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ABSTRACT

Long-Run Effects of Severe Economic Recessions on Male BMI Trajectories and Health Behaviors[1]

With periodic recessions and the rising costs of health care, it is important to know how labor market participation and insecurity affects health outcomes. Yet, this line of research faces a number of methodological challenges which this paper aims to address. We turn to Ukraine's experience after the col-lapse of the USSR to investigate how exogenous labor market shocks during severe recessions affect men's body mass index (BMI) and health-related behaviors. We use growth curve models to analyze BMI trajectories from 2003 to 2007 and find that past exogenous shocks (e.g., plant closings, bankruptcies, restructuring, and privatization) from 1986 to 2003 significantly change the BMI-age relationship for men. We also find a long-lasting effect on drinking behavior that is decreasing with age, while the effect on the probability of smoking is constant across all ages. At the same time, there is no effect on the probability of engaging in vigorous or moderate physical activity.

JEL Classification: I12, J21, J65

Keywords: job loss, labour market exclusion, lay-offs, recession, BMI, growth curve, life course

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1. Introduction

More than eight years after the Global Financial Crisis first hit Wall Street, countries around the world still face slow growth and high economic volatility. The phenomenon that came to be known as the subprime mortgage crisis "reintroduced to the world an era of bank failures, a credit crunch, private defaults and massive layoffs"[2] and is now referred to as Great Recession. The direst consequences for individuals and households are related to unemployment. In spite of a documented decrease in unemployment in some countries, it was expected that the number of people who are unemployed around the world will increase by 2.3 million in 2016 to reach a staggering 199.4 million total (ILO, 2016).

Job loss affects household finances, but that is rarely the only consequence. It may also have important long-lasting effects on health and health behaviors. A significant reduction in household income may lead individuals to avoid spending on non-urgent health care needs and preventive measures. It may also lead to changes in diet resulting in more severe long-run health conditions, including serious diseases such as tuberculosis (Arinaminpathy and Dye 2010). Emotional effects include shock and denial, anxiety and fear, sadness and depression, anger and shame — all of which lead to elevated stress levels and thus higher risk of hypertension, heart problems, and generally poorer health outcomes. Loss of habitual social environment may lead to loneliness and isolation, which in turn may increases BMI (Lauder et al. 2006) and smoking prevalence (DeWall and Pond 2011). The effect of unemployment on the rest of the family is generally considered to be negative, but theoretically may result in positive health consequences if the situation results into a reconsideration of family roles and thus a more balanced life. The greater availability of time to engage in health-beneficial activities, e.g., diet and exercise, may be another positive mechanism of how job loss impacts

[2] http://yaleglobal.yale.edu/content/global-economic-crisis accessed on August 1, 2016.

on health. As can be seen, theoretically the effect of the job loss on health is ambiguous although it seems reasonable to expect that the negative effect dominates.

The economic literature in this area can be divided into two parts depending on whether it relies on aggregate or individual data. The first one focuses on the general effect of economic recessions on mortality, both total and from various causes. This literature [started by Ruhm (2000)] documents that mortality decreases during economic recessions, with some recent studies for other countries confirming earlier findings (Neumayer 2004, Gerdtham and Ruhm 2006) and others not finding the pro-cyclical relationship (Gerdtham and Johannesson 2005, Svensson 2007, Economou et al. 2008, Ruhm 2015). More disaggregated measures of mortality sometimes even show the opposite. For example, Brenner (1997) analyzing time series data for West Germany, finds that increased unemployment and business failure rates are related to heart disease mortality rate increases, after controlling for tobacco, consumption of animal fats and alcohol, income and welfare expenditures. More recent evidence on the effect of 2008 recession on health comes from Iceland. Ásgeirsdóttir et al. (2014) show that the crisis led to significant reductions in unhealthy behaviors such as smoking, drinking alcohol and soft drinks, and eating sweets but also some health-promoting behaviors such as eating fruits and vegetables. At the same time, they document an increase in health-promoting behaviors such as consumption of fish oil and sleep.

In the second branch of this literature, individual-level analyses mostly find evidence in support of counter cyclicality. Unemployment significantly increases mortality risks (Ungváry et al. 1999, Gerdtham and Johannesson 2003, Gerdtham and Johannesson 2005) and lowers socio-economic status, which itself is associated with worse physical health (Wagstaff et al. 2001). Yet, the observational and retrospective studies of the impact of job loss on BMI and health behaviors have reached mixed results. Only recent papers, which focused entirely on job losses from business closings, have provided conclusive evidence. Deb et. al (2011) uses finite mixture modeling to find that job loss results in higher BMI and alcohol consumption

among elderly in the United States, albeit only among individuals who were already at risk. Marcus (2014) uses a non-parametric matching strategy to study the effect of exogenous job loss in Germany and finds that business closings result in a higher probability of smoking initiation and a slight but significant increase in body weight.

In this paper, we estimate the long-run effects of labor market shocks on BMI and health behaviors of working-age Ukrainian men. The tumultuous economic period of Ukrainian transition towards a market economy provides exogenous shocks to employment. We use growth curve models to examine whether labor market shocks change the shape of the entire BMI-age trajectory or only shift the trajectory. We focus on BMI because obesity is a significant determinant of cardiovascular diseases, hypertension, and diabetes, which are important contributors to the ongoing population health crisis in Ukraine (Lekhan, 2015).

Our results are policy relevant. These health conditions may help explain why Ukraine has the fastest rate of depopulation in Europe. Premature mortality of Ukrainian prime-age men is one of the major contributors to this pattern. The leading cause of death and disability is cardiovascular disease, which was 67% of all deaths in 2009. In 2012, Ukraine had the second-worst mortality rate from cardiovascular disease in the world. Cardiovascular mortality is closely related to hypertension, obesity, and tobacco use. Given scarce resources, it may be easier to target obesity through health-promotion policies in an environment where it has not yet reached critical levels (e.g., 28% in the USA in 2010) than to devote scarce resources to fighting the consequences of obesity when it reaches higher levels. In addition to BMI, we apply the same methodology to study related health behaviors — alcohol drinking, smoking, and physical exercise.

We focus on three questions. First, does an individual's history of labor market shocks during the 1990s (a time of considerable economic downturn) significantly alter the BMI-age trajectory? Second, do these labor market shocks affect other related personal behaviors such

as physical exercise, smoking, and alcohol consumption? Finally, do the effects of labor market shocks differ depending whether the shock occurred before or after 1998, and whether the person was married or younger than 35 years old one year prior to the shock?

To answer these questions, we use growth curve models with time-varying controls to document the differences in BMI trajectories depending on exposure to exogenous labor market disturbances over the early period of transition (from 1986 to 2003). These models allow for the initial BMI levels (intercept) and the slopes of the BMI-age trajectories to vary with past individual labor market participation. The Ukrainian setting presents an opportunity to address the endogeneity of initial conditions, which is inherent in growth curve modeling because we only focus on the exogenous disturbances unrelated to personal choice.

This paper contributes to the literature on the individual behavioral effects of labor market shocks in three ways. First, we measure exogenous labor market shocks as those job separations initiated by the employer (closing down, reorganization, bankruptcy, or privatization of enterprise/organization, dismissal initiated by employer). We distinguish these exogenous shocks from endogenous job loss that may be due to low productivity related to health behaviors. This provides further support for two recent papers focusing on business closures as a measure of job loss (Deb, Gallo et al. 2011) and (Marcus 2014). However, compared to these papers, our estimates are based on a much higher proportion of affected individuals.

Second, we use growth curve models because they are theoretically more appropriate than a static approach. The physiological literature discusses the mechanisms of weight gain based on dynamic nutrition models, not the determinants of a one-time weight measure. Moreover, the growth curve model accounts for unobserved heterogeneity of the BMI-age trajectory due to, for example, genetic predisposition or other unobserved concurrent health conditions.

Finally, our paper contributes to the ongoing debate of the health consequences of job loss by studying the effect of past job loss during the times of severe economic downturn (Suhrcke and Stuckler 2012). One of the criticisms of the previous literature on the recession-mortality relationship was the focus on developed countries picking up the effect of only minor business cycle fluctuations, while the individual-level studies did look at the effect of a drastic change in labor market participation, but estimated from a very small fraction of the sample (2.5-7.5%). Instead we study a population where more than a quarter of men have been affected by the most severe recession in the history of Ukraine (40% economic downturn).

2. Methodology: BMI Growth Curve (Random Coefficients) Model

The economics literature mostly focuses on the effect of labor market shocks on short-run health and health behaviors. Yet, the epidemiology literature stresses that the health of individuals is not static (Haas 2008) and that the life course events (both positive and negative) change not only the levels of health but may also influence the age trajectories of health. This has been documented in the epidemiology literature (Kim and Durden, 2007) but is also supported by the economics literature. Case et al. (2002), for example, found that the gap in health of children with different socio-economic status increases as children grow older.

There are four main theoretical perspectives on the life course dynamics of health — the *critical period* model, the *critical period model with later effect modifiers*, the *accumulation of risk* model and the *chain of risk* model (Kuhn et al. 2004). The critical period model links the early life events and environment to later-life health trajectories, starting from the most well-known example of the fetal origins of diabetes and cardiovascular diseases proposed by Barker (1994). The critical period model with later effect modifiers is an extension of the first. It incorporates the exposures to various factors in later life, which may either enhance the effects of early life events on health or diminish them. The first two

models are contrasted by the accumulation of risk model, which stipulates that the risks to health gradually accumulate over time. The chain or risk model is a variation of the third model. It emphasizes not only the number of the adverse or positive events but also the sequence of those events; it is sometimes also referred to as a *pathway model* (Kuhn et al. 2004). None of the models contradicts the others; they may operate simultaneously. It may not be feasible to distinguish between them in empirical work. However, these models have three implications that are directly useful for our current investigation of the effect of labor market shocks on health outcomes.

First, the models all imply that it is necessary to use a life course framework to model health because shocks to health may affect not only current health but also the future trajectory of health. Health and shocks to health have a dynamic relationship. Second, accounting for the fact that each individual arrives at adulthood with an individual health trajectory, which has been formed in early years of life, we should allow for heterogeneity in these trajectories independent of the effects we are studying. Third, it may be the case that the effect of the labor market shocks is not uniform across individuals. For example, there is some evidence for bi-directional effects of job strain on body mass index. One study found that the slimmest workers lost weight in response to job stress while obese workers gained weight (Kivimaki et al. 2006a, 2006b). We should allow for these differences in our empirical model.

Given the theoretical models above, our basic model focuses on health over the life course. We start with a simple two-level random intercept and random slope model for an individual *i* at time *t* showing how health (*H*) changes over time as a quadratic function of age for the period from 2003 to 2007:

$$H_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + u_{i0} + u_{i1} age_{it} + u_{i2} age_{it}^2 + \epsilon_{it} \quad (1)$$

In this model u_{i0} represents individual random effects, u_{i1} , u_{i2} represent the random parts of the coefficients on age and age squared, ϵ_{it} is the random error, and the betas are coefficients to be estimated.

Given the other two implications of the theoretical models, that there is heterogeneity in both the trajectories and the effect of any shocks, we extend the basic model (1) to allow for the initial conditions β_{i0} and the slope β_{i1} to change depending on the experience of labor market shocks (*LMHist*):

$$H_{it} = \beta_{i0} + \beta_{i1} age_{it} + \beta_{i2} age_{it}^2 + u_{i0} + u_{i1} age_{it} + u_{i2} age_{it}^2 + \epsilon_{it} \qquad (2)$$

$$\beta_{ik} = \alpha_{0k} + \alpha_{1k} LMHist_i \quad \forall \quad k = \overline{0,2} \qquad (2a)$$

This approach allows testing of the four main hypotheses:

Hypothesis 1: Individual health-age trajectories are heterogeneous ($u_{i0} \neq 0$). This is the second implication of the theoretical models.

Hypothesis 2: Labor market shocks have a detrimental effect on the level of health irrespective of age ($\alpha_{00} < 0$). This is what most of the economics literature has studied thus far.

Hypothesis 3: Labor market shocks not only change the level of health but also the health-age trajectory ($\alpha_{11} \neq 0$). This is the first implication of the theoretical models.

Amending the model further to allow for $u_{i1} = \vartheta_{01} + \vartheta_{11} LMHist_i$, we are also in a position to test a fourth hypothesis.

Hypothesis 4: The effect of the labor market shocks on the health-age trajectory is heterogeneous across individuals ($\vartheta_{11} \neq 0$). This is the third implication of the theoretical models.

Although we are primarily interested in BMI as a measure of health (*H*), we also explore the related health behaviors: drinking alcohol, smoking, and physical activity.

Labor market history ($LMHist$) is constructed from the information about each individual's experience of job separations initiated by the employer for reasons unrelated to the individual worker's job performance (closing down, reorganization, bankruptcy, privatization of enterprise/organization, or dismissal initiated by employer). Because the last reason listed might not be exogenous (even though in the list of reasons there is another one called "conflict with employer"), we explicitly exclude individuals with such a reason for job separation from the estimation. For the main analysis we use an indicator variable of whether an individual experienced any of these exogenous labor market shocks.

We include other covariates, such as cohort (categorical variable ranging from 1 to 6 and corresponding to the 10-year intervals for the year of birth starting from 1931 and ending in 1991), ethnicity (Ukrainians represent 77.5% of the population, with Russians being the second-largest group at 17.2%), highest level of education ever observed, and whether the person has ever been married by age 30.

To understand the phenomenon better, we offer several amendments to the model to investigate the heterogeneity of the effect of the labor market shock depending on the time period when the shock occurred, the age and the marital status one year prior to the shock by augmenting Equation (2a) in the following way:

$$\beta_{ik} = \alpha_{0k} + \alpha_{1k} LMHist[1990s]_i + \alpha_{2k} LMHist[2000s]_i \ \forall \ \ k = \overline{0,1} \qquad \text{(2a-1)}$$

$$\beta_{ik} = \alpha_{0k} + \alpha_{1k} LMHist[married]_i + \alpha_{2k} LMHist[single]_i \ \forall \ \ k = \overline{0,1} \qquad \text{(2a-2)}$$

$$\beta_{ik} = \alpha_{0k} + \alpha_{1k} LMHist[age < 35]_i + \alpha_{2k} LMHist[age \geq 35]_i \ \forall \ \ k = \overline{0,1} \qquad \text{(2a-3)}$$

To investigate the pathways through which the health effects emerge we also offer an analysis of the labor market shocks on health behaviors such as alcohol drinking, smoking, and physical exercise.

A model similar to (2) is estimated allowing for the contemporaneous drastic changes in working hours, to see whether the effects we observe from the labor market shocks in the long-run are supported by the direction of the short-run effects:

$$H_{it} = \beta_{i0} + \beta_{i1} age_{it} + \beta_{i2} age_{it}^2 + \beta_{i3} X_i + \beta_{i4} LM_{it} + u_{i0} + u_{i1} age_{it} + u_{i2} age_{it}^2 + \epsilon_{it} \quad (3)$$

$$\beta_{ik} = \alpha_{k0} + \alpha_{k1} LMHist_i \quad \forall \quad k = \overline{0,2} \qquad 3(a)$$

where LM_{it} is a vector reflecting recent drastic changes in working hours — movements between states of working overtime, full-time, part-time, and non-working.

3. Data

Individual-level data are taken from three waves of the Ukrainian Longitudinal Monitoring Survey (ULMS): 2003, 2004, and 2007[3]. The ULMS is a nationally representative survey of working age (15-72 y.o.) population which provides a wide range of information on individuals and households, including detailed working history starting from 1986, the year of the Chornobyl catastrophe. The sample is based on the 2001 population Census and is stratified by age, gender, city/town, and regional structure. A modest section on health allows us to analyze individual health, including self-rated health and diagnosed conditions, as well as health-related behaviors such as alcohol and cigarette consumption, and exercising. In total there are 9,902 individuals from 4,232 households across all three waves (Lehman et al. 2012).

The contemporaneous data is combined with the retrospective section of the 2003 wave of the ULMS to build the individual labor market history variables. This allows for the

[3] Institute for the Study of Labor (IZA) (2014). The Ukrainian Longitudinal Monitoring Survey (2003 – 2007). IDSC of IZA. http://dx.doi.org/10.15185/izadp.7090.1

identification of the sufficient number of cases of exogenous job separation during the turbulent transition period of 1990s. The retrospective data section is designed to minimize recall by referring to labor market circumstances at specific, memorable points in time: December 1986 (after the Chornobyl catastrophe), December 1991 (after the collapse of the Soviet Union), December 1997, and every December thereafter until the year 2003. The sample is restricted to men who met the following criteria for the period from 1986 to 2003: (i) were 18 and older in 2003, (ii) started their first job no later than 2001, (iii) were working for pay during this period for at least two consecutive years, (iv) have non-missing information on the reason for job separation, if any. These restrictions reduce the number of available person years from 8,749 to 6,204. A stricter control sample excludes those individuals who experienced voluntary separation from their jobs, reducing the sample further to 3,179.

The outcome variables include BMI, alcohol and tobacco consumption, and the intensity of physical activity.

Exogenous labor market shocks — the main variable of interest — is measured as a binary variable that is equal to one if a person had at least one exogenous labor market shock either in the form of job loss or compulsory leave. Exogenous labor market shocks are identified for those individuals who over the period from 1986 to 2003 had any job separations, based on a series of questions about the job separation, as described earlier.

It is instructive to compare summary statistics stratified by the presence of past labor market shocks, either at the beginning of the sample period (2003) or at the end of the period (2007) (see Table 1). The last four columns show statistics for the stricter sample excluding individuals who had experienced only voluntary job separations. This effectively restricts the control group to those who had not had any job separations in the past. This strategy avoids a contaminated control group if the causes of such voluntary separations are related to our outcome variables.

As can be seen from the simple comparison of columns (1) through (4), men who experienced at least one labor market shock in the past are on average similar to others in terms of BMI either in 2003 or in 2007. Yet, with respect to health behaviors, there are substantial differences: those who experienced a labor market shock are more likely to drink alcohol in 2003 (albeit the difference disappears by 2007) while the difference in the prevalence of smoking persists. In general, the differences are similar in the restricted sample with respect to smoking, and the difference in physical activity becomes statistically significant, while there is no observed difference in alcohol drinking in either period (columns (5)-(8)). However, in terms of BMI, the difference between those who experienced a labor market shock and those who did not becomes statistically significant in 2007. Figure 1 offers a non-parametric analysis of the BMI-age trajectory between those with and without a past labor market shock. As can be seen, the curve for those with a past labor market shock is significantly higher than for other men at early ages. However, in middle ages the BMI-age trajectory for those without a past labor market shock overtakes. The difference becomes insignificant after the age of 50, which is due in part to the small number of observations of people over age 50.

Men are on average the same age in 2003, but those who experienced a labor market shock are about 5 years older at the end of the sample period. Although at first this seems odd, it is consistent with older workers being more likely to have experienced at least one labor market shock. The difference in age becomes even greater in the restricted sample as we exclude those without voluntary job separations and the older one is the less likely he is to stay at the same job. Correspondingly, the treated group is coming from earlier cohorts of population with the difference in average cohort reaching more than a decade in the restricted sample. In both full and restricted samples there is no statistically significant difference between the treatment and control groups in the share of those who have been married by age 30 at the beginning of the period, but the difference become larger in year 2007 and more pronounced in the restricted sample. Those who experienced labor market shocks in the past

are not much different in terms of educational attainment from those who had not in the full sample throughout the period. While in the restricted sample, those hit by the labor market socks are on average less educated at the start of the sample period. In terms of ethnical background, 78-83% of both samples are Ukrainians with the difference between the numbers being not statistically significant in either sample

There is virtually no difference in terms of labor market involvement in the full sample in 2003 with 42-45% of men reporting no working status, 4% working part-time, 31-% working full-time and 21-23% overtime. This changes by year 2007, with those who were affected by the labor market shock becoming more likely to be not working and less likely to be employed full-time. This is drastically different from the situation in the restricted sample — men with no shocks in their labor market history are much less likely to be non-working (13% compared to 45% in 2003, and 9% compared to 35% in 2007) and much more likely to be working either full-time or overtime. Working part-time is relatively rare phenomenon among Ukrainian men, which is supported by the statistics in Table 1.

Concerning the proportion of individuals affected by the adverse exogenous labor market shocks in the past, the last line in Table 1 shows that we have an unprecedented sample compared to previous studies. The size of the treated group ranges from 28-30 percent depending on the year in the full sample and 51-52% in the restricted sample. This considerably improves the power to find an effect over the best examples in the previous literature where only 2.5% (Deb, Gallo et al. 2011) or 7.6% (Marcus 2014) of the total sample had experienced exogenous labor market shocks due to the firm closure.

4. Results

BMI Growth Curve

In our investigation we start with the comparison of the results for BMI from the OLS and the growth curve model using the full sample (see Table 2), implemented by the **xtmixed** procedure in Stata 13. As columns (1) through (3) show, the growth pattern differs depending on the estimation model, and the likelihood ratio favors the growth curve model. The latter shows significant variation in both the starting point of the individual BMI-age growth trajectories and the individual trajectories. In comparison to OLS, the results from the fixed part of the growth curve model reveal a similar growth of BMI with age with a somewhat slower reduction in the speed of this growth. The results presented in column (2) are the ones directly corresponding to Equation (1) and those in column (3) to Equation (2).

After allowing for the individual random coefficients, the effect of the labor market shock history on the BMI-age growth pattern disappears suggesting that the OLS estimated effects are primarily due to individual heterogeneity in BMI-age trajectories. However, this may also be due to a contamination of the control group by those who experienced voluntary job separations. We, therefore, adopt the growth curve model with a random coefficient for age (but not age squared) as our most preferred specification and focus on the restricted sample for further investigation. Estimation with a random coefficient on age squared returned small and statistically insignificant effect for some outcomes and the model did not converge for others, which is the sign of lack of random effects for the coefficient.

Table 3 shows results from estimating Equation (2) on the restricted sample, which excludes individuals with at least one job separation by their own will and no exogenous job separation. This addresses the issue of contamination of the control group, because individuals who leave their jobs on their own may have a motivation related to health, raising concerns about endogeneity. There is a marginally significant level effect of the labor market shock on

BMI, so that independent of age labor market shock leads to approximately 0.7 points higher BMI (which is approximately a 2.3 kg difference for a man 1.75 meters high). Moreover, it changes the BMI-age trajectory significantly towards a flatter relationship. For those who experienced no past labor market shocks, the BMI-age trajectory has a quadratic shape. Starting at age 18 with the average BMI of about 22, each year an average man gains slightly less than one fifth of a BMI point (approximately 0.5 kilos). The annual increase diminishes over time.

Turning to the variables of interest, for those men who experienced any labor market shock in the past, the shape of the BMI-age trajectory is considerably different. It is much flatter, and in middle-ages is located below the trajectory for those who worked continuously (see Figure 2).

Other Related Behaviors

Columns (2)-(4) in Table 3 provide estimates of the age trajectories for three BMI-related health behaviors — alcohol drinking, smoking and physical activity. Like BMI, the probability of both alcohol drinking and smoking follows quadratic shape with no clear age pattern for physical activity. A past labor market shock has no effect on the shape of the growth curve for smoking (Column (3)), but it does shift the smoking-age trajectory upward across all ages. There is a significant change in the age trajectory of alcohol drinking due to a labor market shock at the 10% significance level. While the overall pattern for the control group is a decreasing likelihood of alcohol consumption with age, we do not document any decrease with age for those who experienced a labor market shock in the past. Figures Figure 3-Figure 5 offer visualization of the effect for an average man in the sample. As can be seen, for an average person the only significant difference is observed for smoking behavior.

Job Separation Definitions

One of our concerns was the unclear definition of the job separation "initiated by employer" alongside the existence of the reason called "conflict with employer". Therefore,

we tested for the sensitivity of the results towards exclusion of the individuals with the jobs separation "initiated by employer" from the restricted sample (see Table 4). The results are qualitatively similar, although they are statistically stronger and somewhat larger in magnitude. For example, in this sample the overall upward shift of the age trajectory in alcohol drinking becomes statistically significant at 10% level, showing that those who experienced labor market shocks are 2.5 times more likely to drink alcohol irrespective of age, and like in the previous case, their trajectory is flat showing no decreases with age. This does support our concern related to the excluded cause of job separation. However, in further investigation we have retained individuals with such reason to enable tests for heterogeneity that would have not been possible with a smaller sample size.

Current Labor Market Time Involvement

Although we know that the current labor market participation may be endogenous to the studied outcomes, we estimate Equation (2) using various measures of the current individual work status to explore whether part of the effect we observe is working through the effect of labor market shocks on the future labor market transitions. The inclusion of indicators of whether the person is working part-time, full-time, or overtime (with non-working being the base category) does not alter the results much, except for the level effects of the labor market shock becoming significant at 10% level for alcohol drinking (see Table 5). The results show no qualitative difference.

Current labor market status has virtually no effect on BMI, confirming the dynamic nature of this indicator. Compared to those men who are not working, those who are working part-time do not exhibit any differences in outcomes, except for physical activity. The results for alcohol drinking show that working full-time and over-time is associated with more alcohol consumption, compared to working less than full time. Being with either part-time or full-time work status increases the probability of engaging in physical activity by 50% and 26% respectively, albeit the effect is only significant at 10% level.

Heterogeneity in the Effect of the Labor Market Shock

We also explore possible heterogeneity in the effects of the labor market shock on BMI and health behaviors. We investigated the era effects testing for whether there is any difference in the effect depending on whether a man experiences his first labor market shock in 2000 or earlier compared to that starting from 2001 (after 2000 Ukraine was on the path of economic growth up to the year 2008). We did not find any significant heterogeneity along these lines for health related behaviors. There is virtually no difference in the magnitude of the effect on BMI, while the fact that the effect of labor market shocks experience prior to 2001 is more precise may be entirely due to the greater number of shocks in that period (panel A in Table 6). Panel B of Table 6 provides some evidence on the heterogeneity of the effect depending on whether the first labor market shock has been experienced when the person was 35 years old or younger. Men who experienced a labor market shock while younger than 35 have stronger negative effect on the likelihood of drinking, basically overturning the shape of the alcohol drinking-age trajectory with the alcohol consumption increasing with age. Finally, we also did not find any evidence of the presence of heterogeneity in the labor market shock effect depending on the marital status of the individual one year prior to the labor market shock. The results from this test are available upon request.

Intensive margin

We investigated the intensive margin of two health behaviors — smoking and physical activity. As seen in Table 7, the results come from a much smaller sample, yet are consistent with the main findings. There is no effect on the intensity of physical exercise. However, those who experience a labor market shock in the past smoke about three more cigarettes per day, while having no effect on the shape of the smoking trajectory.

5. Conclusions

In this study we investigated the long-run effect of exogenous shocks to labor market participation on BMI and on health behaviors, relying on the data from a nationally representative sample of adult Ukrainian men (18-72 years old). We examined past exogenous labor market shocks — defined as either job separations from a business closing down, reorganization, bankruptcy, or privatization, or dismissal initiated by employer.

Following the growth curve modeling methodology, we showed that past exogenous labor market shocks not only increase the average BMI, but also alter the shape of the BMI-age trajectory, pointing to a much longer lasting effect. Concerning health behaviors, past negative experience does not change the shape of either the smoking or physical activity age trajectory. It does, however, shift the smoking-age trajectory upward. With regards to the drinking age trajectory, we show alarming evidence that people who experience labor market shocks in the past do not exhibit a decreasing pattern of alcohol consumption with age as the control group does. Moreover, experiencing the first labor market shock at a young age (35 y.o. or younger) sets individuals onto an upward rising drinking- age trajectory.

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Figures

Figure 1: Non-parametric representation of the BMI-age profile depending on past experience of labor market shocks

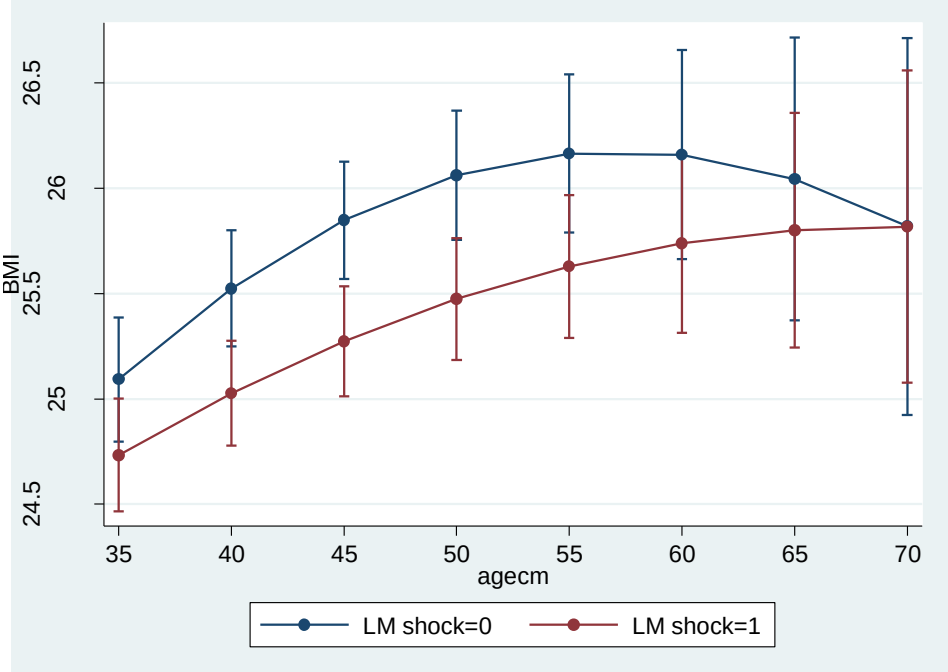

Figure 2: Predicted BMI-age profile for an average individual with and without past labor market shock

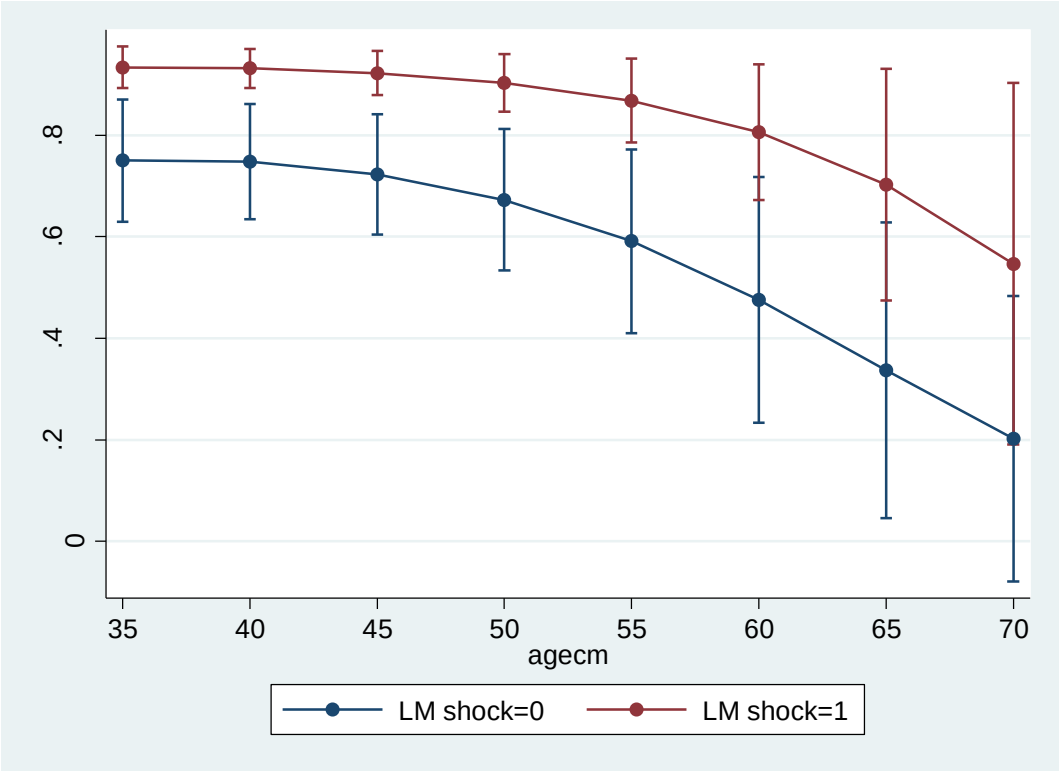

Figure 3: Predicted smoking-age profile for an average individual with and without past labor market shock

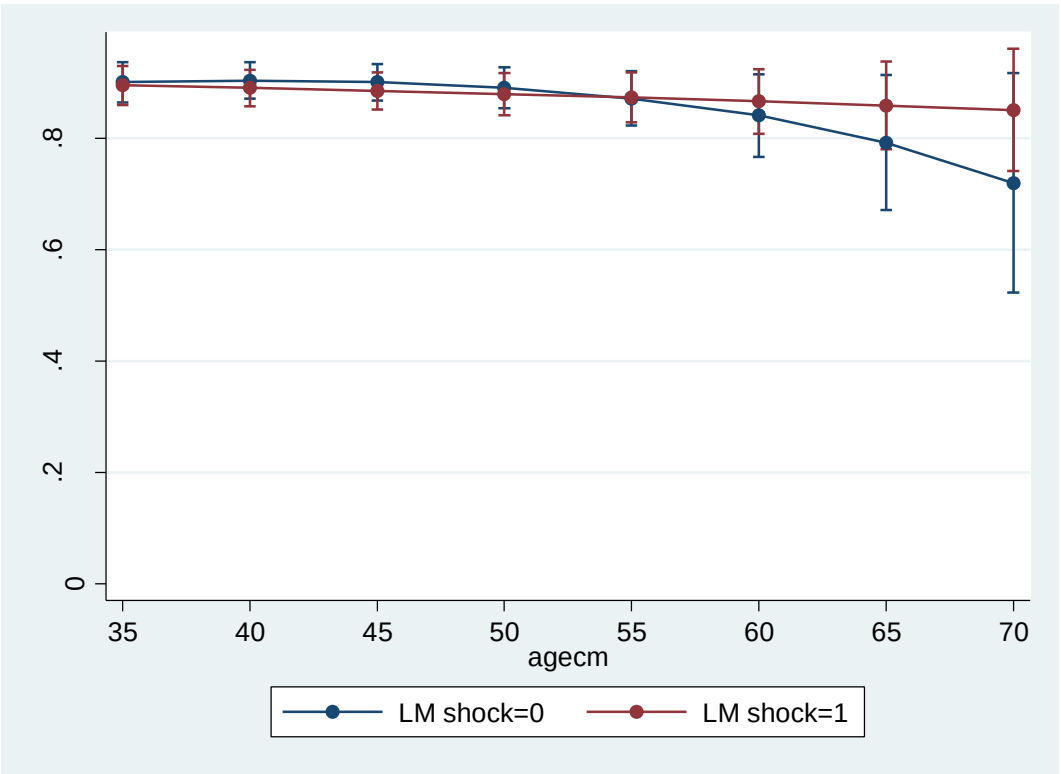

Figure 4: Predicted alcohol drinking-age profile for an average individual with and without past labor market shock

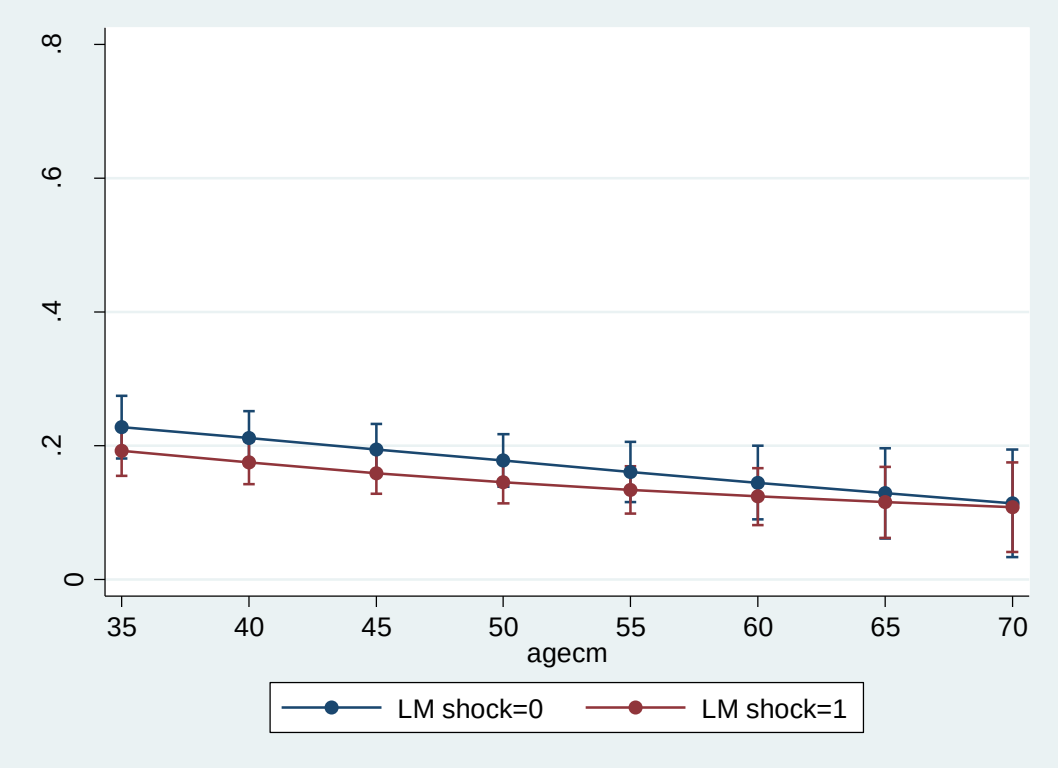

Figure 5: Predicted physical exercise-age profile for an average individual with and without past labor market shock

Tables

Table 1: Summary Statistics: Full Sample

	Full Sample				Restricted Sample			
	2003		2007		2003		2007	
	No LM Shock (1)	LM Shock (2)	No LM Shock (3)	LM Shock (4)	No LM Shock (5)	LM Shock (6)	No LM Shock (7)	LM Shock (8)
Body Mass Index (BMI)	25.10	25.10	25.31	25.56	25.09	25.04	24.90*	25.51*
	(3.46)	(3.41)	(3.63)	(3.60	(3.44)	(3.41)	(3.64)	(3.66)
If Drinking	0.76*	0.81*	0.78	0.77	0.79	0.80	0.78	0.76
If Smoking	0.55**	0.65**	0.57**	0.64**	0.55**	0.65**	0.56**	0.64**
Physical Exercise (PE)	0.26	0.22	0.21	0.18	0.28**	0.21**	0.25**	0.17**
Age	44.57	43.67	44.22**	49.43**	39.87**	43.88**	38.07**	49.27**
	(14.90)	(12.45)	(14.90)	(12.45)	(14.90)	(12.38)	(13.68)	(12.25)
Cohort	3.13	3.24	3.88**	3.39**	3.62**	3.21**	4.53**	3.40**
	(1.56)	(1.21)	(1.59)	(1.22)	(1.50)	(1.20)	(1.40)	(1.22)
If Ukrainian	0.81	0.78	0.81	0.79	0.82	0.78	0.83	0.80
High education ever observed	0.19	0.16	0.20	0.16	0.21*	0.17*	0.20	0.15
Married before age 30	0.64	0.65	0.54**	0.64**	0.62	0.64	0.44**	0.64**
Labor Market Involvement								
Zero-time	0.42	0.45	0.30*	0.35*	0.13**	0.45**	0.09**	0.35**
Part-time	0.04	0.04	0.04	0.06	0.05	0.04	0.05	0.06
Full-time	0.31	0.31	0.39*	0.33*	0.50**	0.31**	0.54**	0.33**
Overtime	0.23	0.21	0.27	0.27	0.31**	0.20**	0.32	0.27
N	1717(70%)	746(30%)	1246(72%)	494(28%)	601(48%)	646(52%)	482(49%)	463(51%)

Standard errors in parentheses * p<0.05, ** p<0.01

Table 2: Regression coefficients – Comparing OLS and Growth Curve Models (Full Sample)

BMI	OLS (1)	GCM (2)	GCM (3)
Past LM shock	0.5404	0.3006	0.3017
	(0.4176)	(0.3905)	(0.3586)
(Age-18)	0.1544**	0.1592**	0.1540**
	(0.0186)	(0.0160)	(0.0158)
(Age-18)^2	-0.0020**	-0.0018**	-0.0017**
	(0.0003)	(0.0003)	(0.0003)
LM shock X (Age-18)	-0.0675+	-0.0351	-0.0350
	(0.0345)	(0.0294)	(0.0284)
LM shock X (Age-18)^2	0.0012*	0.0006	0.0006
	(0.0006)	(0.0005)	(0.0005)
Ukrainian	0.0567	0.0732	0.1298
	(0.1553)	(0.1434)	(0.1411)
Cohort (10 years)	-0.0759	0.0722	0.0389
	(0.1010)	(0.0773)	(0.0769)
High education	0.8244**	0.8483**	0.8164**
	(0.1540)	(0.1498)	(0.1467)
Married	0.1546	0.1400	0.1966+
	(0.1268)	(0.1193)	(0.1170)
Constant	22.9002**	22.0235**	22.1674**
	(0.6490)	(0.5008)	(0.4974)
sd(Age-18)			0.0510**
			(0.0035)
sd(Constant)		2.8296**	2.3792**
		(0.0459)	(0.0702)
N	6204	6204	6204
r2	0.0735		
chi2		368.3071	392.7550
p-value chi2		0.0000	0.0000
LR (vs. OLS)		2259.99	2323.29
p-value LR			0.0000

Standard errors in parentheses + p<0.10, * p<0.05, ** p<0.01

Table 3: Regression coefficients –BMI and Related Behaviors (Restricted Sample)

	BMI (1)	Drinking (2)	Smoking (3)	PE (4)
Past LM shock	0.7028+	2.1081	5.2270+	0.9869
	(0.4067)	(1.0174)	(4.6689)	(0.3184)
(Age-18)	0.1866**	1.0656*	1.0897+	0.9869
	(0.0244)	(0.0292)	(0.0530)	(0.0198)
(Age-18)^2	-0.0023**	0.9986**	0.9977*	0.9998
	(0.0005)	(0.0005)	(0.0009)	(0.0004)
LM shock X (Age-18)	-0.0806*	0.9312+	0.9914	0.9833
	(0.0348)	(0.0373)	(0.0705)	(0.0281)
LM shock X (Age-18)^2	0.0013+	1.0014+	1.0001	1.0003
	(0.0007)	(0.0007)	(0.0013)	(0.0006)
Ukrainian	0.2400	1.6662**	0.7094	0.7194**
	(0.1889)	(0.3082)	(0.2673)	(0.0910)
Cohort (10 years)	0.0208	0.9507	1.6132*	1.0768
	(0.1087)	(0.1238)	(0.3575)	(0.1030)
High education	0.7414**	1.0061	0.1245**	2.2423**
	(0.1963)	(0.1987)	(0.0503)	(0.2862)
Married	0.2840+	0.9082	2.2463*	0.8877
	(0.1567)	(0.1449)	(0.7103)	(0.0970)
Constant	21.9235**	1.0656*	0.2808	0.9869
	(0.7014)	(0.0292)	(0.3980)	(0.0198)
sd(Age-18)	0.0549**			
	(0.0098)			
sd(Constant)	2.3500**	1.9361**	4.8009**	0.8677**
	(0.0932)	(0.1504)	(0.3342)	(0.1279)
N	3179	3179	3179	3179
chi2	239.3623	17.3757	83.237024	108.0573
p-value chi2	0.0000	0.0432	0.0000	0.0000
LR (vs. OLS)	1078.50	179.66	795.77	18.92
p-value LR	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses + p<0.10, * p<0.05, ** p<0.01. Odds ratios reported for binary outcomes.

Table 4: Regression coefficients –BMI and Related Behaviors (Restricted Sample – Excluded Job Separation "Initiated by Employer")

	BMI (1)	Drinking (2)	Smoking (3)	PE (4)
Past LM shock	0.8192+	2.4786+	6.2783+	0.9300
	(0.4463)	(1.3231)	(6.2801)	(0.3353)
(Age-18)	0.1875**	1.0657*	1.0950+	0.9883
	(0.0245)	(0.0293)	(0.0545)	(0.0203)
(Age-18)^2	-0.0023**	0.9986**	0.9977*	0.9998
	(0.0005)	(0.0005)	(0.0009)	(0.0004)
LM shock X (Age-18)	-0.0835*	0.9299+	0.9801	0.9871
	(0.0371)	(0.0398)	(0.0759)	(0.0306)
LM shock X (Age-18)^2	0.0013+	1.0013+	1.0002	1.0002
	(0.0007)	(0.0008)	(0.0014)	(0.0006)

Standard errors in parentheses + p<0.10, * p<0.05, ** p<0.01. Odd ratios reported for binary outcomes.

Table 5: Regression coefficients from Models with Current Labor Market Involvement (Restricted Sample)

	BMI (1)	Drinking (2)	Smoking (3)	PE (4)
Past LM shock	0.7484+	2.2840+	12.2923*	1.0494
	(0.4092)	(1.1038)	(15.1666)	(0.3403)
(Age-18)	0.1850**	1.0572*	1.1395+	0.9829
	(0.0245)	(0.0291)	(0.0792)	(0.0199)
(Age-18)^2	-0.0022**	0.9987*	0.9964**	0.9999
	(0.0005)	(0.0005)	(0.0013)	(0.0004)
LM shock X (Age-18)	-0.0812*	0.9336+	0.9920	0.9839
	(0.0348)	(0.0374)	(0.0968)	(0.0281)
LM shock X (Age-18)^2	0.0013+	1.0013+	1.0004	1.0003
	(0.0007)	(0.0007)	(0.0018)	(0.0006)
Current LM Involvement (Base category – not working)				
- **Part-time**	0.2258	1.1744	0.7966	1.5048+
	(0.2363)	(0.3690)	(0.4626)	(0.3671)
- **Full-time**	0.1440	1.4347*	1.0520	1.2617+
	(0.1361)	(0.2516)	(0.3634)	(0.1760)
- **Overtime**	0.0511	1.6161*	2.6522**	1.2571
	(0.1408)	(0.3037)	(0.9668)	(0.1875)
N	3179	3179	3179	3179
chi2	241.1699	24.0304	88.6086	110.7521
p-value chi2	0.0000	0.0201	0.0000	0.0000
LR (vs. OLS)	1077.33	178.71	796.08	18.87
p-value LR	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses + p<0.10, * p<0.05, ** p<0.01

Table 6: Regression coefficients - Heterogeneity with Timing of the Shock (Restricted Sample)

	BMI (1)	Drinking (2)	Smoking (3)	PE (4)
Panel A. Heterogeneity by Timing of the First Shock				
Past LM shock (<=2000)	2.1654	0.5865	1.7682	0.4143
	(1.2158)	(0.9068)	(2.0330)	(0.6296)
Past LM shock (>2000)	1.8880	0.5461	1.6687	-0.0640
	(0.9708)	(0.4825)	(1.2223)	(0.3308)
(Age-18)	1.2041**	0.0560*	0.1347*	-0.0100
	(0.0294)	(0.0264)	(0.0659)	(0.0198)
(Age-18)^2	0.9977**	-0.0014**	-0.0038**	-0.0002
	(0.0005)	(0.0005)	(0.0012)	(0.0004)
LM shock (<=2000) X (Age-18)	0.9160*	-0.0796	-0.0189	-0.0301
	(0.0397)	(0.0630)	(0.1402)	(0.0455)
LM shock (<=2000) X (Age-18)^2	1.0013+	0.0017	0.0010	0.0004
	(0.0008)	(0.0010)	(0.0023)	(0.0008)
LM shock (>2000) X (Age-18)	0.9301	-0.0277	-0.0058	-0.0374
	(0.0436)	(0.0417)	(0.0980)	(0.0308)
LM shock (>2000) X (Age-18)^2	1.0013	0.0004	0.0007	0.0008
	(0.0009)	(0.0008)	(0.0019)	(0.0006)
Panel B. Heterogeneity by Age at the First Shock				
Past LM shock	3.2818	7.2123	10.3608	0.6987
	(3.0533)	(8.6880)	(26.0599)	(0.6044)
Past LM shock at	0.3918	1.1361	1.1344	0.9976
age <35	(0.3965)	(1.5300)	(3.0592)	(0.9344)
(Age-18)	1.2041**	1.0677*	1.1515*	0.9862
	(0.0295)	(0.0293)	(0.0799)	(0.0197)
(Age-18)2	0.9977**	0.9986**	0.9964**	0.9998
	(0.0005)	(0.0005)	(0.0013)	(0.0004)
LM shock X (Age-18)	0.8904+	0.8828+	1.0181	0.9937
	(0.0537)	(0.0667)	(0.1622)	(0.0557)
LM shock X (Age-18)^2	1.0018+	1.0019+	0.9999	1.0003
	(0.0010)	(0.0012)	(0.0025)	(0.0009)
LM shock X (Age-18) X (Age<=35)	0.3918	0.7917+	0.9774	1.0576
	(0.3965)	(0.0968)	(0.2132)	(0.0854)
LM shock X (Age-18)^2 X (Age<=35)	1.1270	1.0091*	0.9984	0.9984
	(0.0959)	(0.0037)	(0.0058)	(0.0022)

Standard errors in parentheses + p<0.10, * p<0.05, ** p<0.01

Table 7: Regression coefficients – Some Continuous Measures of Health Behaviors (Restricted Sample)

	Cigarettes per day (1)	Exercise intensity (2)
Past LM shock	2.8278*	-0.0056
	(1.3402)	(0.1509)
(Age-18)	0.3003**	-0.0233**
	(0.0829)	(0.0089)
$(Age-18)^2$	-0.0065**	0.0002
	(0.0016)	(0.0002)
LM shock X (Age-18)	-0.1276	-0.0000
	(0.1196)	(0.0002)
LM shock X $(Age-18)^2$	0.0031	-0.0056
	(0.0024)	(0.1509)
N	2543	2854

Note: The estimation for the alcohol consumption in ethanol equivalent does not converge. Standard errors in parentheses + p<0.10, * p<0.05, ** p<0.01