Journal of Health Economics 49 (2016) 14–27

Contents lists available at ScienceDirect

Journal of Health Economics

journal homepage: www.elsevier.com/locate/econbase

The tax-free year in Iceland: A natural experiment to explore the impact of a short-term increase in labor supply on the risk of heart attacks

Thorhildur Ólafsdóttir [a,*], Birgir Hrafnkelsson [b], Gudmundur Thorgeirsson [c], Tinna Laufey Ásgeirsdóttir [a]

[a] University of Iceland, Oddi v/Sturlugötu, 101 Reykjavík, Iceland
[b] University of Iceland, Dunhagi 5, 107 Reykjavík, Iceland
[c] Landspitali, National University Hospital, University of Iceland, Hringbraut, 101 Reykjavik, Iceland

ARTICLE INFO

Article history:
Received 24 July 2015
Received in revised form 3 June 2016
Accepted 16 June 2016

JEL classification:
I1
J22

Keywords:
Coronary heart disease
Acute myocardial infarction
Labor supply
Natural experiment
Iceland

ABSTRACT

Evidence is mixed on whether society-wide economic conditions affect cardiovascular health and the reasons for the suggested relationship are largely untested. We explore whether a short-term increase in labor supply affects the probability of acute myocardial infarctions, using a natural experiment in Iceland. In 1987 personal income taxes were temporarily reduced to zero, resulting in an overall increase in labor supply. We merge and analyze individual-level, registry-based data on earnings and AMIs including all Icelandic men and women aged 45–74 during the period 1982–1992. The results support the prominent hypothesis of increased work as a mechanism explaining worsening heart health in upswings, for men aged 45–64 who were self-employed. We furthermore find a larger increase in probability of AMIs during the tax-free year in men aged 45–54 than men aged 55–64.

1. Introduction

In 1987, a natural experiment took place in Iceland when the income-tax rate was temporarily reduced to zero, resulting in a transitory labor-supply spike. We use register-based individual data on earnings and heart attacks for the Icelandic population to exploit a unique opportunity to examine whether a short-term increase in labor supply causes heart attacks.

The motivation for this research originates from a lack of consensus on (A) whether macroeconomic conditions affect heart health and (B) the mechanisms through which heart health could be affected by macroeconomic fluctuations. In this study we explore (A) and (B). Previous studies on this association from the U.S., Germany, Spain, 23 OECD countries and 23 EU countries have found that overall mortality and coronary heart disease mortality rates increase with declining unemployment rates (Johansson, 2004; Neumayer, 2004; Ruhm, 2000, 2007, 2015; Tapia Granados, 2005; Toffolutti and Suhrcke, 2014). The contrary has been found in a study exploring 13 European Union countries where mortality rates due to heart attacks increased during recessions (Economou et al., 2008).[1] Countercyclical mortality due to heart attacks has also been reported in studies using Swedish data (Gerdtham and Johannesson, 2005; Svensson, 2007, 2010) but those results are challenged by Tapia Granados and Ionides (2011), who conclude that heart attacks fluctuate procyclically in Sweden when GDP lagged by one year is used as a business cycle indicator.

As an explanation of the somewhat counterintuitive findings of procyclicality of heart attacks, it has been proposed that short-term increases in labor-market opportunities may affect health differently than long-term increases do. That is, during upswings, when wage levels are relatively high and the opportunity cost of time thus also high, individuals may temporarily be faced with the incentive to take advantage by temporarily spending more time working and less hours on time-intensive health production, such as exercise, getting enough sleep, preparing home cooked meals and

* Corresponding author at: University of Iceland, Oddi v/Sturlugötu, 101 Reykjavík, Iceland. Tel.: +(354) 820 1050; fax: +(354) 552 6806.
E-mail address: tho32@hi.is (T. Ólafsdóttir).

[1] It has been pointed out that in OECD countries with extensive social welfare systems and more rigid labor markets, the pro-cyclical effect of business-cycles on mortality rates is weaker, and that could explain the different results with regard to heart health (Gerdtham and Ruhm, 2006).

http://dx.doi.org/10.1016/j.jhealeco.2016.06.006
0167-6296/

doctor's visits (Quast and Gonzalez, 2014; Ruhm, 2000, 2007). That said, it is not assumed that working per se is harmful for health, rather, that by increasing hours of work, less time is available for time-intensive health production (Becker, 1965; Grossman, 1972). We note that with this hypothesis it is assumed that people can choose their work hours. As the unemployment rate was very low during the tax-free year, we assume that circumstances allowed for free choice of work hours.[2] Therefore the hypothesis put forward by Ruhm and discussed by other researchers in this literature, referring to Becker's theory of allocation of time and Grossman's theory of the demand for health, can be explicitly tested in this study.

A long-term increase in labor-market opportunities (e.g. being offered a double wage long-term) could thus affect health differently. In such an instance, people would not make use of the opportunity to temporarily work as much as they could, but could spend more time on leisure and health investment while staying on the same consumption path as before the wage change. That way better economic conditions in the long-run might result in better health outcomes, including better heart health.[3]

The probability of suffering a coronary event (which can be diagnosed as acute myocardial infarction (AMI)) is the result of a complex interplay of multiple long- and short-term risk factors (Arbab-Zadeh et al., 2012). Many of those risk factors are lifestyle-related, including chronic stress and sudden stressful events.[4] Among non-modifiable risk factors for coronary heart disease (CHD) are advancing age (risk doubles every decade after 55), gender and family history (World Health Organisation, 2014). Some of the modifiable risk factors for CHD (and AMI) vary with the business cycle and this may be related to cyclicality in labor supply. Drinking, smoking and physical inactivity have been reported to increase in upturns (Dee, 2001; Ettner, 1997; Johansson et al., 2006; Kruger and Svensson, 2010; Ólafsdóttir et al., 2014; Ruhm, 1995, 2005; Ruhm and Black, 2002; Xu, 2013), and hours of sleep were found to increase in a recent downturn in Iceland (Ásgeirsdóttir et al., 2014).

The tax-free year in Iceland has been used as an experiment in supply-side economics, as the short duration of the experiment and the fact that people did pay taxes during the tax-free year on previous year's earnings reduced any form of income effect leaving the substitution effect of the labor-supply response to be measured at its upper bound (Bianchi et al., 2001). The net response to the tax-free year was a short-term increase in labor supply that we explore as a possible influence on the probability of an AMI.[5] Fig. 1 displays the employment rate from 1960 to 1996 (Bianchi et al., 2001) and Fig. 2 displays incidence rates of AMI for men and women in Iceland over the period studied, 1982–1992, with the extension of data from 1992 to 2007. The rise in incidence rate in 1987 for men, which continues through 1988 and then drops in 1989, suggests a deviation from the trend that is sustained over a longer period than

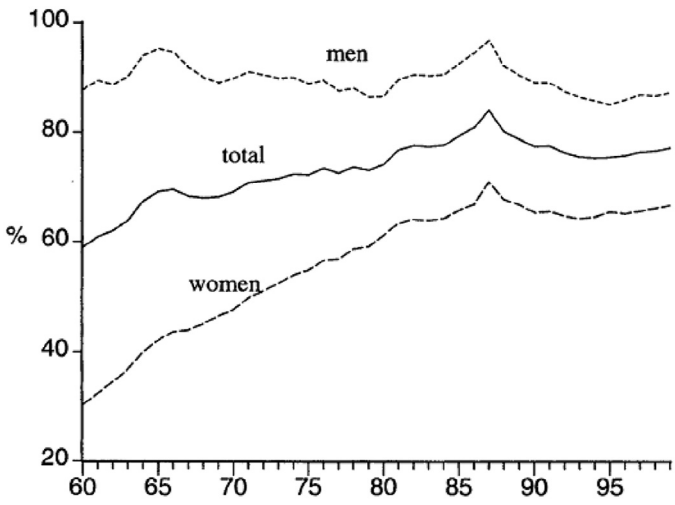

Fig. 1. Employment rate in Iceland 1960–1996 measured as the ratio of total number of weeks worked to the potential supply by all working-age individuals. Source: Bianchi et al. (2001).

deviations in other years suggest.[6] The reduction in CHD mortality over the period 1981–2006 has for the most part been attributed to risk factor reductions (73%) and treatments (25%) (Aspelund et al., 2010).

This study contributes to the limited knowledge of the labor-market pathway that could explain the observed association between macro-economic fluctuations and heart health in the following ways: First is by exploiting a unique natural experiment. Second, the results from previous aggregate analyses where the hypotheses are offered of the mechanisms through which the relationship works (Quast and Gonzalez, 2014; Ruhm, 2007) call for further research using individual-level analyses as in the current study. With micro data, it is possible to explore whether the possible effects on AMI probability are directly through those who increase their work or whether a change in the probability of AMI is more likely because of external effects of an accelerated economy, e.g. air pollution (Heutel and Ruhm, 2013). Third, most of the previous literature on cardiovascular health and macroeconomic conditions explores mortality as opposed to morbidity (Johansson, 2004; Neumayer, 2004; Ruhm, 2000, 2007; Tapia Granados, 2005), which could underestimate the total effect of the macro-economy on cardiovascular health. As an example, an increased probability of hypertension among males during an economic crisis was detected in a recent study using individual-level data (Asgeirsdottir et al., 2014).

A priori it is not obvious which individuals respond the most to the incentives of the tax-free year. This has been explored to some extent in a previous study with a sample size of 9274 individuals (Bianchi et al., 2001). The authors found that self-employed men increased their labor-supply the most. We explore this in our data with similar findings, but furthermore conduct this analysis by age-groups, thereby accounting for different responses to labor-market incentives by age as can be deduced by research on time-use, late career and age (Gauthier and Smeeding, 2003; Greller and Simpson, 1999). We consider two opposite effects of the tax-free year on the labor-supply response by age: (A) decreasing elasticity of substitution of leisure with age. That is, those in the older groups value their leisure time more since they have less of it left. (B) The

[2] The average unemployment rate over the observed period was 1.24% and in 1987 the unemployment rate was 0.4% (Directorate of Labour, 2015). Thus we assume that individuals could choose their work hours, in particular those individuals who were self-employed, for example through overtime or moonlighting.

[3] Lucas and Rapping (1969) were the first to apply the notion of inter-temporal substitution to labor supply. Based on their work, Blanchard and Fischer (1989) give an example that illustrates the inter-temporal substitution of leisure as a response to a transitory wage change, while a permanent wage shock would have no effect on labor supply. This result rests on an assumption of a large absolute value of the intertemporal elasticity of substitution of leisure.

[4] We refer to Ruhm's (2007) extensive literature review on the responsiveness of CHD death to environmental conditions.

[5] According to the Neoclassical theory of labor supply, the aggregate supply of labor may be very different (presumably larger) from that of the individual supply of the majority of workers if individuals cannot freely choose hours of work. Even though this notion generally pertains to the participation rate which is of less interest to our research question than the supply of work hours of those who already hold a salaried job, combining it with the notion of intertemporal substitution of leisure supports the use of the tax-free year as a natural experiment.

[6] In Iceland, age-standardized mortality rates due to AMI increased during 1951–1970, with a plateau between 1970 and 1980. Incidence rates of myocardial infarctions then declined during 1981–1998 by 40% and 34% in men and women respectively (Sigfússon et al., 2001).