A welfare measure of “offset effects” in health insurance

Jacob Glazer a,b, Thomas G. McGuire c,*

a Tel Aviv University, Israel
b Boston University, United States
c Department of Health Care Policy, Harvard Medical School, United States

Abstract

Changing health insurance coverage for one service may affect use of other insured services. When improving coverage for one service reduces use of another, the savings are referred to as “offset effects.” For example, costs of better coverage for prescription drugs may be partly “offset” by reductions in hospital costs. Offset effects have welfare implications but it has not been clear how to value these impacts in design of health insurance. We show that plan-paid – rather than total – spending is the right welfare measure of the offset effect, and go on to develop a “sufficient statistic” for evaluating the welfare effects of change in coverage in the presence of multiple goods. We derive a simple rule for when a coverage improvement increases welfare due to offset effects.

$35 of each dollar saved in drug costs. Chandra et al. (2010) found that the savings in costs due to higher copayments for drugs were partly offset by higher spending on hospital services among retired state employees in California. They tracked offsets by payer since a primary (Medicare) and secondary (employer-provided supplemental) shared in offsets unequally.

The implicit logic in offset papers is that if total medical costs fall due to an increase in coverage, then the change in coverage is welfare improving (i.e. “pays for itself”). This paper argues that change in total medical spending, meaning the sum of plan and patient out-of-pocket spending, is not the right measure of the economic value (or cost) of a change in insurance coverage due to offset effects. Rather, health plan costs alone measure the economic value of savings due to reductions in the use of other services. Applying methods reviewed by Chetty (2009), we show that a “sufficient statistic” for evaluating the welfare effect of change in coverage for one good is

1. Introduction

Health insurance coverage for one good or service can affect the quantity demanded of other goods or services in a health plan. Following an improvement in coverage for one good, a reduction in the quantity demanded of other services or goods is referred to as an offset effect. A large empirical literature in health economics and health services research, focusing on coverage for drugs, finds offset effects, and measures these effects by the change in total spending on the other covered goods. For example, Shang and Goldman (2007) use Medicare Current Beneficiary Survey (MCBS) data from 1992 to 2000 to show that the extra spending on drugs induced by medigap coverage is more than offset by reductions in total health care spending on other goods. Hsu et al. (2006) compare medical spending for Medicare beneficiaries with a cap on drug coverage to spending by those without a cap at Kaiser Permanente of Northern California prior to Medicare Part D. Drug spending was 28% less in the capped group but other categories of expenditures were higher and total spending for all care was not significantly different between the groups, implying a near dollar-for-dollar offset in total costs. Gaynor et al. (2007) study the effect of increases in copayments charged for drugs among private employees on total (plan plus consumer) spending. Increases in non-drug spending, largely in outpatient care, offset
the change in total plan-paid costs less the change in costs transferred to/from consumers.\footnote{Chetty (2009) uses the term as follows. A statistic, e.g., the decline in plan-paid costs, is “sufficient” for welfare analysis in the sense that conditional on this information, no other statistics from the data are informative about welfare. An exact measure of welfare is obviously a sufficient statistic.} We go on to derive an elasticity rule for when the offset effects of an improvement in coverage increase welfare.

A simple argument shows why total costs are not the right welfare measure of an offset effect. Suppose the plan covers just one service, “health care,” and an increase in coverage of health care increases a consumer’s total expenditures on health care. The consumer budget constraint implies that spending on some other non-covered services has to fall. This “offset” says nothing about efficiency since coverage expansions are always exactly “offset” in this trivial sense. What if the affected other spending were on another form of health care that was minimally covered in the plan, say for one percent of costs with consumers paying ninety nine percent? Logically, token coverage cannot imply that we should count the full spending change as an offset.

To see the intuition for our result about the role of plan-paid costs consider the following example. Suppose that there are two services and both are (partially) covered by insurance, namely the individual has to pay some copayment lower than the marginal cost of providing the services. What is the effect of a change in the level of copayment of one of the two services on welfare? Since the level of services the individual chooses to use is at the point where his marginal benefit equals the copayment, and since the copayment is less than marginal cost, there is a welfare loss associated with the consumption of the two services. The change in welfare loss is just the sum of the changes in consumption induced by the reduction in copayment for service 2.

Consider now what happens to utility (welfare) (Eq. (3')) if the plan were to change the copayment for service 2:

\[
\frac{\partial U(c_1,c_2)}{\partial c_2} = (B_1 - 1) \frac{\partial x_1}{\partial c_2} + (B_2 - 1) \frac{\partial x_2}{\partial c_2}
\]

(4)

The second equality follows from Eq. (1). Suppose copayment for service 2 is reduced. If \(\frac{\partial x_1}{\partial c_2} > 0\), there is an offset effect and consumption of \(x_1\) falls with this change. What happens to welfare? Eq. (4) tells us how to value the offset. Reversing the sign of Eq. (4) to get an expression in terms of plan shares, when copayment for service 2 goes up (down), utility of the individual goes up (down) if and only if Eq. (5) holds:

\[
\frac{(1-c_1) \frac{\partial x_1}{\partial c_2} + (1-c_2) \frac{\partial x_2}{\partial c_2}}{x_2} < 0
\]

(5)

Offset effect
Own-price effect

The intuition for this result is the following: the second term on the left-hand side of the inequality captures the inefficiency in consumption induced by the reduction in copayment for service 2. With health insurance, the marginal benefit of health care is less than the marginal cost (\(B_2 = c_2 < 1\)), and the extra consumption of \(x_2\) due to the reduction in copayment creates additional welfare loss.\footnote{In the conventional analysis of optimal health insurance, this welfare loss is weighted against the risk spreading gain to find the optimal copayment, \(c_2\) (Zeckhauser 1970). We return to the issue of risk below.} The first term on the left-hand side in Eq. (5) is the offset effect due to the change in consumption (in this case reduction) of \(x_1\). Just as with the own-price effect, benefits and costs both matter in valuing welfare of any offset effect. The \(\frac{\partial x_1}{\partial c_2}\) part is the reduction in total cost from the change in \(x_1\) and, since \(B_1 = c_1\), the \(-c_1 \frac{\partial x_1}{\partial c_2}\) part is the loss in benefits. Thus, the net welfare measure of offset effects is plan savings: \((1-c_1) \frac{\partial x_1}{\partial c_2}\).

We can relate the analysis to changes in plan’s costs. From Eq. (2) we know that when copayment for service 2 changes, the change in the plan’s costs is given by:

\[
\frac{\partial R(c_1,c_2)}{\partial c_2} = (1-c_1) \frac{\partial x_1}{\partial c_2} + (1-c_2) \frac{\partial x_2}{\partial c_2} - x_2
\]

(6)

Expression Eq. (4) for welfare and Eq. (6) for plan costs are the same except for the presence of \(x_2\), the cost shifting effect of a change in \(c_2\), a transfer ultimately paid by the consumer in any case. Using Eqs. (4) and (6) we can state a rule for welfare in terms of plan-paid costs.

2.1. Rule for welfare effects

The welfare effect of a change in coverage is equal to minus the change in plan costs net of the cost-shifting effect of the coverage change.

Proof. From Eqs. (4) and (6) we get:

\[
\frac{\partial U(c_1,c_2)}{\partial c_2} = -\frac{\partial R(c_1,c_2)}{\partial c_2} - x_2
\]

(7)
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