# What Proportion of the Total Value Generated by New Drugs Accrues to Manufacturers? Review of Empirical Estimates of Producer Surplus

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## Introduction

Medical innovations can provide multiple benefits to patients, families, employers, payers, and health systems. These societal benefits, including reductions in morbidity, mortality, hospitalizations, and other healthcare resource use, are typically incorporated into CEAs. Total societal benefits, which may include productivity and educational attainment, caregiver burden, and other elements from the 'ISPOR value flower', have typically not been well accounted for in CEAs.

In welfare economics, manufacturers' total net revenue is referred to as producer surplus (PS), whilst the remaining proportion of total societal benefits is termed consumer surplus (CS). PS is important as it is a common element in normative debates on firm profits and, more recently, in developing methods to assess the pharmaceutical market's dynamic efficiency.

## Objectives

**The objective was to:**

**Review empirical studies estimating PS in pharmaceutical markets and conduct descriptive analyses of the results.**

## Methods

We conducted a pragmatic literature search to identify empirical studies of PS in pharmaceutical markets. The search was conducted in PubMed® and Google Scholar. Keywords associated with PS studies included "producer surplus", "manufacturer appropriation of surplus", "allocation of economic value", "value of innovation", and "social/societal value". English language peer-reviewed studies with empirical estimates of PS published from 2000–2024 were included. Non-peer-reviewed articles and conference abstracts were excluded. Key information from selected studies was extracted using a standardized table. Abstracted data were independently verified by two reviewers to ensure accuracy. Findings were synthesized narratively, highlighting common themes and methodological gaps. Quantitative data were summarized using descriptive statistics to stratify results on study methodology, therapeutic area, drug or drug class, WTP for health gains, components of value incorporated, and country.

## Results

A total of 16 studies provided 43 unique estimates of PS, predominantly from the US (55.8%) and the UK (34.9%), with the remainder from other countries (9.3%).

There was considerable variation in methods, including different retrospective and cost-effectiveness-based analyses. All studies included WTP for health gains capturing demand-side opportunity costs, with one study also including supply-side budgetary constraints:

- All but one study evaluated PS for a drug or drug class for a single disease state; Hult and Philipson (2023) (1) summarized PS estimates from over 3,000 CEAs
- All studies calculated the value of health gains based on WTP for improvements in QALYs (36 PS estimates) or LYGs (7 estimates)
- A variety of time periods (earliest was 1980) and time horizons (4–60 years) were employed
- One study, which had 12 drug-specific estimates, adopted a unique approach in that opportunity costs were noted for both demand (WTP for health gains) and supply side, reflecting a strictly rationing healthcare system

Two dimensions of all analytic approaches are highlighted in Table 1.

- 10/16 studies assessed CS as a narrowly defined health surplus (reductions in morbidity, mortality, and healthcare resource utilization), 4 included workforce productivity, and only 2 studies attempted to capture broader measures of value that might be considered a total CS from a societal perspective
- 1 US study attempted to distinguish between actual revenues and gross drug expenditures. This complicates interpretation of PS results due to rebates and other fees, ranging from ~10–50% depending on drug class and payer, which accrue to other actors in the pharmaceutical supply chain

**Table 1: Analytic approaches of included empirical studies of PS**

| Consumer surplus estimate | Producer surplus estimate: Net price† | Producer surplus estimate: Total drug expenditures/list price |
|---|---|---|
| **Total CS** | Romley et al (2018) (2) US | Lakdawalla et al (2010) (8) US |
| **Health surplus + work productivity** | Berdud et al (2023) (3) UK/SE†<br>Lindgren and Jönsson (2012) (4) SE†<br>Lindgren et al (2022) (5) SE† | Vanderpuye-Orgle et al (2016) (9) US |
| **Health surplus** | Camejo et al (2014) (6) UK†<br>Woods et al (2021) (7) UK†‡ | Garrison and Veenstra (2009) (10) US<br>Grabner et al (2011) (11) US<br>Jena and Philipson (2008) (12) US<br>Hult and Philipson (2023) (1) Multiple§<br>Cutler et al (2007) (13) US<br>Garrison et al (2024) (14) US<br>Philipson and Jena (2006) (15) US<br>Grabowski et al (2012) (16) US |

† For these ex-US studies, we assume that drug prices are effectively 'net' as the share of wholesalers, etc., is much lower than in the US, but non-zero.

‡ Unique inclusion of both demand- and supply-side measures of opportunity costs to capture strict rationing of care.

§ 3,000 CEAs from multiple countries were collated, which made the list/net distinction less clear; also 20% of the studies accounted for productivity.

Estimates of PS are summarized in Table 2. Estimates from Woods et al (2021) (7) tended to be much greater, reflecting their inclusion of both demand- and supply-side opportunity cost measures. Due to distinct methodological approaches and the resulting impact on estimates, descriptive results were stratified accordingly. The overall mean PS estimate was 42.8%, which reduced to 16.9% without Woods et al (with an estimate of 110.0% for Woods et al alone). UK studies as well as cancer treatments had higher PS estimates, regardless of opportunity cost treatment.

There was little meaningful variation in PS estimates based on comparator or retrospective versus prospective analysis, which may be because all studies focused on health surplus, not total social benefits accruing to consumers.

There was a weak relationship between all PS estimates and WTP for health gains (Figure 1), with a clear linear relationship between PS and WTP within studies that included multiple WTP levels. A major driver was study methodology, with the approach of Woods et al (2021) (7) generating higher estimates of PS.

**Table 2: Summary of PS estimates by study characteristics**

| Category | Subcategory | N | Mean PS, % |
|---|---|---|---|
| **Overall** | Overall | 43 | 42.8 |
| | Without Woods et al (2021) (7) | 31 | 16.9 |
| **WTP level** | WTP ≤50k | 15 | 93.0 |
| | WTP 51–150k | 13 | 14.8 |
| | WTP >150k | 13 | 16.8 |
| **Country** | US | 24 | 17.4 |
| | UK | 3 | 26.8 |
| | Other | 4 | 6.8 |
| | UK – Woods et al (2021) only | 12 | 110.0 |
| **Therapeutic area** | Cancer | 6 | 27.0 |
| | Non-cancer | 25 | 14.5 |
| | Cancer – Woods et al (2021) only | 7 | 148.0 |
| | Non-cancer – Woods et al (2021) only | 5 | 56.0 |
| **Comparator** | Counterfactual | 13 | 13.2 |
| | Drug | 18 | 19.6 |
| | Drug – Woods et al (2021) only | 12 | 110.0 |
| **Analytical method** | CEA | 10 | 16.2 |
| | CEA – Woods et al (2021) only | 12 | 110.0 |
| | Retrospective | 21 | 17.2 |

**Figure 1: Estimates of PS versus WTP for health gains**




## Conclusion

**Prior empirical studies likely overestimate the proportion of social value of innovation that accrues to manufacturers due to two methodological shortcomings:**

1. **Many studies of PS fail to account for the full range of social benefits arising from pharmaceutical innovation**
2. **Most studies do not accurately account for true net manufacturer revenues and so effectively estimate surplus accruing to the entire pharmaceutical supply chain**

**Our findings underscore the need to more comprehensively capture elements of value to estimate PS with greater validity.**

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### Abbreviations

CEA, cost-effectiveness analysis
CS, consumer surplus
LYG, life year gained
PS, producer surplus
QALY, quality-adjusted life year
SE, Sweden
WTP, willingness to pay