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A list of Working Papers on the last
pages

No. 120, 1984

**Unemployment and Mental Health -
Some Evidence from Panel Data**

by

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Abstract

In this paper the effects of unemployment on mental health are analysed. A simple model where both the occurrence of and duration of unemployment are allowed to affect mental health is specified.

Panel data are used to control for "fixed effects," i.e., omitted variables that are constant over time. The main finding is that those who are unemployed seem to have worse mental health than others whereas no effects were found after having controlled for fixed effects.

Introduction

In most western countries there is a public concern about the individual welfare consequences of unemployment. A very common view, in particular during cyclical downturns, is that unemployment represents a suffering per se irrespective of the income losses that might be a consequence of a period of unemployment. Sometimes it is even argued that unemployment has severe impacts on mental health.

Still, there are very few studies that really can verify a causal mechanism from unemployment experiences to mental health.¹ Consequently the knowledge of the existence of, and in that case, the quantitative magnitude of such impacts is very weak. This in turn probably reflects the methodological problems that are connected with causal analysis.

The purpose of this study is to exploit the opportunities that longitudinal data (or panel data) provide in this respect.² The basic advantage with longitudinal data is that a common pitfall in all causal analysis can be avoided, namely the presence of unmeasured variables that influence both the dependent variables (in our case mental health) and the independent variable (in our case unemployment). This advantage has been exploited in several studies of the determinants of wages. The basic idea is to analyze changes in the dependent variable and thereby eliminate the potential bias from omitted variables that are constant over time. In this study a certain variant of this method, recently developed by Chamberlain (1980, 1982) will be used, since the dependent variables are qualitative instead of continuous.

The most important finding is that cross-section analyses indicate that those who are, or recently have been, unemployed have worse mental

health than other labor force members. However, when panel-data are used to control for omitted variables that are constant over time (fixed effects) we cannot reject the null hypothesis that unemployment has no effect on mental health.

The Data

The data analyzed are from the Swedish Level of Living survey that has been conducted three times, 1968, 1974, and 1981, by the Institute for Social Research (see Vuksanović (1979)). These data are based on a representative sample of the Swedish population between 15 and 75 years of age. The sample size is about 6500 individuals.

The basic advantage with this data base for our purposes is that questions about mental health were asked each time. Questions are asked about symptoms of mental illness and about the use of medicine for mental diseases. The questions about symptoms are: "Have you during the last twelve months... (1) had difficulties with sleep; (2) had nervous problems; (3) been deeply depressed." We define the variable "mental symptom" to equal one if the answer to any of these questions is yes, otherwise the variable is zero.

The questions about mental medicines are: Have you during the last 14 days used (1) tranquilizers (like meproban, valium and librium); (2) sleeping pills. We define the variable "mental medicine" to equal one if any of these medicines are used, otherwise the variable is zero.

Two types of unemployment information are available. First, the respondents are asked whether they are unemployed, according to a standard search criterion, at the time of the survey or not, and in that case

how many weeks they have been unemployed. The surveys were in general conducted in May. Second, retrospective questions are asked about unemployment experiences during the whole preceding year; information about the number of unemployment weeks during the year is available.

Model Specification

How can unemployment affect mental health? There is no straightforward theory to rely on in this respect, but some general hypothesis might be worthwhile testing. There is no reason to believe that the unemployed constitute a homogeneous group as far as the effects on mental health are concerned. Instead it is likely that certain groups of unemployed suffer more than others. Actually this heterogeneity is of interest in itself because if the groups that suffer most can be easily identified, they can be made targets for labor market policies of various types.

One important distinction is between "occurrence-" and "duration-effects" of unemployment.³ By occurrence-effect we mean, in this context, that simply becoming unemployed represents a shock for the unemployed. By duration-effect, on the other hand, we mean that mental health deteriorates during the period of unemployment.

There are also strong reasons to believe that the reason for having become unemployed is crucial in this respect. The importance of distinguishing between quits and permanent lay-offs is obvious. Unfortunately our data do not include information of this type. However, descriptive statistics indicate that very few of the unemployed in Sweden have quit their former jobs (see Björklund (1981)).

It also seems reasonable to hypothesize that the mental effects depend on age, sex, and perhaps marital status; it might be more humiliating for a married prime-aged man with several children to become unemployed than for a teenager. A related interesting hypothesis is whether it is the income loss or unemployment per se that is important. Again, the data are a restriction for more detailed analysis--in particular the sample size is too small.

Taking these considerations and the available data into account it seems reasonable to argue that our measures of mental health can be affected not only by the labor market status at the time of the interview but also by the unemployment experiences back in time. If simply becoming unemployed is a shock for the individual (occurrence-effect) the mental health of those who were unemployed at the time of the survey or any time during the preceding year would have deteriorated. If mental health deteriorates during a spell of unemployment (duration-effect) the total number of unemployment weeks during the preceding year plus the weeks during the year of the interview would be an additional determinant.

Using the variable "mental symptoms in 1981," MS81, as an example, we have:

$$MS81_i = f(PC_i, U8081_i, UW8081_i) \quad (1)$$

where PC_i denotes the personal characteristics of individual i , $U8081_i$ denotes unemployment experience at the time of the survey or during the preceding year, and $UW8081$ the total number of unemployment weeks. The variables are presented in greater detail in Table 1.

We only include age (and age squared) among the personal characteristics in order to allow mental health to change over the life cycle. However, we will also run separate equations for men.

Finally we have to define the population to be analyzed. Because we want to emphasize the effect of unemployment versus employment we restrict the analysis to labor force participants. In so doing we hope to capture the effect of not having a job.

Econometric Specification and Estimation

It is obvious that estimates of equation (1) can be plagued by omitted-variable bias even if we could control for several variables representing personal characteristics. Let us introduce the presence of time-invariant omitted variables, so called fixed effects. We denote these variables c_i . In addition we suppress the variables presented above to a matrix X_{81i} with coefficients β . Hence we can formulate the following model for our qualitative variable MS_{81i} :

$$\begin{aligned} MS_{81i}^* &= \beta' X_{81i} + c_i + \varepsilon_{81i} \\ MS_{81i} &= 1 \text{ if } MS_{81i}^* > 0 \\ MS_{81i} &= 0 \text{ if } MS_{81i}^* < 0 \end{aligned} \tag{2}$$

where ε_{81i} is a random term.

But we also have:⁴

$$\begin{aligned} MS_{74i} &= \beta' X_{74i} + c_i + \varepsilon_{74i} \\ MS_{74i} &= 1 \text{ if } MS_{74i}^* > 0 \\ MS_{74i} &= 0 \text{ if } MS_{74i}^* < 0 \end{aligned} \tag{3}$$

If the index of mental health, MS^* , were continuous and observable we could "get rid of" the omitted variable c_i by simply differencing (2) and (3). Then the bias, caused by correlation between X and c , is avoided. However, in our case the observed dependent variable is qualitative and another technique to avoid this potential bias, which is due to Chamberlain (1980, 1982), has to be used.

A logit model for our qualitative variable is assumed, i.e.:

$$\text{Prob}(MS_{81} = 1 \mid \beta, X_{81i}, C_i) = F(\beta' X_{81i} + c_i) = \frac{e^{\beta' X_{81i} + c_i}}{1 + e^{\beta' X_{81i} + c_i}} \quad (4)$$

where F denotes the cdf of the logistic equation.

The basic idea of Chamberlain's technique is to focus only on those who have changed mental status between two subsequent surveys, i.e., those who have values (0,1) and (1,0) on the dependent variables at two surveys. All other observations are deleted from the estimation.

Next, consider the equation for the following probability:

$$\text{Prob}[(0,1) \mid (0,1) \text{ or } (1,0)] = \frac{\text{Prob}(0,1)}{\text{Prob}(0,1) + \text{Prob}(1,0)} \quad (6)$$

Because in our case $\text{Prob}(0,1)$ and $\text{Prob}(1,0)$ are equal to

$$\left(\frac{1}{1 + e^{\beta' X_{74i} + c_i}} \right) \left(\frac{e^{\beta' X_{81i} + c_i}}{1 + e^{\beta' X_{81i} + c_i}} \right) \text{ and } \left(\frac{e^{\beta' X_{74i} + c_i}}{1 + e^{\beta' X_{74i} + c_i}} \right) \left(\frac{1}{1 + e^{\beta' X_{81i} + c_i}} \right)$$

respectively, it turns out that:

$$\text{Prob}[(0,1) \mid (0,1) \text{ or } (1,0)] = \frac{e^{\beta'(X_{81i} - X_{74i})}}{1 + e^{\beta'(X_{81i} - X_{74i})}} \quad (7)$$

Hence the problematic omitted variables c_i have disappeared and we have a straightforward logit model to estimate. Given that mental health has changed between the two surveys our model (6) explains the probability that mental health has worsened. In so doing, however, we obtain estimates of the parameters of interest, purged of omitted-variable-bias created by time-invariant omitted variables.

Results

The analysis has been done on two basic samples, namely on the one hand those who were labor force participants in both 1967-68 and 1973-74 and on the other hand those who were labor force participants in both 1973-74 and 1980-81.⁵ The samples and variables used are defined in Table 1.

Actually, Table 1a and 1b reveal some interesting patterns. In the upper parts of the tables it appears that a higher fraction of the unemployed report symptoms of mental illness and use mental medicines. This pattern can be found in both samples.

In the lower parts of the tables descriptive data about the subsamples with changes in mental health status are presented. First of all it is important to note that the sample sizes are reduced substantially, in particular only about 250 persons report changes in the use of mental medicine and only a fraction of them have been unemployed. Therefore we have to pay less attention to the latter variable.

Does it seem as though those whose mental health has improved have had better labor market development than those whose mental health has deteriorated? If we confine ourselves to "mental symptoms," it seems as though unemployment duration has decreased more for those whose mental health improved from 1968 to 1974 than for those whose mental health deteriorated (Table 1a). However, this pattern cannot be found in Table 1b. Here it rather seems as though the group with improved mental health has a favorable development of unemployment occurrence.

Next we turn to our logit estimates where we have controlled for age, age squared and fixed effects. We start by looking at the results from pure cross-section estimates where we only have controlled for age and age squared. As far as "mental symptoms" are concerned it appears that we have to reject the null hypothesis that, given age, the unemployed have the same mental health as the employed, at least at the ten percent level (Columns 1, 3, 5 and 7 in Table 2). This conclusion is drawn from the likelihood-ratio test that both unemployment variables are zero. However, the t-ratios for unemployment occurrence and unemployment duration respectively indicate that we cannot say whether it is only the long-term unemployed who have symptoms of mental illness or all unemployed.

Do these conclusions hold also after having controlled for fixed effects, i.e., in the "change equations" (columns 2, 4, 6 and 8 in Table 2) and columns 2 and 4 in Table 3. The answer is obviously no. In no case can we reject the null hypothesis that (change in) unemployment experience has an effect on (change in) mental health status. These results definitely illustrate the importance of fixed effects in problems like the one addressed in this paper.

Conclusions

The most important finding in this paper has been that fixed effects, i.e. omitted variables that are constant over time, are important in the analysis of effects of unemployment on mental health status. Whereas it seems as though unemployment tends to hit persons who have symptoms of mental illness, we have had to reject the hypothesis that unemployment experience has a deleterious effect on mental health.

However, I would not be surprised if more detailed analysis of the issue would give other results. The analysis done here can be improved in several ways. First, the samples of individuals with changes in mental health are rather small and only between 50 and 100 persons of them have been unemployed. If the severe mental effects are concentrated to certain subgroups of the unemployed, like the permanently laid off in certain regions, the power of the tests are probably rather low. It might also be that a more extended measure of unemployment--including e.g. discouraged workers--would be more appropriate.

Another problem has to do with the direction of causality. Does unemployment affect mental health and/or does mental illness create unemployment? Because unemployment experience was not significant in our "change equations" we did not have to bother about this problem. However, more detailed analysis of the issue would require information about the timing of changes in mental health and unemployment experience.

Taking the extremely high unemployment figures in the western countries into consideration, there seems to be an urgent need for more detailed analysis of the individual welfare consequences of unemployment.

Footnotes

¹A constructive discussion of the British evidence on the issue can be found in Stern (1981) and Gravelle et al. (1981).

²This is actually the approach recommended by Stern (1981).

³This distinction has also been made in other studies of the effect of unemployment (see, e.g., Björklund, 1981, chapter 5; and Borjas and Heckman, 1980).

⁴To save parameters we assume that the β coefficients are constant over time even though it is not necessary for the technique used.

⁵It would be possible to use a generalization of the technique presented in the preceding section and pool the observations from all three surveys. However, a disadvantage would be that attrition increases if we only can use observations who are labor force participants at all three time periods.

Table 1
Sample Characteristics

1a. Sample A. Labor force participants in 1967-68 and 1973-74				
	With unemployment experience 1973-74		No unemployment experience 1973-74	
Sample size	145		2268	
Mental symptoms 1973-74 (MS74)	44 (0.303)		540 (0.238)	
Mental medicine 1973-74 (MM74)	15 (0.103)		186 (0.082)	
<u>Subsamples with changes in mental health status</u>				
	<u>Mental Symptoms</u>		<u>Mental Medicine</u>	
	Deterioration	Improvement	Deterioration	Improvement
Sample size	312	291	127	119
Unemployment experience ^a 1967-68 (U6768)	23 (0.074)	15 (0.054)	12 (.094)	10 (0.084)
Unemployment weeks 1967-68 (UW6768)	16.4	13.0	15.2	19.3
Unemployment experience ^a 1973-74 (U7374)	23	15	11	11
Unemployment weeks 1973-74 (UW7374)	14.8	6.3	21.7	17.6
1b. Sample B. Labor force participants 1973-74 and 1980-81				
	With unemployment experience 1973-74		No unemployment experience 1973-74	
Sample size	156		3105	
Mental symptoms 1973-74 (MS74)	46 (0.301)		680 (0.219)	
Mental medicine 1973-74 (MM74)	12 (0.071)		177 (0.057)	

-table continues-

Table 1, continued

<u>Subsamples with changes in mental health status</u>				
	<u>Mental Symptoms</u>		<u>Mental Medicine</u>	
	Deterioration	Improvement	Deterioration	Improvement
Sample size	372	459	122	120
Unemployment experience ^a 1973-74 (U7374)	20 (0.054)	36 (0.078)	8 (.066)	9 (0.075)
Unemployment weeks 1973-74 (UW7374)	17.4	13.5	22.0	25.0
Unemployment experience ^a 1980-81 (U8081)	24	31	6	9
Unemployment weeks 1980-81 (UW8081)	15.9	16.8	24.1	18.1

^aTotally 49 persons of those with change in mental symptoms experienced changes in unemployment experience from 1967-68 to 1973-74.

^bTotally 95 persons of those with change in mental symptoms experienced changes in unemployment experience from 1973-74 to 1980-81.

Definition of Variables

Labor force participant, 1967-68: A person who was employed or unemployed at the time of the survey (May 1968), or employed or unemployed any time during the preceding calendar year. The variables for 1973-74 and 1980-81 are defined analogously.

Unemployment experience 1967-68 (U6768): Equals one for those who were unemployed at the time of the survey or during the preceding year, zero otherwise. U7374 and U8081 defined analogously.

Unemployment weeks 1967-68 (UW6768): The total number of unemployment weeks until the time of the survey and the preceding year.

Mental symptoms (MS74): See text.

Mental medicine (MM74): See text.

Table 2, continued

Chi square for likelihood-ratio test that both unemployment coefficients are zero	5.02	0.94	4.38	0.06	6.12	1.73	7.12	2.20
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Asymptotic t-ratios in parentheses.

Critical chi-square values with two degrees of freedom: 4.61 (10%), 5.99 (5%), 9.21 (1%).

^aThe variable MS74W (and MS81W) equals one if mental health (according to mental symptoms) has deteriorated and zero if it has improved.

Table 2
Results on the Determinants of Mental Symptoms

Sample:	A. Labor Force Members 1967-68 and 1973-74				B. Labor Force Members 1973-74 and 1980-81			
	(1) MS74	(2) MS74W	(3) MS74	(4) MS74W ^a	(5) MS81	(6) MS1W ^a	(7) MS81	(8) MS81W ^a
Dep. var.								
Sample size:	2413	603	1503 (men only)	329 (men only)	3261	831	1830 (men only)	376 (men only)
<u>Indep. var.:</u>								
Constant	-0.532 (-0.89)	-0.211 (-0.73)	-2.08 (-2.46)	-0.094 (-0.23)	-1.592 (-2.89)	-0.867 (-3.52)	-2.05 (-2.48)	-0.456 (-1.26)
Age	-0.039 (-1.39)	0.006 (1.005)	0.009 (0.24)	0.006 (0.73)	0.010 (0.39)	0.016 (2.78)	0.014 (0.36)	0.008 (1.04)
Age squared	0.0005 (1.65)	--	0.0001 (0.18)	--	0.0001 (-0.20)	--	-0.0001 (-0.19)	--
U7374	0.056 (0.20)	--	0.478 (1.29)	--	--	--		
UW7374	0.017 (1.40)	--	0.004 (0.23)	--	--	--		
DU7374	--	-0.191 (-0.50)	--	0.016 (0.035)				
DUW7374	--	0.018 (0.94)	--	0.004 (0.18)				
U8081	--	--	--	--	0.462 (1.86)	--	0.664 (1.96)	
UW8081	--	--	--	--	0.0002 (0.002)	--	0.0005 (0.036)	
DU8081	--	--	--	--	--	(0.378) (1.37)	--	0.612 (1.44)
DUW8081	--	--	--	--	--	-0.011 (-0.92)	--	-0.024 (-1.11)

-table continues-

Table 3

Results on the Determinants of Mental Medicine

Sample	A. Labor force participants 1967-68 and 1973-74		B. Labor force participants 1973-74 and 1980-81	
	(1)	(2)	(3)	(4)
Dep. var.:	<u>MM74</u>	<u>MM74W^a</u>	<u>MM81</u>	<u>MM81W</u>
Sample size:	2413	246	3261	242
<u>Indep. var.:</u>				
Constant	-6.14 (-5.45)	-1.00 (-1.97)	-6.67 (-5.79)	-0.061 (-0.12)
Age	0.120 (2.42)	0.023 (2.18)	0.123 (2.47)	0.002 (0.16)
Age squared	-0.0008 (-1.53)	---	-0.0008 (-1.57)	---
U7374	-0.159 (-0.32)	---	---	---
UW7374	0.027 (1.63)	---	---	---
DU7374	---	-0.501 (-0.78)	---	---
DUW7374	---	0.045 (1.54)	---	---
U8081	---	---	0.498 (1.05)	---
UW8081	---	---	0.0006 (0.04)	---
DU8081	---	---	---	-0.430 (-0.74)
DUW8081	---	---	---	.011 (0.65)

-table continues-

Table 3, continued

Chi-square for
likelihood
ratio test
that both
unemployment
coefficients
are zero

4.44

3.86

2.14

0.60

Asymptotic t-ratios in parentheses

Critical chi-square values with two degrees of freedom: 4.61 (10%), 5.99 (5%), 9.21 (1%).

^aThe variable MM74W (and MM81W) equals one if mental health (according to the use of mental medicine) has deteriorated and zero if it has improved.

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