About Me

• I am a co-founder and Chief Data Scientist at R-Brain (r-brain.io)

• I have several years of experience in modeling in the banking industry

• I love building and testing models in particular in R
What is a Dual Time Dynamic model?

- Dual Time Dynamic (DtD) was presented by Breeden, J. L. (2007).

- It decomposes Credit Risk events to months-on-book (maturation), calendar date (exogenous) and vintage (quality):

\[ r(a, v, t) = e^{f_m(a)} e^{f_g(t)} e^{f_Q(v)} \]
As an example:
DtD and APC models

• We can transform the previous model to:

\[ \log(r(a, v, t)) = f_m(a) + f_g(t) + f_Q(v) \]

• Which is an APC (Age=a, Period=t, Cohort=v) model introduced decades ago.
What is the main challenge?

- This model suffers from collinearity. Because:

\[ v = t - a \]
APC Package in R

• Based on the second differences of time effects in which corresponding predictors are identifiable:

\[ u_{age,cohart} = a\ linear\ plane + \sum_{age} \sum \Delta^2 \alpha_s + \sum_{period} \sum \Delta^2 \beta_s + \sum_{cohort} \sum \Delta^2 \gamma_s \]
APC Package

• It is in CRAN: https://cran.r-project.org/web/packages/apc/index.html

• Let’s run an example
Thank you for your attention!

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- Presented notebook: