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Woods, LM; Rchet, B; OConnell, D; Lawrence, GL; Coleman, MP (2012) The impact of screen-detection upon international differences in survival from breast cancer: a comparison of the West Midlands, England, and New South Wales, Australia (poster presentation). In: UNSPECIFIED.

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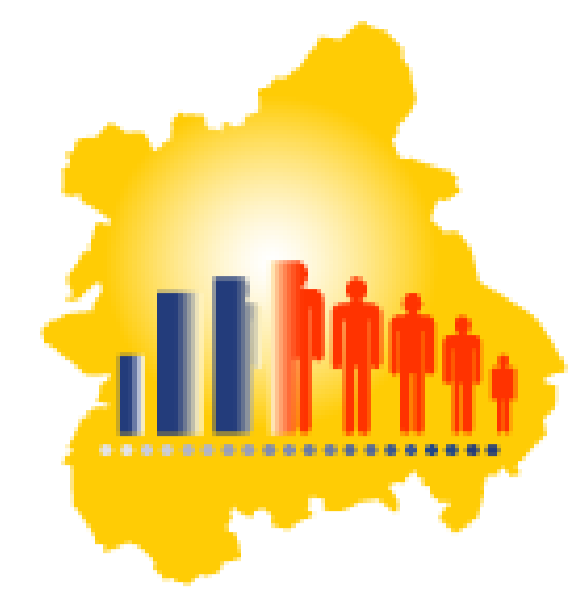
The impact of screen-detection upon international differences in survival from breast cancer: a comparison of the West Midlands, England, and New South Wales, Australia

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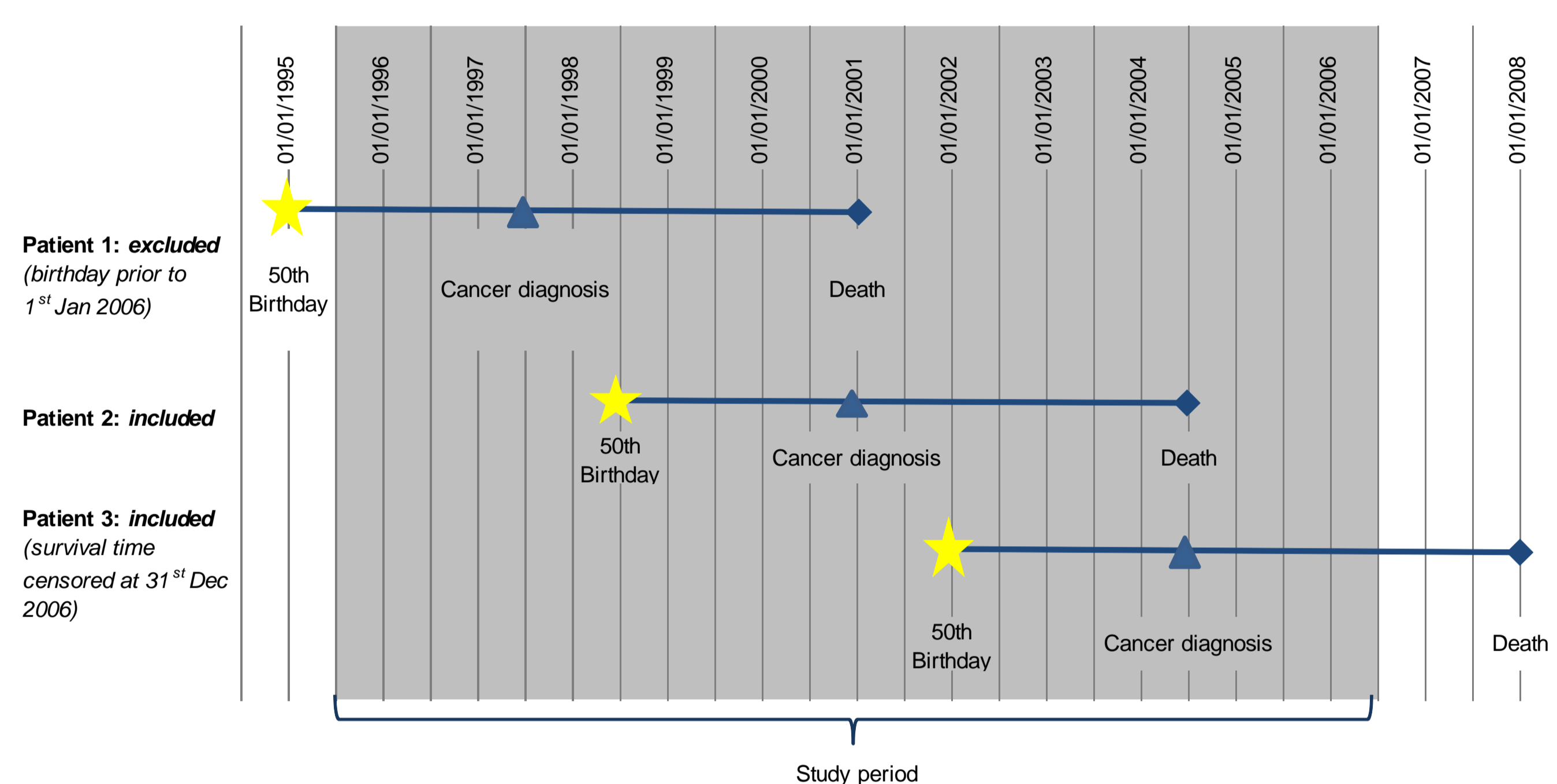
Introduction

- ❖ **Our previous results:** a significant difference in five-year breast cancer survival between Australia and England of 6% in the screening age group for women diagnosed during the period 1996-1999
- ❖ **One possible explanation:** relatively low intensity of breast screening in England compared to Australia

Material

- ❖ Women aged 50 years or younger on 1st January 1996
- ❖ Diagnosed with a primary invasive breast cancer during the period 1 January 1996 to 31 December 2006
- ❖ 5,717 women from West Midlands region of England
- ❖ 6,396 women New South Wales, Australia
- ❖ All women were followed up to 31 December 2006

Figure 1 – Cohort included in analyses



- ❖ Cancer registry data
- ❖ Individual registry records linked to individual screening records
- ❖ Categories for screening status at diagnosis: *screen-detected*, *interval cancer*, *lapsed attender*, *non-attender*

Methods

- ❖ Non-parametric net survival estimates using the Pohar-Perme estimator², using *stns* (software available for Stata 12³)
- ❖ Comparison of the Pohar-Perme estimates with widely used Estève approach^{4;5}
- ❖ Excess hazard and hazard ratios derived from survival
- ❖ Expected survival from regional life tables (single years of age for each year of follow-up)
- ❖ Adjustment for the potential effect of lead time bias:
 - calculation of adjusted survival time $E(s)$ ⁶
 - mean sojourn time of 4 years
 - 10 simulated data sets: $E(s)_1, E(s)_2 \dots E(s)_{10}$ assuming survival exponentially distributed with a mean of $E(s)$
 - survival estimates derived from these 10 separate data sets recombined using rules from the multiple-imputation setting⁷

References

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- (2) Pohar-Perme M, Stare J, Estève J. On Estimation in Relative Survival. *Biometrics* 2011;DOI: 10.1111/j.1541-0420.2011.01640.x
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- (4) Estève J, Benhamou E, Croasdale M, Raymond L. Relative survival and the estimation of net survival: elements for further discussion. *Statistics in Medicine* 1990;9:529-38.
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- (6) Duffy SW, Nagtegaal ID, Wallis M, Cafferty FH, Houssami N, Warwick J, Allgood PC, Kearins O, Tappenden N, O'Sullivan E, Lawrence G. Correcting for lead time and length bias in estimating the effect of screen detection on cancer survival. *Am J Epidemiol* 2008 Jul 1;168(1):98-104.
- (7) Rubin DB. Multiple imputation for non-response in surveys. New York: John Wiley & Sons, 1987.

Results

- ❖ A significant difference in net survival between women diagnosed in New South Wales and the West Midlands (Figure 2)
- ❖ Survival for screen-detected women similar (Figure 3)

Figure 2: Net survival estimates: West Midlands and New South Wales

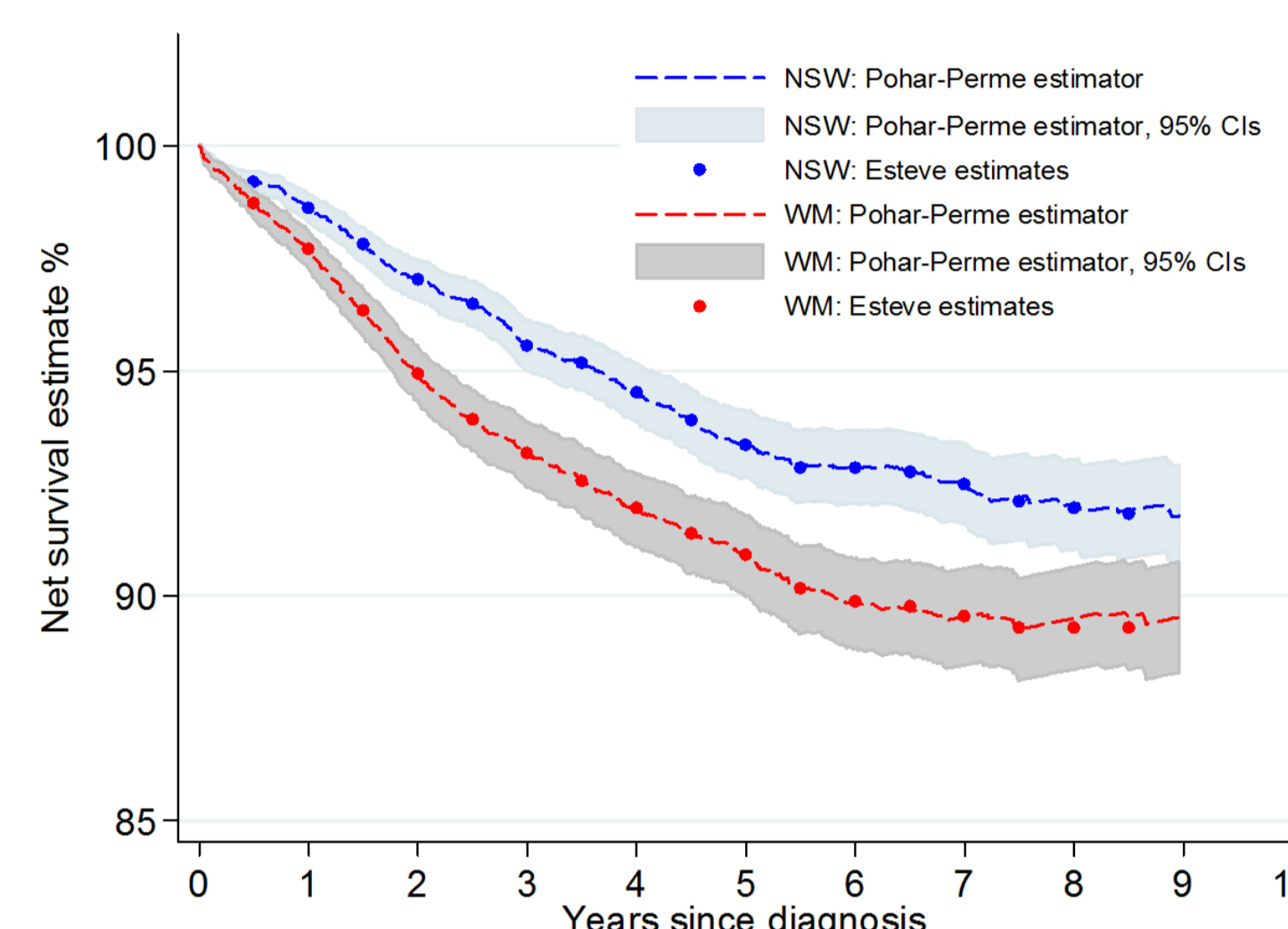
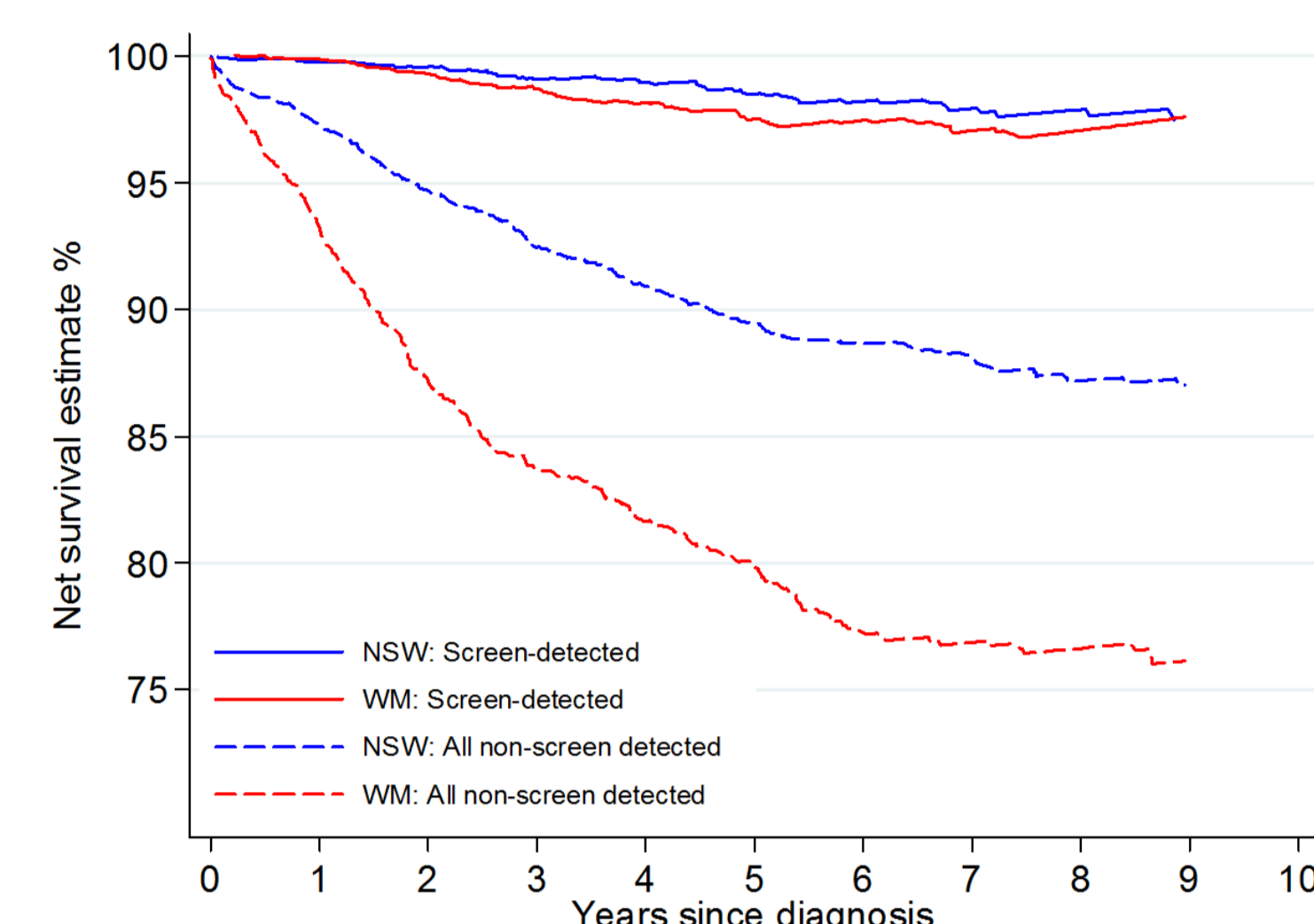


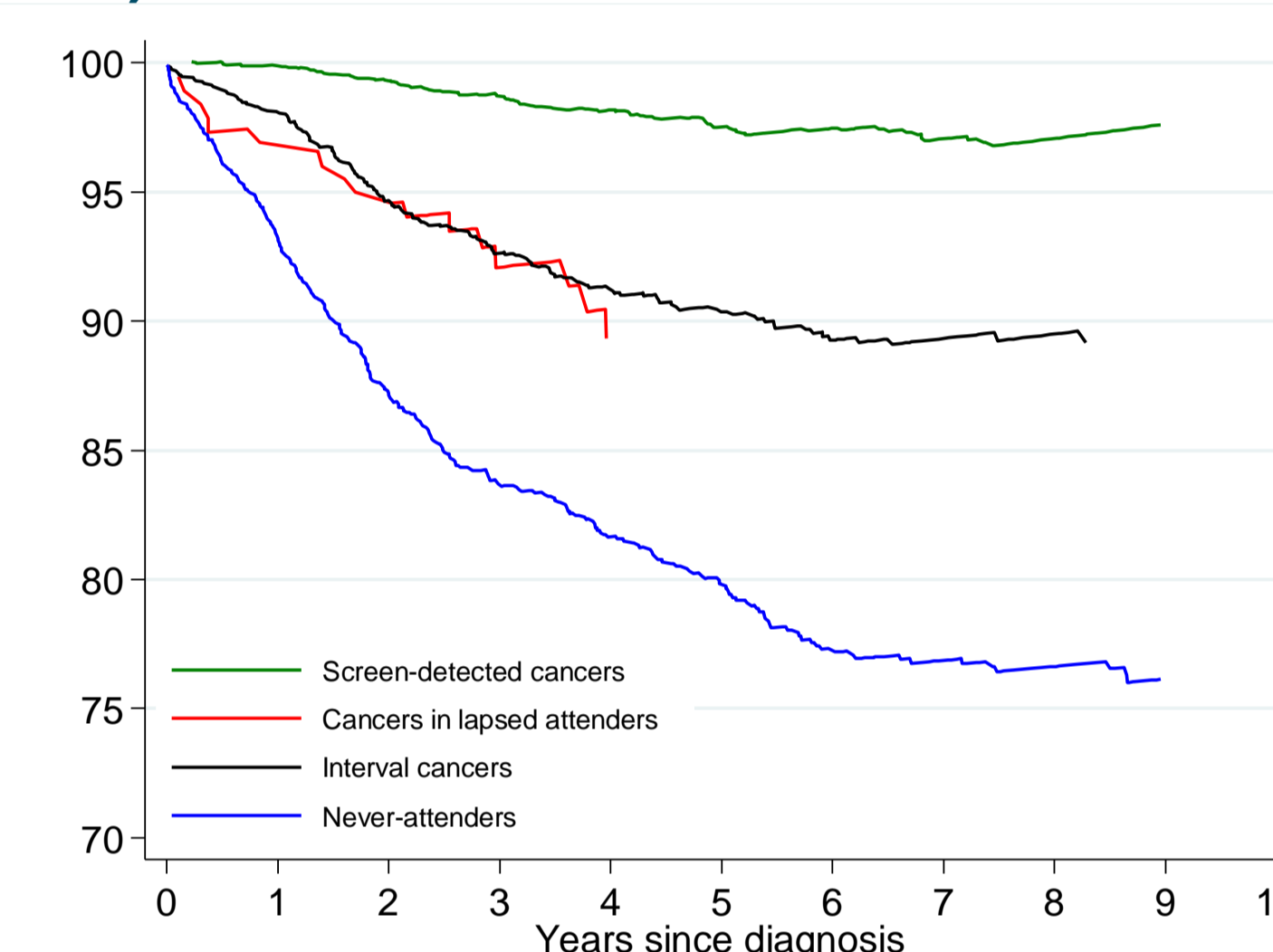
Figure 3: Net survival estimates: Screen-detected vs. non-screened



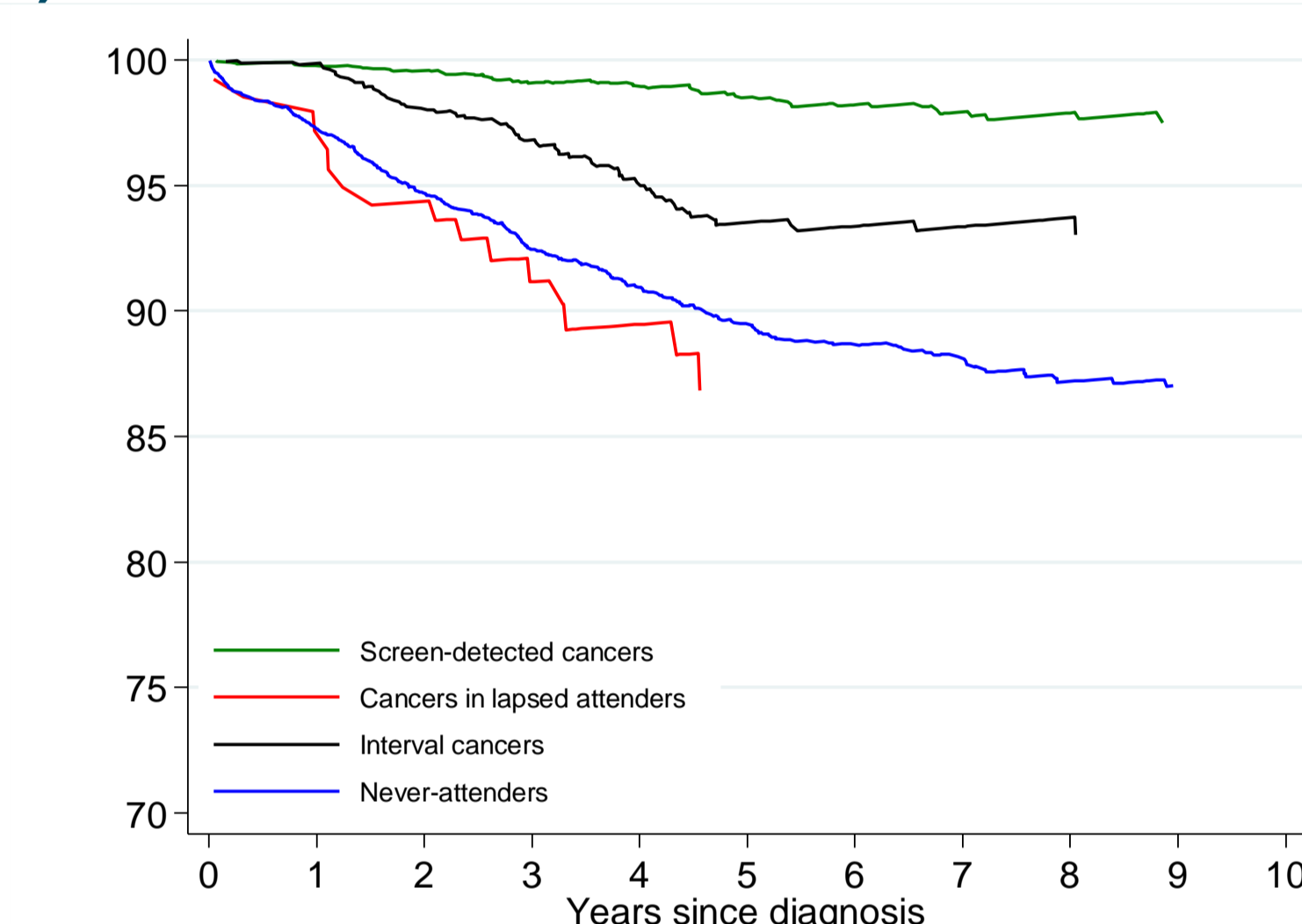
- ❖ Differences smaller for women who had attended screening (Figure 4)

Figure 4: Net survival estimates by screening category

a) West Midlands



b) New South Wales



- ❖ Lead time adjusted estimates lower (Figure 5)
- ❖ Non-significant survival difference between New South Wales and West Midlands in adjusted estimates (Figure 6)

Figure 5: Estimates adjusted for lead time bias: West Midlands

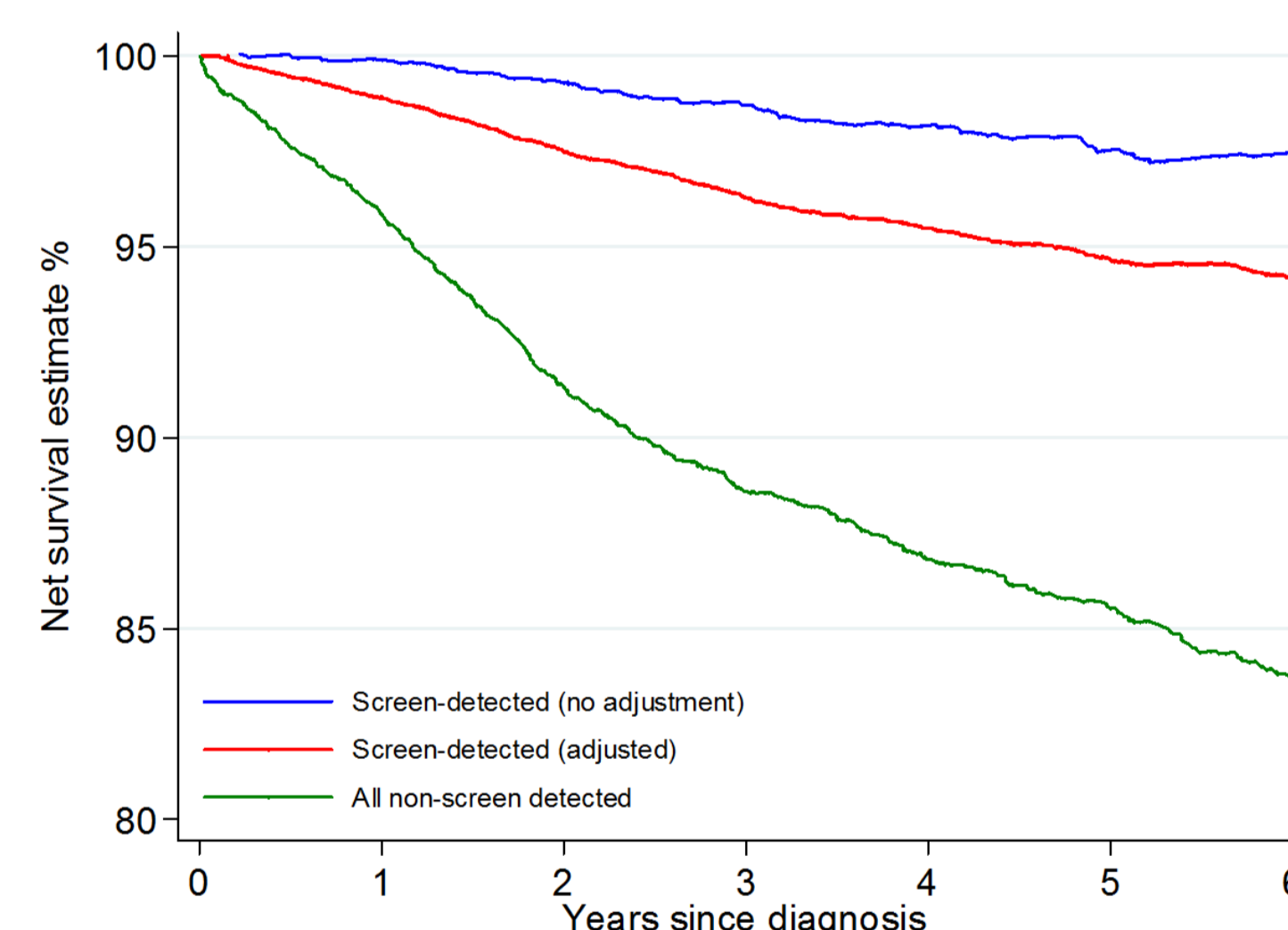
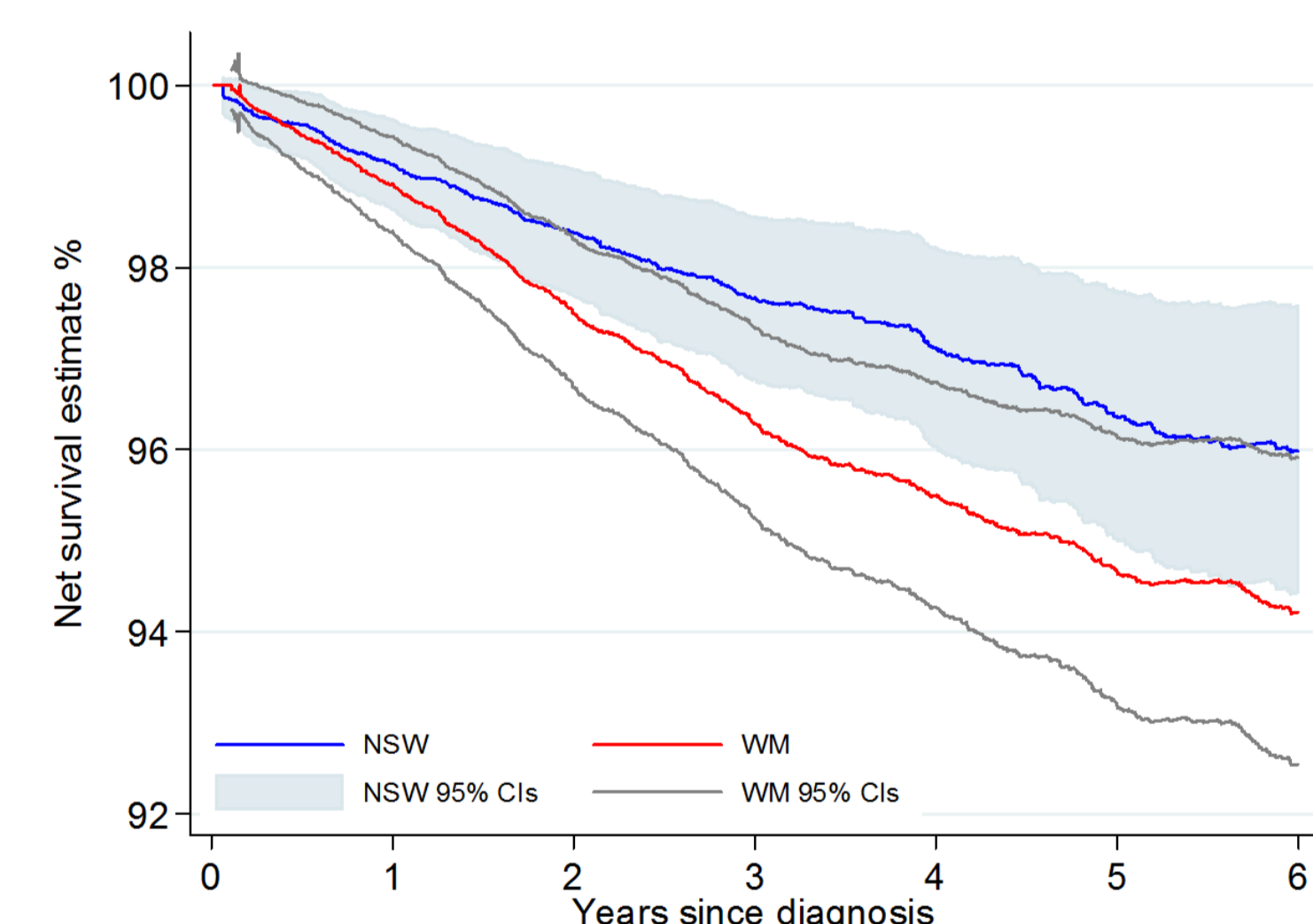


Figure 6: Adjusted net survival estimates: screen-detected cancers



- ❖ Excess hazard ratios: regional differences in survival were greatest during the first three years following diagnosis (Figure 7).

Conclusions

- ❖ Survival remains higher in New South Wales compared to the West Midlands for women aged 50-64
- ❖ Survival differences less marked for women who have attended screening
- ❖ Non-significant difference in survival amongst screen-detected women after adjustment for lead time
- ❖ Differential survival in the non-screen detected groups may be due to women obtaining mammography privately in New South Wales
- ❖ Poorer treatment of non-screen detected women after their diagnosis remains one explanation for poorer survival in West Midlands

Figure 7: Excess hazard ratios comparing lead-time adjusted hazard in screened group with the non-screened group

