1 4 9 5
UNIVERSITY OF ABERDEEN

Business School

Centre for European Labour Market Research

CELMR

Discussion Papers in Economics and Finance

Insecure Lock-in:

The Mental Health Effects of Anticipating Insecure Employment

Daniel Kopasker

Catia Montagna

Keith A. Bender

Discussion Paper No 19-7

October 2019

ISSN 0143-4543

Insecure Lock-in: The Mental Health Effects of Anticipating Insecure Employment

Daniel Kopasker*[1]; Catia Montagna[2]; Keith A. Bender[2]

This version: October 2019

Abstract:

Insecure employment has consistently been shown to have a significant adverse effect on mental health, particularly for males. Using data from the British Household Panel Survey (BHPS), this paper examines the mental health effects of this anticipating entry or prolonged exposure to insecure employment. By estimating the monetary value of health-utility decrements resulting from exposure and anticipation of exposure, we assess the likely benefits of policies which are effective in reducing insecure employment. We show that there are valuable individual and population health benefits which could be gained through effective polices. These benefits will be experienced by males over an anticipation period and an exposure period. For females only the contemporaneous benefits are significant.

Keywords: insecure employment, mental health, job quality

JEL classification: I31, I14, D63

***Corresponding author:** Daniel Kopasker, Health Economics Research Unit, University of Aberdeen, Email: daniel.kopasker@abdn.ac.uk

[1] Health Economics Research Unit (HERU), Institute of Applied Health Sciences, University of Aberdeen, UK.

[2] Department of Economics and Centre for European Labour Market Research, University of Aberdeen, UK.

Acknowledgments:
We thank Gerald McQuade for excellent research assistance and Graham Scotland for helpful discussions. HERU is supported by the Chief Scientist Office (CSO) of the Scottish Government Health and Social Care Directorates (SGHSC). The views expressed here are those of the Unit and not necessarily those of the CSO. This work was supported by the Economic and Social Research Council [ES/J500136/1].

1. Introduction and Background

Insecure employment is an emerging socioeconomic determinant of health [1] which affects around 15% of the UK workforce every year [2]. Insecure employment is a work-related subset of the broader concept of economic insecurity, which has been defined as "the anxiety produced by the possible exposure to adverse economic events and by the anticipation of the difficulty to recover from them" [32, p.1018]. Employment can be considered insecure if it is perceived by an employee to provide inadequate protection from volatility in earnings, hours, or employment. Rather than simply being defined by contract status, insecure employment can occur whenever there is a mismatch between the security demanded by the employee and the security supplied by the employer.

Adverse effects on mental health resulting from exposure to insecure employment have been found consistently across a range of institutional settings ([2],[3],[4],[5],[6],[7]). Within this paper we now examine the intertemporal effects of exposure to insecure employment, including multiple periods of exposure and anticipation of future exposure. In this respect, we are primarily concerned with the effects on employee mental health of being locked-in to insecure employment. By locked-in we mean that an employee anticipates they will be insecure in the next period (one year in our study) but does not feel enabled to seek greater security in their employment.

Modern working practices have led to an increasing prominence of temporary and fixed term contracts. However, the situation of being locked-in to insecure employment is not determined wholly by the contractual status of an employee. Theodossiou and Zangelidis [8] found that dissatisfaction with security in employment increases with firm tenure, a result also found using data from Germany by Geishecker *et al.* [9]. Barmby *et al.* [10] suggest this lock-in may occur due to employees being rewarded for firm-specific skills. Alternative wage offers within the labour market do not include this element of remuneration prior to employment commencing. For this reason, dissatisfied employees reject the outside option and remain in insecure employment due to a financial imperative. Consequently, it is not a subset of the workforce which is potentially locked-in to insecure employment, rather different degrees of exposure to insecurity can be found across groups in the entire workforce. This point was demonstrated succinctly by Balaram and Wallace-Stephen [11], who segment the UK workforce into seven groups based on their varying experiences of work and economic security.

Evidence is emerging regarding the intertemporal experience of economic insecurity. An investigation of the effects of repeated exposure to economic insecurity (not restricted to those in employment) in Canada [12] indicated that the individuals recovered from single periods of exposure, but males exposed to longer periods of exposure suffered larger mental health decrements. Likewise, a study of the Italian workforce [13] indicated that prolonged exposure to temporary employment, possibly one of the most acute forms of insecure employment, increases the probability of psychotropic medication prescription. Long-term exposure to flexible contracts has also been shown to impact on a range of physical health outcomes [14]. While extending the literature by examining the cumulative effect of past exposure to insecure employment in the UK context, our paper is the first to investigate the impact of anticipating exposure to insecure employment in the next period. Clark and Georgellis [15] provide evidence that various future life events, such as entry into unemployment, are anticipated by individuals and this impacts on mental health in the current period. We adopt a similar approach to investigate the impact on mental health in the current period of anticipating entry or prolonged exposure to insecure employment.

Our focus on the employed, rather than including those suffering from economic insecurity while not in employment, is directly relevant to the UK policy context. Despite the accumulation of evidence for a causal effect of economic insecurity on mental health, there is little evidence on which to base an effective policy response. One potential policy response, recently proposed by the UK government, is to provide a right to request a more secure employment contract after a fixed period (6 months) with an employer [16]. This is one element of the UK Government's response to the Taylor review of modern working practices [17], whose recommendations of ways to improve job quality were accepted within the Industrial Strategy White Paper [18]. While pertinent to the UK context, our analysis is generalisable to other institutional settings where population-level policies which restrict exposure to insecure employment are under consideration.

Our results suggest that effective legislation to restrict exposure to insecure employment will have substantial benefits to population mental health and could contribute to reducing the economic loss incurred by employers due to poor employee mental health. The recent Stevenson-Farmer independent review of mental health and employers estimated the size of this loss to be approximately 2% of gross domestic product [19], mainly due to reduced employee productivity as they continue to attend work despite poor mental health.

Therefore, there are significant potential benefits to both population mental health and productivity which may be gained by improving this aspect of job quality.

Using nationally representative data from the British Household Panel Survey [20] (BHPS), we find that males experience an additional anticipation phase prior to exposure to insecure employment, while females suffer only during the exposure period. Legislation limiting exposure to a single period of insecure employment will reduce the contemporaneous effect on mental health by influencing expectations in males, in addition to limiting the total number of periods of exposure for both sexes. We attempt to assess our results within the context of health related quality of life (HRQL) by converting our original measure of mental health, the 12-item General Health Questionnaire (GHQ-12), to a generic health state measure (EQ-5D-3L) using the crosswalk by Serrano-Aguilar *et al*. [21]. Although the scale of this individual benefit we find appears small, the size of the affected population makes this a significant benefit to population mental health. Over 1.3 million employees could directly benefit from effective policies, at the firm or national level, which limit exposure to insecure employment. This would generate substantial societal benefits.

The next section outlines the data and methods used within the analysis. Section 3 provides the results. Section 4 discusses the implications of our findings and the strengths and limitations of our analysis. Section 5 concludes.

2. Methods

2.1 Data

The data employed in our analysis comes from the BHPS [20], a panel study which was conducted for 18 annual waves from 1991. The survey questionnaire covers a range of social and economic issues using consistent wording and response scales across years. The BHPS sample is designed to be nationally representative of the UK adult population.

All eighteen waves are used to build our dataset. However, as our preferred[1] specification includes four lags and one lead of our insecure employment indicator, this restricts the sample period to 1995-2007. Therefore, our sample period covers a time of relative macroeconomic stability which predates the financial crisis of 2008. It has not been

[1] This specification allows comparison with existing studies, particularly Watson and Osberg [12], while maintaining a sample size which is sufficient to address our research questions. Alternative lag structures were also tested and did not substantially alter the results and interpretations.

possible to extend the sample beyond this point due to discontinuities in how key variables are captured in the BHPS and the Understanding Society study, which replaced the BHPS after 2008. Although the financial crisis may have influenced the level of insecure employment, we know of no evidence that the crisis altered the effect on mental health of insecure employment. Consequently, our analysis remains valid to the current context.

Our panel is unbalanced, with each individual being present at least twice. Each data point is formed from observations over a six year period - the current period, the next period (one year later), and the four prior periods (each of one year). At each data point, the sample members must be aged between 16 and 64, and in employment during the six relevant data points. Although our sample is always employed when we observe them, spells of unemployment between periods are also captured.

We focus on exposure to insecure employment, since this is directly relevant to one of the first policies emerging the UK Government's Good Work Plan [16]. However, to ensure that our results are not influenced by the decision to focus on those employed at all six data points, we repeat the analysis while additionally including those unemployed at relevant past or future data points, but employed in the current period. Results for this alternative sample are reported in the Appendix 3 and do not significantly alter our main findings.

2.2 Measurement of Mental Health

The dependent variable in the analysis comes from responses to the GHQ-12, a verified measure of mental health status [24]. The questions cover aspects of mental functioning and emotional difficulties (see Appendix 1 for the question wording). Responses to the individual questions within the GHQ-12 are scored on a scale ranging from 0 (substantial decrease in symptoms compared to usual) to 3 (substantial increase in symptoms compared to usual). The twelve scores are then summed to form a Likert scale from 0 to 36 capturing a single dimension of mental health [25]. In keeping with the relevant literature, this score has been reversed such that the scale is increasing in mental health. Additionally, the scale has been standardised to allow coefficients to be interpreted as standard deviations from the sample mean.

One limitation of the GHQ-12 is that it does not provide a direct utility valuation of changes in HRQL. Converting GHQ-12 to a preference based measure is a second-best solution to this problem. To provide an indication of the utility decrements incurred by exposure to

insecure employment we adopt this approach, in addition to our main results based directly on GHQ-12. The crosswalk comes from Serrano-Aguilar *et al.* [21] and is based on a general population sample using EQ-5D-3L – a utility-based measure of HRQL that is the standard outcome measurement employed in the UK to calculate Quality-Adjusted Life Years (QALYs). In EQ-5D-3L respondents rate their degree of impairment in different health dimensions using 3 response levels (no problems, some problems and extreme problems). The five health dimensions are mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. One year of perfect health would score 1 on the EQ-5D-3L scale, and 36 on our reversed GHQ-12 scale.

Evidence suggests that existing HRQL measures do not sufficiently capture mental health and wellbeing effects [26]. The main limitation of mapping a mental health measure to EQ-5D is that the mapping is largely to the single mental health dimension, and not to the other four physical health dimensions [27]. Other mapping functions have attempted to address this by including measures of self-rated physical health [28], but use a more aggregated measure of the GHQ-12. A preference-based measure of HRQL that specifically captures mental health changes (ReQoL) is now in the advanced stages of development [29]. This new measure has the potential to greatly improve cost-utility analysis of mental health interventions, but in the present study we must rely on an EQ-5D-3L crosswalk.

2.3 Measurement of Insecure Employment

The measure of insecure employment used within the analysis is formed by combining two questions from the BHPS. The first question asks respondents "How satisfied would you say you are with the job security in your present job?". Responses are given on a 7-point scale. These have been recoded into a binary variable such that those expressing any dissatisfaction with their current level of job security are coded as 1. Analysis across a range of objective and subjective measures of economic insecurity identified this question as containing the most information in a mental health context [2]. By using this broad measure of insecurity, we do not impose any restrictions on which type of employee can be secure or insecure. For example, an employee for whom temporary employment is desirable can define them self as secure. Likewise, permanent employees with long tenure can define themselves as insecure. For example, if their employer is relatively uncompetitive in comparison to international competitors.

The second question asks respondents "How well would you say you yourself are managing financially these days?" and responses are given on a 5-point scale. These have been recoded into a binary variable with individuals expressing financial difficulty and in paid employment coded as 1. Again, this does not impose any restriction on which individuals are secure or insecure. This is particularly important since we do not observe indebtedness.

By combining these two questions we capture a broad range of experiences of insecurity in employment, such as those outlined in Balaram and Wallace-Stephen [11]. From Kopasker *et al.* [2], we know that a substantial number of employees on full time permanent contracts feel insecure, despite not expecting to become unemployed in the next 12 months. The reasons for insecurity amongst this group are not yet fully understood, although there is some indication that working hours, career progression, and pensions may contribute to this perception [8]. Consequently, it is valuable to employ a broad measure of insecure employment within the analysis which allows for many factors.

2.4 Method and Model Specification

We estimate our model using the fixed effects estimator, which controls for all time-invariant factors influencing mental health outcomes, such as such as genetic inheritance and psychological predisposition. To investigate gender effects, which cannot be separately identified from other time-invariant factors using our preferred method, we conduct sub-group analysis based on gender.

The specification employed to examine the effect on mental health of anticipating exposure to insecure employment takes the form:

$$H_{it} = \beta_0 I_{it} + \beta_1 I_{it+1} + \beta_2 (I_{it} \times I_{it+1}) + \sum_{k=1}^{4} \beta_{2+k} I_{it-k} + \beta_7 P_{it} + \beta_8 F_{it} + X'_{it}\gamma + \alpha_i + \eta_t + \varepsilon_{it} \qquad (1)$$

where H_{it} is the standardised GHQ-12 score or EQ-5D-3L conversion for individual *i* at time *t*, *I* is the dummy variable indicating exposure to insecure employment, a single interaction term capturing exposure to insecure employment in both the current (*t*) and future periods (*t+1*) is included, *P* is a continuous variable capturing the proportion of time spent unemployed in the past four years, and *F* is a dummy variable which equals one if the individual experiences a spell of unemployment (regardless of duration) in the next 12 months. *X* is a vector of standard controls (percentiles of equivalised household income, existing medical condition dummy, education dummies, age bands, marital status dummies, number of children,

industry of employment dummies, occupation dummies, log of hours worked, part-time dummy, and employer size dummies). The individual-specific intercept is given by α, η is the time dummy, and ε represents the idiosyncratic error. Standard errors are clustered at the individual level such that they are robust to arbitrary heteroscedasticity and within-subject autocorrelation.

The main variables of interest are β_1 and β_2. The former captures the effect of anticipating insecure employment in the next period, while the interaction term β_2 will indicate if this anticipation effect differs for individuals who are currently exposed to insecure employment. Estimates for parameters on the lags of exposure to insecure employment (β_3, β_4, β_5, and β_6) are also of interest as they capture the cumulative effect of past exposure to insecure employment.

From both Geishecker [6] and Kopasker *et al.* [2] we know that simultaneity may exist in the relationship between insecure employment and mental health. However, these studies clearly show that when this occurs, it results in an underestimate in the absolute value of the effect size. Consequently, we accept that our chosen approach may result in conservative estimates of parameter values.

3. Results

3.1 Descriptive statistics

Descriptive statistics are given in Table 1. From these statistics it is clear that there is a great range of mental health outcomes amongst the employed in both the male and female samples. The female sample has a slightly lower mean level of mental health than the male sample, but also greater variation. The second thing that is apparent is that insecure employment is a very common experience. Just under half of both the male and female samples have experienced at least one period of insecurity. However, very few individuals experience more than two consecutive periods of insecure employment during the six year periods used to form each data point. The declining mean level of insecurity as measurement moves closer to t=0 reflects that the sample period was a time of decreasing insecurity and macroeconomic stability, as previously shown in Kopasker *et al.* [2].

Table 1. Descriptive Statistics for Sample

	Male (n=13265)	Female (n=10713)
GHQ-12 score (unstandardised)	25.723 (4.532)	24.466 (5.228)
EQ-5D-3L (unstandardised)	0.760 (0.103)	0.737 (0.126)
Insecure employment t	0.185	0.163
Insecure employment t+1	0.196	0.178
Insecure employment t-1	0.177	0.153
Insecure employment t-2	0.171	0.145
Insecure employment t-3	0.165	0.145
Insecure employment t-4	0.163	0.145
Zero period of insecure employment	0.520	0.540
One period of insecure employment	0.210	0.222
Two periods of insecure employment	0.112	0.115
Three periods of insecure employment	0.071	0.061
Four periods of insecure employment	0.042	0.032
Five periods of insecure employment	0.028	0.021
Six periods of insecure employment	0.017	0.011
Proportion of time unemployed in the past 4 years	0.003 (0.018)	0.002 (0.014)
Experienced unemployment in next 12 months	0.009	0.008
No qualifications	0.145	0.147
Lower secondary	0.300	0.392
Upper secondary	0.254	0.200
Higher education	0.301	0.260
Bottom income quintile	0.203	0.200
2nd income quintile	0.207	0.194
Middle income quintile	0.200	0.200
4th income quintile	0.197	0.198
Top income quintile	0.194	0.208
Under 35	0.258	0.230
Age 35-44	0.354	0.346
Age 44-64	0.388	0.425
Married	0.709	0.658
Living as a couple	0.111	0.103
Widowed	0.005	0.02
Divorced	0.038	0.080
Separated	0.013	0.022
Never married	0.125	0.117
Number of children	0.813 (1.008)	0.595 (0.876)
Existing health problem	0.469	0.567
Log of hours worked	3.659 (0.161)	3.399 (0.375)
Less than 25 employees	0.243	0.322
25-99 employees	0.252	0.279
100-499 employees	0.296	0.214
500+ employees	0.208	0.186
Part-time	0.020	0.303

Notes: Mean and standard deviation (in brackets) for continuous variables. Proportions for dummy variables

The low levels of unemployment experience, both in the previous four periods and the future period, results from the requirement for our sample members to be employed at every measurement point, otherwise the BHPS question on satisfaction with their current job security is not asked (Appendix 3 provides results which removes this requirement).

Our male sample is slightly younger, better educated, and has fewer existing health problems than the female sample, but their positions in the household income distributions are roughly equal. On average the male sample also works longer hours and is less likely to be in part-time employment.

3.2 Regression analysis

The results of the regression analysis are reported in Table 2. The first two columns provide results using the standardised GHQ-12 scores for males and females, respectively. These coefficients can be interpreted as deviations from the gender-specific sample mean levels of mental health. For both sexes, we find no cumulative effect of past exposure to insecure employment. The contemporaneous effects are large and statistically significant for males and females, with the negative effect on mental health comparatively larger in males.

For the first key variable of our analysis, the effect of anticipation, we find that males who anticipate insecure employment in the immediate subsequent period suffer declines in mental health in the current period – i.e. prior to reporting their employment as insecure in the BHPS. Using a linear combination of the EQ-5D-3L results from Column 3 of Table 2, this indicates a cumulative health-utility decrement of 0.043 for each period of exposure to insecure employment. This decrement is incurred over two periods – the anticipation period and the exposure period.

One interesting aspect of the anticipation period is that the size of the effect does not differ between males currently in secure or insecure employment. We fail to reject that the interaction effect is equal to zero, implying that anticipation of prolonged exposure has the same adverse effect on mental health as anticipating initial entry into insecure employment. Males in either secure or insecure employment suffer a mental health loss in the current period of 0.122 of a standard deviation on the GHQ-12 scale when anticipating insecurity in the subsequent period. Since we find no statistically significant lagged effects of exposure to insecure employment, our results imply that mental health subsequently recovers from this exposure.

Table 2. The Effect of Insecure Employment on Mental Health (12-item General Health Questionnaire and mapped EQ-5D-3L)

Dependent variable	Male GHQ-12	Female GHQ-12	Male EQ-5D-3L	Female EQ-5D-3L
Insecure employment t	-0.342***	-0.229***	-0.032***	-0.026***
	(0.035)	(0.038)	(0.004)	(0.005)
Insecure employment t+1	-0.122***	-0.020	-0.011***	-0.002
	(0.031)	(0.036)	(0.003)	(0.005)
Insecure employment t & t+1	-0.008	-0.011	-0.004	-2E-4
	(0.054)	(0.062)	(0.006)	(0.008)
Insecure employment t-1	-0.025	0.037	-0.004	0.004
	(0.027)	(0.032)	(0.003)	(0.004)
Insecure employment t-2	0.012	0.027	-7E-5	0.003
	(0.025)	(0.031)	(0.003)	(0.004)
Insecure employment t-3	-0.006	-0.014	-0.004	-0.001
	(0.026)	(0.030)	(0.003)	(0.004)
Insecure employment t-4	0.008	0.046	0.0016	0.005
	(0.026)	(0.030)	(0.002)	(0.004)
Unemployment experience	0.580	0.291	0.026	0.059
	(0.560)	(0.889)	(0.058)	(0.101)
Unemployment anticipation	-0.179*	0.027	-0.018*	0.002
	(0.094)	(0.111)	(0.010)	(0.013)
Existing medical condition	-0.112***	-0.178***	-0.011***	-0.020***
	(0.026)	(0.026)	(0.003)	(0.003)
Other controls	Yes	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	13265	10713	13265	10713
Individuals	2284	2001	2284	2001
R^2 (within)	0.043	0.025	0.057	0.033

Notes

Clustered standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Other controls include household income quintile, education, age, marital status, number of children, industry of employment, hours worked, employer size, and part-time status.

For females the results are much simpler. Whereas the mental health effects in males are experienced over two periods, females experience adverse effects in a single period and to a lesser extent. Only the contemporaneous effect of insecure employment on mental health is statistically significant. Therefore, effects are suffered in a single period from which

the individual subsequently recovers. This contemporaneous effect, when converted to EQ-5D-3L, equates to a current health-utility decrement of 0.026 (column 4 of Table 2).

Our results are robust to a range of specifications and samples. Estimating the model with fewer lags or more leads did not alter our results, likewise, so did including the sum of past exposure to insecure employment. We estimated the model using the lag structure from Watson and Osberg [12], which includes combinations of past exposure and does not include current and future exposure, but continued to find no statistically significant effects of past exposure to insecure employment. Augmenting the Watson and Osberg [12] lag specification with current and future insecurity reproduced our main results. Restricting our sample to the primary workforce (full-time employees with permanent contracts), as in Kopasker et al. [2], led to slightly larger coefficient estimates (see Appendix 2), but the difference was not statistically significant in comparison to the results in Table 2. Finally, we included individuals employed in the current period but unemployed, rather than insecure in employment, in past or future periods (see Appendix 3). Again, the differences were not statistically significant.

4. Discussion

The analysis in this paper extends our understanding of the intertemporal mental health effects of insecure employment. For males in the workforce, we have identified an anticipation period during which adverse mental health effects start to be experienced. This is then followed by the contemporaneous effect during the exposure period. For females only the exposure period is significant. Past experiences were consistently insignificant across a range of specifications, which suggests that individuals return to a baseline level of mental health, as was observed for a number of events in Clark and Georgellis [15].

Although the contemporaneous effects are comparable in size to those found in Kopasker *et al.* [2], despite the sample being expanded to include both the primary and secondary workforce, we find no evidence that past exposure to insecure employment has a lasting effect on mental health. Somewhat surprisingly, this is contrary to the findings of Watson and Osberg [12] using Canadian data. One factor may be the composition of the samples in the two studies. Watson and Osberg [12] additionally include the unemployed and those not within the labour force within their sample, as they are concerned with a broader definition of economic insecurity. Therefore, it is possible that the lagged effects they identify result from the cumulative effects of non-employment, rather than insecure employment.

Our focus is insecure employment. By definition, the unemployed and those not in the labour force cannot be in insecure employment. Hence, we do not include the unemployed in our main sample. The additional results reported in Appendix 3 suggest that this would not significantly influence our results.

Although our analysis and Watson and Osberg [12] investigate the effects of past exposure to insecurity, one consequence of sample selection differences is that the model specification are quite different. Our specification includes a range of controls covering aspects of an individual's employment relationship, such as occupation dummies. These controls allow us to investigate the effect of insecure employment holding other things constant across the workforce. Since the analysis of Watson and Osberg [12] includes sample members who are not in employment, it would not possible to control for such variables. Consequently, our analysis is relevant to a specific group – employees. The analysis of Watson and Osberg [12] concerns a broader, less specific, effect. However, when we remove the employment relationship variables the statistical significance and implications of our findings are unchanged. In fact, reducing the model to only four lags of the insecurity variable does not produce results which are statistically significant at conventional levels. Our results clearly demonstrate that it is current and future insecurity which influence the mental health outcomes of employees in the UK.

Our main contribution is to provide evidence that insecure employment is anticipated in some cases, and this impacts of mental health prior to the event occurring. This has important implications as policies are currently being proposed which could alter individual's expectations regarding their future security in employment, such that multiple periods of exposure would become less likely to be anticipated and experienced.

The analysis indicates that the benefits of policy interventions improving security in employment will predominantly be experienced by the male population within the UK workforce. This is consistent with a range of existing evidence which has found that insecure employment disproportionately impacts on the mental health of males ([2],[5],[12]), and can be attributed to the role of social norms in determining the importance of employment to male mental health [30]. Males represent over half of the total UK labour force of 32.21 million individuals [22]. The potential benefits to population mental health of reaching such a large group through a single intervention are significant. Furthermore, females will also

benefit from a reduction in the number of periods of exposure to insecurity, but to a lesser extent and within a single period.

From Column 3 of Table 2 we know that every period of exposure to insecure employment costs a male employee 0.043 of a QALY: 0.011 during the anticipation phase and 0.032 during exposure. If the 'right to request' is effective in limiting exposure, this would not prevent the first period of exposure to insecure employment from occurring, but will prevent subsequent periods occurring amongst individuals locked-in to an employment relationship. We know from Theodossiou and Zangelidis that it is not only those in objectively insecure employment who experience this lock-in [8], but it can potentially affect all members of the workforce. Within our sample, 47% of males exposed to insecure employment go on to suffer a second consecutive period of exposure. It is this group that will predominantly benefit from the policy intervention. Given an average rate of insecure employment of 16.5% within our male sample, we can conservatively estimate that in excess of 1.3 million male employees would benefit from this population-level job quality intervention in any single year. However, it is not clear how an employer could provide greater security to an insecure employee on a full-time permanent contract. Green [4] provides evidence that increasing employability through transferable skills may be one approach. The most effective policy response, either at the firm and national level, would address insecurity amongst the male workforce during the anticipation phase. This would reduce the adverse impact of insecure employment on male mental health by three quarters. More research, in partnership with firms and human resource professionals, is required to identify approaches which would achieve this outcome.

Through the use of QALYs we can place a monetary value on the societal benefit produced by preventing declines in population mental health resulting from insecure employment. The current willingness to pay per QALY within The Green Book [31] from HM Treasury, which provides guidance on evaluating and appraising policies, is £60,000. While the cost-effectiveness threshold employed by the National Institute for Health and Clinical Excellence (NICE) when assessing interventions within a constrained healthcare budget is between £20,000 and £30,000. Our analysis suggests that an intervention that is effective in reducing exposure to insecure employment, potentially the UK Government's proposed 'right to request', would provide an individual benefit of between £860 and £2580 for each of the 1.3 million male employees who would be expected to benefit from this intervention every year. Although this is very much a back-of-the-envelope calculation and we do not have

details on the cost of an intervention, it is a conservative estimate and does indicate the scale of potential societal benefits from improving this aspect of job quality. This is before taking into account the productivity benefits of improving employee mental health, which the Stevenson-Farmer commission suggested are also substantial [19]. As such, the case for improving population mental health through job quality interventions is compelling.

The strength of our analysis is the use of longitudinal data for a large general population sample. This allowed measurement to be taken in six consecutive periods for all sample members to measure variations in mental health resulting from changes in employment conditions. Our findings using the GHQ-12 clearly show that being locked-in to insecure employment causes significant damage to the mental health of the UK workforce.

The main limitation of the current study is that our estimates of HRQL changes are based on a crosswalk rather than directly elicited responses to questions to EQ-5D or an alternative health utility measure. However, our analysis is the first to address the absence of a utility-based or monetary valuation of insecure employment and we have attempted to be conservative when approximation was required. Future research will continue to refine this valuation and extend the approach to other features of employment relationships, such as those identified in the Taylor review [17]. Such analyses will enhance the evidence base for how industrial policy and employment practices impact on population health. In further research we also intend to quantify the productivity benefits to employers of reforms to working practices which benefit employee mental health. This will provide clear evidence of the incentive for employers to improve firm performance while providing HRQL benefits to their employees.

5. Conclusion

The analysis in this paper has shown that job quality has significant intertemporal effects on population mental health. Job quality interventions, such as the right to request greater security in employment which was proposed in the UK Government's response [16] to the Taylor review of modern working practices [17], have the potential to generate significant societal benefits by preventing the mental health decrements associated with being locked-in to insecure employment. To achieve these benefits it is essential that any legislation is effective in reducing exposure to insecure employment.

Appendix 1: GHQ-12 Questions

Here are some questions regarding the way you have been feeling over the last few weeks. For each question please tick the box next to the answer that best describes the way you have felt.

Have you recently....

a) been able to concentrate on whatever you're doing?

b) lost much sleep over worry?

c) felt that you were playing a useful part in things?

d) felt capable of making decisions about things?

e) felt constantly under strain?

f) felt you couldn't overcome your difficulties?

g) been able to enjoy your normal day-to-day activities?

h) been able to face up to problems?

i) been feeling unhappy or depressed?

j) been losing confidence in yourself?

k) been thinking of yourself as a worthless person?

l) been feeling reasonably happy, all things considered?

Appendix 2: The Effect of Insecure Employment on Mental Health for the Primary Workforce (12-item General Health Questionnaire and mapped EQ-5D-3L)

	Male	Female	Male	Female
Dependent variable	GHQ-12	GHQ-12	EQ-5D-3L	EQ-5D-3L
Insecure employment t	-0.345***	-0.260***	-0.033***	-0.031***
	(0.037)	(0.045)	(0.004)	(0.006)
Insecure employment t+1	-0.130***	0.003	-0.011***	0.002
	(0.032)	(0.042)	(0.003)	(0.005)
Insecure employment t & t+1	-0.023	0.010	-0.005	8E-4
	(0.055)	(0.077)	(0.006)	(0.010)
Insecure employment t-1	-0.027	0.050	-0.003	0.003
	(0.028)	(0.039)	(0.003)	(0.005)
Insecure employment t-2	0.015	-0.011	6E-4	-0.001
	(0.026)	(0.038)	(0.003)	(0.005)
Insecure employment t-3	-0.007	-0.007	-0.003	0.001
	(0.026)	(0.037)	(0.003)	(0.005)
Insecure employment t-4	0.007	0.049	0.002	0.006
	(0.026)	(0.037)	(0.002)	(0.005)
Unemployment experience	0.586	0.660	0.026	0.111
	(0.550)	(0.801)	(0.060)	(0.094)
Unemployment anticipation	-0.181*	0.068	-0.019*	0.007
	(0.102)	(0.143)	(0.010)	(0.018)
Existing medical condition	-0.117***	-0.166***	-0.011***	-0.019***
	(0.027)	(0.032)	(0.003)	(0.004)
Other controls	Yes	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	12950	7702	12950	7702
Individuals	2261	1614	2261	1614
R^2 (within)	0.043	0.031	0.058	0.042

Notes

Clustered standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Other controls include household income quintile, education, age, marital status, number of children, industry of employment, hours worked, employer size, and part-time status

Appendix 3. The Effect of Insecure Employment and unemployment on Mental Health (12-item General Health Questionnaire and mapped EQ-5D-3L)

	Male	Female	Male	Female
Dependent variable	GHQ-12	GHQ-12	EQ-5D-3L	EQ-5D-3L
Insecure employment t	-0.342***	-0.229***	-0.032***	-0.026***
	(0.034)	(0.037)	(0.004)	(0.005)
Insecure or unemployed t+1	-0.111***	-0.022	-0.010***	-0.002
	(0.030)	(0.035)	(0.003)	(0.005)
Insecure or unemployed t & t+1	-0.019	-0.043	-0.004	-0.005
	(0.052)	(0.061)	(0.006)	(0.008)
Insecure or unemployed t-1	-0.016	0.036	-0.003	0.003
	(0.025)	(0.030)	(0.003)	(0.004)
Insecure or unemployed t-2	0.011	0.016	0.0002	0.001
	(0.024)	(0.030)	(0.003)	(0.004)
Insecure or unemployed t-3	0.001	-0.019	-0.002	-0.001
	(0.024)	(0.029)	(0.002)	(0.004)
Insecure or unemployed t-4	0.011	0.049*	0.002	0.005
	(0.024)	(0.029)	(0.002)	(0.004)
Unemployment experience	0.256	-0.546	0.001	-0.071
	(0.206)	(0.509)	(0.021)	(0.069)
Unemployment anticipation	-0.149**	-0.107	-0.014**	-0.016
	(0.062)	(0.097)	(0.006)	(0.013)
Existing medical condition	-0.121***	-0.178***	-0.012***	-0.020***
	(0.025)	(0.026)	(0.002)	(0.003)
Other controls	Yes	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	14168	11129	14168	11129
Individuals	2430	2063	2430	2063
R^2 (within)	0.044	0.026	0.056	0.034

Notes

Clustered standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Other controls include household income quintile, education, age, marital status, number of children, industry of employment, hours worked, employer size, and part-time status.

Bibliography

1. Benach J, Vives A, Amable M, Vanroelen C, Tarafa G, Muntaner C. Precarious Employment: Understanding an Emerging Social Determinant of Health. Annual Review of Public Health. 2014;35(1):229-53. doi:doi:10.1146/annurev-publhealth-032013-182500.
2. Kopasker D, Montagna C, Bender KA. Economic insecurity: A socioeconomic determinant of mental health. SSM - Population Health. 2018;6:184-94. doi:https://doi.org/10.1016/j.ssmph.2018.09.006.
3. Ferrie JE, Shipley MJ, Marmot MG, Stansfeld S, Smith GD. Health effects of anticipation of job change and non-employment: longitudinal data from the Whitehall II study. BMJ : British Medical Journal. 1995;311(7015):1264-9.
4. Green F. Unpacking the misery multiplier: How employability modifies the impacts of unemployment and job insecurity on life satisfaction and mental health. Journal of Health Economics. 2011;30(2):265-76. doi:https://doi.org/10.1016/j.jhealeco.2010.12.005.
5. Rohde N, Tang KK, Osberg L, Rao P. The effect of economic insecurity on mental health: Recent evidence from Australian panel data. Social Science & Medicine. 2016;151(Supplement C):250-8. doi:https://doi.org/10.1016/j.socscimed.2015.12.014.
6. Geishecker I. Simultaneity Bias in the Analysis of Perceived Job Insecurity and Subjective Well-being. Economics Letters. 2012;116(3):319-21. doi:http://dx.doi.org/10.1016/j.econlet.2012.03.018.
7. Watson B, Osberg L. Job insecurity and mental health in Canada. Applied Economics. 2018;50(38):4137-52. doi:10.1080/00036846.2018.1441516.
8. Theodossiou I, Zangelidis A. Career prospects and tenure–job satisfaction profiles: Evidence from panel data. The Journal of Socio-Economics. 2009;38(4):648-57. doi:http://dx.doi.org/10.1016/j.socec.2009.03.006.
9. Geishecker I, Riedl M, Frijters P. Offshoring and Job Loss Fears: An Econometric Analysis of Individual Perceptions. Labour Economics. 2012;19(5):738-47. doi:http://dx.doi.org/10.1016/j.labeco.2012.05.018.
10. Barmby T, Bryson A, Eberth B. Human capital, matching and job satisfaction. Economics Letters. 2012;117(3):548-51. doi:http://dx.doi.org/10.1016/j.econlet.2012.07.026.
11. Balaram B, Wallace-Stephen F. Thriving, striving, or just about surviving? Seven portraits of economic security and modern work in the UK.: Royal Society for the encouragement of Arts, Manufactures and Commerce. 2018. https://www.thersa.org/discover/publications-and-articles/reports/seven-portraits-of-economic-security-and-modern-work-in-the-uk
12. Watson B, Osberg L. Healing and/or breaking? The mental health implications of repeated economic insecurity. Social Science & Medicine. 2017;188:119-27. doi:https://doi.org/10.1016/j.socscimed.2017.06.042.
13. Moscone F, Tosetti E, Vittadini G. The impact of precarious employment on mental health: The case of Italy. Social science & medicine. 2016;158:86-95. doi:10.1016/j.socscimed.2016.03.008.
14. Bender KA, Theodossiou I. The Unintended Consequences of Flexicurity: The Health Consequences of Flexible Employment. Review of Income and Wealth. 2018; 64: 777-799. doi:doi:10.1111/roiw.12316.
15. Clark A, Georgellis Y. Back to Baseline in Britain: Adaptation in the British Household Panel Survey. Economica. 2013;80(319):496-512. doi:10.1111/ecca.12007.
16. HM Government. Good work: a response to the Taylor Review of modern working practices. 2018. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/679767/180206_BEIS_Good_Work_Report__Accessible_A4_.pdf
17. Taylor M, Marsh G, Nicole D, Broadbent P. Good Work: The Taylor Review of Modern Working Practices 2017. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627671/good-work-taylor-review-modern-working-practices-rg.pdf

18. HM Government. Industrial Strategy: building a Britain fit for the future. 2017. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/730048/industrial-strategy-white-paper-web-ready-a4-version.pdf
19. Farmer P, Stevenson D. Thriving at Work: a review of mental health and employers. 2017. https://www.gov.uk/government/publications/thriving-at-work-a-review-of-mental-health-and-employers
20. University of Essex, ISER. British Household Panel Survey: Waves 1-18, 1991-2009. 8th Edition ed. SN 5151. UK Data Service. 2018. http://doi.org/10.5255/UKDA-SN-5151-2
21. Serrano-Aguilar P, Ramallo-Fariña Y, Trujillo-Martín MDM, Muñoz-Navarro SR, Perestelo-Perez L, Cuevas-Castresana CDL. The relationship among Mental Health Status (GHQ-12), Health Related Quality of Life (EQ-5D) and Health-State Utilities in a general population. Epidemiologia e Psichiatria Sociale. 2011;18(3):229-39. doi:10.1017/S1121189X00000518.
22. Office for National Statistics (ONS). UK labour market: January 2018. 2018. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/january2018.
23. The World Bank. The World Bank Databank. 2018. https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS
24. Goldberg DP, Gater R, Sartorius N, Ustun TB, Piccinelli M, Gureje O et al. The Validity of Two Versions of the GHQ in the WHO Study of Mental Illness in General Health Care. Psychological medicine. 1997;27(1):191-7.
25. Hankins M. The Factor Structure of the Twelve Item General Health Questionnaire (GHQ-12): the Result of Negative Phrasing? Clinical Practice and Epidemiology in Mental Health. 2008;4(10). doi:10.1186/1745-0179-4-10.
26. Bockerman P, Johansson E, Saarni SI. Do established health-related quality-of-life measures adequately capture the impact of chronic conditions on subjective well-being? Health Policy. 2011;100(1):91-5. doi:10.1016/j.healthpol.2010.10.008.
27. Bohnke JR, Croudace TJ. Calibrating well-being, quality of life and common mental disorder items: psychometric epidemiology in public mental health research. The British journal of psychiatry : the journal of mental science. 2016;209(2):162-8. doi:10.1192/bjp.bp.115.165530.
28. Lindkvist M, Feldman I. Assessing outcomes for cost-utility analysis in mental health interventions: mapping mental health specific outcome measure GHQ-12 onto EQ-5D-3L. Health and quality of life outcomes. 2016;14(1):134-. doi:10.1186/s12955-016-0535-2.
29. Keetharuth AD, Brazier J, Connell J, Bjorner JB, Carlton J, Taylor Buck E et al. Recovering Quality of Life (ReQoL): a new generic self-reported outcome measure for use with people experiencing mental health difficulties. The British Journal of Psychiatry. 2018;212(1):42-9. doi:10.1192/bjp.2017.10.
30. Clark AE. Unemployment as a Social Norm: Psychological Evidence from Panel Data. Journal of Labor Economics. 2003;21(2):323-51. doi:10.1086/345560.
31. HM Treasury. The Green Book: Central Government Guidance on Appraisal and Evaluation. 2018. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf
32. Bossert, W., & D'Ambrosio, C. (2013). Measuring Economic Insecurity. International Economic Review, 54(3), 1017-1030. doi:10.1111/iere.12026