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The short-run effects of unexpected job loss on health[1]

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Abstract

This paper provides new evidence on the effect of job loss on health. Using a unique combination of detailed micro level panel data from the Netherlands with detailed information on health measures, employment, and job loss expectations, we estimate the immediate effect of unexpected job loss on health. We find no evidence for decreases in health, either physical or mental, upon job loss, but clear evidence for immediate reductions in headaches and fatigue. Our results suggest that the immediate effect of reduced work stress are bigger than the immediate increase in financial stress from job loss.

JEL-codes: D84, I10, J22, J60

Keywords: Health, Job loss, Expectations

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1 Introduction

It has been well-documented that job loss often has a detrimental effect on income (e.g. Stevens, 1997). Individuals usually suffer an immediate income drop upon job loss which, depending on the persistence of the job loss and the scarring effect, may also lead to permanent effects by a decline in future income (e.g. Arulampalam, 2001). A vast amount of literature has studied the effect of job loss on consumption and generally finds substantial drops in consumption upon job loss.[5] Parallel to analyzing the consequences of job loss on income and consumption, studies have started analyzing the consequences of job loss on health. This is important as potential detrimental effects of job loss on health may further exacerbate the problems of employability of the unemployed and their general well-being. Furthermore, this may have severe consequences for the public finances as deteriorating health if job loss increases the costs of job loss beyond measures of increased unemployment insurance benefits and decreased taxes and benefits contributions (Kuhn et al., 2009). This has become all the more important since the 2020 COVID-19 pandemic, which has a big joint impact on unemployment, public costs of healthcare, and social insurances.

Many early studies show that the unemployed have worse health compared to those who are employed.[6] However, it is hard to interpret these results causally due to potential issues regarding reverse causality and omitted variables. More recent studies have tried to estimate the causal effect of unemployment on health. This literature generally exploits exogenous variation in unemployment from exogenous events such as firm closures and mass lay-offs.[7] A drawback from this approach is that conclusions mat not be generalizable to the population as firms may have very specific characteristics and types of workers. Other papers infer causal estimates from matching (e.g. Browning et al., 2006; Marcus, 2014), instrumental variables (IV) (e.g. Gathergood, 2013), or exploit the longitudinal nature of the data (e.g. Björklund, 1985; Böckerman & Ilmakunnas, 2008; Romeu Gordo, 2009; Popovici & French, 2013). The matching studies assume that individuals are similar based on observed characteristics. The IV study exploits panel data to use lags of unemployment as an instrumental variable. Causal inference from using panel data and

[5] Dynarski & Sheffrin (1987), Gruber (1997), Browning & Crossley (2001, 2008, 2009), Stephens (2004), Aguiar & Hurst (2005), Krueger & Mueller (2012), Aguiar et al. (2013), Michelacci & Ruffo (2015), Kroft & Notowidigdo (2016), and Hendren (2017).
[6] Clark and Oswald, 1994; Blanchflower, 1996; Korpi, 1997; Winkelmann and Winkelmann, 1998; Laporte, 2004; Hamilton, Merrigan & Dufresne, 1997.
[7] Eliason & Storrie, 2009; Kuhn et al., 2009; Böckerman & Ilkmakunnas, 2009; Kassenboehmer & Haisken-DeNaw, 2009; Deb et al., 2009; Salm, 2009; Schmitz, 2011; Browning & Heinesen, 2012; Classen & Dunn, 2012; Bratsberg et al., 2013; Riumallo-Herl et al., 2014; Schiele & Schmietz, 2016.

fixed effects assume that it is sufficient to condition on unobserved heterogeneity to infer causal effects. A different strand in the literature does not focus on actual job loss but on job insecurity and show that possible job loss already induces negative effects on health (Green, 2011; Caroli & Godard, 2016; Van Lent et al., 2021). Both Caroli & Godard (2016) and Van Lent et al. (2021) use an IV-strategy and assume that cross-country heterogeneity in employment protection legislation and the extent to which this heterogeneity explains cross-country differences in job insecurity can be used to estimate causal effects of job loss on health. However, Van Lent et al. (2021) show that this assumption does not hold empirically.

The current paper exploits unique micro panel data and people's subjective expectations to estimate the causal effects of job loss on health. Compared to the existing literature, we make three substantive contributions. Firstly, we differentiate between expected and unexpected job loss building forth on the method of Stephens (2004). By looking at unexpected job loss we exploit exogenous variation and thus overcome issues related with omitted variables and reverse causality. To our knowledge, the only existing paper that raises the issue of the importance of differences in the expectancy of job loss and condition on job loss expectations is Michaud et al. (2016). Compared to Michaud et al. (2016), we follow the approach of Stephens (2004) and calculate job loss shocks using both job loss expectations and the actual job loss outcome. Using this approach allows us to analyze the immediate short-run health effects upon job loss. Prior work of the effects of job loss on health mostly focuses on medium- and long-run effects.

Secondly, although a wide variety of health measures is analyzed in the literature, including both subjective and objective health measures as well as physical and mental health measures, many studies focus only on one or few particular health outcomes.[8] This may be an important determinant of the lack of consensus in the literature on the effects of unemployment. A recent meta-study on

[8] Studies using a general health measure that includes both physical and mental health (i.e. Romeu Gordo, 2006; Salm, 2009; Böckerman & Ilmakunnas, 2009; Schmitz, 2011; Schaller & Stevens, 2015; Schiele & Schmitz, 2016).
Studies focusing on physical health exploit the availability of objective measures and analyze the consequences of unemployment for BMI (Ruhm, 2000; Böckerman et al., 2007; Charles & DeCicca, 2008; Jónsdóttir & Ásgeirsdóttir, 2014), BMI in combination with smoking behavior (Ruhm 2005; DeCicca & McLeod 2008; Marcus, 2014; Falba et al., 2005; Deb et al., 2011), cholesterol and blood pressure (Black et al., 2015), illegal drug use (Platt, 1995; French, 2001; DeSimone, 2002; Compton et al., 2014), hospitalization or visiting a GP/specialist (Browning et al., 2006), or, more recently, biomarkers (Michaud et al., 2016). Additionally, studies consider mortality as an objective physical health outcome (Sullivan & von Wachter, 2009; Eliason & Storrie 2009; Browning & Heinesen 2012).
Studies focusing on mental health usually depend on more subjective measures such as stress (Fenwick and Tausig, 1994), social identity (Kasl & Jones, 2000), feelings of shame and guilt (Björklund et al., 2015), or anxiety and depression scales (Frese & Mohr, 1987; Stankunas et al., 2006; Gathergood, 2013; Álvaro et al., 2019). However, some studies have attempted to analyze the effect of unemployment on more objective measures of mental health using sleeping behavior (Van Cauter & Spiegel, 1999; Ferrie et al., 2007; Gangwisch et al., 2007; Patel & Hu, 2008; King et al., 2008; Antillón et al., 2014), hospitalization for stress-related diseases (Browning et al., 2006), or internet search behavior (Tefft, 2011).

the causal effect of retirement on health indicates that much of the different conclusions drawn in the literature can be explained by the use of different types of health indicators (Knoef et al., 2020). Therefore, it is important to analyze effects for a wide variety of health measures. We study a wide array of health measures available in our data in order to analyze the differential effects of job loss on health measures. We use a combination of health measures including physical, mental, doctor diagnoses, medication, doctor visits, and health behavior. Since we are interested in immediate effects of job loss on health, we focus on non-chronic diseases. This should give us an idea of how job loss affects short-run health and the extent to which potential health deterioration from job loss is primarily a consequence of mental health issues such as stress.

A final contribution of our paper is that the effect of job loss on health has not been studied for the Netherlands before. Contrasting Michaud et al. (2016) who analyze US households over 50 years old, we analyze the consequences of unexpected job loss for those under and above the age of 50 in a framework of relatively high unemployment benefits and high health insurance coverage. It is interesting to analyze the effects of job loss on health in such an institutional framework as the financial accessibility to health care is unlikely to explain a potential effect and financial stress from job loss are likely to be mild.

Our estimations results suggest that we find no significant immediate drops in health following an unexpected job loss. However, we find an immediate decrease in headaches and fatigue upon job loss. These results suggest that the stress from work may be considered bigger than financial stress upon job loss. This effect, however, may be different if mid- and long-run consequences are taken into account. Also, this result is likely to be driven by the relatively generous social insurance programs in the Netherlands. This is in line with prior literature suggesting that the consequences of job loss on health are more severe in the US than in European countries with more generous social insurance programs (i.e. Jäntti et al., 2000; Rodriguez, 2001; Bambra & Eikemo, 2009; McLeod et al., 2012; Riumallo-Herl et al., 2014). These cross-country differences suggest that welfare state institutions, in particular generous unemployment insurance and universal health care access, can mitigate the effect of job loss on health.

The remainder of the paper is structured as follows. We outline the institutional framework regarding unemployment- and health insurances in the Netherlands in Section 2. We present the data in Section 3. In Section 4, we describe our econometric model. The estimation results are

presented in Section 5. Finally, we conclude our paper in Section 6 and explain why our results are of interest for future socioeconomic policy.

2 Institutional framework

2.1 Unemployment benefits

People who become unemployed usually have the right to claim unemployment insurance (UI) benefits in the Netherlands. There is a right to claim UI benefits if a person worked at least 26 of the last 36 weeks and if the job loss is not culpable to the employee. Culpable reasons to become unemployed are mostly instant dismissals by the employer and voluntary quits. Every paid employee is automatically covered by UI benefits.

The duration of UI benefits depends on work history. The minimum duration is three months. This is extended by one month for every year worked up to a maximum of 38 months for those who worked at least 4 out of the last 5 years. As from 2016, the maximum of 38 months has been reduced to 24 months. The accumulation of months has also been made less generous: one month for every of the first 10 years of work and half a month for every year of work beyond 10 years.

The first two months, the UI benefits replace 75% of the last earnings with an absolute maximum of about 3,100 euros. From the third month on, the replacement rate is reduced to 70% of the last earnings with an absolute maximum of about 2,900 euros. Prior to 2016, replacement rates were 70% for the total duration of UI benefits. In some specific sectors (e.g. agriculture, industry, construction), collective agreements require employers to complement UI benefits to a 100% replacement rate. The duration of the employer's supplement depends on the collective agreement in the sector. Upon job loss, contributions to occupational pensions are automatically stopped or reduced, depending on the sector's collective agreement.

When UI benefits are exhausted, people can claim asset- and income-based means-tested welfare benefits that guarantee a minimum standard of living (about 1,100 euros per month). In addition, older unemployed have two extra options to receive extended benefits during unemployment. 1) Those born before January 1st 1965, who become unemployed after the age of 50 may be eligible for IOAW benefits after the exhaustion of regular UI benefits. These benefits complement household income up to the subsistence level for those households that fall below this level. Hence, eligibility is means-tested based on household income, but assets are not taken into account (that

is the main difference compared to welfare benefits). 2) Persons who become unemployed after the age of 60, and received UI benefits for a minimum of 3 months, can receive IOW-benefits after the exhaustion of regular UI benefits. These benefits are at most 70% of the minimum wage, depending on the level of income before unemployment. Compared to IOAW benefits, IOW benefits do not take into account household income, but only personal income. IOW was initially introduced in 2009 as a temporary arrangement to alleviate job finding difficulties among older unemployed during the Great Recession. However, in 2014 and 2019 the arrangement has been extended for four years.

The right to claim benefits comes with the obligation to apply for jobs. Mandatory job-search requirements apply to claimants regardless of age in order to increase the probability of finding a job. Exemptions are made for those who are within one year of their statutory retirement age, informal caretakers, voluntary workers (under some conditions), and starting entrepreneurs. Exceptions are made because they may increase the probability to find a job. Not abiding by the mandatory job-search requirements can have severe consequences that can range from financial sanctions to losing the right to claim UI benefits. After some time, people even have to accept all job offers irrespective of their educational level.

From an international perspective, Dutch UI benefit may seem relatively generous. OECD (2019a) shows that the net replacement rate for the first 2 months of job loss is one of the highest in the OECD and is about 30, 40, and 15 percentage points higher than in the U.S., U.K., and Germany, respectively. Despite the relative generosity of UI benefits, Been et al. (2021) show that total non-durable consumption drops significantly following a job loss in the Netherlands although the effect is small (about 5%). This result suggests that job loss induces a limited income shock that may or may not be sufficient to induce financial stress upon job losers in the Netherlands.

2.2 Health insurance

The Netherlands has a relatively high per capita spending on health from an international perspective. In Europe, only Norway, Germany, Austria, and Sweden spend more on health per capita than the Netherlands, according to the OECD (2019b). In 2017, 10.1% of the GDP was spend on health, which is slightly above the EU average of 9.8%. The absolute spending is € 3,791 per person, which is, again, above the EU average of €2,884.

All Dutch citizens are required to at least purchase a basic package of statutory health insurance from a private insurer. The insurers are required to accept all applicants. The health insurance standardly include physician, home nursing, hospital and mental health care, as well as prescription drugs. The insured pay premiums, annual deductibles (max. 385 euros per year), and coinsurance or copayments on selected services and drugs. The government finances the coverage for children up to age of eighteen. The financing of the health care system is primarily public, through premiums, tax revenues, and government grants. Hence, the accessibility of health care is relatively high in this system and out-of-pocket health spending is internationally relatively small. Therefore, job loss should have little to no effect on the access to health care in the Netherlands and accessibility of health care is unlikely to be an explanation of potentially negative effects of job loss, and income loss more generally, on health.

3 Econometric model

We largely follow the empirical framework of Stephens (2004) and estimate the following regression equations for individual *i* at time *t*. The first equation we estimate includes a job loss dummy that equals 1 of the person lost his/her job and zero if the person remained in his/her job

$$\Delta y_{it} = \beta_0 + \beta_1 jobloss_{it} + \Delta \boldsymbol{X}'_{it}\beta_2 + \boldsymbol{t}'_t\beta_3 + \varepsilon_{it} \quad (1)$$

Equation 1 does not differentiate between expected and unexpected job loss. Since expected job loss is anticipated it cannot be considered a shock since individuals can already adjust to the expected job loss. By allowing for unexpected job loss, like in Equation 2, we make sure to analyze the shock of job loss.

$$\Delta y_{it} = \gamma_0 + \gamma_1 shock_{it} + \Delta \boldsymbol{X}'_{it}\gamma_2 + \boldsymbol{t}'_t\gamma_3 + \epsilon_{it} \quad (2)$$

with

$$shock_{it} = [jobloss_{it} - E_{it-1} jobloss_{it}] \quad (3)$$

with y_{it} being different health measures such that β_1 measures the marginal effect of job loss on health. $jobloss_{it}$ is a dummy variable that takes value one if an individual suffers an involuntary job loss between periods $t-1$ and t.[9]

$shock_{it}$ measures the extent to which expectations of job loss differ from the actual outcomes. E_t is an operator denoting the expectations an individual forms conditional on the information available at t. $[jobloss_{it} - E_{it-1}jobloss_{it}]$ is the unemployment shock at time t, which takes the values in the interval [0, 1] if $jobloss_{it} = 1$, and takes values in the interval [-1, 0] if $jobloss_{it} = 0$. γ_1 measures the marginal effect of unexpectedly losing or keeping ones job on health. Since we are particularly interested in the effects of job loss, we also estimate Equation 2 considering job losers only, i.e. only considering the interval [0,1]. Then, γ_1 measures the marginal effect of unexpected job loss on health.

X_{it} is a vector of control variables including age dummies, marital status, number of children in the household, educational level, tenure, sector, and occupation; t_t is a vector of year dummies. Following Stephens (2004), Equations 1 and 2 are estimated in first-differences (FD) in order to captures all unobserved time-invariant within-person heterogeneity. This is specifically important in our case, as both the dependent variables (i.e. health) as well as the job loss expectations might be subject to optimism or pessimism. Using within-person estimation we control for such optimism or pessimism of persons. ε_{it} and ϵ_{it} are the respective error terms that are assumed to be IID and normally distributed. To capture the causal effect of job loss on health, we assume that job loss is only correlated with the time-invariant component of the error-term. Standard errors are clustered at the individual level. Equation 1 and 2 are estimated using linear estimators, but we use non-linear estimators to check the sensitivity of the results.

4 Data

4.1 Sample

We use data from the LISS panel (Longitudinal Internet Studies for the Social sciences) of CentERdata. The LISS Core Study consists of about 4,500 households representative of the Dutch population and it is run every year since 2007. We supplement the LISS core data with an additional

[9] Job loss is defined as having paid employment at time t-1 and being unemployed at time t. So, job loss does not include persons who stopped working because of health issues as these persons report to be sick or disabled. This makes sure that we do not capture reverse effects of health shocks on job loss shocks.

module. The Health module contains detailed information on numerous measures of health, including both subjective measure and more objective measures of health. This module is available for the years 2008-2020. We select only those health measures that are likely to be immediately affected by job loss. This means that we do not report health measures related to chronic diseases.

To implement our empirical strategy, we make the following selection: we keep persons who are aged 25 to 64, who are observed for at least two periods, who are employed or became unemployed since the previous wave, and who have no missing data on health. This selection is necessary to be able to apply the approach of Stephens (2004) to our health data. Also, we leave out persons who report receiving disability benefits to rule out any reverse causality running from health to job loss. This leaves us with about 28,000 observations and about 17,000 wave-to-wave observations after taking first differences, which we use to calculate changes in employment status. For a detailed overview of summary statistics for the variables used in the paper, we refer to Table 1.

Table 1. Summary statistics.

Variables	Obs.	Mean	S.D.	Min.	Max.
Health measures					
Subjective health	28,153	3.21	0.72	1	5
Headache	27,852	0.17	0.38	0	1
Fatigue	27,852	0.28	0.45	0	1
Insomnia	27,852	0.17	0.38	0	1
Anxiety	28,115	2.08	0.98	1	6
Depression	28,115	1.99	0.99	1	6
Hypertension	27,064	0.10	0.30	0	1
High cholesterol	27,064	0.05	0.22	0	1
Hypertension meds.	28,034	0.11	0.31	0	1
High cholesterol meds.	28,034	0.06	0.24	0	1
Pain meds.	28,034	0.08	0.27	0	1
Sleep meds.	28,034	0.03	0.16	0	1
Anxiety/depression meds.	28,034	0.03	0.18	0	1
Physician	28,030	1.59	2.35	0	61
Psychiater	28,030	0.54	2.93	0	100
Smoking	28,092	0.19	0.39	0	1
Alcohol	28,088	4.47	2.07	1	8

Background variables					
Age	28155	45.38	10.65	25	64
Female	28155	0.50	0.50	0	1
Partner	28155	0.74	0.44	0	1
Number of children	28155	0.96	1.11	0	6
Education	28155	2.92	0.78	1	6
Year	28155	2013.76	3.92	2008	2020
Job loss and expectations					
Unemployed	28,155	0.05	0.22	0	1
Job loss	16,959	0.02	0.14	0	1
Job loss expectation	22,638	0.17	0.25	0	1
Shock	14,220	-0.14	0.25	-1	1
Job loss shock	14,220	0.01	0.09	0	1

Table 2. Differences in health between employed and unemployed.

	Independent variables	
Dependent variables	No controls	Controls
	(1)	(2)
Overall		
Subjective health[1]	-0.224***	-0.173***
	(0.031)	(0.031)
Physical		
Headaches[2]	0.007	0.010
	(0.017)	(0.017)
Fatigue[2]	0.017	0.012
	(0.020)	(0.020)
Insomnia[2]	0.111***	0.087***
	(0.020)	(0.019)
Mental		
Anxiety[3]	0.175***	0.208***
	(0.043)	(0.042)
Depression[3]	0.291***	0.304***
	(0.046)	(0.045)

Diagnoses		
Hypertension[2]	0.055***	0.029*
	(0.017)	(0.016)
High cholesterol[2]	0.045***	0.031**
	(0.013)	(0.012)
Medication		
Hypertension[2]	0.053***	0.019
	(0.017)	(0.016)
High cholesterol[2]	0.048***	0.028**
	(0.013)	(0.013)
Pain[2]	0.045***	0.039***
	(0.015)	(0.015)
Sleep[2]	0.033***	0.028***
	(0.010)	(0.010)
Anxiety/depression[2]	0.037***	0.033***
	(0.011)	(0.011)
Medical visits		
Physician[4]	0.654***	0.491***
	(0.120)	(0.135)
Psychiater[4]	0.469***	0.459***
	(0.146)	(0.148)
Behavior		
Smoking[2]	0.105***	0.092***
	(0.021)	(0.021)
Alcohol[5]	0.273**	0.104
	(0.119)	(0.114)

Notes: *** significant at 1%-level, ** significant at 5%-level, * significant at 10%-level. Standard errors are presented within parentheses.

[1] An indicator ranging from 1 (very bad health) to 5 (very good health).

[2] A binary variable that is 1 for YES, and 0 for NO.

[3] An indicator ranging from 1 (not at all) to 6 (extremely).

[4] A continuous variable indicating the number of times.

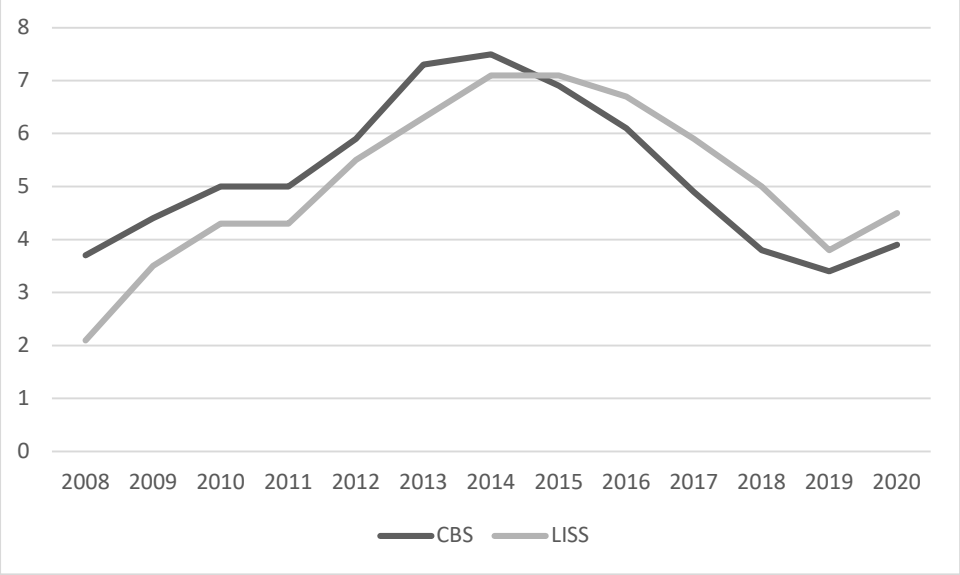
[5] Alcohol is an indicator measuring the alcohol use in the past week. The indicator has the following categories: 1 (almost every day), 2 (five or six days per week), 3 (three or four days per week), 4 (once or twice a week), 5 (once or twice a month), 6 (once every two months), 7 (once or twice a year), 8 (not at all over the last 12 months).

In Table 2 we show OLS estimates of unemployment on the different health measures. Column 1 does not include control variables. Column 2 includes the control variables gender, age, having a

partner, number of children, educational level, and year. We only consider health measures that can be directly affected by unemployment in the short-tun. The results suggest that health is significantly worse for those unemployed compared to those in employment. This applies to all health measures considered except headaches and fatigue. The results do not imply that unemployment induces health effects but the coefficients are mere correlations that should not be interpreted causally. Our further analysis shows how job loss changes these health indicators.

We consider thus that an individual transits to unemployment if at period *t-1* he/she reports to be employed, while at period t he/she reports to have lost his/her job due to layoff, plant closure, or contract ending,[10] and he/she reports to be looking for a new job. The data show that, for all years, out of all individuals employed at *t-1*, about 2% have lost their job at *t*. This percentage is larger for the years after the financial crisis, reaching a maximum of 2.8% in 2014, and smaller during upturns with a minimum of 0.9% in 2019. Those unemployed, regardless when they lost their job, make up about 4.9% of the data. This percentage is highest in 2015 (7.1%) and lowest in 2008 (2.1%). In Figure 1 we show that the deviation of this percentage of unemployed is relatively small compared to official unemployment statistics from Statistics Netherlands (CBS). Most importantly, the figure shows that trends in unemployment are similar in the CBS and LISS data.

Figure 1. % of unemployed in CBS data and LISS sample.



[10] Unfortunately, we do not observe the actual cause of job loss. However, we know that job loss is not due to health reasons as those leaving their job for health reasons report to be in sickness benefits or disability insurance and not to be in unemployment and looking for a job.

4.2 Job loss expectations

Trough the Work and Schooling module, the LISS provides information about subjective job loss expectations. We rely on the following question to assess to what extent transitions into unemployment are unexpected:

What is the probability of losing your job in the next 12 months on scale from 0 to 100? 100 is absolutely certain that you lose your job.

In Figures 2 and 3 we show how the job loss expectations are distributed. Figure 1 suggests that most people do not expect to lose their job. Those who do most often report small probabilities close to 0.1 ad 0.2. We observe some bunching of reported job loss probabilities at 0.5 meaning that those people either do not know and therefore choose 0.5 or that they actually think they have a 0.5 probability of losing their job. The distribution in Figure 2 suggests that the expectations have predictive power for actual job loss as those losing their job report higher probabilities of job loss much more frequently.

Figure 2. The distribution of job loss expectations in %.

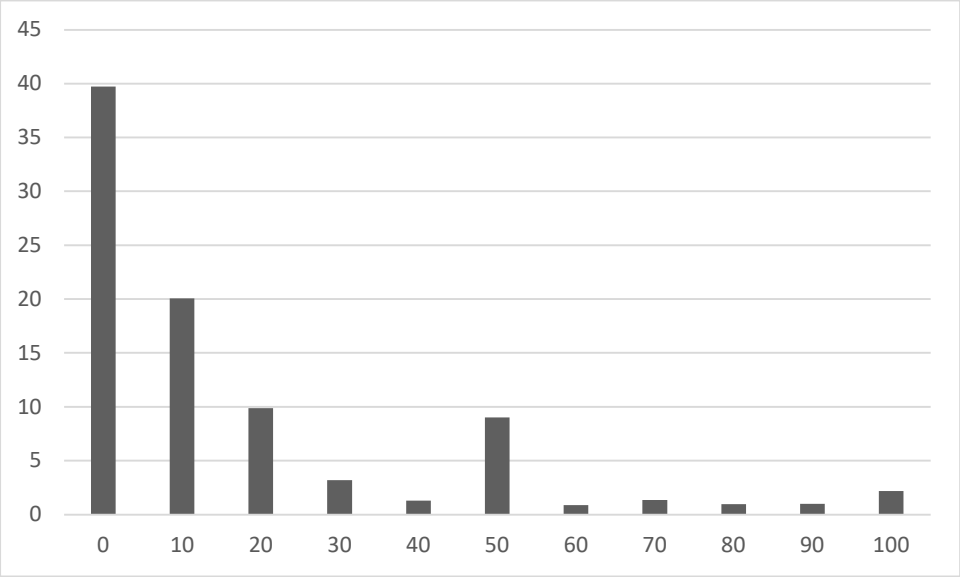
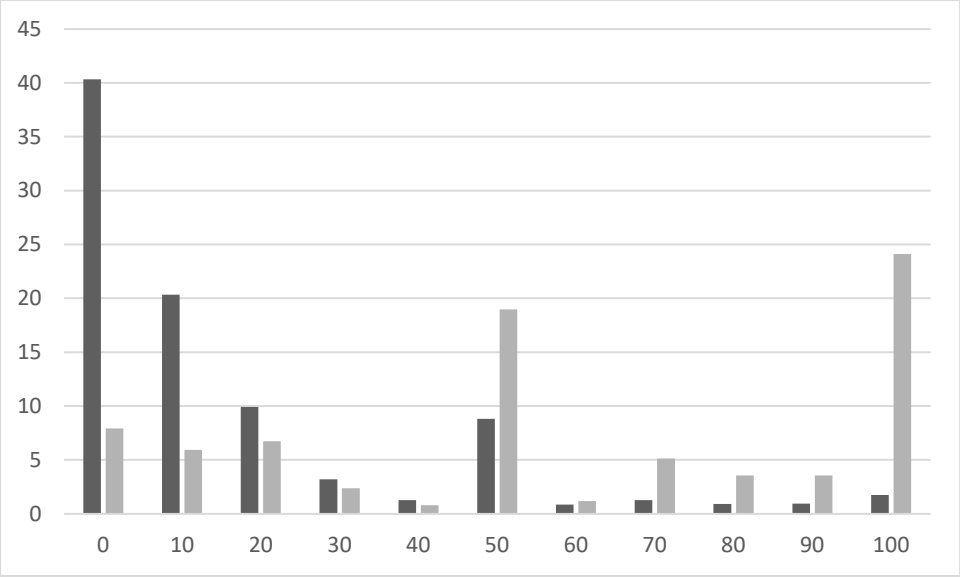


Figure 3. The distribution of job loss expectations at t-1 in % by actual job loss outcome at t (no job loss – dark grey, job loss – light grey).



In Table 3 we further investigate the relation between job loss and subjective job loss probabilities and the extent to which job loss expectations have predictive power for actual job loss. In the first column we show that an additional decimal point in the subjective probability of job loss increases the chance of actual job loss by 0.9%. Therefore, individuals who report a 100% chance of losing their job are 9% more likely to actually lose it compared to those who report a zero chance. For comparison, Stephens (2004) reports estimates in the range of 15%. This effect is similar when we include control variables related to gender, age, having a partner, number of kids, educational level, and year. We observe that primarily older people are more likely to lose their job. Given these estimates, we conclude that subjective job loss probabilities have substantial predictive power to explain actual job loss. Hence, we argue that a discrepancy between the actual outcomes and the expectation can be interpreted as an unforeseen unemployment shock.

Table 3. Predictive power of job loss expectations.

	Job-loss between years	
	(1)	(2)
Job loss expectation t-1	0.09***	0.09***
	(0.01)	(0.01)

Controls	No	Yes
Obs.	14,220	14,220

Notes: *** significant at 1%-level, ** significant at 5%-level, * significant at 10%-level. Standard errors are presented within parentheses.

As Stephens (2004) argues, the job loss expectations should be indictive for income expectations. In Table 3 we show that job loss expectations also affect income expectations. Here, we measure expected income by a subjective 5-point scale indicating the extent to which people expect their finances to improve or worsen. Regardless of taking into account background characteristics, we find that individuals who report a 100% chance of losing their job also report their expected income to worsen by about 0.50-0.60 on a 5-point scale.

Table 4. Job loss and income expectations.

	Expected income	
	(1)	(2)
Job loss expectation	-0.56***	-0.52***
	(0.04)	(0.04)
Controls	No	Yes
Obs.	21,993	21,993

Notes: *** significant at 1%-level, ** significant at 5%-level, * significant at 10%-level. Standard errors are presented within parentheses.

5 Estimation results

5.1 Baseline linear regressions

The estimation results of our econometric model are presented for a wide variety of health measures in Table 5.[11] In column 1, we estimate the effect of job loss regardless of the extent to which the job loss was foreseen. We find very few immediate health effects of job loss. Job loss significantly decreases the probability of suffering from headaches (4%), fatigue (4.5%), and the degree of anxiety (0.16 on a 6-point scale). Job loss also tends to reduce alcohol consumption by 0.06 on an

[11] We use linear estimators in our baseline regressions in Table 3. However, our results are robust to using non-linear estimators for binary and ordered dependent variables. This is shown in Section 5.2.

8-point scale of alcohol consumption. Apart from these effects, we find no significant short-run effects on other health measures of job loss.

The estimation results in column 1 include both expected and unexpected job loss. To analyze to what extent heath shocks from job loss are driven by unexpected job loss, we present the effects of unexpected job loss on health measures in column 2 of Table 3. These results largely confirm the (lack of) effects of job loss on health from column 1 whilst showing more prominent effects of unexpected job loss. Unexpected job loss significantly decreases the probability of suffering from headaches (7.3%), fatigue (11.5%), and the degree of anxiety (0.22 on a 6-point scale). Additionally, we find that unexpected job loss leads to a reduction in the probability to use sleeping medication by 2.7%. As for health behavior, alcohol consumption decreases by 0.08 on an 8-point scale. This leaves us to believe that the degree of expectancy of a job loss is an important driver of our results. Compared to our OLS estimates in Table 2, our results show that a period of unemployment is associated with worse health. However, we find no evidence of immediate adverse effects of job loss on health.

Altogether, our results show that job loss primarily leads to a short-run decrease in headaches, fatigue, and anxiety. This suggests that the immediate effect of an unexpected job loss is to relieve stress from work. This reduction in stress appears to be bigger than the possible increase in financial stress due to reduced income. However, this result is likely to be driven by the relatively generous unemployment insurance benefits, in both terms of level and duration, which is consistent with prior cross-country findings that health deterioration following job loss is worse in the US than in European countries with more generous social insurance systems (i.e. Riumallo-Herl et al., 2014). These cross-country differences suggest that welfare state institutions, in particular generous unemployment insurance and universal health care access which are both prevalent in the Netherlands, could weaken the effect of job loss on health. Recent evidence from Been et al. (2021) shows that unemployment leads to significant but small decreases (about 5%) in consumption spending among Dutch households which confirms the relatively minor reduction in income and well-being at job loss. Additionally, Been et al. (2021) show that leisure time, including time spend on sleep, increases significantly upon unemployment. This is consistent with prior evidence from Aguiar et al. (2013) who show that about half of the increase in non-work time during unemployment is allocated to watching TV and sleeping/resting.

Apart from the health measures shown in Table 3 which are potential candidates to show a short-run effect of job loss, we also considered a broader array of health variables including health measure that are not likely to be affected in the short-run. In line with our expectations, we find no significant effects of job loss of such health measures including BMI, heart-, lung-, and stomach diseases, diabetes, cancers, Alzheimer's, arthritis, osteoporosis, etc. However, we do not rule out that job loss may have mid-term to long-term effects in all aforementioned health measures but the immediate effect of job loss on (mental) health seems to be positive.

Table 5. Estimation results of the effect of (unexpected) job loss on health.

	Independent variables		
Dependent variables	Job loss	Shock	Unexpected job loss
	(1)	(2)	(3)
Overall			
Subjective health[1]	0.022	-0.011	0.074
	(0.035)	(0.018)	(0.054)
Physical			
Headaches[2]	-0.040***	-0.008	-0.073**
	(0.015)	(0.008)	(0.029)
Fatigue[2]	-0.045**	-0.024***	-0.115***
	(0.018)	(0.009)	(0.037)
Insomnia[2]	0.003	0.001	-0.017
	(0.016)	(0.008)	(0.028)
Mental			
Anxiety[3]	-0.157**	-0.015	-0.216*
	(0.063)	(0.031)	(0.117)
Depression[3]	0.057	0.043	-0.076
	(0.066)	(0.032)	(0.112)
Diagnoses			
Hypertension[2]	0.002	-0.002	0.020
	(0.010)	(0.005)	(0.021)
High cholesterol[2]	-0.004	-0.005	0.006
	(0.009)	(0.005)	(0.019)
Medication			

Hypertension[2]	-0.005	-0.003	-0.005
	(0.006)	(0.004)	(0.011)
High cholesterol[2]	-0.002	0.004	-0.002
	(0.006)	(0.003)	(0.009)
Pain[2]	0.004	-0.009*	0.001
	(0.008)	(0.005)	(0.015)
Sleep[2]	-0.011	-0.012***	-0.027*
	(0.009)	(0.004)	(0.015)
Anxiety/depression[2]	0.014	0.001	0.001
	(0.009)	(0.004)	(0.012)
Medical visits			
Physician[4]	-0.164	0.128	-0.172
	(0.168)	(0.089)	(0.239)
Psychiater[4]	0.072	0.127	0.058
	(0.194)	(0.087)	(0.235)
Behavior			
Smoking[2]	0.006	-0.005	0.035
	(0.012)	(0.006)	(0.025)
Alcohol[5]	0.060**	0.031**	0.084*
	(0.029)	(0.015)	(0.046)

Notes: *** significant at 1%-level, ** significant at 5%-level, * significant at 10%-level. Standard errors are presented within parentheses. All regressions include control variables as described in Equation 1 and 2.

[1] An indicator ranging from 1 (very bad health) to 5 (very good health).

[2] A binary variable that is 1 for YES, and 0 for NO.

[3] An indicator ranging from 1 (not at all) to 6 (extremely).

[4] A continuous variable indicating the number of times.

[5] Alcohol is an indicator measuring the alcohol use in the past week. The indicator has the following categories: 1 (almost every day), 2 (five or six days per week), 3 (three or four days per week), 4 (once or twice a week), 5 (once or twice a month), 6 (once every two months), 7 (once or twice a year), 8 (not at all over the last 12 months).

5.2 Non-linear regressions – Or Appendix? - (it provides extra information that is interesting)

Many of the health measures we use in Table 5 are non-continuous. Most of the variables are measured as a binary indicator. Since we estimate the model in FD, we implicitly transform the binary health indicators into an ordered indicator consisting of -1, 0, and 1. In Table 4 we present the estimation results for all binary health variables using the ordered probit estimator which may better fit the data than the linear models in FD.

Firstly, the ordered probit estimator leads to similar conclusions as the linear estimator in Table 5. This means that our conclusions are robust with respective to estimation method. Secondly, the estimation results in Table 6 reveal interesting additional information for the effect of unexpected job loss on headaches, fatigue, sleep medication, and alcohol consumption. For headaches, fatigue, and sleep medication our results show that the positive effects of unexpected job loss on these health measures stem from both people reporting less frequent increases and more frequent decreases in the health measure. For example, those unexpectedly losing their job report to be 6% less likely to transition from no fatigue to fatigue and report to be 5% more likely to transition from fatigue to no fatigue. This symmetry is also found for the effects on headaches and sleep medication. For smoking, which was not find to be affected significantly in the linear estimator, we find job losers are both more likely to stop smoking (-1) and to start smoking (1). Apparently, these contradicting effects cancel out in the linear regression.

Table 6. Estimation results of an ordered probit for binary health measures.

	Outcome		
Dependent variables	= -1	= 0	= 1
	(1)	(2)	(3)
Physical			
Headaches	0.03***	0.00	-0.03***
	(0.01)	(0.00)	(0.01)
Fatigue	0.05***	0.01***	-0.06***
	(0.01)	(0.00)	(0.01)
Insomnia	0.01	0.00	-0.01
	(0.01)	(0.00)	(0.01)
Diagnoses			
Hypertension	0.01	0.00	-0.01
	(0.01)	(0.00)	(0.01)
High cholesterol	0.00	0.00	0.00
	(0.01)	(0.00)	(0.01)
Medication			
Hypertension	0.00	0.00	0.00
	(0.01)	(0.00)	(0.01)
High cholesterol	0.00	0.00	0.00

	(0.01)	(0.00)	(0.01)
Pain	0.00	0.00	0.00
	(0.01)	(0.00)	(0.01)
Sleep	0.01**	0.00*	-0.01**
	(0.01)	(0.00)	(0.01)
Anxiety/depression	0.00	0.00	0.00
	(0.01)	(0.00)	(0.01)
Behavior			
Smoking	-0.02*	0.01*	0.01*
	(0.01)	(0.01)	(0.01)

Notes: *** significant at 1%-level, ** significant at 5%-level, * significant at 10%-level. Coefficients yield marginal effects. Standard errors are presented within parentheses. All regressions include control variables as described in Equation 1 and 2.

5.3 Heterogeneity analyses

To analyze the heterogeneity of the effect of unexpected job loss on health measures by person- and household characteristics, we use the specification as in column 3 of Table 3 and interact unexpected job loss with a dummy for the specific group that we are interested in. We differentiate between couples, main income earners, women, low-educated, and persons aged 50+. We find no statistical evidence for heterogeneous effects, except for heterogeneity in the effect of unexpected job loss on headaches for main income earners and women. Being the main income earner decreases the probability of headaches by 11.6% (significant at the 5%-level). We find no effect for other household members. Similarly, we find that being a male decreases the probability of headaches by 12.3% (significant at the 1%-level). We find no effect for females. Unsurprisingly, the characteristics of being a main income earner and being a male correlate strongly and we therefore conclude that our results are mainly driven by male main income earners. These persons are most likely to work full-time and perceive stress from work. Our findings that the results for headaches are mainly driven by male main income earners strengthens our idea that the immediate effect of job loss is to reduce work stress more than the increase in financial stress. However, we should not that the insignificance of the interaction effects does not imply the absence of heterogeneity per se. Many of the interactions effects are not very precisely estimates given the standard errors, which is most likely a consequence of the relatively low statistical power because of the small number of observations that show a year-to-year job loss (330 observations).

Next to person- and household characteristics, effects might be heterogeneous over the business cycle. Therefore, we add the unemployment rate and the interaction between the unemployment rate and unexpected job loss to our specification in column 3 of Table 3. For most of the health measures reported in Table 3 we do not find heterogeneous effects with respect to the unemployment rate. However, we find differential effects for sleep medication. We find that unexpected job loss decreases the probability of sleep medication by about 16.8% (significant at the 5%-level) while a 1%-point higher unemployment rate decreases the reduction in the probability of using sleep medication if job loss is totally unexpected by about 2.7% (significant at the 5%-level). Similarly, we find that unexpected job loss decreases the extent of depression by about 0.96 on a 6-point scale (significant at the 5%-level) while a 1%-point higher unemployment rate decreases the reduction in depression if job loss is totally unexpected by about 0.17 on a 6-point scale (significant at the 5%-level). These differential effects of the business cycle suggests that the positive effect of job loss on health especially exists in periods of low unemployment. In periods of high employment, job loss does not reduce the use of sleep medication and the extent of anxiety. However, we find no clear differential effects of the unemployment rate on headaches, fatigue, anxiety, and sleep which all showed significant effects in Table 3.

The differential effects over the business cycle may suggest that the uncertainty of the job is important in explaining the positive health effects of a job loss. We can measure job uncertainty by the standard deviation of the job loss expectations:

$$insecurity_{it} = E_{it-1}jobloss_{it} * [1 - E_{it-1}jobloss_{it}]$$

which is on the interval [0, 0.25]. We add the job insecurity and the interaction between job insecurity and unexpected job loss to our specification in column 3 of Table 3 and find no clear statistically differential effects. Despite the positive relationship between the unemployment rate and the insecurity measure (a 1%-point increase in the unemployment rate increases job insecurity by about 0.03; significant at the 1%-level), our results suggest that the unemployment rate matters more for the effect of job loss on health measures than the personally perceived job insecurity. This difference may be explained by the fact that the unemployment rate negatively affects the job finding rate (a 1%-point increase in the unemployment rate decreases the subjective job finding

probability as reported by currently unemployed (N = 1,170) by about 11%; significant at the 5%-level). Therefore, the positive effect of job loss on health may in part be determined by people's beliefs about the ease of reemployment. Unfortunately, the number of unemployed people reporting subjective job finding probabilities is too small in our data to do further econometric analyses.

6 Conclusion

Prior studies have shown that the unemployed have worse health compared to those who are employed. More recent studies have tried to estimate the causal effect of unemployment on health exploiting firm closures, matching techniques, panel data analyses, and instrumental variables regression. However, these techniques all have their issues regarding the assumptions of generalizability, the importance of non-observed characteristics, and finding a decent instrument.

Compared to this existing literature, we make two contributions. Firstly, we estimate the effect of unexpected job loss building forth on the method of Stephens (2004) using subjective expectations. Since such expectations indicate a shock, we can estimate the causal effect of job loss on health for a representative sample of households. Moreover, this approach allows us to estimate immediate effects on health upon job loss which contrasts the other approaches. Secondly, whereas most literature has focused on a particular health outcome, we study a wide array of health measures available in our data to get a broader view of the short-run effects of (unexpected) job loss on health.

Our results suggest that unexpected job loss does not result in a short-run deterioration of health. Instead, we find that headaches and fatigue decreases upon job loss. Given the relatively generous social insurance programs in the Netherlands, this suggests that the immediate relieve from work stress is bigger than the immediate increase in financial stress upon job loss. This finding is consistent with prior cross-country analyses that suggest that the effect of job loss on health is less strong in countries with more generous social insurance programs (i.e. Riumallo-Herl et al., 2014). These cross-country differences suggest that welfare state institutions, in particular generous unemployment insurance and universal health care access which are both prevalent in the Netherlands, could weaken the effect of job loss on health. Our findings of the effect of job loss on health are consistent with Been et al. (2021) who show that unemployment decrease consumption by a small amount and increases leisure time, i.e. sleep, substantially among Dutch households.

Our results are interesting as they show that much of the detrimental effects of unemployment on health that have been found in the literature are likely to come from effects in the mid- to long run and/or from financial stress from job loss with limited social insurance programs. For future research it is interesting to analyze the effects of unemployment benefits exhaustion on health to further explain the mechanism of financial stress in the relationship between unemployment and health, even in countries with relatively generous social insurance programs.

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