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Department of  
Primary Industries



**AARES**  
AUSTRALIAN AGRICULTURAL &  
RESOURCE ECONOMICS SOCIETY

# Financial risk analysis of lucerne pasture establishment: Under-sowing vs Direct sowing

**Tom Nordblom** <sup>1,3</sup> **Tim Hutchings** <sup>3,4</sup> **Guangdi Li** <sup>2,3</sup>  
**Richard Hayes** <sup>2,3</sup> **John Finlayson** <sup>5</sup>

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*NSW DPI = NSW Department of Primary Industries New South Wales, Australia*  
*WWAI = Wagga Wagga Agricultural Institute, Pine Gully Road,*  
*Wagga Wagga, NSW 2650 Australia*

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Lucerne, direct-sown



Wheat, under-sown with Lucerne





# Wheat, under-sown with Lucerne

Despite consistent messages on reduced pasture performance, due to competition between the cover-crop, and the lucerne, farmers in the mixed-farming zone of south-eastern Australia continue to rely on the practice



## Cropping phase of rotation

5 years of  
cropping

Canola  
Wheat  
Barley  
Lupin

Wheat + under-sown Lucerne

## Pasture phase of rotation

first grazing year

4 years of  
pasture

Lucerne  
Lucerne  
Lucerne  
Lucerne

## Cropping phase of rotation

5 years of  
cropping

Canola  
Wheat  
Barley  
Lupin  
Wheat

## Pasture phase of rotation

first grazing year

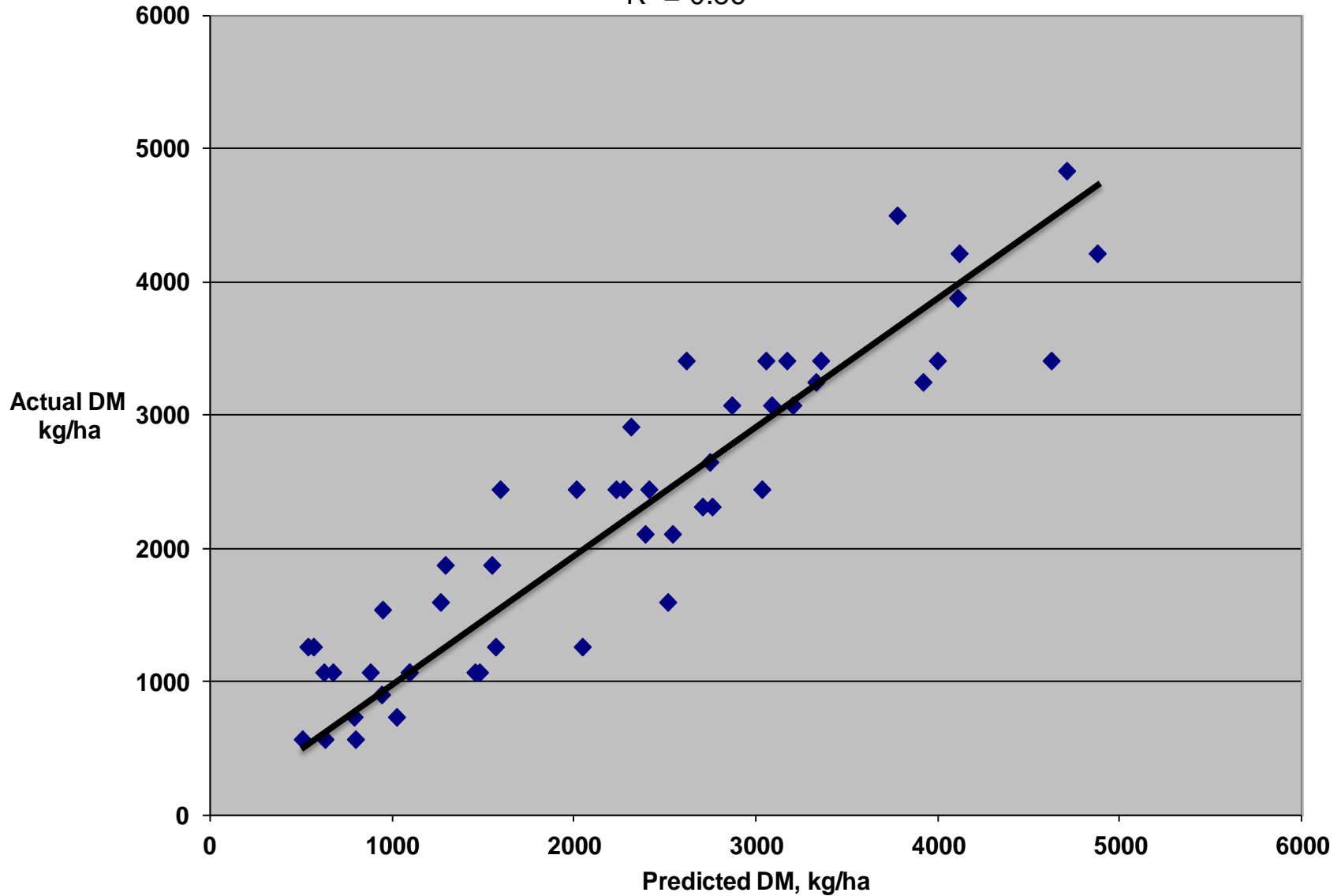
4 years of  
pasture

Lucerne directly sown  
Lucerne  
Lucerne  
Lucerne

**Initial findings from field experiments over four  
years along a 200 km North-South transect from  
Ariah Park to Brocklesby, NSW  
(Li *et al.*, 2015)**



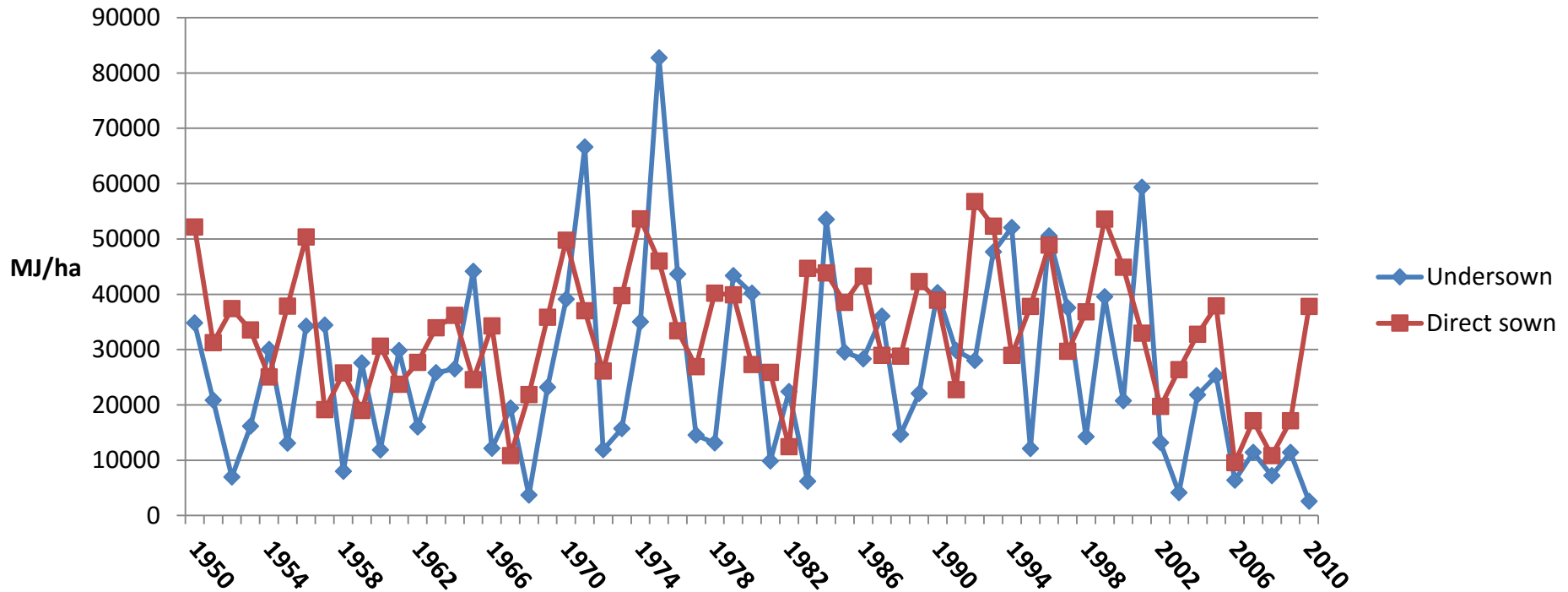
**Actual v. predicted Dry Matter**  
**Year 2, all sites**  
 $R^2 = 0.86$



***Comparison of observed and predicted pasture DM yields in the first year of grazing***



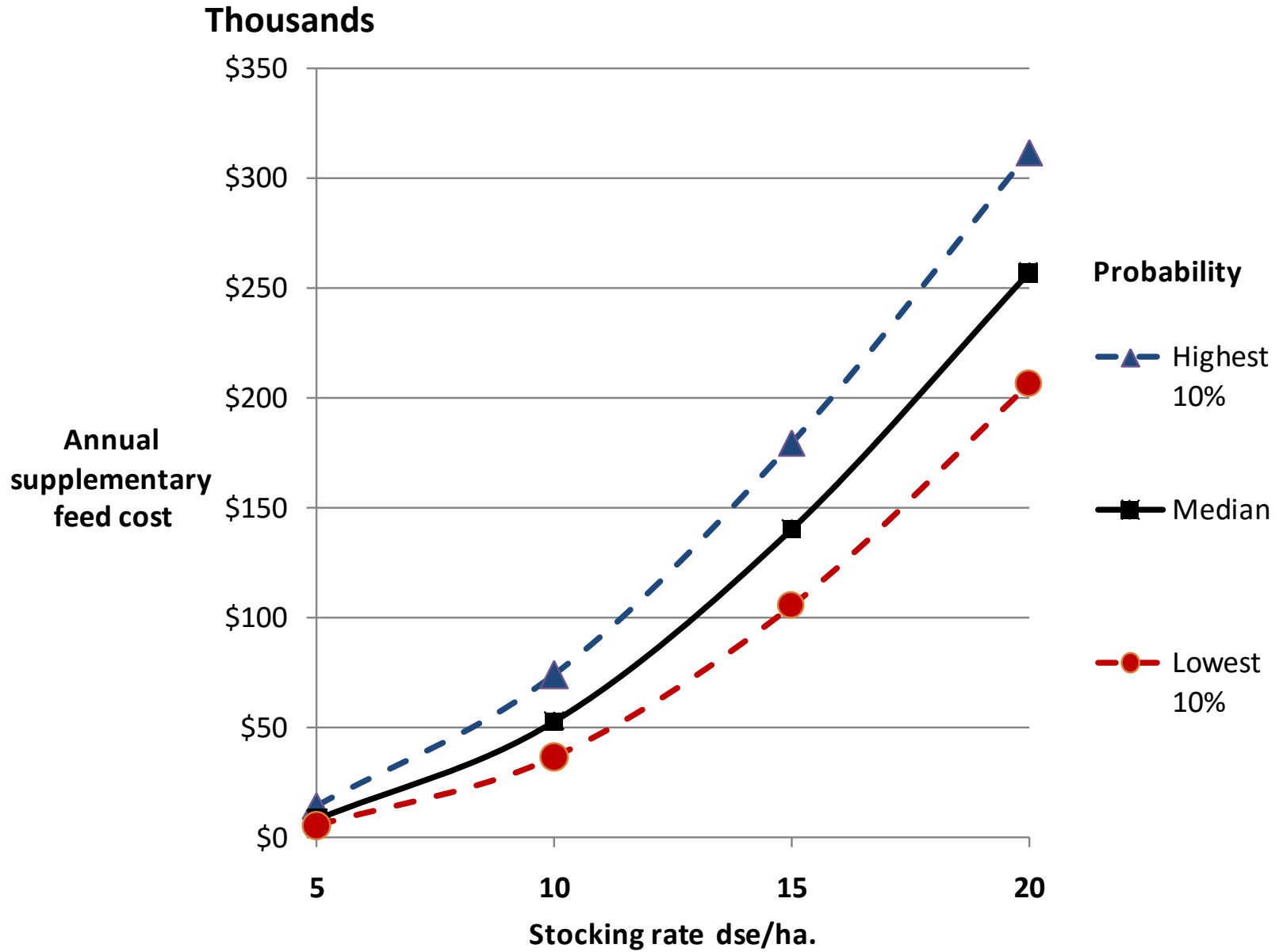
Comparison of annual energy yield of established lucerne pastures (Li et al. 2014)



- In energy production, **Direct-sown** is ahead of **Undersown** in 40 out of 60 years (1950-2010).
- In years of lucerne establishment failure, the pasture in that paddock is assumed to revert to an annual pasture.

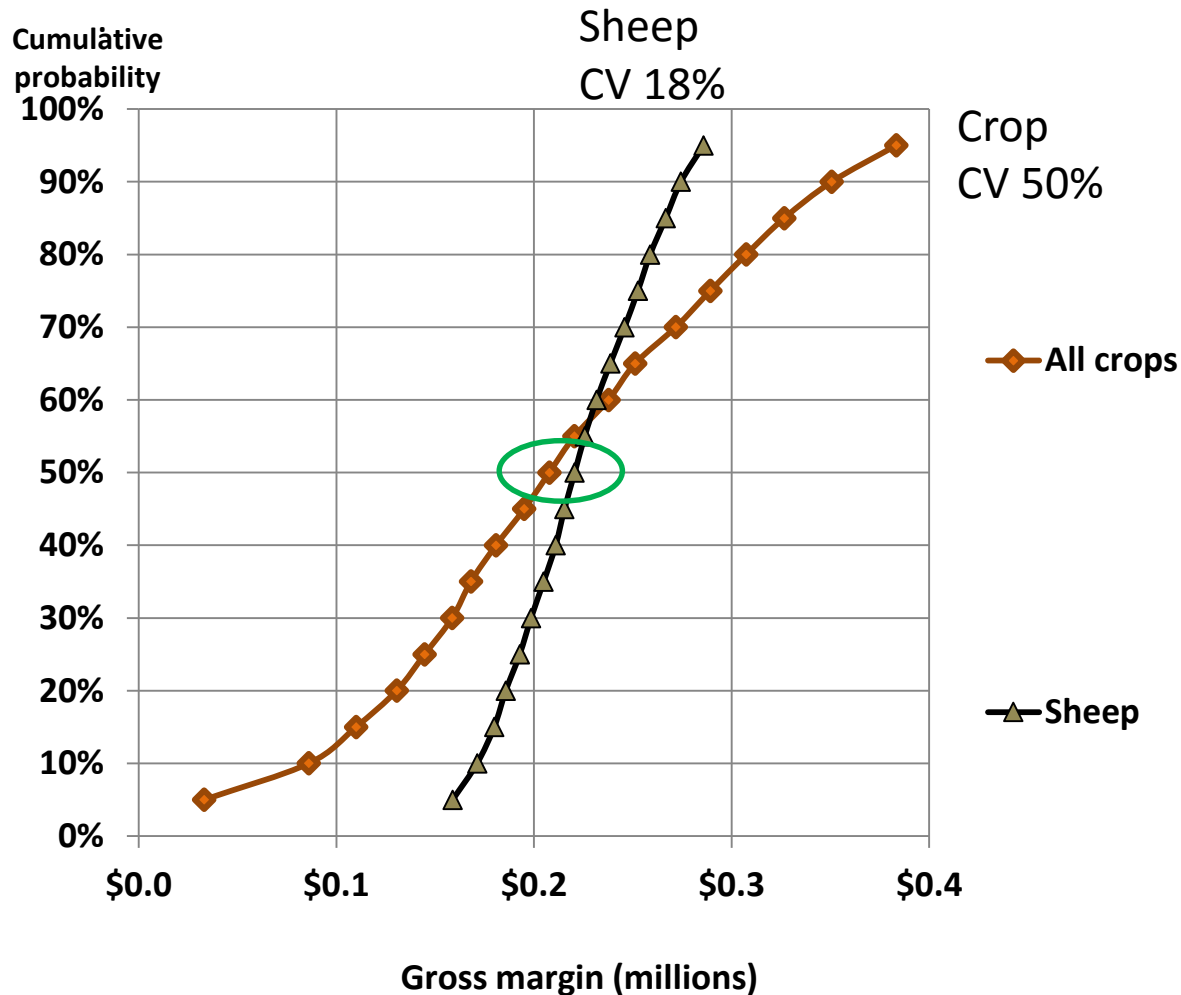


# Direct sown lucerne pasture





# Annual whole-farm gross margin profiles for Sheep and Crop enterprises



**Similar gross margins, but cropping has higher variability  
-- about three times riskier than Sheep --**

# Dynamic budgeting for risk

10 year cash margin estimates for dynamic analysis

15 dse/ha, 80% equity, direct sown pasture

Cum.  
Probability

100%

90%

80%

70%

60%

50%

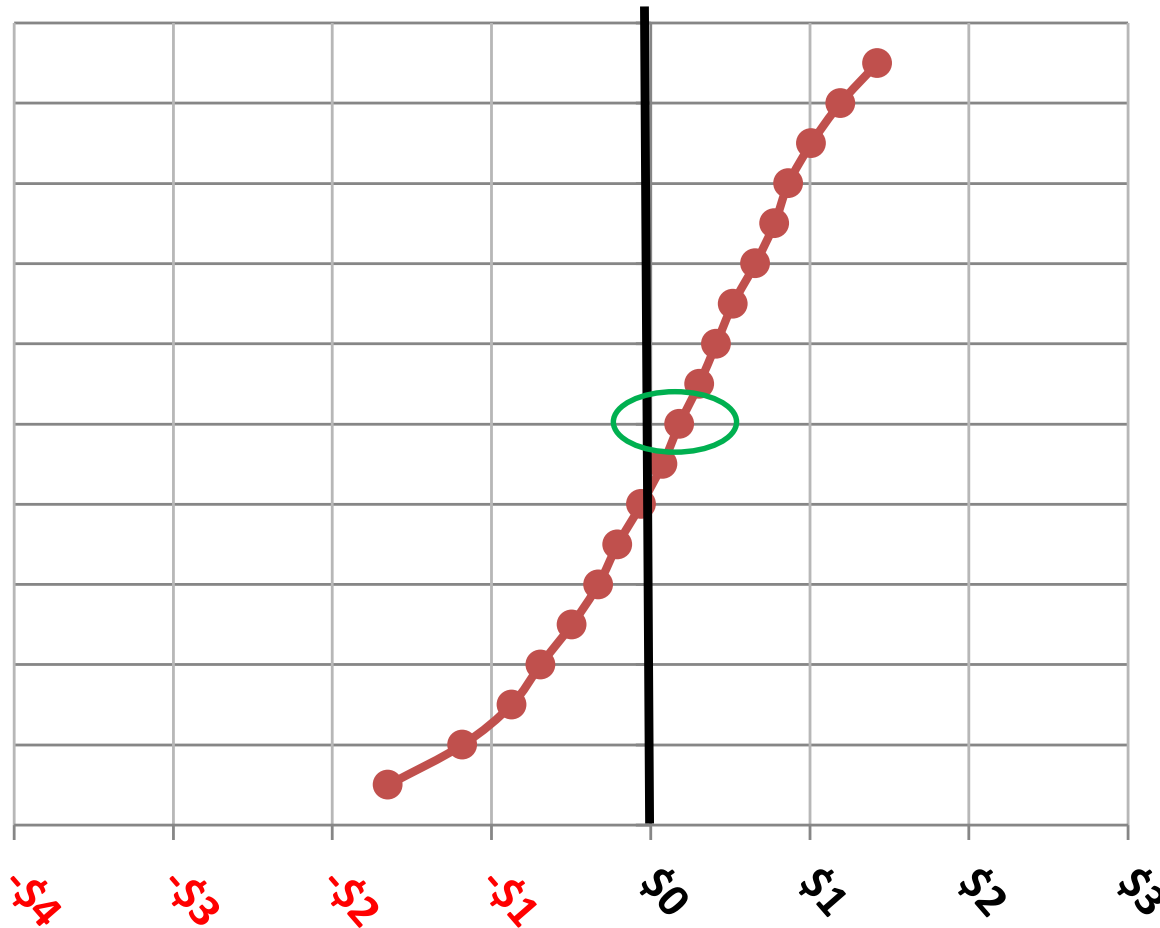
40%

30%

20%

10%

0%



Starting  
equity

100%

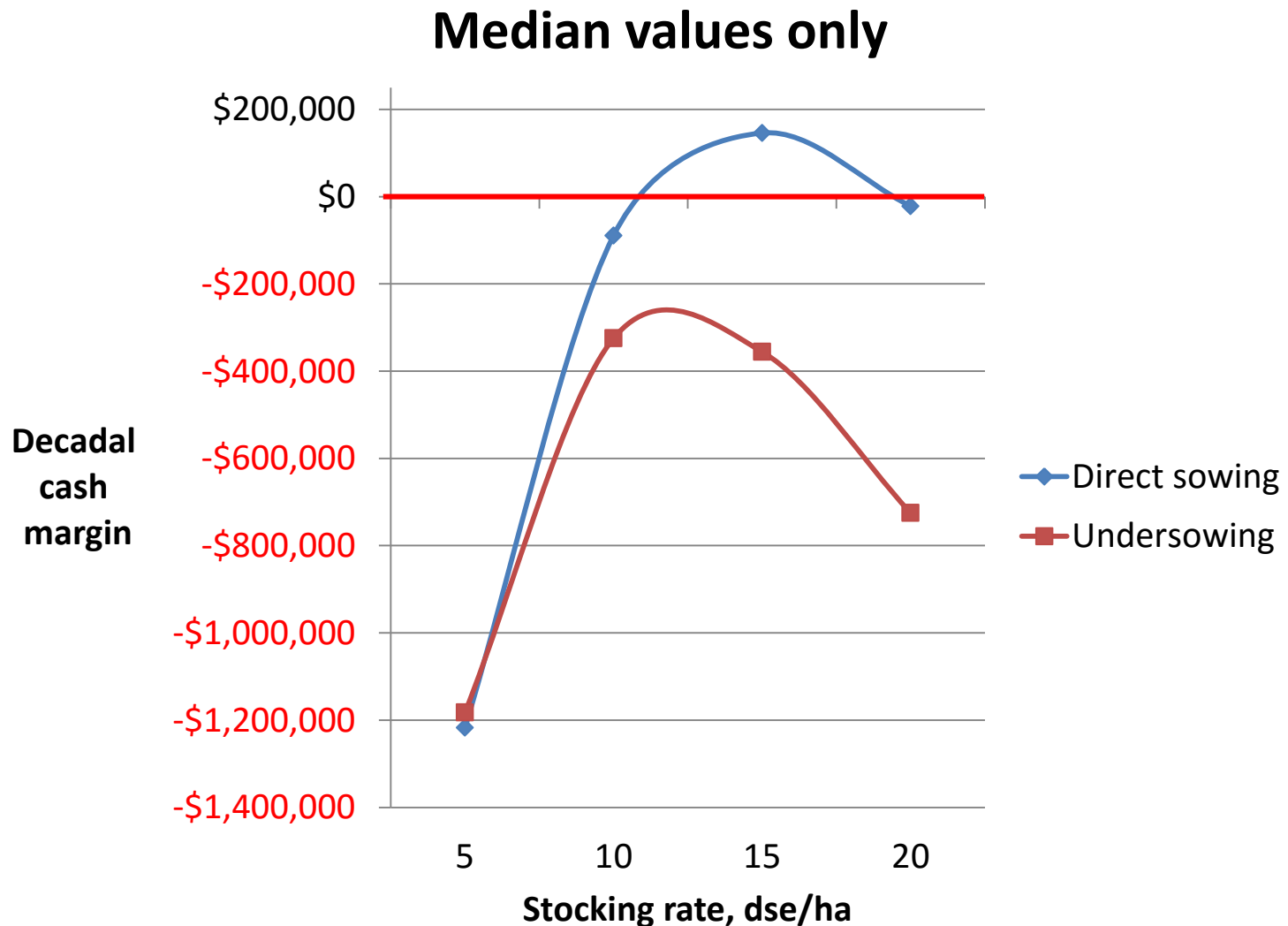
● 80%

60%

Decadal cash margin (millions)



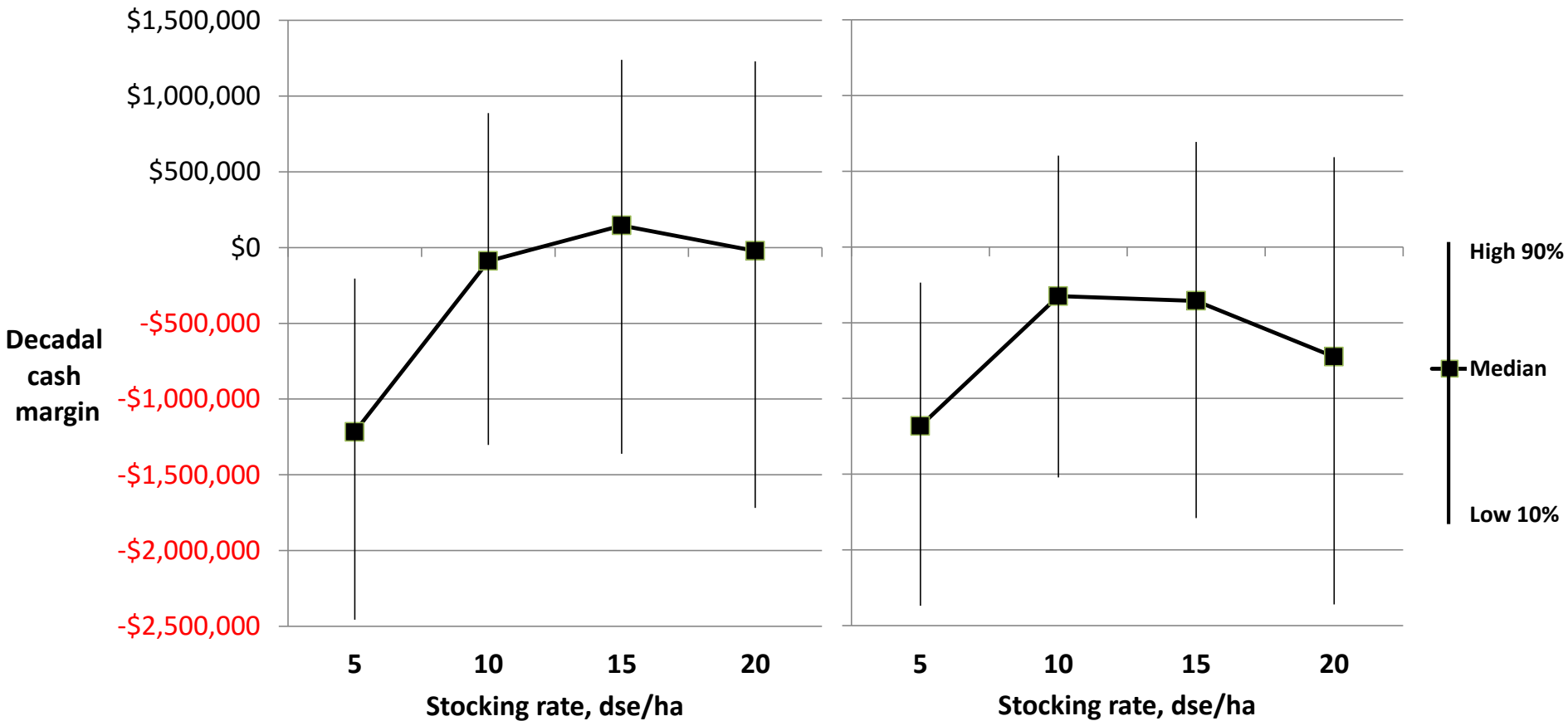
# Effects of sowing methods and stocking rates on whole-farm decadal cash margins, given starting equity of 80%



# Effects of sowing methods and stocking rates on whole-farm decadal cash margins, given starting equity of 80%

## Direct sowing

## Under-sowing

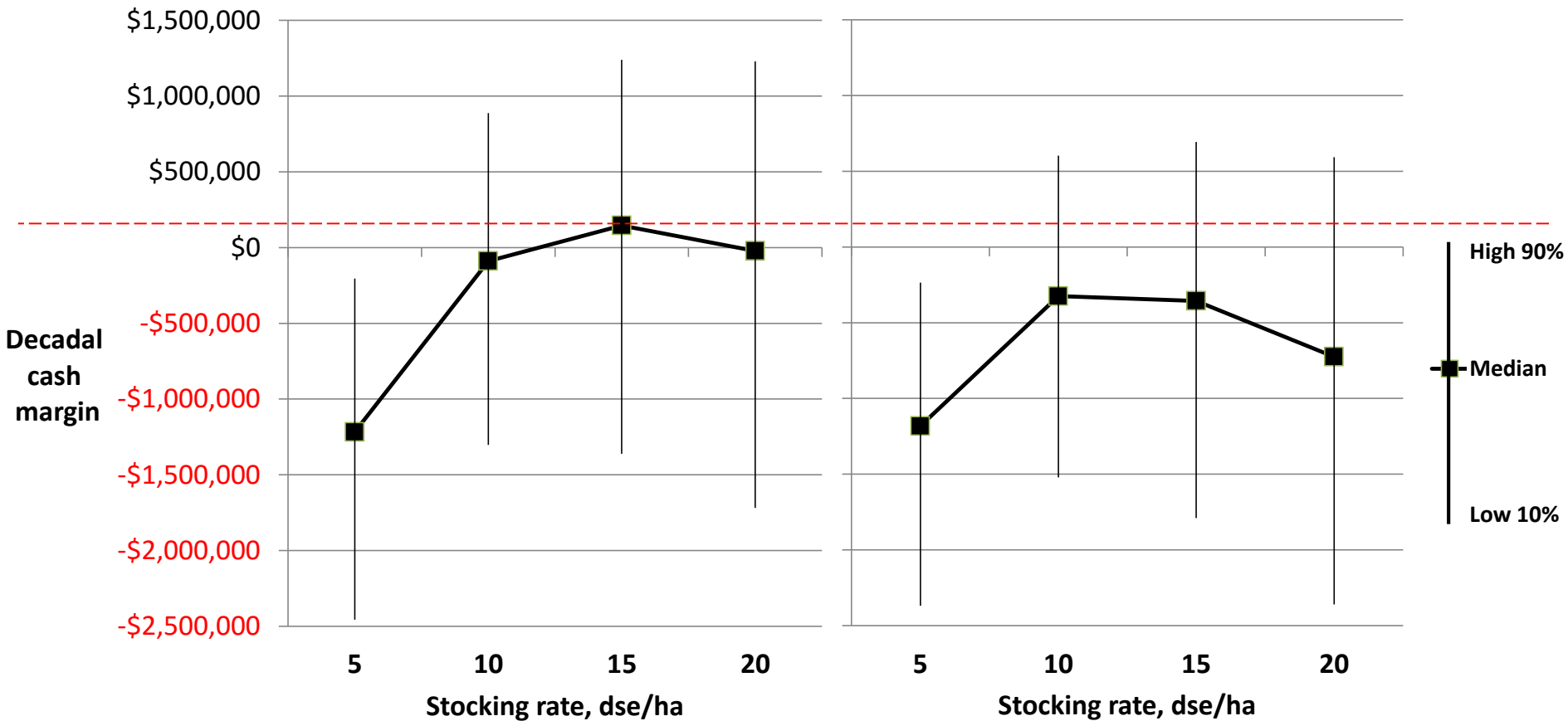




# Effects of sowing methods and stocking rates on whole-farm decadal cash margins, given starting equity of 80%

## Direct sowing

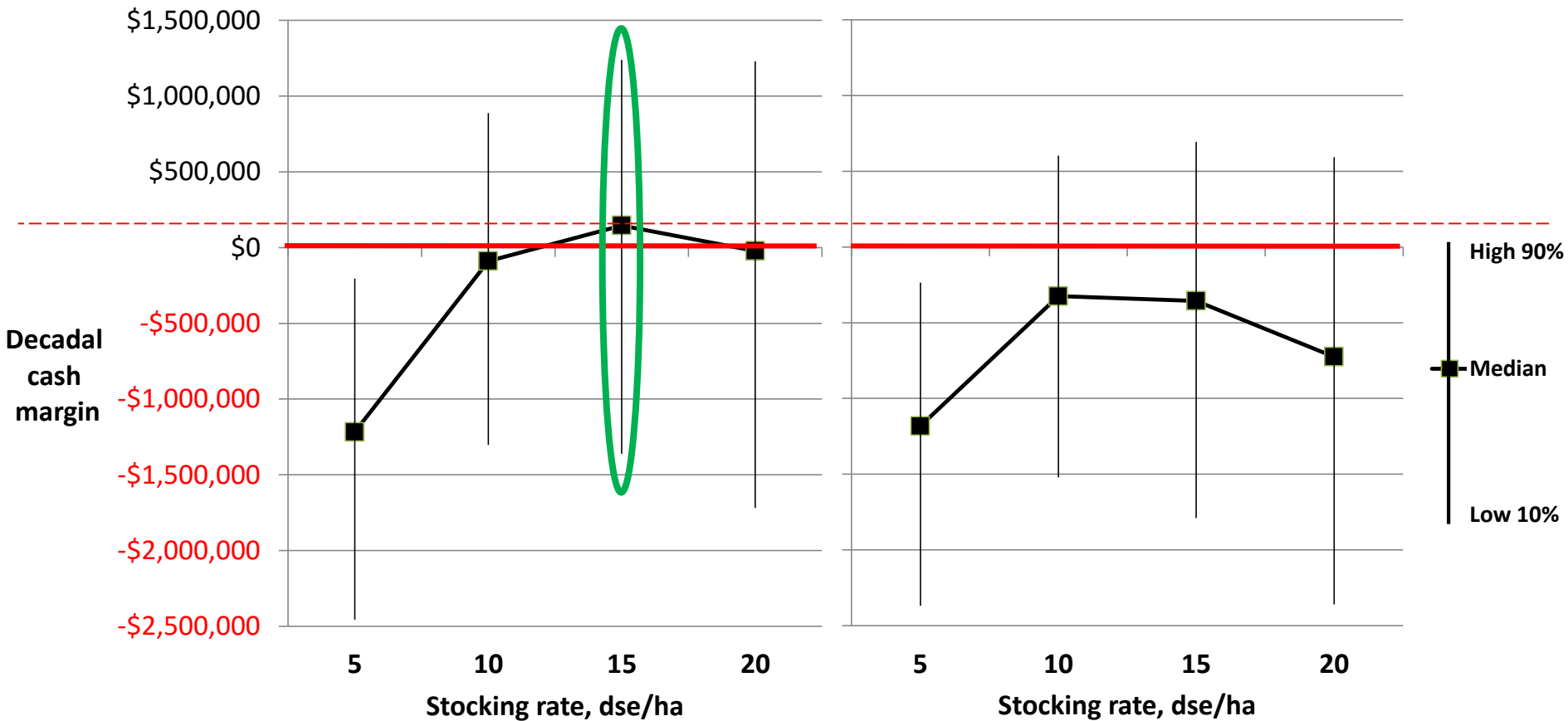
## Under-sowing



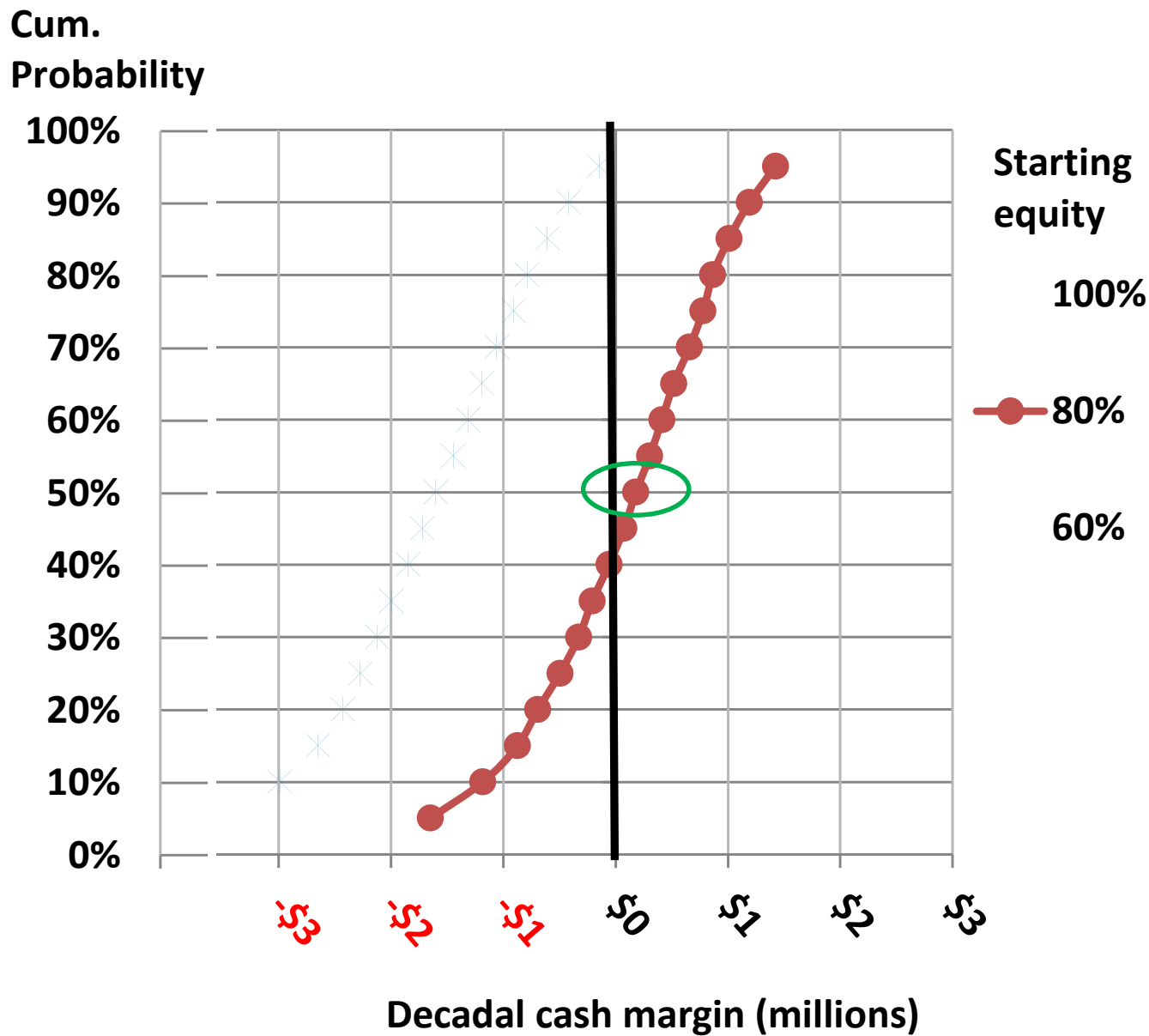
# Effects of sowing methods and stocking rates on whole-farm decadal cash margins, given starting equity of 80%

## Direct sowing

## Under-sowing



# Effects of starting equity on decadal ending cash balance (15 dse/ha)





# Effects of starting equity on decadal ending cash balance (15 dse/ha)

Cum.  
Probability

100%

90%

80%

70%

60%

50%

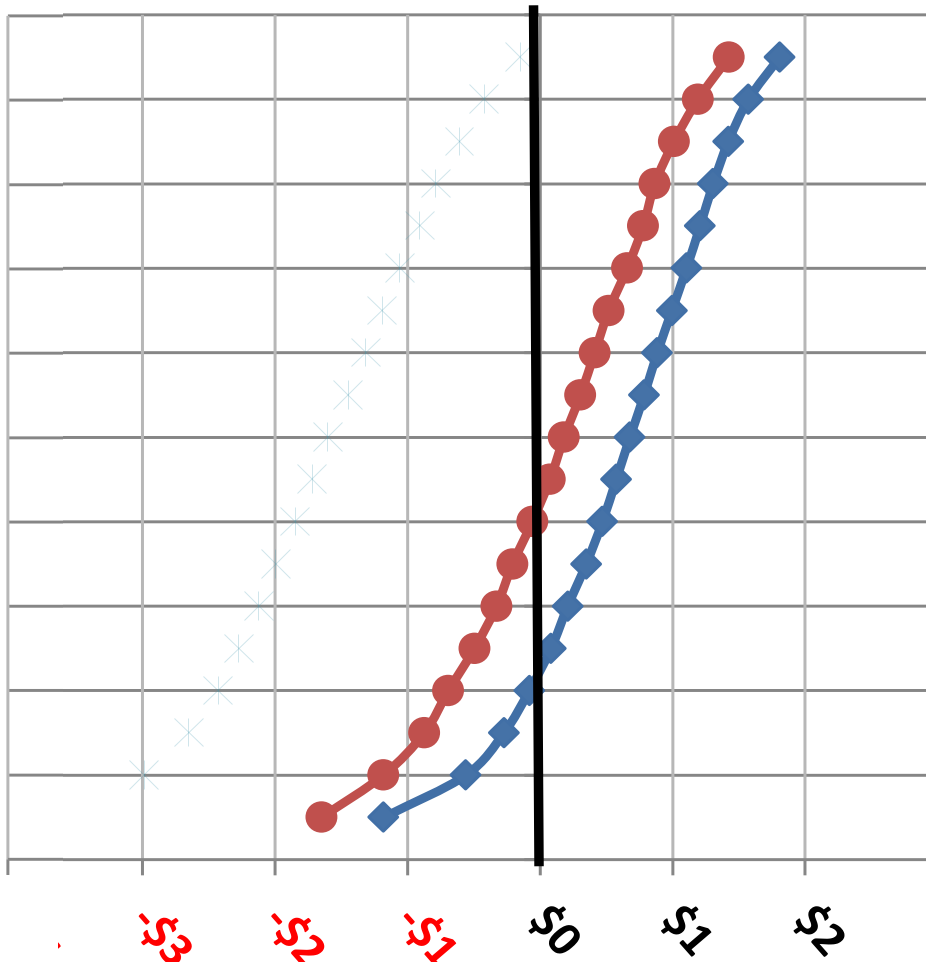
40%

30%

20%

10%

0%



Starting  
equity

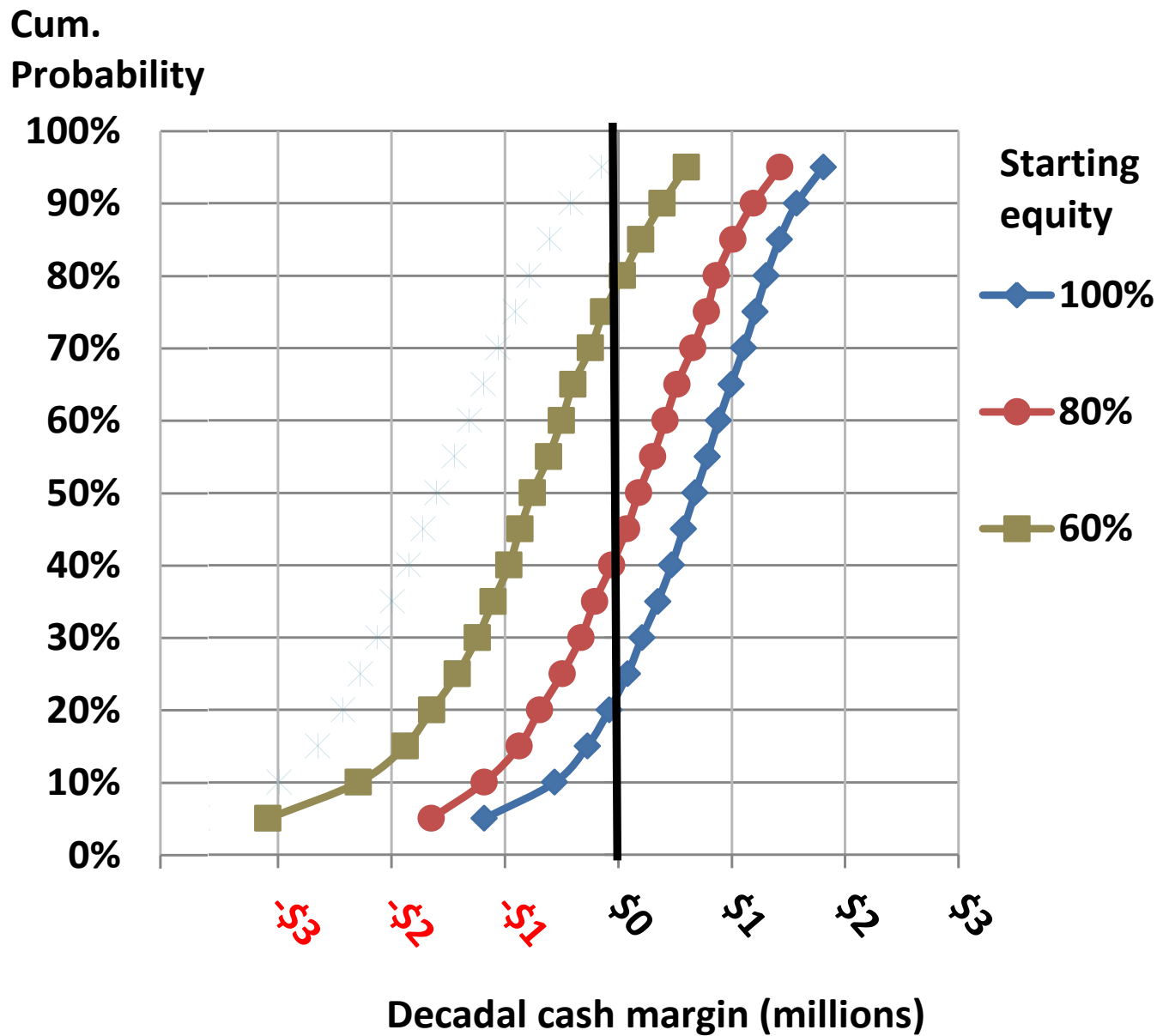
◆ 100%

● 80%

60%

Decadal cash margin (millions)

# Effects of starting equity on decadal ending cash balance (15 dse/ha)



# Conclusions

- Advice to farmers based on average years, average prices and gross margins, can be very misleading.
- **It masks the wide range of whole-farm outcomes possible due to price and yield variations and the effects of debt on viability**
- Chasing higher production alone can drive farmers into unsustainable debt
- **Reducing debt is often more important than raising production, particularly for those with low equity**





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