Journal of Health Economics 31 (2012) 135–146

Contents lists available at SciVerse ScienceDirect

Journal of Health Economics

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

The *other* ex ante moral hazard in health☆

Jay Bhattacharya[a], Mikko Packalen[b,*]

[a] Stanford University School of Medicine, CHP/PCOR, 117 Encina Commons, Stanford, CA 94305-6019, United States
[b] University of Waterloo, Department of Economics, 200 University Avenue West, Waterloo, ON N2L 3G1, Canada

ARTICLE INFO

Article history:
Received 20 January 2011
Received in revised form 29 July 2011
Accepted 7 September 2011
Available online 16 September 2011

JEL classification:
I10
I18
D62
H23

Keywords:
Self-protection
Prevention
Innovation
Health insurance
Obesity

ABSTRACT

It is well-known that pooled insurance coverage can induce people to make inefficiently low investments in self-protective activities. We identify another ex ante moral hazard that runs in the opposite direction. Lower levels of self-protection and the associated chronic conditions and behavioral patterns such as obesity, smoking, and malnutrition increase the incidence of many diseases and consumption of treatments to those diseases. This increases the reward for innovation and thus benefits the innovator. It also increases treatment innovation which benefits all consumers. As individuals do not take these positive externalities into account, their investments in self-protection are inefficiently high. We quantify the lower bound of this externality for obesity. The lower bound is independent of how much additional innovation is generated. The results show that the externality we identify offsets the negative Medicare-induced insurance externality of obesity. The Medicare-induced obesity subsidy is thus not a sufficient rationale for "soda taxes", "fat taxes" or other penalties on obesity. The quantitative finding also implies that the *other* ex ante moral hazard that we identify can be as important as the ex ante moral hazard that has been a central concept in health economics for decades.

1. Introduction

It is well-known that pooled insurance coverage can create a disincentive for the insured individual to invest in self-protective activities – a form of ex ante moral hazard (Ehrlich and Becker, 1972). In health economics it is also well understood that insurance coverage can create also an ex post moral hazard (Pauly, 1968; Manning et al., 1987). These moral hazards are induced by insurance, but the term moral hazard (and our use of the term) refers to the more general "problem of inducing agents to supply proper amounts of productive inputs" in the presence of hidden action and can occur in multi-agent models even when there is no uncertainty (Holmström, 1982). The ex ante and ex post moral hazards both lead to a negative externality: the former causes people to invest insufficiently in self-protection, while the latter causes people to consume health care resources at an inefficiently high level.

In this paper, we identify a distinct second form of ex ante moral hazard that runs in the opposite direction from the one examined by Ehrlich and Becker (1972). It causes people to devote an inefficiently high level of resources to self-protection.

This *other* ex ante moral hazard arises through the impact that self-protection has on the reward for innovation. Lower levels of self-protective activities such as exercise and healthy diet and the associated chronic conditions and behavioral patterns such as obesity, smoking, and malnutrition increase the incidence of many diseases and consumption of treatments to those diseases by the individual. This increases the reward for innovation that an innovator receives and thus benefits the innovator. By the induced innovation hypothesis, which has broad empirical support, the increase in the reward for innovation increases also the innovation of treatments to those diseases. Because consumers capture some of the surplus created by pharmaceutical and other medical innovation, this additional innovation benefits all people who are afflicted with any of those diseases.

☆ We thank Tyler Cowen, Steven Levitt, Neeraj Sood, an anonymous referee, and participants at the NBER Health Care 2008 meeting for helpful comments and discussions. We are responsible for all remaining errors. Bhattacharya thanks the National Institute on Aging for funding his work on this project.

* Corresponding author. Tel.: +1 519 888 4567.
E-mail addresses: jay@stanford.edu (J. Bhattacharya), packalen@uwaterloo.ca (M. Packalen).

0167-6296/$ – see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.jhealeco.2011.09.001

A lower level of self-protection has therefore two positive external impacts: it directly increases the reward for innovation which benefits the innovator, and it indirectly induces additional innovation which benefits other consumers. Because people do not account for these positive externalities when they decide their levels of self-protection, this mechanism – the *other* ex ante moral hazard – causes people choose inefficiently high levels of self-protection. The mechanism examined here and the mechanism examined in Ehrlich and Becker (1972) are ex ante moral hazards in the same sense: the private and social optimum differ for the prevention decision that is taken before health status is revealed.

We call the combined external effect from a lower level of self-protection on the innovator and other consumers as the "innovation externality". The presence of the externality on the innovator implies that the mechanism that we identify is present and quantitatively important even if there is no induced innovation effect and that – as is shown by our formal analysis – the innovation externality is present even when the innovator captures the entire ex post surplus from innovation.[1]

Our analysis concerns goods for which the reward for innovation from each consumer is increasing in the consumer's consumption of the good. Accordingly, the innovator's marginal revenue from any consumer, including the consumer who is marginal in terms of the consumer's level of self-protective activities, is always above the marginal social cost. This gap between marginal revenue and social cost, together with the presence of self-protective activities that influence the intensity of demand, is the impetus for the existence of the *other* ex ante moral hazard and the associated optimal subsidy for lower levels of self-protection. This gap between marginal revenue and social cost is also the reason why our analysis differs from the famously erroneous analysis of pecuniary external economies and diseconomies of scale in the production of existing goods by Pigou (1912). Contrary to what Pigou asserted, taxes or subsidies for consumption are not warranted in the cases he examined because the producer's revenue from the marginal consumer is equal to the marginal social cost (see Young, 1913, and e.g. Liebowitz and Margolis, 1995). In contrast, for newly invented goods this marginal revenue and the marginal social cost are different.

The central role of the reward for innovation in our analysis is also a reason why we focus our analysis of the *other* ex ante moral hazard on health. As is well known, the share of revenue that is reward for innovation is much greater in the pharmaceutical industry than in most if not even all other industries. The potential of the innovation externality to drive a large wedge between the privately and socially optimal levels of self-protection is thus substantial in health. Another factor driving our focus on health is the presence of important self-protective activities (prevention) that influence the intensity of ex post demand.

The economic efficiency consequences of the ex ante moral hazard examined by Ehrlich and Becker (1972) depend on what extent marginal health care costs are shared through insurance and on how elastic self-protective activities are with respect to the associated benefits. Similarly, the economic efficiency consequences of the ex ante moral hazard that we identify depend on the size of the innovation externality and on how elastic self-protective activities are with respect to the associated benefits. Unfortunately, it is very hard to obtain reliable self-protective elasticity measures and, consequently, evidence on this central concept in health economics is scant.

For this reason we limit the scope of the quantitative part of our analysis to the measurement of the magnitude of the innovation externality and how large it is in comparison with the pooled health insurance externality. The comparison provides an assessment of the relative importance of the two forms of ex ante moral hazard in health. Moreover, in most economic models of externalities – including the model that we present – the optimal policy depends only on the magnitude of the external effect and is independent of the relevant behavioral elasticity (of course, the elasticity must be non-zero for policies to have efficiency implications). Quantifying the innovation externality thus goes a long way toward determining the optimal policy, and is also sufficient to capture its distributional consequences.

While the innovation externality and the associated *other* ex ante moral hazard apply to health behavior in general, we present the analysis in the context of obesity, which is known to increase the prevalence of many diseases and the associated medical expenditures. This focus enables us to keep the analysis concrete and efficiently quantify the innovation externality of obesity to demonstrate that the mechanism we identify is also quantitatively important.

In the theoretical part we present a model which allows us to characterize the magnitude of the innovation externality of obesity in terms of straightforward and empirically malleable economic concepts. We derive an expression for the lower bound of the innovation externality, which is independent of the extent of induced innovation. While our main focus is on total welfare, we also show that this lower bound has an alternative interpretation from the consumer welfare perspective. In the quantitative part we use the lower bound to calculate the innovation externality for obesity, and compare this positive externality with the negative Medicare-induced health insurance externality of obesity.

2. Related literature

2.1. Obesity, disease, and health expenditures

Americans are increasingly overweight or obese. The proportion of adults classified as obese increased from 12.0% in 1991 to 20.9% in 2001 (Mokdad et al., 1999, 2003; Wang and Beydoun, 2007).

Obesity is associated with an increased risk of a range of chronic conditions, including diabetes, hypertension, heart disease, and stroke (Kasper et al., 2004). In some cases, there are solid biochemical and physiological reasons to suppose that the association is causal, such as in the case of diabetes. In other cases, the evidence is murkier. Here, we do not attempt to settle (nor are we capable of settling) the debate over which of these relationships are causal. Instead, our aim is to show that if the effect of obesity on disease prevalence is causal and obesity therefore has a negative Medicare-induced health insurance externality then obesity has also an offsetting positive innovation externality. Either externality is present only for diseases for which the relationship is causal, and absent when it is not. The extent to which the relationships are causal is thus unlikely to significantly change the relative comparison of the two opposing externalities of obesity. For this reason we are comfortable with limiting the scope of our analysis to not include an analysis of to what extent the associations between obesity and disease prevalence represent causal effects.

Not surprisingly, also expected health care expenditures are higher for the obese than for normal weight individuals. A large

[1] Our analysis thus does not rely on the assumption that there is an underinvestment in innovation from the perspective of total surplus, holding the level of self-protective activities constant. The only case when there is no positive innovation externality is when there is a large enough overinvestment in innovation that the increase in the reward for innovation leads to a decrease in total surplus. Given the empirical evidence on private vs. social returns to R&D (see e.g. Jones and Williams, 1998; Bloom et al., 2007) it seems very unlikely that this special case applies in practice.