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Workplace Stress in the United States: Issues and Policies

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WORKPLACE STRESS IN THE UNITED STATES: ISSUES AND POLICIES

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ABSTRACT/RESUMÉ

Workplace Stress in the United States: Issues and Policies

Despite relative affluence, workplace stress is a prominent feature of the US labour market. To the extent that job stress causes poor health outcomes – either directly through increased blood pressure, fatigue, muscle pain, etc. or indirectly through increased rates of cigarette smoking – policy to lessen job stress may be appropriate. Focusing predominantly on the United States, this report reviews the literature on a variety of economic concerns related to job stress and health. Areas in which economists may provide valuable insights regarding job stress include empirical selection concerns in identifying the effect of stress on health; measurement error with respect to stress; the existence and magnitude of compensating differentials for stress; and the unique "job lock" effect in the United States created by a system of employer-provided health insurance. This report concludes with a brief discussion of US policies related to job stress.

This Working Paper relates to the 2014 OECD Economic Survey of the United States (www.oecd.org/eco/surveys/economic-survey-united-states.htm).

JEL Classification codes: l1; J22.
Keywords: job stress, health, labour market policy

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Stress au travail aux États-Unis : questions et actions

Malgré une relative prospérité, le stress au travail constitue une caractéristique importante du marché du travail aux États-Unis. Dans la mesure où il génère des problèmes de santé, soit directement par une hausse de la tension artérielle, de la fatigue, des douleurs musculaires, etc., soit indirectement par une augmentation de la consommation tabagique, il semble utile d'entreprendre des actions visant à atténuer le stress au travail. Ce rapport, qui porte essentiellement sur les États-Unis, passe en revue les articles publiés sur diverses problématiques économiques liées au stress au travail et à la santé. Parmi les domaines dans lesquels les économistes pourraient apporter un éclairage intéressant sur le stress au travail, on peut citer les problèmes de sélection empirique lors de la détermination de l'effet du stress sur la santé, les erreurs de mesure en rapport avec le stress, la présence et l'ampleur des différentiels compensatoires liés au stress, ainsi que l'effet – propre aux États-Unis – de « rétention de l'emploi » créé par un système d'assurance-maladie fournie par l'employeur. Le présent rapport se conclut par une brève analyse des mesures prises dans le pays pour lutter contre le stress au travail.

Ce document de travail est lié à *l'Étude économique 2014 des États-Unis* menée par l'OCDE (www.oecd.org/eco/surveys/united-states.htm).

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WORKPLACE STRESS IN THE UNITED STATES: ISSUES AND POLICIES

by Michael Darden[1]

Introduction

Gross national income per capita in the United States was USD 52 547 in 2012.[2] The United States earns a perfect 10 out of 10 in the OECD "Better Life" index on the dimension of household income and financial wealth.[3] And yet, at a time of relative affluence if not relative to the recent past, then especially relative to the rest of the world – a sizable fraction of Americans are stressed, anxious, and depressed in regards to the workplace. Indeed, a survey by the American Institute for Stress reports that 35% of workers said their jobs are harming their physical or emotional health.[4] Furthermore, 80% of workers feel stress on the job; nearly half say they need help in learning how to manage stress; and 42% say their co-workers need such help.

Within the United States, the Center for Disease Control and Prevention (CDC) operates the National Institute for Occupational Safety and Health (NIOSH) with the goal to "provide national and world leadership to prevent workplace illnesses and injuries."[5] A 1999 NIOSH report identified several key stylized facts about stress in the US workforce.[6] First, 40% of workers in 1999 reported their job as very or extremely stressful; 25% viewed their jobs as the number one stressor in their lives; 75% of employees believed that workers had more on-the-job stress than a generation ago; 29% of workers felt quite a bit or extremely stressed at work; and 26% of workers said they were "often or very often burned out or stressed by their work". Furthermore, the report suggested that job stress is more strongly associated with health complaints than financial or family problems.

More recently, the American Psychological Association polled 1 546 adults, aged 18 years or more who were currently employed as full-time, part-time, or self-employed workers in 2011.[7] 36% of respondents said they "typically feel tense or stressed out during their workday" and 40% claimed that "low salary is significantly impacting their stress level at work". 20% of respondents reported that their average daily level of stress from work was an 8, 9, or 10 out of 10.

The United States is not the only country where work-related health issues have attracted rising attention. In many countries, changes in the labour market, such as just-in-time delivery, atypical employment contracts and lower job security, are sources of concerns for the health of workers. In addition, the demographic ageing of the labour force and the rising proportion of women may also have an impact. In Europe, 22% of workers report suffer from stress and fatigue due to their jobs, a share that has risen over the past decade (OECD, 2008).

That Americans are both relatively wealthy and stressed with respect to work is somewhat at odds with recent evidence on the relationship between income and life-satisfaction. Deaton (2008) reviews the literature on this relationship and analyses the results of a Gallup Organization World Poll. He reports that

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1. Department of Economics, Tulane University. Professor Darden thanks Patrick Lenain (OECD) for helpful comments.
2. Source: OECD
3. See OECD Better Life Index.
4. See 2001 Attitudes in the American Workplace VII Report, the American Institute for Stress.
5. CDC - NIOSH
6. NIOSH (1999).
7. American Psychological Association (2011).

"average life satisfaction is strongly related to per capita national income". Furthermore, Stevenson & Wolfers (2013) find a strong positive correlation between subjective well-being and national income. Those authors also find that estimating well-being as a function of the log of income provides a better model fit than a linear income specification. Comparisons among poor countries are found to exhibit a very similar well-being/income relationship to comparisons among only rich counties.

While the results of Stevenson & Wolfers (2013) are shown to be robust to different measures of life-satisfaction, Deaton (2008) concedes that life-satisfaction is a complex, multi-dimensional factor that is difficult to aggregate into a single index. If life-satisfaction is a function, in part, of workplace stress, then workplace stress may be increasing with overall life-satisfaction if other dimensions of life-satisfaction are also improving. To the extent that workplace stress causes poor health, increasing workplace stress may overtake other dimensions of life-satisfaction if it crosses some threshold.

This report focuses on job stress, health and policy. While the primary area of interest is the United States, I draw on international research when appropriate. The report proceeds as follows. First, I establish the definition of "job strain" theoretically, and I explore how scientists in medicine, epidemiology, and economics have characterised the effects of job strain on health. Measurement and data issues – especially with regard to the latent nature of stress – have provided challenges in establishing consistent estimates of the effect of job strain on health. Next, I examine how economists think about job stress and review the economic literature of job stress in the United States. I also review the literature on the complementarity between job stress and other forms of health investment (e.g., smoking). Next, I show that the literature has found that poor mental health has real implications for the labour market in the form of increased absenteeism and job loss and decreased productivity. Finally, I provide an overview of US policies regarding workplace safety and disability as they relate to job stress. The report concludes with stylized facts on the United States and discusses recent policy measures that may address job stress.

Job Strain and Health

From a theoretical sense, Karasek & Theorell (1990) build a psychological model of job strain as a function of "*decision latitude*" and "*psychological demands"* in the workplace. Decision latitude is itself a function of skill discretion and decision authority. That is, low decision latitude within a job may exist when the environment within which a worker operates is constrained such that the optimal course of action – from the perspective of the worker – cannot be taken. However, constraints do not in themselves cause job strain. Indeed, within the model of Karasek & Theorell (1990), job strain exists only when a constrained worker is also subject to strong psychological demands. Those authors use the example of an assembly line worker for whom nearly all action is constrained. With increased demands (e.g., higher output) come increased psychological strains. Occupations with low decision latitude and low psychological demands are deemed passive jobs, while high-decision latitude and high psychological demand jobs are deemed active. Karasek & Theorell (1990) use the example of a high school teacher as that of an active job and a waitress as a high-strain job.

How to empirically measure job strain has proven difficult, and different studies have relied on different measures and definitions. Indeed, the literature is difficult to aggregate because results are sensitive to the empirical definition of job strain. However, the prevailing measures of strain are self-reported mental outcomes. Consistent with Karasek & Theorell (1990), the American Psychological Association (American Psychological Association, 2011) directly asked participants of a US job strain survey the extent to which they were "satisfied with the amount of *control* and *involvement*" in their jobs. 62% of respondents agreed or strongly agreed that they were satisfied. While 10% of respondents claimed that personal responsibilities interfered with job duties, 25% claimed the opposite – that the demands of their job interfered with their home/family responsibilities.

Both decision latitude and psychological demand are ultimately latent variables for which proxy variables (e.g., self-reported categorical stress variables) may be absent in large, representative datasets. Indeed, most studies rely on self-reported measures of job strain that may or may not be consistent with medical and psychological definitions of stress. For example, French & Dunlap (1998), in a study on compensating wage differentials and job stress, define job stress as a binary indicator from a self-reported question on whether an individual's job is mentally stressful. If an individual claimed that a job is mentally stressful, then that individual was treated as mentally stressed. Kivimaki *et al*. (2012) measure job strain with a series of questions about the psychosocial aspects of their job. These ask specifically about job-demand items (e.g., intensity of work, etc.) and job control-items (e.g., decision freedom). They construct an index of these questions, and they define high-job demand as above the median job strain score. Low control was defined as being below median levels of control. However, the empirical definition of job strain is disputed in the literature. Indeed, Landsbergis & Schnall (2013) are critical of Kivimaki *et al.* (2012) – who find that workplace stress may be associated with increased cardiovascular disease risk – because their analysis does not control for work hours, poor social support and job security as empirical measures of job strain.

Promising recent work has used latent factor models to define stress and health as they influence a variety of outcomes. For example, Azagba & Sharaf (2011) empirically define a weighted average of several questions that relate to psychological demand and worker control. Those authors then break the resulting index into tertiles and assign low, medium or high job strain to an individual observation. Fletcher *et al*. (2011) merge Panel Study of Income Dynamics (PSID) data to Dictionary of Occupational Titles (DOT) data – which categorize the level of physical, mental, and emotional strain of a job – to model self-reported health status a function of job characteristics. Those authors use Principal Component Analysis (PCA) to construct an index of the environmental strain of a job.[8] Those authors find evidence that especially "bad job characteristics", as measured by the DOT, predict poor health outcomes.

Labour Market Conditions and Health

Health economists have devoted much effort to the causal relationship between macroeconomic conditions and health. A series of papers by Christopher Ruhm have investigated this relationship in the United States. Ruhm (2000) lists four mechanisms by which health and macroeconomic conditions may be correlated: *1)* changes in opportunity cost of time; *2)* health as an input into the production of goods and services; *3)* risky activities as normal goods; and *4)* in(out)migration due to good(bad) economic times may cause an observed selection effect. Ruhm (2000) shows a strong negative relationship between macroeconomic conditions and health. Using US data from the Behavioural Risk Factor Surveillance System, he finds that a one percentage point increase in the state unemployment rate is associated with 0.5% increase in total mortality. An additional possible mechanism for this finding is that job separation (or the potential for job separation) increases stress, which leads to cardiovascular disease and mortality.

In a similar study, Morefield *et al*. (2011) analyse longitudinal data on occupational status and health transitions from the US representative Panel Study of Income Dynamics. The authors find evidence that tenure in blue-collar employment causes workers to "wear-out" – defined as lowered subjective health assessment – more quickly relative to white-collar workers. This result is shown to be robust to corrections for education and other demographic characteristics. Letvak *et al*. (2012) study the mental health of 1 171 registered nurses (RN) in the United States. Relative to a national rate of depression of 9%, RNs in the sample of Letvak *et al*. (2012) were 100% more likely to exhibit signs of depression. Furthermore,

8. PCA is a data reduction technique in which a researcher weighs a variety of correlated measurements to construct an index. The weights are determined by the eigenvector values of an eigenvector decomposition of the variance/covariance matrix. See Vyas & Kumaranayake (2006) for a detailed review with respect to the construct of socio-economic statutes indexes.

depressed nurses were more likely to negatively influence the productivity of other nurses, and depression was correlated with higher BMI and worse job-satisfaction. Importantly, the authors find that depression was less likely to be reported and treated than physical ailments.

The negative effect of unemployment on health is well documented.[9] Recent evidence from Sullivan & Wacher (2009b) shows that for older male workers in the United States with a large amount of tenure in an occupation, mortality rates jump in the year after job displacement and mortality rates remain higher even 20 years post displacement. They attribute their findings to a mechanism in which stress persists and causes mortality rates to rise. Furthermore, job loss may result in lower lifetime earnings, which may by itself cause chronic stress, and chronic stress may imply higher rates of mortality.

The threat of unemployment, or more generally job security, however, may also be an underlying cause of stress-related health outcomes. For example, Sullivan & Wacher (2009a) suggests that variability in earnings – through job separation – is associated with increased mortality rates for male workers in Pennsylvania. Furthermore, Virtanen *et al*. (2011) find that perceived job insecurity may lead to adverse health effects, and Mattiasson *et al*. (1990) find that the threat of unemployment increases cholesterol levels.

Similarly, the perceptions and outlook of American workers may also be affected by job stress. A survey from the Attitudes in the American Workplace found that 73% of American workers would not want their boss's job. Furthermore, Johnston & Lee (2013) study changes in workers' perceptions of their jobs before and several years after a promotion. Interestingly, and conversely to the work of Karasek & Theorell (1990), they report both more control and decision-making freedom and yet also more stress and long hours. Years after a promotion, any positive effects of higher income are found to have been nullified and stress remains high. However, they find no long-term health effects of promotion with the exception of reduced mental health.

Labour economists have also studied a uniquely American form of job stress: job lock – a situation in which a worker stays in a job despite the desire to seek other employment – caused by employer-provided health insurance. Especially in cases in which a worker is poorly matched to a job or is unprepared for or unaware of the stress that comes with a job, job lock may imply chronic stress situations that lead to poor health outcomes. Indeed, Madrian (1994), the seminal paper in the job lock literature, suggests that employer-provided health insurance creates a job-lock effect in which voluntary turnover rates are 25% lower for those with health insurance. Furthermore, if health insurance improves health but creates additional stress from those locked a job, and stress causes poor health outcomes, then standard statistical models will understate the importance of health insurance on health. The extent to which the Affordable Care Act (ACA) may lessen an employer provided health-insurance job lock effect is discussed below.

Health Effects

Physiologically, stress is a natural phenomenon that everyone experiences. Stress causes the adrenal glands to release hormones that elevate heart rate and blood pressure. Stress can have positive implications in the sense that these hormones boost energy in situations characterized by conflict. However, when stress becomes chronic – constant stress over a long period of time in which hormone levels stay elevated – the health consequences can be severe.[10] According to NIOSH (1999), the early warning signs of job stress

9. However, generally the results in the job displacement and health literature depend critically on the measure of health under study. For example, Browning *et al.* (2006) find no effect of job displacement on hospital admissions for conditions related to chronic stress in Denmark.

10. That job stress does not manifest itself into major health conditions until after many years' presents a challenge to empirically identifying and quantifying the effects of stress. For example, the Framing- ham Heart Study is

related health implications are headache, sleep disturbances, difficulty concentrating, short temper, and upset stomach. In the long run, stress is associated with cardiovascular disease, musculoskeletal disorders, psychological disorders, workplace injury, and suicide.[11]

The medical literature has emphasized the relationship between stress and cardiovascular ailments. The mechanism through which job stress affects cardiovascular health is blood pressure. Vrijkotte *et al*. (2000) define job stress, in part, as a high imbalance between workplace effort and reward in a sample of 109 white-collar workers in the Netherlands. The authors find that a high imbalance is associated with higher systolic blood pressure whether at work or not and a higher heart rate at work. See Vrijkotte *et al*. (2000) for a review of the literature on work stress and blood pressure.

The long-term effects of job stress on cardiovascular disease, broadly defined, are difficult to model because ideal data would include longitudinal information of individuals over a broad set of social, economic, and demographic characteristics. Furthermore, stress is a difficult measure with regard to the workplace.[12] Several observational cohort studies have tried to quantify job stress with cardiovascular disease. Kivimaki *et al* (2002) administered a work stress questionnaire to a small sample of Finnish factory workers with no baseline cardiovascular disease. The authors use the psychosocial demand/job control framework of Karasek &Theorell (1990) to construct a variety of survey questions. Job strain is measured by summing the responses (on a 1 to 5 scale) and splitting the sample into tertiles based upon the sum of the question scores. The authors follow up with sample subjects on cardiovascular conditions, with a mean follow up time of 25.6 years. Age and gender adjusted results suggest that high job strain (the highest tertile) was associated with a 2.2-fold increase in cardiovascular mortality.

In a more general review of several studies, Kivimaki *et al*. (2012) review 13 European cohort studies and find evidence of an association between job strain and cardiovascular disease. Those authors also suggest that a main mechanism linking job stress and cardiovascular disease may be an observed correlation between job stress and cigarette smoking.[13] Studying the population of workers between ages 40 and 50 in Denmark, Black *et al*. (2012) examine how job displacement affects cardiovascular health. Those authors find that cardiovascular disease is worse for those displaced, and this finding can largely be attributed to a increase in smoking. Interestingly, the cardiovascular health of the spouses of displaced workers is unaffected.

There is little evidence of a relationship between job stress and cancer. Heikkila *et al*. (2013), who conduct a meta-analysis of the effects of work stress on the risk of cancer in European countries, found no evidence across 12 European cohort studies of any cancer risk from job strain. However, there is evidence that job stress may play a role in suicides. Mohseni-Cheraghlou (2013) examines panel data on United States workers from 1979 to 2004 and finds that suicide may be linked with labour-market factors. Indeed, states with high unemployment rates saw greater counts and percentages of suicides.

To summarize the literature on the effects of job stress on health, chronic stress may lead to severe cardiovascular consequences; however, chronic stress is difficult to measure, and later life health outcomes are difficult to attribute to working age conditions.

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one of the few longitudinal health studies over many decades, but that survey does not contain any consistently measured labour market information.

11. See Steptoe & Kivimaki (2012) for a thorough review of the medical science behind stress and cardiovascular disease.

12. See discussion above.

13. See discussion on secondary factors below.

Health Production

Economists have much to contribute to the literature on job stress and health. The seminal work of Grossman (1972) defines how economists generally think about health. The key insight of Grossman (1972) is that health is a derived demand – that is, an individual demands health such that she may consume other goods. Therefore, in the Grossman framework, health is produced by optimally selecting lifestyle behaviours (e.g., exercise, alcohol, etc.) and human capital investments (e.g., school decisions). Income and the price of consumption goods and medical services affect the optimal investment in health through the budget constraint. The model predicts that higher income should be associated with improved health – an individual has more money to invest in health. However, if job stress causes poor cardiovascular health, the model of Grossman (1972) makes two predictions. First, the model suggests in the long-run that individuals, who are particularly prone to job stress and the associated health implications, will select out of high stress occupations. Second, if job stress is reducing the current health of an individual, the model predicts that an individual may revaluate her investment in health on other dimensions.

The selection issue described above – that there exists heterogeneity in preferences for and tolerance of stress, and those better at coping/adapting to stress select into stressful jobs – implies that standard statistical techniques that relate job stress to health may not accurately capture the severity of the effect of job stress. In economics this is known as an identification problem – the effect of job stress on health is muddled by selection into jobs. Indeed, French & Dunlap (1998) emphasize that very little of the medical literature on stress and cardiovascular disease consider that stress is a negative job characteristic that may be priced out with higher wages. Consider two jobs that are differentiated only by the level of stress. An employer may offer a higher wage for the more stressful position, and the selection effect described earlier may generate a positive correlation between the types of people that can handle stress and wages.

French & Dunlap (1998) study 1 500 workers in the United States for evidence of compensating differentials. They find evidence that cohorts of workers under stress exhibit a wage premium of 3-10% relative to "non-stressed" cohorts. The authors note that if labour markets are efficient – no job search frictions or information asymmetries – then policy regarding job stress is unnecessary because compensating differentials have priced out the unpleasantness of stressful occupations. The authors are quick to note however that the existence of compensating differentials does not imply that markets are efficient.[14]

Important recent work by Fletcher *et al*. (2011) ask whether cumulative job characteristics - the accumulation of particularly negative and stress-related job characteristics over a five year period of time – affect health. The cumulative nature of job characteristics is important because the medical literature has emphasized that chronic stress over time may lead to poor health outcomes. Fletcher *et al.* (2011) use principal component analysis to reduce the dimension of DOT data into an index of the accumulated physical and environmental work conditions.[15] They estimate ordered probit models of self-reported health as a function of accumulated job characteristics and controls. Importantly, they control for the self-selection of relatively healthy individuals into more strenuous/demanding/control occupations. They show that when they do not control for earnings – and thus do not allow for compensating differentials – they may understate the effects of poor working conditions on health.

Fletcher *et al*. (2011) find that long-term exposure to physically and environmentally strenuous work conditions worsened self-reported health for US workers. Importantly, those authors find that the effects of

14. Ose (2005) formulate a theoretical model that ties health to working conditions and yields a testable hypothesis of compensating wage differentials.

15. Without PCA, the authors also construct cumulative work hours and labour income.

job stress on self-reported health may vary by education, gender and ethnicity. For men, the negative effect of cumulative physical demands at work is driven largely by non-whites. Furthermore, much of the effect of cumulative environmental conditions is due to younger workers, whereas the negative effects of physical conditions are driven by older workers. In general, the magnitudes of the negative effects are larger for women, but female negative effects are driven by whites. The general finding that accumulated job stressors are correlated with worse self-reported health is consistent with the medical notion that acute, temporary stress is not a medical problem, but chronic stress results in the production of cortisol hormones that imply health effects later in life.

Following from Grossman (1972), economists should contribute to the literature on job stress by studying the substitutability and complementarity between stressful work characteristics and other forms of health investment. For example, if cigarette smoking relieves stress, job stress may cause an increase in smoking, and the observed correlation between chronic job stress and poor health may be in part due to smoking. Indeed, Kivimaki *et al*. (2012) and Black *et al*. (2012) independently find that job strain is less important in predicting coronary heart disease than other risk factors such as smoking.

How individuals cope with stress is important. Focusing on older workers in the Health and Retirement study, Ayyagari & Sindelar (2010) find that job stress reduces the probability of quitting cigarette smoking and increases the quantity of cigarettes smoked in the United States. Importantly, their panel data approach allows for fixed effects estimation at both the individual and time levels that removes time invariant individual unobserved heterogeneity and the secular trend in cigarette smoking. Examining the Canadian National Population Survey, Azagba & Sharaf (2011) show that job strain increases drinking among those already classified as heavy drinkers. Job strain also is shown to increase smoking for light smokers. However, neither rates of smoking nor drinking are shown to increase on the extensive margin, a key distinction when considering policy. For example, we would expect an increase in smoking as a result of job stress to also be accompanied by an increase in cancer incidence, though Heikkila *et al.* (2013) find no effect of work stress on cancer risk. The work of Azagba & Sharaf (2011) and Heikkila *et al*. (2013) can be reconciled by noting that the main driver for lung cancer risk is the extensive margin of cigarette smoking.

If alcohol is a normal good, then we would expect increases in income – through improved macroeconomic conditions – to be associated with an increase in alcohol demand and alcohol prices. Studying BRFSS data, Ruhm & Black (2002) show that, on the intensive margin, there is a positive relationship between macroeconomic indicators and alcohol consumption. However, similar to Azagba & Sharaf (2011) finding that smoking increases on the intensive margin for stressed workers, Ruhm & Black (2002) find that wealth does not induce non-drinkers to start. Importantly, the authors also find that the relationship is symmetric – bad economic times decrease overall alcohol consumption because heavy drinkers drink less. Furthermore, those authors show that their results hold when controlling for cognitive ability, risk preferences and time discounting.

The Labour Market Implications of Poor Health

Generally, NIOSH (1999) suggest that stress is correlated with absenteeism, tardiness, and intentions to quit. Research on 15 OECD countries has found that stress leads to increased rates of absenteeism and individuals' quitting behaviour. Indeed, Leontaridi & Ward (2002) find that individuals reporting at least some workplace-related stress are 10 - 14% more likely to hold intentions to quit or be absent from work. Those authors also show that the probability of absenteeism is increasing in the level of self-reported stress. Leontaridi &Ward (2002) show that work hours and physical demands, as well as being female, are correlated with higher levels of stress, and that stress is increasing in income and educational attainment.

According to economic theory, a worker's wage should reflect the value of her marginal product. That the marginal product of a worker should fall as health declines is common sense; thus, we should expect workplace stress to manifest itself in lower productivity and lower wages. A 2004 report from the Centers for Disease Prevention and Control reviews 52 published studies that examine the relationship between long working hours and "illnesses, injuries, health behaviours, and performance".[16] According to the review, the majority of studies find that along a number of health dimensions, overtime work is detrimental. Of the 52 studies, lengthy work times were categorized as *1)* any time over 40 hours per week, *2)* specifically 10 and 12 hour-work shifts relative to 8-hour shifts, *3)* 12-hour shifts in particular, and *4)* very long shifts in which an individual is on call for 24, 32, or 48 hours. Across a variety of countries, category 1 was generally associated with higher risk for cardiovascular disease, but studies that focused on hypertension were inconclusive. The report finds that 8 of 12 studies find increased morbidity and mortality risks associated with broad overtime work, but also a trend towards increased cigarette and alcohol consumption, as well as worse test performance. The report also finds report mixed results across a variety of outcomes for extended work as defined in categories 2 and 3.

Especially of note in the CDC report is the general association in most studies of worse subjective health, productivity and overtime hours. Rocheteau (2002) provides a conceptual framework within which one can analyse worker productivity under a policy designed to, in part, relieve workplace stress: mandated work time limits. Rocheteau (2002) states that, "our model predicts that reducing the number of working hours in high unemployment countries can reduce the unemployment rate, whereas the same policy in low unemployment countries has negative effect on the employment level". The key mechanism that drives their results is the well-known notion of efficiency wages – paying workers more than the value of their marginal product to induce effort, and thus prevent moral hazard induced shirking, and to generate loyalty. In the model of Rocheteau (2002), workers shirk their work responsibility if the rent received from working -- the value of being employed less that of being unemployed – exceeds a threshold that is a function of the disutility of work and the probability of being dismissed when shirking. Clearly, as unemployment benefits rise, or as marginal tax rates rise, the incentive to shirk increases. Crucially, the disutility of work is assumed to be increasing, at an increasing rate, in the number of hours of work. In addition to ignoring feedback loops, the model of Rocheteau (2002) omits any mention of increases in productivity induced by health benefits and stress relief from reduced hours or efficiency wages.

Another important implication of growing workplace stress levels is the potential increase in mental health disability applications. Indeed, the Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) programmes have grown considerably since the 1984 decision to switch from a medical to a functional definition of disability. Autor & Duggan (2003) argue that the odd co-movement of rising disability growth and improving aggregate health in the United States can be partly explained by changes in screening within the SSDI program and an increase in the rate at which wages are replaced in the SSDI programme. Furthermore, not surprisingly, Maestas *et al*. (2013) show that the extent to which disability insurance negatively impacts work participation depends on the severity of the disability, and Kostol & Mogstad (2014) show that the disabled who receive disability insurance and do not work, but who have some capacity for work, may respond to financial work incentives designed to promote a return to work. Autor & Duggan (2007) show that expansion of Veterans' Affairs Disability Compensation programme reduced the labour-force participation rate of Vietnam Veterans. Autor & Duggan (2006) offer an excellent summary of the growth in the SSDI and SSI programs, as well as the toll of these programmes on the long-run solvency of the Social Security program in the United States.

16. See CDC (2004).

United States Policy

In the United States, research on the psychological strain in the workplace – especially over time – has lagged behind Western European countries. With respect to policy, it is important to differentiate between policy at the organizational (employer) and individual (employee) level. The emphasis of US research has been on individual characteristics that lead to stress-related illness. This focus has implied a number of individual level worker safety policies. The Worker Protection Act of 1970 created two Federal agencies tasked with protecting worker safety and health. OSHA, the Occupational Safety and health Administration, is tasked with enforcing Federal workplace safety regulations. The National Institute for Occupational Safety and Health (NIOSH) is required by Congress to conduct research on workplace safety issues. OSHA recognizes job stress in particular industries, such as hospital workers, but typically outsources guidance with respect to job stress issues to NIOSH. In fact, OSHA links to other countries reports on the health hazards of job stress.[17]

In the 1980s, the National Institutes for Health (NIH) drastically cut funding for the National Institute for Occupational Safety and Health (NIOSH), and eliminated research divisions working on mental health in the workplace (Karasek & Theorell, 1990). In 1996, NIOSH mental health research was revived through the broader National Occupational Research Agenda. That work focused on the effect of the organisation of the workplace and psychosocial factors on job stress. NIOSH has also investigated policies designed to improve safety within the workplace.[18] In the last decade, NIOSH has been active in funding research on the effects of work shift duration on health. The product of their funded research has been guidance and approved methods for managing and avoiding fatigue.[19]

From a policy perspective, the overarching Fair Labour Standards Act, enforced by the Department of Labour, establishes certain standards (e.g., minimum hourly wages, overtime compensation after 40 hours of work in one week, etc.), but the Act does not focus specifically on alleviating the strains of work.[20] Indeed, after a minimum set of standards, the Act regulates certain employee benefits such as work breaks only if those benefits are offered in the first place. For example, no general laws on lunch breaks/coffee breaks/etc exist, but FLSA requires that if granted, these breaks count as working time. The Act does not place any restrictions on the following: vacation time; holiday, severance, or sick pay; rest periods; premium pay for weekend or holiday work; pay raises or fringe benefits; discharge notices; or providing pay stubs.[21] Furthermore, the FLSA does not limit the number of hours in a day, or days in a week, an employee may be required or scheduled to work, including overtime hours, if the employee is at least 16 years old. Other policies (minimum wages, rest periods, etc.) vary across states.

The Act does stipulate that employees must receive at least minimum wage and may not be employed for more than 40 hours per week without receiving at least one and one-half times their regular rates of pay for the overtime hours. However, several controversial provisions exempt employers from paying overtime wages in certain circumstances. For example, to avoid paying overtime wages, an employer may designate a worker as an administrator if the employee is compensated on a salary basis; earns more than USD 455 per week; the employee's primary tasks are in office work; and the employee's "primary duty includes the exercise of discretion and independent judgment with respect to matters of significance".[22] The Act also places definitions on work itself. For example, the Act differentiates between a worker engaged to wait for work (counted as work time) versus waiting to engage in work (not work time).

17. See OSHA for an example of OSHA information regarding stress in hospital workers.
18. See http://www.cdc.gov/niosh/topics/stress/
19. See http://blogs.cdc.gov/niosh-science-blog/2012/03/08/sleep-and-work/
20. For the basic rules of FLSA, see http://www.dol.gov/whd/regs/compliance/whdfs22.htm
21. http://www.dol.gov/elaws/esa/flsa/screen6.asp
22. See http://www.dol.gov/whd/overtime/fs17a_overview.htm for a complete list of exemptions.

Furthermore, the Act defines when sleep on the job is considered working time, but it places no restrictions on weekly work hours for the general labour force.[23]

As noted above, if a worker is mismatched in her job, but remains because of employer provided health insurance, this tension may generate job stress. Furthermore, if a worker worries about losing her job because of unaffordable health insurance on the individual market, then researchers may observe a correlation between stress and local labour market conditions. Expanding health insurance – either through the public provision of insurance or otherwise – coverage may lessen job strain through a number of mechanisms described above. Indeed, the Affordable Care Act (ACA), may dramatically improve the mental health if the individual market exchanges are successful in providing affordable health insurance policies.

While it is still too early to evaluate the ACA, important work on Medicaid expansion in currently underway in Oregon. The Oregon Health Study Group (see Finkelstein *et al.* (2012) and Finkelstein *et al*. (2013)), randomly offered the opportunity to enrol in Medicaid – the US health insurance program for the poor – to a group of low-income adults. The sampled population is those individuals at or below the 100% poverty threshold (USD 11 720/year in 2012 for a single adult), and the authors are quick to point out that the ACA will require all states to offer Medicaid eligibility to individuals at 133% of the poverty level. Those randomly selected for Medicaid showed higher health-care utilisation and lower out-of-pocket medical expenditures and debt. Two years after randomization, Finkelstein *et al*. (2013) find no effect of Medicaid expansion on blood pressure or cholesterol levels and a positive effect on the probability of a diabetes diagnosis. Importantly however, the researchers also find that Medicaid coverage – relative to being uninsured – is associated with 32% increase in self-reported overall happiness (Finkelstein *et al.,* 2012) and a decrease in the probability of a positive depression screening of 9.15 percentage points (Finkelstein *et al.,* 2013). Lower rates of depression are not surprising given that Finkelstein *et al*. (2013) also find that receipt of coverage "nearly eliminated catastrophic out-of-pocket medical expenditures". Furthermore, in addition to potentially alleviating stress related to medical expenditures, the ACA represents a large expansion in mental health services as all health plans on the private exchanges are required to cover mental health and substance use disorder care.[24]

Final Remarks

The medical literature shows that chronic stress, broadly defined, causes poor health outcomes. Survey evidence from the United States suggests that the workplace is the number one cause of stress. In addition to poor health outcomes directly from stress and indirectly from coping mechanisms such as cigarette smoking, workplace stress may cause lower worker productivity and increased absenteeism. Therefore, job stress is a growing concern for policy makers. However, with policy as with empirical research, how stress is defined is of vital importance. Small changes in screening definitions may lead to large changes in disability enrolments just as small changes in self-reported questionnaires may lead to large changes in empirical results. Indeed, policies not directly aimed at workplace stress reduction such as the Affordable Care Act may be the most effective at reducing job stress in the United States.

23. Regulations for rest time for specific occupations (e.g., airline pilot) are created and enforced by individual Federal agencies (e.g., Federal Aviation Administration.
24. See http://www.mentalhealth.gov/get-help/health-insurance/.

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