

Economic Evaluation of Checkpoint Inhibitors for the Treatment of Advanced Melanoma in the Irish Healthcare Setting

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Introduction

The objective of this research is to assess the cost-effectiveness of checkpoint inhibitors (CIs) for the first-line treatment of unresectable or metastatic (advanced) melanoma (AM) in the Irish healthcare setting.

Methods

The cost-effectiveness analysis was conducted with reference to the Guidelines for Economic Evaluation in Ireland. The included interventions were all CIs licensed in Europe AM (ipilimumab, pembrolizumab, nivolumab, nivolumab in combination with ipilimumab (NIVO-IPI)). The comparator was intravenous dacarbazine. A de-novo three-health state partitioned survival model was constructed. The perspective was that of the Irish health service, with a cycle length of one week and time horizon of 30 years. A discount rate of 5% was applied to costs and outcomes. Efficacy inputs were derived through systematic review, and network meta-analysis. Kaplan-Meier curves were digitised and recreated using R to provide baseline estimates of hazard. Parametric methods were used to extrapolate survival, with external data from melanoma registries used to inform long-term projections. EQ-5D-3L utility data from the pivotal trials were applied. Resource use estimates were derived from the literature and analysis of national hospital episode statistics. Diagnosis-related group costs were used (€ 2018), supplemented with cost data from Irish tertiary hospitals and the literature. A full incremental analysis was conducted, with incremental cost per quality adjusted life year (QALY) as the outcome. Probabilistic and deterministic sensitivity analyses were conducted.

Results

Ipilimumab was excluded due to extended dominance, and nivolumab was dominant of pembrolizumab. The ICER for nivolumab versus dacarbazine was €85,044/QALY (incremental costs €63,163, incremental QALYs 0.81) and for NIVO-IPI versus nivolumab was €287,501/QALY (incremental costs €89,270, incremental QALYs 0.31). Outcomes were most sensitive to assumptions regarding survival, treatment costs, and discount rates. The probability of cost-effectiveness for nivolumab at the Irish cost-effectiveness threshold of €45,000/QALY was 9%.

Conclusions

- Checkpoint inhibitors are not cost-effective for the treatment of advanced melanoma at the Irish cost-effectiveness threshold of €45,000/QALY.
- Dominant treatment options and opportunities for divestment have been identified.
- Reassessment with more mature clinical trial data can change the cost-effectiveness estimates.

Cumulative Rankogram 1L Treatments OS

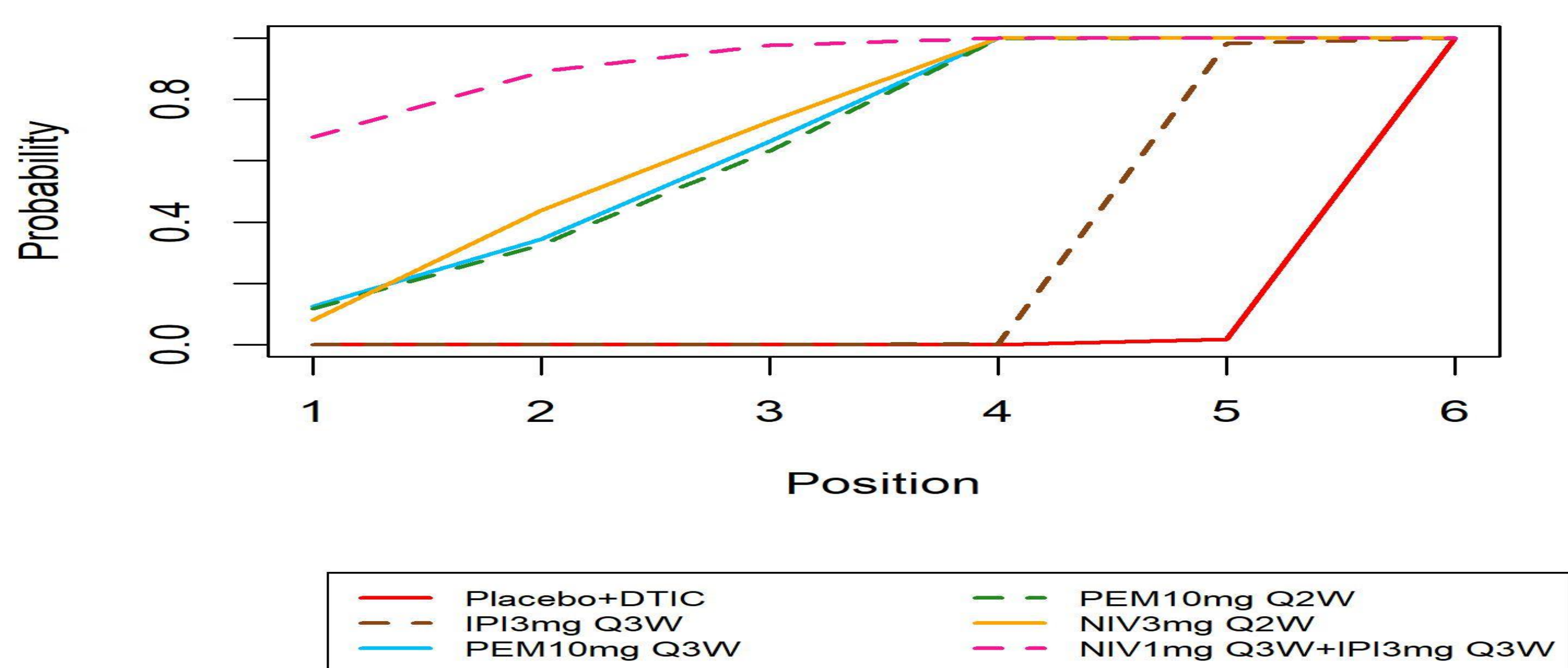


Figure 1: Cumulative rankogram of included treatments, for the overall survival outcome

Partitioned Survival Model

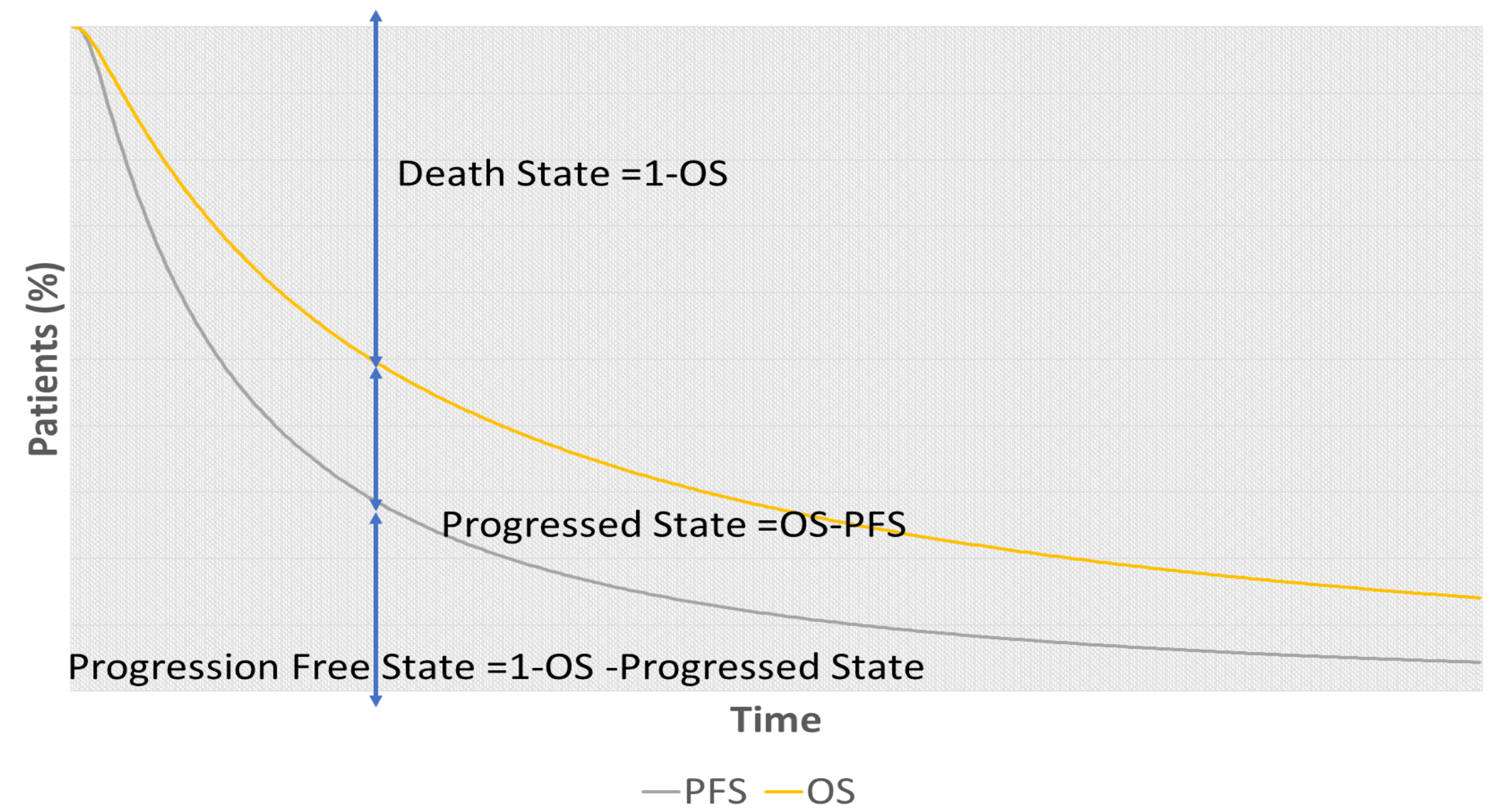


Figure 2: Model structure. PFS=Progression Free Survival, OS= Overall Survival

Probabilistic Model Outcome

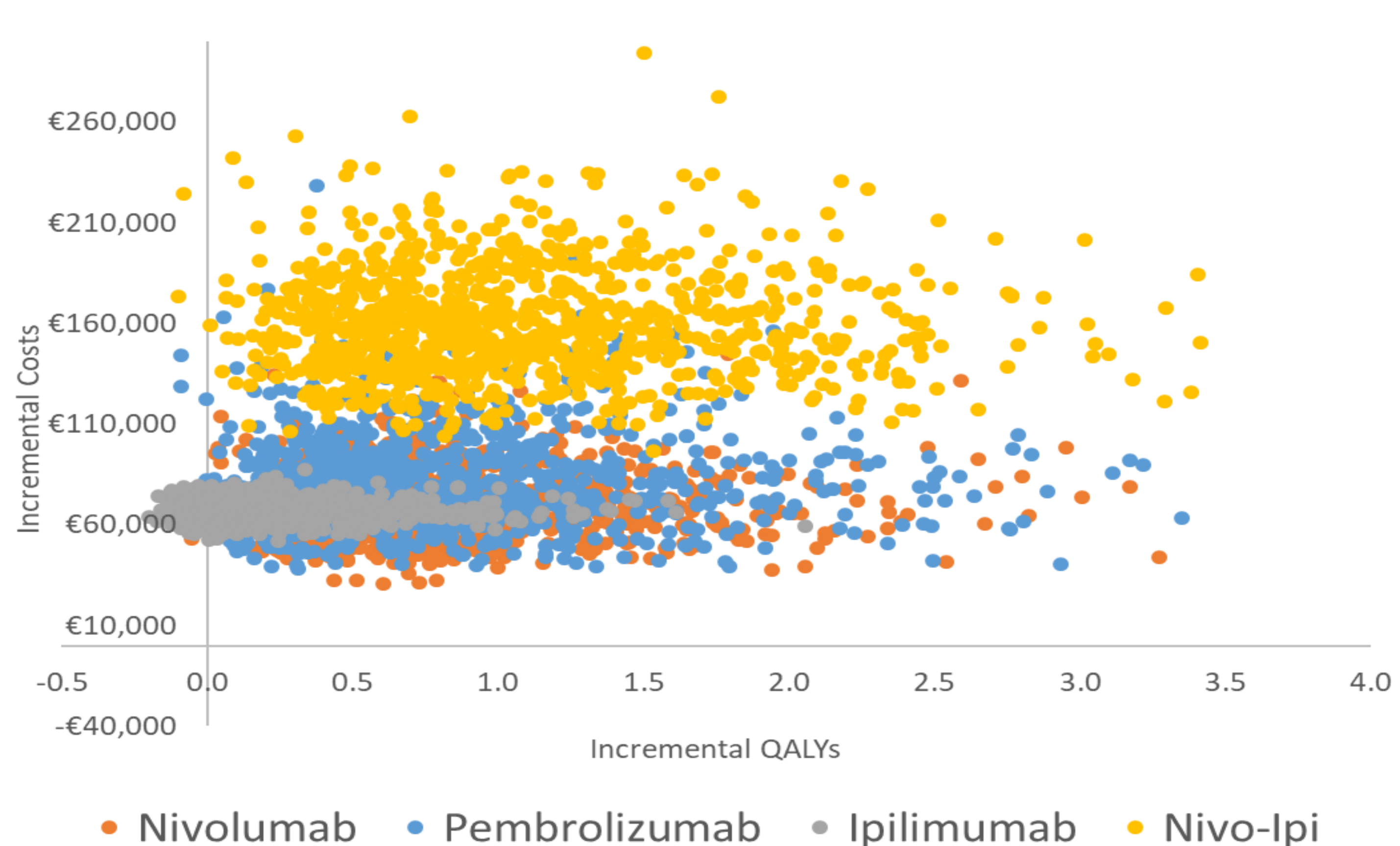


Figure 3: Probabilistic Model Outcomes

Cost-Effectiveness Frontier

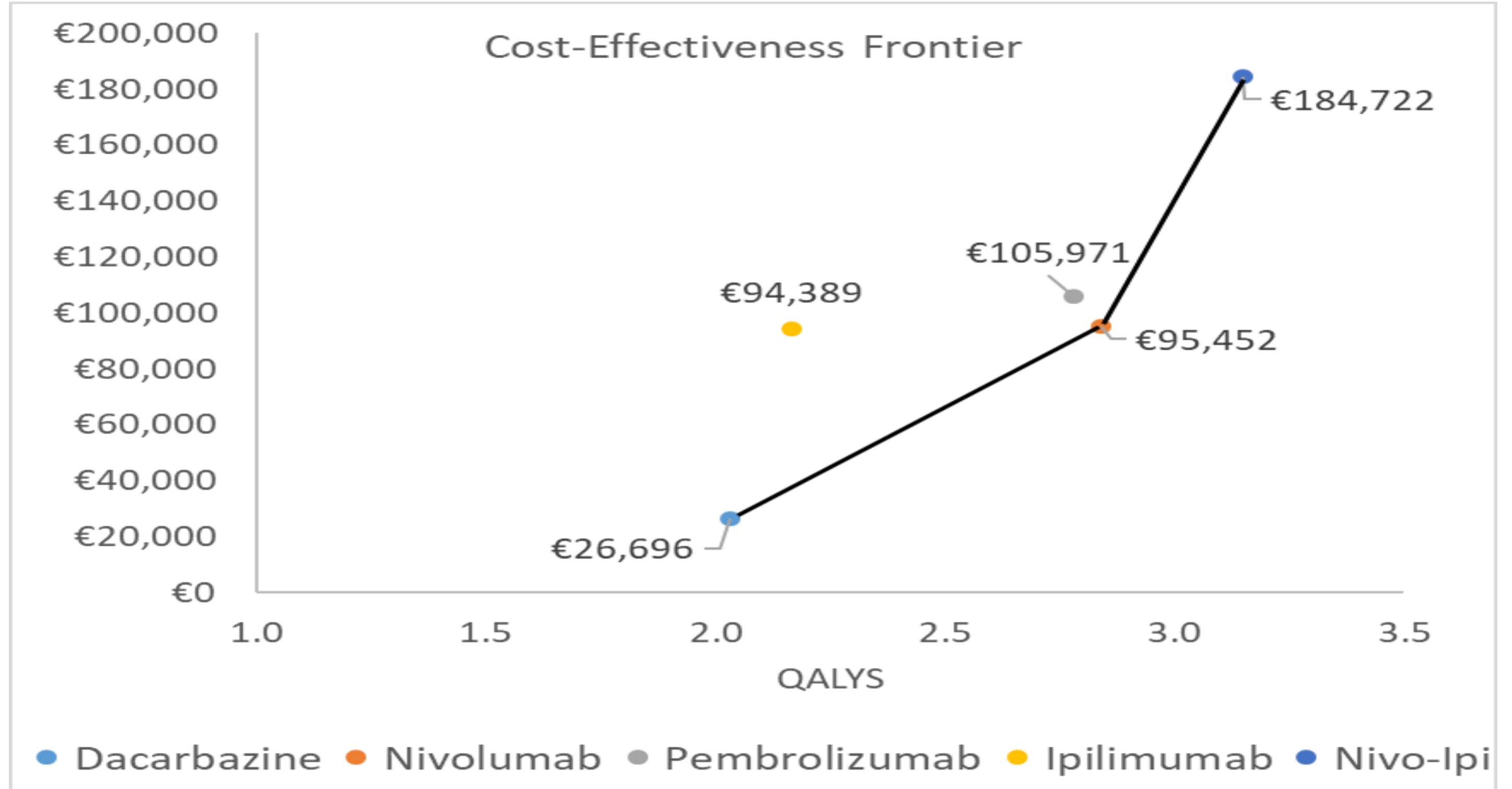


Figure 4: Cost-Effectiveness Frontier

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