectors responsible for nationwide inspection visits (MLVT, 2011, p. 11). This

[10]Prakas are issued by the Ministry for Social Affairs, Labour, Vocational Training and Youth Rehabilitation in relation to the Labour Law. For more on these, see `http://www.arbitrationcouncil.org/en/resources/labour-law-and-regulations/prakas` Accessed 03/10/2019.

[11]The year before the survey used in the empirical analysis of this paper was conducted.

number of labour inspectors is inadequate for the size of Cambodia's working population which is about 10.75 million (NIS, 2013, p. 30).[12] These figures point to a very low probability of inspection: The average formal employee in a registered establishment in Cambodia is unlikely to see a labour inspector all through his or her working life. As the results in table A5 show, the effect of working in a registered firm on the probability of injury is negative, as expected, but insignificant. Apart from issues of corruption and lack of transparency in the labour inspectorate system (Human Rights Watch, 2015), it has also been argued that the unwillingness to enforce labour laws (and the repression of labour more broadly) is a part of the political and economic strategy of the political elite (Berliner, Greenleaf, Lake, & Noveck, 2015; Salmivaara, 2018).

Another explanation for the insignificance of informal employment is based on models of worker learning and adaptive behaviour (Viscusi, 1979; Viscusi & O'Connor, 1984). When workers begin a job, they are imperfectly informed about the occupational hazards they are getting into. However, through personal or colleagues' experiences of occupational injuries/illnesses, they update their initial expectations about the job and decide to quit if the experiences are sufficiently unpleasant to warrant an exit from the job. However, as a worker is becoming more aware about the job hazards, the cost of quitting the job is also increasing Robinson (1987). This is particularly the case in formal employment where the worker stands to lose not just relatively higher pay, but pensions, health insurance and other benefits. Thus, a formal employee might decide to stay on even after discovering the hazards of a job because of the difficulty in finding alternative formal employment. Informal work on the other hand, with its low barriers to entry, arguably offers more scope for the process of job experimentation that Viscusi and O'Connor (1984) analyse. It is relatively easy for an informal worker to disengage from a job that he or she has discovered to be dangerous and find something else that suits his or her tolerance for risk. Hence, the high turnover rate in informal employment may shield informal workers from occupational risk.[13]

[12] According to ILO's benchmark of one labour inspector for every 40,000 workers in less developed countries, there should be 269 labour inspectors in Cambodia.

[13] This statement is speculative. I am not aware of any studies that consider this matter.

7 Conclusion

In this paper, I attempt to examine empirically the relationship between informal employment and work injury/illness in Cambodia. Results from probit models show that informal employment on its own is significantly associated with a 3.38 percentage point increase in the probability of suffering a work injury/illness. Controlling only for personal characteristics, informal employment significantly increases the probability of illness/injury by 4.29 percentage points while controlling only for job or firm characteristics, the effect of informal employment is insignificant. In the most complete specification of the probit model with controls for personal, job and firm characteristics all included, the effect of informal employment turns out to be small in magnitude and insignificant, contrary to the hypothesis set out in the paper. I discuss possible explanations for this economically interesting, if statistically insignificant, result.

The empirical analysis however has some shortcomings. For instance, due to limitations in the data set, only one identifying restriction has been included in the bivariate probit model (table A4 in the appendix) that jointly estimates the probability of sustaining an injury/illness and the probability of being in informally employed. I am unable to test alternative identifying restrictions. Hence the extent and direction of bias in the effect of informal employment may not have been robustly determined. Richer data including panel data (showing how workers transit between employment types over time and how this affects their health) would greatly improve the economic analysis of occupational health and safety in developing countries.

The results here nevertheless raise the question of whether occupational health regulation in Cambodia should rely on labour inspections which focus on the formal sector or whether is should be regarded as a public health issue that is not concerned with the form of the employment relationship or enterprise. Either case will require strengthening the institutional capacity for the enforcement of health and safety regulations in workplaces across Cambodia.

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Appendix

Table A1: Characteristics of workers in informal and formal employment[1]

	Informal	Formal	Total
Sex			
Female	37.86	65.53	43.24
Male	62.14	34.38	56.76
Age			
15-24	46.70	58.71	49.03
25-34	26.37	29.80	27.03
35-44	14.97	8.05	13.63
45-54	9.09	2.82	7.88
55+	2.85	0.60	2.41
Education			
Primary or below	64.24	41.95	59.91
Secondary	33.62	49.39	36.67
Tertiary	2.14	8.71	3.41
Occupation			
Managers	0.17	1.86	0.50
Professionals	1.27	3.67	1.73
Technicians & associate professionals	2.88	4.20	3.14
Clerical support workers	0.91	4.17	1.54
Service & sales workers	7.75	6.55	7.52
Skilled agriculture & forestry workers	1.46	0.18	1.21
Craft & related trades	16.37	6.91	14.54
Plant & machinery operatives	15.26	64.48	24.81
Elementary occupations	53.91	7.99	45.00
Sector			
Agriculture	35.70	2.28	29.28
Mining	1.03	0.42	0.90
Manufacturing	20.02	73.56	30.40
Electricity	0.36	0.84	0.45
Construction	21.03	2.34	17.40
Trade	4.15	3.19	3.96
Transportation	6.97	3.19	6.23
Other services	10.73	14.18	11.40
Firm size			
Works alone	8.49	5.35	7.88
2-4	22.10	5.70	18.92
5-9	22.45	5.29	19.12
10-19	20.09	5.47	17.26
20-49	11.23	5.35	10.08
50+	15.64	72.83	26.73
N	6913	1664	8577

[1] Data source: CLFS 2012. Figures in the table are percentages.

Table A2: Characteristics of study sample by employment type and gender[1]

	Female			Male		
	Informal	Formal	Total	Informal	Formal	Total
Age						
15-24	49.94	65.02	54.38	44.47	46.68	44.97
25-34	24.22	26.65	24.94	29.68	35.84	28.64
35-44	13.87	6.41	11.67	15.64	11.20	15.11
45-54	8.98	1.74	6.85	9.17	4.90	8.67
55+	2.98	0.18	2.16	2.80	1.40	2.60
Education						
Primary or below	68.40	49.18	62.74	61.70	28.14	57.77
Secondary	29.57	45.88	34.38	36.08	55.94	38.41
Tertiary	2.02	4.95	2.88	2.21	15.91	3.82
Occupation						
Managers	0.11	0.64	0.27	0.20	4.20	0.68
Professionals	1.40	2.50	1.70	1.21	5.94	1.80
Technicians & associate professionals	3.02	3.50	3.15	2.80	5.60	3.12
Clerical support workers	1.12	4.03	2.00	0.77	4.37	1.20
Service & sales workers	11.40	2.84	8.90	5.54	13.64	6.50
Skilled agriculture & forestry workers	1.64	0.18	1.21	1.35	0.17	1.21
Craft & related trades	8.06	3.94	6.85	21.44	12.60	20.40
Plant & machinery operatives	21.93	76.65	38.04	11.20	41.25	14.72
Elementary occupations	51.32	5.77	37.90	21.93	12.24	50.41
Sector						
Agriculture	41.40	1.00	29.52	32.24	4.54	28.98
Mining	0.30	0.18	0.27	1.47	0.87	1.40
Manufacturing	31.68	86.81	47.91	12.92	48.25	1.90
Electricity	0.11	0.01	0.10	0.51	2.27	0.71
Construction	6.34	0.46	4.61	29.98	5.94	27.15
Trade	4.66	1.83	3.83	3.84	5.76	4.06
Transportation	1.66	0.05	1.30	10.24	8.21	10.00
Other services	13.90	8.97	12.46	8.80	24.12	10.60
Firm size						
Works alone	8.67	5.49	7.74	8.38	5.07	8.00
2-4	18.80	2.84	14.10	24.12	11.18	22.60
5-9	19.18	1.92	14.10	24.44	11.71	22.95
10-19	18.07	2.36	13.50	21.32	11.01	20.11
20-49	9.63	3.66	7.87	12.20	8.57	11.77
50+	25.64	83.51	42.67	9.54	52.44	14.58
N	2617	1092	3709	4296	572	4868

[1] Data source: CLFS 2012. Figures in the table are percentages.

Table A3: Non-fatal occupational injury/illness in informal and formal employment[1]

	Informal	Formal	Total
Gender			
Female	6.07	5.50	5.90
Male	11.01	7.17	10.56
Age			
15-24	6.38	5.01	6.06
25-34	10.31	6.25	9.44
35-44	14.40	11.94	14.11
45-54	10.50	8.51	10.35
55-64	11.68	10.00	11.60
Education			
Primary or below	9.28	5.73	8.80
Secondary	9.17	6.33	8.43
Tertiary	4.73	6.20	5.46
Occupation			
Managers	n/a	9.68	6.98
Professionals	4.54	4.92	4.70
Technicians & associate professionals	10.05	2.86	8.18
Clerical support workers	1.60	8.70	5.30
Service & sales workers	3.00	11.00	4.34
Skilled agriculture & forestry workers	4.95	33.33	5.77
Craft & related trades	15.51	5.21	12.75
Plant & machinery operatives	4.83	5.68	5.27
Elementary occupations	10.25	5.26	10.07
Sector			
Agriculture	9.89	7.90	9.86
Mining	14.08	n/a	12.82
Manufacturing	6.80	5.23	6.05
Electricity	4.00	7.14	5.13
Construction	11.49	15.38	11.59
Trade	8.01	11.32	8.53
Transportation	11.61	3.77	10.84
Other services	4.99	8.05	5.73
Firm size			
Works alone	11.58	4.49	10.65
2-4	9.62	9.47	9.61
5-9	9.47	14.77	9.75
10-19	8.20	6.00	8.10
20-49	13.53	12.35	13.41
50+	4.71	4.78	4.75
N	6913	1664	8577

[1] Data source: CLFS 2012. Figures in the table are percentages.

Table A4: Bivariate probit model for occupational injury and informal employment

	Injury	Informal employment
Informal	0.266	
	(0.81)	
Female	−0.164**	−0.0809
	(−3.17)	(−1.52)
Household size	−0.0167	0.00840
	(−1.54)	(0.67)
Change job	0.403**	−0.0360
	(5.50)	(−0.37)
Married	0.205**	0.0457
	(3.57)	(0.74)
Education (ref: Tertiary)		
Primary and below	0.00543	0.660**
	(0.02)	(6.03)
Secondary	−0.00332	0.557**
	(−0.02)	(5.26)
Age	0.0145	−0.0236
	(1.21)	(−1.66)
Age squared	−0.000142	0.000304
	(−0.90)	(1.51)
Tenure (ref: 10 years or more)		
< 3 months	−0.288**	0.136
	(−2.84)	(1.13)
3 months to < 6 months	−0.0313	0.123
	(−0.30)	(1.01)
6 months to < 12 months	−0.0966	0.249*
	(−0.90)	(2.10)
1 year to < 3 years	0.00535	0.146
	(0.06)	(1.37)
3 years to < 5 years	0.0115	0.102
	(0.11)	(0.89)
5 years to < 10 years	0.0184	−0.0102
	(0.17)	(−0.08)
Occupation (ref: Plant and machine operatives)		
Managers	−0.143	−0.636*
	(−0.44)	(−2.49)
Professionals	−0.317	−0.307
	(−1.36)	(−1.92)
Technicians and associate professionals	0.0427	0.265*
	(0.28)	(2.26)
Clerical support workers	0.0593	−0.0124*
	(0.27)	(−0.08)
Service and sales workers	−0.243	−0.0252
	(−1.63)	(−0.21)
Skilled agric., forestry and fishery workers	−0.218	0.194
	(−0.93)	(0.57)
Craft and related trades	0.245	0.416***
	(2.47)	(4.91)
Elementary occupations	0.107	0.367***
	(1.11)	(4.12)
Hours worked	0.00195	0.000387
	(1.06)	(0.18)
Union	0.0387	−0.548***
	(0.33)	(−8.74)
Piece rate	−0.0582	0.143
	(−0.86)	(1.40)
Earnings	−0.0113	−0.231***
	(−0.53)	(−8.41)
Employer registered	−0.0336	−0.827***
	(−0.31)	(−13.47)
Firm size (ref: 50 or more persons)		
Works alone	0.143	0.192
	(1.33)	(2.00)
2-4 persons	0.214*	0.602***
	(2.06)	(6.66)
5-9 persons	0.221*	0.528***
	(2.14)	(5.71)
10-19 persons	0.118	0.515***

	(1.79)	(5.46)
20-49 persons	0.430***	0.373***
	(4.15)	(3.87)
Sector (ref: Agriculture)		
Mining	0.131	−0.215
	(0.65)	(−0.79)
Manufacturing	−0.0967	−0.752***
	(−0.92)	(−6.04)
Elect., gas and water	−0.457	−1.286***
	(−1.14)	(−4.43)
Construction	−0.150*	−0.130
	(2.02)	(−1.05)
Trade	0.190***	−0.278
	(1.27)	(−1.62)
Transportation and storage	−0.0661	−0.374**
	(−0.70)	(−2.69)
Other services	−0.112	−0.580***
	(−0.95)	(−4.30)
HHinformal		0.00766
		(0.43)
ρ		−0.162
		(−0.80)
N	8577	8577

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
The estimations include 25 provincial dummies which are not reported in order to save space

Table A5: Probability of sustaining an occupational injury or illness. Probit estimates (marginal effects). Dependent variable: *Injury*

	(1)	(2)	(3)	(4)	(5)
Informal	0.0338***	0.0429***	0.00338	−0.0101	0.00147
	(4.08)	(4.90)	(0.32)	(−0.94)	(0.13)
Female		−0.0352***			−0.0231***
		(−5.52)			(−3.33)
Household size		−0.00250			−0.00220
		(−1.69)			(−1.50)
Change job		0.0581***			0.0549***
		(5.88)			(5.52)
Married		0.0303***			0.0281***
		(3.87)			(3.60)
Education (ref: Tertiary)					
Primary and below		0.0130			0.00692
		(0.77)			(0.36)
Secondary		0.00728			0.00582
		(0.43)			(0.31)
Age		0.00229			0.00186
		(1.41)			(1.15)
Age squared		−0.0000211			−0.0000179
		(−0.99)			(−0.84)
Tenure (ref:10 years or more)					
< 3 months		−0.0303*			−0.0348*
		(−2.23)			(−2.56)
3 months to < 6 months		0.000662			−0.00372
		(0.04)			(−0.25)
6 months to < 12 months		−0.00770			−0.0120
		(−0.51)			(−0.80)
1 year to < 3 years		0.000720			0.00152
		(0.05)			(0.11)
3 years to < 5 years		−0.000161			0.00227
		(−0.01)			(0.15)
5 years to < 10 years		0.00425			0.00270
		(0.26)			(0.16)
Occupation (ref:Plant and machine operatives)					
Managers			0.0149		−0.0211
			(0.40)		(−0.69)
Professionals			−0.00625		−0.0335
			(−0.36)		(−1.78)
Technicians and associate professionals			0.0278		0.00847
			(1.63)		(0.44)
Clerical support workers			−0.00106		0.00602
			(−0.06)		(0.21)
Service and sales workers			−0.00927		−0.0248
			(−0.98)		(−1.70)
Skilled agric, forestry and fishery workers			0.00871		−0.0209
			(0.36)		(−0.93)
Craft and related trades			0.0761***		0.0404**
			(6.75)		(3.13)
Elementary occupations			0.0530***		0.0179
			(6.22)		(1.54)
Hours worked			0.0000883		0.000282
			(0.35)		(1.13)
Union			−0.00237		−0.00273
			(−0.18)		(−0.22)
Piece rate			−0.000316		−0.00744
			(−0.03)		(−0.81)
Earnings			0.00461		−0.00242
			(1.91)		(−0.91)
Registered				−0.00346	−0.0131
				(−0.34)	(−1.29)
Firm size (ref: 50+)					
Works alone				0.0578***	0.0201
				(4.19)	(1.65)
2-4 persons				0.0464***	0.0315**
				(4.46)	(2.87)
5-9 persons				0.0448***	0.0324**

				(4.36)	(2.94)
10-19 persons				0.0278**	0.0275*
				(2.77)	(2.46)
20-49 persons				0.0777***	0.0657***
				(5.79)	(4.75)
Sector (ref: Agriculture)					
Mining				0.0309	0.0213
				(0.85)	(0.62)
Manufacturing				−0.0139	−0.0177
				(−1.41)	(−1.33)
Elect., gas and water				−0.0420	−0.0563
				(−1.21)	(−1.86)
Construction				0.0159	−0.0207*
				(1.66)	(−2.06)
Trade				−0.0122	0.0310
				(−0.79)	(1.18)
Transportation and storage				0.00689	−0.0104
				(0.50)	(−0.78)
Other services				−0.0376***	−0.0175
				(−4.08)	(−1.11)
N	8577	8577	8577	8577	8577

Specifications (2) and (5) include 25 provincial dummies which are not reported to save space
t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A6: Description and summary statistics of variables[1]

Variable	Description	Mean	SD
Informal	1/0 dummy: 1 if individual is informally employed	0.806	0.395
Injury	1/0 dummy: 1 if individual sustained a non-fatal work injury/illness in the last 12 months	0.085	0.280
Female	1/0 dummy: 1 if female	0.432	0.495
Household size	Number of people in household	5.820	2.058
Change job	1/0 dummy: 1 if individual wishes to change current job	0.080	0.272
Married	1/0 dummy: 1 if Married	0.420	0.494
Education	Level of education attained by the individual: 1) Primary or below; 2)Secondary; 3) Tertiary	1.435	0.560
Age	Age in years	28.096	10.762
Tenure	Years worked for current employer: 1) Less than 3 months; 2) 3 months to less than 6 months; 3) 6 months to less than 12 months; 4) 1 year to less than 3 years; 5) 3 years to less than 5 years; 6) 5 years to less than 10 years; 7) 10 years or more	3.47	1.724
Province	Province of residence- 25 provincial dummy	10.371	6.870
Occupation	Occupation of main job: 1) Managers; 2) Professionals; 3) Technicians and associate professionals; 4) Clerical support workers; 5) Service and sales workers; 6) Skilled agriculture, forestry and fishery workers; 7) Craft and related trades workers; 8) Plant and machinery operatives; 9) Elementary occupations	7.700	1.770
Hours worked	Number of hours usually worked per week	51.910	12.617
Union	1/0 dummy: 1 if individual is a member of a union	0.107	0.310
Earnings	Log of last pay	11.708	1.455

Table A6 – *Continued on next page*

Table A6 – *continued*

Variable	Description	Mean	SD
Registered	1/0 dummy: 1 if individual works in a registered firm	3.830	1.673
Firm size	Number of employees in firm: 1) Works alone; 2) 2-4; 3) 5-9; 4) 10-19; 5) 20-49; 6) 50 or more	3.830	1.673
Industry	Industry of main job: 1) Agriculture; 2) Mining; 3) Manufacturing; 4) Electricity, gas and water supply; 5) Construction; 6) Transportation and storage; 9) Other services	3.700	2.370
HHinformal	Number of household members engaged in informal employment	2.723	1.664

[1] Data source: CLFS 2012
[2] All variables have 8557 observations
[3] 25 provincial dummies in Cambodia not included to save space