

No Pain, No Gain:
The Effects of Exports on Job Injury and Sickness

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Abstract: We live in a century of globalization and rising expenditures on health, but little rigorous research has been done to understand the impacts of globalization on individuals' health. We combine Danish data on individuals' health with Danish matched worker-firm data to understand how increases in exports by firms affect their employees' job injuries and sick-leave days during 1995-2006. We find that an exogenous increase in exports leads to higher work efforts and higher rates of injury and sickness. The former includes less minor sick-leave days and more total hours (regular plus over-time), and the latter includes higher rates of job injury, higher incidence of stress and depression for women, and more genuine sick days per worker per year. In addition, these effects differ for large vs. small export shocks and also differ for men vs. women. During the 2007-2009 recession, Danish exports and on-the-job injuries fell significantly. Our estimates could account (out of sample) for 12%- 62% of the actual decrease in job injury counts in this period. Finally, we develop a framework to calculate the contemporaneous welfare losses due to higher rates of multiple types of injury and sickness.

1. Introduction

A large literature examines how globalization affects wages and pecuniary welfare; e.g. Feenstra and Hanson (1999), Autor, Dorn and Hanson (2013), and Hummels, Jørgensen, Munch and Xiang (2014), or HJMX 2014. Another large literature examines how individuals' health is shaped by economic conditions; e.g. Marmot et al. (1991), Ruhm (2000), and Sullivan and von Wachter (2009). In this paper we take a small step to bridge the gap between the two literatures by examining how globalization, in particular exports, affects workers' health.

We do so by using Danish administrative data that match the population of Danish workers to the universe of private-sector Danish firms. For each individual we have rich information about work intensity (total hours worked, including over-time) and health outcomes, including on-the-job injuries, number and severity of worker absences due to illness, and utilization of the healthcare system, including prescription drug use, doctors visits and hospitalization. For each firm, we have detailed information on production characteristics and international trade (imports, exports) disaggregated by partner country and product.

Using these data we can match worker health outcomes to characteristics of the firms and industries in which they work, and to study how exogenous changes in those characteristics affect worker health outcomes. The richness of the data allows us to describe work intensity and access to health care in novel ways. For example, because we see both counts and dates, we can distinguish between workers' "major" and "minor" sick-leave days. Major-leave sick days correspond to time off of work in which workers also access the health care system (seeing a doctor or buying prescription drugs) within a week. Minor sick-leave days correspond to time off work in which workers do not access the health care system. This may represent actual sickness of sufficiently mild severity that health professionals are not required or shirking (e.g. claiming additional vacation time in the guise of a medical event).

Our hypothesis is as follows. Suppose a firm faces an upward sloping labor supply curve (due to, e.g. labor market frictions) and a rise in demand for its products. To respond to this demand shock the firm increases labor quantities, either by hiring more workers or increasing work intensity. Examples of the latter channel include working additional hours, choosing to work rather than to stay home in case of mild sickness, and working at a more rapid pace on the job. If an increase in work intensity leads to increased risk of adverse health outcomes, then we will see a positive relationship between three variables within the firm: rising exports, rising work intensity, and adverse measures of employee health. The reverse may occur during recessions: reductions in exports, work intensity, and adverse health outcomes.

We face a significant identification challenge in taking our hypothesis to the data. Firms may differ in task composition, technology employed, and the strength of work ethic in ways that are correlated with output and with health outcomes. For example, better technology may increase sales and reduce injury risk, but a hard-driving corporate culture may increase sales while increasing injury risk. Similarly, changes in worker health, especially for smaller firms, may significantly reduce worker and firm productivity and firm sales. To address this problem, we rely on shocks to demand arising from exogenous changes in export markets.

The work intensity and health outcome effects of changes in output could in principle be the same regardless of whether they arise from domestic or foreign shocks. However, the output of the firms in our data is highly oriented toward export markets and relying on exports to identify the effects yields several significant benefits. First, within the same industry, otherwise similar firms sell products to different markets. This allows us to construct instruments (transportation costs and importer demand shocks) that are specific to a particular partner country \times product \times year, but whose impact varies across firms. These instruments generate large exogenous firm-year variation in the exports, providing an excellent source of identification for changing work intensity and health outcomes. Second, trade-

related shocks may be more transient than domestic demand shocks (c.f. the literature on short export durations as in Besedeš and Prusa, 2006). This makes it more likely that firms will respond to a positive foreign demand shock by increasing work intensity rather than hiring additional workers.

In our base regressions, we condition on job-spell fixed effects so that the source of our variation is the change over time within a given worker-firm relationship. We find that an exogenous increase in exports leads to higher rates of job injury, higher incidence of stress and depression for women, and more genuine sick days per worker per year. These adverse effects on workers' health are likely due to increased efforts/work intensity. Following an export shock, workers reduce the numbers of minor sick-leave days but increase total hours (regular hours plus over-time hours). In addition, these effects of exports on workers' health and efforts differ for large vs. small export shocks, and also differ for men vs. women. These results are novel to the literature.

To provide some context for these estimates we perform two exercises. First, our estimates from micro data may provide a new channel through which the reduction in work intensity during economic recessions affects injury. Using our estimates and the actual decrease in exports for Denmark, we predict the fall in job-injury counts due to the fall in exports during the Great Trade Collapse for Denmark. We find that declining output due to exports accounts for 12% - 62% of the actual decrease in job-injury counts in this period. Second, while our injury result captures the "pain" from globalization, our earlier work, HJMX 2014, shows the "gain" from globalization: wage rises in response to exogenous increases in exports. Which is more substantial? The literature that estimates the economic values of better health focuses on reduced mortality and longer life span,¹ and so we develop a framework to calculate the contemporaneous welfare loss due to higher rates of multiple types of injury and sickness. Using this framework we show that the injury-and-sickness pain from rising exports is small but substantial, as compared with the wage gain.

¹ E.g. Murphy and Topel (2003), Becker, Philipson and Soares (2005), and Egan, Mulligan and Philipson (2013). An exception is Finkelstein, Luttmer and Notowidigdo (2013), who estimate the effects of chronic diseases on marginal utility using data on subjective happiness.

Our work mainly speaks to the following strands of literature. In the trade literature, one line of work examines the effects on wages and/or employment of offshoring (e.g. Feenstra and Hanson 1999), exports (e.g. Verhoogen 2008), import competition (e.g. Autor, Dorn and Hanson 2013), offshoring and exports (e.g. HJMX 2014), and the threat of import competition (e.g. Pierce and Schott 2014).² Autor, Dorn, Hanson and Song (2013) and McManus and Schaur (2014) examine, respectively, how U.S. imports from China affect the social-security-disability-insurance (SSDI) take-up rates and injury rates. Another line of work estimates pecuniary welfare gains from trade (e.g. Broda and Weinstein 2006, Arkolakis, Costinot and Rodriguez-Clare 2012). In the health literature,³ one line of work studies how economic recessions affect mortality rates (e.g. Ruhm 2000, Coile, Levine and McKnight 2014),⁴ a second line of work studies the effects of displacement and plant closures on mortality and hospitalization (e.g. Sullivan and von Wachter 2009, Browning and Heinesen 2012),⁵ and a third line of work estimates the economic values of better health, as we discussed previously. Relative to the trade literature we explore the non-pecuniary effects of globalization on individual workers' health. Relative to the health literature, we explore a unique set of exogenous trade shocks that change the competitive environment of firms and study the micro channels through which these shocks affect workers' injury and sickness. The comprehensive and panel structure of our Danish data allow us to study effects that occur within job spells, and to avoid a significant problem that confounds identification with previous work. Since Danish health care is free and universal, changes in income or job status do not affect workers' access to health care. We can then attribute changes directly to the work environment itself.

In addition, our work is also related to other studies, such as those using similar dependent variables. We will bring them up later in the paper. In what follows, section 2 describes our data.

² For recent surveys see Goldberg and Pavcnik (2007), Harrison, McLaren and McMillan (2011), and Hummels, Munch and Xiang (2014).

³ For surveys of older work see Currie and Madrian (1999) and Smith (1999).

⁴ See also Stevens, Miller, Page and Filipinski (2011), Lindo (2013), Tekin, McClellan and Minyard (2013), and Ruhm (2013).

⁵ See also Black, Devereaux and Salvanes (2012), Browning, Dano and Heinesen (2006), Eliason and Storie (2007, 2009).

Section 3 provides a theoretical framework to motivate our empirical specifications, and describes how we construct our instrument variables. Section 4 presents our main results. section 5 draws out their broader implications for changes in injury counts during recessions. Section 6 calculates the non-pecuniary welfare effects of exports. Section 7 concludes.

2. Data, Danish Labor Market, and Danish Healthcare System

2.1 Data on Workers, Firms, and Trade, and Danish Labor Market

In previous work (HJMX 2014) we have used Danish⁶ administrative data that matches workers to firms and the import and export transactions of those firms. The data cover the period 1995-2006 and match the population of Danish workers to the universe of private-sector Danish firms. Each firm's trade transactions are broken down by product and origin and destination countries. The primary data sources are the Firm Statistics Register, the Integrated Database for Labor Market Research ("IDA"), the link between firms and workers ("FIDA"), and the Danish Foreign Trade Statistics Register. This link enables us to study exogenous shocks to each firm's trading environment and how those shocks are translated into changes in firm outcomes (output, employment) as well as labor market outcomes for each worker. We again use this strategy, but augmented to include measures of health outcomes and work intensity for workers.

We have three ways to measure worker health outcomes. One, individual-transactions data on doctor visits, prescriptions and hospitalizations. Two, data on individual's work-related injuries. Three, episodes in which individuals miss work due to illness. Each has its advantages and disadvantages. Individual transactions data provide the most comprehensive look at health care utilization. However, utilization may not indicate an adverse health outcome (as in well-patient visits) or it may indicate an adverse health outcome that is unrelated to employment. Work-related injuries

⁶ As we describe in HJMX 2014, Denmark is a good candidate for studying the effect of labor demand shocks on wages because it has one of the most flexible labor markets in the world (e.g. Botero et al. 2004).

are clearly adverse health outcomes related to employment, but are relatively rare. The use of sick leave is much more common, and in many cases represents an adverse health outcome but may or may not be related to employment, and it is possible that workers may “shirk” by falsely claiming illness. We will use each of these in different ways to try and understand the effects of export shocks on worker’s health.

2.2 Data on Individual Transactions within the Danish Healthcare System

For this paper we bring in additional administrative datasets that contain comprehensive information about individuals’ health care utilization during 1995-2009. We observe the *universe* of *transactions* for every person within the Danish healthcare system, including doctors visits, prescription drug purchases, and hospitalization.⁷ These datasets are organized by the same worker identifiers as the data in sub-section 2.1, allowing us to merge them.

The data on doctors visits includes each individual’s visit dates (by week), type of doctors visited (e.g. general practitioner, psychiatrist), and total cost of the visit. The data on prescriptions include each individual’s prescription date, detailed drug classification following the Anatomical Therapeutic Chemical classification system (ATC), copay (out-of-pocket expenses by patients) and total prescription drug cost. The data on hospitalization includes dates for first and last day of the hospitalization period and the diagnosis which follows the International Classification of diseases (ICD10).

In the literature, a common concern for data on the utilization of medical care is that access to care could be correlated with individuals’ socio-economic conditions (e.g. income and employment

⁷ Prescription drugs data are drawn from the “Register of Medicinal Product Statistics” maintained by Statens Serum Institut (SSI). These data hold all individual transactions at pharmacies. There is information about the transaction price, the price paid by the consumer, a detailed ATC drug code and the date of the transaction. Data for contacts with the doctor are drawn from the “Doctoral Visits Register”. In this register every visit to the doctor (including phone calls) is identified by a visit date and a doctor type (e.g. general practitioner, specialized doctor, dentist, psychologists etc.). We disregard all dental visits in the data.

status), and that this correlation could contaminate the care-utilization data (e.g. Currie and Madrian 1999). This concern would be especially serious for care-utilization data for the U.S., since the majority of healthcare in the U.S. is employer-based. For example, an unemployed worker in the U.S. might visit doctors less, not because he/she is healthier, but because he/she has lost access to healthcare. However, this concern is unlikely to be a main issue for us, because the Danish healthcare system is almost entirely funded by the government, available to all Danish residents regardless of employment status, and virtually free to all.⁸

There are two main exceptions to free healthcare in Denmark. Dental care is not covered and a small portion of prescription-drug expenses are borne by the patients. We do not consider dental visits in our data, and the prescription co-pays are small enough (roughly 0.13 percent of median income) that income constraints on access are unlikely to be binding.⁹ Given the free and universal nature of the Danish healthcare system, access to healthcare in Denmark is independent of economic shocks to individual workers.¹⁰ Therefore, our data provides us a unique opportunity to study the effects of economic shocks on individual workers' health, because any time a Danish individual interacts with the Danish healthcare system, we observe this interaction and its detailed information in our data.

The main variables we use in the paper are the following dummies that indicate severe stress and depression: whether an individual has positive expenses on any anti-depressant prescription drug, and whether an individual purchases anti-depressants or visits a psychiatrist.¹¹ As in many developed countries, the number of antidepressants prescribed in Denmark has increased markedly over the past

⁸ There are private hospitals in Denmark which suggests queuing might be an issue for hospitalization. We do not address quality of care issues in this paper.

⁹ For all Danish full time workers aged 20-60 during 1995-2009, the median out-of-pocket expense is 404 DKK while the median labor income is 296,379 DKK (1 DKK is about 0.18 USD in this time period).

¹⁰ Even if a worker is unemployed, the unemployment benefits are generous, as discussed in sub-section 2.1.

¹¹ Anti-depressants are defined as ATC code N06A, which includes the subgroups N06AA (Non selective monoamine reuptake inhibitors), N06AB (Selective serotonin reuptake inhibitors), N06AF (Monoamine oxidase inhibitors, non-selective), N06AG (Monoamine oxidase type a inhibitors) and N06AX (Other antidepressants). Of these Selective serotonin reuptake inhibitors account for the bulk of anti-depressant purchases. For example Prozac belongs to this group of anti-depressants.

decades. Danish sales of anti-depressants have increased from less than 10 per 1000 inhabitants in 1990 to 84 per 1000 inhabitants in 2010. Anti-depressants are often used as first-line treatment of severe depression and for treatment of mild to moderate depression that persist after alternative treatments such as cognitive therapy. Table 1 shows the summary statistics of these variables. In our main sample, the workers with large manufacturing firms that import and export at some point during 1995-2006,¹² 2.93% of worker-years have positive expenses on anti-depressant drugs, and 3.24% either purchase anti-depressants or visit psychiatrists.

2.3 Job-Related Injury

When a worker is injured on the job, they may file a petition for compensation with the National Board of Industrial Injuries (NBII). If the job injuries are severe enough to cause permanent damages to the workers' earning and working abilities, then the workers are also eligible for a one-time, lump-sum monetary compensation from the Danish government.

We observe all the petitions filed during 1995-2009, and the final decision by NBII for each petition. Among those filed by Danish workers aged 20-60, NBII rejected 44% of petitions, accepted 28% but paid no compensation, and accepted 22% with compensation. For each petition with positive compensation, we observe: (1) the percentage damage to the workers' working and earning abilities (e.g. 15%), as determined by NBII; (2) the monetary compensation awarded; (3) detailed types of injury (e.g. "sprain, strain, etc.", and "toxic eczema"); and (4) the year of the injury and other information. The main injury variable we use is a dummy that equals 1 if worker i is injured in year t , and the injury is severe enough to warrant positive monetary compensation.¹³

¹² We focus on these workers and firms in order to construct instruments, which we will explain in sub-section 3.4. In Table A1 we show the summary statistics for several variables for the "Full" sample, which consists of all Danish workers aged 20-60 during 1995-2009, and the "Mfg." sample, those with the manufacturing sector. These summary statistics are similar to our main sample.

¹³ A medical literature studies the risk factors of job injury using data for individual firms or industries (e.g. Bigos et al. 1991), and a small economic literature studies the "Monday effect", that the number of injury claims jumps on Mondays in

One potential concern with our main injury dummy is that the standard used by NBII to award compensation may endogenously respond to economic fluctuations (e.g. tougher standards during recessions). This is not the case in our data. During 2007-2009, Denmark's Great Depression, NBII accepted around 51% of all petitions, while during the pre-recession years of 2004-2006, NBII accepted about 48% of all petitions.

The first panel of Table 1 shows the summary statistics of our injury variables. The mean injury rate is about 4 per thousand in our main sample. 4.1 per thousand for the manufacturing sample. Our injury rate is lower than in the U.S. data, probably because we only include severe injuries while the U.S. data includes all injuries. The mean injury compensation across all workers, including those who do not receive positive compensation is 1542.5 DKK; the mean conditional on receiving positive compensation, however, is 401,987 DKK in our main sample.¹⁴ This is roughly similar to the median annual labor income (see sub-section 2.2).

Note that in Denmark, workers typically do not exit the labor force after receiving monetary compensation. In our data, most workers stay employed with the same firm after injury. This is different from the U.S., where workers typically exit the labor force upon receiving Social Security Disability Insurance (SSDI).

2.4 Minor and Major Sick-leave Days

Worker sick leaves are recorded in the "Sickness benefit register", along with the reason for absence from work (sickness, birth of child, child care leave, child sick etc). We use this register to count the number of days absent from work due to sickness for each worker-year. The reasons for absences are self-reported, which suggests the possibility of shirking, or workers calling in sick when

U.S. data (e.g. Campolieti and Hyatt 2006). Finally, the U.S. data on injury rates by industry and occupation are widely used to estimate the value of a statistical injury (e.g. Viscusi and Aldy 2003).

¹⁴ The mean injury rate and injury compensation in our main sample are very similar to the sample of all manufacturing worker-years, the "Mfg" sample in Table A1.

they are not. This kind of variables has been used in the literature before as a measure for shirking/efforts (e.g. Ichino and Maggi 2000, Hesselius et al., 2009). The interpretation is that more sick-leave days are more days of absence of work, and so more shirking, less efforts.¹⁵ Taking full advantage of our data we are able to go one step further than the literature, to show exactly what the workers do during their sick-leave spells.

We split the sick-leave variable into two components by cross-checking the exact dates of every sick-leave spell in the sick-leave Register data against the precise dates of every individual's prescription drug purchases and doctor visits. Since our prescription-drug Register and doctor-visit Register data cover the *universe* of these transactions in Denmark, when we do not observe any drug purchase or doctor visit one week before, during or one week after a sick-leave spell, we are confident that this particular worker never visited a doctor or purchased any prescription drug during his sick leave. We count the number of such days as *minor* sick-leave days. We count all the other sick-leave spells as *major* sick-leave days.¹⁶

Table 1 shows that for our main sample, the average is 6.11 per worker per year for major sick-leave days, and 0.21 per worker per year for minor sick-leave days. However, the vast majority of the observations have 0 values for major sick-leave days (over 90%) and minor sick-leave days (over 95%). Among those with positive values, the mean is 38.9 per worker per year for major sick-leave days in the full sample, and 2.5 per worker per year for minor sick days. Table 1 also shows that Danish firms are very export oriented, which is useful for our identification strategy. Exports as a share of firm sales is 0.66 for the average worker in the sample.

¹⁵ Other measures for shirking/efforts include survey questions (Freeman, Kruse and Blasi, 2008) and outputs of individual workers at individual firms (e.g. Lazear 2000, Mas and Moretti 2009). The medical literature also uses the number of sick-leave days (e.g. Kivimaki et al, 2005), but, again, does not have information about what the workers do during sick-leave spells.

¹⁶ Henrekson and Persson (2004) show that the number of sick-leave days responds to changes in sick-leave benefits in Sweden. There has been no major policy change regarding sick-leave benefits in Denmark in our estimation sample.

2.5 Work Hours

We observe over time hours and total hours (over time plus regular hours) for a sub-sample of our workers from the “Wage Statistics Register”. This register is based on reporting from the firms and covers in principle workers in all private sector firms with at least 10 employees. One potential concern is that our work-hour sub-sample may be subject to selection: some occupations (e.g. managers) may be more subject to the reporting rules than others (e.g. assembly line workers). Table A2 in the Appendix tabulates the fractions of 1-digit occupations in employment for our main sample and for the work-hour subsample. The employment shares are similar.

Table 1 shows that the mean number of total hours is 1532.6 per year in our main sample. Of these, 50.6 hours are over time. In our analysis we focus on the number of total hours, because over-time hours take the value of 0 for a large fraction of our work-hour sub-sample.

To summarize, our dataset provides several advantages. First, the data cover the population of Danish workers and firms. Second, we consistently track the actual health utilization of individual workers over time so we control for unobserved worker heterogeneity. Finally, the large number of variables in the data provides rich information, and this helps us to pinpoint the specific channels through which exports affect health, as we explain below.¹⁷

3. Framework and Specification

3.1 Conceptual Framework

Figure 1 shows our conceptual framework. Firm j faces an upward sloping labor supply curve (e.g. Manning 2011). Its demand for labor is derived from the firm’s production function and (domestic plus foreign) demand for firm j ’s output. The intersection of firm j ’s labor demand and

¹⁷ Two very well-known panel datasets with individuals’ health information are the Framingham heart sample (e.g. Hubert et al. 1983), and the Whitehall sample (e.g. Bosma et al. 1997, Marmot et al. 1997). These samples are not fully representative of the population: those in the Framingham heart sample are relatively obese, and those in the Whitehall sample British civil servants located in London.

supply curves determine wage and the quantity of labor supplied to firm j . Suppose an exogenous shock increases firm j 's exports so that j 's demand for labor increases. It follows that wages rise for firm j (which HJMX 2014 has shown), and that the quantity of labor supplied to the firm also rises (which we will show below). Labor supplied to the firm can increase either through an increase in the number of workers, or an increase in work intensity holding the number of workers constant. Examples of the latter channel include working additional hours, taking fewer minor sick-leave days off, and working at a more rapid pace on the job.

Medical research has shown that working long and extended hours is associated with a wide range of negative health outcomes, including higher blood pressure, higher cortisol level (an indicator for stress), more depression, higher probability of coronary heart disease and death (e.g. Virtanen et al. 2012, O'Reilly and Rosato 2013).¹⁸ In addition, prolonged squatting and working with hands are associated with widespread body pain (e.g. Harkness et al., 2004).¹⁹ Following this line of work we hypothesize that an increase in work intensity increases the likelihood of injury and sickness. It then follows that a rise in exports should be associated with higher injury and sickness rates. These are our main hypotheses.

On the other hand, offshoring²⁰ is likely to have ambiguous effects on injury. An exogenous increase in offshoring may either increase or decrease firm j 's labor demand, depending on the complementarity between labor and imported inputs, and could also change the task composition within firm j (e.g. firm j could have offshored more hazardous tasks).²¹ Therefore, our main focus in this paper is exports, but we also control for offshoring in our estimation.

¹⁸ This point has recently received media coverage, such as the blog "Get a life – or face the consequences", January 30, 2014, of the Economist magazine (<http://www.economist.com/blogs/freeexchange/2014/01/working-hours?fsrc=rss>).

¹⁹ These studies in the medical literature focus on identifying risk factors and correlation patterns, and do not separate exogenous changes in work intensity from the tendency of certain individuals to work hard and suffer adverse health consequences.

²⁰ Given previous work (e.g. Autor, Dorn, Hanson and Song 2013) we do not focus on the effects of import competition.

²¹ HJMX 2014 show that exogenous increases in offshoring lead to higher (lower) wages for skilled (unskilled) workers, and lower wages for the workers of more hazardous occupations conditional on skill.

We face two challenges in taking our hypotheses to the data. First, exports are endogenous. Productive firms may export more and use better technology, which could reduce injury rates. Second, individual workers' work intensity is typically unobservable to researchers. We will follow the instrument-variable strategy of HJMX 2014 to address the endogeneity of exports, and our data allows us to observe total hours, including over-time work. We spell out the details below.

3.2 Theory

We first formalize the conceptual framework laid out in sub-section 3.1 and derive our estimation equations. To ease exposition we will drop subscripts during the initial derivation, but add them back when we transit to the empirical specifications.

Consider a single Danish firm selling in both domestic and foreign markets, and its total revenue is ψY . The parameter ψ is a demand shifter, and could potentially capture aggregate expenditure, elasticity of demand, trade cost to the destination markets, and so on. Y depends on the quantity of the firm's output, Q , and the elasticity of demand.²² The firm produces output Q using capital, K , materials, M , and labor, the quantity of which depends on employment, L , and effort of individual workers, e . Assume that the firm's production function is continuously differentiable and concave (e.g. Cobb-Douglas, CES), and that individual workers' effort cost is $ac(e)$, where a is a parameter, and the function $c(\cdot)$ is continuously differentiable and convex.

The firm and its employees engage in multi-lateral bargaining, where each worker receives the same weight in the bargaining process (Stole and Zwiebel 1996, and Helpman, Itskhoki and Redding

²² E.g. consider the following monopolistic-competition framework. Preferences are CES with substitution elasticity $\sigma > 1$. There is a single foreign market, and the ice-berg trade cost between Denmark and the foreign market is $\tau > 1$. Let "*" denote the variables for the foreign market. Then it is easy to show that the firm's total revenue, from both the domestic and

foreign markets, equals $(\frac{E}{P^{1-\sigma}} + \frac{E^* \tau^{1-\sigma}}{P^{*1-\sigma}})^{\frac{1}{\sigma}} Q^{\frac{\sigma-1}{\sigma}}$, where E is consumer expenditure and P the CES price index (e.g. Helpman,

Itskhoki and Redding 2010). In this example, $\psi = (\frac{E}{P^{1-\sigma}} + \frac{E^* \tau^{1-\sigma}}{P^{*1-\sigma}})^{\frac{1}{\sigma}}$ and $Y = Q^{\frac{\sigma-1}{\sigma}}$.

2010, or HIR 2010). The solution of this bargaining process has the firm collecting the fraction $1 - \beta$ of the total surplus, while each individual worker collects the fraction β of total surplus per worker. The parameter β is a constant.²³ We assume that the workers' outside options are 0. The firm's outside option equals the fraction $1 - \theta_f$ of total revenue, ψY .

The total surplus of the bargaining game is then $\psi Y - p_M M - rK - (1 - \theta_f)\psi Y = \theta_f \psi Y - p_M M - rK$, where p_M is the price of materials, including domestic materials and imported/offshored inputs, and r is the price of capital. We assume that the firm takes p_M and r as given. The firm's problem is to choose L , M and K to maximize its take $(1 - \beta)[\psi Y - p_M M - rK - (1 - \theta_f)\psi Y] + (1 - \theta_f)\psi Y - b(L)$, where $b(L)$ is search/hiring cost. The optimally chosen employment, L , is the extensive margin for labor quantity. For the rest of the paper we push the firm's problem into the background and focus on the workers' problem.²⁴

The workers take the firm's optimal choices of L , M and K as given and

$$\max_e \left\{ \beta \frac{\theta_f \psi Y - rK - p_M M}{L} - ac(e) \right\}. \quad (1)$$

Let $y = Y/L$ be revenue per worker. Then the first-order condition for (1) is

$$\beta \theta_f \psi \frac{\partial y}{\partial e} = ac'(e). \quad (2)$$

Equation (2) determines the optimal effort level, e , which is the intensive margin for labor quantity.

Equation (2) implies that

$$\frac{\partial e}{\partial \psi} = \frac{\beta \theta_f (\partial y / \partial e)}{ac''(e) - \beta \theta_f \psi \frac{\partial^2 y}{\partial e^2}}. \quad (3)$$

²³ β , in turn, depends on such parameters as the elasticity of demand (e.g. HIR 2010). For our purpose, how β depends on these other parameters does not matter, as long as β is a constant.

²⁴ The firm takes as given individual workers' optimal choices of effort level, which we derive below.

Because $\partial y / \partial e > 0$ (effort makes a positive contribution to total output), $c''(e) > 0$ (effort cost is convex), and $\frac{\partial^2 y}{\partial e^2} < 0$ (diminishing returns with respect to effort level), equation (3) says that $\frac{\partial e}{\partial \psi} > 0$; i.e. as export increases for exogenous reasons, effort level rises. The intuition is simply that the increase in export raises returns to effort. Therefore,

Proposition 1. Effort level rises as export rises for exogenous reasons.

To make the transition from (2) to an estimation equation we add the following specifications for effort cost and revenue per worker:

$$ac(e) = ae^\eta, 1 < \eta. \quad (4)$$

$$y = e^\gamma F(K, M, L), 0 < \gamma < 1. \quad (5)$$

Equation (4) specifies a power function for effort cost. The power, η , exceeds 1 to ensure that effort cost is a convex function. One special case of specification (4) is the quadratic functional form $c(e) = \frac{1}{2}e^2$. On the other hand, equation (5) says that effort level enters revenue per worker in a multiplicative way and as a power function. The parameter value for the power γ is to ensure that revenue per worker is increasing and concave in effort level.²⁵

Plugging (4) and (5) into equation (2) yields $e^{\eta-\gamma} = \frac{\beta\gamma\theta_f\psi}{a\eta} F(K, M, L)$, or

$$\ln e = \frac{1}{\eta-\gamma} (\ln \beta + \ln \theta_f + \ln \psi + \ln \frac{\gamma}{\eta} - \ln a) + \frac{1}{\eta-\gamma} \ln F(K, M, L). \quad (6)$$

We now specify how the variables in (6) change across workers, i , firms, j , and years, t . We assume that β and γ are constant, since they reflect inherent input-output relationship in firm-level production and elasticity of demand. The firm's demand shifter, ψ , and input uses, K , L , and M , all

²⁵ A special case of (5) is for the production function to be Cobb-Douglas (i.e. $Q = BK^{\delta_K} M^{\delta_M} (eL)^{\delta_L}$, $\delta_K + \delta_M + \delta_L = 1$), and for preferences to be CES so that revenue is a power function of output (see note 10, where we show that $Y = Q^{\frac{\sigma-1}{\sigma}}$, where $\sigma > 1$ is the substitution elasticity).

vary by firm by year, while the firm's outside option, θ_f , varies across firms but not over time (since we do not have good measures for θ_f in the data). For the workers' variables, effort level, e , varies by worker by year. We assume that the shape of the effort cost function, η , captures time-invariant worker characteristics (e.g. gender), while the shifter of the effort cost function, a , captures time-varying worker characteristics (e.g. union status).²⁶ Adding worker, firm and year subscripts to equation (6) we get

$$\ln e_{it} = \frac{1}{\eta_i - \gamma} (\ln \beta + \ln \theta_{f,j} + \ln \psi_{jt} - \ln a_{it} + \ln \frac{\gamma}{\eta_i}) + \frac{1}{\eta_i - \gamma} \ln F(K_{jt}, M_{jt}, L_{jt}). \quad (7)$$

Equation (7) implies that $\frac{\partial \ln e_{it}}{\partial \ln \psi_{jt}} = \frac{1}{\eta_i - \gamma} > 0$. This simply echoes Proposition 1. In addition, it suggests the following interaction effect. A given exogenous change in export has larger effects on the effort levels of the workers whose effort costs, η_i , are smaller. We will estimate both the direct effect of exports and how it interacts with time-invariant worker characteristics.

In our data, we use exogenous changes in export, X_{jt} , to measure changes in the demand shifter, ψ_{jt} . Let C_i be time-invariant worker characteristics that may affect the shape of the cost function, η_i . Equation (7) then implies the following regression

$$\ln e_{it} = \alpha_{ij} + \beta_1 \ln X_{jt} + \beta_2 C_i \ln X_{jt} + \mathbf{x}_{it} b_1 + \mathbf{z}_{jt} b_2 + \mathbf{x}_{it} \mathbf{z}_{jt} b_3 + \alpha_R + \alpha_{IND,t} + \varepsilon_{ijt}. \quad (8)$$

In equation (8), $\beta_1 \ln X_{jt} + \beta_2 C_i \ln X_{jt}$ represent the way we estimate the term $\frac{1}{\eta_i - \gamma} \ln \psi_{jt}$ in equation (7). β_1 captures the direct effect of exogenous changes in export on overtime hours, and by Proposition 1, $\beta_1 > 0$. β_2 captures how the effects of exports interact with time-invariant worker characteristics, and $\beta_2 > 0$ if an increase in C_i means a decrease in effort cost by equation (7).

²⁶ Implicitly we have also assumed that the relationship between η_i and a_{it} and individual effort costs cannot be verified with third parties, so that they do not affect the bargaining game between workers and the firm.

The motivation for the other variables in equation (8) is as follows. α_{ij} is job-spell fixed effects and it controls for the terms $\frac{1}{\eta_i - \gamma} \ln \beta$ and $\frac{1}{\eta_i - \gamma} \ln \theta_{f,j}$ in (7), and also absorbs the portion of $\frac{1}{\eta_i - \gamma} \ln F(K_{jt}, M_{jt}, L_{jt})$ that is worker-firm specific. α_R and $\alpha_{IND,t}$ represent region and industry-by-year fixed effects. The vector of firm characteristics, \mathbf{z}_{jt} , and worker characteristics, \mathbf{x}_{it} , control for the terms $\frac{1}{\eta_i - \gamma} \ln a_{it}$ and $\frac{1}{\eta_i - \gamma} \ln F(K_{jt}, M_{jt}, L_{jt})$.

3.3 Empirical Specifications

Motivated by (8), we first estimate the effects of exports on IOS_{ijt} , the injury or sickness status of worker i employed by firm j in year t . We then estimate how export affects WK_{ijt} , measures for how much or how hard worker i works for firm j in year t . The estimation for IOS_{ijt} shows how export affects individual workers' health, while that for WK_{ijt} helps identify the micro channels of these effects.

To be specific, for IOS_{ijt} we estimate

$$IOS_{ijt} = \beta_1 \ln X_{jt} + \beta_2 F_i \ln X_{jt} + \mathbf{x}_{it} b_1 + \mathbf{z}_{jt} b_2 + b_3 F_j \ln M_{jt} + \alpha_{ij} + \alpha_R + \alpha_{IND,t} + \varepsilon_{ijt}. \quad (9)$$

Equation (9) comes from (8). F_j is the dummy for female. The vector of time-varying worker characteristics, \mathbf{x}_{it} , includes union status, marital status and experience. The vector of time-varying firm controls, \mathbf{z}_{jt} , includes value of offshoring, M_{jt} , employment, capital/labor ratio, and the share of skilled workers in employment. α_{ij} , α_R , and $\alpha_{IND,t}$ represent job-spell, region and industry-by-time fixed effects. Relative to (8), we have only included the interaction between the female dummy and offshoring in (9), and not the other interaction terms between the vectors \mathbf{x}_{it} and \mathbf{z}_{jt} . The effects of exports on men's health are β_1 , and those for women $\beta_1 + \beta_2$.

Of the variables we have discussed in section 2, we use the following for IOS_{ijt} : (1) the dummy

for job-related injuries; and (2) the dummies for severe stress or depression. If higher efforts by individual workers lead to more injury and sickness, by (8) we have $\beta_1 > 0$, $\beta_1 + \beta_2 > 0$, or both.

To identify the micro channels through which exports affect injury and sickness, we estimate

$$WK_{ijt} = \beta_1 \ln X_{jt} + \beta_2 F_i \ln X_{jt} + \mathbf{x}_{it} b_1 + \mathbf{z}_{jt} b_2 + b_3 F_j \ln M_{jt} + \alpha_{ij} + \alpha_R + \alpha_{IND,t} + \varepsilon_{ijt} . \quad (10)$$

The right-hand side variables of equation (10) are the same as in (9), and we think about the dependent variable of (10), WK_{ijt} , as a proxy for the unobservable effort level, e_{it} , of (8). Of the variables we have discussed in section 2, we use the following for WK_{ijt} : (1) the number of *minor* sick-leave days; and (2) the number of total work hours. We expect the coefficients of exports for total hours to be positive. However, the export coefficients for minor sick-leave days should be negative, for the following reason. When a worker claims sick leave but never visits a doctor or purchases any prescription drug one week before and one week after his spell of absence, there are two possibilities. One, the worker could be shirking. Or, his sickness could be so mild that he could have chosen to work. In either case, we interpret a reduction in the number of *minor* sick-leave days as evidence for increased effort level.

We also use the number of major sick-leave days as our dependent variable. For this variable the interpretation of the estimation results is more subtle, because it could measure both sickness and efforts. Suppose our results suggest that worker i has more major sick-leave days in year t . This clearly shows that worker i has more sickness in t , because we know that he/she either visited doctors or made new purchases of prescription drugs during the sick-leave spells. Whether worker i has decreased efforts, however, is unclear.²⁷ On the other hand, suppose worker i reduces his/her major sick-leave days. This likely implies more time at work and so more efforts on the part of worker i . But whether worker i has less sickness is unclear, since he/she may choose to work while sick, which is not uncommon. A recent survey by the National Foundation for Infectious Diseases shows that in the U.S.,

²⁷ More major sick-leave days likely imply more absence from work, and absenteeism has been used in the literature as a measure for shirking/efforts (see sub-section 2.4). However, worker i may be too sick to show up to work.

66% of workers still go to the office while showing flu symptoms.²⁸ We will re-visit these points when we present our results in section 4. We will also use our results for the other dependent variables to help interpret the results for major sick-leave days.

In both equations (9) and (10) we control for job-spell fixed effects α_{ij} . This allows us to sweep out individual-level time-invariant factors that could affect health (e.g. Black, Devereux and Salvanes, 2007, Case and Paxson 2008)).²⁹ A central concern for our estimating strategy is that exports, X_{jt} , could be correlated with the error term, ε_{ijt} . For example, variation in firm-year productivity is correlated with exporting (see HJMX 2014 for evidence on this point within our sample). Productivity may also co-vary with worker health outcomes for two reasons. Firms may be more productive because they use more modern, and safer, technology that reduces injury rates. This implies a negative correlation between X_{jt} and ε_{ijt} . Alternatively, firms may be more productive in an output-per-worker sense precisely because they have a corporate culture of high work intensity. This implies a positive correlation between X_{jt} and ε_{ijt} . Therefore, ex ante, it is unclear how X_{jt} is correlated with ε_{ijt} . Below we explain how we deal with the endogeneity of export.

3.4 Instrumental Variables

We follow HJMX 2014 and use external shocks to Denmark's trading environment to construct instruments for X_{jt} . First, world import demand WID_{ckt} is country c 's total purchases of product k from the world market (less purchases from Denmark) at time t . A rise in WID could result from shocks to demand (either consumer tastes or industrial uses of particular products) or reflect a loss of comparative advantage by c in product k .

²⁸ This survey result was recently mentioned in the media (e.g. <http://www.newrepublic.com/article/119969/new-york-city-ebola-case-why-did-dr-craig-spencer-go-bowling>).

²⁹ We also control for industry x year fixed effects, which sweep out the effects of import competition at the industry level.

In addition, changes in transport costs capture shocks to the delivered price of particular inputs purchased by Denmark. To get transportation costs we first estimate cost functions using US imports data following Hummels (2007). We then use the estimated coefficients plus pre-sample information on the destination, bulk, and modal use for Danish imports to construct c - k - t varying cost measures, tc_{ckt} . The key source of variation is an interaction between distance, modal use, and oil prices. In our sample period real oil prices fell from \$20 to \$11 per barrel between 1995 and 1998, and then rose sharply to \$45 per barrel in 2005. These fuel prices have an especially strong effect on goods air shipped long distances and a very weak effect on goods moved short distances via train. This implies that changes over time in fuel prices affect the level of costs, the relative cost of employing air v. ocean v. land transport and the relative cost of distant versus proximate partners.

The instruments have country-product-time variation. To get a single value for each firm-year we aggregate as follows. Let I_{ckt} represent instrument $I \in (tc, WID)$ for importing country c , selling HS 6 product k , at time t , and let s_{jck} represent the share of c - k in total exports for firm j in the pre-sample year (1994).³⁰ Then to construct a time varying instrument for firm j we have $I_{jt} = \sum_{c,k} s_{jck} I_{ckt}$.

The idea behind this strategy is the following. For some reason firm j exports a particular product k to country c . Firm j may have a long standing business relationship with a firm in c , or the products that c makes might be a particularly good fit for the firms in j . This relationship is set in the pre-sample and is fairly consistent over time (see HJMX 2014). Over time there are shocks to the desirability of exporting product k to country c . Transportation costs become more favourable or country c experiences changes in its production costs or consumer demand that are exogenous to firm j , and these are reflected in changing imports from the world as a whole by country c . Because firm j exports product k to country c more than other firms it disproportionately benefits from these changes.

³⁰ Some firms enter or begin exporting within sample. For these firms we use export patterns in their first years of exports to construct pre-sample weights and employ data from year 2 and onwards for the regression analyses.

HJMX 2014 show that firms have very few export-product-by-destination-country in common and that in most cases, firm j is the *only* firm that exports product k to country c .

Our strategy for instrumenting offshoring is similar. Rather than *WID*, we use World export supply, or WES_{ckt} , country c 's total supply of product k to the world market, minus its supply to Denmark, in period t . *WES* captures changes in comparative advantage for the exporting country, arising from changes in production price, product quality, or variety. For transport costs we focus on those for Danish imports, and we use the firm's pre-sample shares of imports from $c-k$.

To summarize, we instrument for offshoring (exporting) using the weighted averages of world export supply (world import demand), and transport costs. The weights are pre-sample import (export) shares, and these differ significantly across firms. The use of these instruments implies that we focus on large manufacturing firms that both import and export, as in HJMX 2014. Table 1 shows the summary statistics of the following worker characteristics: log hourly wage, experience, marital status and union status. These values are similar for our main sample as compared with the samples of the Danish labor force ("Full"), or the Danish labor force in manufacturing ("Mfg").

4. Results

We organize the results of regressions (9) and (10) by the dependent variables. Our estimation sample spans 1995-2006 and includes nearly 2 million observations, each being worker- i by firm- j by year- t . We include job-spell fixed effects in the estimation; i.e. we ask, during worker i is employed by firm j , if j changes how much it exports for exogenous reasons, does worker i become more likely to be injured on the job? Since our main explanatory variable, export, varies by firm-year, we cluster standard errors by firm-year.

4.1 Physical Health: Injury

Table 2 reports how export affects individual workers' likelihood of getting injured on the job. The dependent variable equals 1 if worker i , employed by firm j , gets injured in year t , and 0 otherwise. In Column 1 of Table 2, labeled "FE" (for job-spell fixed effects), we report the OLS estimate for regression (1). The coefficient for export is 0.4 per thousand (precisely estimated). However, as we discussed in sub-section 3.2, this estimate may be biased downward due to the endogeneity of exports. We then construct instruments for export (and offshoring) as described in sub-section 3.3. Following Wooldridge (2002), we instrument the interactions of export and offshoring with the female dummy using the interactions of the export-instruments and offshoring-instruments with the female dummy, and include the full set of instruments in the first stage of each of the four endogenous variables (exports, offshoring, and their interactions). Table A2 in the Appendix reports the first stage results. They are similar to HJMX 2014.

We report the IV estimates in column 2 of Table 2, labeled "FE-IV". The export coefficient is marginally significant at the 10% level, and suggests that if export doubles for exogenous reasons, the workers' likelihood of injury rises by 2.0 per thousand within job spells. The IV estimate is four times as large as the OLS estimate, consistent with our earlier discussions (sub-section 3.2) that productive firms may export more and use good technology that reduces injury rate. The IV estimate is also economically significant, since the mean injury rate is 4.1 per thousand in our estimation sample.

One reason for the marginal significance of the export coefficient can be non-linearity: large export shocks could have different effects than small ones. To investigate this we calculate, within each job spell, the deviation of log exports (by firm by year) from the mean within the job spell. We then use the quartiles of the distribution of the mean-deviations in our sample to construct four export quartile dummies: the 1st quartile dummy is for all the observations where the mean-deviations of log exports

fall into the first quartile, and so on.³¹ Interacting the export quartile dummies with the two gender dummies, we get 8 dummies with 6 degrees of freedom.³² We leave out the first quartile dummies and estimate the effects of 2nd – 4th quartile export shocks on injury rate, and how these effects vary across gender.

Column 3 of Table 2 reports the OLS estimates for the discrete export shocks. The effects of exports are the most pronounced when export shocks are large, in the 4th quartile (relative to 1st-quartile export shocks). In response to these export shocks, injury rate rises by 0.4 per thousand for women and 0.6 per thousand for men (these coefficient estimates are not statistically different). Column 4 reports the IV estimates, and they are again larger than OLS. For our 6 discrete-export-shock variables, 5 are statistically significant under IV. The effects of exports on injury rate are similar for 2nd-quartile export shocks and 3rd-quartile export shocks, and this non-linearity may explain why our estimate is marginally significant when our export variable is continuous. The estimates for the 4th quartile export variables, however, are significantly larger than for the 2nd and 3rd quartiles. Finally, our IV estimates for men are similar to women. For example, export shocks in the 3rd quartile increase men's injury rate by 0.5 per thousand and women's by 0.6 per thousand. Export shocks in the 4th quartile raise both men and women's injury rate by 1.1 per thousand.

4.2 Numbers of Sick-Leave Days

We have hypothesized that exports increase workers' injury rates because they increase workers' efforts. One way to observe changes in workers' efforts in our data is to look at the changes in the number of minor sick-leave days. Since these are sick-leave spells during which the workers neither visit doctors nor make new purchases of prescription drugs, a reduction in their number likely reflects

³¹ The cut-off points for the quartiles for observed exporting are -0.117, 0.005 and 0.134, and for predicted exporting they are -0.088, 0.004 and 0.101. For predicted exporting in the total hours sub-sample they are -0.071, 0.000 and 0.065.

³² The four export quartile dummies sum up to the constant and so do the two gender dummies.

increased efforts (e.g. reducing shirking, or choosing to work rather than staying home in case of mild sickness/discomfort). As a result, according to our hypothesis, the number of minor sick-leave days should decrease in response to exports.

Table 3 reports our results. In columns 1 and 2 our export variable is continuous and we do not find significant results. In columns 3 and 4 our export variables are discrete, and we obtain precisely estimated coefficients. Under both OLS (column 3) and IV (column 4), men reduce their minor sick-leave days in the presence of 2nd-quartile export shocks (relative to 1st-quartile export shocks). The magnitude of this reduction, 0.016 – 0.018 days per worker per year, is sizable given the sample mean of 0.21 days. In the presence of 3rd-quartile export shocks, men reduce their minor sick-leave days even more, by 0.031 – 0.048 days, or 14.6% - 22.9% of the sample mean. When export shocks are in the 4th quartile, however, our estimates are statistically insignificant, and this non-linearity could help explain why our estimates are insignificant when our export variable is continuous. On the other hand, women also reduce minor sick-leave days (e.g. the coefficient estimate for the 3rd-quartile export shock is significant under IV). The magnitudes of women's responses tend to be smaller than men's. This could be because in our sample, women have less minor sick-leave days than men, 0.175 vs. 0.225.

We now turn to the number of major sick-leave days. As we discussed earlier (e.g. sub-section 3.3), this variable could either increase (e.g. workers become less healthy due to increased efforts) or decrease (more working-while-sick) when exports increase. In addition, while more major sick-leave days clearly indicate worse health, less major sick-leave days do not necessarily imply better health, as workers might choose to work while sick.

Table 4 reports our estimation results. When our export variables are continuous (columns 1 and 2), the IV and OLS estimates have opposite signs, making them hard to interpret. When our export variables are discrete (columns 3 and 4), however, the OLS and IV estimates are similar. In the presence of 2nd and 3rd quartile export shocks, men cut back on their number of major sick-leave days

by 0.43 – 1.05 days per person per year (all the coefficient estimates for men are statistically significant). These are sizable effects, given that the number of major sick-leave days has the sample mean of 6.11. The evidence for women is also strong, showing that they reduce their major sick-leave days by 1.24 – 2.42 per person per year (3 out of 4 coefficient estimates for women are statistically significant). The magnitudes of women’s responses tend to be similar to men’s. These results corroborate our findings for the number of minor sick-leave days in Table 3, and provide further empirical evidence that workers increase efforts when exports rise exogenously (e.g. more working-while-sick).

On the other hand, when export shocks fall in the 4th quartile, our estimates show that men have *more* major sick-leave days (under IV), and women have even more than men (both OLS and IV). Again, this non-linearity may help explain why our OLS and IV estimates differ when our export variables are continuous. There are two possible interpretations for the 4th-quartile results. First, workers actually reduce efforts, contrary to our hypothesis. Second, rises in exports have such large effects on workers’ health that they are too sick to work more, consistent with our hypothesis. While the 1st interpretation seems unlikely, given our results for the 2nd and 3rd quartile export shocks, we want to explore further by drawing out contrasting implications and then taking these to our data.

The 1st interpretation implies that in the presence of 4th-quartile export shocks, workers should reduce total work hours, and that they do not suffer any other adverse health consequences. The 2nd interpretation implies that 4th-quartile export shocks lead to additional adverse health outcome, and that workers do not reduce total hours, even though they have more major sick-leave days. Our findings so far are already lined up against the 1st interpretation: more major sick-leave days are, in itself, an adverse health outcome, and workers suffer higher injury rates (Table 2). We bring in additional evidence against this interpretation below.

4.3 Total Work Hours

Table 5 shows the response of log total hours to exogenous changes in exports.³³ In columns 1 and 2 we have continuous export variables. The coefficient of log exports is not significant, but its interaction with the female dummy is marginally significant at the 10% level, suggesting that women increase total hours as exports rise exogenously. In columns 3 and 4 we use discrete export variables. All the 2nd and 3rd quartile export variables are statistically significant. They show that men increase total hours by 0.022 to 0.033 log points, while women increase them by 0.039 and 0.051 log points. The magnitudes of women's responses tend to be slightly larger than men's. These results corroborate our findings in Tables 3 and 4 that both men and women reduce sick-leave days when exports rise. Looking at our findings in Tables 3-5, we see that compared with women, men reduce their minor sick-leave days by a bit more, reduce their major sick-leave days by similar magnitudes, and increase their hours by a bit less. In other words, overall, men and women have similar effort responses to 2nd and 3rd quartile export shocks. This is consistent with our finding in Table 2 that these export shocks have similar effects on men and women's injury rates.

On the other hand, when export shocks fall in the 4th quartile, our coefficient estimates are statistically insignificant. At first glance this seems a strike against our hypothesis that workers increase efforts. We believe, however, that this result should be viewed in the context of our findings in Table 4: the workers do not change their total hours *despite* having more major sick-leave days. This is evidence that workers are increasing efforts in response to 4th-quartile export shocks.

4.4 Mental Health: Stress and Depression

We now examine whether exogenous increases in exports lead to other adverse health outcome, especially large export shocks in the 4th quartile. Our dependent variable is an indicator for severe

³³ We use the total-hours sub-sample for the estimation, and report the first-stage results in Table A3. They are similar to our first-stage results for the full sample, which we report in Table A2 and are similar to HJMX 2014.

depression: it equals 1 if worker i , employed by firm j , has positive expenses for prescription anti-depressant drugs. We look at depression for two reasons. First, depression can develop quickly once triggered by stressful life events,³⁴ and job pressures are the No. 2 cause of such stress after financial worries, according to a recent Wall-Street-Journal report.³⁵ This fits well with regression (9), which investigates the contemporaneous effects (i.e. within the same year) of exports. In addition, depression is a mental issue and so closely related to subjective feelings. Exogenous rises in exports raise wages (HJMX 2014) and higher income leads to higher self-rated subjective happiness (e.g. Finkelstein et al, 2013). This additional channel works against our hypothesis that exports tend to increase incidence of severe depression because of increased efforts/work intensity.

We report our results in Table 6. Column 1 reports the OLS estimates and column 2 reports the IV estimates. For women, both the OLS and IV estimates show that rising exports increase their likelihood of severe depression. In addition, the IV estimate is larger than the OLS estimate. This is intuitive, because productive firms likely export a lot and use good technology or management practices that make the workplace less stressful. To see the economic significance of our IV estimate, suppose a firm's exports rise exogenously by 10%. Then the likelihood that the female employees of this firm take prescription anti-depressants rises by $(0.0148 - 0.0049) \times 10\% = 0.0010$, or 1 per thousand. This represents a large effect since in our sample, 3.95% of women use anti-depressants. Column 2 also shows that getting married reduces the likelihood of using anti-depressants by 0.0049 (highly significant). Comparing the effects of exports with the sample mean and the effects of marriage, we see that a 10% exogenous rise in exports, not uncommon in our sample, increases the fraction of severely depressed women by about 2.5% ($0.0010/3.95\%$), and its effect on severe depression is roughly one fifth the size of getting married ($0.0010/0.0049$). On the other hand, our

³⁴ According to the National Institute of Mental Health in the U.S., "any stressful situation may trigger a depression episode" (<http://www.nimh.nih.gov/health/publications/depression/index.shtml#pub5>).

³⁵ "To Cut Office Stress, Try Butterflies and Medication?", by Sue Shellenbarger, The Wall Street Journal, October 9, 2012.

estimates show that exports reduce men's incidence of severe depression (under both OLS and IV). This is consistent with increased subjective feelings of happiness due to higher wages.

Columns 3 and 4 of Table 6 report our OLS and IV estimates for discrete export shocks. For men, there is evidence that exports reduce their incidence of severe depression under OLS, but not under IV. For women, large export shocks, in the 4th quartile, increase the incidence of severe depression by 2.2 per thousand (OLS) to 2.3 per thousand (IV). These results are consistent with our finding in Table 4 that 4th-quartile export shocks increase women's major sick-leave days by much more than men's. In Table 7 we broaden our analyses to include less severe stress and depression: our dependent variable equals 1 if in year t , worker i ever uses prescription anti-depressants or visits a psychiatrist. The results are similar to Table 6.³⁶

In summary, in section 4 we report rich results showing how exogenous increases in exports affect individual workers' health through increased efforts. The effects of exports differ for large vs. small export shocks, and also for men vs. women. For small export shocks (2nd and 3rd quartiles), workers increase work hours, have less sick-leave days, and suffer higher injury rates. The effects on men and women tend to be similar. Large export shocks (4th quartile) have more adverse effects on workers' health than small export shocks: more major sick-leave days, even higher injury rates, and for women, higher incidence of severe depression and stress. In spite of this wide range of adverse health outcome, workers do not cut back on work hours. The effects of large export shocks on women tend to be larger than on men. All these results are novel to the literature. In the next section we draw out additional implications of our results for injury.

5. Broader Implications: Injury Rate and Total Injury Count during the Great Depression

One might be concerned that our estimation results are narrow, and not readily applicable

³⁶ In recent work Dahl (2011) shows that changes in organizational structures of the firm increase the likelihood that their employees take anti-depressants using Danish data.

outside our estimation sample (large manufacturing firms) and our estimation framework (within job-spell changes). To address this concern we investigate whether, and how much, our estimates from *micro* data help us understand the changes in the injury rate and total injury count for the entire Danish economy during the Great Depression, both *macro* variables.

Like the U.S. (and many other countries), Denmark suffered a large drop in both aggregate output and trade during 2007-2009 (Figure A1 in the Appendix). During the Great Trade Collapse the total value of Danish export fell by 17%. If our hypothesized micro channel is generally applicable, we should expect to see declines in the injury rate and total injury count for Denmark, a (small) silver lining for the Great Recession.³⁷

This is what we see in the data. Figure 2 plots the total injury count, employment, and injury rate for Denmark over time, and all three macro variables fall during 2007-2009. In particular, injury rate falls from 3.58 per thousand in 2007 to 3.13 per thousand in 2009, a decline of 0.45 per thousand. Now our micro-data produce an elasticity of 0.4-2.0 per thousand when export is a continuous variable (Table 2).³⁸ Using this, and the 17% drop in Danish export, we get a predicted reduction in injury rate of 0.068 - 0.34 per thousand, which is 15.1% - 75.6% of the actual reduction in injury rate.

Turning to total injury count, we can predict its levels in 2008 and 2009 in the following way. We hold Danish employment at its 2007 level, and multiply it by our predicted injury rates, which we obtain using our estimated elasticity of 0.4-2.0 per thousand and the actual decline in Danish export in 2008 and 2009 (relative to 2007). Figure 3 plots the actual injury count and the series of predicted injury count. The predicted series tracks the actual data well. The predicted drop in total injury count between 2007 and 2009 is 200-1025 cases, and it accounts for 12%-62.44% of the actual decline of 1641 cases.

³⁷ During this recession the number of sick-leave days (major plus minor) and the total cost of prescription drugs also declined for Denmark. However, doctor visits (both counts and costs) increased, and changes in hospitalization were mixed (the number of hospital days fell but total cost rose).

³⁸ Our other estimate is 0.36 per thousand when export is a discrete shock exceeding 10% (column 3 of Table 2). It is less clear how this can be used to make predictions.

In summary, the empirical relationship between export and injury rate that we have obtained using micro data, for 1995-2006, and conditional on within job spell changes, helps account for substantial fractions of the actual changes in injury rate and total injury count during 2007-2009, both macro variables for the entire Danish economy. These findings highlight the economic significance of our micro-data estimates, and suggest that they have broader implications beyond our estimation sample of large manufacturing firms and estimation framework of within-job-spell changes.

6 Pain vs. Gain from Exports

Our results in section 4 show that rising exports makes individual workers less healthy by increasing their injury and sickness rates. This is a source of non-pecuniary welfare pain from globalization. Relative to the pecuniary welfare gain that the literature has reported (e.g. HJMX 2014), how large is the pain? In this section we develop a framework to calculate the net effect of exports on individual workers' welfare.

We use the workers' objective function in equation (1) of our model as the measure for their welfare, W ; i.e.

$$W = \max_e \left\{ \beta \frac{\theta_f \psi Y - rK - p_M M}{L} - ac(e) \right\}. \quad (11)$$

There are several challenges in calculating the value of W using (11). The equation contains many parameters whose values we do not observe. In addition, the welfare loss results from multiple injury and sickness conditions and we cannot plug in the estimates from the literature on the value of a statistical injury (e.g. Viscusi and Aldy 2003).

Our first step in relating equation (11) to the observables in our data is to assume that

$$\beta \frac{\theta_f \psi Y - rK - p_M M}{L} = C, \quad (12)$$

where C denotes the workers' income. Plugging (12) into (11) and differentiating with respect to the export shock, we have

$$\frac{\partial W}{\partial \psi} = C \frac{\partial C}{\partial \psi} - \frac{\partial [ac(e)]}{\partial \psi} = C \frac{\partial \ln C}{\partial \psi} - \frac{\partial [ac(e)]}{\partial \psi}. \quad (13)$$

The first term on the right-hand side of equation (3) shows the welfare gain in response to rising exports due to higher income, and the second term shows the welfare loss due to higher injury and sickness rates.

We observe all the variables in equation (13) that determine the welfare gain, and list them in the top panel of Table 8. For income, C , we use the average wage in our sample. Our measure for $\frac{\partial \ln C}{\partial \psi}$, the percentage change in income in response to export, is the estimate for the wage elasticity of export in HJMX (2014), 0.0493. Plugging these values into the first term of equation (13), we obtain that following a 10% exogenous increase in export, welfare gain amounts to 1465 DKK for men and 1158 DKK for women. Women have lower welfare gains than men because they have lower average wages in our sample.

To calculate the welfare loss due to higher injury and sickness rates, we assume that the cost function, $ac(e)$, relates to injury and sickness rates in the following way

$$ac(e) = H(d_0, d_1, \dots, d_n) = A d_0^{\beta_0} d_1^{\beta_1} \dots d_n^{\beta_n}, \beta_0 + \beta_1 + \dots + \beta_n = 1, \quad (14)$$

where A is a constant. In equation (14), d_0 is the injury rate and $d_1 \dots d_n$ the incidences of sickness, such as severe depression. The Cobb-Douglas functional form in (14) provides a way to aggregate the welfare losses due to multiple injury and sickness conditions, whose weights are the parameters $\beta_0 \dots \beta_n$.

Equation (14) implies that

$$\frac{\partial [ac(e)]}{\partial \psi} = \frac{\partial H}{\partial \psi} = H \frac{\partial \ln H}{\partial \psi} = H \left(\beta_0 \frac{\partial \ln d_0}{\partial \psi} + \beta_1 \frac{\partial \ln d_1}{\partial \psi} + \dots + \beta_n \frac{\partial \ln d_n}{\partial \psi} \right). \quad (15)$$

Equation (15) says that welfare loss is the product of two terms: H , the total welfare cost itself, and its percentage change following the export shock, the terms in the brackets. This percentage change is, in turn, the weighted sum of the percentage changes of the incidences of individual injury and sickness conditions, the weights being the parameters $\beta_0 \dots \beta_n$.

We first calculate the welfare loss in percentages, as we observe the values of all the variables in the brackets in (15). Using our results from section 4, we can calculate the percentage changes of the incidences of injury and sickness in response to exports. We restrict our calculations to job injury and severe depression, for which we have unequivocal results using continuous export variables, and we use our IV estimates, where we have addressed the endogeneity of exports. Since our dependent variables in section 4 are dummies, we divide our coefficient estimates by the mean rates of job injury and severe depression. For example, for severe depression for women, our coefficient estimate is 0.010 (this is $\frac{\partial d_1}{\partial \psi}$). Given that 3.95% of women have severe depression in our sample (this is d_1), the percentage change in severe-depression rate for women is $0.010/0.0395 = 0.25$ (this is $\frac{\partial \ln d_1}{\partial \psi} = \frac{\partial d_1}{\partial \psi} / d_1$); i.e. women's injury rate rises by about 25% following an export shock. We report our results in the middle panel of Table 8. They range from -20.2% for men's severe-depression rate, to 63.5% for women's injury rate. These are large estimates because our coefficient estimates in section 4 are large relative to the sample mean.

To measure the share weight of one injury or sickness condition, such as β_1 , we use the share of its health-care spending in the total health-care spending in Denmark. In Appendix Table A4 we report Denmark's healthcare spending by category in 2010. Out of the total of 132.1 billion DKK, 4.1 billion goes to injury compensation, and 539 million to prescription anti-depressants. These imply a share of 3.1% for injury (this is β_0) and 0.4% for severe depression (this is β_1).

We now plug the values of the percentage changes of injury and severe-depression rates and their share weights into equation (15), and obtain that welfare loss is 1.37% for men and 2.07% for women. Our estimate for men is lower than for women because men's incidence of severe depression decreases with respect to exports, and their mean injury rate is higher.

We now turn to the total health cost, H . While it is not directly observable in our data, we can back it out using the following first-order condition. By equation (14),

$$\frac{\partial H}{\partial d_0} \frac{d_0}{\beta_0} = \frac{d_0}{\beta_0} (A\beta_0 d_0^{\beta_0-1} d_1^{\beta_1} \dots d_n^{\beta_n}) = H. \quad (16)$$

We observe all the variables on the left hand side of equation (16). $\frac{\partial H}{\partial d_0}$ is the welfare loss the workers suffer in response to an increase in injury rate. Assuming that the injury compensation scheme in Denmark fully compensates the workers for their sufferings after injury, we can measure it using the average injury compensation in our data, 381,660 DKK for men and 397,103 DKK for women³⁹ d_0 is the mean injury rate in our sample. We list the values for $\frac{\partial H}{\partial d_0}$ and d_0 in the bottom panel of Table 8.

Finally, β_0 is the share of injury compensation in the Danish health-care spending, which we discussed earlier. Plugging these values into equation (16), we obtain that total health cost is 52,597.5 DKK for men and 40,296.2 DKK for women. Our estimate for men is higher because they have higher mean injury rate in our sample. In addition, these estimates are relatively small because the average worker has low injury and sickness rates in our sample.

We can now calculate how workers' welfare changes in response to a 10% exogenous increase in exports. For men this is 72.0 DKK (10% x 52597.5 x 1.37%) and for women, 83.5 DKK. These estimates are small because injury compensation and anti-depressant spending together have a low share weight of 3.5% in Danish healthcare spending. For men, this loss amounts to 4.91% of welfare

³⁹ These are roughly \$68699 and \$71479, respectively, and comparable to the estimates of the value of a statistical injury (e.g. Viscusi and Aldy 2003).

gain, and for women, 7.21%. In words, the pain from rising exports, due to more injury and sickness rates, are small but substantial relative to the gain due to higher wages. For net welfare change we obtain an estimate of 1393 DKK for men and 1075 DKK for women.

There are several caveats for our estimates. First, we may underestimate the total health cost if the Danish government does not fully compensate injured workers, or if total spending on antidepressants is lower than consumer surplus. Finally, we do not observe leisure in our data and so have left it out, and our results are for contemporaneous changes in welfare. We leave these questions for future research.

7. Conclusion

In this paper we use matched worker-firm data from Denmark to study how exports affect individual workers' work efforts and health. For each individual in our data we observe his/her every transaction with the Danish healthcare system, and we are able to match his/her health information with detailed data on his/her employers' exposure to global trade. This allows us to base our identification on changes within worker-firm specific matches (i.e. within job spells), and on the export shocks that originate outside of Denmark but whose impacts vary across Danish firms.

We obtain the following results that are novel to the literature. In response to an exogenous increase in exports, workers increase efforts by reducing the number of minor sick-leave days and increase total work hours (regular plus over time). They also suffer several adverse health outcomes, including higher rates of job injury, higher incidence of stress and depression for women, and more genuine sick days per worker per year. We develop a framework to calculate the contemporaneous welfare loss due to higher rates of multiple types of injury and sickness.

Our results for injury rates, obtained using micro data, could account for a substantial fraction of the reduction in total injury counts in the Danish macro economy during the 2007-2009 recession.

Our results for stress and depression highlight the importance of workers' mental health in today's global economy. Recent years have seen major efforts by the mental-health research community to better recognize and classify mental disorders.⁴⁰ Large U.S. companies are offering trainings in cognitive behavioral skills, scented relaxation rooms, "living walls" decorated with plants, and outdoor cafes with wildflowers, in order to help their employees combat stress at work.⁴¹ Our results suggest that such endeavour may be especially useful for the female workers whose employers are rapidly expanding in the global market.

⁴⁰ E.g. "Mental Illness Gets a Rethink for Kids", by Shirley S. Wang, the Wall Street Journal, October 19, 2012.

⁴¹ See "To Cut Office Stress, Try Butterflies and Medication?", by Sue Shellenbarger, The Wall Street Journal, October 9, 2012.

Appendix

Table A1 Additional Summary Statistics

	Full, 95-09			Mfg, 95-09		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Injury Dummy	33510639	0.0031	0.056	5503922	0.0041	0.064
Injury Payment (DKK)	106698	430571	845591	23238	450467	863345
log (Hourly wage)	31299066	5.280	0.469	5234344	5.356	0.382
Married (Dummy)	33510639	0.525	0.499	5503922	0.541	0.498
Experience	33510591	15.524	10.203	5503919	16.906	9.813
Union (Dummy)	33510564	0.713	0.452	5503912	0.779	0.415

Table A2 Employment Shares by 1-digit Occupation for the Estimation Sample and the Work-hours Subsample

Occupation (1 digit)	Main Sample Occp. Share	Hours Subsample Occp. Share
1	.032245	.0370792
2	.0715409	.0779478
3	.1439805	.1619491
4	.0627748	.0556741
5	.0115262	.0052905
6	.0042052	.0028871
7	.1983044	.1716986
8	.3877012	.3975089
9	.082292	.0891845
Missing	.0054299	.0007804

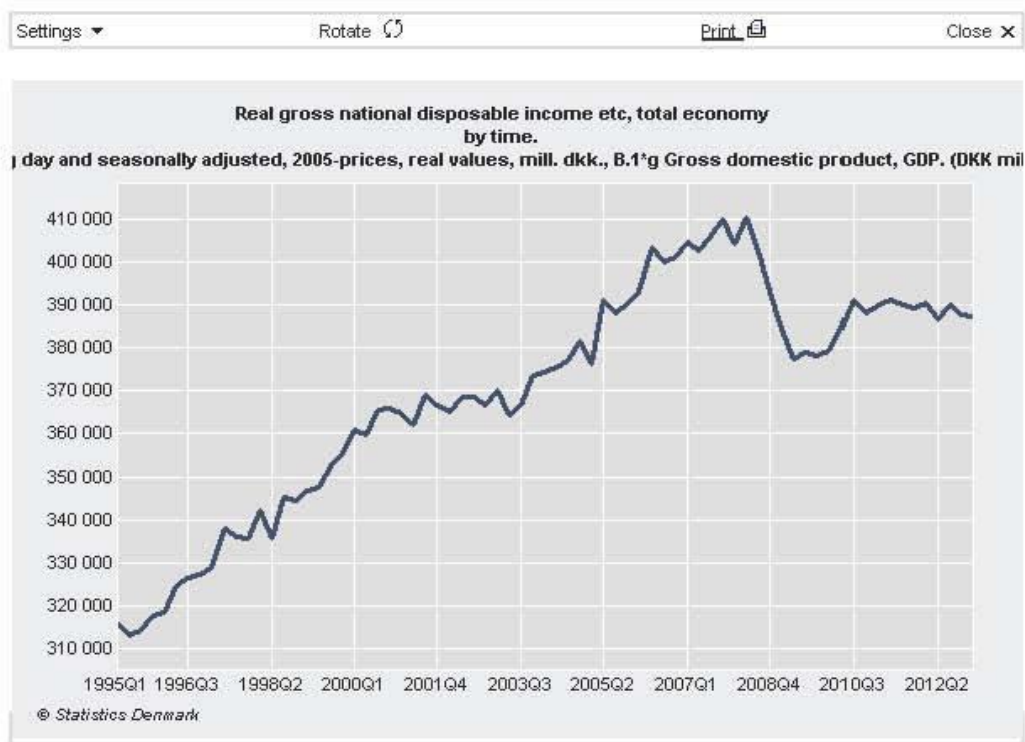


Figure A1 Quarterly GNP (Seasonally Adjusted) of Denmark

Table A3. First Stage Results (Main Sample)

	Log(exports)		x female		Log(offshoring)		x female	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log WID, exports	0.2600***	0.1655***	-0.0695***	-0.0516***	-0.0751	-0.0135	-0.0980***	-0.0731***
	[3.56]	[2.76]	[-4.37]	[-3.16]	[-0.61]	[-0.20]	[-5.37]	[-4.00]
Log transport costs, exports	-8.5867	-7.7960**	-2.0056*	-1.7536	21.4485***	4.5822	-4.3490***	-6.3907***
	[-1.48]	[-2.02]	[-1.74]	[-1.26]	[3.03]	[0.70]	[-2.72]	[-4.00]
Log WES, offshoring	0.0286	0.1596***	-0.0528***	-0.0506**	0.2461***	0.3613***	-0.0728***	-0.0720***
	[0.34]	[2.80]	[-3.54]	[-2.41]	[3.34]	[5.38]	[-5.46]	[-5.30]
Log transport costs offshoring	5.0655*	3.9780	1.2004*	0.4462	15.3680***	13.1457***	0.5208	-0.0294
	[1.84]	[1.45]	[1.86]	[0.77]	[-2.65]	[-2.48]	[0.66]	[-0.03]
<i>Interactions with female dummy</i>								
Log WID, exports	-0.1439***	-0.0762**	0.3751***	0.2852***	0.0762	0.1007*	0.3114***	0.3693***
	[-4.02]	[-2.37]	[6.02]	[5.43]	[1.55]	[1.90]	[3.38]	[4.79]
Log transport costs, exports	1.9843	1.1308	0.7138	-1.7203	2.5683	0.2134	30.7920***	19.9214***
	[1.10]	[0.65]	[0.19]	[-0.72]	[0.90]	[0.07]	[5.92]	[4.21]
Log WES, offshoring	0.0634	0.0288	0.2489***	0.2818***	-0.0715	-0.1477***	0.3779***	0.3800***
	[1.41]	[0.67]	[3.62]	[5.45]	[-1.53]	[-2.96]	[5.70]	[5.63]
Log transport costs offshoring	-2.2796	-1.5877	-2.5798	-0.5908	-3.1542	0.1308	19.7793***	12.3353**
	[-1.26]	[-0.83]	[-0.81]	[-0.20]	[-1.07]	[0.04]	[-3.64]	[-2.54]
<i>Firm and worker controls</i>								
log employment	0.7675***	0.7425***	0.2325***	0.2328***	0.9231***	0.9622***	0.2860***	0.3087***
	[14.12]	[11.64]	[13.72]	[9.38]	[12.61]	[11.58]	[11.91]	[9.72]
log capital-labor ratio	-0.0159	-0.0250	0.0038	0.0005	0.0391	-0.0024	0.0177*	0.0094
	[-0.77]	[-1.31]	[0.51]	[0.07]	[1.27]	[-0.08]	[1.74]	[0.88]
share, high-skilled workers	-0.9227*	-1.5839**	-0.3596	-0.5812	-0.2364	-1.5628*	-0.1575	-0.7224**
	[-1.72]	[-1.99]	[-1.51]	[-1.60]	[-0.33]	[-1.74]	[-0.61]	[-2.15]
experience	0.0100	0.0024	-0.0042	-0.0032	0.0238**	0.0068	-0.0049	-0.0204***
	[1.40]	[0.33]	[-1.05]	[-0.81]	[2.50]	[0.56]	[-0.90]	[-3.02]
experience squared	0.0000	0.0001*	-0.0001**	0.0000	-0.0001**	0.0001	-0.0001***	-0.0000
	[0.07]	[1.66]	[-2.08]	[0.05]	[-2.40]	[1.02]	[-2.72]	[-1.04]
union	-0.0195***	-0.0086*	-0.0109***	-0.0067**	0.0132*	0.0035	0.0001	0.0013
	[-3.25]	[-1.65]	[-3.38]	[-2.50]	[1.85]	[0.47]	[0.03]	[0.36]
married	0.0036	0.0022	-0.0042***	-0.0029*	0.0023	0.0028	-0.0069***	-0.0068***
	[1.40]	[0.79]	[-2.79]	[-1.69]	[0.70]	[0.73]	[-3.42]	[-2.91]
Observations	1,978,209	1,173,820	1,978,209	1,173,820	1,955,728	1,162,510	1,955,728	1,162,510
R-squared	0.1977	0.1816	0.0911	0.0833	0.1346	0.1589	0.0809	0.0894
Number of job spell FE	389,015	323,554	389,015	323,554	387,788	322,033	387,788	322,033
F-statistics for instruments	5.759	3.839	21.47	13.72	5.292	6.098	42.26	30.03

Notes: Clustered (firm-by-year) t-statistics in square brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table A4 Danish Healthcare Spending by Category, 2010

Sickness Benefits	19.8
Hospitals	78.7
Prescription drugs	7.4
Anti-Depressant	0.54
Injury Compensation	4.1
Health insurance	19.8
Regular doctor visits	8.1
Specialized doctor visits	3.2
Subsidy to private dentists	1.4
Public dentists	2.1
Home care	3.8
Total health care expenses	132.1

Notes: The bold-faced are major categories and the others are sub-categories.

References

- Arkolakis, Costas, Arnaud Costinot and Andres Rodriguez-Clare, 2012. "[New Trade Models, Same Old Gains?](#)," American Economic Review, American Economic Association, vol. 102(1), pages 94-130, February.
- Autor, David, David Dorn, and Gordon Hanson. 2013. "The China Syndrome: Local Labor Market Effects of Import Competition in the United States". American Economic Review 103, pp. 2121-2168.
- Autor, David, David Dorn, Gordon Hanson, and Jae Song. 2013. "Trade Adjustment: Worker Level Evidence", NBER working paper No. 19226.
- Becker, Gary S., Tomas J. Philipson, and Rodrigo R. Soares, 2005. "The Quantity and Quality of Life and the Evolution of World Inequality", American Economic Review March 2005, 95(1), pp. 277-291.
- Besedeš, Tibor and Thomas J. Prusa, 2006. "Ins, Outs, and the Duration of Trade." Canadian Journal of Economics 39 (1): 266-295.
- Bigos, Stanley J.; Battié, Michele C.; Spengler, Dan M.; Fisher, Lloyd D.; Fordyce, Wilbert E.; Hansson, Tommy H.; Nachemson, Alf L.; Wortley, Mark D., "A Prospective Study of Work Perceptions and Psychosocial Factors Affecting the Report of Back Injury", Spine, January 1991.
- Black, Sandra E., Paul J. Devereux and Kjell G. Salvanes, "From the Cradle to the Labor Market? The Effect of Birth Weight on Adult Outcomes", The Quarterly Journal of Economics, February 2007, 409-439.
- Black, Sandra E., Paul J. Devereux and Kjell G. Salvanes. 2012. "Losing Heart? The Effect of Job Displacement on Health". NBER wp 18660.
- Bosma, Hans, Michael G Marmot, Harry Hemingway, Amanda C Nicholson, Eric Brunner, and Stephen A Stansfeld, "Low Job Control and Risk of Coronary Heart Disease in Whitehall II (prospective cohort) Study", 1997, British Medical Journal 314:558-565.
- Botero, Juan C., Simeon Djankov, Rafael La Porta, Florencio Lopez-De-Silanes and Andrei Shleifer. 2004. "The Regulation of Labor." *Quarterly Journal of Economics* 119(4), 1339-1382.
- Broda, Christian and David E. Weinstein. "[Globalization And The Gains From Variety.](#)" Quarterly

- Journal of Economics, 2006, v121(2,May), 541-585.
- Browning, Martin, Anne Moeller Dano, and Eskil Heinesen, "Job Displacement and Stress-Related Health Outcomes", *Health Economics* 15 (2006), 1061-1075.
- Browning, Martin and Eskil Heinesen, "Effect of Job Loss Due to Plant Closure on Mortality and Hospitalization", *Journal of Health Economics* 31 (2012) 599-616.
- Case, Anne, and Christina Paxson. 2008. "Stature and Status: Height, Ability, and Labor Market Outcomes". *Journal of Political Economy* 116 (3), 499-532.
- Campolieti, Michele, and Douglas E. Hyatt, "Further Evidence on the 'Monday Effect' in Workers' Compensation", *Industrial and Labor Relations Review* 59 (3), April 2006, 438-450.
- Coile, Courtney C., Phillip B. Levine, and Robin McKnight, "Recessions, Older Workers, and Longevity: How Long Are Recessions Good for Your Health", *American Economic Journal: Economic Policy*, August 2014, 6(3), 92-119.
- Currie, Janet, and Brigitte Madrian. 1999. *Health, Health Insurance and the Labor Market*. In Orley Ashenfelter and David Card eds., *Handbook of Labor Economics*, North-Holland.
- Dahl, Michael S., "Organizational Change and Employee Stress", *Management Science* 57 (2), 2011, pp. 240-256.
- Danish Economic Council. 2009. *Danish Economy, Autumn 2009*. Copenhagen.
- Egan, Mark L., Casey B. Mulligan, and Tomas J. Philipson. "Adjusting Measures of Economic Output For Health: Is the Business Cycle Countercyclical?", NBER working paper 19058, May 2013.
- Eliason, Marcus, and Donald Storrie, "Does Job Loss Shorten Life?", *Journal of Human Resources* 44(2), 2007, 277-302.
- Eliason, Marcus, and Donald Storrie, "Job Loss is Bad for Your Health – Swedish Evidence on Cause-Specific Hospitalization Following involuntary Job Loss", *Social Science and Medicine* 68 (2009), 1396-1406.
- Feenstra, R.C. and Gordon H. Hanson. 1999. "The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States." *Quarterly Journal of Economics*, 114, pp. 907-40.

- Finkelstein, Amy, Erzo P. Luttmer and Matthew J. Notowidigdo, “What Good is Wealth Without Health? The Effect of Health on the Marginal Utility of Consumption”, *Journal of European Economic Association*, January 2013 11(S1): 221-258.
- Freeman, Richard, Douglas Kruse, and Joseph Blasi (2008). “Worker Responses To Shirking Under Shared Capitalism” NBER Working Paper No. 14227.
- Goldberg, Pinelopi K., and Nina Pavcnik. 2007. “Distributional Effects of Globalization in Developing Countries.” *Journal of Economic Literature* 45(1), 39-82.
- Harkness, Elaine F., Gary J. Macfarlane, Elizabeth Nahit, Alan J. Silman, and John McBeth, “[Mechanical injury and psychosocial factors in the work place predict the onset of widespread body pain: a two-year prospective study among cohorts of newly employed workers](#)”, *Arthritis & Rheumatism* 50(5), May 2004, 1655-1664.
- Harrison, Ann, John McLaren and Margaret S. McMillan. 2011. “Recent Findings on Trade and Inequality”. *Annual Review of Economics* 3, pp. 261-289.
- Henrekson, Magnus, and Mats Persson, “The Effects on Sick Leave of Changes in the Sickness Insurance System”, *Journal of Labor Economics*, 2004 22(1), 87-113.
- Hesselius, P., et al. (2009). "Sick Of Your Colleagues' Absence?" *Journal of the European Economic Association* 7(2-3): 583-594.
- Hubert, Helen B., Manning Feinleib, Patricia M. McNamara, and William P. Castelli, “Obesity as an Independent Risk Factor for Cardiovascular Disease: A 26-year Follow-up of Participants in the Framingham Heart Study”, *Circulation* 1983, 67: 968-977.
- Hummels, David, Rasmus Jørgensen, Jakob Munch, and Chong Xiang. “The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data”, *American Economic Review*, 104 (6), June 2014, 1597-1629.
- Hummels, David, Jakob Munch, and Chong Xiang. 2014. “Offshoring and Labor Markets”, under revision, *Journal of Economic Literature*.
- Ichino, A. and G. Maggi (2000). "Work environment and individual background: Explaining regional shirking differentials in a large Italian firm." *Quarterly Journal of Economics* 115(3): 1057-1090.

- Jacobson, L. S., R. J. LaLonde, and D. G. Sullivan, 1993, "Earnings losses of displaced workers", *American Economic Review* 83, pp. 685–709.
- Kivimaki, Mika, Jenny Head, Jane E. Ferrie, Harry Hemingway, Martin J. Shipley, Jussi Vahtera, Michael G. Marmot, "Working while ill as a risk factor for serious coronary events: the Whitehall II study", *American Journal of Public Health*, 95(1), January 2005, 98-102.
- Kuhn, A., R. Lalive and J. Zweimuller, 2009. "The Public Health Costs of Job Loss", *Journal of Health Economics*, 28(6), 1099-1115.
- Lazear, E. P. (2000). "Performance pay and productivity." *American Economic Review* 90(5): 1346-1361.
- Leth-Petersen, Søren and Gabriel Pons Rotger. 2009. Long Term Labour Market Performance of Whiplash Claimants. *Journal of Health Economics*, 28, 996-1011.
- Leth-Petersen, Søren and Niels Skipper. 2012. Income and the use of Prescription Drugs for Near Retirement Individuals. *Journal of Health Economics*, Forthcoming.
- Lindo, Jason M. "Aggregation and the Estimated Effects of Local Economic Conditions on Health", NBER working paper 19042, May 2013.
- Ljunge, Martin, 2013, "Sick of Taxes?", Working Paper.
- Manning, A., 2011, Imperfect Competition in the Labor Market, in O. Ashenfelter and D. Card, eds., *Handbook of Labor Economics* Vol. 4B, Amsterdam: North Holland.
- Marmot, M. G, George Davey Smith, Stephen Stansfeld, Chandra Patel, Fiona North, Jenny Head, Ian White, Eric Brunner and Amanda Feeney, "Health Inequalities Among British Civil Servants: the Whitehall II Study", *Lancet* 1991, 337: 1387-1393
- Marmot, MG, H Bosma, H Hemingway, E Brunner and S Stansfeld, "Contribution of Job Control and Other Risk Factors to Social Variations in Coronary Heart Disease Incidence", *Lancet* 1997, 350 (235-239)
- Mas, A. and E. Moretti (2009). "Peers at Work." *American Economic Review* 99(1): 112-145.
- McManus, T Clay and Georg Schaur, 2014, "The Effects of Import Competition on Worker Health", mimeo, University of Tennessee.

- Munch, Jakob and Michael Svarer. 2005. Mortality and Socio-economic Differences in Denmark: A Competing Risks Proportional Hazard Model, *Economics and Human Biology* 3, 17-32.
- Murphy, Kevin M. and Robert H. Topel. "The Economic Value of Medical Research," in Kevin M. Murphy and Robert H. Topel, eds., *Measuring the Gains from Medical Research: An Economic Approach*. Chicago: University of Chicago Press, 2003.
- O'Reilly, Dermot and Michael Rosato. 2013. "Worked to death? A census-based longitudinal study of the relationship between the number of hours spent working and mortality risk", *International Journal of Epidemiology* 42(6), 1820-1830.
- Ruhm, Christopher, 2000. "Are Recessions Good for Your Health?". *Quarterly Journal of Economics* May 2000, 617-650.
- Ruhm, Christopher. "Recessions, Healthy No More?" NBER working paper 19287 August 2013.
- Smith, James, 1999. "Healthy Bodies and Thick Wallets: the Dual Relations between Health and Economic Status", *Journal of Economic Perspectives* 13(2), 145-166.
- Stevens, Ann Huff, Douglas L. Miller, Marianne E. Page, and Mateusz Filipiński. "The Best of Times, the Worst of Times: Understanding Pro-Cyclical Mortality", NBER working paper 17657, December 2011.
- Sullivan, Daniel and Till von Wachter. 2009. "Job Displacement and Mortality: An Analysis Using Administrative Data". *Quarterly Journal of Economics*, , 1265-1306.
- Tekin, Erdal, Chandler McClellan, and Karen J. Minyard. "Health and Health Behaviors During the Worst of Times: Evidence from the Great Recession", NBER working paper 19234 July 2013.
- Verhoogen, Eric. 2008. "Trade, Quality Upgrading, and Wage Inequality in the Mexican Manufacturing Sector." *Quarterly Journal of Economics*, 123(2), 489-530.
- Virtanen, Marianna, Katriina Heikkilä, Markus Jokela, Jane E. Ferrie, G. David Batty, Jussi Vehtera, Mika Kivimäki, "Long working hours and coronary heart disease: a systematic review and meta-analysis", *American Journal of Epidemiology*, 176 (7), September 2012, 586-596.
- Viscusi, W. Kip and Aldy, Joseph E., "The Value of A Statistical Life: A Critical Review of Market Estimates Throughout the World" (2002). Harvard Law School John M. Olin Center for Law, Economics and Business Discussion Paper 392.

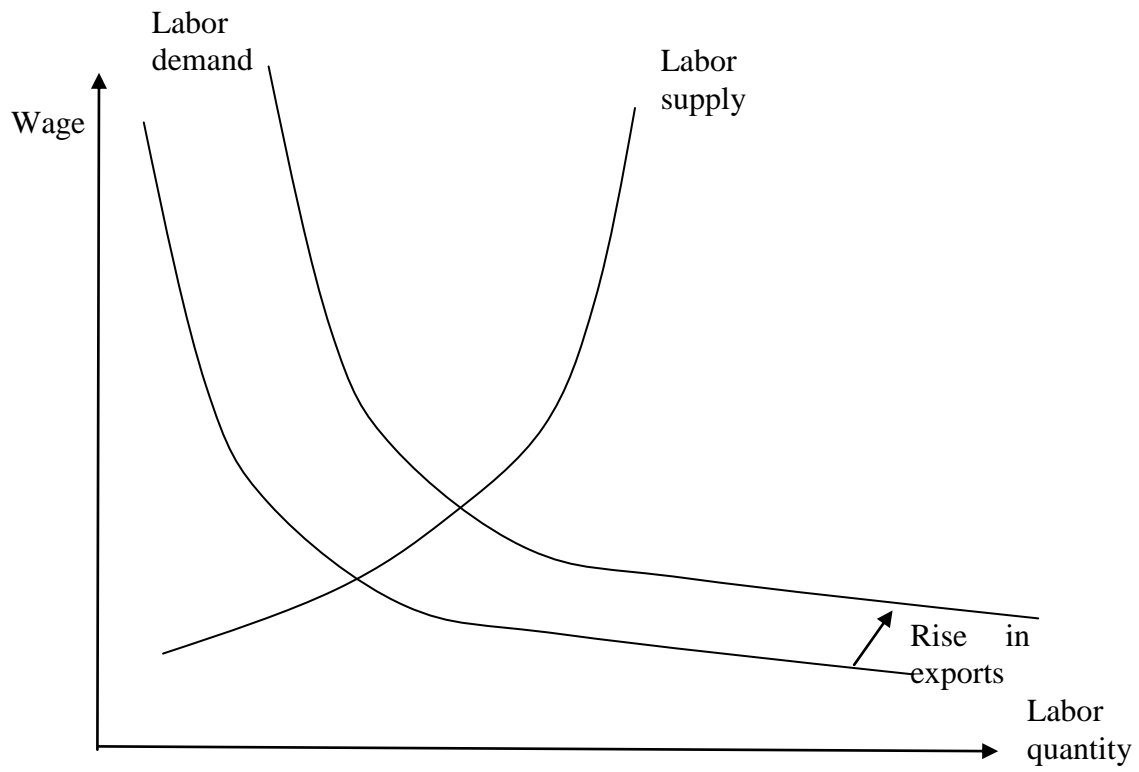


Figure 1 Conceptual Framework

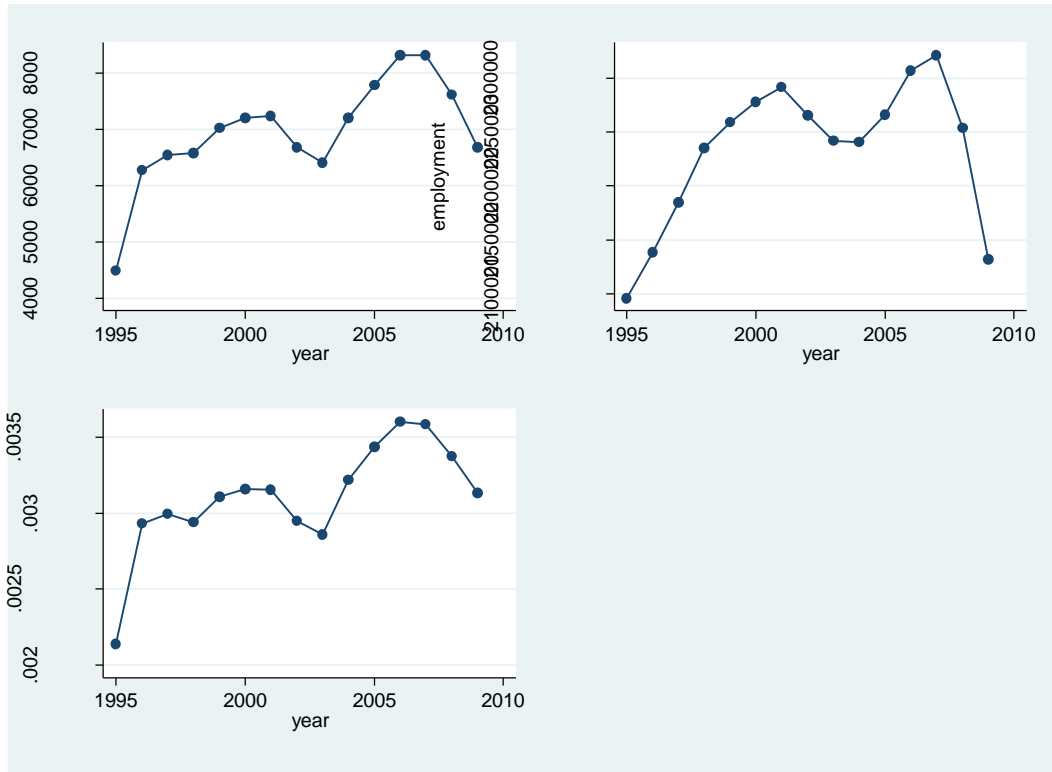


Figure 2 Total Injury Count, Employment, and Injury Rate for Denmark

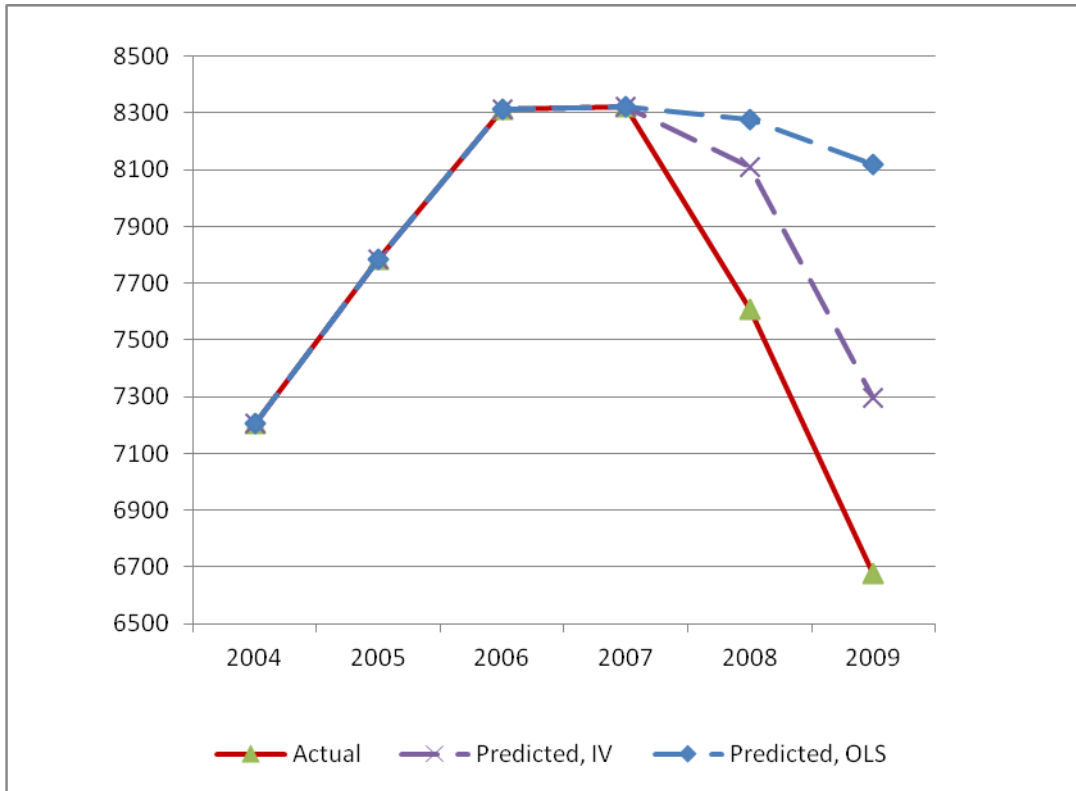


Figure 3 Actual and Predicted Total Injury Counts for Denmark

Table 1 Summary Statistics

Main Sample, 95-06			
	Obs	Mean	Std. Dev.
Injury Dummy	1955728	0.004	0.062
Injury Payment (DKK)	1955728	1542.515	51391.800
log (Hourly wage)	1955728	5.193	0.308
Married (Dummy)	1955728	0.586	0.493
Experience	1955728	17.863	9.308
Union (Dummy)	1955728	0.875	0.331
Overtime Hours (count)	1161807	50.623	116.514
Total Hours (count)	1163794	1532.598	365.040
Major Sick Days (count)	1955728	6.115	30.606
Minor Sick Days (count)	1955728	0.208	2.639
Anti. Dep. (Dummy)	1955728	0.029	0.169
Anti. Dep. Or Psych. (Dummy)	1955728	0.032	0.177
Export/Sales	1955728	0.659	4.241

Notes: The main sample covers the workers with large manufacturing firms that import and export at some point during 1995-2006.

Table 2 Injury Rates

	Dep. Var = Injury Dummy			
	FE	FE-IV	FE	FE-IV
Log exports	0.0004*** [4.09]	0.0020* [1.71]		
Log exports x female	-0.0001 [-0.71]	-0.0017 [-1.42]		
Exp. 2q x male			-0.0004* [-1.77]	0.0003 [1.55]
Exp. 2q x female			-0.0002 [-0.85]	0.0005** [2.05]
Exp. 3q x male			0.0002 [1.27]	0.0005** [2.52]
Exp. 3q x female			0.0003 [1.28]	0.0006*** [2.61]
Exp. 4q x male			0.0006*** [3.41]	0.0011*** [4.34]
Exp. 4q x female			0.0004** [2.21]	0.0011*** [4.06]
Log offshoring	-0.0001 [-0.94]	0.0022** [2.56]	-0.0001 [-0.72]	0.0023*** [2.94]
Log offshoring x female	-0.0001 [-0.75]	0.0008 [0.84]	-0.0001 [-0.89]	-0.0001 [-0.20]
Log employment	-0.0004 [-1.61]	-0.0036** [-2.44]	-0.0006** [-2.17]	-0.0036*** [-4.20]
Log capital-labor ratio	0.0004** [2.45]	0.0003* [1.88]	0.0003** [2.33]	0.0003* [1.92]
Share, high-skilled workers	-0.0060*** [-3.20]	-0.0044* [-1.94]	-0.0060*** [-3.25]	-0.0045** [-2.35]
Exp. 5-20 years	0.0010*** [4.35]	0.0010*** [4.30]	0.0010*** [4.33]	0.0010*** [4.26]
Exp. 20+ years	0.0008** [2.50]	0.0008** [2.41]	0.0008** [2.49]	0.0008** [2.41]
Union	0.0001 [0.53]	0.0001 [0.43]	0.0001 [0.50]	0.0001 [0.52]
Married	-0.0002 [-0.94]	-0.0002 [-1.02]	-0.0002 [-0.93]	-0.0002 [-1.01]
Observations	1,955,728	1,955,728	1,955,728	1,955,728
R2	0.0006	0.0006	387,788	0.0006
Number of job spell fixed effects	387,788	387,788	0.0006	387,788

Notes: Clustered (firm-by-year) t-statistics in square brackets. 2q = 2nd quartile, etc.

Table 3 Minor Sick-Leave Days

	Dep. Var. = #. Minor Sick-Leave Days			
	FE	FE-IV	FE	FE-IV
Log exports	0.0021 [0.63]	0.0316 [0.68]		
Log exports x female	-0.0054 [-1.03]	-0.0282 [-0.59]		
Exp. 2q x male			-0.0159** [-2.18]	-0.0179** [-2.11]
Exp. 2q x female			-0.0136 [-1.51]	-0.0189* [-1.93]
Exp. 3q x male			-0.0306*** [-4.08]	-0.0482*** [-5.47]
Exp. 3q x female			-0.0140 [-1.59]	-0.0229** [-2.18]
Exp. 4q x male			-0.0012 [-0.18]	-0.0128 [-1.25]
Exp. 4q x female			-0.0063 [-0.81]	-0.0180 [-1.57]
Log offshoring	-0.0027 [-0.94]	0.0087 [0.27]	-0.0022 [-0.76]	-0.0012 [-0.04]
Log offshoring x female	0.0105** [2.46]	0.0725** [2.24]	0.0099** [2.31]	0.0578*** [2.67]
Log employment	-0.0260** [-2.26]	-0.0735 [-1.40]	-0.0223* [-1.88]	-0.0192 [-0.58]
Log capital-labor ratio	-0.0031 [-0.61]	-0.0044 [-0.85]	-0.0026 [-0.51]	-0.0046 [-0.89]
Share, high-skilled workers	-0.0505 [-0.64]	-0.0271 [-0.31]	-0.0385 [-0.49]	-0.0697 [-0.89]
Exp. 5-20 years	-0.0706*** [-5.88]	-0.0717*** [-5.96]	-0.0699*** [-5.83]	-0.0705*** [-5.87]
Exp. 20+ years	-0.0478*** [-3.03]	-0.0493*** [-3.12]	-0.0470*** [-2.98]	-0.0482*** [-3.05]
Union	0.0018 [0.19]	0.0027 [0.30]	0.0017 [0.18]	0.0017 [0.19]
Married	-0.0266*** [-2.79]	-0.0264*** [-2.76]	-0.0265*** [-2.78]	-0.0259*** [-2.71]
Observations	1,955,728	1,955,728	1,955,728	1,955,728
R2	0.0002	0.0002	0.0002	0.0002
Number of job spell fixed effects	387,788	387,788	387,788	387,788

Notes: Clustered (firm-by-year) t-statistics in square brackets. 2q = 2nd quartile, etc.

Table 4 Major Sick-Leave Days

	Dep. Var. = #. Major Sick-Leave Days			
	FE	FE-IV	FE	FE-IV
Log exports	-0.0175 [-0.31]	-2.2137*** [-3.18]		
Log exports x female	0.5403*** [4.59]	0.0910 [0.10]		
Exp. 2q x male			-1.0472*** [-6.79]	-0.7396*** [-6.23]
Exp. 2q x female			-1.3747*** [-7.08]	-0.5185*** [-2.75]
Exp. 3q x male			-0.6644*** [-5.85]	-0.4284*** [-3.24]
Exp. 3q x female			-0.6795*** [-3.71]	-0.1020 [-0.51]
Exp. 4q x male			-0.1329 [-1.27]	0.7188*** [4.15]
Exp. 4q x female			1.0709*** [6.61]	1.9384*** [8.93]
Log offshoring	-0.1632*** [-4.76]	-1.4407*** [-2.86]	-0.1508*** [-4.54]	-0.4205 [-0.90]
Log offshoring x female	0.4570*** [6.90]	6.6662*** [12.07]	0.4057*** [6.27]	5.9006*** [15.52]
Log employment	-0.4021** [-2.16]	0.8322 [0.90]	-0.5905*** [-2.85]	-3.1137*** [-5.54]
Log capital-labor ratio	-0.0995 [-1.17]	-0.1993** [-2.22]	-0.0980 [-1.17]	-0.1601* [-1.75]
Share, high-skilled workers	-2.2972* [-1.79]	-4.5427*** [-3.03]	-1.7705 [-1.40]	-1.3008 [-0.99]
Exp. 5-20 years	0.2779** [2.34]	0.1470 [1.24]	0.2988** [2.52]	0.1942 [1.64]
Exp. 20+ years	-0.7941*** [-5.16]	-0.9620*** [-6.26]	-0.7684*** [-4.99]	-0.9032*** [-5.88]
Union	0.5574*** [5.38]	0.6214*** [5.91]	0.5543*** [5.34]	0.6940*** [6.63]
Married	-0.9941*** [-9.98]	-0.9321*** [-9.38]	-0.9801*** [-9.85]	-0.9423*** [-9.48]
Observations	1,955,728	1,955,728	1,955,728	1,955,728
R2	0.0088	0.0092	0.0091	0.0095
Number of job spell fixed effects	387,788	387,788	387,788	387,788

Notes: Clustered (firm-by-year) t-statistics in square brackets. 2q = 2nd quartile, etc.

Table 5 Total Work Hours

	Dep. Var. = log (Tot. Hours)			
	FE	FE-IV	FE	FE-IV
Log exports	-0.0072 [-1.14]	-0.0071 [-0.08]		
Log exports x female	0.0112* [1.73]	0.1159* [1.95]		
Exp. 2q x male			0.0266*** [3.24]	0.0220*** [3.02]
Exp. 2q x female			0.0386*** [5.30]	0.0388*** [5.57]
Exp. 3q x male			0.0327*** [3.95]	0.0311*** [3.57]
Exp. 3q x female			0.0508*** [6.49]	0.0389*** [4.61]
Exp. 4q x male			0.0009 [0.08]	-0.0042 [-0.32]
Exp. 4q x female			0.0091 [1.03]	0.0142 [1.39]
Log offshoring	0.0081*** [2.67]	0.0270 [0.74]	0.0069** [2.29]	0.0263 [0.72]
Log offshoring x female	-0.0031 [-0.77]	-0.0757*** [-2.71]	-0.0023 [-0.58]	-0.0367** [-2.32]
Log employment	0.1015*** [4.97]	0.0799 [1.32]	0.0963*** [4.46]	0.0869** [1.97]
Log capital-labor ratio	0.0013 [0.23]	0.0019 [0.32]	0.0004 [0.07]	0.0020 [0.35]
Share, high-skilled workers	0.1533 [1.35]	0.1899 [1.09]	0.1367 [1.21]	0.1729 [1.31]
Exp. 5-20 years	0.0986*** [24.95]	0.0997*** [25.43]	0.0968*** [24.89]	0.0981*** [24.78]
Exp. 20+ years	0.0906*** [23.17]	0.0920*** [23.89]	0.0890*** [22.99]	0.0905*** [23.08]
Union	0.0020 [0.56]	0.0026 [0.72]	0.0020 [0.58]	0.0017 [0.49]
Married	0.0070*** [3.14]	0.0067*** [3.04]	0.0065*** [2.94]	0.0067*** [2.97]
Observations	1,161,807	1,161,807	1,161,807	1,161,807
R2	0.0267	0.0265	0.0284	0.0279
Number of job spell fixed effects	321,863	321,863	321,863	321,863

Notes: Clustered (firm-by-year) t-statistics in square brackets. 2q = 2nd quartile, etc.

Table 6 Severe Depression

	Dep. Var. = Anti. Dep. (Dummy)			
	FE	FE-IV	FE	FE-IV
Log exports	-0.0006*** [-3.40]	-0.0049** [-2.08]		
Log exports x female	0.0012*** [2.77]	0.0148*** [3.87]		
Exp. 2q x male			-0.0014*** [-3.87]	-0.0007* [-1.76]
Exp. 2q x female			-0.0004 [-0.57]	-0.0002 [-0.35]
Exp. 3q x male			-0.0006* [-1.75]	-0.0004 [-0.99]
Exp. 3q x female			0.0006 [1.00]	-0.0001 [-0.22]
Exp. 4q x male			-0.0009*** [-2.65]	-0.0004 [-0.84]
Exp. 4q x female			0.0022*** [3.66]	0.0023*** [3.16]
Log offshoring	-0.0001 [-0.95]	-0.0032* [-1.91]	-0.0001 [-0.94]	-0.0032** [-2.06]
Log offshoring x female	0.0009*** [3.57]	0.0116*** [5.10]	0.0008*** [3.03]	0.0171*** [10.94]
Log employment	0.0031*** [4.82]	0.0029 [0.94]	0.0027*** [4.00]	0.0003 [0.19]
Log capital-labor ratio	-0.0001 [-0.24]	-0.0003 [-1.17]	-0.0001 [-0.24]	-0.0003 [-0.90]
Share, high-skilled workers	0.0069 [1.41]	0.0054 [1.01]	0.0071 [1.45]	0.0066 [1.34]
Exp. 5-20 years	0.0017*** [3.16]	0.0014** [2.56]	0.0017*** [3.16]	0.0014** [2.57]
Exp. 20+ years	0.0015** [2.07]	0.0012 [1.55]	0.0016** [2.07]	0.0011 [1.52]
Union	0.0006 [1.17]	0.0010** [1.97]	0.0006 [1.21]	0.0010* [1.86]
Married	-0.0051*** [-10.07]	-0.0049*** [-9.74]	-0.0051*** [-10.03]	-0.0049*** [-9.78]
Observations	1,955,728	1,955,728	1,955,728	1,955,728
R2	0.0073	0.0075	0.0074	0.0075
Number of job spell fixed effects	387,788	387,788	387,788	387,788

Notes: Clustered (firm-by-year) t-statistics in square brackets. 2q = 2nd quartile, etc.

Table 7 Stress and Depression

	Dep. Var. = Anti. Dep. Or Psych. (Dummy)			
	FE	FE-IV	FE	FE-IV
Log exports	-0.0007*** [-3.49]	-0.0055** [-2.19]		
Log exports x female	0.0014*** [2.94]	0.0157*** [3.90]		
Exp. 2q x male			-0.0014*** [-3.80]	-0.0007* [-1.69]
Exp. 2q x female			-0.0002 [-0.25]	-0.0003 [-0.47]
Exp. 3q x male			-0.0006 [-1.55]	-0.0004 [-0.95]
Exp. 3q x female			0.0011 [1.62]	-0.0004 [-0.61]
Exp. 4q x male			-0.0009*** [-2.65]	-0.0006 [-1.14]
Exp. 4q x female			0.0025*** [3.84]	0.0021*** [2.59]
Log offshoring	-0.0001 [-0.86]	-0.0040** [-2.25]	-0.0001 [-0.85]	-0.0041** [-2.42]
Log offshoring x female	0.0009*** [3.17]	0.0145*** [6.09]	0.0008*** [2.66]	0.0206*** [12.40]
Log employment	0.0031*** [4.49]	0.0030 [0.91]	0.0025*** [3.60]	0.0003 [0.15]
Log capital-labor ratio	-0.0003 [-0.85]	-0.0006* [-1.89]	-0.0003 [-0.87]	-0.0005 [-1.64]
Share, high-skilled workers	0.0074 [1.44]	0.0054 [0.96]	0.0075 [1.45]	0.0066 [1.29]
Exp. 5-20 years	0.0032*** [5.27]	0.0028*** [4.62]	0.0032*** [5.26]	0.0028*** [4.62]
Exp. 20+ years	0.0030*** [3.74]	0.0025*** [3.15]	0.0030*** [3.73]	0.0025*** [3.11]
Union	0.0002 [0.40]	0.0007 [1.26]	0.0003 [0.45]	0.0006 [1.13]
Married	-0.0064*** [-11.25]	-0.0062*** [-10.91]	-0.0064*** [-11.22]	-0.0062*** [-10.95]
Observations	1,955,728	1,955,728	1,955,728	1,955,728
R2	0.0073	0.0075	0.0073	0.0075
Number of job spell fixed effects	387,788	387,788	387,788	387,788

Notes: Clustered (firm-by-year) t-statistics in square brackets. 2q = 2nd quartile, etc.

Table 8 Welfare Changes Following 10% Rise in Exports

Variables Used		Men	Women
<hr/> Welfare Gain <hr/>			
	C = average wage, sample	297164.3 DKK	234994.5 DKK
	$\frac{\partial \ln C}{\partial \psi}$ = wage elasticity of exports, HJMX 2014	0.0493	0.0493
	Total welfare gain, (13)	1465.02 DKK	1158.52 DKK
<hr/> Welfare Loss <hr/>			
% change in health cost			
	$\frac{\partial \ln d}{\partial \psi}$		
	For injury, Table 2	0.4676	0.6350
	For severe depression, Table 3	-0.2025	0.2506
	β For injury, Table A4	0.0310	0.0310
	For severe depression, Table A4	0.0041	0.0041
	Total % change in health cost, (15)	0.0137	0.0207
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health cost	$\frac{\partial H}{\partial d_0}$ = average injury compensation, sample	381659.7 DKK	397103.1 DKK
	d_0 = injury rate, sample	0.0043	0.0031
	Total health cost, (16)	52597.5 DKK	40296.2 DKK
	Total welfare loss, (15)	71.99 DKK	83.54 DKK
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Net Welfare Change		1393.03 DKK	1074.98 DKK