

Final Report

Project 5/08:
**Work and Mental Well-being: Work Stress and
Mental Well-being of the Australian Working
Population**

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Executive Summary

Data from the first six waves of the HILDA survey for the period 2001 to 2006 are used to:

- document the type and level of work stressors (i.e. job insecurity, unfair payment) by gender and occupation;
- document how satisfied or dissatisfied workers are with the different aspects of their jobs;
- reassess a recent study (Carroll 2007), which examines the effect of unemployment on mental well-being, to determine whether his findings are consistent with the results from the longer panel by adding three more waves of the HILDA survey; and
- examine the relevance of work stressors to mental well-being of the employed using multivariate analysis.

The HILDA survey provides the Self Completion Questionnaire (SCQ) pertaining to potential sources of work stress, which we called work stressors, for 10854 individuals aged 16-59 and employed for one or more years during the six years. Five potential work stressors are identified: unfair payment, job insecurity, job demands, low skill utilisation and lack of freedom. These range between one and seven, with a higher rating associated with higher levels of perceived work stress. In addition, job strain, which is defined by high psychological workload demands combined with low decision latitude, is identified as an alternative measure of a work stressor using items available in HILDA waves five and six. The exploration of these variables forms the basis of the descriptive analysis. For multivariate analysis, the total work stressor is constructed by summing up all five work stressors and dividing by five. The total work stressor counterbalances all different levels of the five work stressors above. The multivariate analysis sample consists of 1212 men and 1072 women who work in all waves between waves two and six (no employment transition).

Descriptive analysis

The level of work stressors by gender and occupation has been documented. On average, men report higher scores relating to unfair payment, job insecurity, and job demands. In contrast, women report higher average scores for work stressors concerning low skill utilisation and lack of freedom (Table 4). In addition, when considering gender and occupation together, women working as managers and administrators or in professional occupations, on average,

tend to report higher scores of unfair payment than their male counterparts (Appendix Table 1).

Two benchmarks are used to compare the level of work stressors by gender and occupation. One benchmark is the sample mean score and the other is the 75th percentile of the sample score distribution. Each benchmark is created separately for each work stressor, and also for men and women separately. If an individual's reported score is higher than this benchmark, we consider the person to have a high level of exposure to stress arising from a particular work stressor. More women are relatively prone to reporting high scores in the work stressors in all dimensions than men (Figure 2). In particular, 21 per cent of women have high levels of stress relating to job demands compared to their male counterparts at 9 per cent, based on the 75th percentile cut off. By occupation (Figure 3), the level of job demands is a dominant work stressor for people in skilled occupations, which includes i) managers & administrators, ii) professionals, iii) associate professionals, iv) tradespersons, and v) advanced clerical & service workers. On the other hand, job insecurity, low skill utilisation and lack of freedom are likely to be key work stressors for people in unskilled occupations, which includes vi) intermediate clerical sales & service, vii) intermediate production & transport, viii) elementary clerical sales & service workers, and ix) labourers.

On average, women have a higher level of job strain than men do. The difference is small but statistically significant. Across occupations, job strain is on average higher for people in unskilled occupations, particularly for labourers (Table 5). Proportionally, there is no difference in job strain by gender. More people in unskilled occupations have a high level of job strain compared with those in skilled occupation. 35 per cent of elementary clerical sales & service workers and laborers have a high strain job based on the 75th percentile cut off (Figure 5). This may be driven by the fact that they have relatively low decision latitudes in their jobs.

This project also documents workers' levels of job satisfaction. While job satisfaction is not our main research interest, it would nevertheless be helpful to see work related stress from the reverse angle. On average, and also proportionally, men are less satisfied with their jobs than women. By occupation, people in unskilled occupations have, on average, lower levels of overall job satisfaction as well as in most of job aspects (Table 6). Also, more people in

unskilled occupations are dissatisfied with their jobs relative to those in skilled occupations, particularly with the work itself (Figure 6).

Multivariate analysis

The multivariate analysis seeks to answer the question of what are the impacts of work stressors on individual mental well-being (also called happiness), once other possible life stressors such as family, health, finance and also unobservable individual fixed effects are controlled for. The question on life satisfaction (also called subjective well-being) from the HILDA survey is our dependent variable to measure individual mental well-being. We use instrumental variable methods to address concerns regarding the endogeneity between mental well-being and work stressors since both of them are self-accessed (subjectively evaluated). Work/job characteristics are used as instrumental (identifying) variables for work stressors. These characteristics are presumed to have effects on individual's mental well-being only through their effects on work stressors. We apply the two stage least squares estimator with fixed effects (2SLS-FE) and the limited information maximum likelihood estimator with fixed effects (LIML-FE).

In the identifying equation of work stressors, estimates for occupation indicate that advanced clerical & service workers have the highest total work stressor level among occupational groups for men, and intermediate production & transport workers and elementary clerical sales & service workers score the highest in total work stressor for women (Table 11a and 11b). For men, it seems to be driven by higher levels of unfair payment and lack of freedom reported for this occupation. For women, the driving factors are low skill utilisation and lack of freedom for both occupational groups.

On the association between mental well-being and work stressor (Table 12), we find that a greater level of the total work stressor is negatively correlated with workers' mental well-being, even after controlling for other important individual and household characteristics and individual fixed effects. An increase in the total work stressor by one standard deviation (0.683 point for men, 0.720 point for women) would decrease mental well-being by 0.36-0.50 points for men, and 0.39-0.52 points for women. This result is statistically significant. What this suggests is that investment to reduce workplace stress will have positive effects on

workers' mental well-being. In addition, the negative effect of unfair payment on mental well-being is statistically significant for women, but not for men, suggesting that improving fairness of payment is important for the mental well-being of women in work. Regarding other explanatory variables for individuals' mental well-being (Table 13), our findings are consistent with general perceptions about them. Having good health has a strong positive effect on people's mental well-being while worsening financial circumstances lower their mental well-being.

Last, on re-examining a recent study (Carroll 2007), which examines the effect of unemployment on mental well-being, our results using a longer panel are, in general, consistent with the findings of Carroll (2007). Being unemployed or not in the labour force is associated with a decrease in people's mental well-being (Table 8). In addition, we find a greater negative effect of unemployment on mental well-being for men than women, which is in contrast to Carroll's findings but more in line with results in the international literature.

Policy Implications

We found evidence that reductions in the total work stressor will have positive effects on workers' mental well-being. As work related stress can develop into severe mental illness and reduce an individual's labour market attachment, this validates the value of investments that reduce the risk of workplace stress. It is important to make workplaces not only physically but also mentally healthy for workers. Moreover, interventions should be applied to a wide range of sources of work related stress and should be a collaborative effort between employers and employees.

Furthermore, there are indications that fairness of payment is a key factor behind the happiness of women who are working. In light of the recent policy focus on boosting women's labour supply, this would be one of the areas that such policies should address.

1. Introduction

The impact of mental health on workers and their productivity has emerged as one of the important issues in the Australian workforce. This project explores the effects of different sources of work stress on the mental well-being of the Australian working population. Work related stress is the response of a person to physical and/or psychological work demands and pressures which are not matched to the worker's individual ability to cope with them. There could be various sources of stress, which we label as work stressors from now on, and their relative impacts would depend on an individual's values and attitudes toward these stressors. Also, the impacts of these stressors on an individual's mental well-being depend on the individual's capability to manage stress itself. It could be innate like individual personality or acquired from past experiences. Regardless, individuals are likely to differ in this unobservable aspect, and our research controls for such unobservable individual heterogeneity.

There is already a wide range of policy interventions in place to make workplaces physically healthy and safe, and recently, researchers and policy makers have become more aware of the importance of mental illnesses such as schizophrenia and clinical depression for individuals' labour market and employment outcome. However, the same policies have yet to be extended to more general mental well-being. Early intervention and efforts to make the work environment mentally healthy will reduce the chances of workers developing more severe disorders and will increase labour market attachment. Severe work stress could also drive workers out of the labour market and increase dependence on welfare. An investigation of work stressors will provide useful information to identify which of the job aspects are deemed more important by workers. Such information could be used in the design of employment and workplace relations policies. In addition, identifying the effect of work stressors on mental well-being, which is expected to directly influence a worker's productivity, would provide important insights to improve work environments.

No previous Australian study has extensively investigated the effect of work stressors on the mental well-being of the general working population. This project will first comprehensively document the key sources of work stress based on available information in the Household Income and Labour Dynamics in Australia (HILDA) Survey. Following this, econometric analysis will examine the impact of these work stressors on mental well-being (happiness),

after controlling for other potential life stressors, general health, and unobservable individual heterogeneity.

The objectives of this project are as follows:

- Document the type and level of work stressors (i.e. job insecurity, unfair payment) by occupation and gender
- Document how satisfied or dissatisfied workers are with the different aspects of their jobs
- Examine the relevance of work stressors to the mental well-being of the employed population using multivariate analysis.

In addition, by adding three more waves of HILDA to the analysis, this project extends a recent Australian study (Carroll 2007) which examines the effect of unemployment on psychological well-being. We now have six waves in HILDA ranging from 2001 to 2006. We examine whether Carroll's findings are consistent with comparable results from this longer panel.

The report proceeds as follows. Section 2 presents a brief review of some recent studies relevant to this project. Section 3 describes the data and key variables such as work stressors and job strain. Section 4 presents the results from descriptive analyses. Section 5 re-assesses Carroll's (2007) study. Section 6 describes the multivariate methods used to examine the effect of work stressors on mental well-being and reports the estimation results. Section 7 concludes.

2. Previous Research

No previous Australian research in the fields of economics has comprehensively examined, using longitudinal data, the effect of work stressors on the mental well-being of workers. This is more or less the same for the international literature. Only some evidence for the negative effect of job insecurity on mental health has been documented in previous research (Adam and Flatau 2006, Hellgren and Chirumbolo 2003). In general, health and medical researchers have been more interested in the effect of work stress (job strain) on workers' health

conditions (i.e. work injury, high blood pressure, migraine, cardiovascular disease, mental distress) (Wilkins and Beaudet 1998, Schnall and Landsbergis 1994).¹

There are, however, two streams of parallel work which delve into bordering topics in relation to work and mental well-being, which we define as the degree of life satisfaction or happiness. One stream deals with the linkage from unemployment to happiness, while the other revolves around the concept of job satisfaction. Although these topics are not the main focus of this report, some of the descriptive statistics provided here are comparable to the findings in such works.

The effect of unemployment on mental well-being has already been studied quite extensively by a few papers in Australia. Carroll (2007), for example, investigates this relationship using the first three waves of HILDA. He found that the unemployed in Australia report lower life satisfaction than observationally equivalent employed people. Although it is not statistically significant, the longer the unemployment history, the greater is the probability of reporting low life satisfaction. The results also suggest that, potentially, the effect of unemployment on life satisfaction is larger for women than for men. Dockery (2005), using the Longitudinal Surveys of Australian Youth (LSAY), and Headey and Wooden (2004), using HILDA, both find evidence that unemployment and unhappiness have a strong association. In addition, Flatau, Galea and Petridis (2000) find that the negative association between unemployment and mental well-being holds across both indicators of mental well-being that they use: the SF-36 Mental Health Scale from the 1995 National Health Survey (NHS) and the incidence of suicidal thoughts, plans and attempts from the 1997 National Survey of Mental Health and Wellbeing of Adults (SMHWB). This finding — a negative association of unemployment with mental well-being — from Australian studies is consistent with the international literature on the relationship between unemployment and life satisfaction (Clark 2003, Winkelman and Winkelman 1998). Carroll (2007) notes that unemployment appears less painful for men in Australia than for men in Germany and the UK (Table 9 in Carroll 2007 shows international comparisons).

Another strand of study is related to job satisfaction. Long (2005) studies the issues of job satisfaction and gender using HILDA wave 1. A consistent finding is that women are

¹ Upcoming HILDA waves 7 and 9 will have information on self assessed health conditions including heart disease, clinical depression and high blood pressure. This could be a future research topic using HILDA.

significantly happier in work than their male counterparts (Sousa-Poza and Sousa-Poza 2003, Sloane and Williams 2000, Clark 1997). Long finds that differences in job satisfaction were more significant when looking at people with lower levels of education in lower skilled jobs. Women with lower levels of education and working in lower skilled occupations are significantly happier at work than their male counterparts and women with further education and higher skilled positions. In contrast, the gender differences are much less for those who are younger, without children and those with further education. Long notes that this is likely to be due to differences in the work expectations of men and women. In particular, the expectations of work are not uniformly held by all women. Women who have a high priority for work may have more expectations compared with their male counterparts. Also, the nature or characteristics of jobs may differ for men and women in lower skilled occupations. Kifle and Kler (2007) also find similar results using the first four waves of HILDA after controlling for unobserved heterogeneity. They find that women reported higher levels of job satisfaction compared to men with the exception of satisfaction with job flexibility.

3. Data

We use data from the first six waves of the HILDA Survey, which is the Australian longitudinal data set that collects information on all individuals for a number of randomly selected households on a yearly basis. The main sample is comprised of individuals who are currently employed, the only group for which the investigation of the relevance of work stressors to mental well-being is applicable. Furthermore, the analysis will refer to individuals of working age who are active in the labour force. Later, to re-assess a previous study (Carroll 2007) on the effect of unemployment on mental well-being, a second sample comprising all individuals including the unemployed and those not in the labour force is used in section 5.

Over six waves, the main sample contains 10854 individuals (5549 men and 5305 women) aged 16 through 59 who are employed at the time of the survey and who answer questions pertaining to potential work stressors in the Self Completion Questionnaire (SCQ). Individuals are defined as ‘currently employed’ if they have answered that they are working full time or part time in the main HILDA Survey questionnaire and have reported that they are currently undertaking paid work in the SCQ. For wave 1, the employed are those who responded that they are working full time or part time in the main survey (as the SCQ does not ask about current paid work in wave 1). About 12 per cent of those who indicated that

they are employed in the main waves have not completed the SCQ. Among this group, a relatively higher proportion is men. All full time students have been excluded from the sample as well since working is not their main activity- the underlying determinants of their work stress factors might have been different to those whose main activity is working.² Also, individuals whose occupation information is missing have been excluded from the sample. Table 1 shows the distribution of the different characteristics by gender. The main trends arising from this table are i) for both men and women, professional is the most common type of occupation at 20 per cent for men and 28 per cent for women; ii) men are more likely to be self employed than women; and iii) 90 per cent of men and 56 per cent of women work full time.

Table 1. Sample - employed population aged 16 to 59 over six waves.

| | <u>Men</u> (in %) | <u>Women</u> (in %) |
|--|----------------------|------------------------|
| <i>Occupation (100%)</i> | | |
| Managers & administrators | 11.30 | 5.08 |
| Professionals | 20.12 | 28.40 |
| Associate professionals | 14.05 | 13.30 |
| Tradespersons | 19.97 | 2.47 |
| Advanced clerical & service workers | 0.70 | 6.78 |
| Intermediate clerical, sales & service workers | 8.86 | 26.10 |
| Intermediate production & transport workers | 12.66 | 1.95 |
| Elementary clerical, sales & service workers | 4.31 | 9.68 |
| Labourers | 8.03 | 6.24 |
| <i>Employment type (100%)</i> | | |
| Employee | 79.57 | 88.70 |
| Self employed | 20.43 | 11.30 |
| <i>Working arrangements (100%)</i> | | |
| Full time | 90.42 | 55.52 |
| Part time | 9.58 | 44.48 |
| Number of observations | 19574 | 17800 |

3.1 Work stress and Work stressors

To identify work stress and work stressors, we use 11 statements (these are documented in Table 2), which are consistent over six waves. Responses are made on a seven-point scale

² On average, full time students who are employed have lower overall job stress and stress relating to fair payment but higher stress relating to ability and job freedom relative to their counterparts who are employed but not studying full time.

ranging from ‘strongly disagree’ (a score of 1) to ‘strongly agree’ (a score of 7) for each of the statements.

Table 2. Items from the HILDA Survey used to define work stress and work stressors.

| Work stress | |
|-----------------------|--|
| | a) My job is more stressful than I had ever imagined. |
| | b) I fear that the amount of stress in my job will make me physically ill. |
| Work stressors | |
| Unfair payment | c) I get paid fairly for the things I do in my job.* |
| | d) I have a secure future in my job.* |
| Job insecurity | e) The company I work for will still be in business 5 years from now.* |
| | f) I worry about the future of my job. |
| Job demands | g) My job is complex and difficult. |
| Low skill utilisation | h) My job often requires me to learn new skills.* |
| | i) I use many of my skills and abilities in my current job.* |
| Lack of Freedom | j) I have a lot of freedom to decide how I do my own work.* |
| | k) I have a lot of freedom to decide when I do my work.* |

* Reverse scored

Work stress could be directly measured by the first two items (*a* and *b*). Rather than representing the overall stress experienced in a job, this seems to measure the level of psychological stress from a job. Five dimensions of potential work stressors³ are constructed using items *c* to *k*. Scores of items are summed up and then divided by the number of items for each work stressor. To maintain consistency so that higher scores are associated with higher levels of work stress, scores of items *c*, *d*, *e*, *h*, *i*, *j* and *k* are reversed before they are summed.

3.2 Job strain

Robert Karasek (1979) originally developed and provided evidence for the ‘job strain’ concept and model. Two scales are used to measure job strain - *psychological demands* and *decision latitude*. Job strain is defined as jobs characterized by high psychological workload demands combined with low decision latitude. Decision latitude is the primary measure of the concept of control and has often been defined as the combination of job decision-making authority and the opportunity to use and develop skills on the job. Health (medical) researches

³ Other work stressors such as Supervisor support, Co-worker support or Physical demand could also be considered; however, HILDA does not have items to derive these stressors.

on job strain and workers' health report that job strain is associated with a range of adverse physical and mental health outcomes including psychological distress, depression, hypertension, various forms of cardiovascular disease (CVD), and other outcomes. In addition, job strain (also known as "high-strain" jobs) may promote unhealthy coping behaviours, such as smoking, that also contribute to CVD.

Table 3 lists items from HILDA Surveys that are used to define job strain. These are similar to items which are often used to define job strain from the US Quality of Employment Surveys (Schnall and Landsbergis, 1994).

Table 3. Items from the HILDA Survey used to define job strain.

Psychological workload demands

- My job is complex and difficult.
- I have to work fast in my job.
- I have to work very intensely in my job.
- I don't have enough time to do everything in my job.

Job decision latitude

Decision authority

- I have a lot of freedom to decide how I do my own work.
- I have a lot of say about what happens on my job.
- I have a lot of choice in deciding what I do at work.
- I have a lot of freedom to decide when I do my work

Skill Utilization

- My job often requires me to learn new skills.
- My job requires me to do the same things over and over again.*
- My job provides me with a variety of interesting things to do.
- My job requires me to take initiative.
- I use many of my skills and abilities in my current job.

* Reverse scored

New items, except those in Table 2, are only available in HILDA waves 5 and 6. Job strain is therefore defined only for waves 5 and 6. As one of the common approaches, job strain is measured as a ratio of psychological workload demands to decision latitude.⁴ Psychological workload demands are measured as the sum of relevant items divided by the number of items. Decision latitude is measured as the sum of two subscales (items related to decision authority and skill utilization), given equal weight, divided by the number of items in the two subscales.

⁴ This approach creates a continuous job strain variable. Since this is non-linear, it tends to give more weight to latitude (the denominator) than demands.

3.3. Other key variables

The main HILDA Survey asks participants about job satisfaction, with satisfaction scores ranging from 0 to 10 in value. A higher number indicates higher satisfaction. It contains five domains on different aspects of jobs: total pay, job security, the work itself, hours of work, and flexibility available to balance work and non work commitments. It also asks about overall job satisfaction considering all these aspects. Job satisfaction is not our main research topic for this project but we will look briefly at the sample average and those who are dissatisfied with their job by gender and occupation. It may indirectly inform us about their levels of work stress, although job satisfaction and work stress do not provide directly interchangeable information.

Lastly, we will examine two measures of mental well-being. One is the Subjective Well-Being (SWB) based on the life satisfaction variable in the main HILDA Survey that ranges from 0 to 10. The other is the SF-36 (*Short Form 36 health status questions*) mental health scale ranging between 1 and 100, which is a derived variable from the SCQ. SWB will be a dependent variable for our multivariate analysis in section 6.

4. Descriptive Analysis

The descriptive analysis sets the scene with pooled data analysis of the type and level of key sources of work related stress, including the following:

- Table of the type and level of key work stressors by occupation and gender.
- Table of the level of different aspects of job satisfaction for the employed.
- Distribution of the life satisfaction index, and the physical and mental health index (0 to 100 scale) by employment and labour force status.

4.1. The distribution of work stress and stressors among the employed

Figure 1 displays the sample distribution of work stress and five potential work stressors, which are defined earlier, based on pooled data from six waves.

Figure 1. The distribution of work stress and work stressors.



Note: pooled data over 6 waves.

From Figure 1 it is clear that people’s responses are differently distributed across work stress and the different types of work stressors. However, most distributions tend to be skewed to the left, except for job demands. A very small number of people provide responses of extreme values, one or seven. Overall, more than half of individual responses were below four for each of these variables, except for job demands, for which more people report scores greater than four.

The sample average scores on work stress and stressors are summarised by each group of characteristics (gender, occupation and employment) in Table 4 below. The average score for work stress over six waves is 2.9. The average score for job demands is the highest among the potential work stressors, while that for job insecurity is the lowest. From this, it would appear that job demands is the most important stress factor among all sources of work stress. On average, men report higher levels of work stress than women. Among work stressors, men have higher scores relating to unfair payment, job insecurity, and job demands. In contrast, women report higher average scores on work stressors concerning low skill utilisation and a lack of freedom. However, when considering gender and occupation together (Appendix Table 1), women working as managers and administrators and professionals, on average, tend to report higher scores than their male counterparts in relation to all dimensions of work stressors except job insecurity and job demands.

Table 4. Sample average on work stress and work stressors by characteristics, employed population aged 16 to 59 over six waves.

| | Work Stress | Work Stressors | | | | |
|--|-------------|----------------|----------------|-------------|-----------------------|-----------------|
| | | Unfair Payment | Job Insecurity | Job Demands | Low Skill Utilisation | Lack of Freedom |
| Overall average | 2.90 | 3.44 | 2.70 | 4.00 | 3.00 | 3.78 |
| Gender | | | | | | |
| Men | 2.97 | 3.45 | 2.81 | 4.26 | 2.93 | 3.66 |
| Women | 2.83 | 3.43 | 2.59 | 3.72 | 3.08 | 3.91 |
| Occupation | | | | | | |
| i) Managers & administrators | 3.19 | 3.38 | 2.63 | 4.85 | 2.64 | 2.85 |
| ii) Professionals | 3.16 | 3.46 | 2.52 | 4.97 | 2.38 | 3.58 |
| iii) Associate professionals | 3.08 | 3.44 | 2.62 | 4.26 | 2.85 | 3.48 |
| iv) Tradespersons | 2.85 | 3.49 | 2.90 | 4.07 | 2.80 | 3.69 |
| v) Advanced clerical & service workers | 2.57 | 3.04 | 2.44 | 3.46 | 3.34 | 3.24 |
| vi) Intermediate clerical, sales & service workers | 2.74 | 3.54 | 2.69 | 3.41 | 3.23 | 4.15 |
| vii) Intermediate production & transport workers | 2.72 | 3.45 | 2.95 | 3.29 | 3.62 | 4.35 |
| viii) Elementary clerical, sales & service workers | 2.55 | 3.36 | 2.76 | 2.69 | 3.87 | 4.59 |
| ix) Labourers | 2.57 | 3.36 | 3.07 | 2.85 | 3.88 | 4.28 |
| Employment type | | | | | | |
| Employee | 2.91 | 3.47 | 2.66 | 3.99 | 3.00 | 4.04 |
| Self employed | 2.88 | 3.29 | 2.91 | 4.07 | 2.98 | 2.42 |
| Working arrangements | | | | | | |
| Full time | 3.05 | 3.50 | 2.67 | 4.27 | 2.84 | 3.75 |
| Part time | 2.49 | 3.26 | 2.79 | 3.23 | 3.44 | 3.87 |
| Number of observations* | 37231 | 37246 | 36974 | 37249 | 37213 | 37225 |

* Observations are based on pooled data from an unbalanced panel over six waves of HILDA.

In addition, we test whether men and women differ significantly on these dimensions of works stressors. The gender differences in average scores on these variables are significant at lower than the 1 percentage level, except for unfair payment. This suggests that, with the exception of the average score of unfair payment, there is a real difference between the average level of potential stress experienced by men and women with regards to different job aspects.

Across occupations, people in skilled occupational groups (*i* to *v*) tend to have higher average scores on work stressors, relative to those in unskilled groups (*vi* to *ix*).⁵ Among the work stressors, job demands is a strong stress factor for people in skilled occupations whereas lack

⁵ Skilled and unskilled occupations are defined in line with the second edition of the Australian Standard Classification of Occupation (ASCO2).

of freedom and low skill utilisation are more important sources of stress for those in unskilled occupations. Relatively fewer differences are shown in the average scores on unfair payment and job insecurity across occupational groups. On average, employees generally report higher scores on all these dimensions than the self-employed, except for job demands (for which the average level of stress is very similar between the two groups) and job insecurity. This might reflect the higher degree of control the self-employed have over their jobs when compared to employees. Relative to each other, the average scores on work stress as well as most stressors between full time and part time workers are remarkably similar to those between men and women. This may be related to the fact that women comprise a higher proportion of part time workers in comparison to men. However, part time workers tend to have slightly higher stress in relation to job insecurity, which is consistent with the nature of part time jobs.

Since Table 4 only shows mean comparisons between groups, we now compare what proportion of each group has greater levels of work stress and is exposed to higher levels of work stressors. This will provide more information on the differences in work stress among these groups. Specifically, it will reveal how the distributions of work stress differ between genders and occupational groups. To examine this, we construct a dummy variable for each work stressor, where a variable equals 1 if its scores are greater than a benchmark, and zero otherwise. In this way, these dummy variables identify individuals who have a greater risk of high levels of work stress for each separate stressor. We set two benchmarks: one is higher than a sample mean score and the other is higher than the 75th percentile of the sample score distribution. Since we find that the sample means for men across most stress factors are significantly different from those of women in Table 4, both benchmarks are adjusted for gender differences. That is, the benchmarks are calculated separately for each gender.

Figures 2 and 3 show what percentage of people in each group has high stress factors based on the 75th percentile. The relevant figures based on the sample mean are presented in Appendix Figures 1 and 2.

Figure 2. Proportion of people who report high score on dimensions of job stress by gender.*

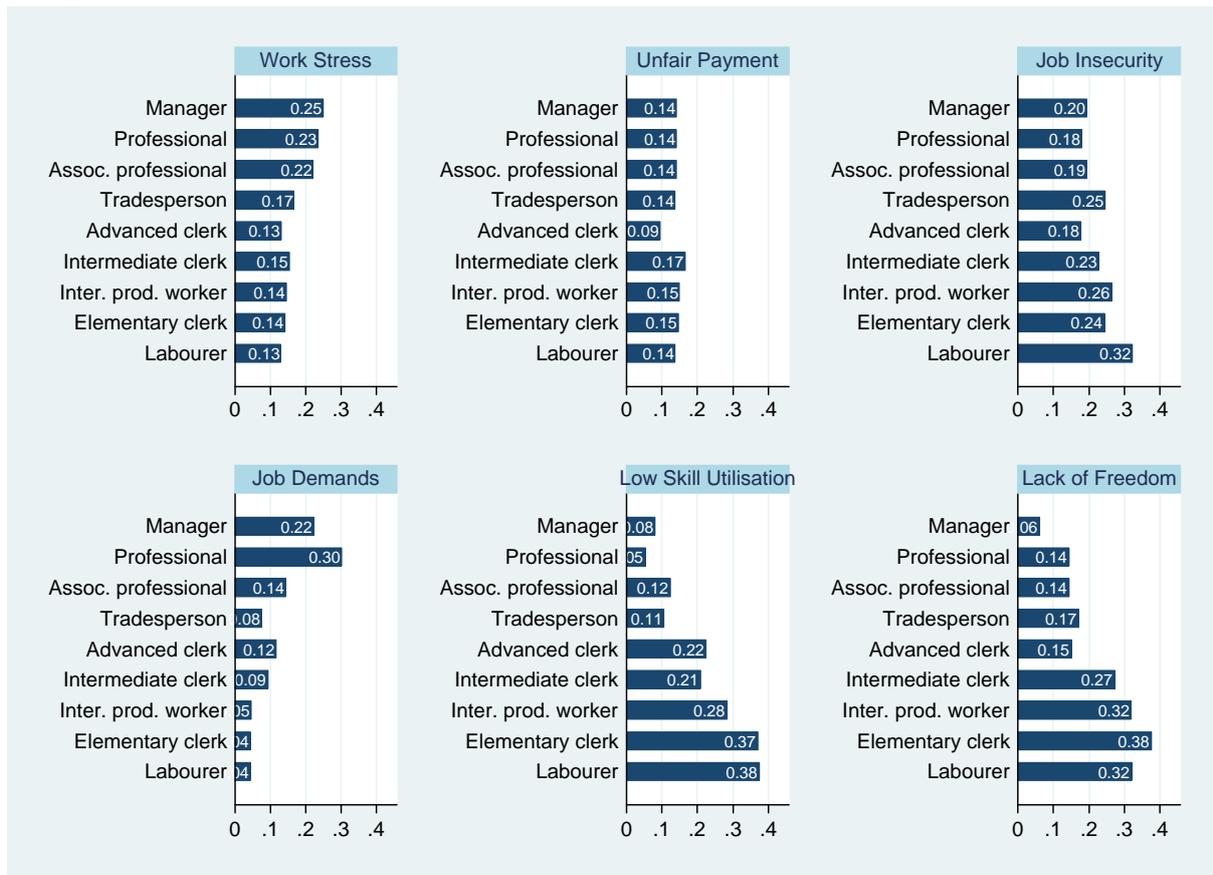


* A benchmark at the gender-adjusted 75th percentile on each score.

Figure 2 shows that proportionally more women have a relatively high risk of stress in all dimensions of work stressors, despite the mean scores of men being greater than those of women on unfair payment, job insecurity and job demands, as shown in Table 4. Bearing in mind that the benchmark has been adjusted for gender, the interpretation of this is that the prevalence of exposure to high levels of stress is higher among women even though they report lower levels of work stress than men, on average. In particular, 21 per cent of women are in the high risk group in relation to job demands compared to their male counterparts at 9 per cent, based on the 75th percentile cut off.⁶ This implies that the distribution of job demands is more likely to be skewed to the right for men than women. By occupation (Figure 3), proportionally more people in unskilled occupations have a greater risk of having high levels of stress relating to job insecurity, low skill utilisation and lack of freedom. On the other hand, more people in skilled occupations have a high level of work stress, and a greater risk of having high levels of stress particularly concerning job demands.

⁶ An alternative interpretation for this is that women have a 21 per cent chance of being in a high risk group for job demands, whereas men only have a 9 per cent chance.

Figure 3. Proportion of people who report high scores on dimensions of job stress by occupation.*

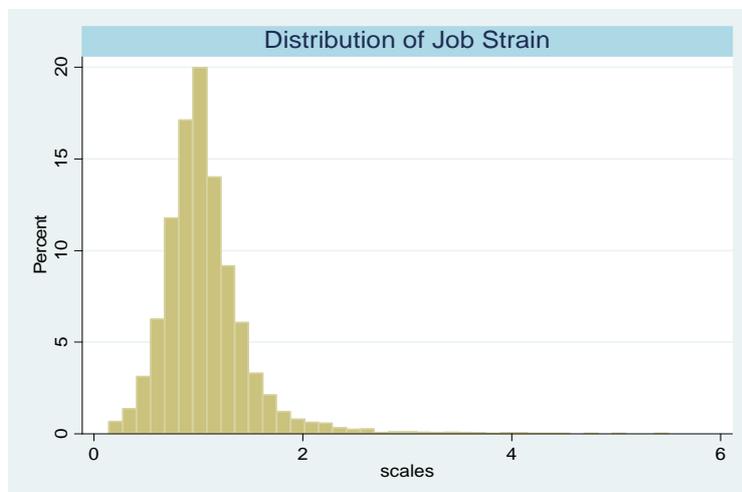


* A benchmark at the gender-adjusted 75th percentile on each score.

4.2. The distribution of Job Strain among the employed (only for wave 5 and 6)

The distribution of job strain is skewed to the left (average 1.07, min 0.14 and max 5.5). It implies that jobs characterized by higher psychological workload demands also have higher decision latitude in our sample. Therefore, people have relatively low job strain in general.

Figure 4. The sample distribution of job strain.*



* Based on data from only wave 5 and 6 of HILDA.

Table 5 below provides the average level of job strain by gender and job characteristics. On average, women have a higher level of job strain than men do. The difference seems to be small but it is statistically significant at the 1 percentage level. This is consistent with other research showing that men report having more job control than women (Roxbergh 1996). In addition, it may reflect differences in the types of occupations in which men and women are employed (Table 1). A slightly higher proportion of women who are managers and administrators or professionals report higher scores on almost all work stress dimensions in Appendix Table 1. By occupation, job strain is higher for people in unskilled occupations than those in skilled occupations, particularly for labourers. (This same trend applies to job strain by occupation and gender in Appendix Table 1.) This contrasts with Table 4 in which work stress is relatively higher for people in skilled occupations than those in unskilled ones. It may be that the work stress variable in Table 4 strongly reflects psychological job demands.⁷ Job strain is lower for the self-employed relative to employees and for part time workers compared to full time workers. This is consistent with the pattern of relative work stress between these groups in Table 4.

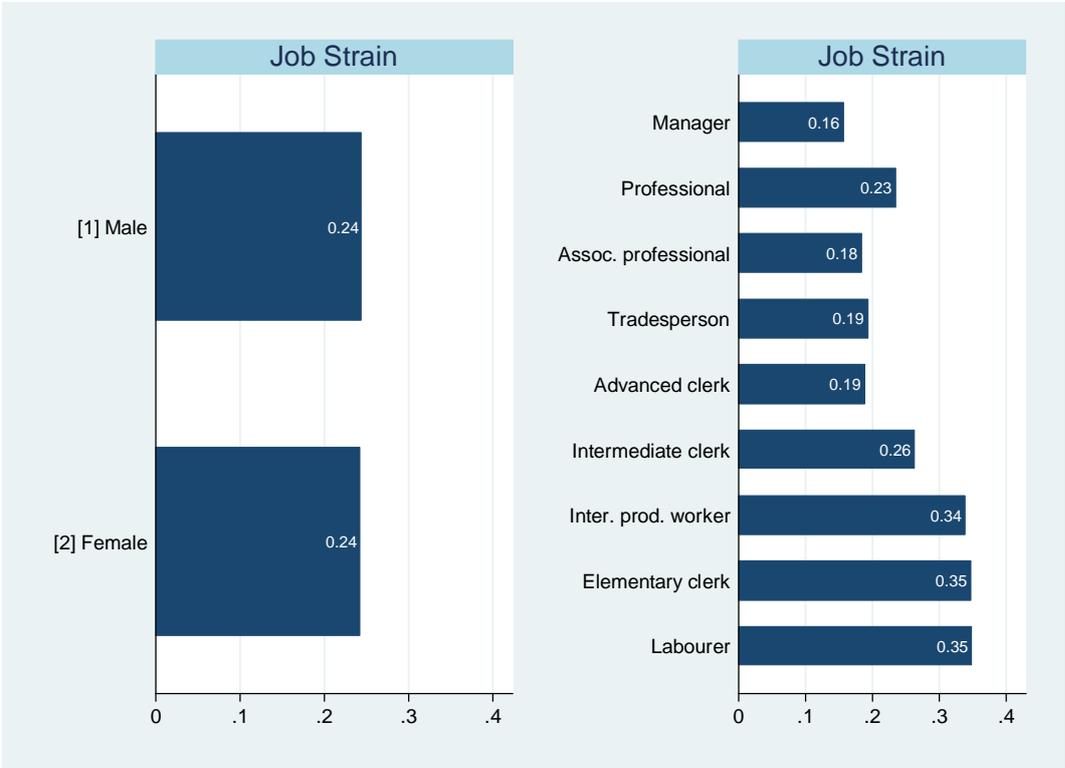
Table 5. Sample average on job strain by characteristics, employed population aged 16 to 59 over Waves 5 and 6 of HILDA.

| | Job Strain |
|--|-------------------|
| Overall average | 1.07 |
| Gender | |
| Male | 1.06 |
| Female | 1.08 |
| Occupation | |
| Managers & administrators | 1.00 |
| Professionals | 1.06 |
| Associate professionals | 1.01 |
| Tradespersons | 1.00 |
| Advanced clerical & service workers | 0.95 |
| Intermediate clerical, sales & service workers | 1.08 |
| Intermediate production & transport workers | 1.16 |
| Elementary clerical, sales & service workers | 1.18 |
| Labourers | 1.20 |
| Employment type | |
| Employee | 1.10 |
| Self employed | 0.89 |
| Working arrangements | |
| Full time | 1.07 |
| Part time | 1.04 |
| Number of Observations | 12129 |

⁷ From the relevant items in Table 2, this is more likely to measure the aspect of psychological workload demands. Therefore, the variable work stress does not seem to be directly comparable with job strain as a measurement of work stress levels.

For job strain, we construct a dummy variable indicating high job strain, in exactly the same way we have done for work stressors using two benchmarks – higher than the sample average and higher than the 75th percentile. A value of 1 implies that this person has a high-strain job. The proportion of people who have a high strain job based on the 75th percentile cut off is shown in Figure 5, and Appendix Figure 3 provides the equivalent graph based on the sample average. There is no difference by gender. Proportionally, more people in unskilled occupations have a high strain job compared with those in skilled occupations. 35 per cent of labourers and elementary clerical, sales and service workers have a high strain job. This might be due to the fact that these individuals have relatively low decision latitudes in their jobs.

Figure 5. Proportion of people who have a high strain job by gender and occupation.*



* A benchmark at the gender-adjusted 75th percentile on the job strain scale.

4.3. Job Satisfaction among the employed

The distributions of all aspects of job satisfaction are very much skewed to the right, as is evident in the higher values of the average score across all categories. People are, on average, the least satisfied with their pay among different job aspects in Table 6. On average, men have less job satisfaction than women do in all aspect of their jobs. This difference is statistically significant except for the aspect relating to the work itself. This is consistent with general

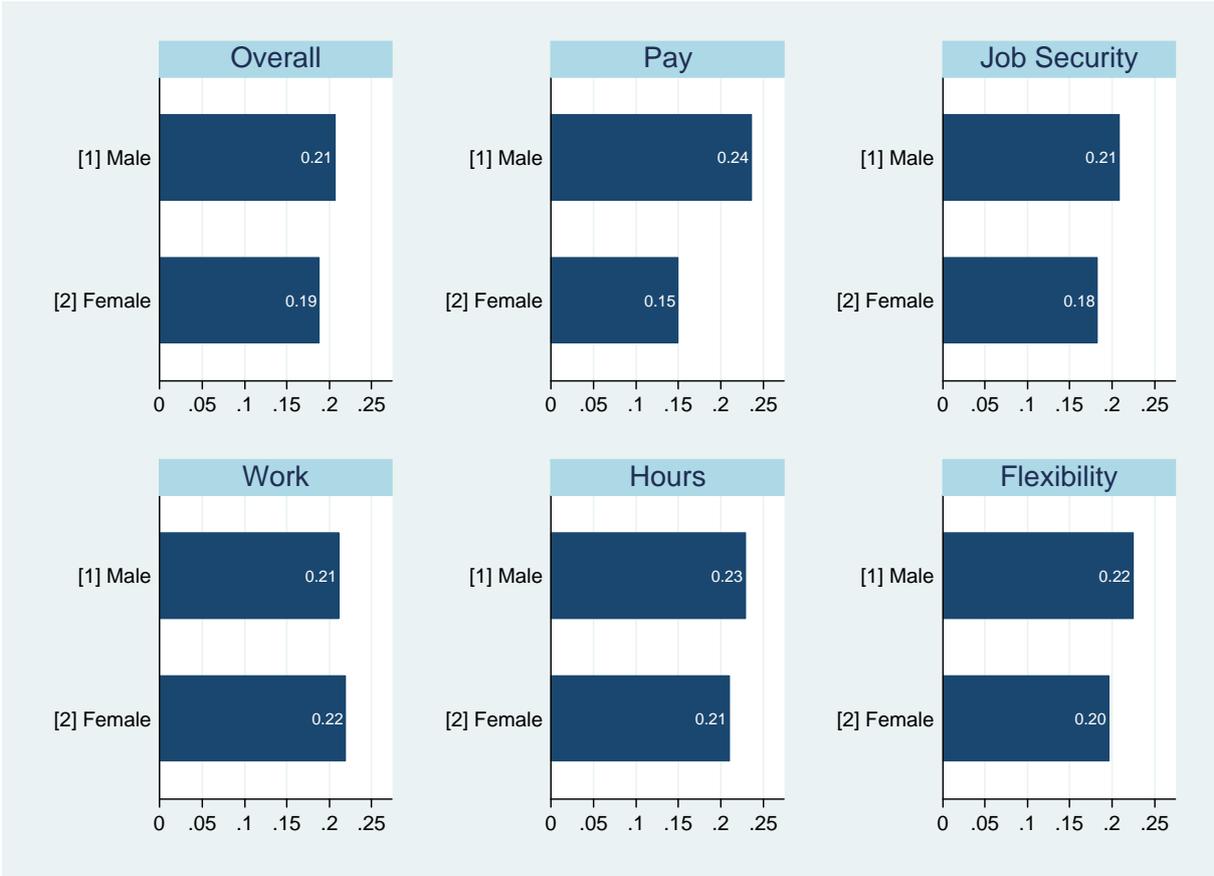
findings that women are more likely to be satisfied with their job than their male counterparts (Long 2005; Sloane and Williams 2000; Clark 1997).

Table 6. The average of job satisfaction by characteristics, employed population aged 16 to 59 over six waves.

| | <i>Job satisfaction categories</i> | | | | | |
|--|------------------------------------|------------|---------------------|-------------|--------------|--------------------|
| | Overall | Pay | Job Security | Work | Hours | Flexibility |
| Overall average | 7.61 | 6.81 | 7.89 | 7.62 | 7.13 | 7.38 |
| Gender | | | | | | |
| Male | 7.52 | 6.79 | 7.78 | 7.61 | 6.99 | 7.24 |
| Female | 7.72 | 6.84 | 8.02 | 7.63 | 7.29 | 7.52 |
| Occupation | | | | | | |
| Managers & administrators | 7.72 | 6.92 | 8.04 | 7.90 | 6.84 | 7.30 |
| Professionals | 7.59 | 6.92 | 7.96 | 7.73 | 7.11 | 7.31 |
| Associate professionals | 7.67 | 6.88 | 8.08 | 7.73 | 7.01 | 7.32 |
| Tradespersons | 7.65 | 6.68 | 7.77 | 7.76 | 7.13 | 7.30 |
| Advanced clerical & service workers | 8.12 | 7.28 | 8.44 | 7.84 | 7.75 | 8.19 |
| Intermediate clerical, sales & service workers | 7.64 | 6.67 | 7.84 | 7.54 | 7.33 | 7.59 |
| Intermediate production & transport workers | 7.43 | 6.79 | 7.64 | 7.46 | 7.06 | 6.88 |
| Elementary clerical, sales & service workers | 7.44 | 6.63 | 7.85 | 7.20 | 7.01 | 7.42 |
| Labourers | 7.46 | 6.67 | 7.51 | 7.14 | 7.18 | 7.45 |
| Employment type | | | | | | |
| Employee | 7.59 | 6.88 | 7.96 | 7.57 | 7.19 | 7.33 |
| Self employed | 7.75 | 6.43 | 7.54 | 7.89 | 6.80 | 7.60 |
| Working arrangements | | | | | | |
| Full time | 7.57 | 6.82 | 7.96 | 7.65 | 7.01 | 7.14 |
| Part time | 7.73 | 6.79 | 7.70 | 7.54 | 7.48 | 8.05 |
| Number of observations | 37364 | 37330 | 37303 | 37366 | 37363 | 37346 |

People in skilled occupations have, on average, slightly higher satisfaction than those in unskilled occupations in overall satisfaction as well as in most of these job aspects, except for flexibility. With flexibility, the trend is reversed, with people in low skilled occupations, on average, reporting more satisfaction. The only exception is Intermediate production and transport workers who are the least satisfied with the flexibility of their work. This is mainly driven by the fact that male workers in this occupation are less satisfied with this aspect of their work than all other men. There is little difference in the level of satisfaction with working hours between occupation groups other than Advanced clerical and service workers generally reporting higher levels of satisfaction than all other groups and managers and administrators being the least satisfied in this respect. These trends do not seem to change much when both gender and occupation are considered together.

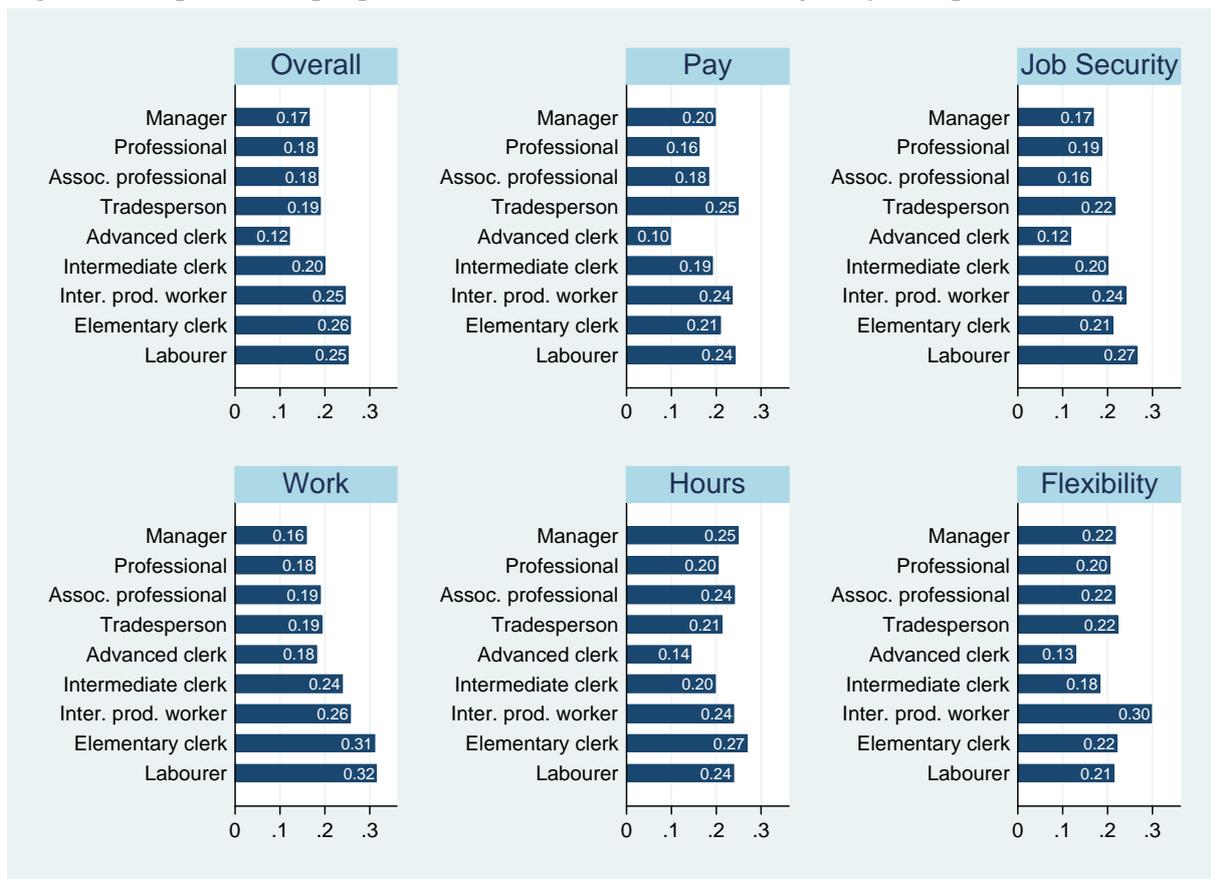
Figure 6. Proportion of people who are dissatisfied with their job by gender.*



* A benchmark at the gender-adjusted 25th percentile on each scale.

In a consistent manner, we examine which groups of people are proportionally dissatisfied with their job with a benchmark at the 25th percentile on each job satisfaction scale. Proportionally, more men are dissatisfied with their job, in particular with their pay, compared to their female counterparts (Figure 6). By occupation, proportionally more people in unskilled occupations are dissatisfied with their job relative to those in skilled occupations, particularly with the work itself.

Figure 7. Proportion of people who are dissatisfied with their job by occupation.*



* A benchmark at the gender-adjusted 25th percentile on each scale.

Overall, the level of job satisfaction among different occupations tends to be less variable relative to the level of work stress and stressors which we examined earlier. In particular, it's interesting that people in skilled occupations are more likely to be satisfied with their job but also more likely to be stressed in certain work dimensions (particularly on the average: refer to Tables 4 and 6). In addition, for women, the level of job satisfaction is higher but job strain is also higher than their male counterparts. We can observe such contradictions in certain work dimensions between Figures 2 and 6. Thus, it seems that people have different perceptions of these questions regarding work related satisfaction and stress in HILDA.

4.4. Measurement of mental well-being by employment status

In this subsection, we use the expanded sample including the unemployed and non-participants in the labour market. We present two different measurements of mental well-being: 1) SWB based on life satisfaction (0 to 10 scores), and 2) SF-36 indexes of mental health status (0 to 100 scales). In addition we also look at SF-36 indexes of general and physical health. For all of them, a larger number represents more satisfaction and better health. Table 7 presents the average of these variables. The distributions of these

measurements are exhibited in Figures 8 and 9 by current labour force status: employed, unemployed, and not in the labour force.⁸

Table 7. The average of life Satisfaction and dimensions of SF-36 health indexes

| | Life satisfaction | SF-36 | | | Number of observations |
|----------------------------|-------------------|---------------|----------------|----------------------|------------------------|
| | | Mental health | General health | Physical functioning | |
| <i>Employed</i> | 7.85 | 75.29 | 72.81 | 72.81 | 37749 |
| Working Full time | 7.82 | 75.78 | 73.06 | 73.06 | 27587 |
| Working Part time | 7.92 | 73.94 | 72.14 | 72.14 | 10162 |
| <i>Not employed</i> | 7.62 | 67.40 | 61.70 | 61.70 | 10404 |
| Unemployed | 7.26 | 66.85 | 66.03 | 66.03 | 1792 |
| Not in Labour Force | 7.69 | 67.51 | 60.80 | 60.80 | 8612 |

While it is clear that those who are employed have, on average, better health than those who are not employed, the two groups differ relatively less in terms of the degree of life satisfaction when compared with the differences in other SF-36 indexes. Looking at labour force status in more detail, there seems to be an indication that full time workers have, on average, slightly better health conditions than part time workers but part time workers are, on average, more satisfied with their lives. Amongst those not working, those not in the labour force have worse general and physical health than those who are unemployed, but slightly better mental health. Moreover, life satisfaction is substantially greater for those not in the labour force compared to the unemployed. This might reflect the fact that being not in the labour force is more of a voluntary decision relative to being unemployed.

The distribution of life satisfaction (Figure 8) and the SF-36 health indexes (Figure 9) by their current labour force status tells us a consistent story along with Table 7. Between the unemployed and those not in the labour force, the differences in general health and physical functioning is greater than the differences in mental health (Figure 9). Proportionally, more people are in the left side of the distribution (lower health) for those who are not in the labour force relative to the unemployed for these two indexes.

In the next section, we revisit Carroll’s 2007 study on unemployment and psychological well-being using the first six waves of HILDA for the analysis.

⁸ These are consistent with the definition in section 5 of Carroll’s 2007 study.

Figure 8. The distribution of life satisfaction by labour force status

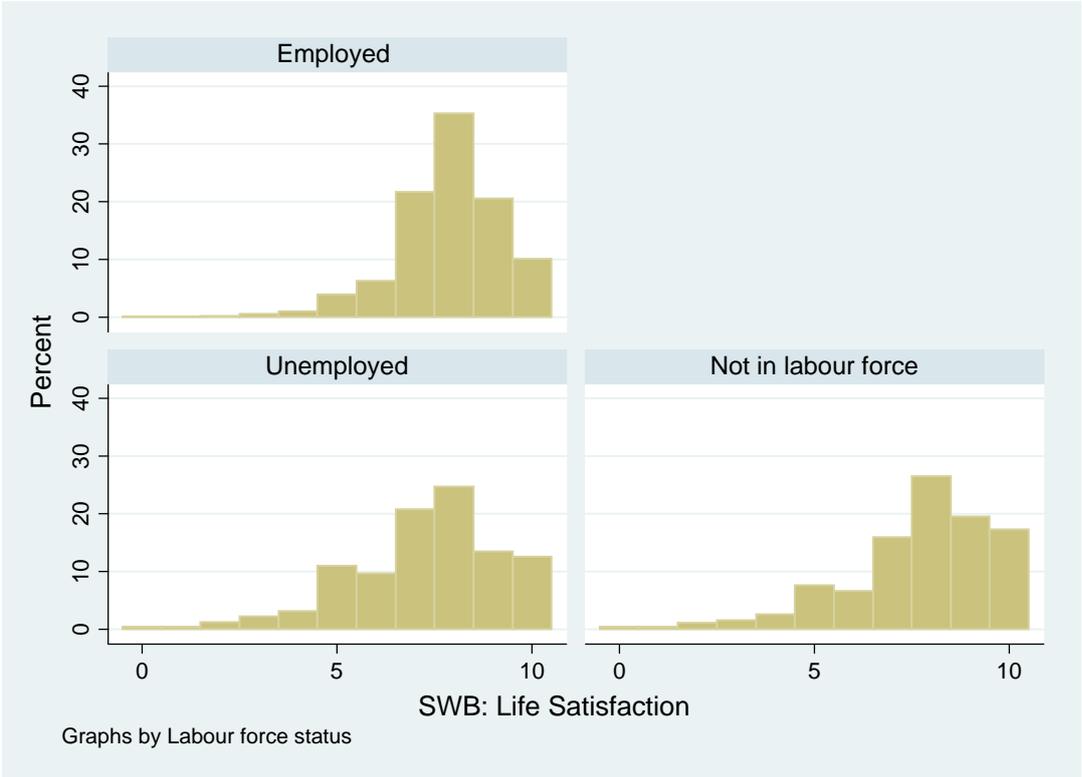
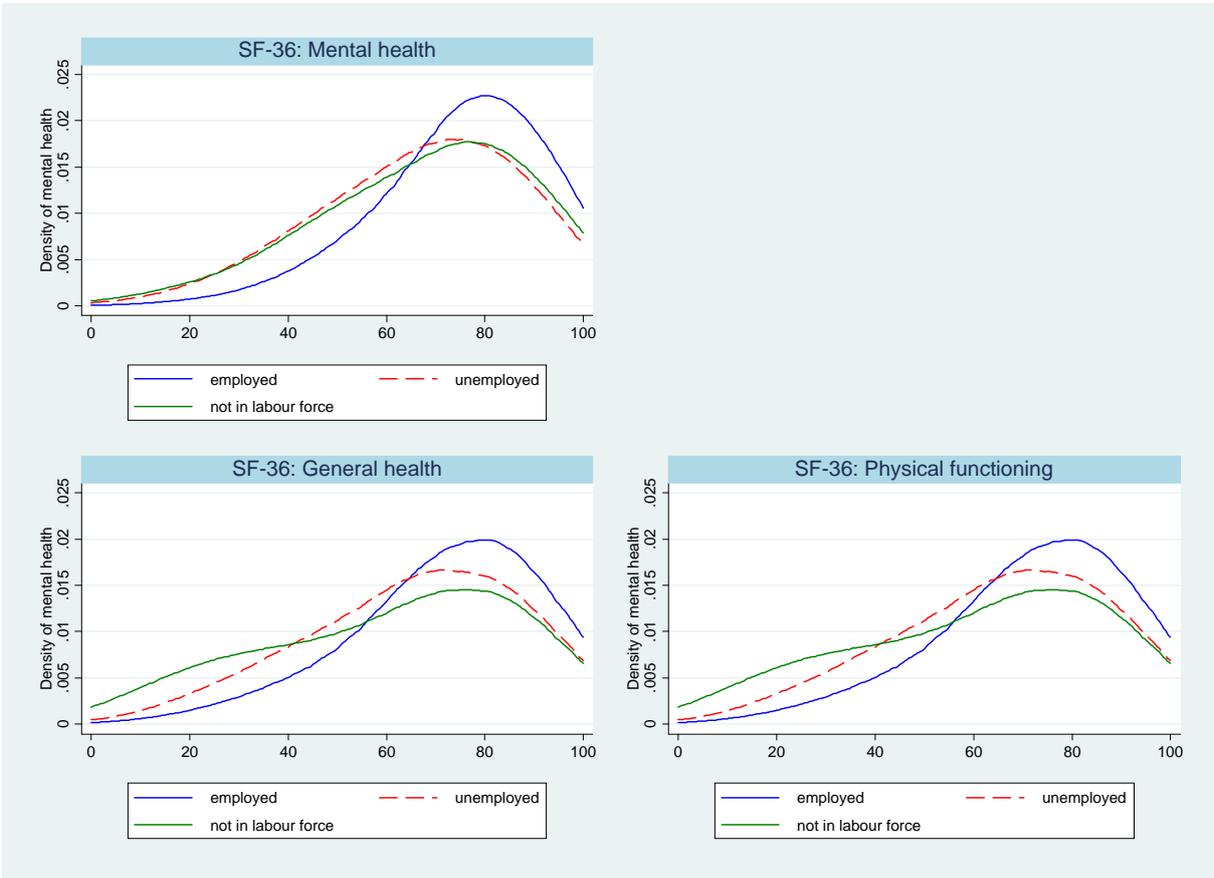


Figure 9. The distribution of SF-36 Health Indexes by labour force status.*



* Produced by kernel density.

5. Unemployment and psychological well-being: *Extension of Carroll's study (2007)*

Carroll (2007) investigates the effect of unemployment on the psychological well-being of Australians using the first three waves of HILDA. He used the variable of 'life satisfaction' as a measure of psychological well-being. The original values that range from 0 to 10 were compressed into two values- a value of 1 if life satisfaction is reported at 6 or above for representing high life satisfaction, and 0 otherwise (*the dependent variable*). The unemployment variable was defined as those people who are not in employment, but who are actively seeking and available for work. The employed are those people who work for pay or profit for one or more hours per week.⁹ Carroll's study found that the unemployed in Australia report lower life satisfaction than observationally equivalent employed people. The result from the conditional fixed effects logit specification is that being unemployed rather than employed is associated with a 32 per cent lower probability of reporting high life satisfaction for men, and 49 per cent for women (see, tables 6 and 7 in his paper for results from other specifications).

We estimate two specifications, one is a random effects logit model and the other is a conditional fixed effects logit model. Brief descriptions of these estimators are presented in the Appendix. The description of variables and regression sample summary statistics are in Appendix Table 2. All variables are defined in the same way as in Carroll's paper except that we use a dummy variable for having children instead of the number of children as a continuous variable.¹⁰ The differences between his sample and our sample are 1) we have three more waves (unbalanced panel) and 2) our sample is restricted to those aged between 16 to 59 years and we have omitted all full time students. We put in this restriction to make the sample consistent with our descriptive analysis on life satisfaction in sub section 4.4. Carroll's sample didn't exclude fulltime students and the age group is between 15 to 64 years. We have previously estimated our specification with his sample restriction; there is no significant difference in the results.

⁹ These labour force statuses are defined based on the International Labour Organisation (ILO) definitions of unemployment, employment and not in the labour force.

¹⁰ Happiness is more likely to be related to having children or not rather than how many children they have. We also estimated models with the number of children; there is no significant difference in these estimates from those with a dummy for having children.

Table 8 presents our results. Results are presented as odds ratios, as consistent with Carroll's paper. Odds ratios that are greater than 1 imply that as the explanatory variable increases in size, there is a higher likelihood of reporting high life satisfaction: a positive correlation. In contrast, an odds ratio that is smaller than 1 implies a negative correlation.

Table 8. Unemployment and life satisfaction by gender (*Odds Ratios*)

| | <i>Men</i> | | | | <i>Women</i> | | | |
|--------------------------|----------------|-------------|---------------------------|-------------|----------------|-------------|---------------------------|-------------|
| | Random effects | | Conditional Fixed effects | | Random effects | | Conditional Fixed effects | |
| | <i>Odds</i> | <i>S.E.</i> | <i>Odds</i> | <i>S.E.</i> | <i>Odds</i> | <i>S.E.</i> | <i>Odds</i> | <i>S.E.</i> |
| Unemployed | 0.35*** | 0.05 | 0.51*** | 0.08 | 0.40*** | 0.05 | 0.62*** | 0.10 |
| Not in labour force | 0.32*** | 0.04 | 0.52*** | 0.08 | 0.63*** | 0.05 | 0.78** | 0.09 |
| Married | 3.66*** | 0.35 | 2.26*** | 0.30 | 3.61*** | 0.32 | 2.31*** | 0.31 |
| Disabled | 0.44*** | 0.04 | 0.79** | 0.08 | 0.31*** | 0.02 | 0.69*** | 0.07 |
| Has Children | 0.55*** | 0.06 | 1.00 | 0.26 | 0.67*** | 0.08 | 1.58* | 0.42 |
| Partner unemployed | 0.65* | 0.15 | 0.92 | 0.24 | 0.77 | 0.18 | 0.95 | 0.26 |
| Age | 0.84*** | 0.02 | | | 0.89*** | 0.02 | | |
| Age squared | 1.27*** | 0.04 | | | 1.16*** | 0.04 | | |
| ESB Migrant | 0.82 | 0.13 | | | 0.94 | 0.15 | | |
| NESB Migrant | 0.46*** | 0.06 | | | 0.49*** | 0.06 | | |
| Living in city | 0.76* | 0.10 | 0.90 | 0.23 | 0.89 | 0.11 | 1.51 | 0.44 |
| Living in regional areas | 0.84 | 0.12 | 1.27 | 0.33 | 1.10 | 0.15 | 1.70* | 0.51 |
| Income | 1.01*** | 0.00 | 1.00 | 0.00 | 1.01*** | 0.00 | 1.00** | 0.00 |
| Income squared | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 |
| Education- University | 2.12*** | 0.31 | | | 1.88*** | 0.24 | | |
| Education- Diploma | 1.39*** | 0.15 | | | 1.38*** | 0.15 | | |
| Education- Year 12 | 1.65*** | 0.24 | | | 1.40*** | 0.18 | | |
| Wave 2 | 0.96 | 0.09 | | | 1.04 | 0.09 | | |
| Wave 3 | 1.29*** | 0.13 | | | 1.50*** | 0.14 | | |
| Wave 4 | 1.11 | 0.11 | | | 1.54*** | 0.15 | | |
| Wave 5 | 1.14 | 0.11 | | | 1.47*** | 0.14 | | |
| Wave 6 | 1.12 | 0.11 | | | 1.39*** | 0.14 | | |
| Observations | 25137 | | 4990 | | 26591 | | 5399 | |
| Person observations | 5995 | | 982 | | 6235 | | 1021 | |
| Log likelihood | -5773.1484 | | -1798.0341 | | -6072.8809 | | -1947.8633 | |
| Hausmann test (d.f) | | | 188.09 (10) | | | | 289.79 (10) | |

Note: * 10% significance ** 5% significance *** 1% significance

In general, our results are consistent with the findings of Carroll (2007). Being unemployed, not in the labour force or having a disability are associated with a decrease in life satisfaction, while being married is associated with an increase in life satisfaction. Our results from the conditional fixed effects logit show that for being unemployed rather than employed, men are 49 per cent less likely to report high life satisfaction, whereas the equivalent figure is 38 per cent for women. In addition, we find a greater negative effect of unemployment on life satisfaction for men than women, which is in contrast to Carroll's findings. However, our

finding is more consistent with the international literature on the relationship between unemployment and life satisfaction (Kraft 2000). Table 9 (on page 299) in Carroll's paper provides a good summary of international comparisons. Carroll (2007) notes that unemployment appears less painful for men in Australia than for men in Germany and the UK. In contrast, our finding shows unemployment to be less painful for women in Australia than for women in other countries.

In terms of the comparison between the random and fixed effects models, our results are somewhat different from those of Carroll's. Carroll (2007) finds that the significant effects on life satisfaction arising from being unemployed or not in the labour force disappears for men when a fixed effects model is estimated instead of a random effects model. However, such effects remain significant with our results. The same is true for having a disability for the sample of both genders. Using 6 waves of HILDA instead of three, we find that the significant effects on life satisfaction arising from being unemployed, not in the labour force or having a disability do not ever disappear when one moves away from random effects models to fixed effects modelling. In addition, the positive effect of income on life satisfaction becomes significant for women in both models when compared with the results of Carroll.

6. Multivariate analysis

The multivariate analysis will seek to answer the questions posed earlier on the relevance of work stressors to the mental well-being of the employed population. The subjective well-being (SWB), also termed life satisfaction and happiness, is generally used as a measurement of mental (psychological) well-being in the literature. We use SWB from HILDA as a dependent variable in our multivariate analysis. On the meaning of SWB questions, there is an argument about the interpretation of the answers, which range from 0 to 10. Psychologists and sociologists usually interpreted these scores as cardinal, and economists more generally interpreted them as ordinal. The Ferrer-i-Carbonell and Frijters (2004) paper addresses this issue well and finds that the assumption of cardinality or ordinality does not qualitatively change the results, while the treatment of the unobserved time-invariant individual effects does. We take the cardinality assumption, and apply a linear panel data model with fixed effects.¹¹ In the fixed effects model, all time-invariant individual specific effects are captured

¹¹ A dichotomous model (a conditional fixed effect logit model) could also be applied but it would result in a loss of information in the process of fitting data into two categories.

by an individual idiosyncratic error, leaving only within (individual) variations to be explained by covariates. A fixed effects linear model is relatively easy to apply and estimates are consistent. Also, one of the advantages is that the coefficients of the linear estimator can be directly interpreted as partial effects.¹² A partial effect represents the estimated average change in the dependent variable for a one unit change in an explanatory variable.

To control unobservable individual fixed heterogeneity across genders, we split the sample by men and women. Separate regression models are fitted for each gender. Next, we address the concern of endogeneity in the variables of work stressors since both SWB and work stressors are subjectively evaluated. We apply an instrument variables (IV) approach using work /job characteristics as instruments for work stressors. We presume that individuals' work/job characteristics that are time varying affect individuals' mental well-being (only) through an effect on the individual's work stressors, once important individual and household characteristics are controlled for.

6.1. Model specification

Happiness is known as being determined by satisfaction in different domains of life, such as family, health, finance, social interaction and work. In its most general form, the panel data model for happiness can be specified as:

$$SWB_{it} = S_{it}\delta + X_{it}\beta + \alpha_i + u_{it} \quad (1)$$

Where subjective well-being, SWB_{it} is the dependent variable ranging between 0 and 10. S_{it} is a variable of work stressor which is a key variable of interest here. Each of the five stressors (scores ranged between 1 and 7) is separately included in the estimation one by one. We also construct the total work stressor by summing up all five work stressors, and it is rescaled to be ranged between 1 and 7, the same as other work stressors, through dividing by five. The total work stressor variable measures the overall level of work stressors based on all five work stressors. Within an individual, the lower score of one work stressor can offset the higher score of another one so that this variable represents the average measure of overall work stressor for each individual. Rating seven implies the person reports the highest level (seven) for all five work stressors and is extremely stressed. X_{it} is a group of observed variables

¹² The fixed effect ordered logit model which is an index model cannot predict probabilities and estimate marginal effects (the partial effects) without making an extra assumption about fixed-effects. Woodbridge (2002) mentioned that none of these assumptions are good because we don't know the distribution of fixed effects. On the other hand, in an ordered probit setting, allowing for fixed individual effects yields inconsistent estimates (it's very hard computationally).

which may affect happiness in different domains of an individual's life. Also, a group of stressful lifetime events is included as explanatory variables for SWB, as they are influential in determining the baseline happiness (Clark et al. 2008). The explanatory (X_{it}) variables included in the model are defined as follows:

- Age dummy variables. The following age categories (in years) are distinguished: 16-30 (omitted dummy); 31-40; 41-50; 51-59.
- A partner status dummy. One indicates both de facto relationship and legal marriage.
- A dummy for dependent children. A child living with his or her parents is defined as dependent if under 15 years of age or if aged 15-24 years and in full-time study (and not employed full-time or living with a partner or a child of his or her own). These definitions are consistent with the ABS approach of defining sole parent families.
- Dummy variables for Region of residence. The following categories are distinguished: major city (omitted dummy); inner region; outer areas; remote areas.
- Four dummy variables for highest educational attainment. The following categories are distinguished: less than secondary school which includes certificates I, II and with level not determined (omitted dummy); Secondary school; Certificate III or IV; Diploma; Degree and above.
- Four dummy variables derived from SF-36 general health index (0 to 100 scales): 0-29 (omitted dummy); 30-39; 40-49; 50-100. Individuals with a score above 50 were considered as not disabled (very good health), mild health condition/disability was represented by a score between 40 and 49, moderate health condition/disability 30 to 39 and severe health condition/disability a score below 30 (Jones and Latreille 2007, Sanderson and Andrews 2002) .
- Log of weekly wages from current main job. There is ongoing debate about the effect of income or earnings on individuals' happiness. Although current earnings are not expected to have a great effect on SWB, we include this variable to avoid over estimating the effect of work stressors on SWB since high earnings may compensate for high work stress.
- Time dummies (wave2 is omitted) are also included to control a common time trend.
- In addition, a group of dummy variables, which indicates stressful life events experienced in the past 12 months, is included. They are marital separation, death of spouse/child/close relatives/family member, victim of physical violence/a property

crime, serious personal injury or illness to self/close relative/family member, fired/layoff, changed job, and the major worsening in financial situation(e.g. bankrupt).

- Last, we include a financial hardship variable, ranging from 0 to 7. It is constructed as the sum of seven binary indicators, indicating whether the household respondent (i) could not pay electricity, gas or telephone bills on time, (ii) could not pay the mortgage or rent on time, (iii) pawned or sold something, (iv) went without meals, (v) was unable to heat the home, (vi) asked for financial help from friends or family, (vii) asked for help from welfare/community organisations.

Repeated observations for an individual (i) over time (t) allow us to construct a model in which individuals may differ in evaluating their happiness. Such individual unobserved heterogeneity is specified in estimation as an individual specific error (α_i), $\alpha_i \neq \alpha_j$. α_i is an idiosyncratic individual fixed effects term which takes into account differences in underlying SWB and unobservable time-invariant characteristics (i.e. personality traits, ability to manage stress). The error term u_{it} is assumed to be independently, identically distributed over i and t with mean zero and variance σ_u^2 . And u_{it} is assumed to be uncorrelated with the regressors and the individual specific effects (α_i).

6.1.1. Endogeneity of work stressors

There are good reasons to be concerned about the endogeneity of SWB and work stressors given that they are both subjectively evaluated.¹³ To control for subjectivity in the measurement of work stressors, we employ work/job characteristics as instrumental variables for work stressors. Work/job characteristics are assumed to affect SWB only through their effects on work stressors. We apply a two-stage least squares (2SLS) estimator with fixed effects (FE) which is also called the generalized instrumental variables estimator. In the first stage, each work stressor (S_{it}) is regressed on all the instruments (Z_{it}) using a fixed effects linear model.

$$S_{it} = Z_{it}\gamma + \alpha_i + \varepsilon_{it} \quad (2)$$

¹³ Endogeneity is a correlation of regressors with the error term. It violates the assumption of the orthogonality (independency) between a regressor (S_{it}) and error terms (u_{it}), which adversely affects the consistency of estimates. Valid instruments will correct this problem. An instrument is strongly correlated with a endogenous regressor but orthogonal to the error terms.

In the second stage, the predicted values of the work stressor ($\hat{S}_{it} = Z_{it}\hat{\gamma} + \hat{a}_i$) based on the coefficients ($\hat{\gamma}$) and individual effect (\hat{a}_i) from the first stage regression are plugged into the equation (1) in place of the work stressor (S_{it}). In this way, 2SLS takes the information contained in a set of instruments (Z_{it}) and inputs it into a single instrument (\hat{S}_{it}). Two error terms, u_{it} and ε_{it} are assumed to be independent. Instruments (Z_{it}), also called the identifying variables, are as follows:

- A dummy for having a casual job
- A dummy for having supervisory responsibilities at work
- A dummy for working in small firm which has less than 20 employees
- A dummy for part time employment (working less than 35 hours a week)
- A dummy for working over time that indicates a person is working more than 45 hours a week
- A dummy for employment tenure that indicates that the tenure with the current employer is less than 3 years
- Finally, a set of dummies for occupation. The occupation of managers and administrators is an omitted dummy.

The model parameters are obtained by 2SLS-FE estimator using the ‘xtivreg2’ program (Baum, Schaffer and Stillman 2007) in the econometric software *Stata*. Over and under identification and also weak instruments issues are tested during the estimation process. We also apply the limited information maximum likelihood (LIML) estimator because the test for weak instruments is marginally rejected.¹⁴ Both estimates are presented in the sub section 6.3 and we do not prefer one method over the other.

6.2. Analysis sample

For multivariate analysis, we use a balanced panel from HILDA wave 2 to wave 6 since wave 1 does not have life event variables. The sample for analysis includes only people who work in all five waves. Those that make an employment transition (between working and not working) between waves are excluded from our regression sample. Our final estimation sample includes 1212 of men and 1072 women. The loss of sample size between the

¹⁴ Weak identification arises when the excluded instruments are weakly correlated with the endogenous regressors. LIML estimator is an alternative IV estimator. It is obtained by joint maximum likelihood estimation of the single equation (1) plus the reduced form (the first stage equation (2)) for the endogenous regressors. There is evidence that LIML performs better than 2SLS in the presence of weak instruments. (Hahn, Housman and Kuersteiner 2004).

descriptive analysis and the multivariate analysis is additionally due to the following factors:
i) for a fixed (within) effect estimation, individuals who do not change their rating of happiness over time are dropped; ii) individuals with missing information on any explanatory variable are dropped; iii) individuals having no variation in any of the explanatory variables are dropped as well. Table 9 presents summary statistics for variables in the regression sample including instruments for work stressors.

Table 9. Summary statistics of the analysis sample.

| Variable | <i>Men</i> | | <i>Women</i> | |
|---|-------------------|------------------|---------------------|------------------|
| | Mean | Std. Dev. | Mean | Std. Dev. |
| Happiness (SWB) (rating from 0 to 10) | 7.822 | 1.271 | 7.899 | 1.234 |
| <i>Work stressors (rating from 1 to 7)</i> | | | | |
| Unfair payment | 3.413 | 1.568 | 3.407 | 1.686 |
| Job insecurity | 2.664 | 1.232 | 2.411 | 1.206 |
| Job demands | 4.420 | 1.725 | 3.962 | 1.865 |
| Low skill utilisation | 2.925 | 1.299 | 2.958 | 1.394 |
| Lack of freedom | 3.860 | 1.495 | 4.052 | 1.606 |
| Total work stressor | 3.456 | 0.683 | 3.358 | 0.720 |
| Log weekly wage for current main job | 6.901 | 0.500 | 6.425 | 0.621 |
| | In (%) | | In(%) | |
| Aged 16-30 | 16.6 | | 14.8 | |
| Aged 31-40 | 31.2 | | 26.2 | |
| Aged 41-50 | 36.3 | | 41.6 | |
| Aged 51-59 | 15.9 | | 17.4 | |
| Married | 79.1 | | 71 | |
| Having dependent children | 47.4 | | 39.9 | |
| <i>Remoteness</i> | | | | |
| Major city | 67.2 | | 63.6 | |
| Inner region | 22.1 | | 25.6 | |
| Outer areas | 10.4 | | 10.4 | |
| Remote areas | 0.3 | | 0.4 | |
| <i>Education</i> | | | | |
| Less than secondary school | 19.7 | | 27.6 | |
| Secondary school | 12.4 | | 13.3 | |
| Certificate III or IV | 29 | | 13.2 | |
| Diploma | 9.7 | | 10.4 | |
| Degree and above | 29.2 | | 35.6 | |
| <i>General health: SF36</i> | | | | |
| No health condition (very good health) | 89.4 | | 90.6 | |
| Mild health condition | 5.9 | | 4.9 | |
| Moderate health condition | 3.3 | | 2.6 | |
| Severe health condition | 1.5 | | 2 | |

| <i>Stressful life events</i> | | |
|---|------|------|
| Marital separation | 3.4 | 3.8 |
| Death of a family member (including spouse) | 10.4 | 11.8 |
| Victim of violence/property crime | 6.8 | 6 |
| Serious illness to oneself/family member | 20.4 | 22.5 |
| Laid off | 2.7 | 1.8 |
| Change job | 14.2 | 13.7 |
| Major worsening of financial situation | 1.6 | 1.9 |
| Financial hardship | 31.9 | 33.1 |
| Observations | 5725 | 5098 |
| The number of individuals | 1212 | 1072 |

On average, men are more prone to high work stress in unfair payment, job insecurity and job demands, and women tend to be more stressed concerning low skills utilisation and the lack of freedom. In total, men report a relatively higher point of work stressor on average than women do. On average, an individual from the sample of men is more likely to be married (79% vs 70%), has more dependent children (47% vs 40%) and higher earnings relative to the sample of women. On the other hand, women have a higher level of education and are healthier than men. There are no patterns in the incidence of stressful life events between the sample of men and that of women. Women have slightly more (2 percentage points) experience with illness to self/close relative/family member than men. These differences in life events experienced could be simply because of the difference in the reporting of events between men and women.

Table 10. Summary statistics for work/job characteristics.

| Variable | <i>Men</i> In (%) | <i>Women</i> In(%) |
|--|------------------------------|-------------------------------|
| Casual job | 8.9 | 16.5 |
| Supervisory role | 61.3 | 48.7 |
| Small size of firm | 29.9 | 32.1 |
| Short employment tenure (< 3 years) | 28.7 | 28.8 |
| Over time (> 45 hours) | 33.1 | 11.7 |
| Part time worker | 4.9 | 41.2 |
| <i>Occupation</i> | | |
| Managers & administrators | 10.2 | 5.1 |
| Professionals | 25 | 35.4 |
| Associate professionals | 15.3 | 13.6 |
| Tradespersons | 15.8 | 1.1 |
| Advanced clerical & service workers | 1 | 6.1 |
| Intermediate clerical, sales & service workers | 9.9 | 24.4 |
| Intermediate production & transport workers | 13.5 | 1.7 |

| | | |
|--|------|------|
| Elementary clerical, sales & service workers | 4.3 | 7.3 |
| Labourers | 5 | 5.3 |
| Observations | 5725 | 5098 |
| Number of individuals | 1212 | 1072 |

In table 10, more men have supervisory responsibilities at work and work overtime when compared to women. Meanwhile, more women are likely to be casual, part time workers and working in small sized firms relative to men.

6.3. Results

The first stage estimates show the associations between work stressors and job and work place characteristics. We will discuss the first stage estimates before presenting the main results of the effect of work stressors on workers' mental well-being.

6.3.1 Work stressors and job and work place characteristics

Table 11a and b present the first stage estimates for men and women, respectively. For men (Table 11a), working over time is positively associated with unfairness in payment when compared to those not working over time. On the other hand, casual or part time jobs are negatively associated with unfair payment when compared to non-casual or full time jobs, respectively. Having a casual job and working in a small firm increases job insecurity relative to having a non casual job and working in a firm of larger size, respectively. People having supervisory roles and working over time also have higher levels of job demands than those having no supervisory role and not working over time, respectively. Part time workers have more freedom in their jobs than full time workers, as they are usually allowed to decide when they do their work. In addition, junior workers working less than three years for the current employer are more likely to have a lower level for the total work stressor relative to those having longer employment tenure.

Table 11a. First stage results of the sample of men

| | Unfair Payment | Job Insecurity | Job Demands | Low Skill Utilisation | Lack of Freedom | Total Work Stressor |
|-------------------------------------|---------------------|----------------------|----------------------|-----------------------|--------------------|----------------------|
| Casual job | -0.194** (0.098) | 0.285*** (0.071) | -0.342*** (0.088) | 0.135** (0.067) | -0.020 (0.078) | -0.027 (0.039) |
| Supervisory role | 0.050 (0.056) | -0.113*** (0.041) | 0.104** (0.050) | -0.113*** (0.039) | -0.087* (0.045) | -0.032 (0.023) |
| Small size of firm | -0.039 (0.064) | 0.123*** (0.046) | -0.156*** (0.057) | 0.105** (0.044) | -0.082 (0.051) | -0.010 (0.026) |
| Short employment tenure (< 3 years) | -0.090 (0.058) | -0.176*** (0.042) | -0.096* (0.052) | -0.078* (0.040) | -0.062 (0.047) | -0.100*** (0.023) |
| Over time (> 45 hours) | 0.136** | -0.064 | 0.215*** | -0.067* | -0.057 | 0.033 |

| | | | | | | |
|---|----------|---------|-----------|----------|----------|---------|
| | (0.058) | (0.042) | (0.051) | (0.039) | (0.046) | (0.023) |
| Part time worker | -0.282** | 0.139 | -0.217* | 0.190** | -0.247** | -0.084 |
| | (0.136) | (0.099) | (0.121) | (0.093) | (0.109) | (0.055) |
| Occupation (Omitted Managers & administrators) | | | | | | |
| Professionals | 0.012 | -0.012 | -0.049 | 0.034 | 0.047 | 0.006 |
| | (0.100) | (0.072) | (0.089) | (0.068) | (0.080) | (0.040) |
| Associate professionals | -0.080 | 0.021 | -0.131 | 0.063 | 0.112 | -0.003 |
| | (0.104) | (0.075) | (0.092) | (0.071) | (0.083) | (0.042) |
| Tradespersons | -0.307** | -0.028 | -0.112 | 0.019 | 0.078 | -0.070 |
| | (0.139) | (0.100) | (0.124) | (0.095) | (0.111) | (0.056) |
| Advanced clerical & service workers | 0.585** | 0.144 | 0.099 | -0.028 | 0.321* | 0.224** |
| | (0.239) | (0.173) | (0.213) | (0.164) | (0.191) | (0.096) |
| Intermediate clerical, sales & service workers | -0.016 | -0.054 | -0.222** | 0.192** | 0.194** | 0.019 |
| | (0.120) | (0.087) | (0.107) | (0.083) | (0.096) | (0.048) |
| Intermediate production & transport workers | -0.008 | 0.063 | -0.444*** | 0.262*** | 0.081 | -0.009 |
| | (0.139) | (0.101) | (0.124) | (0.095) | (0.111) | (0.056) |
| Elementary clerical, sales & service workers | -0.033 | -0.003 | -0.264* | 0.254** | 0.165 | 0.024 |
| | (0.176) | (0.128) | (0.157) | (0.121) | (0.141) | (0.071) |
| Labourers | -0.279* | 0.165 | -0.331** | 0.228** | 0.194 | -0.005 |
| | (0.160) | (0.116) | (0.143) | (0.110) | (0.128) | (0.064) |

Note: standard errors in parenthesis, * p<0.1, ** p<0.05, *** p<0.01, all second stage regressors in table 9 are also included.

Women's first stage results show similar patterns to men's in the direction of the effects of work/job characteristics on each work stressor. However, the magnitude and statistical significance of these estimates are different between the sample of men and women. In Table 11b, casual workers are less likely to have high stress relating to unfair payment or high job demands, but more likely to have higher job insecurity or lower skill utilisation than non casual workers. Women in supervisory roles are more likely to feel there is unfairness in the payment or their job demands are high relative to those in non-supervisory roles. But they have more freedom in work than their counterparts. This may reflect their freedom for how they do work. Like men, women who have worked less than three years for the current employer have lower levels of work stressor in total than people whose tenure are longer. The magnitude for women is smaller but more statistically significant. Unlike men, for women, working over time and part time does not have a significant effect on work stressors except for the effect of overtime on unfair payment.

Table 11b. First stage results of the sample of women

| | Unfair Payment | Job Insecurity | Job Demands | Low Skill Utilisation | Lack of Freedom | Total Work Stressor |
|---|----------------------|----------------------|----------------------|--------------------------|---------------------|------------------------|
| Casual job | -0.439*** (0.095) | 0.482*** (0.065) | -0.263*** (0.086) | 0.299*** (0.065) | -0.196** (0.077) | -0.024 (0.038) |
| Supervisory role | 0.153*** (0.059) | 0.024 (0.040) | 0.208*** (0.053) | -0.074* (0.040) | -0.104** (0.048) | 0.041* (0.023) |
| Small size of firm | -0.137* (0.074) | 0.078 (0.051) | -0.103 (0.067) | 0.032 (0.051) | -0.103* (0.060) | -0.047 (0.030) |
| Short employment tenure (< 3 years) | -0.112* (0.063) | -0.111*** (0.043) | -0.061 (0.057) | -0.125*** (0.043) | 0.001 (0.051) | -0.082*** (0.025) |
| Over time (> 45 hours) | 0.218** (0.096) | -0.039 (0.066) | -0.050 (0.087) | -0.077 (0.066) | -0.005 (0.078) | 0.010 (0.038) |
| Part time worker | -0.145* (0.083) | 0.002 (0.057) | -0.069 (0.075) | 0.077 (0.057) | -0.121* (0.067) | -0.051 (0.033) |
| Occupation (Omitted) | | | | | | |
| Managers & administrators) | | | | | | |
| Professionals | -0.209 (0.133) | 0.045 (0.091) | 0.081 (0.121) | -0.132 (0.091) | 0.109 (0.108) | -0.021 (0.053) |
| Associate professionals | -0.189 (0.146) | 0.185* (0.100) | -0.073 (0.132) | -0.009 (0.099) | 0.118 (0.118) | 0.007 (0.058) |
| Tradespersons | 0.409 (0.359) | 0.410* (0.246) | -0.543* (0.325) | 0.465* (0.245) | 0.231 (0.291) | 0.195 (0.143) |
| Advanced clerical & service workers | -0.023 (0.184) | 0.013 (0.126) | -0.155 (0.166) | 0.117 (0.125) | 0.290* (0.149) | 0.049 (0.073) |
| Intermediate clerical, sales & service workers | 0.034 (0.151) | 0.138 (0.103) | -0.193 (0.137) | 0.185* (0.103) | 0.237* (0.122) | 0.080 (0.060) |
| Intermediate production & transport workers | -0.035 (0.276) | 0.324* (0.189) | -0.585** (0.250) | 0.931*** (0.189) | 0.718*** (0.224) | 0.271** (0.110) |
| Elementary clerical, sales & service workers | -0.088 (0.191) | 0.150 (0.131) | -0.349** (0.173) | 0.654*** (0.131) | 0.699*** (0.155) | 0.213*** (0.076) |
| Labourers | -0.185 (0.225) | 0.151 (0.154) | -0.692*** (0.204) | 0.680*** (0.154) | 0.698*** (0.182) | 0.130 (0.090) |

Note: standard errors in parenthesis, * p<0.1, ** p<0.05, *** p<0.01, all second stage regressors in table 9 are also included.

By occupational group, for both men and women, unskilled workers are less likely to be stressed in job demands but more likely to be stressed in low skill utilisation. For women, lack of freedom is also a significant stress factor for unskilled workers. In terms of total work stressor, advanced clerical & service workers is the most stressful occupational group for men. On the seven point scale of total work stressor, advanced clerical & service workers have 0.22 points higher total work stressor rating than managers & administrators have. This seems to be driven by the higher level of unfair payment and lack of freedom. For women,

intermediate production & transport workers and elementary clerical, sales & service workers are the most stressful occupational groups. Intermediate production & transport workers have 0.27 points while elementary clerical, sales & service workers have 0.21 points higher total work stressor ratings relative to managers & administrators. For them, the key driving factors are low skill utilization and lack of freedom for both occupational groups. In the next subsection, we will discuss the second stage results.

6.3.2 Mental well-being and work stressor

As mentioned earlier, we estimate each work stressor and the total work stressor separately. Table 12 shows the effect of each work stressor on happiness, controlling for other important individual and household characteristics and individual fixed effects. We present only coefficients of work stressors in Table 12 to focus on our main research question. Table 13 shows estimates of all other explanatory variables in the regression for the total work stressor. In both tables, (i) is estimates from the fixed effects (FE) linear specification. (ii) and (iii) are fixed effects IV approaches with the 2SLS estimator and LIML estimator, respectively. In general, the effects of work stressors are negatively associated with an individual's happiness. For both men and women, most of the work stressors are statistically significant in specification (i) although the magnitudes are moderately small. The endogeneity of work stressors, however, are likely to affect most coefficients of work stressors. For this reason, we will emphasise the results from specifications (ii) and (iii) that are based on IV methods. In fact, we see that the IV approaches greatly reduce the statistical significance of the estimates of work stressors themselves. Most of those estimates (ii and iii) are not statistically significant any more after endogeneity has been taken into account, except for total work stressor for men and women, and unfair payment for women. Yet, in Table 13, the IV approach doesn't greatly affect the coefficients of most of the other explanatory variables. These results are less sensitive to different estimators or specifications.¹⁵

Individuals exposed to higher levels of work stress in all dimensions (higher total work stress) are significantly less likely to be happy, even once important individual and household characteristics, including life events, are controlled for. In interpretation of the coefficients from table 12, we use one standard deviation as a unit of change. In this way, its magnitude could be more comparable to those of other explanatory variables. A one point change in the

¹⁵ In addition, for each estimator, we also estimate different specifications. For example, we include or exclude stressful life events or define variables in different ways. All results including estimates of work stressors are very robust. The different specifications do not change the main results.

total work stressor may be less feasible because its standard deviation is small. A low standard deviation means that data points will all be very close to a particular (mean) value. Results from Table 12 suggest that an increase in total work stressor by one standard deviation (0.683 points for men, 0.720 points for women) would decrease happiness by 0.36-0.50 points for men, and 0.39-0.52 points for women.¹⁶ Also, for women, an increase in unfair payment by one standard deviation (1.686 points) would decrease happiness by 0.30-0.35 points.

Table 12. The effect of work stressor on physiological well-being.

| | Unfair Payment | Job Insecurity | Job Demands | Low Skill Utilisation | Lack of Freedom | Total Work Stressor |
|--|----------------|----------------|-------------|-----------------------|-----------------|---------------------|
| <i>Men</i> | | | | | | |
| <u>(i) fixed effects estimation (FE specification)</u> | | | | | | |
| coefficient | -0.049*** | -0.065*** | -0.006 | -0.040*** | -0.057*** | -0.178*** |
| Std. Err. | (0.010) | (0.014) | (0.011) | (0.014) | (0.012) | (0.025) |
| <u>(ii) fixed effects IV estimation (2SLS-FE specification)</u> | | | | | | |
| coefficient | -0.146 | -0.110 | -0.058 | -0.014 | -0.072 | -0.525* |
| Std. Err. | (0.106) | (0.114) | (0.083) | (0.137) | (0.176) | (0.286) |
| <u>(iii) fixed effects IV estimation (LIML-FE specification)</u> | | | | | | |
| coefficient | -0.204 | -0.125 | -0.072 | -0.001 | -0.123 | -0.737** |
| Std. Err. | (0.137) | (0.133) | (0.093) | (0.168) | (0.370) | (0.375) |
| <i>Women</i> | | | | | | |
| <u>(i) fixed effects estimation (FE specification)</u> | | | | | | |
| coefficient | -0.060*** | -0.082*** | -0.026** | -0.026* | -0.051*** | -0.210*** |
| Std. Err. | (0.010) | (0.015) | (0.011) | (0.015) | (0.013) | (0.026) |
| <u>(ii) fixed effects IV estimation (2SLS-FE specification)</u> | | | | | | |
| coefficient | -0.176** | 0.123 | -0.130 | 0.014 | -0.120 | -0.544** |
| Std. Err. | (0.082) | (0.112) | (0.096) | (0.087) | (0.113) | (0.269) |
| <u>(iii) fixed effects IV estimation (LIML-FE specification)</u> | | | | | | |
| coefficient | -0.205** | 0.179 | -0.169 | 0.022 | -0.153 | -0.716** |
| Std. Err. | (0.092) | (0.128) | (0.113) | (0.095) | (0.137) | (0.339) |

Table 13 shows coefficients of the other explanatory variables. Marital status (being with a partner), health and family financial situation are important factors affecting people's happiness for both man and women. On the 11 point scale of life satisfaction (0 is totally dissatisfied and 10 is totally satisfied), married people have about 0.3 points higher happiness

¹⁶ The magnitude of the decrease in the happiness of individuals as a result of a one standard deviation increase in one particular work stressor is calculated by multiplying the value of 1 standard deviation in the stressor by the relevant coefficient in table 12.

rating than singles. Poor health lowers people's happiness. The negative effects are getting larger as people's health conditions become more severe, and these estimates are very statistically significant. Compared to the level of happiness of people having very good health, happiness decreases by about 0.56-0.57 points for women, and about 0.37-0.4 for men if they have a severe health condition.

Table 13. The effect of work stressor on mental well-being

| | <i>Men</i> | | | <i>Women</i> | | |
|---|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
| | (i) FE | (ii) 2SLS-FE | (iii) LIML-FE | (i) FE | (ii) 2SLS-FE | (iii) LIML-FE |
| Total work stressor | -0.178*** (0.025) | -0.525* (0.286) | -0.737** (0.375) | -0.210*** (0.026) | -0.544** (0.269) | -0.716** (0.339) |
| <i>Age group (omitted aged 16-30)</i> | | | | | | |
| Aged 31-40 | 0.084 (0.075) | 0.066 (0.077) | 0.055 (0.081) | 0.020 (0.107) | 0.067 (0.115) | 0.091 (0.122) |
| Aged 41-50 | 0.077 (0.103) | 0.047 (0.108) | 0.029 (0.113) | 0.108 (0.131) | 0.151 (0.138) | 0.173 (0.144) |
| Aged 51-59 | 0.253* (0.133) | 0.205 (0.141) | 0.177 (0.149) | 0.093 (0.157) | 0.149 (0.166) | 0.178 (0.173) |
| Married | 0.324*** (0.069) | 0.305*** (0.072) | 0.294*** (0.076) | 0.271*** (0.075) | 0.307*** (0.082) | 0.326*** (0.087) |
| Having dependent children | 0.061 (0.051) | 0.060 (0.051) | 0.059 (0.053) | -0.162*** (0.063) | -0.189*** (0.067) | -0.203*** (0.071) |
| <i>Remoteness (omitted Major city)</i> | | | | | | |
| Inner region | 0.104 (0.095) | 0.108 (0.097) | 0.110 (0.101) | 0.119 (0.130) | 0.126 (0.133) | 0.129 (0.136) |
| Outer areas | -0.304** (0.151) | -0.338** (0.156) | -0.358** (0.163) | -0.100 (0.167) | -0.136 (0.172) | -0.155 (0.178) |
| Remote areas | -1.316 (0.977) | -1.870* (1.094) | -2.207* (1.188) | -1.492** (0.588) | -1.409** (0.601) | -1.366** (0.619) |
| <i>Education (omitted Less than secondary school)</i> | | | | | | |
| Secondary school | -0.332 (0.299) | -0.446 (0.318) | -0.515 (0.337) | 0.434* (0.248) | 0.372 (0.257) | 0.339 (0.267) |
| Certificate III or IV | -0.381 (0.232) | -0.399* (0.236) | -0.410* (0.245) | -0.138 (0.162) | -0.158 (0.165) | -0.168 (0.170) |
| Diploma | -0.558* (0.290) | -0.618** (0.299) | -0.654** (0.312) | -0.349 (0.337) | -0.390 (0.344) | -0.411 (0.354) |
| Degree and above | -0.705* (0.391) | -0.841** (0.414) | -0.923** (0.437) | -0.383 (0.305) | -0.348 (0.311) | -0.329 (0.320) |

| | | | | | | |
|---|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| General health: SF36 | | | | | | |
| <i>(omitted very good health)</i> | | | | | | |
| Mild health condition | -0.260 ^{***} (0.059) | -0.232 ^{***} (0.064) | -0.215 ^{***} (0.069) | -0.207 ^{***} (0.070) | -0.184 ^{**} (0.073) | -0.172 ^{**} (0.077) |
| Moderate health condition | -0.471 ^{***} (0.081) | -0.422 ^{***} (0.092) | -0.393 ^{***} (0.100) | -0.461 ^{***} (0.096) | -0.425 ^{***} (0.102) | -0.407 ^{***} (0.107) |
| Severe health condition | -0.450 ^{***} (0.130) | -0.402 ^{***} (0.139) | -0.373 ^{**} (0.147) | -0.604 ^{***} (0.140) | -0.573 ^{***} (0.145) | -0.557 ^{***} (0.149) |
| Log weekly wage for current main job | 0.031 (0.052) | -0.010 (0.062) | -0.035 (0.070) | -0.000 (0.045) | 0.011 (0.046) | 0.016 (0.048) |
| Stressful life events | | | | | | |
| Marital separation | -0.304 ^{***} (0.076) | -0.317 ^{***} (0.078) | -0.326 ^{***} (0.081) | -0.253 ^{***} (0.077) | -0.229 ^{***} (0.081) | -0.217 ^{***} (0.084) |
| Death of a family member (including spouse) | 0.048 (0.040) | 0.049 (0.040) | 0.049 (0.042) | -0.041 (0.042) | -0.047 (0.043) | -0.050 (0.044) |
| Victim of violence/property crime | -0.065 (0.050) | -0.065 (0.051) | -0.065 (0.053) | -0.123 ^{**} (0.058) | -0.109 [*] (0.060) | -0.102 (0.062) |
| Serious illness to oneself/family member | 0.018 (0.032) | 0.023 (0.033) | 0.026 (0.034) | -0.031 (0.034) | -0.028 (0.035) | -0.027 (0.035) |
| Laid off | 0.069 (0.080) | 0.086 (0.083) | 0.096 (0.086) | 0.217 ^{**} (0.104) | 0.226 ^{**} (0.106) | 0.230 ^{**} (0.109) |
| Change job | 0.037 (0.039) | -0.013 (0.058) | -0.044 (0.068) | 0.012 (0.043) | -0.007 (0.046) | -0.017 (0.049) |
| Major worsening of financial situation | -0.285 ^{***} (0.104) | -0.251 ^{**} (0.109) | -0.230 ^{**} (0.115) | -0.357 ^{***} (0.103) | -0.355 ^{***} (0.105) | -0.353 ^{***} (0.108) |
| Financial hardship | -0.054 ^{***} (0.020) | -0.046 ^{**} (0.022) | -0.042 [*] (0.023) | -0.080 ^{***} (0.024) | -0.068 ^{**} (0.026) | -0.061 ^{**} (0.028) |
| Wave (omitted wave 2) | | | | | | |
| wave3 | 0.058 [*] (0.034) | 0.058 [*] (0.034) | 0.059 [*] (0.036) | 0.068 [*] (0.037) | 0.062 (0.038) | 0.058 (0.039) |
| wave4 | -0.003 (0.035) | -0.003 (0.036) | -0.003 (0.037) | 0.071 [*] (0.039) | 0.055 (0.041) | 0.047 (0.043) |
| wave5 | -0.042 (0.037) | -0.037 (0.038) | -0.034 (0.040) | -0.018 (0.041) | -0.044 (0.047) | -0.058 (0.050) |
| wave6 | -0.078 ^{**} (0.040) | -0.058 (0.044) | -0.045 (0.047) | -0.076 [*] (0.044) | -0.091 ^{**} (0.046) | -0.099 ^{**} (0.048) |

Note: standard errors in parenthesis, * p<0.1, ** p<0.05, *** p<0.01, constants are also included.

Recent experience of a major worsening in the family financial situation also lowers people's happiness by about 0.23-0.25 points for men and 0.35-0.36 points for women relative to those who did not experience this event in the past year. Living in a remote region makes both men and women unhappy. It lowers their happiness by about 1.4 points for women and around 2 points for men when compared to ones living in a major city. In fact, for both men and

women, this variable has the greatest impact on their happiness amongst all the explanatory variables listed. In addition, it is interesting to note for men, the effect of living in a remote region is less statistically significant relative to women and that living in an outer region is also associated with a more moderate decrease in men's happiness but the same does not hold for women. Having dependent children is negatively associated with women's happiness. We include a group of stressful life events to control for people's base line happiness. Certain life events may have relatively short effects on people's happiness compared to others. And current situations are improved compared with the time when individuals were actually experiencing these events.

7. Conclusions

Work is one of the identified domains on which individuals' happiness (or life satisfaction) is based, as well as family, health, finance and social interaction. Research shows the employed are likely to be happier than the unemployed (Carroll 2007; Clark 2003). Thereby employment itself can be a crucial factor for individual happiness. However, once employed, the workplace can have a negative impact on individuals' happiness as a result of work-related stress. This stress can be induced by various work stressors such as job insecurity, unfair payment, lack of freedom, job demands etc. Medical research shows high levels of work related stress can be linked to a wide range of mental health conditions such as depression, anxiety etc. Prolonged levels of this psychological stress are positively associated with the risk of having hypertension and cardiovascular diseases.

This project documents the type and level of work stressors by gender and occupation. The descriptive analysis shows that proportionally more women have a relatively high risk for work related stress in all dimensions of work stressors (Figure 2). By occupation, for people in unskilled occupations, job insecurity, low skill utilisation and lack of freedom are likely to be major sources of their work related stress. On the other hand, high levels of job demands is the most important source of stress for people in skilled occupations (Figure 3).

Multivariate analysis suggests that advanced clerical & service workers have the highest level of the total work stressor among occupational groups for men, and intermediate production & transport workers and elementary clerical sales & service workers for women (Table 11a and 11b). For men, it seems to be driven by higher levels of unfair payment and lack of freedom for this particular occupation. For women, the driving factors are low skill utilisation and lack of freedom for both occupations.

One of the main objectives of this project is to examine the effect of work stressors, which could be sources of work related stress, on workers' mental well-being. The multivariate analysis controls for a variety of potentially confounding determinants of individuals' mental well-being outside the workplace as well as unobservable individual fixed effects. The endogeneity in the self-assessed level of work stressors and subjective well-being has also been taken into account. The results show that the negative impact of total work stressor on happiness is statistically significant for both men and women (Table 12). Compared to other factors within this model that are associated with individual happiness, the magnitude of the effect of the total work stressor on happiness is similar to that of marriage. The negative effect of unfair payment on happiness is statistically significant for women, but not for men.

Looking at our results in light of policy, there are two main implications. First, we found evidence that reductions in the averaged workplace stress across all five categories of the potential work stressors identified above (total work stressor) will have positive effects on workers' mental well-being. In this sense, investments that reduce the risk of workplace stress are very worthwhile. It is important to provide workplaces that are not only physically but also mentally healthy for workers. Interventions should be applied to a wide range of sources of work related stress. Furthermore, to address workplace stress, collaboration by employers and employees is necessary. Early intervention could reduce the risk of work related stress developing into severe mental illness, and increase an individual's labour market attachment. Furthermore, there are indications that fairness of payment is a key factor behind the happiness of women who are working. In light of the recent policy focus on boosting women's labour supply, this would be one of the areas that such policies should address.

Appendix Table 1. Average scores on work stress dimensions by gender and occupation.

| | Work Stress | Work Stressors | | | | | Job Stain* |
|--|-------------|----------------|----------------|-------------|-----------------------|-----------------|------------|
| | | Unfair Payment | Job Insecurity | Job Demands | Low Skill Utilisation | Lack of Freedom | |
| Men | | | | | | | |
| i) Managers & administrators | 3.15 | 3.34 | 2.66 | 4.91 | 2.60 | 2.75 | 0.98 |
| ii) Professionals | 3.13 | 3.39 | 2.69 | 5.16 | 2.42 | 3.33 | 1.04 |
| iii) Associate professionals | 3.22 | 3.46 | 2.66 | 4.63 | 2.74 | 3.46 | 1.02 |
| iv) Tradespersons | 2.87 | 3.48 | 2.91 | 4.17 | 2.79 | 3.70 | 1.00 |
| v) Advanced clerical & service workers | 2.99 | 3.20 | 2.70 | 4.56 | 2.93 | 3.75 | 1.14 |
| vi) Intermediate clerical, sales & service workers | 2.91 | 3.57 | 2.73 | 3.86 | 3.16 | 3.98 | 1.10 |
| vii) Intermediate production & transport workers | 2.76 | 3.51 | 2.98 | 3.35 | 3.58 | 4.34 | 1.15 |
| viii) Elementary clerical, sales & service workers | 2.80 | 3.53 | 2.86 | 3.11 | 3.81 | 4.49 | 1.21 |
| ix) Labourers | 2.61 | 3.38 | 3.11 | 3.09 | 3.58 | 4.16 | 1.12 |
| Women | | | | | | | |
| i) Managers & administrators | 3.30 | 3.46 | 2.55 | 4.68 | 2.73 | 3.09 | 1.04 |
| ii) Professionals | 3.17 | 3.52 | 2.39 | 4.81 | 2.35 | 3.78 | 1.08 |
| iii) Associate professionals | 2.91 | 3.43 | 2.56 | 3.83 | 2.99 | 3.50 | 0.99 |
| iv) Tradespersons | 2.64 | 3.56 | 2.82 | 3.21 | 2.88 | 3.57 | 0.99 |
| v) Advanced clerical & service workers | 2.52 | 3.02 | 2.42 | 3.34 | 3.39 | 3.18 | 0.93 |
| vi) Intermediate clerical, sales & service workers | 2.67 | 3.53 | 2.68 | 3.24 | 3.25 | 4.21 | 1.07 |
| vii) Intermediate production & transport workers | 2.46 | 3.06 | 2.78 | 2.84 | 3.94 | 4.40 | 1.25 |
| viii) Elementary clerical, sales & service workers | 2.43 | 3.27 | 2.70 | 2.48 | 3.90 | 4.63 | 1.17 |
| ix) Labourers | 2.51 | 3.34 | 3.01 | 2.52 | 4.30 | 4.45 | 1.30 |
| Number of obs | 37231 | 37246 | 36974 | 37249 | 37213 | 37225 | 12129 |

*only for wave 5 and 6.

Appendix Table 2. Summary Statistics for Carroll’s study.

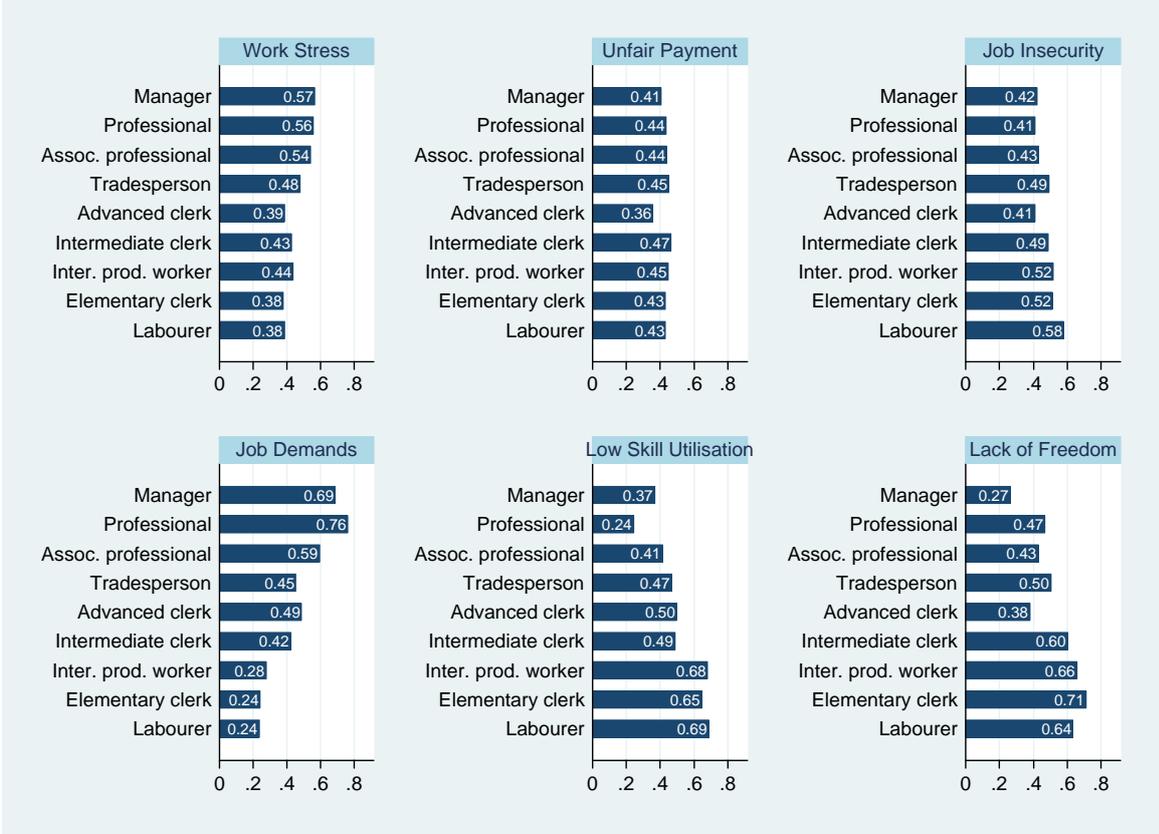
| Variables | Description | <i>Men</i> (in %) | <i>Women</i> (in %) |
|-----------------------------------|--|----------------------|------------------------|
| Level of life satisfaction (mean) | on scale 0-10 | 5.93 | 6.87 |
| Those who are satisfied with life | =1 if Life satisfaction > 5 | 91.58 | 91.79 |
| Unemployed | =1 if unemployed | 4.33 | 3.50 |
| Not in labour force | =1 if not in labour force | 9.37 | 26.15 |
| Married | =1 if married | 60.62 | 65.20 |
| Disabled | =1 if disabled (self –assessed) | 21.23 | 19.59 |
| Has Children | =1 if number of children > 0 | 60.97 | 70.33 |
| Partner unemployed | =1 if partner unemployed | 1.54 | 1.51 |
| Age (mean) | Age | 38.60 | 38.74 |
| ESB Migrant | =1 if born overseas in English speaking country | 10.81 | 9.17 |
| Not English SeB Migrant | =1 if born overseas in non English speaking country | 11.17 | 12.95 |
| Living in city | =1 if live in city | 62.85 | 63.27 |
| Living in regional areas | =1 if live in region | 23.08 | 23.12 |
| Income (mean) | Annual household disposable income in thousands in 2006 dollar | 71.19 | 68.61 |
| University degrees and above | =1 if university degrees and above | 21.71 | 24.49 |
| Diploma | =1 if non-university tertiary qualifications | 38.83 | 25.57 |
| Completed Year 12 | =1 if year 12 completed | 14.23 | 16.60 |

Appendix Figure 1. Proportion of people who report high score on dimensions of job stress by gender.*



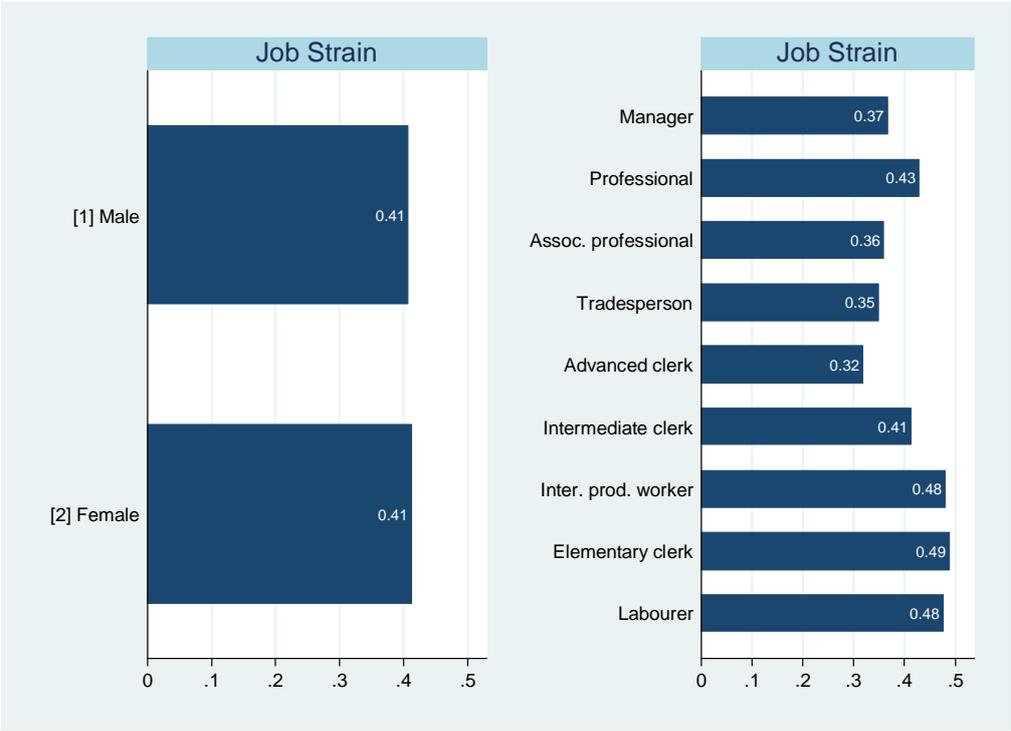
* A benchmark at the gender-adjusted sample average on each variable.

Appendix Figure 2. Proportion of people who report high score on dimensions of job stress by occupation*



* A benchmark at the gender-adjusted sample average for each variable.

Appendix Figure 3. Proportion of people who have a high strain job by gender and occupation.*



* A benchmark at the gender-adjusted sample average on the job strain scale.

Appendix: Random effects logit and Conditional fixed effects logit estimator.

Let $P(y_{it}=1)$ be the probability that individual i has high life satisfaction (is happy) in time period t , $t=1, \dots, T$. Such a probability can be expressed in terms of the indirect utility V_{it} by individual i in period t .

$$P(y_{it} = 1) = F(V_{it} + \alpha_i), \quad V_{it} = X_{it}\beta \quad (a)$$

where F is a cumulative logistic distribution function, X_{it} is the set of exogenous explanatory variables for happiness including unemployment, and α_i are unobserved individual effects. Therefore, a standard panel logistic function has the following form:

$$P(y_{it} = 1 | X_{it}, \alpha_i) = \frac{\exp(X_{it}\beta + \alpha_i)}{1 + \exp(X_{it}\beta + \alpha_i)} \quad (b)$$

A random effects logit estimator assumes normally distributed (random) individual effects (α_i), which is also assumed to be uncorrelated with X_{it} .

On the other hand, a conditional fixed-effects logit model (FEL) developed by Chamberlain (1980) makes it possible to control for unobserved individual fixed effects without restricting their distribution, and the parameter estimates based on a conditional FEL are consistent and efficient. The parameter identification in conditional FEL is based on the sub-sample of those who experienced at least one positive and one negative outcome, so the estimation results will not be affected by people who do not change their happiness (always having high or low life satisfaction). The FEL approach stipulates that if $k_i = \sum_{t=1, \dots, T} y_{it}$ is the number of positive outcomes in an individual's happiness sequence (y_{i1}, \dots, y_{iT}) , then conditioning on k_i ,

$$P(y_i | n_i) = \frac{\exp\left(\sum_{t=1, \dots, T} y_{it} X_{it} \beta\right)}{\sum_{D_i \in B_i} \exp\left(\sum_{t=1, \dots, T} d_{it} X_{it} \beta\right)} \quad (c)$$

where d_{it} may take on the values 0 or 1 so that $\sum_{t=1, \dots, T} d_{it} = n_i$ and B_i denotes all possible happiness sequences resulting in the same n_i :

$$B_i = \left\{ D_i = (d_{i1}, \dots, d_{iT}) \mid d_{it} \in \{0,1\}, \sum_t d_{it} = n_i \right\} \quad (d)$$

As shown in (c), the probability does not depend on the individual specific constant α_i . The consistent and efficient estimates of β can be obtained using a maximum likelihood (ML) estimator available in most statistical software packages (SAS, STATA, etc.). The drawback of this estimator is that it cannot predict probabilities and estimate marginal effect (the partial effects) of explanatory variables without making an extra assumption about fixed-effects (α_i) because the distribution of α_i is unrestricted. Woodbridge (2002) mentioned that none of these assumptions are good because we don't know its distribution. For further details on these estimators, please refer to Carroll (2007).

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