



# Illness related wage and productivity losses: Valuing ‘presenteeism’



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## ARTICLE INFO

### Article history:

Received 28 April 2015

Received in revised form

20 October 2015

Accepted 23 October 2015

Available online 26 October 2015

### Keywords:

Canada

Productivity loss

Presenteeism

Marginal productivity

Wage loss

Team work

Valuation

## ABSTRACT

One source of productivity loss due to illness is the reduced “quantity” or “quality” of labor input while working, often referred to as presenteeism. Illness-related presenteeism has been found to be potentially more costly than absenteeism. To value presenteeism, existing methods use wages as a proxy for marginal productivity at the firm level. However, wage may not equal marginal productivity in some scenarios. One instance is when a job involves team production and perfect substitutes for workers are not readily available. Using a Canadian linked employer–employee survey (2001–2005), we test whether relative wage equals relative marginal productivity among team workers and non-team workers with different frequencies of presenteeism (reduction at work due to illness). For the pooled cross-sectional estimates (2001, 2003, 2005) we obtain 13,755 observations with 6842 unique workplaces. There are 6490 observations for the first differences estimates from the odd years and 5263 observations for the first differences estimates from 2001 to 2002 and 2003 to 2004. We find that in both small and large firms, team workers with frequent reductions at work are less productive but earn similarly compared with non-team workers without reductions. We also find that in small firms, workers with occasional work reductions are more productive than workers without reductions, but the reverse is true in large firms. The study findings partially support the literature stating that productivity loss resulting from employee presenteeism could exceed wages if team work is involved.

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## 1. Introduction

Absenteeism is when employees do not arrive at work due to illness. Presenteeism, the flip side of absenteeism, occurs when employees attend work, however due to illness, are not functioning at full capacity (Hemp, 2004). In economic terms, presenteeism refers to the reduced intensity or quality of labor input due to illness while working (Zhang et al., 2011). As a result, both quantity of output (working more slowly, taking more breaks, or repeating tasks) and quality of output (mistakes) will be affected (Hemp, 2004). Many studies have been performed to measure productivity loss arising from illness-related presenteeism and showed that presenteeism is potentially more costly than absenteeism (D'Abate and Eddy, 2007; Goetzl et al., 2004). For instance, Bank One found that its cost of presenteeism amounted to \$311.8 million in 2000,

accounting for 63% of the total health-related costs including direct medical costs and other indirect costs as a result of absenteeism, short-term and long-term disability (Hemp, 2004).

### 1.1. Literature

The existing literature seeks to explain the presenteeism phenomenon and uncover factors that determine presenteeism by considering the association between presenteeism and absenteeism phenomena (Baker-McCleary et al., 2010; Dew et al., 2005; Johns, 2011, 2010), or evaluates the presenteeism related to certain diseases (Despiéglé et al., 2012; Mitchell and Bates, 2011; Zhang et al., 2015). Karanika-Murray et al. (2015) recently presented a model of sickness presenteeism as a determinant of job satisfaction. However, more empirical studies that measure and value the economic cost of productivity loss due to ill health are needed because current research suffers from the following limitations (Zhang et al., 2011).

First, there is a lack of objective measure of productivity loss resulting from presenteeism at the employee level. Unlike

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absenteeism, presenteeism is not always noticeable. For certain jobs, we can link employee self-reported presenteeism and objective measures of productivity, for example, the amount of time spent on each call and between calls for call center workers (Lerner et al., 2003). However, most often, the objective measure of productivity is not available at the employee level (Zhang et al., 2011).

Second, when estimating cost of presenteeism, time loss is first estimated and then converted to costs based on the employees' wage. Wage is assumed to equal marginal productivity at the firm level (Berger et al., 2001; Johannesson, 1996). However, wage may not equal marginal productivity for many reasons (Zhang et al., 2011). One instance is if a job involves team production and perfect substitutes for workers are not readily available (Pauly et al., 2008, 2002). If one team member reduces his or her productivity while working, it might affect other team members' work progress and productivity. Thus, the resulting productivity loss would exceed the wage loss of the team member. A multiplier has been suggested to adjust wage to represent the actual cost of productivity loss. Workplace compensation mechanisms are another factor that may lead the productivity loss due to presenteeism to be less than wage (Severens et al., 1998). Some previous empirical studies have applied wage multipliers or considered compensation mechanisms to estimate the cost of productivity loss (Krol et al., 2012; Zhang et al., 2015).

Several previous studies have linked self-reported presenteeism and actual productivity loss (Hemp, 2004; Lerner et al., 2003). However, no prior studies have linked self-reported presenteeism to an objective monetary measure of productivity or tested the equality of wage and marginal productivity with respect to presenteeism.

## 1.2. Conceptual framework

In estimating a wage regression alone, it is difficult to determine whether the estimated wage differentials reflect productivity differentials or other factors such as wage discrimination (Hellerstein et al., 1999; Hellerstein and Neumark, 1999). Hellerstein and Neumark (1999) and Hellerstein et al. (1999) have developed a framework to simultaneously estimate firm-level wage equation and production function to test the equality between marginal productivity differentials and wage differentials for workers with different characteristics such as age, sex and occupation.

Based on the Hellerstein et al. framework, Hægeland and Klette (1999) analyzed the difference in wage and productivity across Norwegian workers by sex, education and work experience and over 10 studies examined the age-related wage-productivity gap (van Ours and Stoeldraijer, 2010). These studies use databases containing information on a firm's output and payroll, as well as its workers' characteristics including age, sex, and occupation. In Canada, there is such a linked employer-employee database, the Workplace and Employee Survey (WES). The availability of such a database and the Hellerstein et al. framework enables us to test the equality between wage and marginal productivity for workers with different team work status and presenteeism frequencies.

## 1.3. Hypothesis

The null hypothesis is that wage losses due to presenteeism equal marginal productivity losses for both team workers and non-team workers. We also test whether the difference between the wage and productivity losses due to presenteeism is the same in small firms and large firms.

We find that in both small and large firms, team workers with health-related frequent work reductions are less productive than non-team workers without reductions and the resulting

productivity loss is larger than the wage differentials. In large firms, workers with occasional reductions are less productive than those without reductions. However, in small firms, non-team workers with occasional reduction at work are more productive than those without reductions but are paid less than their productivity.

## 2. Methods

### 2.1. Data

The WES was one of only a few linked employer-employee surveys worldwide and the only one in Canada. Two survey questionnaires were administered by Statistics Canada: one for workplaces (1999–2006) and one for employees (1999–2005) (Statistics Canada, n.d.). Workplaces were first randomly sampled from all Canadian employers in the Statistics Canada Business Registry that had paid employees in March of each survey year except those employers in Yukon, Nunavut, the Northwest Territories and those operating in crop production and animal production, fishing, hunting and trapping, private households, religious organizations and public administration. The initial workplace sample in 1999 was followed over time and then was refreshed in odd years (2001, 2003, and 2005) with a sample of firm births. Employees were sampled from a list of employees working or on paid leave in March provided by the workplace samples. Fresh samples of employees were selected in odd years to reflect employee turnover, and the selected employees were followed for two years only.

For this study, we first focus on the for-profit workplaces which have at least one employee interviewed and whose output value is positive. During the second survey years, over 11% of surveyed employees had a different employer or had left their employer and did not have a new employer, which affects almost 30% of surveyed workplaces. Since employee attrition from the WES during the second survey years is high and the attrition is likely non-random (Pendakur and Woodcock, 2010), data from even-numbered years are not used for the cross-sectional analysis but only for the longitudinal analysis (more details in Section 2.3.3). However, on account of the question related to our measure of presenteeism having changed since 2001 (details in Section 2.2.2), we further restrict our sample to the data from 2001.

This study is a secondary analysis using Statistics Canada data and thus does not require an ethics review. Statistics Canada (2015) has established the policies and procedures to mitigate the risk to respondents of Statistics Canada's surveys and to protect the confidentiality of respondents.

### 2.2. Variable definition

#### 2.2.1. Outcome variables and independent variables of interest

*Output* is defined as value added, i.e., annual gross operating revenues minus expenses on materials (Turcotte and Rennison, 2004a, 2004b). *Wage* is defined as annual payroll.

*Reduction at work* due to illness is used as our proxy measure for self-reported presenteeism. In 1999, this was assessed by asking employees, "Are you limited in the kind of activity that you can do because of a long-term physical condition, mental condition or health problem?" followed by, "If yes, are you limited at work?" (Statistics Canada, n.d.). Response options were limited to either yes or no. However in 2001, the work limitation question was replaced with a new question that asked, "Does a physical condition or mental condition or health problem reduce the amount or the kind of activity you can do at work or at school?" (Statistics Canada, n.d.). This question refers to conditions or health problems that have lasted or are expected to last six months or more. Four choices were available: 1) yes, often, 2) yes, sometimes, 3) no, 4) not applicable.

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