

INTRODUCTION

- **Multi-indication drugs:** drugs used to treat multiple indications—different diseases, various stages of the same disease, distinct treatment phases, or in combination with other therapies.
- **Challenge:** therapeutic versatility, different patient populations, and treatment values across indications. **How to properly price those drugs?**
- **How are multi-indication drugs priced today?**
 - Single price based on the first approved indication (Turkey, the Netherlands and, to some extent, the US)
 - Average price across all indications, weighted by volume alone (Spain) or by volume and value (Germany, France, Canada, Belgium, Australia)
 - Indication-based pricing: Different price per indication, through:
 - Differential MEA/discounting from a single list price (UK, Switzerland, some U.S. insurers, Italy until 2019)
 - Separate brand names with distinct pricing

MODEL SETUP

- A monopoly health plan offers a multi-indication drug to all clinically eligible patients in indication i if that indication's price does not exceed a **threshold determined by a function of the expected therapeutic benefits** of some or all n indications
$$p_i \leq \mathcal{P}(\mathbb{E}[b_1(x_1)|x_1 \leq \hat{x}_1], \dots, \mathbb{E}[b_i(x_i)|x_i \leq \hat{x}_i], \dots, \mathbb{E}[b_n(x_n)|x_n \leq \hat{x}_n])$$
- where:
 - $b_1(x_1)$ is the therapeutic benefit from indication i , with $b'_i(x_i) < 0$.
 - $x_i \in [0,1]$ is the therapeutic mismatch with the drug's mechanism of action, with density $f_i(x_i)$ and distribution $F_i(x_i)$
 - \hat{x}_i is the **greatest therapeutic mismatch the drug manufacturer chooses to include in the clinically eligible population** for indication i
- The manufacturer's strategic choices of $\{\hat{x}_i\}_{i=1}^n$ simultaneously **determine the demand for the drug and its expected therapeutic benefit** in each indication—and hence influence the price in each indication.

RESULTS

Indication-Based Pricing

Prices equal expected therapeutic benefits

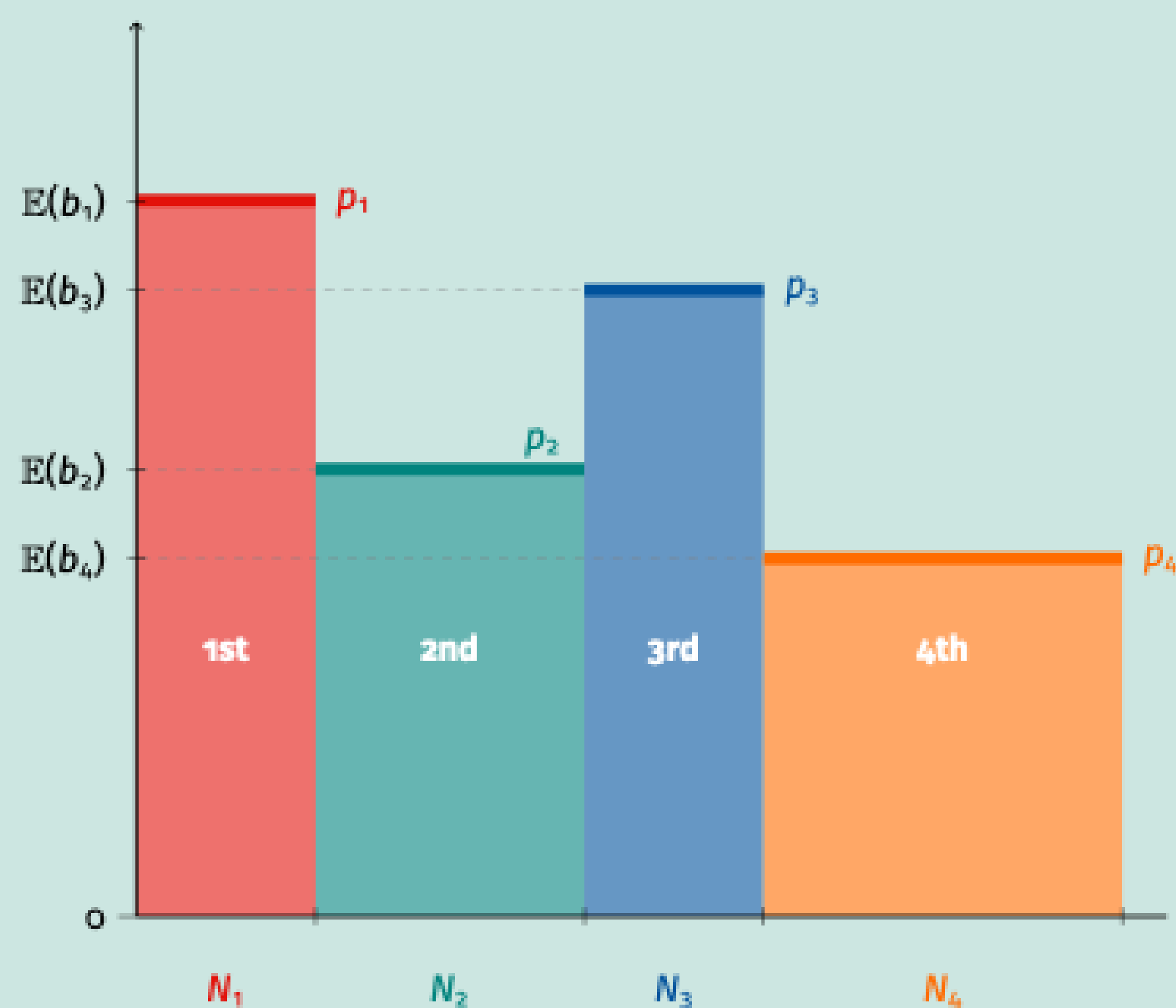


Figure 1: Expected therapeutic benefits ($\mathbb{E}(b_i)$), clinically eligible patient populations fully covered by the health plan (N_i), and indication-specific prices ($p_i = \mathbb{E}(b_i)$) set dynamically as each of four sequentially introduced indications ($i = 1, 2, 3, 4$) become available. Source: Barros et al. (2025).

Population-Weighted Uniform Pricing

Single price adjusts as portfolio expands



Figure 2: Expected therapeutic benefits ($\mathbb{E}(b_i)$), clinically eligible patient populations fully covered by the health plan (N_i), and a population-weighted uniform price ($p_{(1,n)} = \frac{\sum_{i=1}^n \mathbb{E}(b_i) \times N_i}{\sum_{i=1}^n N_i}$) that adjusts dynamically as each of four sequentially introduced indications ($i = 1, 2, 3, 4$) become available. n denotes the number of available indications. Source: Barros et al. (2025).

Pure Subscription Model (The "Netflix Model")

Lump-sum payment adjusts as portfolio expands

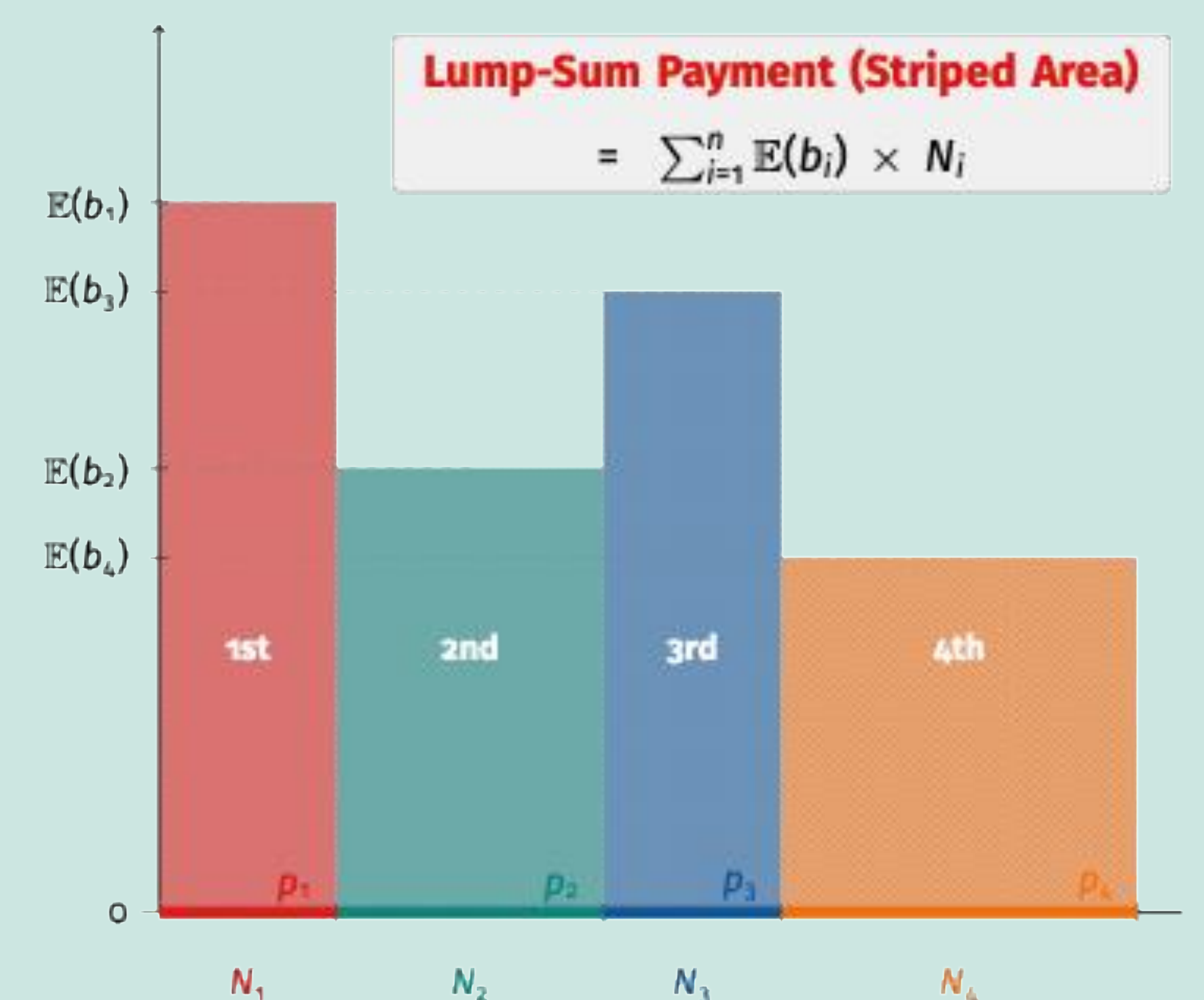


Figure 3: Expected therapeutic benefits ($\mathbb{E}(b_i)$), clinically eligible patient populations fully covered by the health plan (N_i), and a particular case of a two-part tariff: indication-specific prices ($p_i = 0$) plus a lump-sum payment equal to total therapeutic benefit ($\sum_{i=1}^n \mathbb{E}(b_i) \times N_i$) that adjusts dynamically as each of four sequentially introduced indications ($i = 1, 2, 3, 4$) become available. n denotes the number of available indications. Source: Barros et al. (2025).

- **Efficient pricing mechanisms:** across those pricing mechanisms, the objective function of the manufacturer equals total therapeutic benefit across all indications → **exactly those patients with nonnegative therapeutic benefit are included in clinical trials** and receive the treatment by the health plan
 - Efficient pricing mechanisms emerge as **equilibrium outcomes of Nash bargaining problems** → no need to be exogenously imposed on manufacturers
- **Inefficient pricing mechanisms:**
 - *Unweighted average uniform pricing:* population of high-benefit indications with few patients inefficiently restricted to push price upwards; indications with low expected therapeutic benefit but large patient populations inefficiently expanded
 - *Anchor pricing:* uniform price anchored to a single indication's expected therapeutic benefit; manufacturer inefficiently restricts anchor indication's eligible population and goes full coverage in all other indications (volume effect)
- **Sequential efficiency:** if indications are introduced sequentially, efficiency is maintained *if prices can adjust both upward and downward over time*. Otherwise, different types of inefficiencies depending on whether the manufacturer is myopic or forward-looking.

POLICY IMPLICATIONS

- 1 **Static efficiency:** Three pricing mechanisms achieve efficient allocation by maximizing therapeutic benefit and ensuring only patients with non-negative therapeutic benefit receive treatment: Indication-based pricing, weighted average uniform pricing and two-part tariffs
- 2 **Sequential efficiency:** Efficiency is maintained when indications are introduced sequentially, *provided prices can adjust both upward and downward over time*. If not, other inefficiency emerges
- 3 **Pricing Mechanisms as Bargaining Equilibria:** the bargaining solution essentially prevents the manufacturer to fully extract the health plan's surplus, although maintaining efficiency
- 4 **Policy flexibility:** While all three mechanisms deliver identical efficient outcomes, they differ conceptually and in practical feasibility. Use other criteria to select preferred mechanism.
- 5 **The limits of HTA:** Under efficient pricing mechanisms but without bargaining power, the manufacturer captures the entire total therapeutic benefit as profits, leaving the health plan with zero surplus.

