



Mathematical Statistics  
Stockholm University  
Examensarbete **2013:1**,  
<http://www.math.su.se/matstat>

# Proportional hazards model for matched failure time data

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February 2013

## Abstract

The aim was to compare proportional hazards models for matched failure time data in terms of underlying assumptions and requirements for causal inference. We also wanted to compare the models in terms of power and performance under model misspecification. Four models were compared: the stable-Weibull frailty model, the stratified Cox model, the marginal Weibull model and the marginal Cox model. Strict assumptions behind the stable-Weibull model makes it less useful for unmatched data. The stratified Cox model is the most appropriate model when one wants to make causal inference from unmatched clustered data. Matched data from different frailty models were generated to compare the methods empirically. The power of the stable-Weibull model was significantly larger than the power of the stratified Cox. The performance of the stable-Weibull model was sensitive to misspecification of the baseline hazard. The marginal Weibull model and the marginal Cox model performed very similar. For small intra-cluster dependence, they performed similar to the stable-Weibull model in terms of power. When misspecified, the marginal Cox performed well for small to moderate dependence.

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