



theta

Toronto Health Economics and
Technology Assessment Collaborative

Cost-effectiveness analysis and budget impact assessment

Combining the two for the aid of decision makers

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Introduction

- Many health care decision makers consider both **cost-effectiveness analysis (CEA)** and **budget impact assessment (BIA)**
- However, these are usually considered **separately** and it is the job of the decision making committee to *implicitly* make the necessary trade-offs between the two
- By **combining** these we make the trade-offs *explicit* in order to aid decision makers



Example

- **Oncotype DX** is a gene expression profiling assay for early-stage breast cancer
- We conducted a **CEA** and **BIA** for the Ontario Health Technology Advisory Committee
- CEA and BIA were presented **separately**
- CEA results: $\Delta C = \$3505$, $\Delta E = 0.22$ QALYs
ICER = \$15,932 per QALY
- BIA estimate: **N=3825** per year
Budget impact \$4m per year



What actually *is* budget impact?

- Defined by a recent ISPOR task force as:
 - “... the **financial consequences** of adoption and diffusion of a new health-care intervention within a specific health-care setting or system context given inevitable resource constraints.”
- But what are “financial consequences”?
- To understand the “consequences” of adoption we *must* consider **opportunity cost**
- **Critical question: is the budget fixed?**



Fixed vs flexible health budgets

- If the budget is **perfectly fixed**, adoption displaces other technologies, resulting in *forgone health* elsewhere in the system
- “*Health*” rather than *financial* consequence
- By definition there is *no budget impact*
- If the budget is **perfectly flexible**, adoption results in a budget impact of $\Delta C \times N$
- If the budget is **partially fixed**, adoption results in budget impact *and* forgone health



How much *health* is *forgone*?

- When the budget is perfectly or partially **fixed**, any costs falling within the budget will *displace* other technologies, resulting in **forgone health** elsewhere in the system
- To estimate this we need an estimate of the *shadow price of the budget*, denoted by k
- Efforts underway in the UK to estimate k
- Dividing the costs that fall within the budget by k gives us the **health forgone**



Is the budget impact *worth it*?

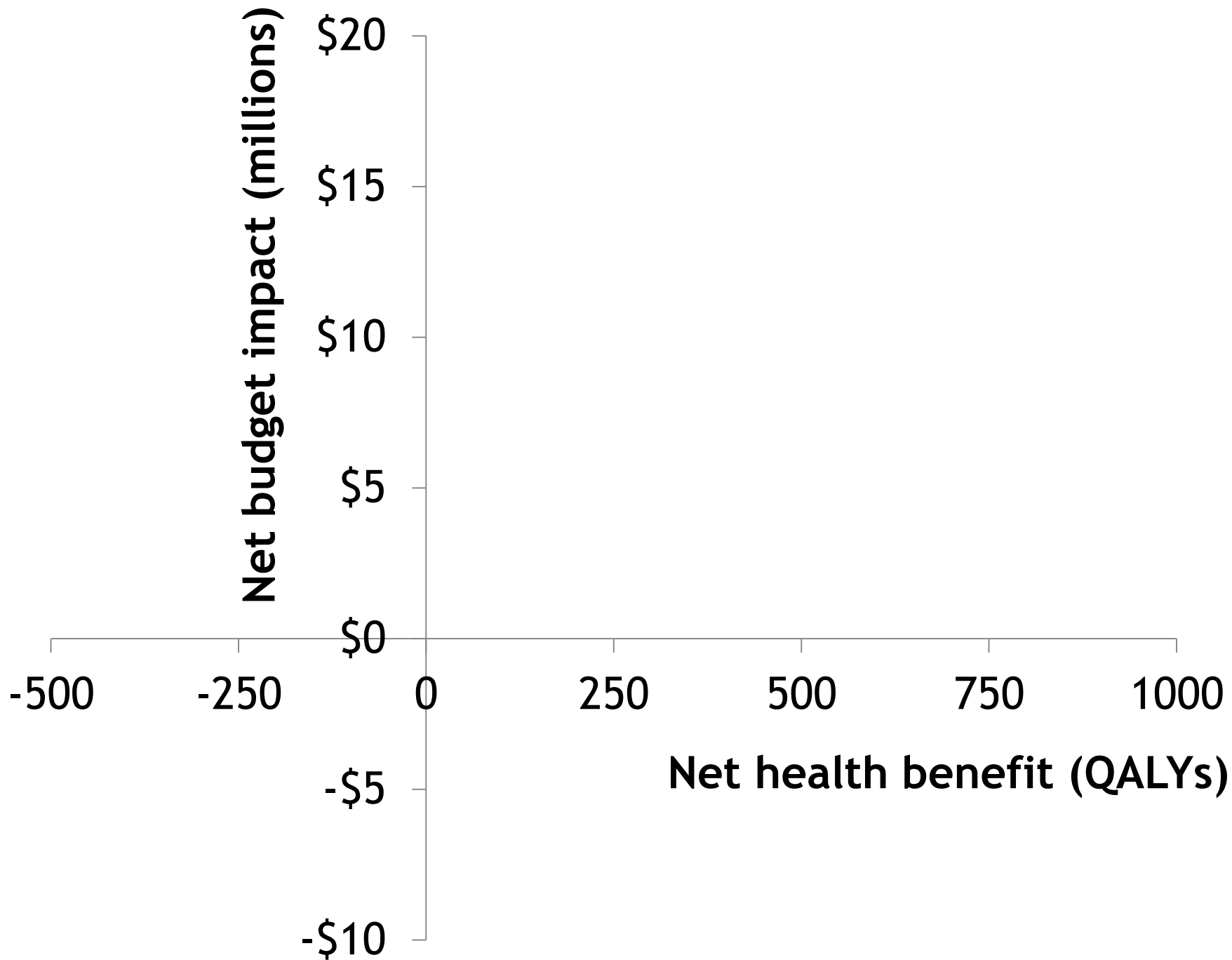
- When the budget is perfectly or partially **flexible**, any costs resulting in an expansion of the budget will ultimately fall on **other sectors and/or taxpayers**
- We need an estimate of *the amount of cost the decision maker is willing to impose on other sectors and/or taxpayers in order to gain a QALY within the health system*
- We denote this as **m** (distinct from **k**)

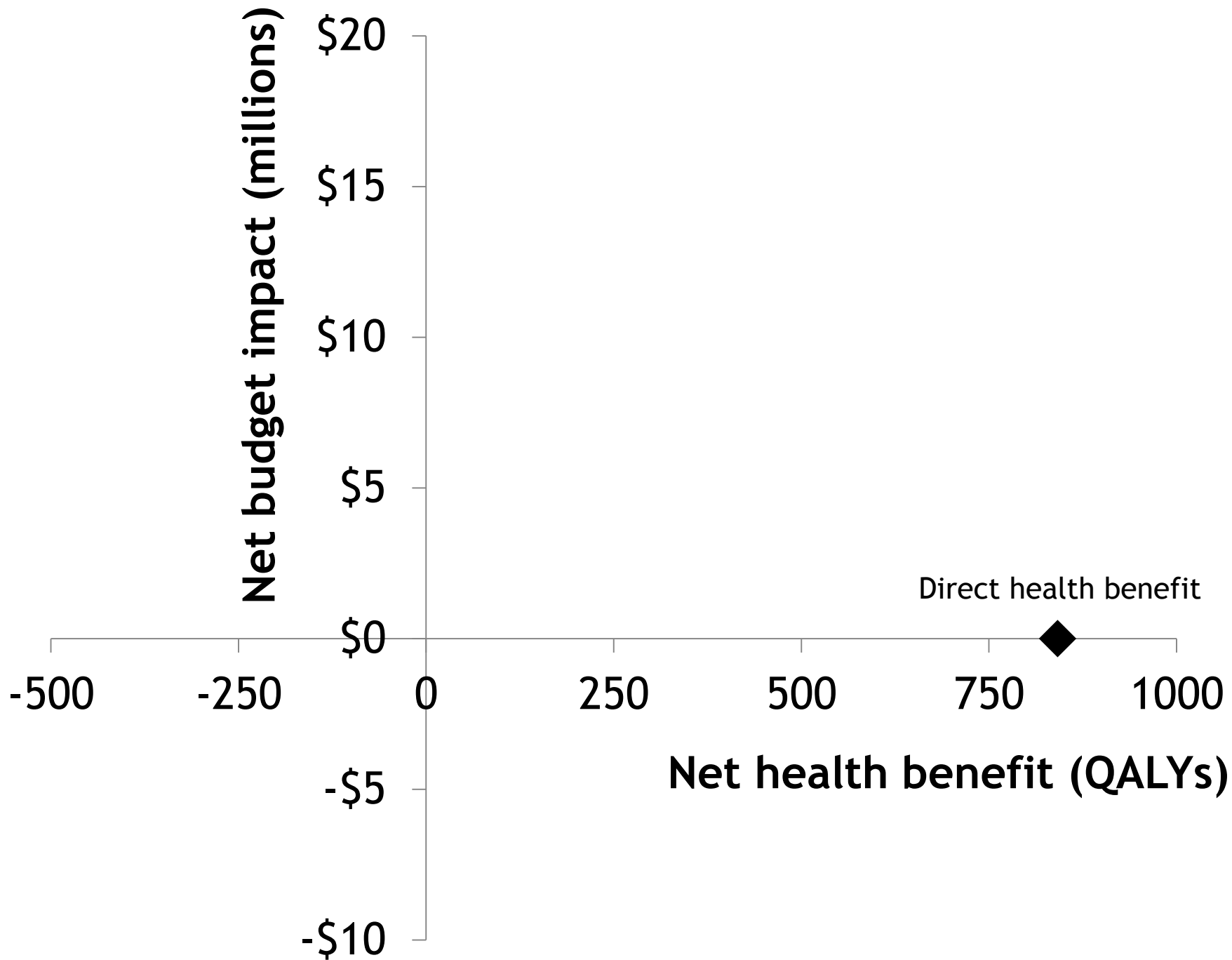


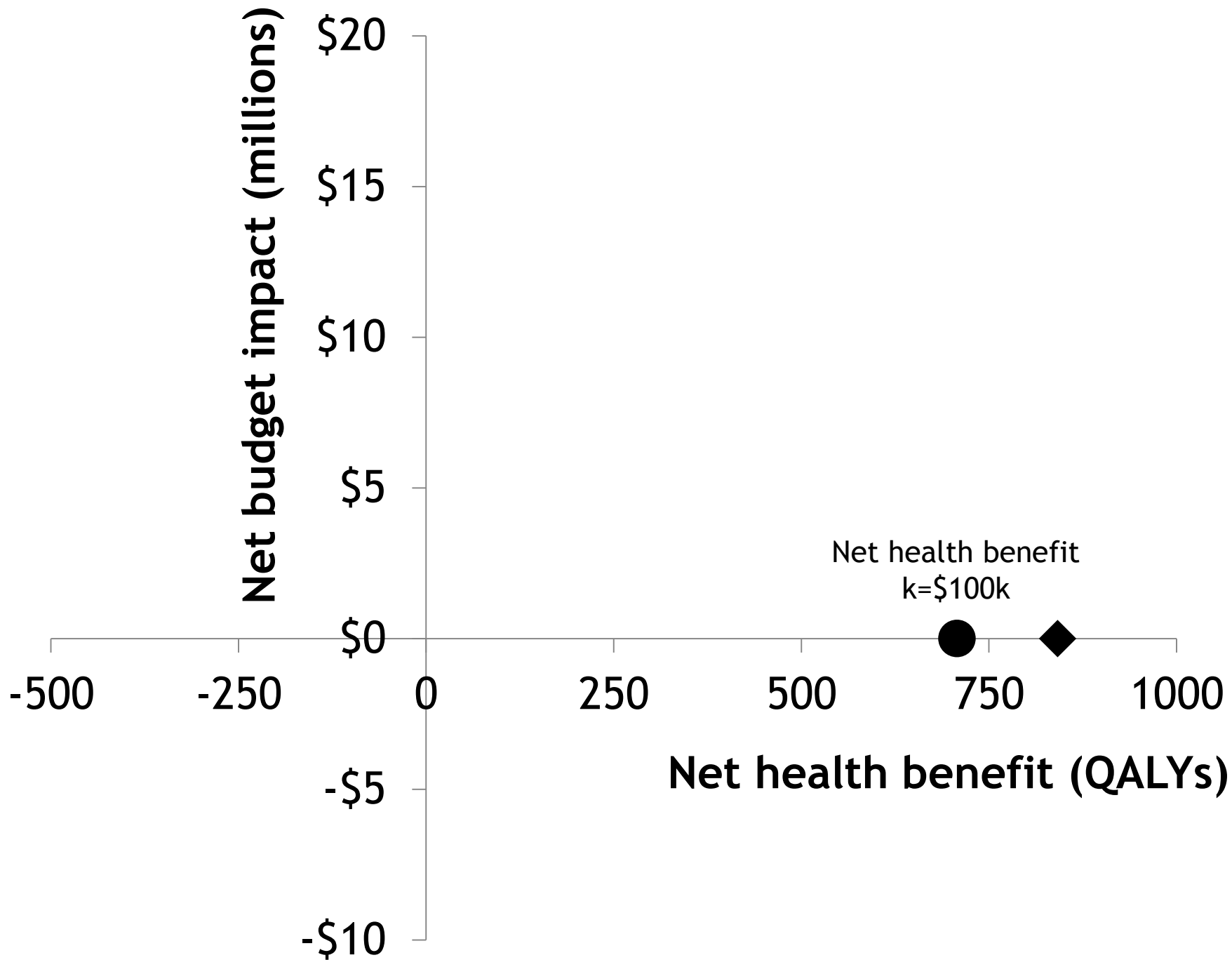
Example: *perfectly fixed* budget

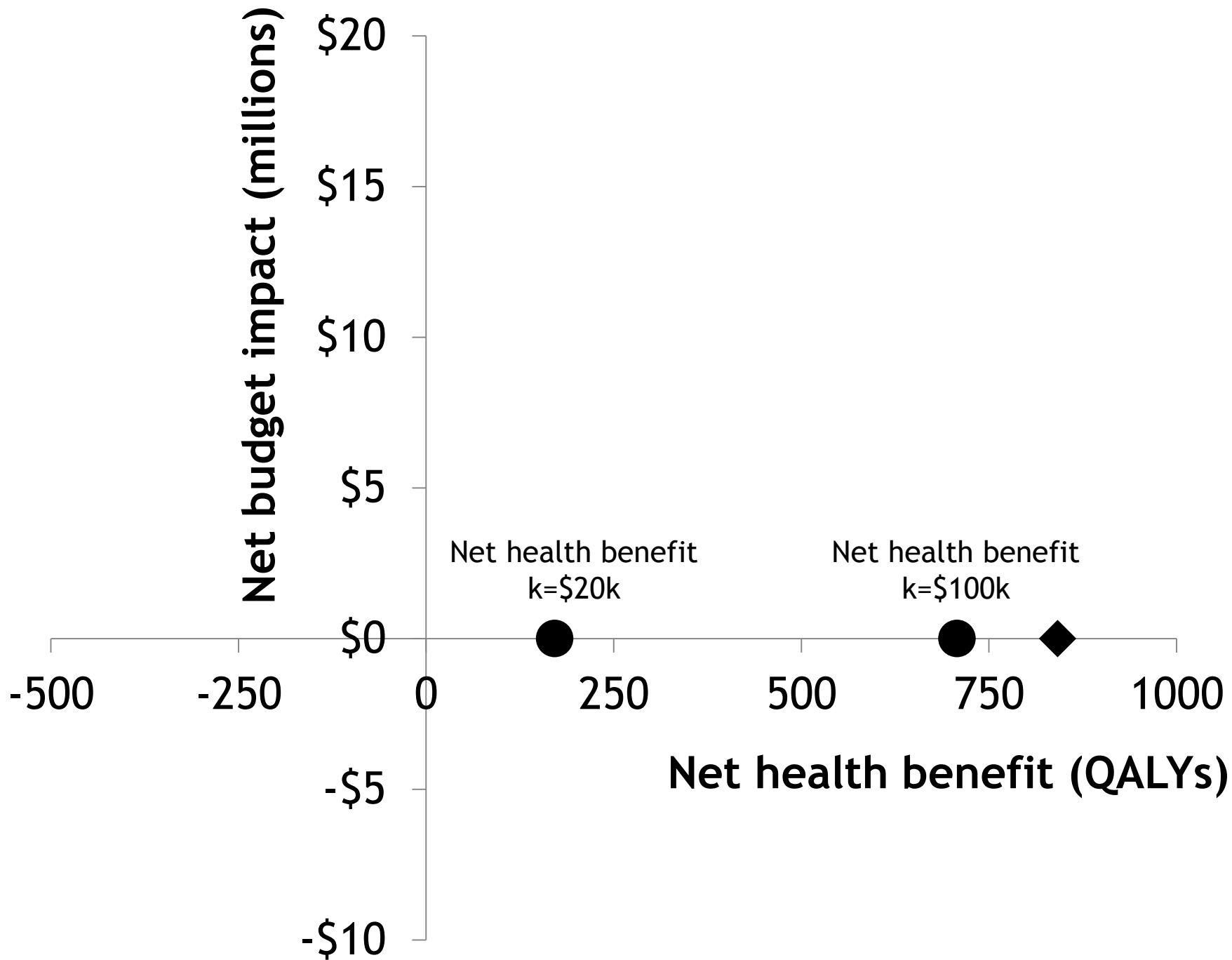
- $\Delta C = \$3505$, $\Delta E = 0.22$ QALYs, $N = 3825$
- If the budget is **perfectly fixed**, adopting Oncotype DX has *no impact on the budget*
- There is a *direct health benefit* of $0.22 \times 3835 = 842$ QALYs but an *indirect health loss* since $\$3505 \times 3825 = \13.4m will fall on the budget and displace other health
- **Critical question:** does the direct health benefit exceed the indirect health loss?







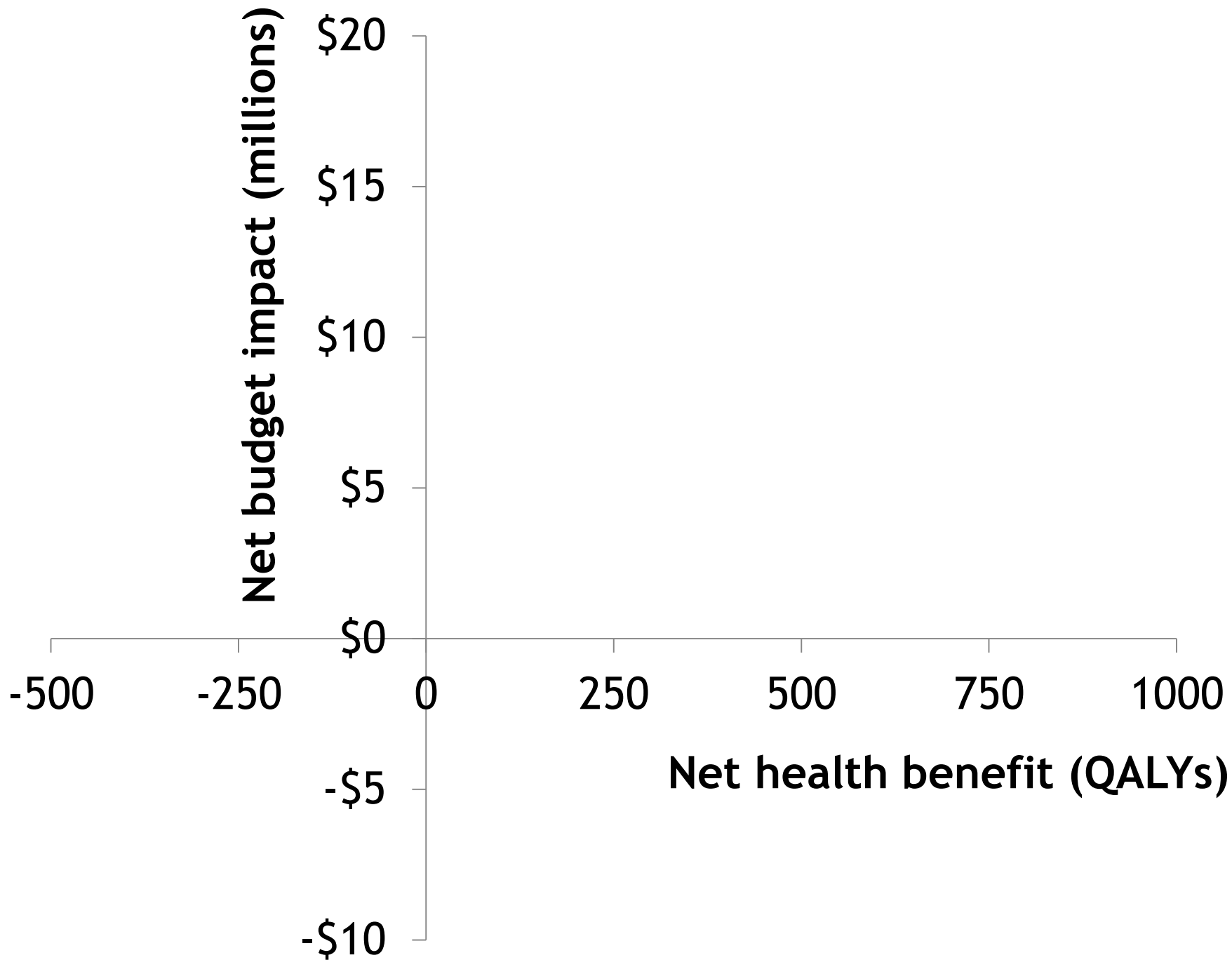


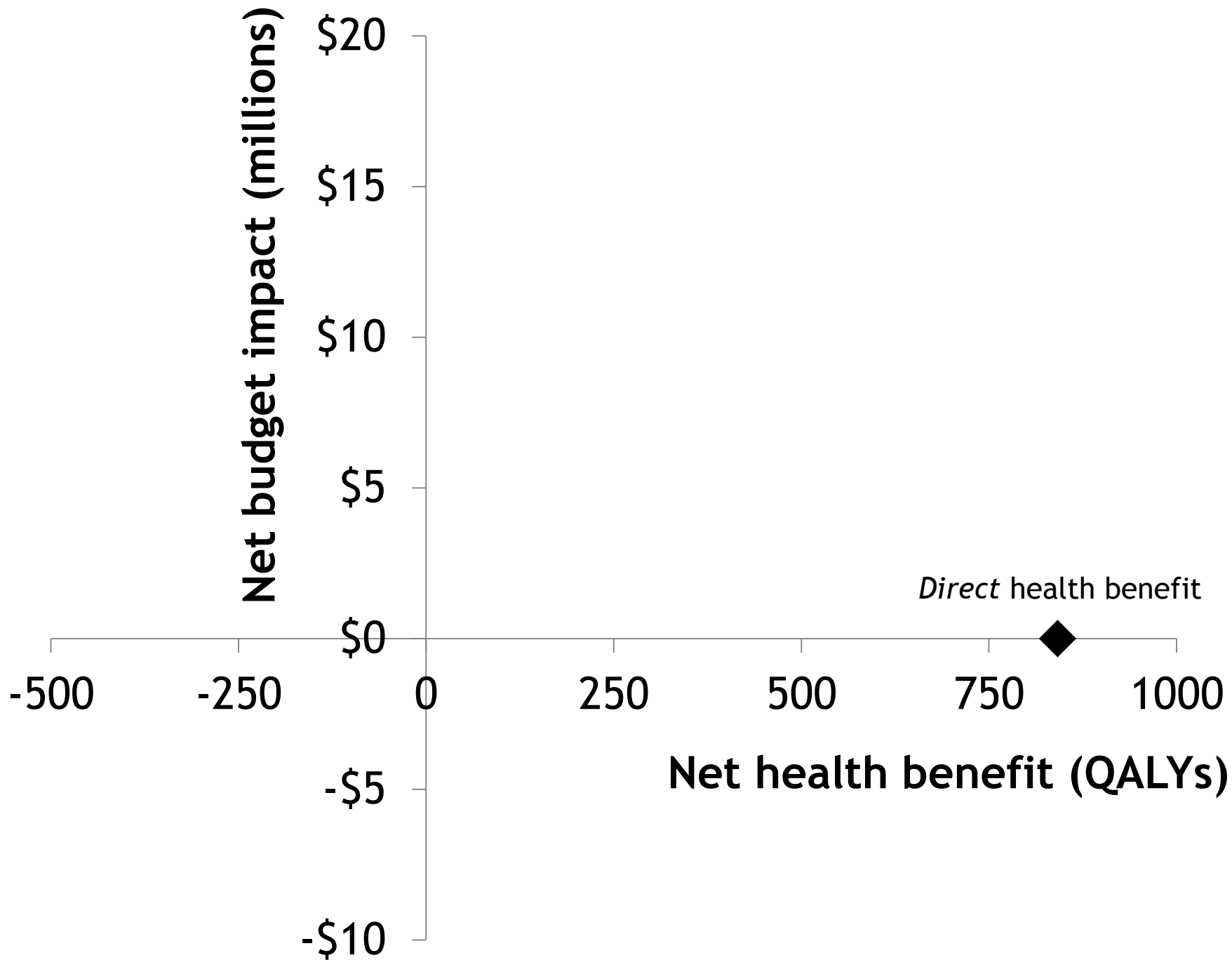


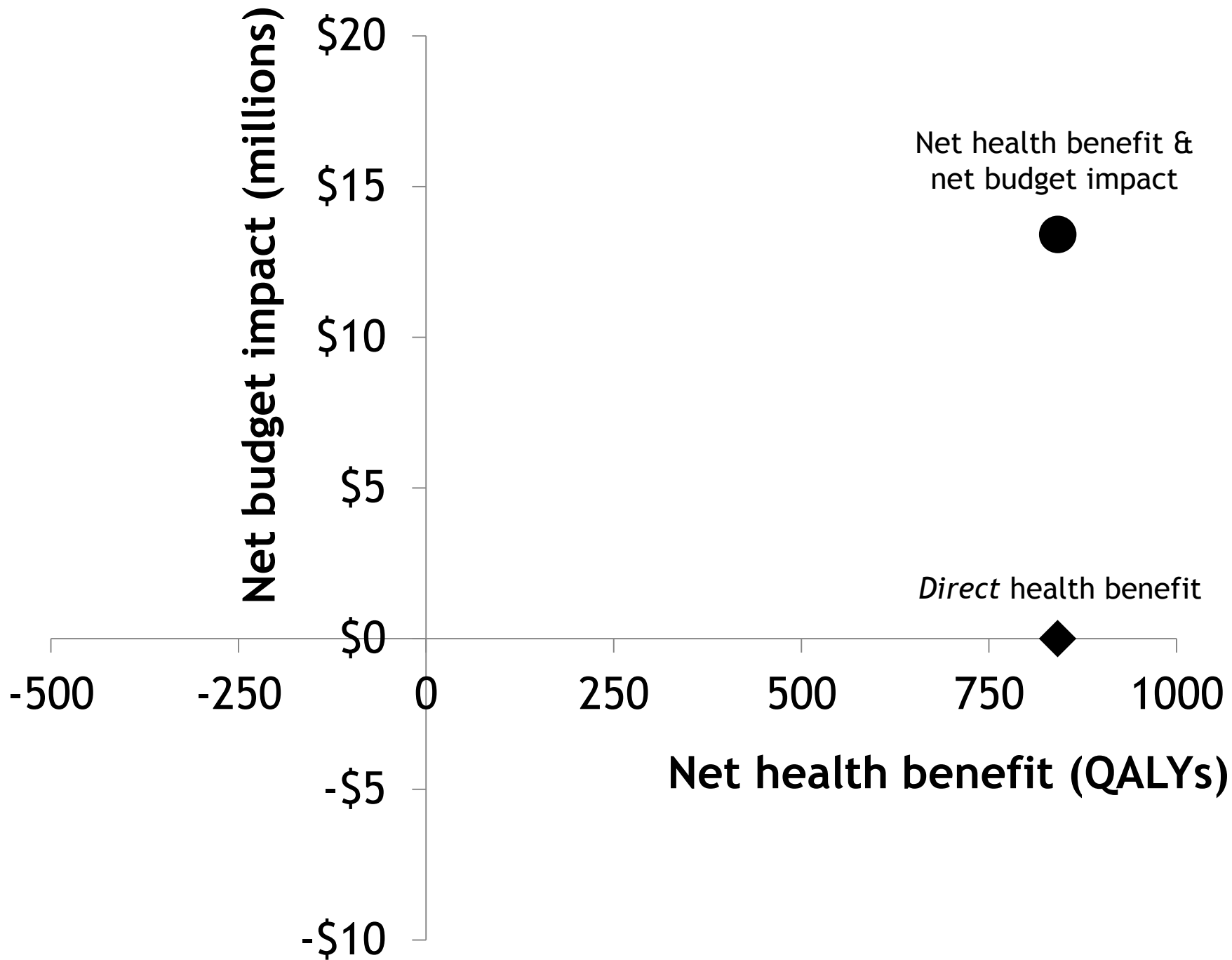
Example: *perfectly flexible* budget

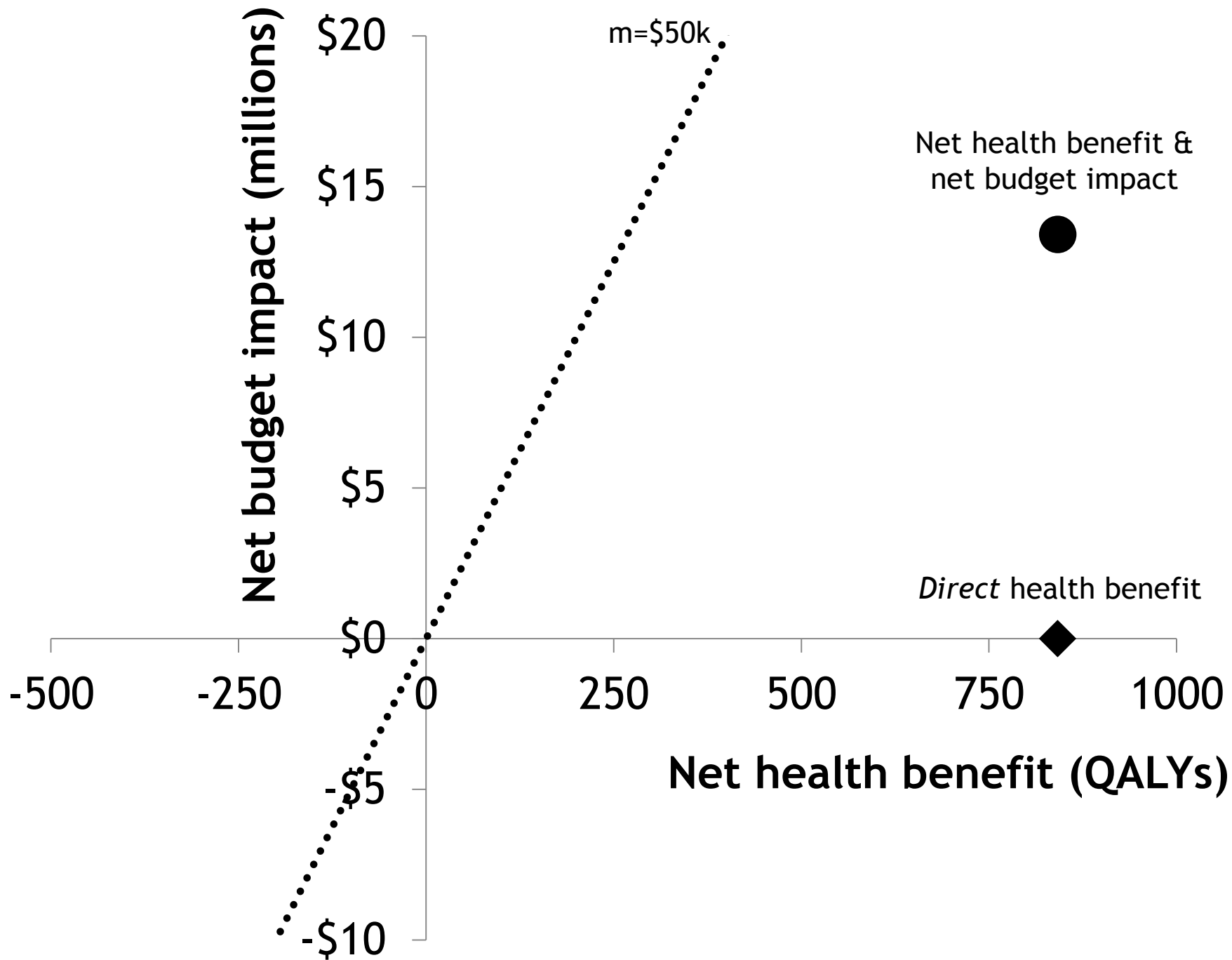
- $\Delta C = \$3505$, $\Delta E = 0.22$ QALYs, $N = 3825$
- If the budget is **perfectly flexible**, adopting Oncotype DX results in a budget impact of $\$3505 \times 3825 = \13.4m
- Again there is a *direct health benefit* of **842 QALYs** but *no indirect health loss* since no other technologies need to be displaced
- **Critical question:** is the gain of 842 QALYs worth increasing the budget by \$13.4m?







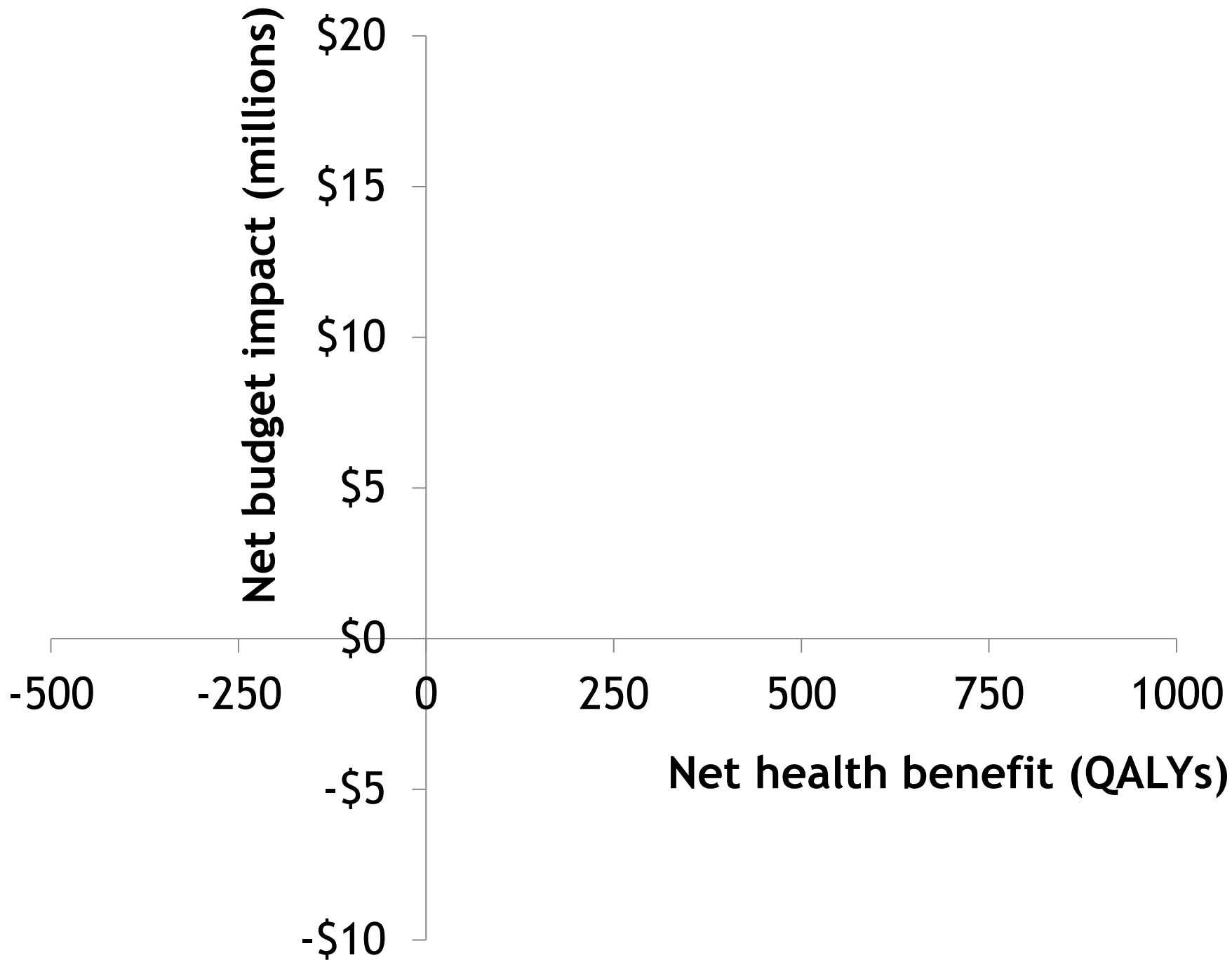


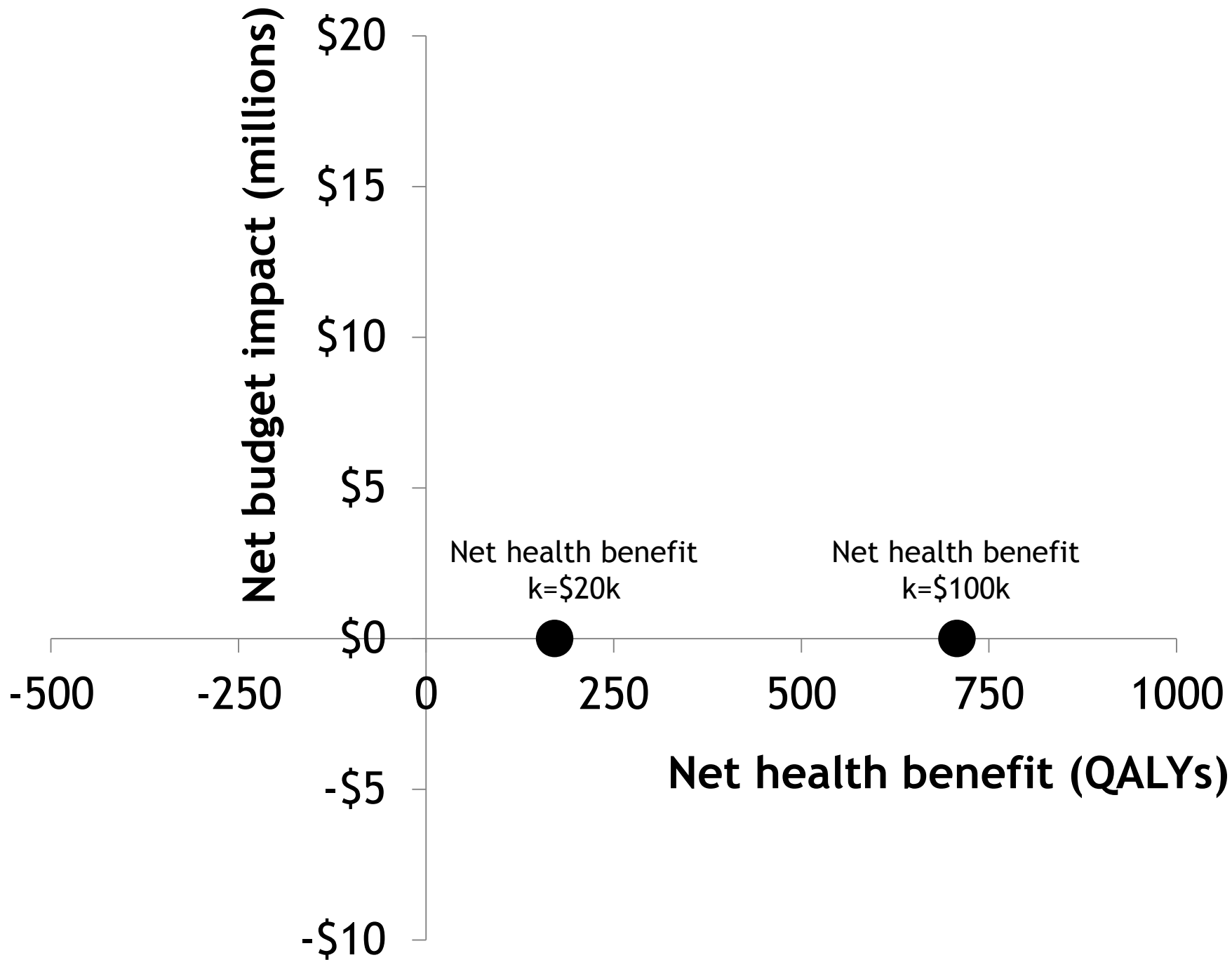


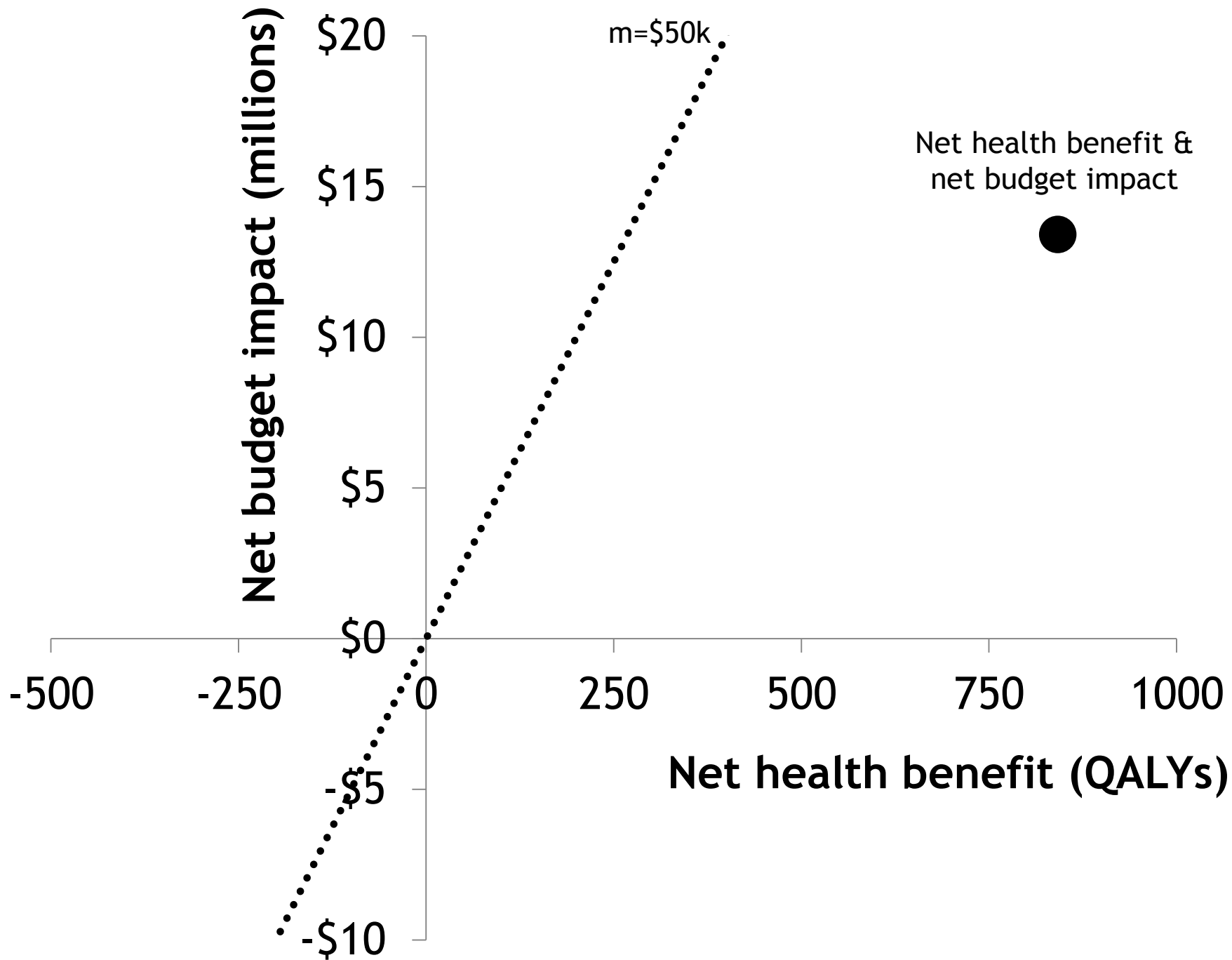
Example: *partially fixed* budget

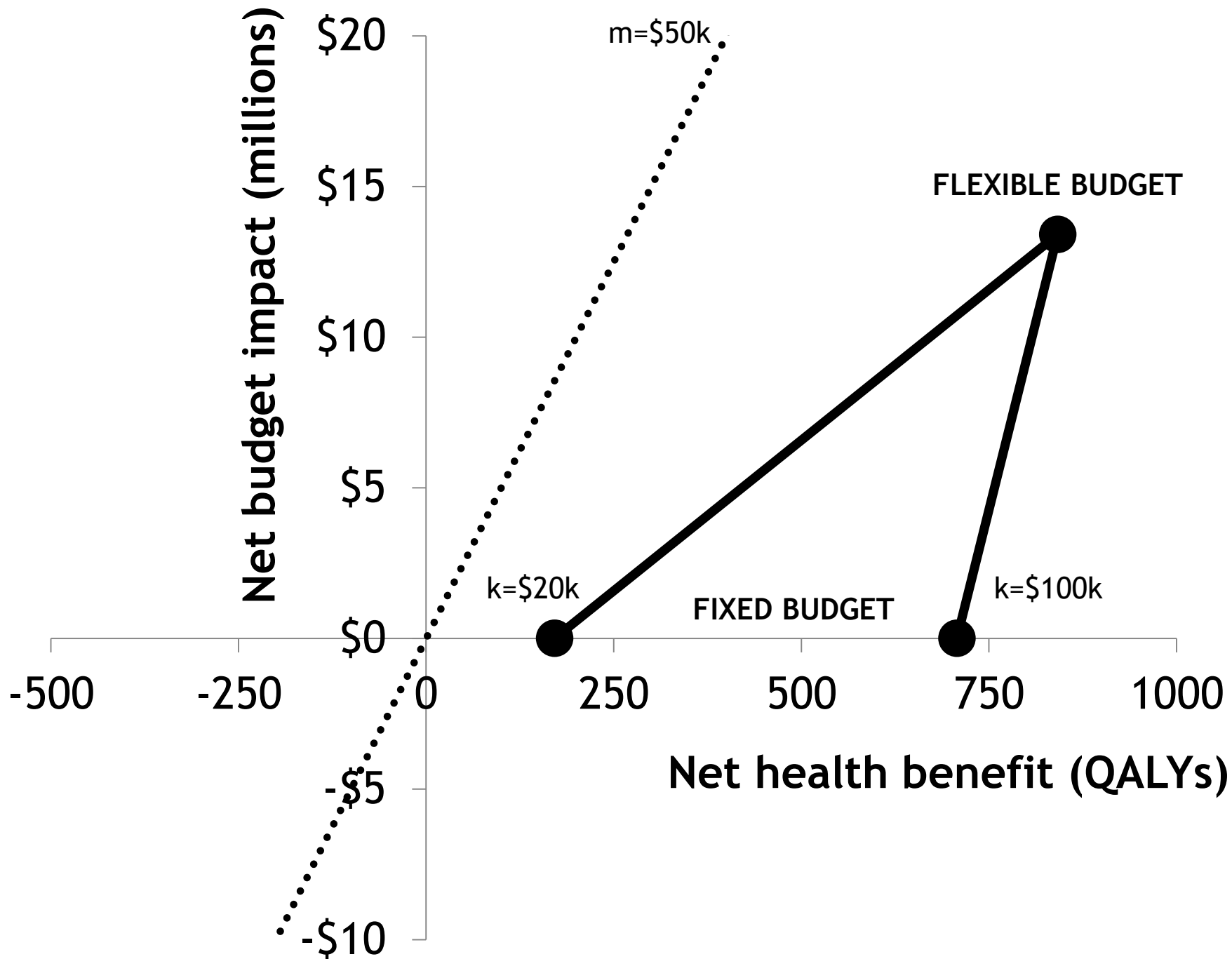
- $\Delta C = \$3505$, $\Delta E = 0.22$ QALYs, $N = 3825$
- If the budget is **partially fixed**, adopting Oncotype DX results in a budget impact of **somewhere between \$0 and \$13.4m**
- There is a *direct health gain* of **842 QALYs** but an *indirect health loss* since the *remaining* costs will fall within the budget
- **Critical question: is the *net* health gain worth the increase in the budget?**

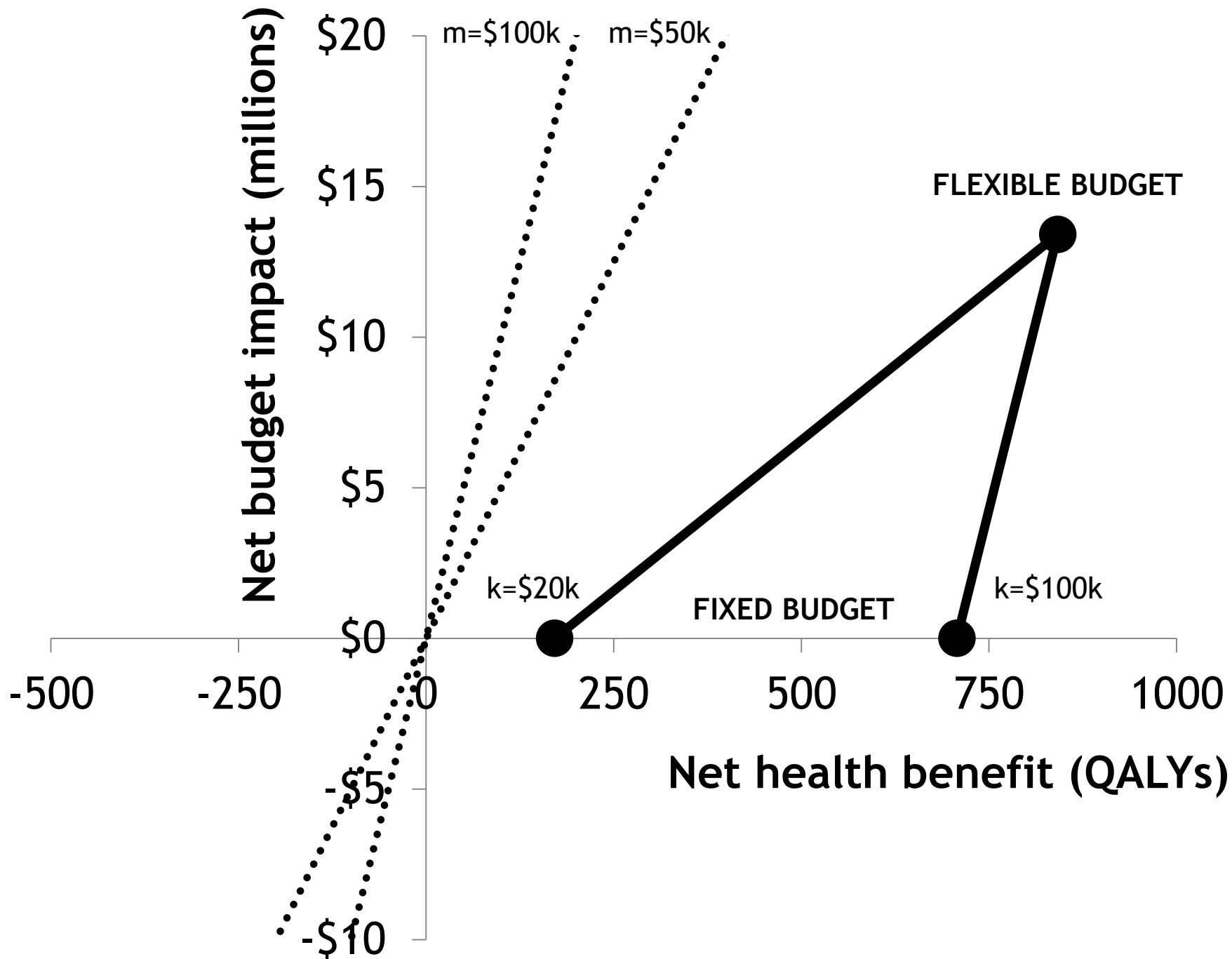


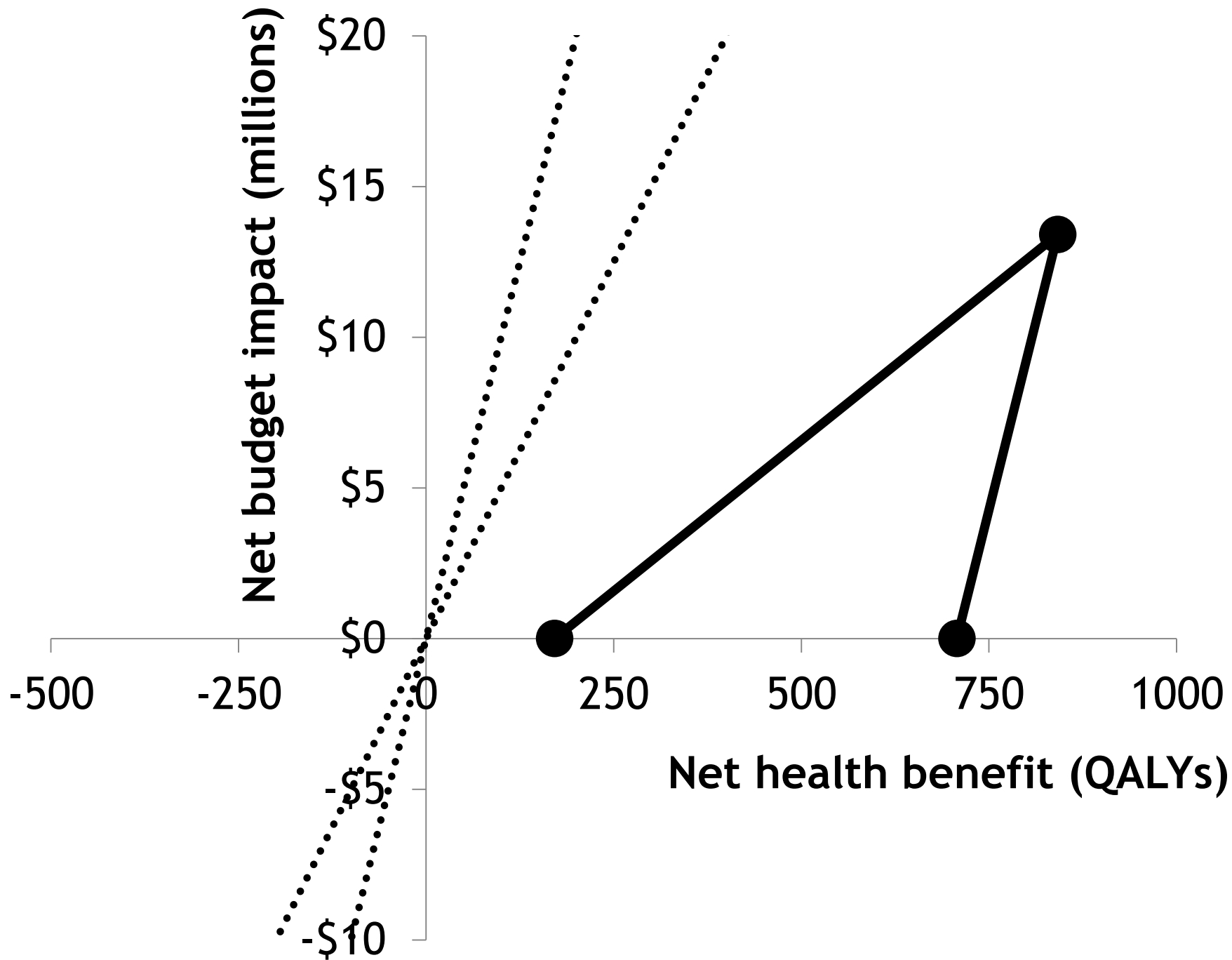












Summary

- A single graph can simultaneously display **net health gain** and **budget impact** across *a range of plausible values* of **k** and **m** and for *all possible degrees* of **budget fixity**
- Only ΔC , ΔE and **N** need to be known
- Interpreted in exactly the same way as the familiar **cost-effectiveness (CE) plane**
- Can instantaneously show whether or not an adoption decision **justifies** its budget impact



Thank you!

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