

# Package: vcPB (via r-universe)

September 14, 2024

**Type** Package

**Title** Longitudinal PB Varying-Coefficient Groupwise Disparity Model

**Version** 1.1.1

**Description** Estimating the disparity between two groups based on the extended model of the Peters-Belson (PB) method. Our model is the first work on the longitudinal data, and also can set a varying variable to find the complicated association between other variables and the varying variable. Our work is an extension of the Peters-Belson method which was originally published in Peters (1941)<[doi:10.1080/00220671.1941.10881036](https://doi.org/10.1080/00220671.1941.10881036)> and Belson (1956)<[doi:10.2307/2985420](https://doi.org/10.2307/2985420)>.

**Depends** KernSmooth, rlist, lme4, methods

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.2.3

**URL** <https://github.com/SangkyuStat/vcPB>,  
<https://sangkyustat.github.io/vcPB/>

**BugReports** <https://github.com/SangkyuStat/vcPB/issues>

**Repository** <https://sangkyustat.r-universe.dev>

**RemoteUrl** <https://github.com/sangkyustat/vcpb>

**RemoteRef** HEAD

**RemoteSha** 0c2628165d8781b9afc0f831d2c5b48a8ed73f54

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vc.pb	<i>Varying-Coefficient Disparity Decomposition Analysis for a Longitudinal Data</i>
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### Description

The `vc.pb` offers Peters-Belson(PB) type of nonparametric varying-coefficient regression method which measures the disparity between a majority group and a minority group for the longitudinal data.

### Usage

```
vc.pb(
  formula,
  group,
  data,
  id,
  modifier = NULL,
  local_time = NULL,
  bandwidth_M = NULL,
  bandwidth_m = NULL,
  bandwidth_xM = NULL,
  bandwidth_xm = NULL,
  bandwidth_Z_M = NULL,
  bandwidth_Z_m = NULL,
  bandwidth_Z_xM = NULL,
  bandwidth_Z_xm = NULL,
  detail = FALSE,
  ...
)
```

### Arguments

<code>formula</code>	a formula for the model.
<code>group</code>	a vector within the data which is used for separating majority and minority groups.
<code>data</code>	a data frame and data has to be included with the form of <code>data.frame</code> .
<code>id</code>	a vector within the data which is used for identifying the observations.
<code>modifier</code>	(optional) a vector from the data which is an optional argument to add the varying term into the model. The default is <code>NULL</code> . If the class of the vector is given as <code>integer</code> then, the continuous version of <code>vc.PB</code> is performed and if the class is <code>factor</code> or <code>character</code> , then the discrete version is proceeded. Three different sets of inputs are needed for different versions.
<code>local_time</code>	(optional) a vector used for the local points of time variable in the kernel regression.

bandwidth_M	(optional) a bandwidth for the time variable used for estimating the time-varying coefficient of the majority group.
bandwidth_m	(optional) a bandwidth for the time variable used for estimating the time-varying coefficient of the minority group.
bandwidth_xM	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix for the majority group.
bandwidth_xm	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix for the minority group.
bandwidth_Z_M	(optional) a bandwidth for the varying variable used for estimating the time-varying coefficient of the majority group. Used only when the class of modifier is integer.
bandwidth_Z_m	(optional) a bandwidth for the varying variable used for estimating the time-varying coefficient of the minority group. Used only when the class of modifier is integer.
bandwidth_Z_xM	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix related to varying variable for the majority group. Used only when the class of modifier is integer.
bandwidth_Z_xm	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix related to varying variable for the minority group. Used only when the class of modifier is integer.
detail	a bool argument whether the detailed results are provided or not.
...	used for controlling the others.

### Value

vc.pb returns an object of class "vc.pb", which is a list containing following components:

call	a matched call.
overall_disparity	overall disparity between major and minor groups.
explained_disparity	explained disparity between major and minor groups, this component is given only when varying is null.
explained_disparity_by_X	explained disparity from the variables without modifier variable given that the modifier variable is from the majority group, this component is given only when varying is not null.
explained_disparity_by_Z	explained disparity from modifier variable, this component is given only when varying is not null.
unexplained_disparity	unexplained disparity between major and minor groups.
times	local time points used for kernel regression.
major	a majority group label.
minor	a minority group label.

`modifier, varying.type` the modifier variable and the type of the modifier variable, these components are given only when `varying` is not null.

`bandwidths` various corresponding bandwidths. Please see the details or the attached reference for more information.

**Author(s)**

Sang Kyu Lee

**Examples**

```
set.seed(1)
n <- 100
x1 <- rnorm(n)
x2 <- rnorm(n)
time <- rep(1:5, 20) + runif(n)
y <- rnorm(n)
sub_id <- rep(1:25, 1, each = 4)
group <- rep(as.character(1:2), 25, each = 2)
z <- as.character(rbinom(n, 1, prob = 0.5))

data <- data.frame(y = y, x1 = x1, x2 = x2, z = z, group = group, time = time, sub_id = sub_id)

fit <- vc.pb(y ~ (x1|time) + x2, data = data, id = sub_id, group = group)
fit
```

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