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: **ΔC=$3505**, **ΔE=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*?

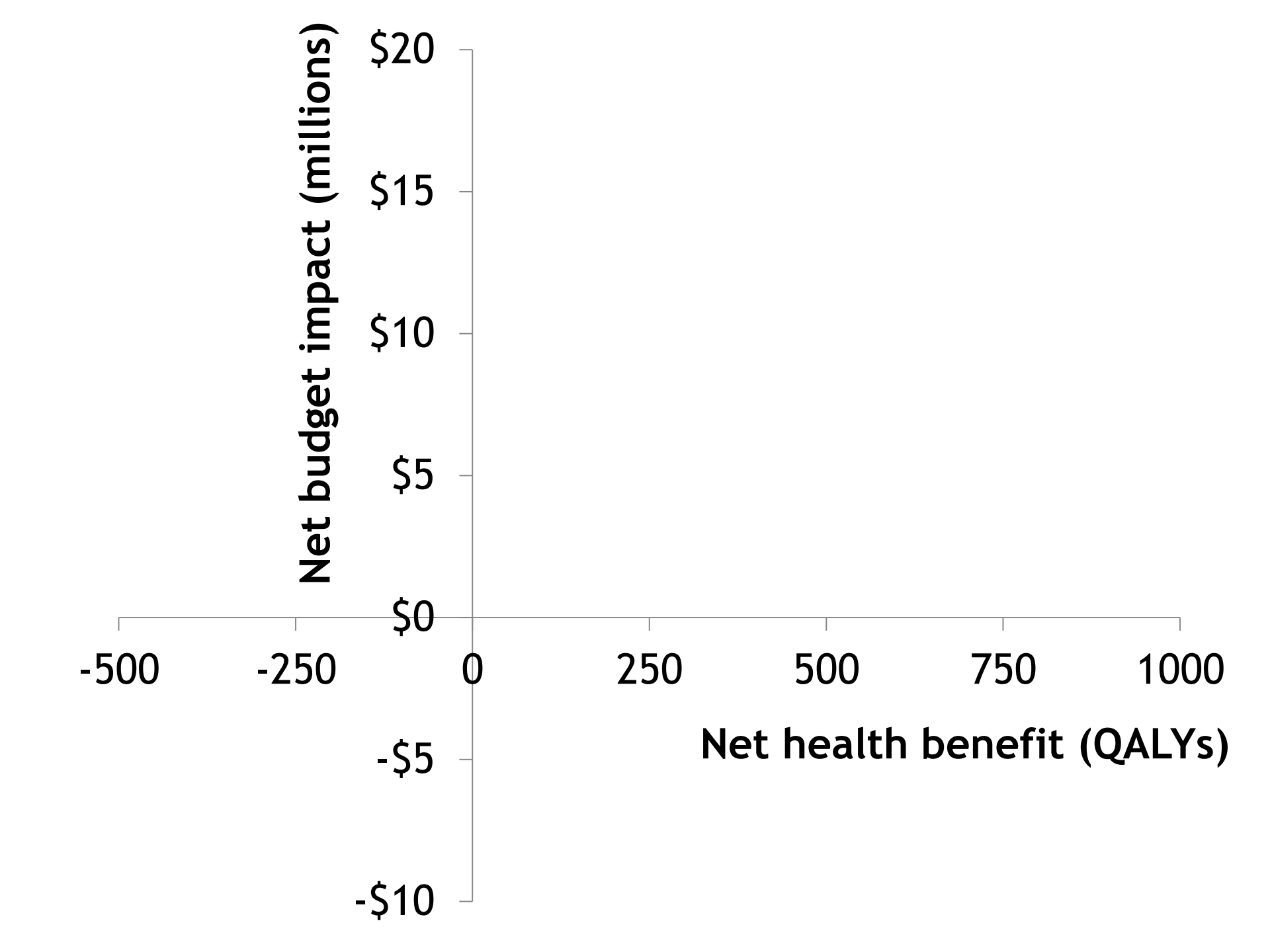
- When the budget is perfectly or partially **fixed**, any costs falling within the budget will *displace* other technologies, resulting in **forgone health** elsewhere in the system
- To estimate this we need an estimate of the *shadow price of the budget*, denoted by **k**
- Efforts underway in the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

- **ΔC=$3505, ΔE=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 x 3835 = **842 QALYs** but an *indirect health loss* since $3505 x 3825 = **$13.4m** will fall on the budget and displace other health
- **Critical question: does the direct health benefit exceed the indirect health loss?**


Net budget impact (millions)
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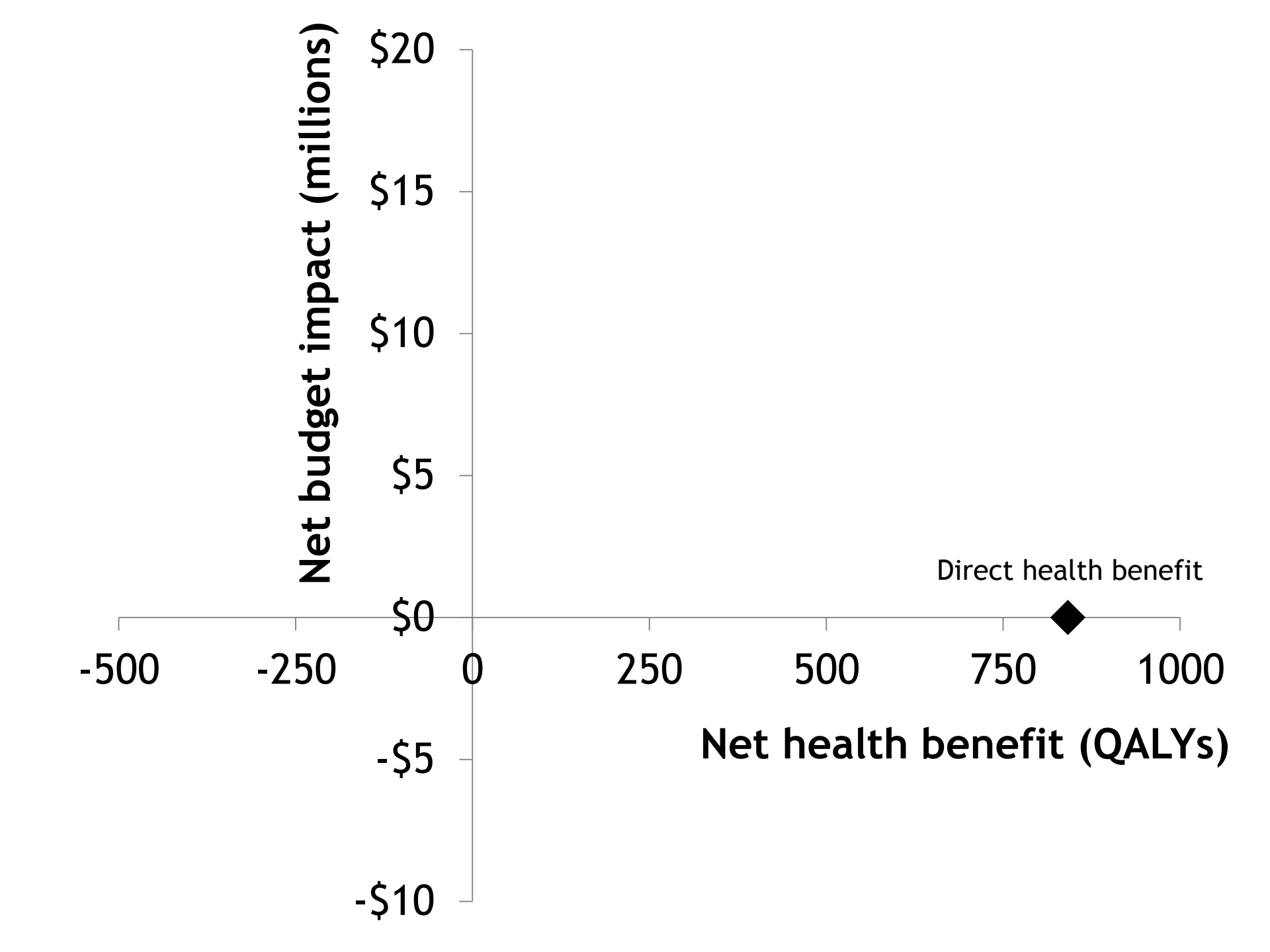
Net health benefit (QALYs)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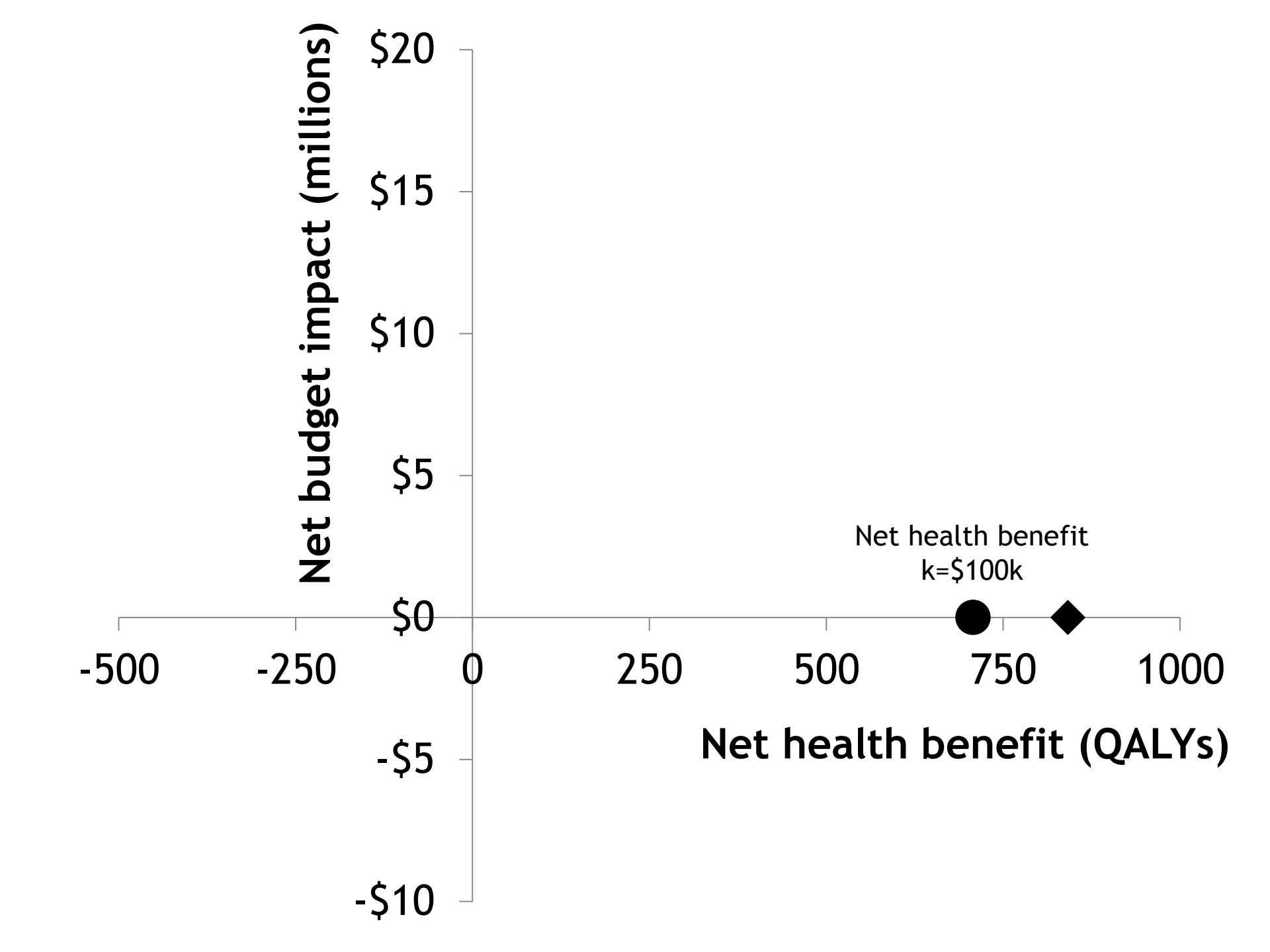
Net health benefit (QALYs)
Direct health benefit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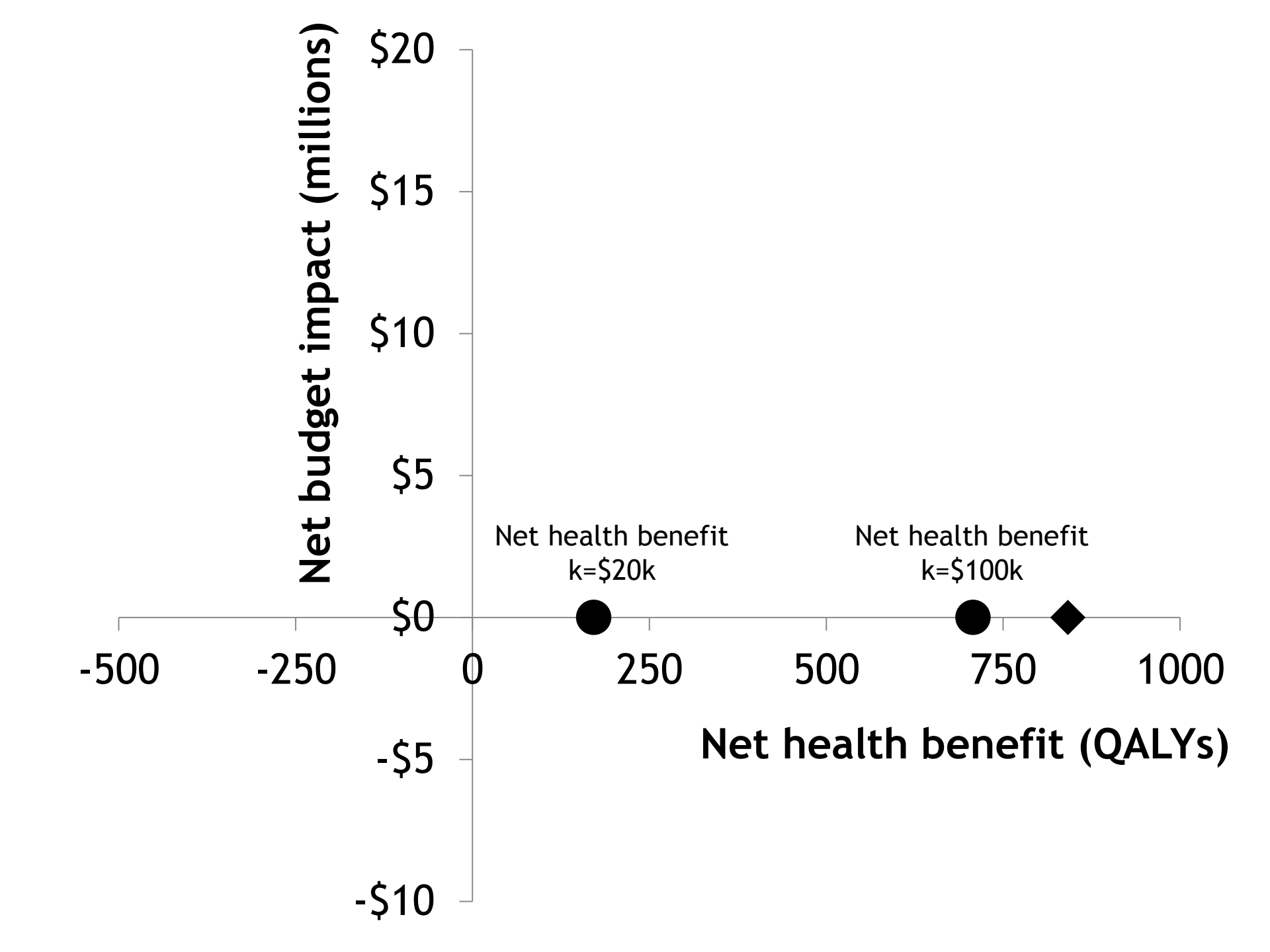
Net health benefit (QALYs)
Net health benefit
k=$100k


Net budget impact (millions)
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Net health benefit
k=$20k
Net health benefit
k=$100k
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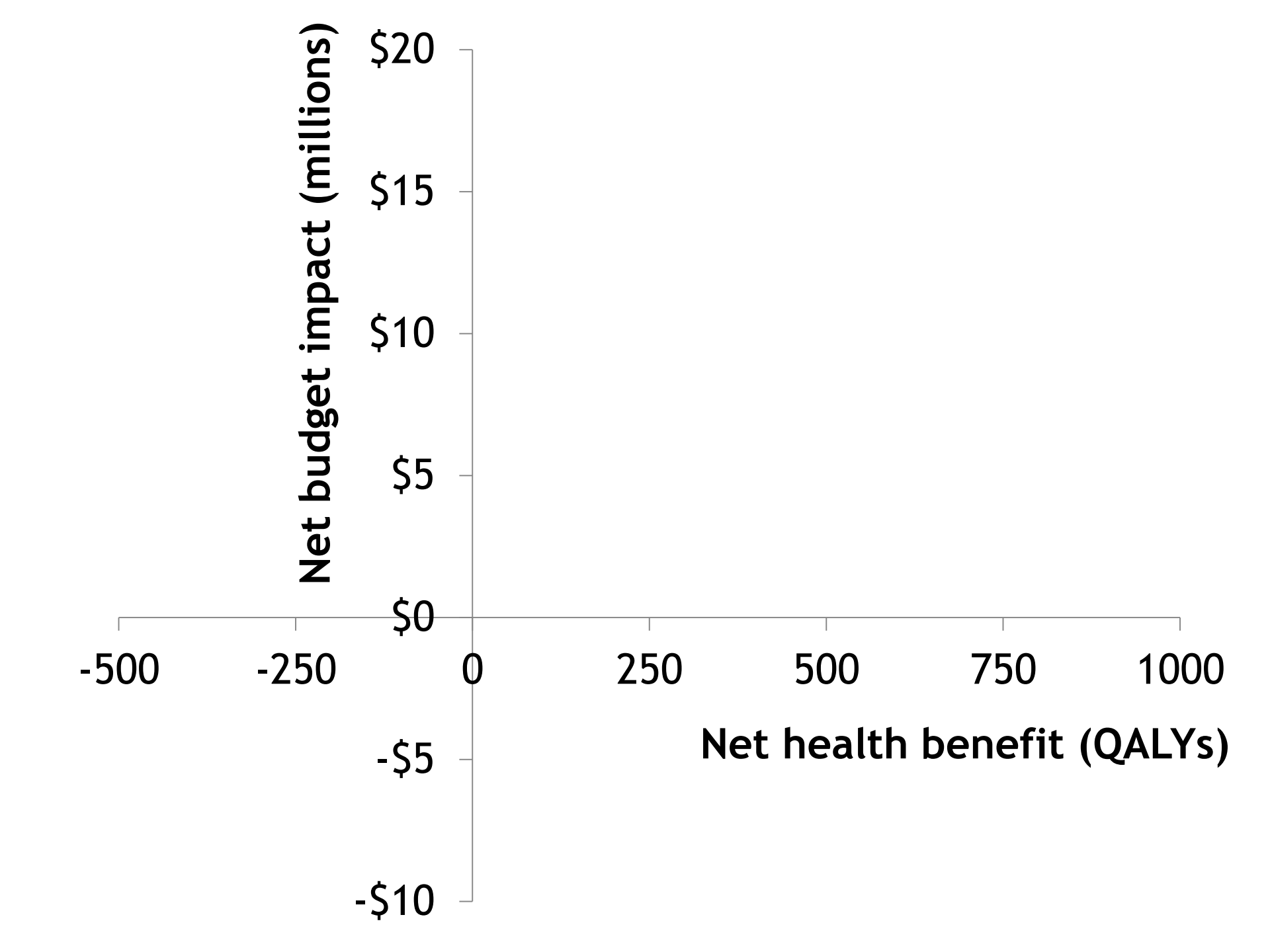
750
1000
Net health benefit (QALYs)

Example: *perfectly flexible* budget

- **ΔC=$3505, ΔE=0.22 QALYs, N=3825**
- If the budget is **perfectly flexible**, adopting Oncotype DX results in a budget impact of $3505 x 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?**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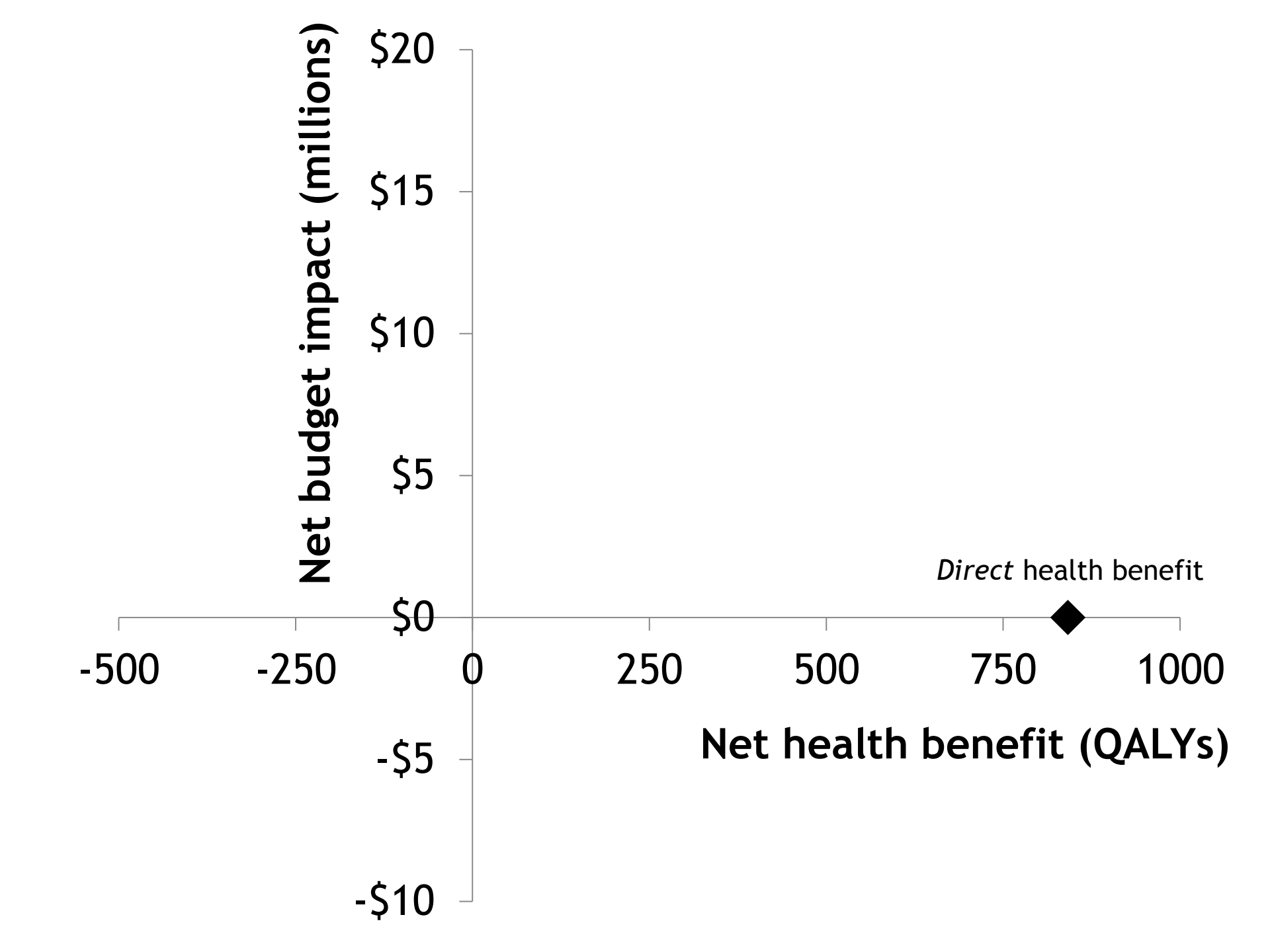
Net health benefit (QALYs)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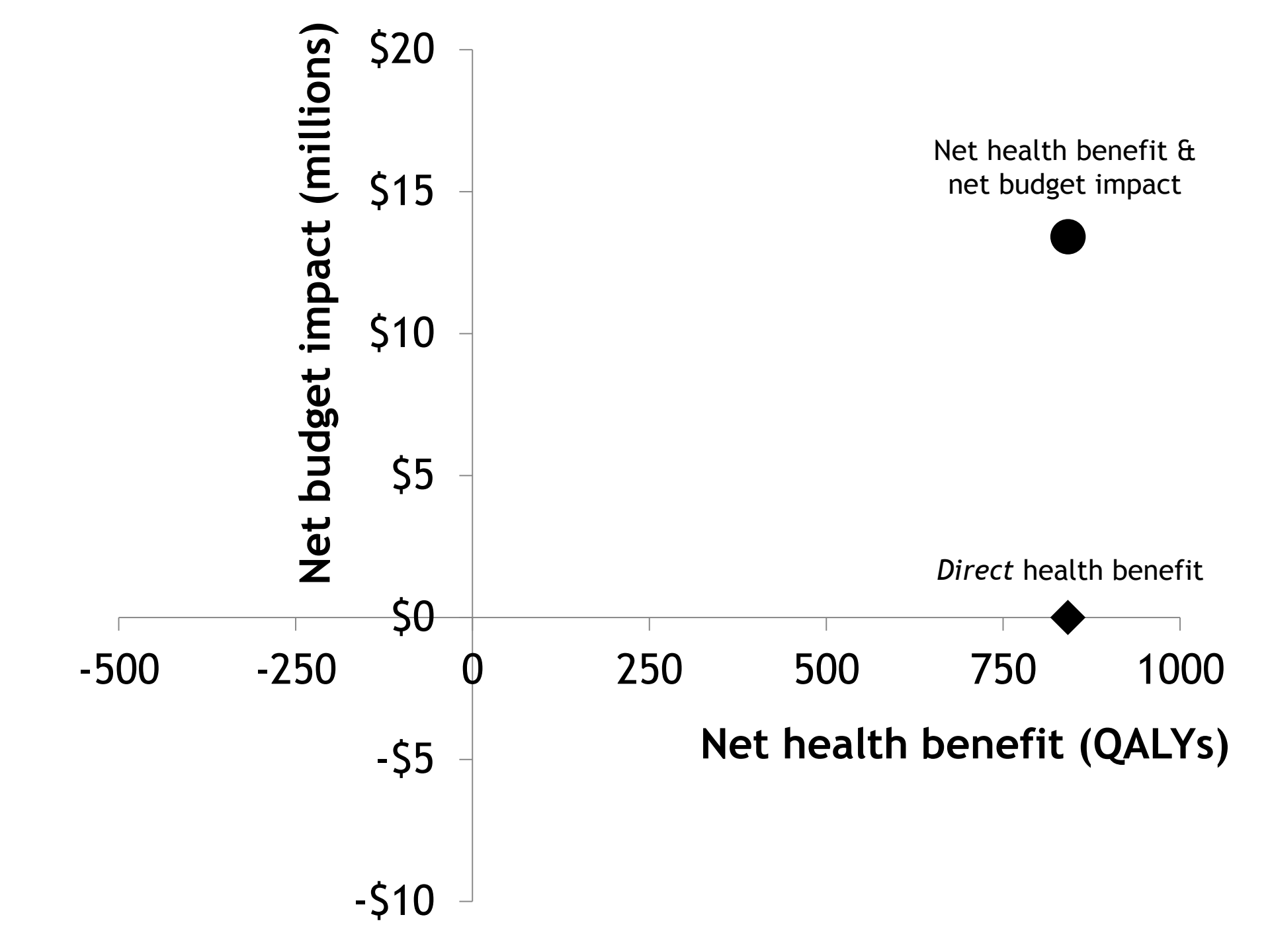
Net health benefit (QALYs)
Direct health benefit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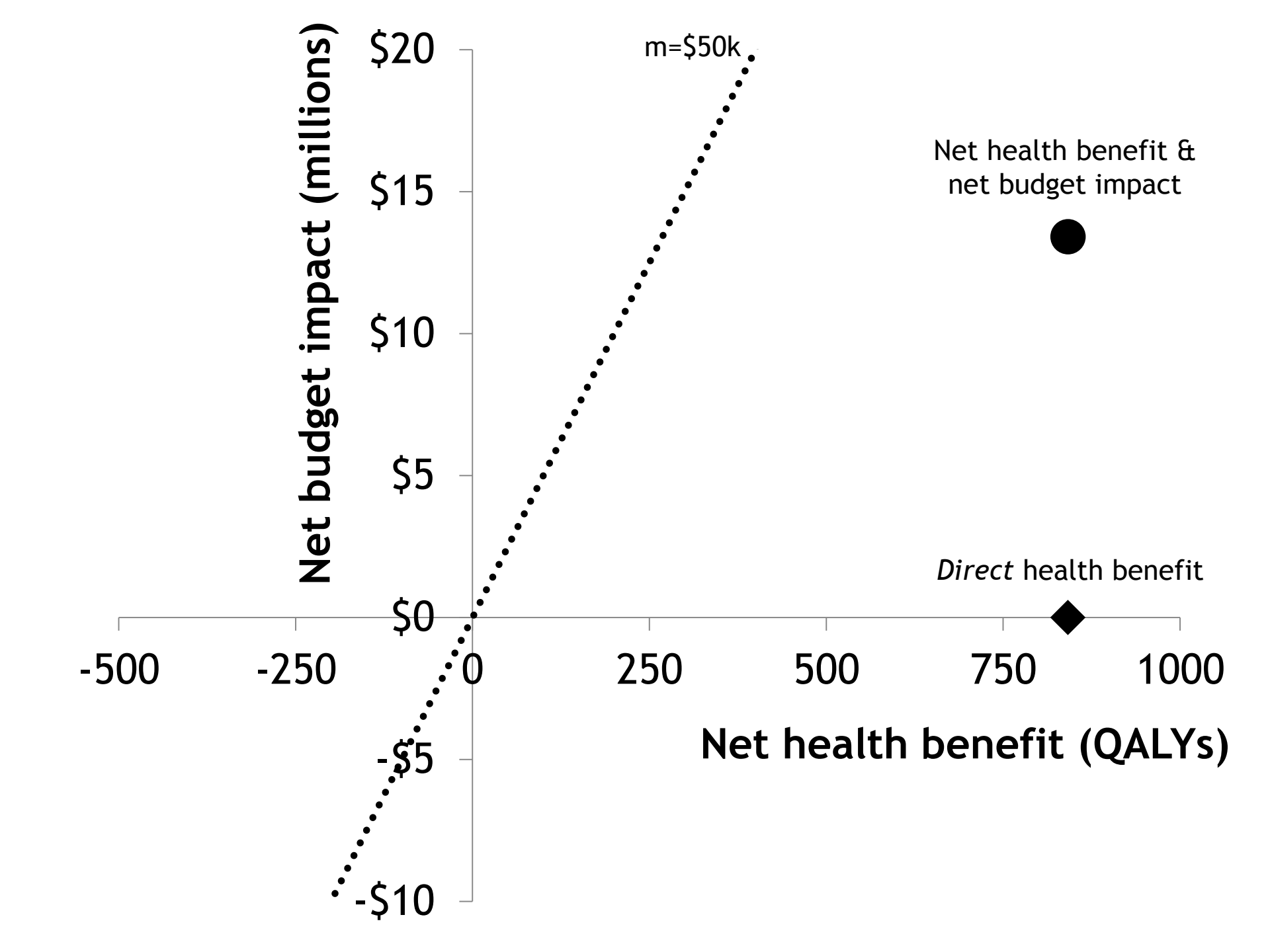
Net health benefit (QALYs)
Net health benefit &
net budget impact
Direct health benefit


m=$50k
Net health benefit &
net budget impact
Direct health benefit
Net budget impact (millions)
$20
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-$5
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-500
-250
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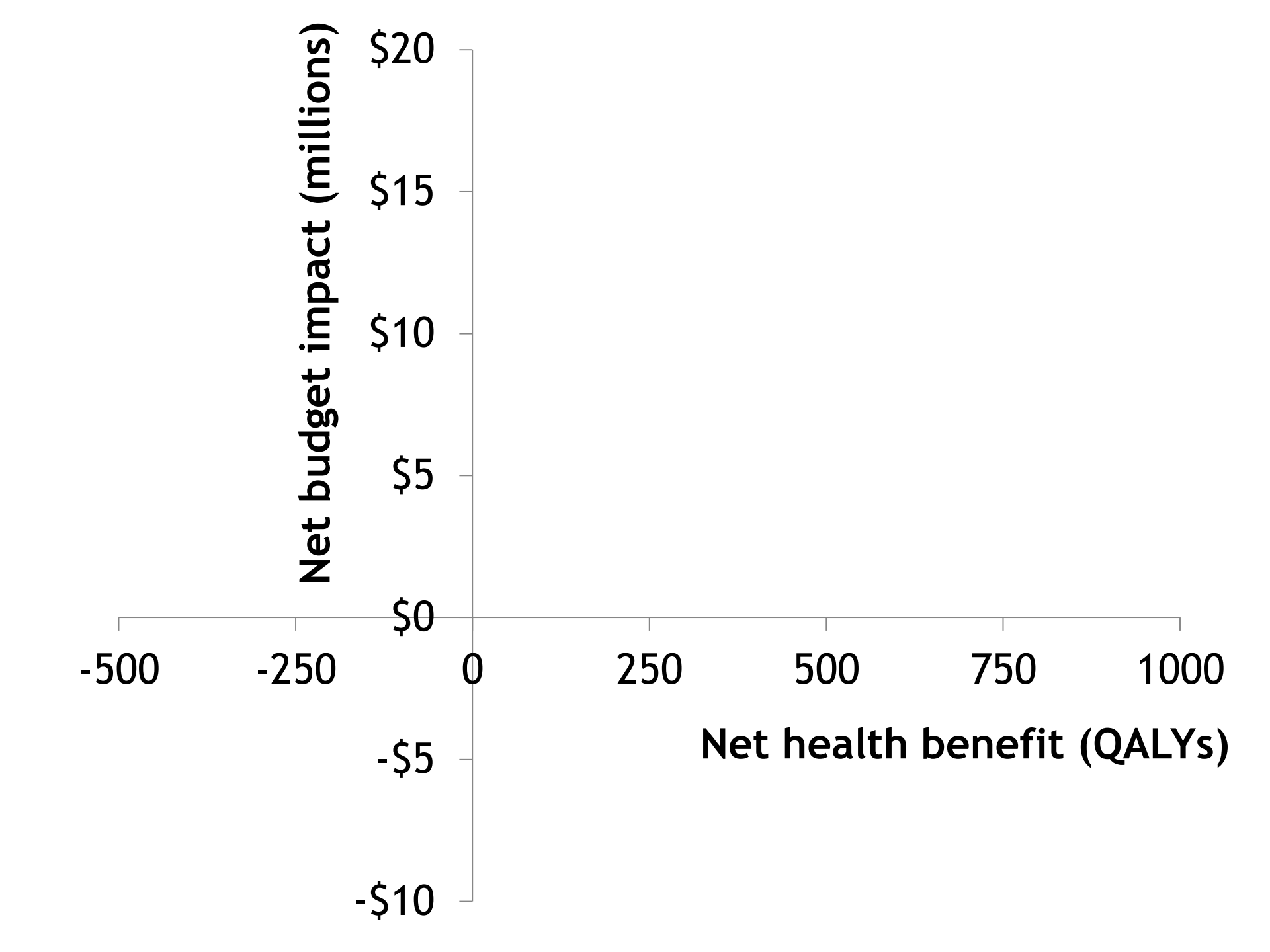
250
500
750
1000
Net health benefit (QALYs)

Example: *partially fixed* budget

- **ΔC=$3505, ΔE=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?**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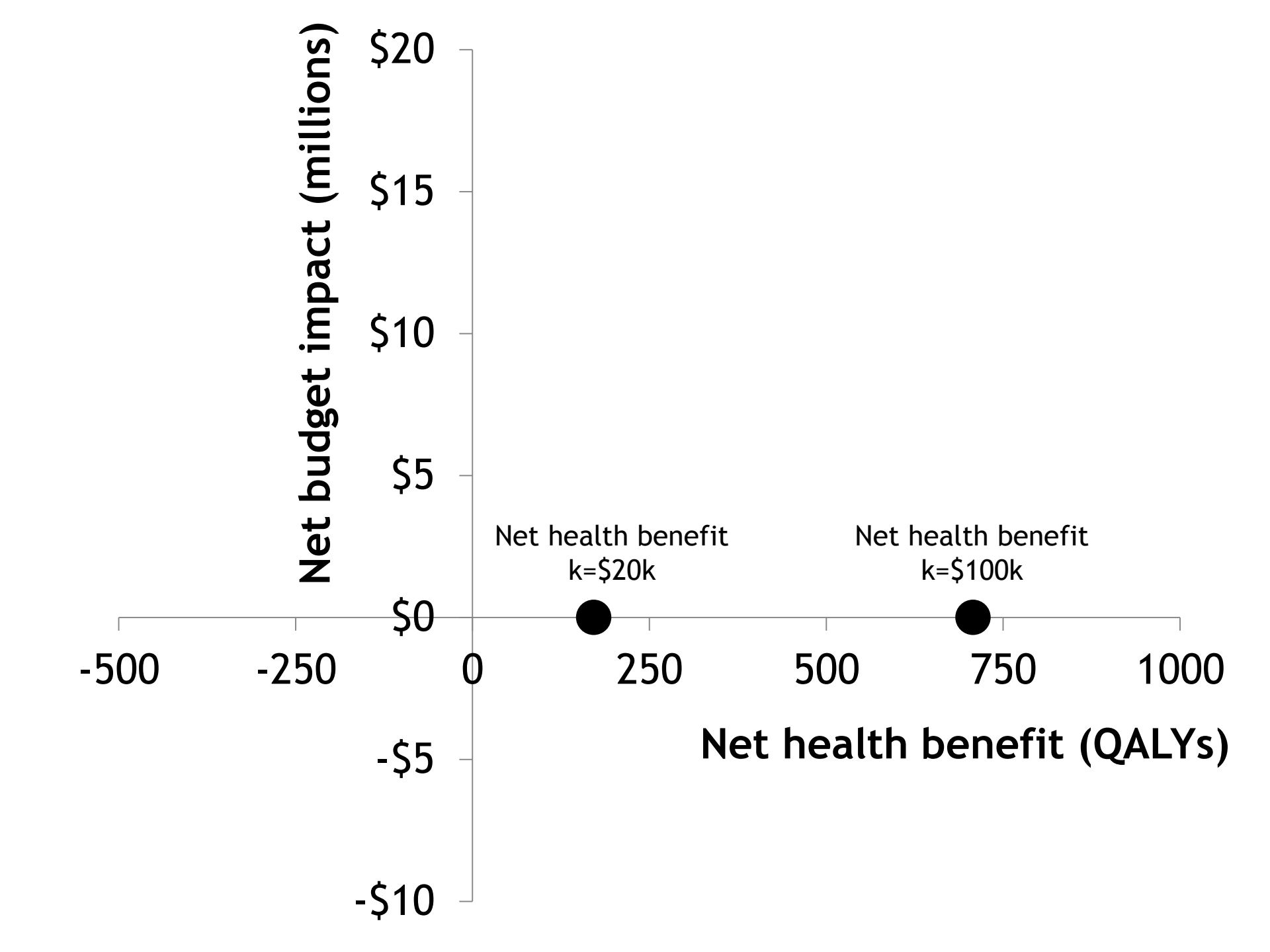
Net health benefit (QALYs)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Net health benefit
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Net health benefit
k=$100k
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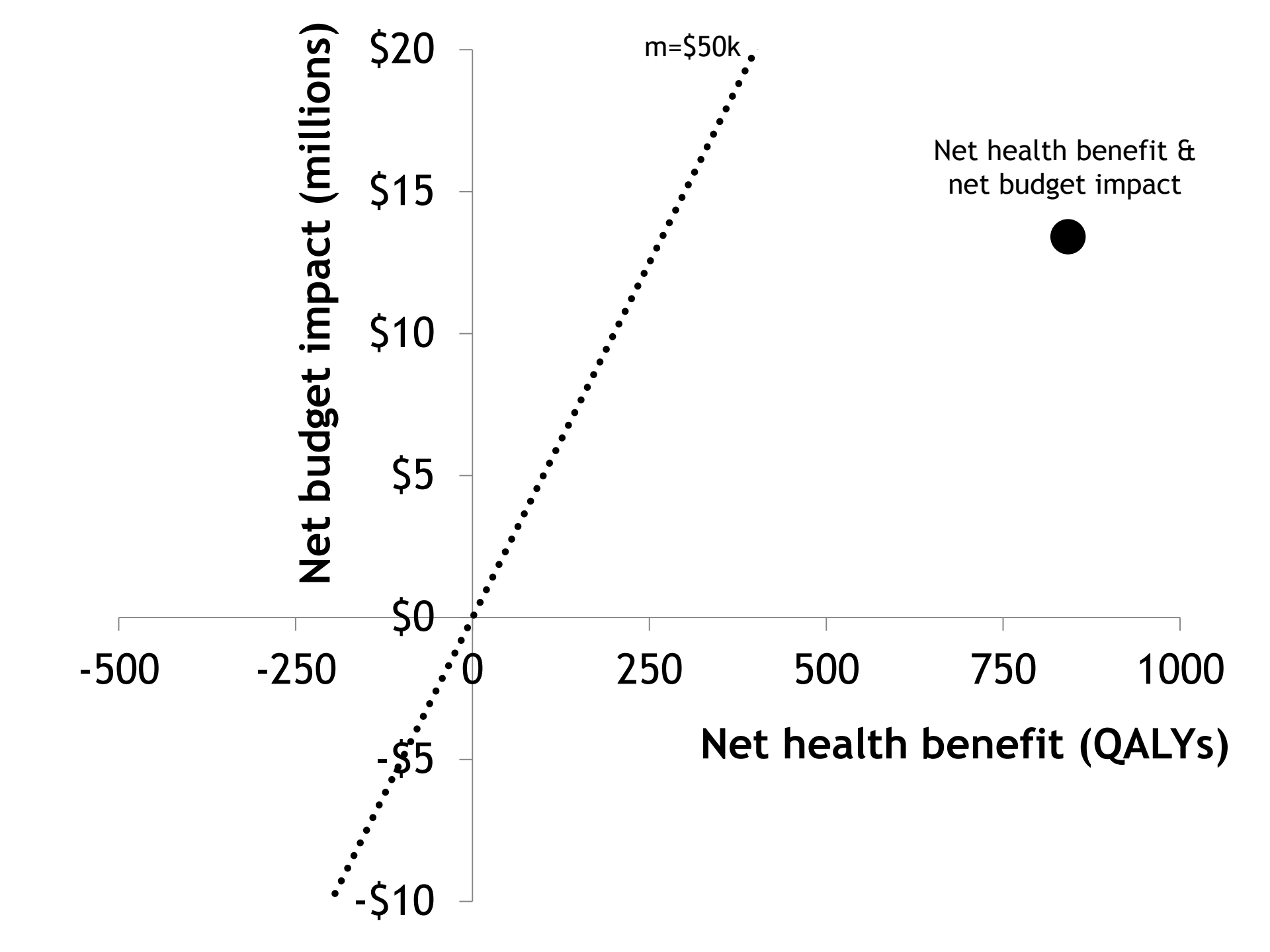
Net health benefit (QALYs)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Net health benefit &
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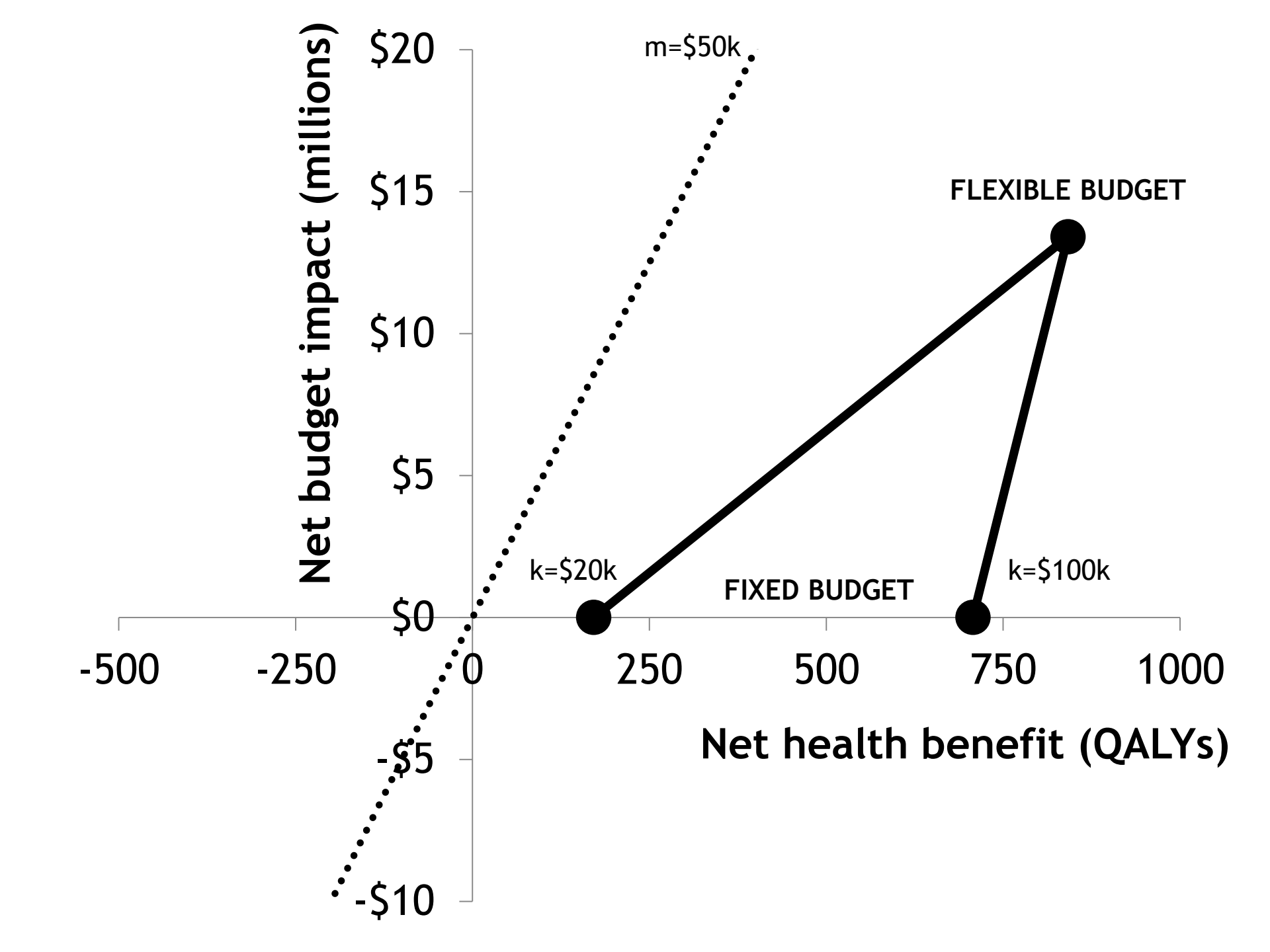
Net health benefit (QALYs)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Net health benefit (QALYs)
m=$50k
FLEXIBLE BUDGET
k=$20k
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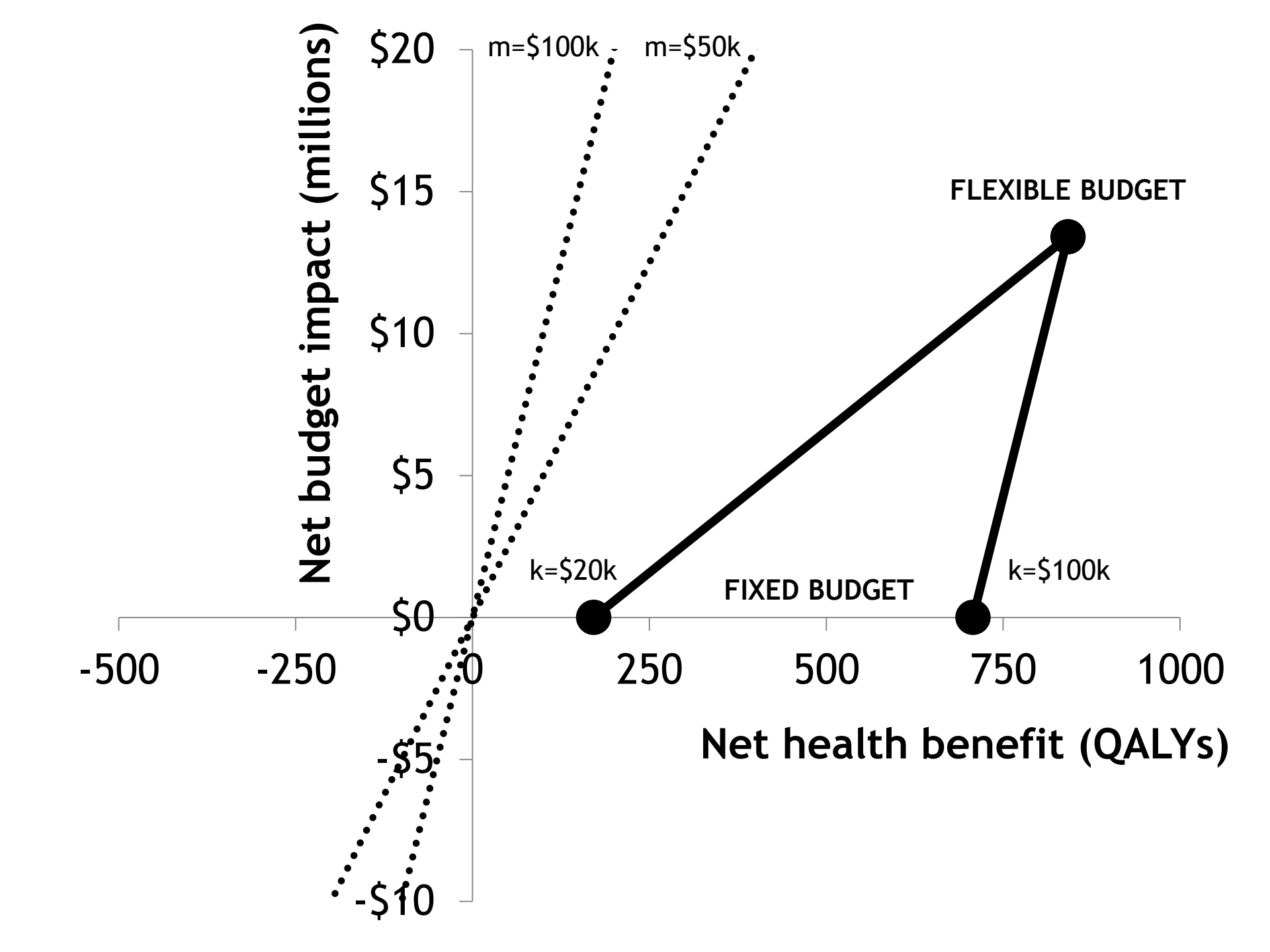
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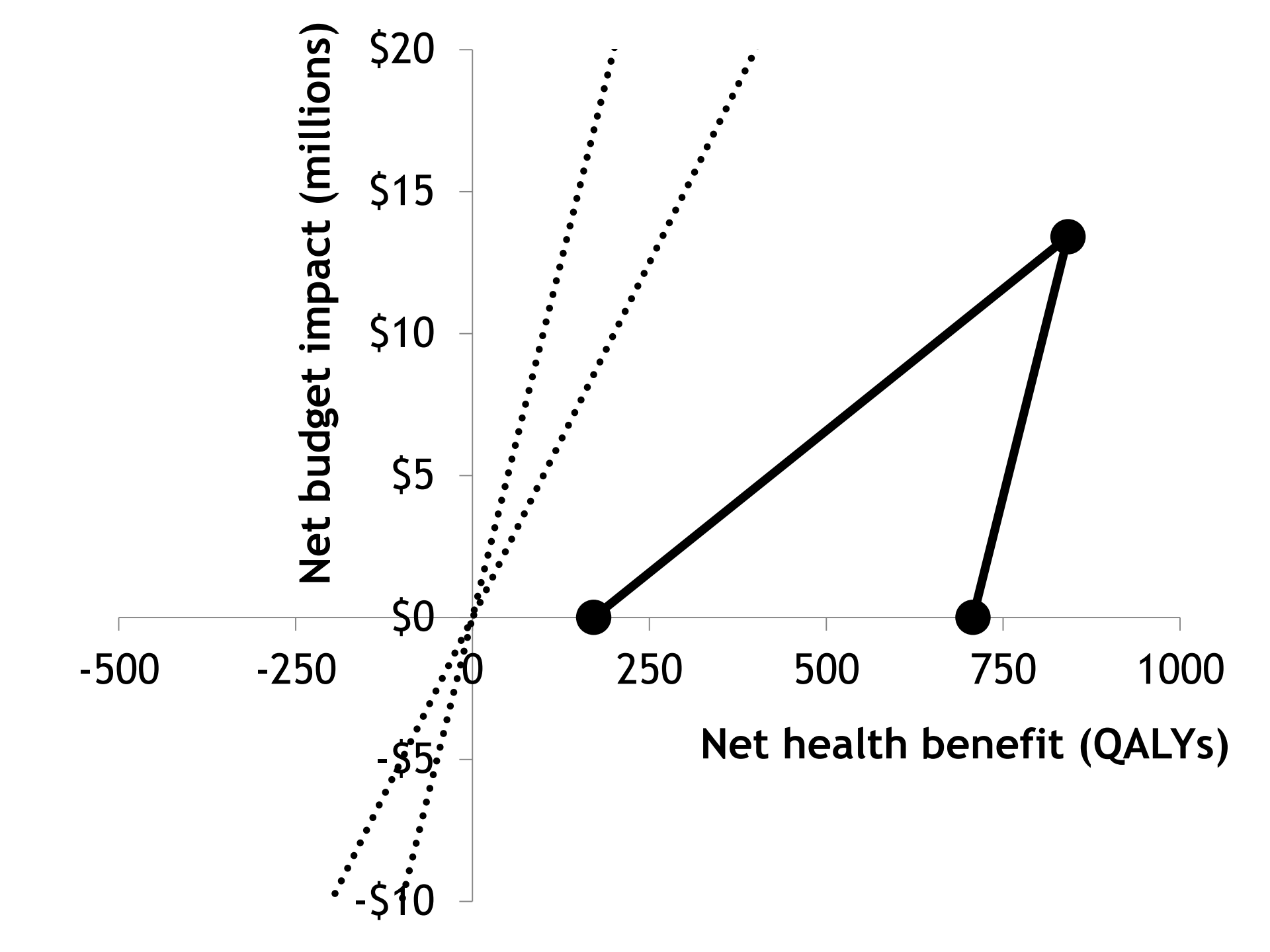
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Net health benefit (QALYs)

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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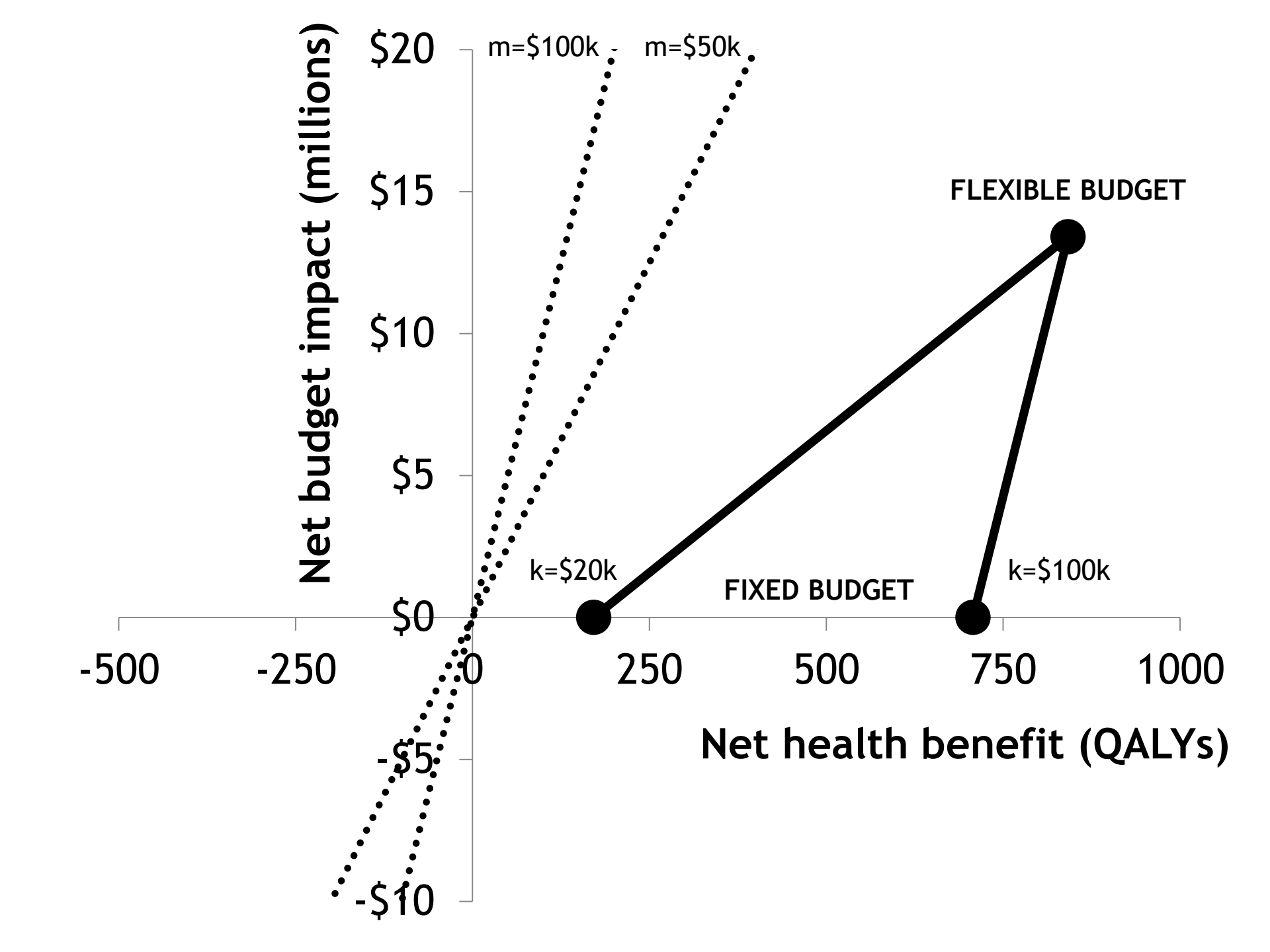
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