Package 'dynacem'

June 18, 2025

Title Evaluates Cost-Effectiveness Models With Dynamic Pricing And Uptake

Version 0.0.0.9000

Description Evaluates cost-effectiveness models with dynamic pricing and uptake.

License GPL (>= 3)

Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.2

Imports dplyr,
purrr,
readr,
rlang

Suggests heemod,
testthat (>= 3.0.0)

Config/testthat/edition 3

Depends R (>= 3.5)

LazyData true

Contents

calc_cohpv *Calculate present value in a given cohort*

Description

Present value of a series of payoffs for a single given cohort, entering at given time, allowing for dynamic pricing

Usage

```
calc_cohpv(j, uptakes, payoffs, pindex, discrate)
```

Arguments

j	Time at which patient begins any modelled intervention
uptakes	Vector of patient uptake through the time horizon of interest (<= time horizon of economic model)
payoffs	Field names of payoffs of interest (character vector)
pindex	Vector of price indices through the time horizon of interest (<= time horizon of economic model)
discrate	Discount rate per timestep, corresponding to price index

Value

Total discounted present value

calc_futurepv *Calculate present value in a given cohort and price index*

Description

Present value of a series of payoffs for a single given cohort, entering at given future time, allowing for dynamic pricing and a potential offset to the price index. Time is partitioned into the sum of time at which the patient begins the intervention and time since the patient initiated the intervention.

Usage

```
calc_futurepv(k, l, payoffs, pindex, discrate)
```

Arguments

k	Time since patient initiated any modelled intervention
l	Timestep at which the cost-effectiveness evaluation takes place (offset to the price index)
payoffs	Field names of payoffs of interest (character vector)
pindex	Vector of price indices through the time horizon of interest (<= time horizon of economic model)
discrate	Discount rate per timestep, corresponding to price index

Value

Discounted present value

`calc_onepv` *Calculate present value of a payoff at a given time*

Description

Calculate present value of a payoff for a dynamic multi-cohort cost-effectiveness model for given time. Time is partitioned into the sum of time at which the patient begins the intervention and time since the patient initiated the intervention.

Usage

```
calc_onepv(j, k, uptakes, payoffs, pindex, discrate)
```

Arguments

`j`	Time at which patient begins any modelled intervention
`k`	Time since patient initiated any modelled intervention
`uptakes`	Vector of patient uptake through the time horizon of interest (<= time horizon of economic model)
`payoffs`	Field names of payoffs of interest (character vector)
`pindex`	Vector of price indices through the time horizon of interest (<= time horizon of economic model)
`discrate`	Discount rate per timestep, corresponding to price index

Value

Discounted present value

`dynpv` *Total present value from dynamic multi-cohort cost-effectiveness model*

Description

Total present value from dynamic multi-cohort cost-effectiveness model

Usage

```
dynpv(uptakes, payoffs, pindex, discrate)
```

Arguments

uptakes	Vector of patient uptake through the time horizon of interest (<= time horizon of economic model)
payoffs	Field names of payoffs of interest (character vector)
pindex	Vector of price indices through the time horizon of interest (<= time horizon of economic model)
discrate	Discount rate per timestep, corresponding to price index

Value

List including

- total: Total present value
- uptake: Total number of uptaking patients
- mean: Average present value per uptaking patient (=total/uptake)

Examples

```
# Obtain dataset
democe <- get_dynfields(
   heemodel = oncpsm,
   payoffs = c("cost_daq_new", "cost_total", "qaly"),
   discount = "disc"
   )

# Obtain payoff vector of interest
payoffs <- democe |>
   dplyr::filter(int=="new") |>
   dplyr::mutate(cost_oth = cost_total - cost_daq_new)
Nt <- nrow(payoffs)

# Example calculation
dynpv(
   uptakes = rep(1, Nt),
   payoffs = payoffs$cost_oth,
   pindex = 1 + (1:Nt)*0.05/52,
   discrate = (0.05 + 0.03)/52
)
```

---

futurepv *Calculate present value in a given cohort at a future time*

Description

Present value of a series of payoffs for a single given cohort, entering at given future time, allowing for dynamic pricing.

Usage

```
futurepv(l, payoffs, pindex, discrate)
```

Arguments

`l`	Timestep at which the cost-effectiveness evaluation takes place (offset to the price index)
`payoffs`	Field names of payoffs of interest (character vector)
`pindex`	Vector of price indices through the time horizon of interest (<= time horizon of economic model)
`discrate`	Discount rate per timestep, corresponding to price index

Value

Discounted present value

Examples

```
# Obtain dataset
democe <- get_dynfields(
   heemodel = oncpsm,
   payoffs = c("cost_daq_new", "cost_total", "qaly"),
   discount = "disc"
   )

# Obtain discount rate
discrate <- get_param_value(oncpsm, "disc")

# Obtain payoff vector of interest
payoffs <- democe |>
   dplyr::filter(int=="new") |>
   dplyr::mutate(cost_oth = cost_total - cost_daq_new)
Nt <- nrow(payoffs)

# Run calculation for timesteps 1:10
futurepv(
  l = 1:10,
  payoffs = payoffs$cost_oth,
  pindex = rep(1, 2*Nt),
  discrate = discrate
)
```

`get_dynfields` *Helper function to get a tibble of the relevant fields from heemod output*

Description

Helper function to get a tibble of the relevant fields from heemod output

Usage

```
get_dynfields(heemodel, payoffs, discount, fname = NA)
```

Arguments

heemodel	A health economic model object from the *heemod* package (see heemod::heemod-package).
payoffs	Field names of payoffs of interest (string vector)
discount	Name of parameter providing discount rate per cycle (string)
fname	Export data to a .CSV file of this name, if given (character)

Value

Tibble of payoffs taken from the heemod model, by intervention and model timestep (model_time).

The field vt is calculated as (1+i)^(1-model_time), where i is the discount rate per model timestep set in the *heemod* model through the parameter disc_cycle. This can be useful in 'rolling-up' payoff values to the timestep in which they were incurred.

An additional set of payoffs (identified with a "_rup" suffix) provides calculations of the payoffs as at the start of the timestep in which they were incurred, i.e. original payoff / vt.

See Also

heemod::heemod-package

Examples

```
democe <- get_dynfields(
   heemodel = oncpsm,
   payoffs = c("cost_daq_new", "cost_total", "qaly"),
   discount = "disc"
   )
head(democe)
```

---

get_param_value *Obtain the discount rate per model cycle from heemod output*

Description

Obtain the discount rate per model cycle from heemod output

Usage

```
get_param_value(heemodel, param)
```

Arguments

heemodel	A health economic model object from the *heemod* package (see heemod::heemod-package).
param	Name of parameter to extract from the heemod model

Value

Value of the parameter from the heemod model

See Also

heemod::heemod-package

Examples

```
get_param_value(
   heemodel = oncpsm,
   param = "disc"
   )
```

`oncpsm` *Heemod cost-effectiveness model example*

Description

An example three state cost-effectiveness model in oncology built using `heemod::heemod-package()` according to the assumptions and specification in the accompanying paper.

Usage

```
oncpsm
```

Format

`oncpsm`**:**
A heemod object

Source

Created based on assumptions.

Index