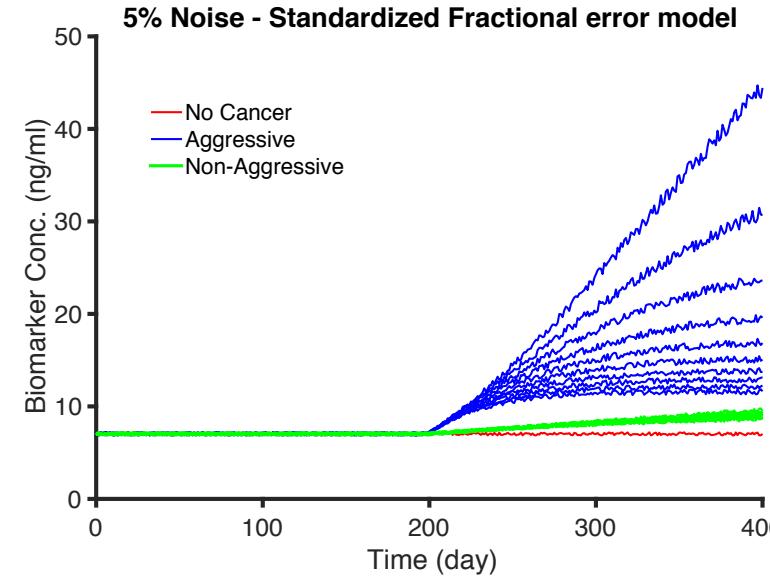
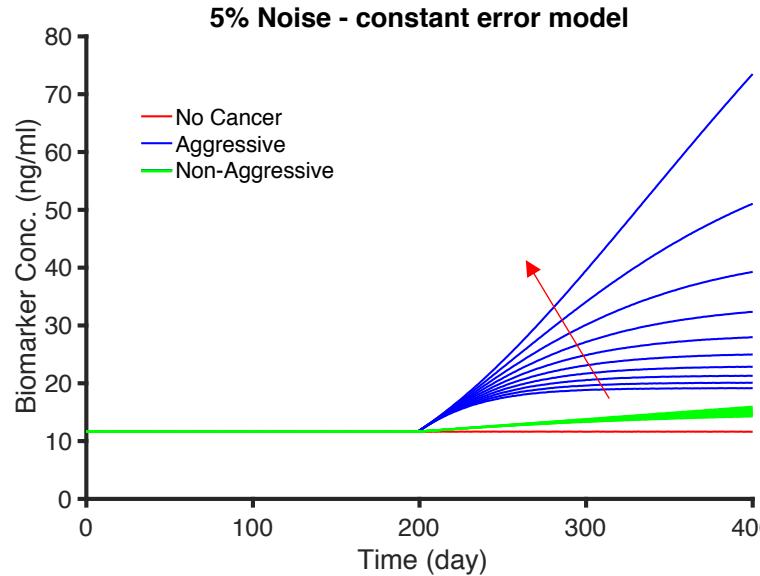


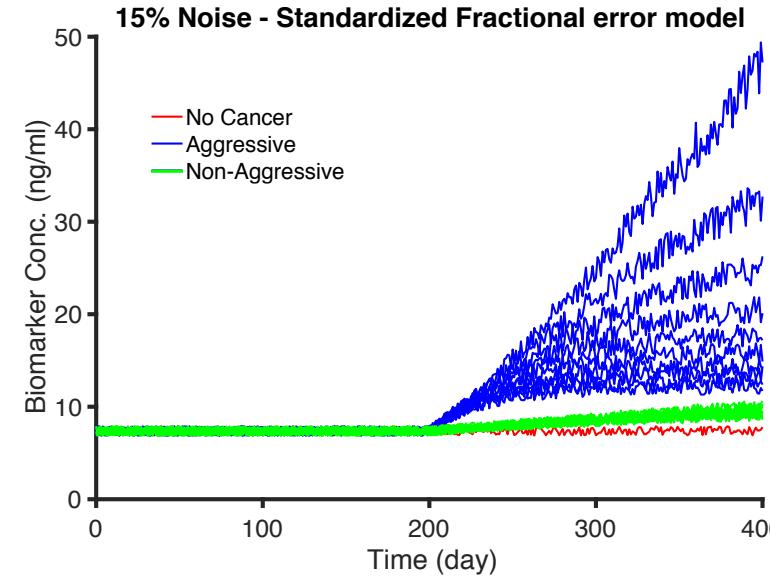
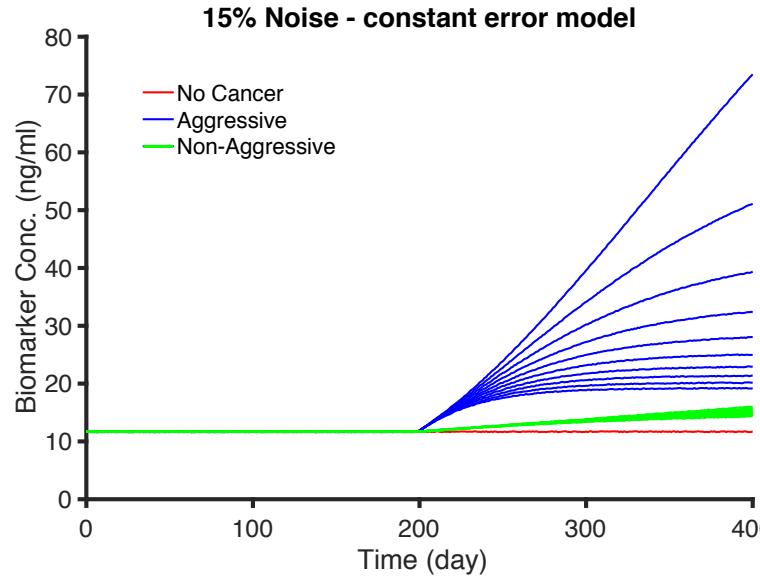
Early Detection of Cancer Using Longitudinal Biomarker Measurements

- Simulating 3 classes of biomarker trajectories (No Cancer, Aggressive and non-aggressive)
 - Use different error models (range of noise level)
- Using **fixed** observation time:
- kGrowth and kDecay sensitivity analysis
 - in a range of noise level
 - w and w/o different normalization methods
- Observation span vs sampling intervals
 - in a range of noise level



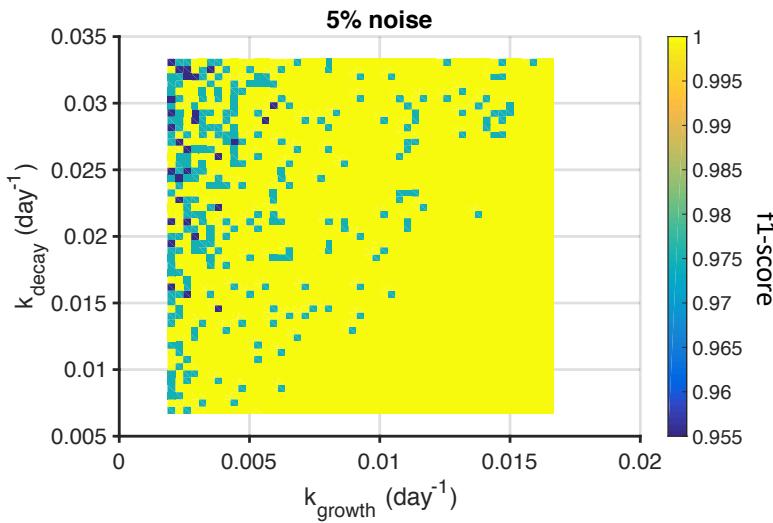
3 models, fixed k_{Growth} for each class of patients, with a range of k_{Decay} .
Red arrow: k_{Decay} decreases.

Class	K_Decay (1/day)	K_Growth (1/day)
No Cancer	0	0
Non-Aggressive	$1/(20*30):1/150$ (linspace, 10)	$1/(18*30)$
Aggressive	$1/150:1/30$ (linspace, 10)	$1/60$

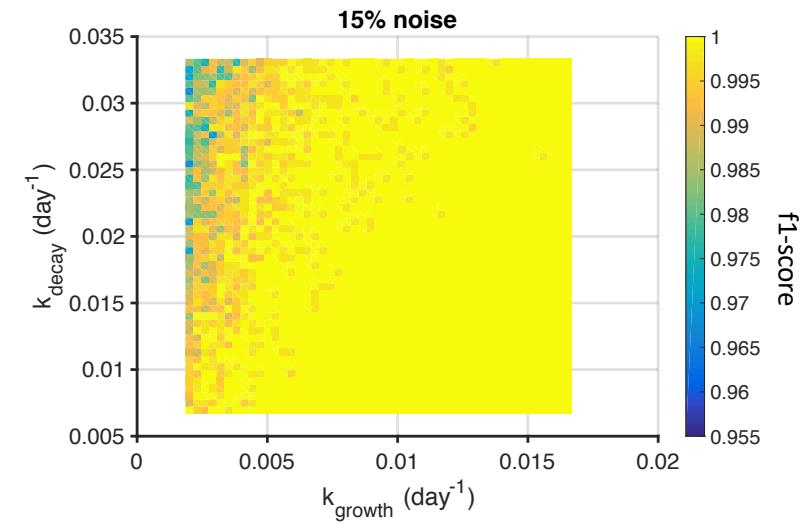
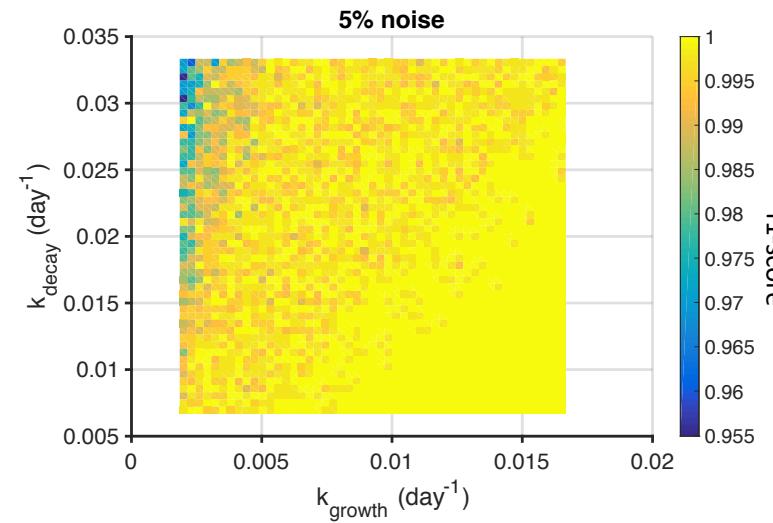


Observation time: 400 days
Sampling time: 1 day
Cancer on-set time: day 200
Baseline mean: 8 ng/mL
Baseline std: 1.5 ng/mL

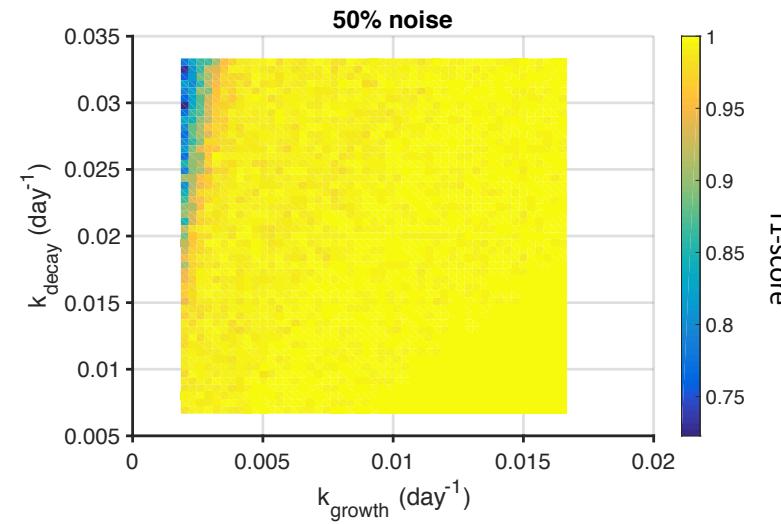
1 iteration

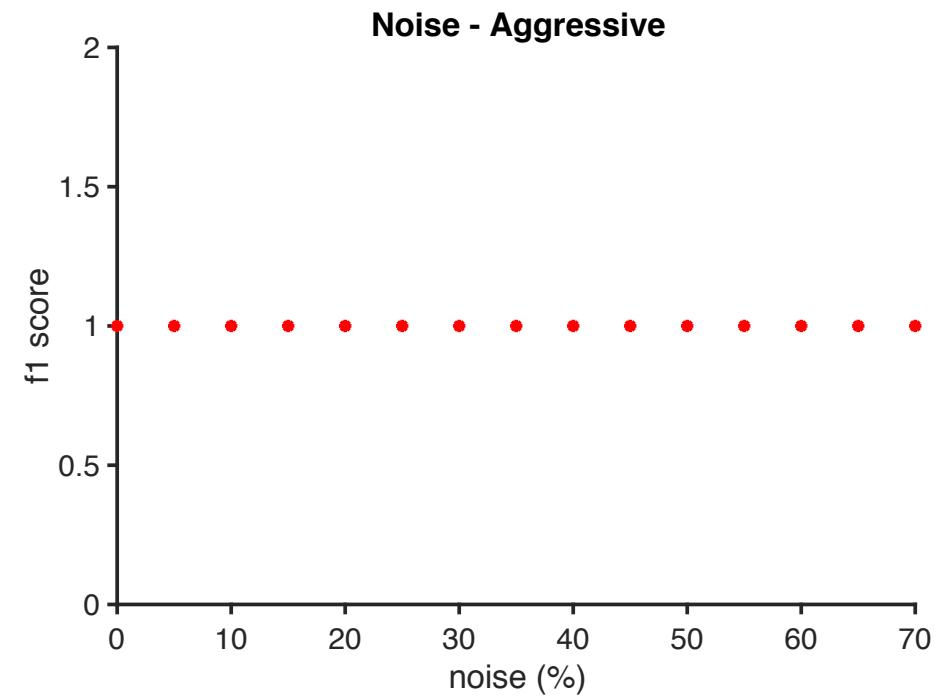
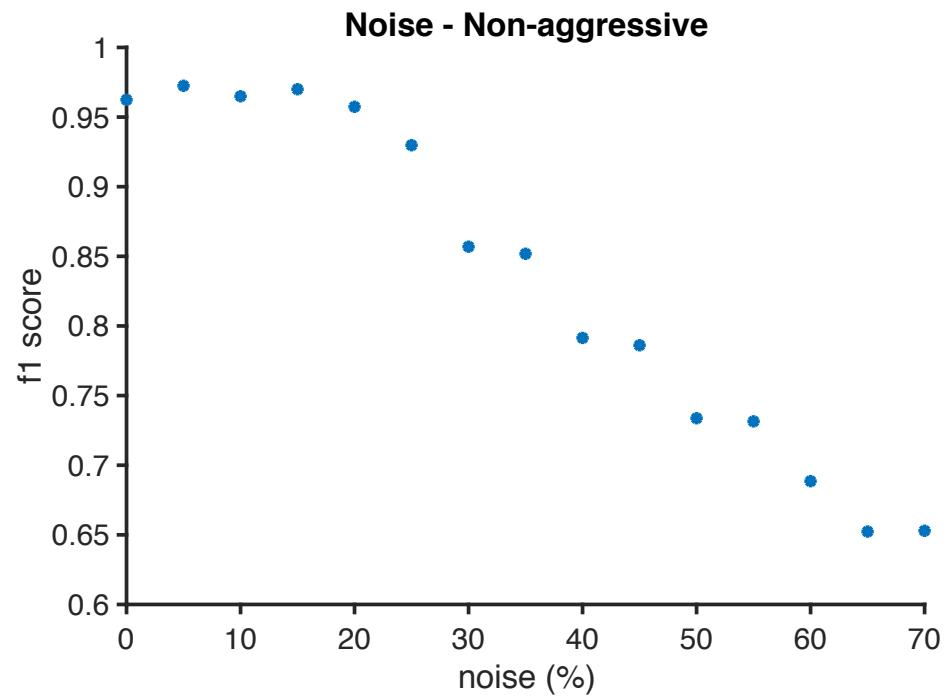


10 iterations
10-fold cross validation

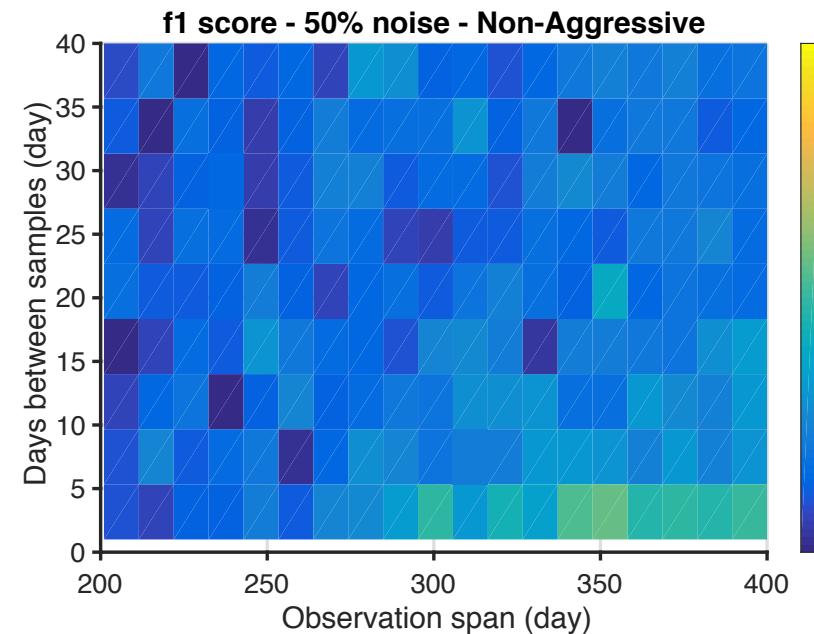
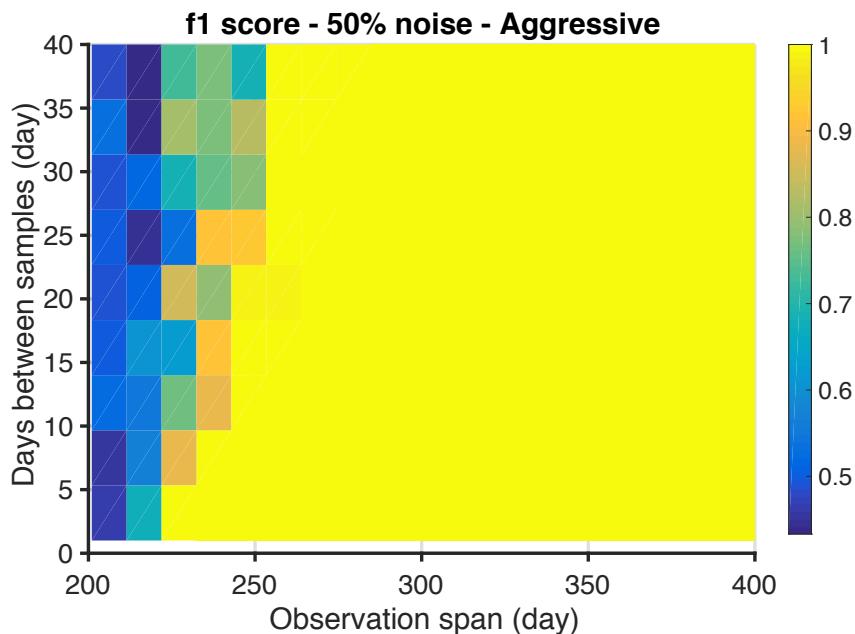
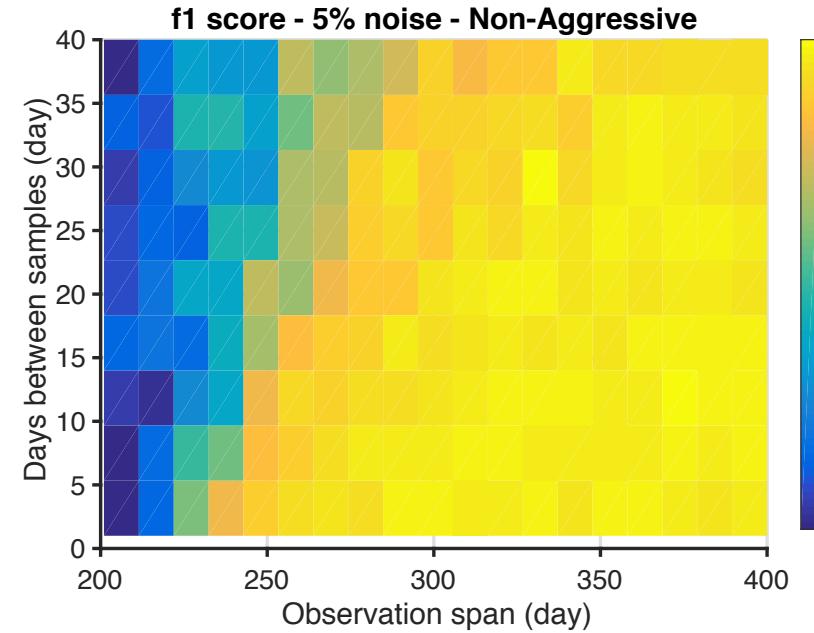
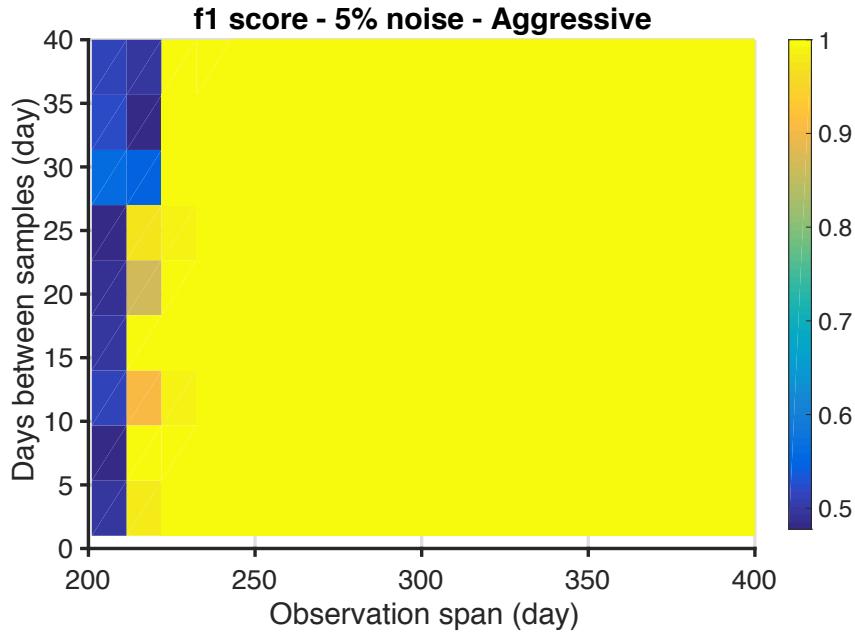


Class	K_Decay (1/day)	K_Growth (1/day)
No Cancer	0	0
Cancer	1/30:1/150 (linspace, 50)	1/(18*30):1/60 (linspace, 50)

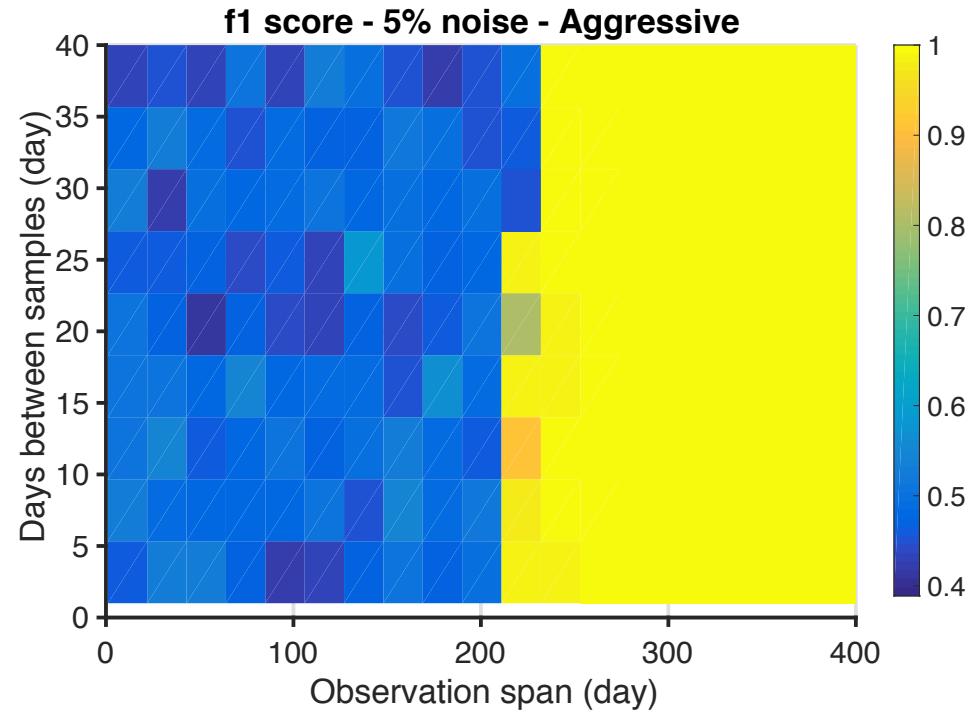




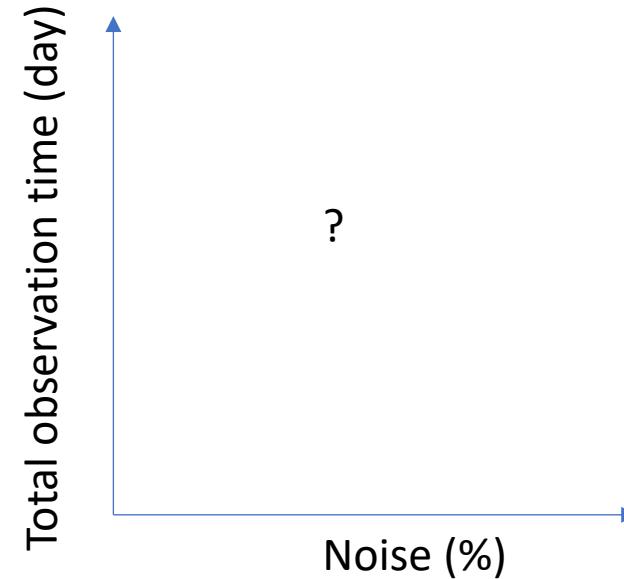
Noise (%)	Non-Aggressive	Aggressive
0:70	$k_{\text{Growth}} = 1/(18*30) \text{ (day}^{-1}\text{)}$ $k_{\text{Decay}} = 1/30 \text{ (day}^{-1}\text{)}$	$k_{\text{Growth}} = 1/60 \text{ (day}^{-1}\text{)}$ $k_{\text{Decay}} = 1/150 \text{ (day}^{-1}\text{)}$



Observ. Span (day)	200:400 (linspace,20)
Sampling int. (day)	1:40 (linspace,10)
Aggressive	$k_{\text{Growth}} = 1/60 \text{ (day}^{-1}\text{)}$ $k_{\text{Decay}} = 1/150 \text{ (day}^{-1}\text{)}$
Non-aggressive	$k_{\text{Growth}} = 1/(18*30) \text{ (day}^{-1}\text{)}$ $k_{\text{Decay}} = 1/30 \text{ (day}^{-1}\text{)}$



Observ. Span (day)	1:400 (linspace,20)
Sampling int. (day)	1:40 (linspace,10)
Aggressive	$k_{Growth} = 1/60 \text{ (day}^{-1}\text{)}$ $k_{Decay} = 1/150 \text{ (day}^{-1}\text{)}$
Non-aggressive	$k_{Growth} = 1/(18*30) \text{ (day}^{-1}\text{)}$ $k_{Decay} = 1/30 \text{ (day}^{-1}\text{)}$



1. Why accuracy instead of f1-score?
2. Observation time after cancer onset (200 days)?

