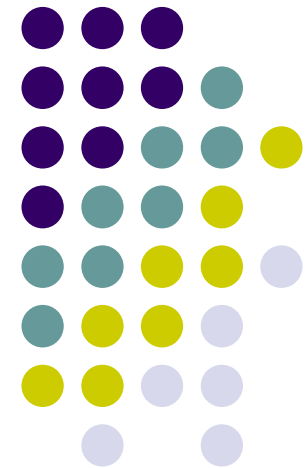


Serial monogamy and the spread of HIV



How explosive can it get?



Wim Delva MD, PhD

Carel Pretorius MSc, PhD

Stijn Vansteelandt MSc, PhD

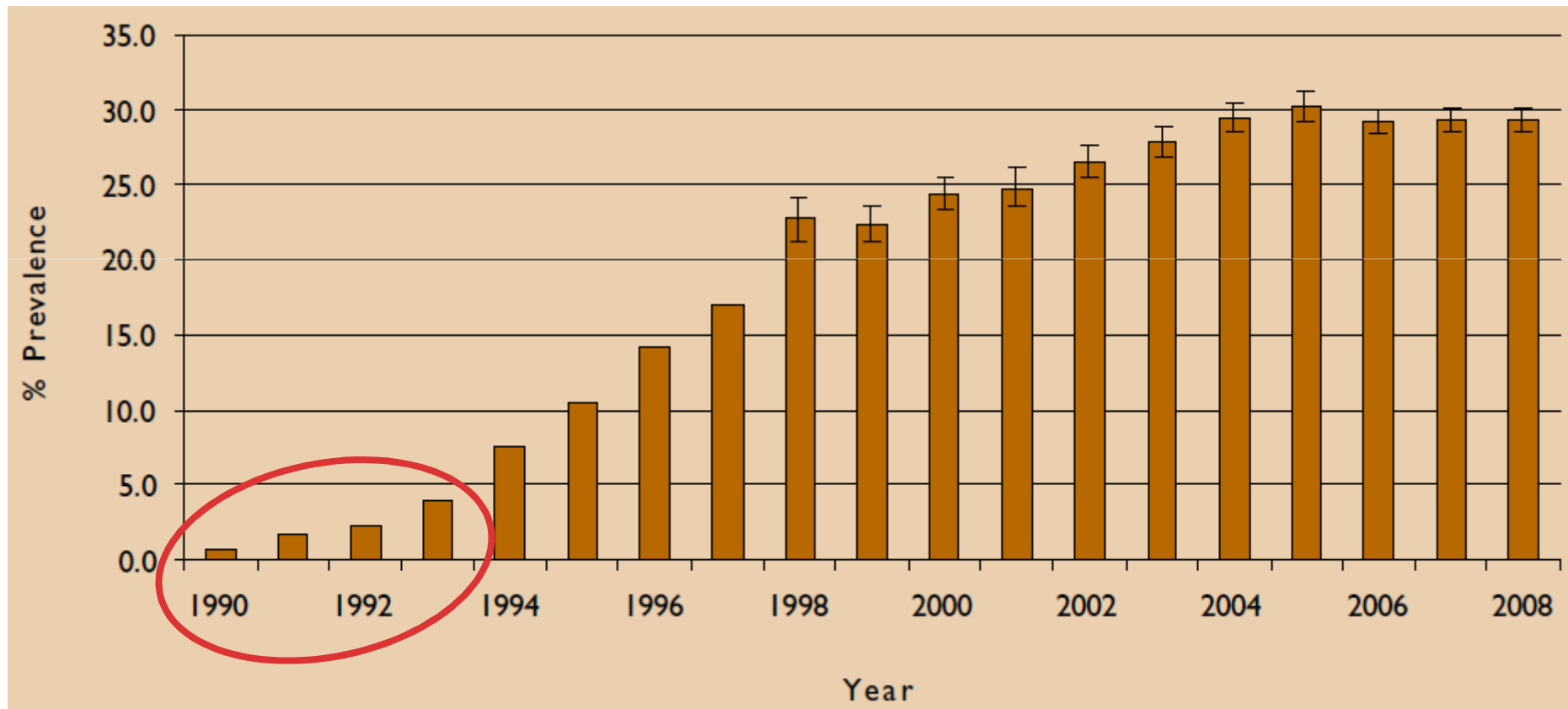
Marleen Temmerman MD, PhD

Brian Williams MSc, PhD

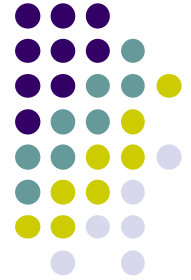


SACEMA
DST/NRF Centre of Excellence in Epidemiological Modelling and Analysis

3. Serial monogamy and the spread of HIV



The compartmental model



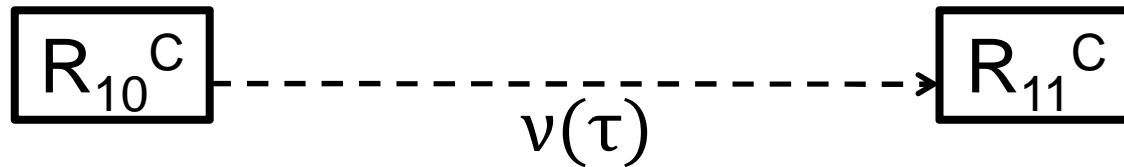
$$\boxed{R_{10}^C}$$

Sero-discordant casual relationship

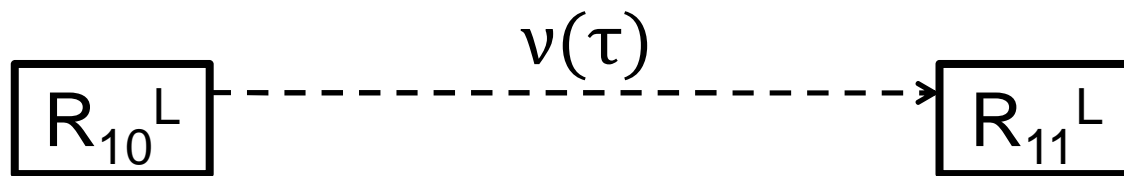
$$\boxed{R_{10}^L}$$

Sero-discordant long-term relationship

The compartmental model



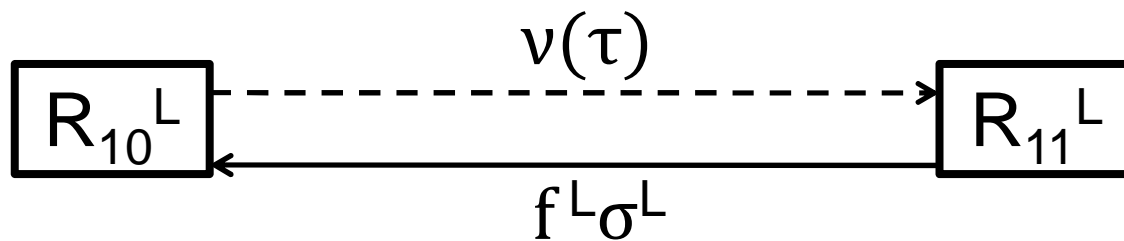
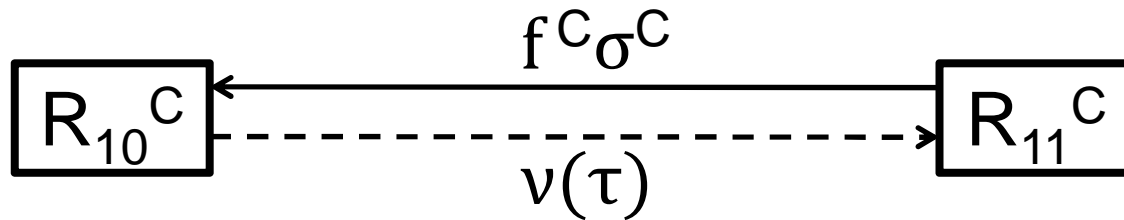
Sero-concordant casual relationship



Sero-concordant long-term relationship

v = HIV transmission rate
 τ = times since infection

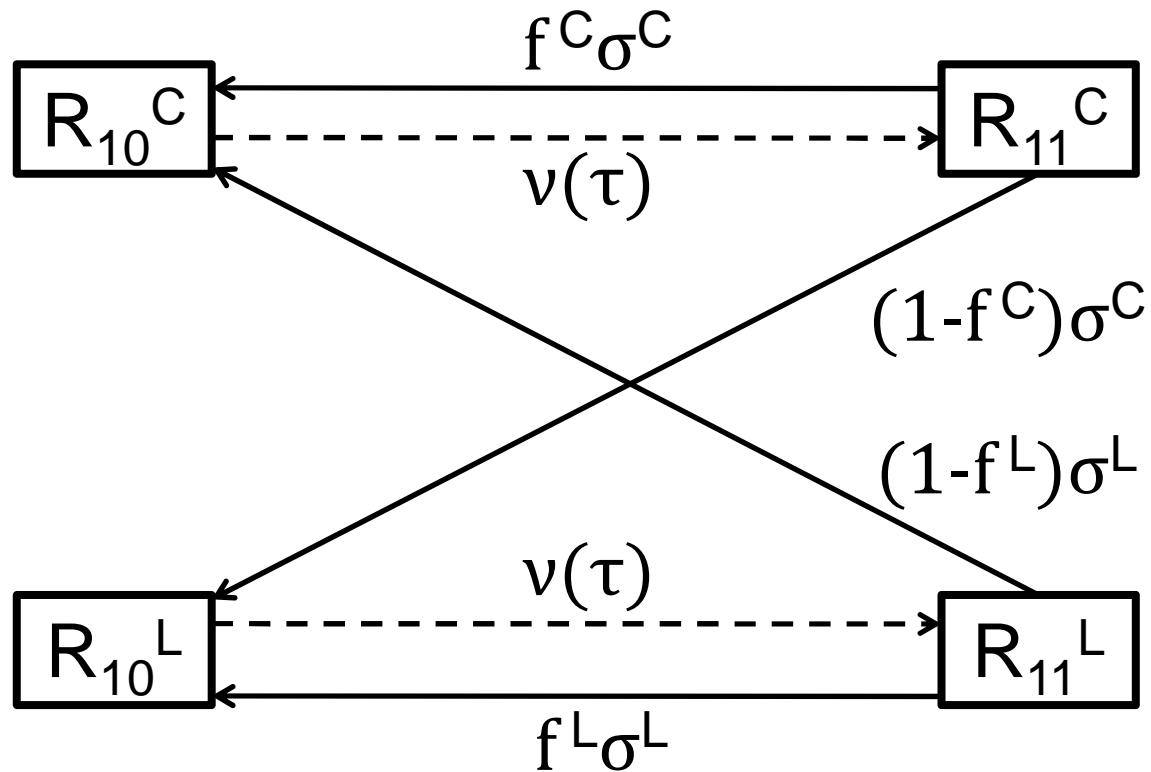
The compartmental model



σ = partner turnover rate

f = assortativeness parameter

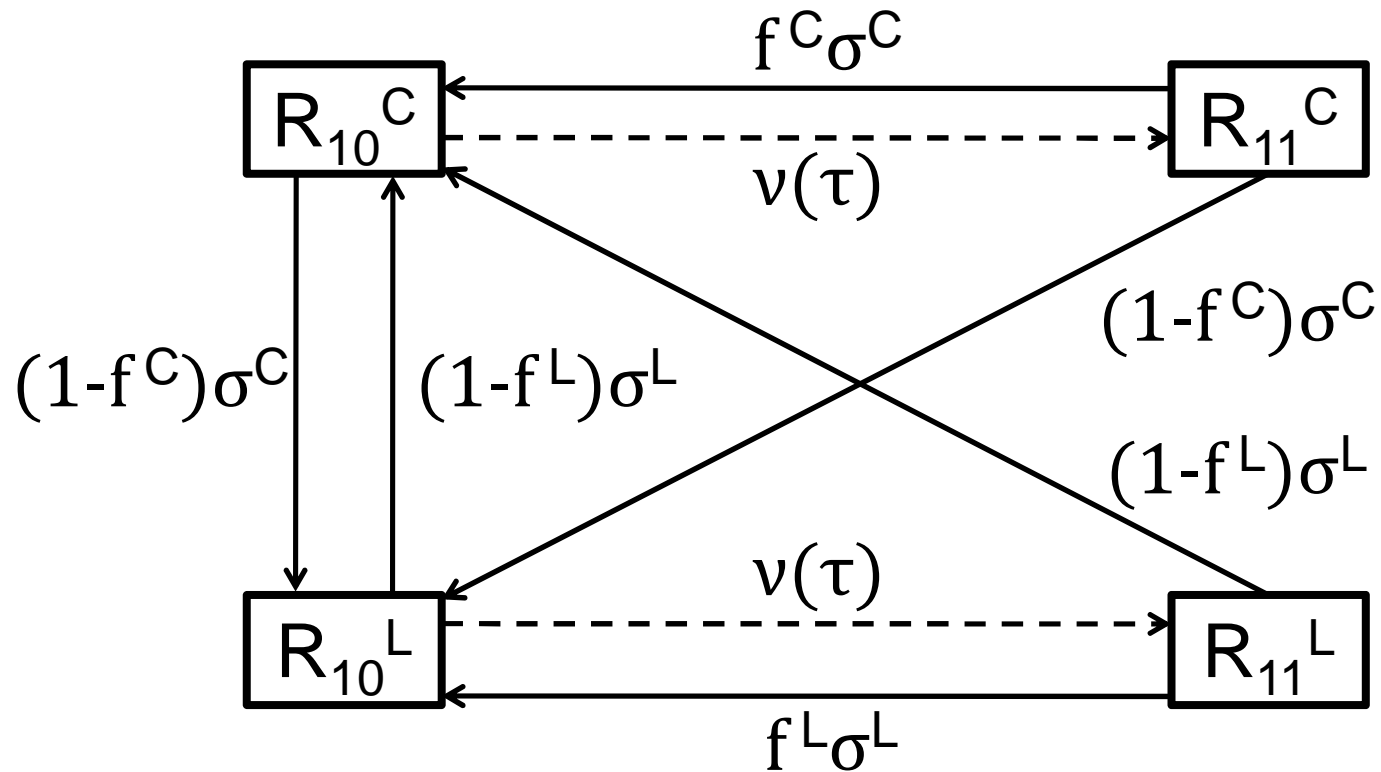
The compartmental model



σ = partner turnover rate

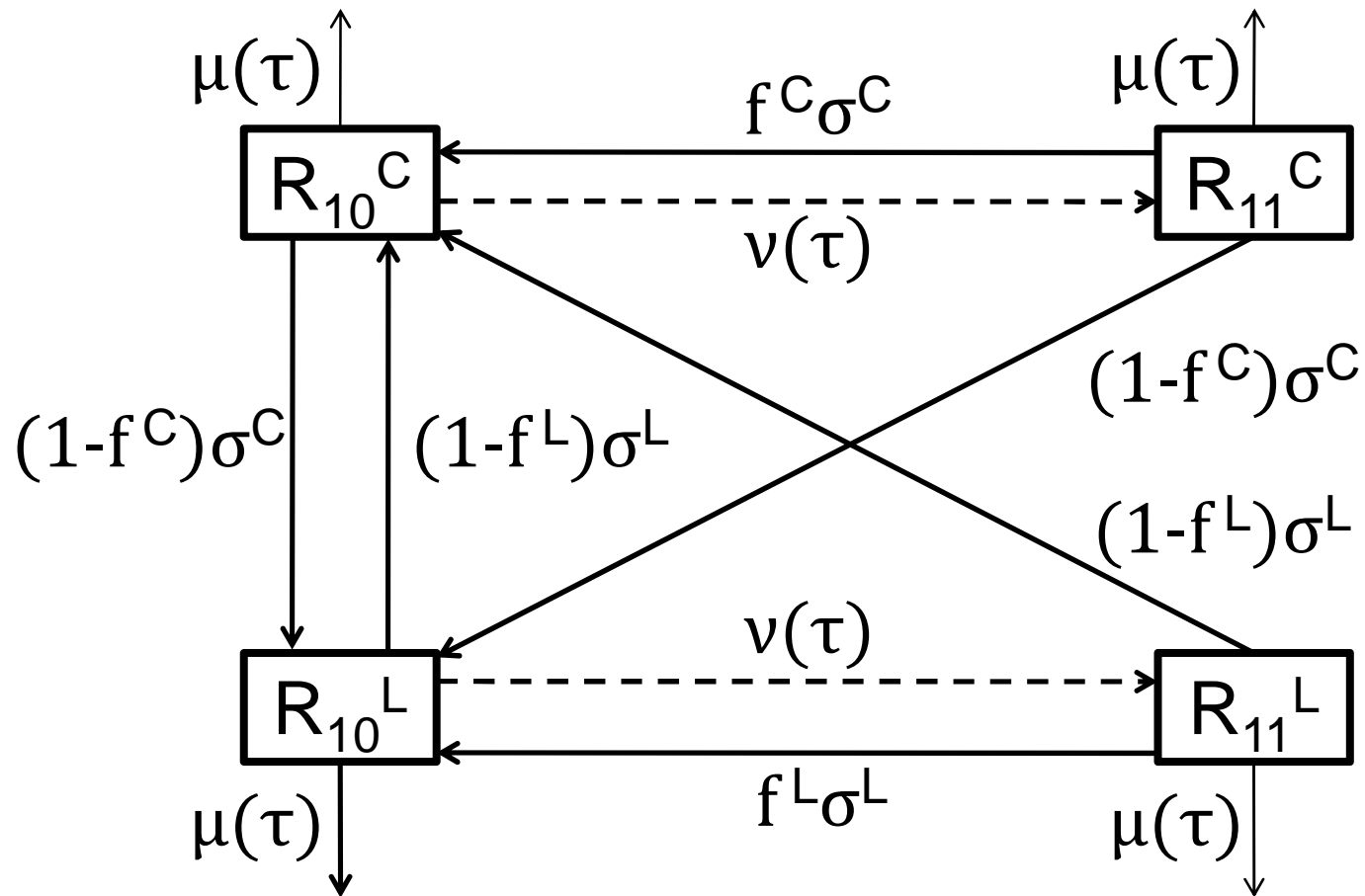
f = assortativeness parameter

The compartmental model



σ = partner turnover rate
 f = assortativeness parameter

The compartmental model



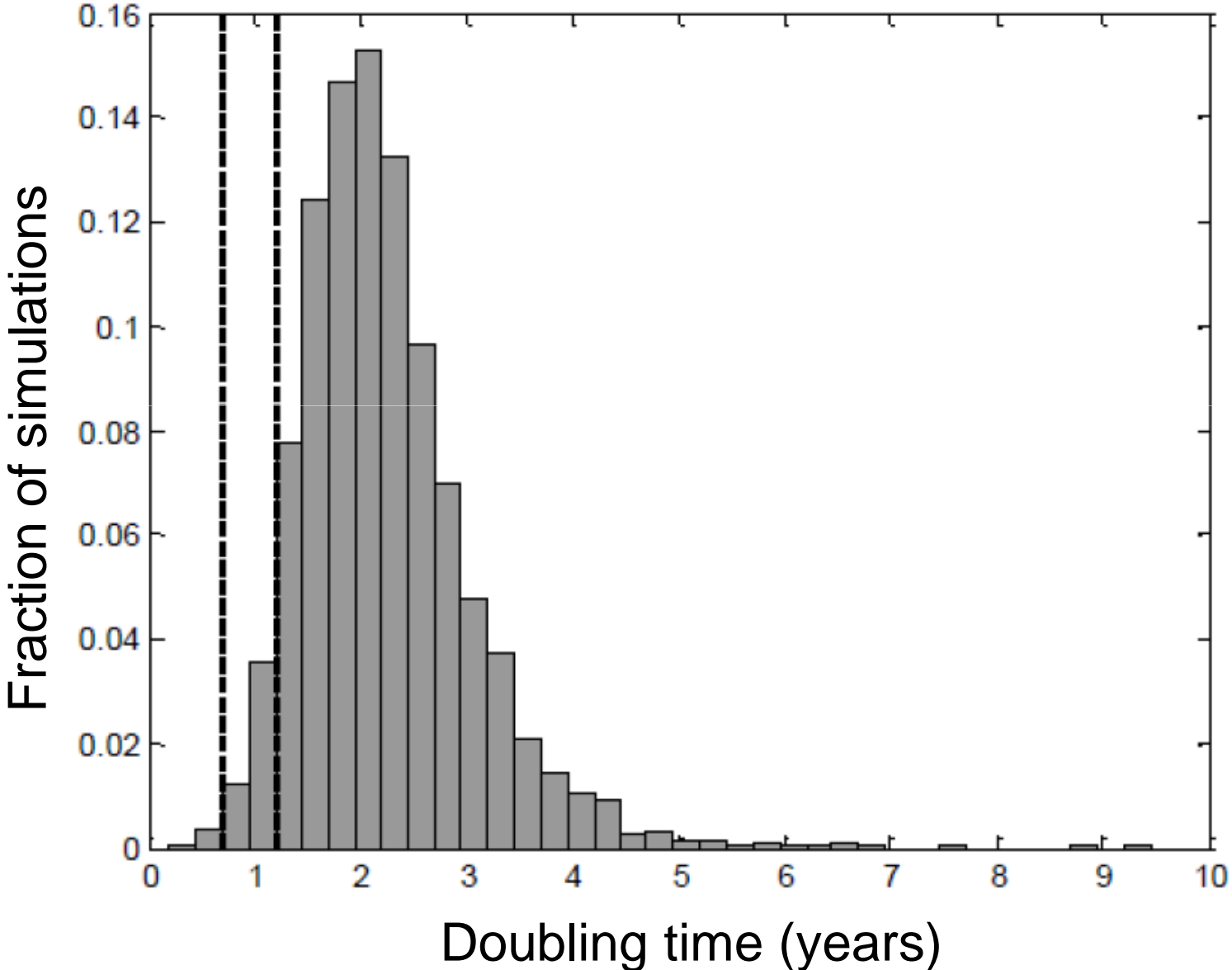
μ = HIV-related mortality rate

Uncertainty analysis

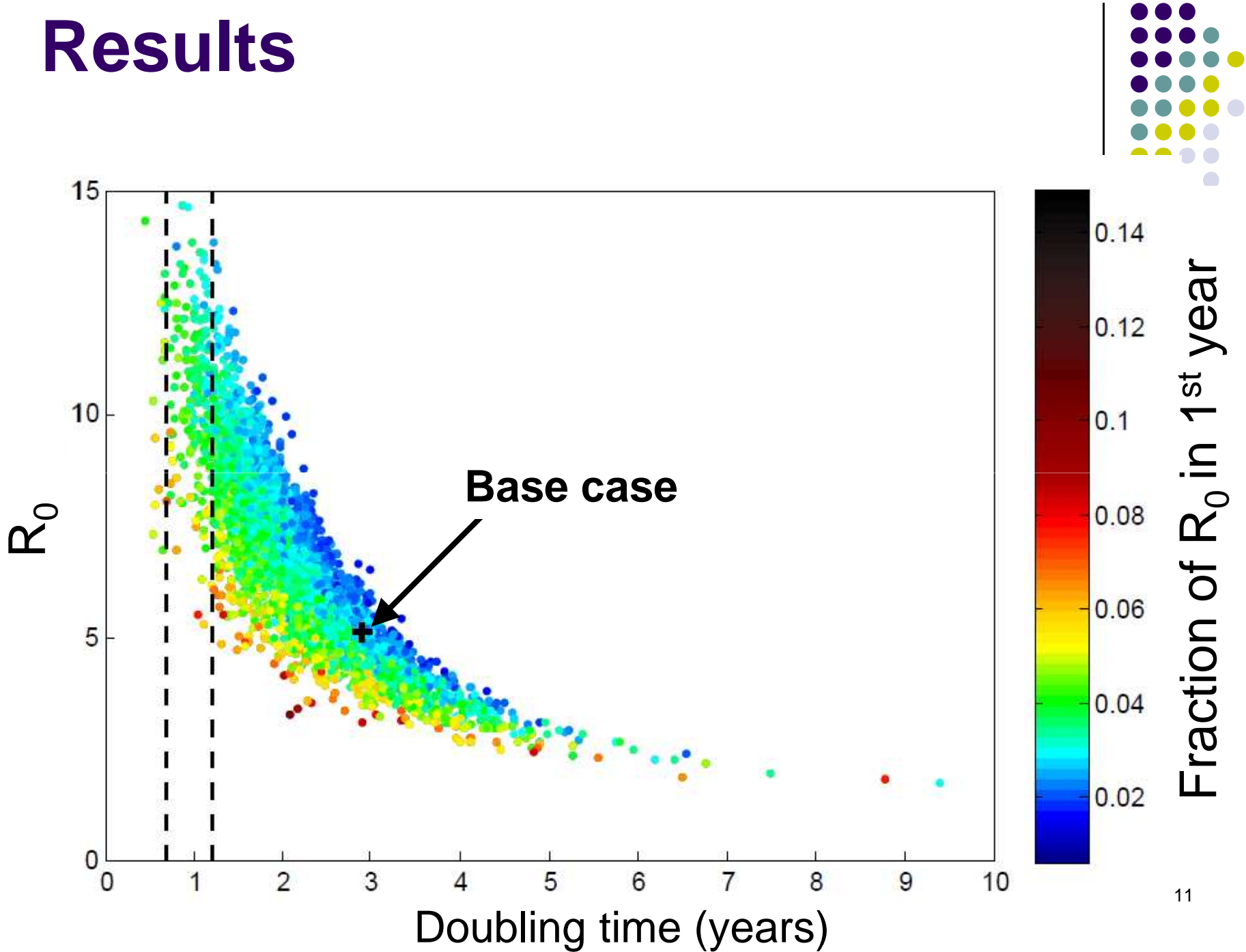


Parameter	Base-case value (Peak)	Range
Transmission probability per sex act		
Acute	0.92%	0.28%-3.60%
Chronic	0.10%	0.05%-0.20%
Late	0.73%	0.20%-1.53%
Co-factor effect of other STIs		
Relative risk of HIV transmission	4	2-9
STI prevalence in casual relationships	50%	20%-80%
STI prevalence in long-term relationships	20%	10%-50%
Frequency of sex acts	2 / week	1-3
Average duration of relationships		
Casual relationships	3 months	26 days-6 months
Long-term relationships	1 year	6 months-2 years
Fraction of relationships that are casual	30%	10%-50%

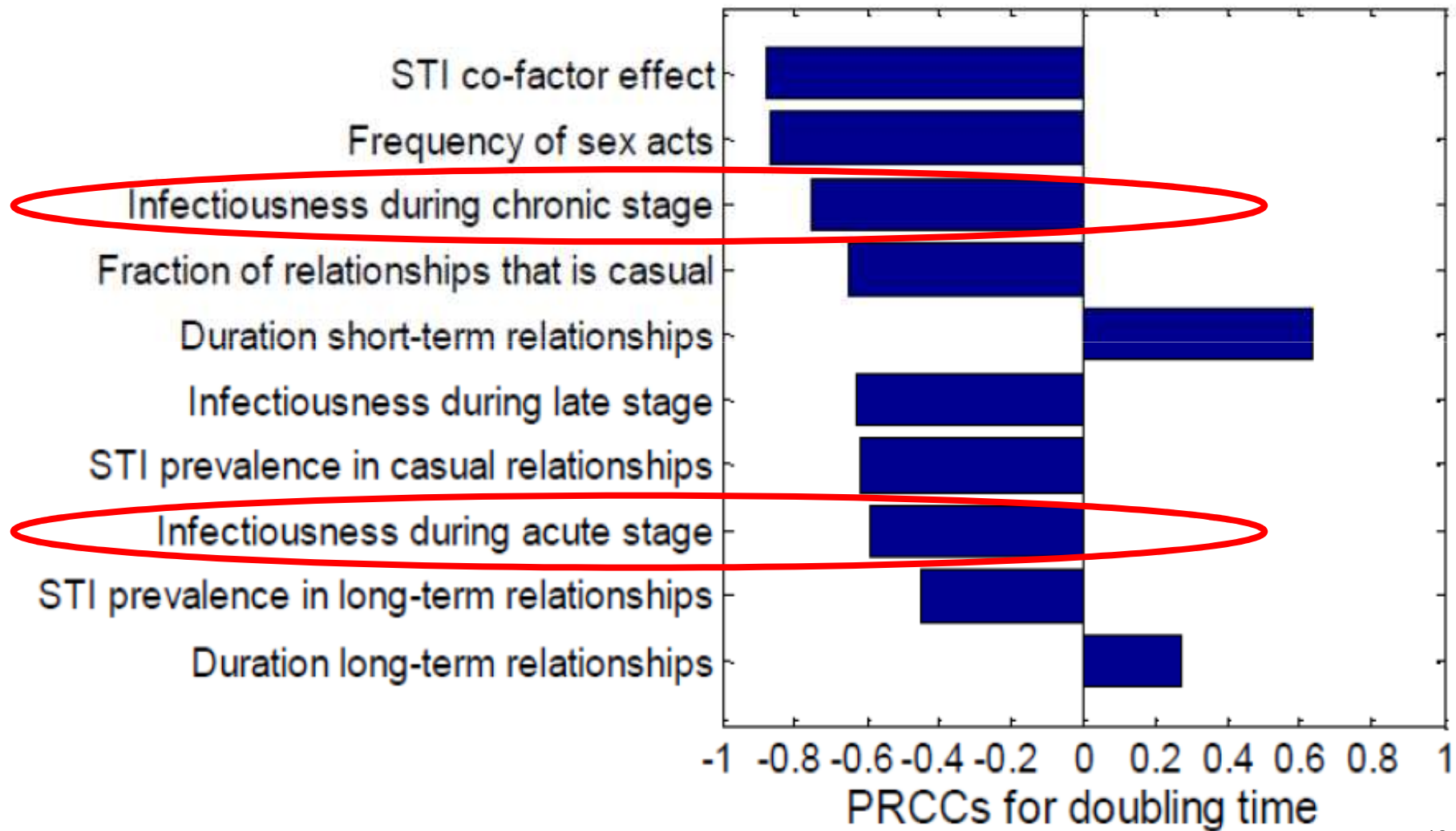
Results



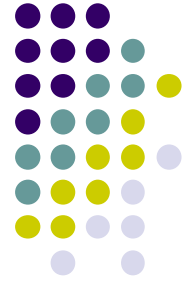
Results



Sensitivity analysis



Conclusions



- Serial monogamy unlikely to result in doubling time of 1.2 years or less
- The South African HIV epidemic is unlikely to have emerged from a serially monogamous sexual network
- Serial monogamy reduces effect of high acute infectiousness
- New models needed to capture the effect of concurrency *realistically*

Thanks



- **IWT** (Flemish Institute for Innovation through Science and Technology)
- **FWO** (Flemish Research Fund)