Cotton Catchment Communities CRC

Centre Pivots and Lateral Moves: profitable or not?

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RURAL WATER USE EFFICIENCY INITIATIVE

Improving irrigation management for a profitable and sustainable future

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Background

- Increasing interest in CPLMs
- Apparent WUE benefits over furrow irrigation systems
- Cotton CRC funded project to assess the profitability and risk with the conversion to CPLMs

Project Process

- 5 cotton-grain irrigators with CPLMs interviewed
- Excel used to develop a whole farm financial and economic model for the:
  - current farming system (the “without” CPLMs)
  - new farming system (“with” CPLMs)
- Yields, prices and water use provided by irrigators

4-Step Process

1. Steady State Profit Analysis
2. Financial Analysis
3. Economic Analysis
4. Marginal Analysis

1. Steady State Profit Analysis

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- Annual operating profit for “without” and “with” scenarios calculated for each farm
- Return on assets then calculated using the annual operating profit and value of assets for each farm and scenario
- @RISK used to produce cumulative probability curves for annual returns based on the yield and price ranges specified by irrigators

Figure 1 Farm A Annual Operating Profit

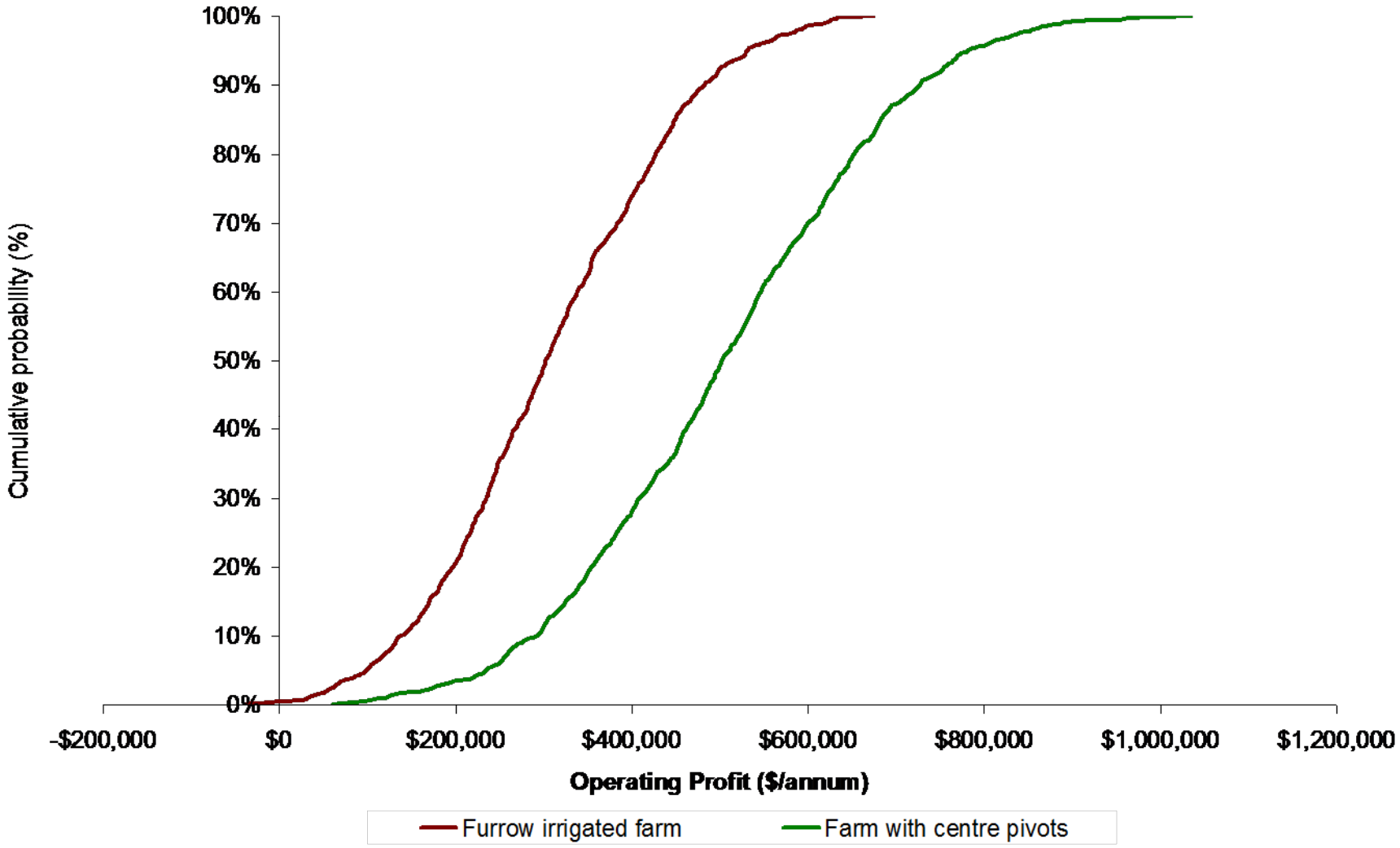

Figure 2 Farm B Annual Operating Profit

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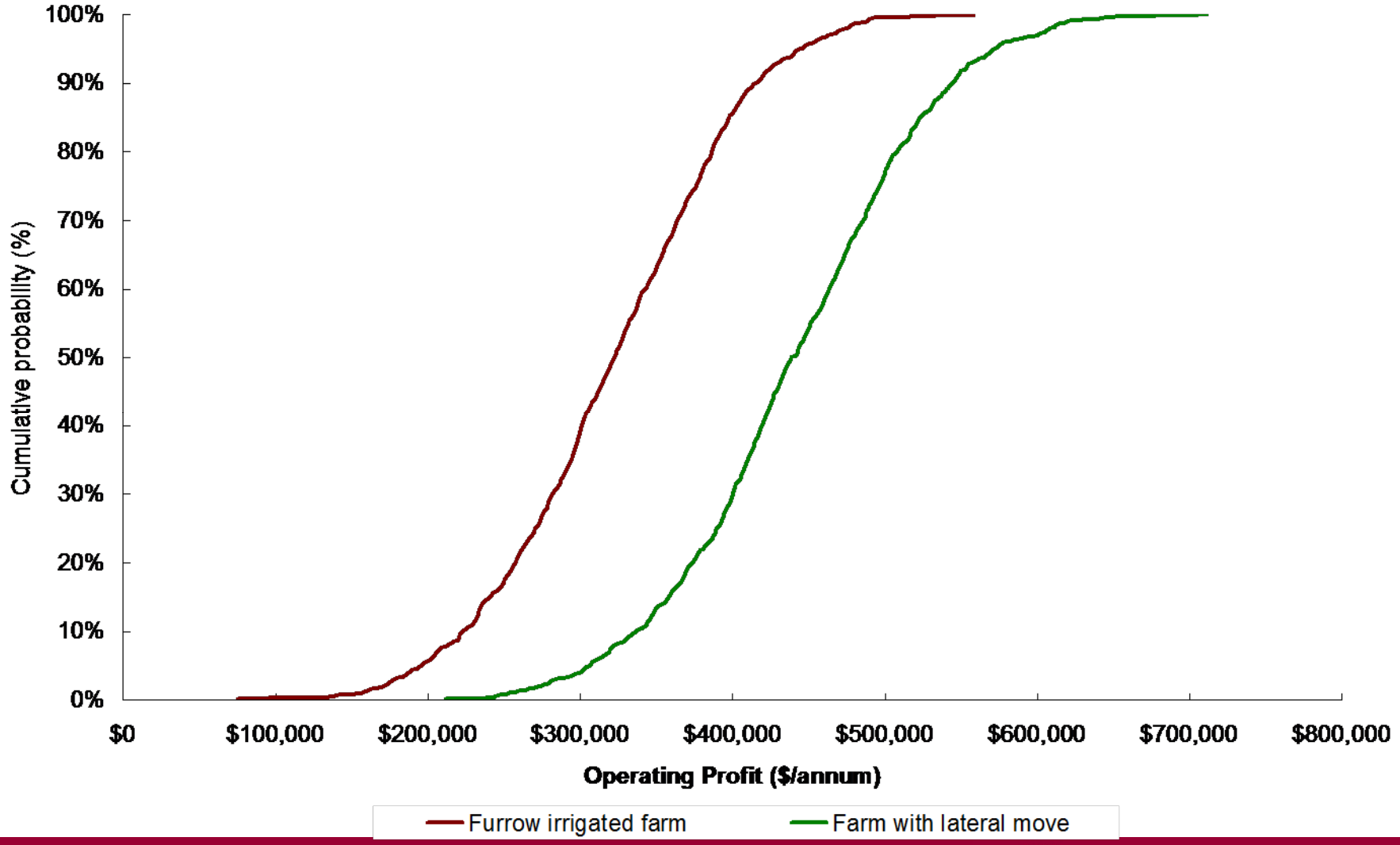

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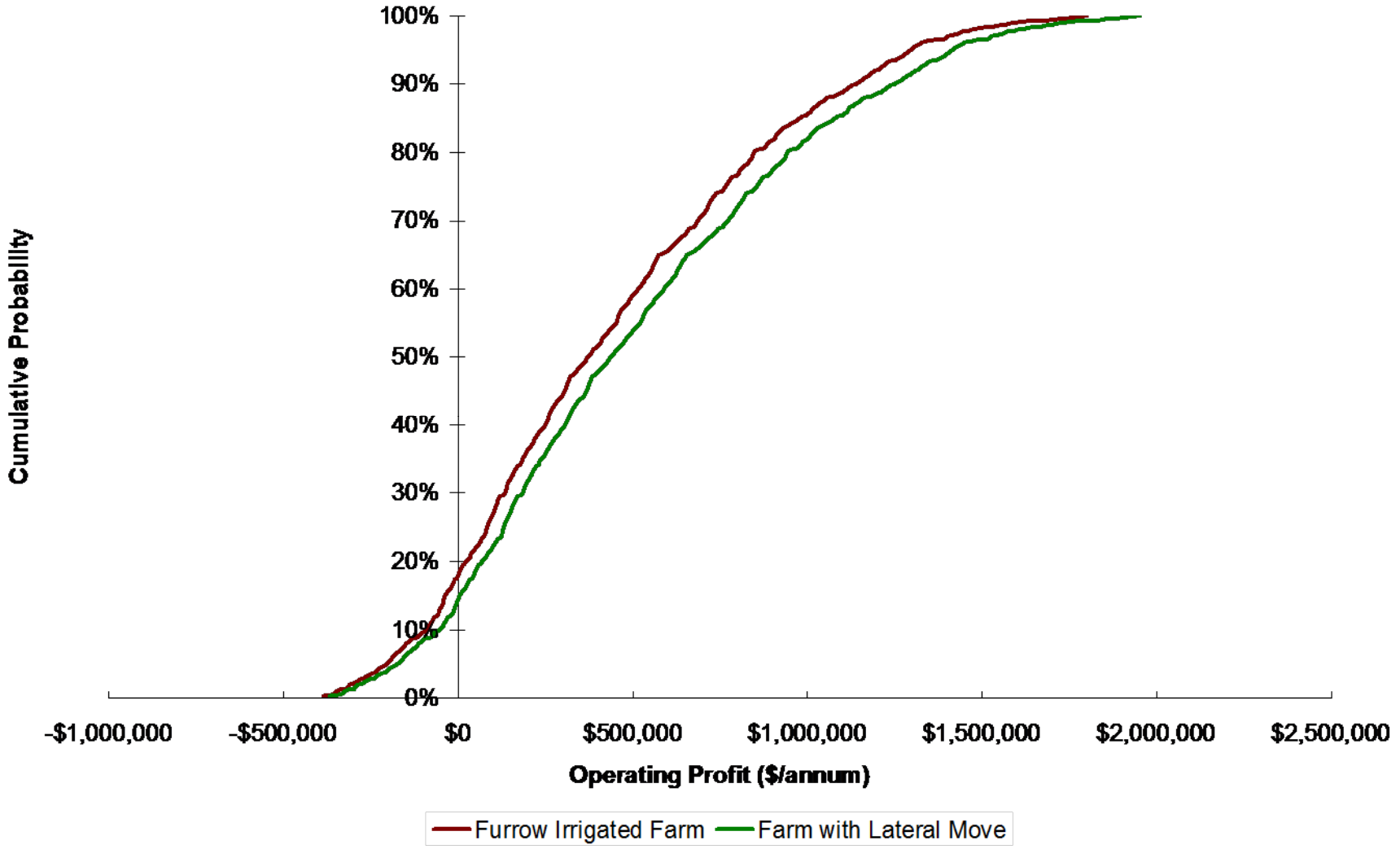
Figure 3 Farm C Annual Operating Profit



2. Financial Analysis

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- A 20 year financial analysis completed for Farms A and B
- Cash flows developed which included debt repayments, investor drawings and taxation
- Variability in cash flow outcomes assessed using @RISK

Table 7 20 Year Financial Analysis ($m)

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	Farm A			Farm B		
	Without Centre Pivots	With Centre Pivots	Difference	Without Lateral Move	With Lateral Move	Difference
Cash Inflows	**$32.21**	**$44.66**	**$12.45**	**$27.81**	**$34.88**	**$7.06**
Variable Expenses	$18.84	$25.39	$6.55	$13.36	$16.53	$3.16
Overhead Expenses	$3.04	$3.10	$0.06	$2.89	$2.96	$0.07
Farm Drawings	$5.54	$6.54	$1.00	$5.07	$5.86	$0.79
Financial Expenses	$0.35	$4.44	$4.08	$1.64	$2.67	$1.02
Farm Cash Expenses	**$27.78**	**$39.47**	**$11.69**	**$22.96**	**$28.01**	**$5.05**
Cash balance	**$4.43**	**$5.19**	**$0.76**	**$4.85**	**$6.87**	**$2.02**

Figure 7 Farm B – Cumulative Cash Flows

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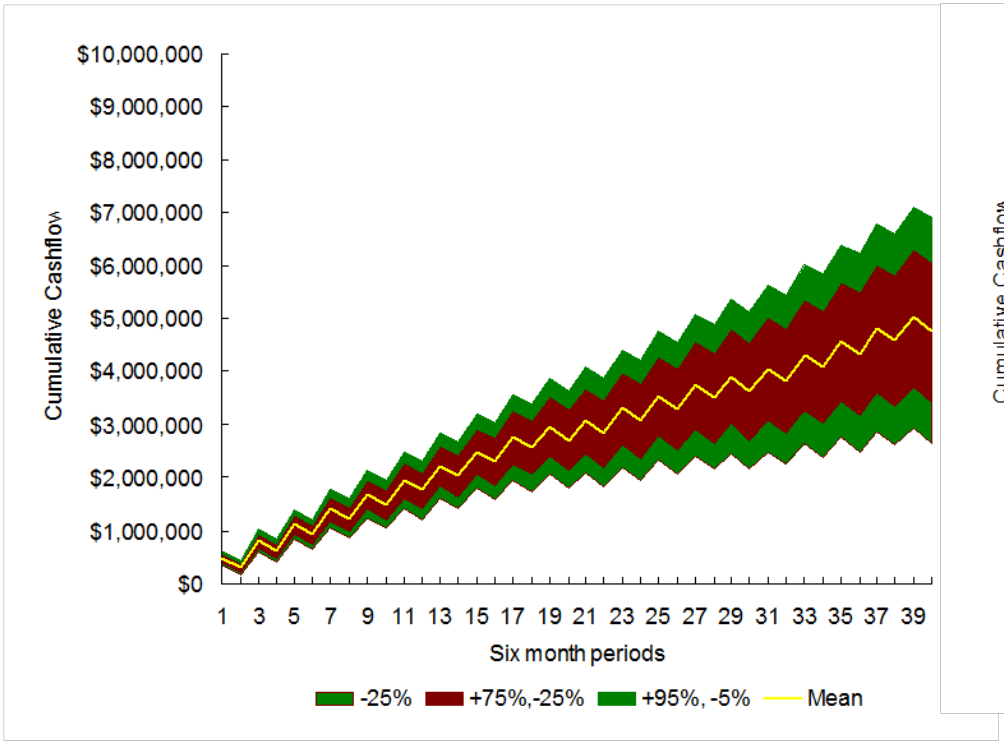
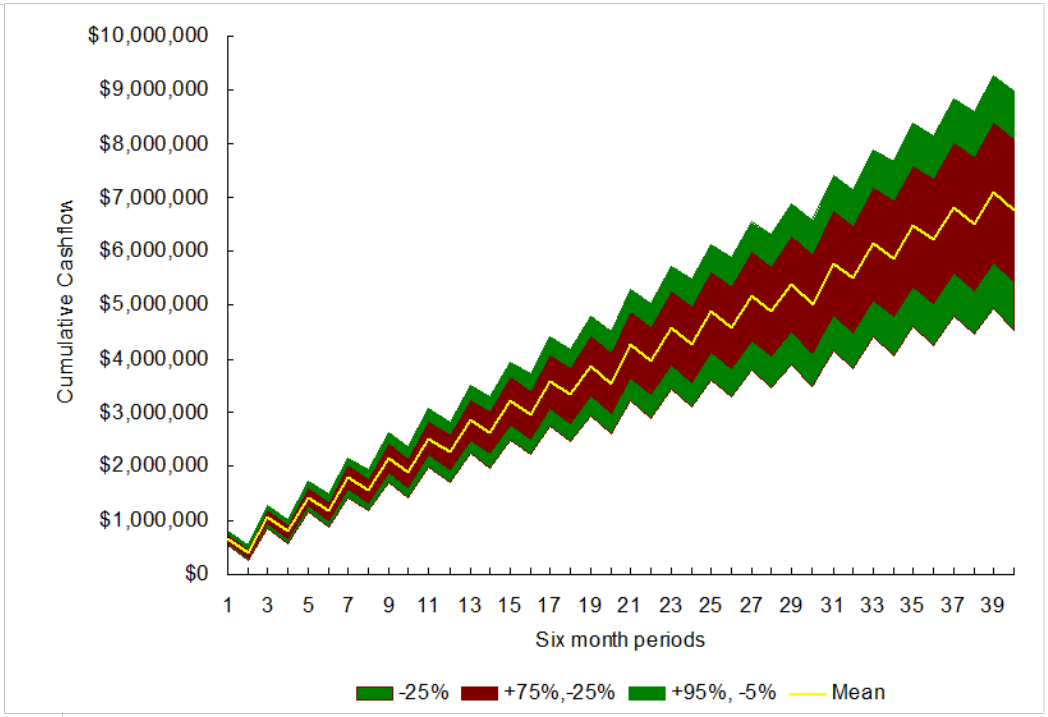


Without



With

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3. Economic Analysis

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- Economic efficiency of investment analysed over 20 years for Farm A and Farm B
- Based on the Present Value framework – future cash flows converted to present cash equivalents
- NPV and IRR calculated for “without” and “with” scenarios

Table 8 Economic Analyses

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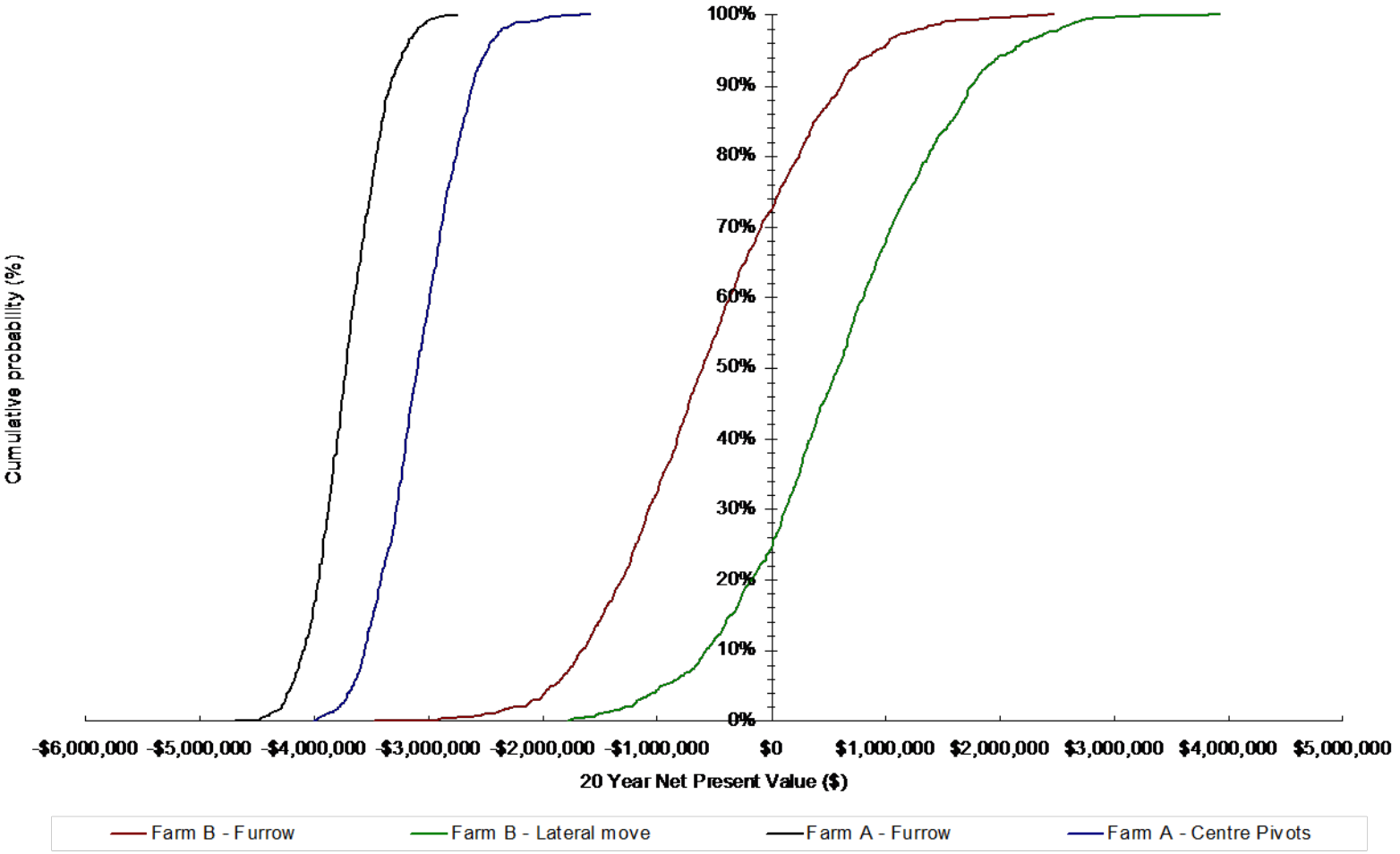
	Farm A		Farm B	
	Without CPLM	With CPLM	Without CPLM	With CPLM
IRR	5.6%	6.8%	9.0%	11.1%
NPV (10% Discount rate)	-$3.71m	-$3.08m	-$0.51m	$0.59m

With an opportunity cost of capital of 10% over a 20 year investment period:

- Farm A - the present value of benefits foregone by continuing with the existing farming system is $3.71 million. Investment in the centre pivots reduces this to a loss of $3.08 million.
- Farm B - the present value of benefits foregone by continuing with the existing farming system is $0.51 million. Investment in the lateral move results in an increase in the net present value of benefits to $0.59 million.

Figure 8 Cumulative NPVs



4. Marginal Analysis

- Differs from the whole farm analysis
- Only the capital invested and extra costs and additional returns from the investment considered
- Allows benefits from the project alone to be accurately identified and the payback period to cover costs determined
- @RISK used to generate the NPV distribution for the marginal analysis

Figure 9 Farm A Expected Cash flow

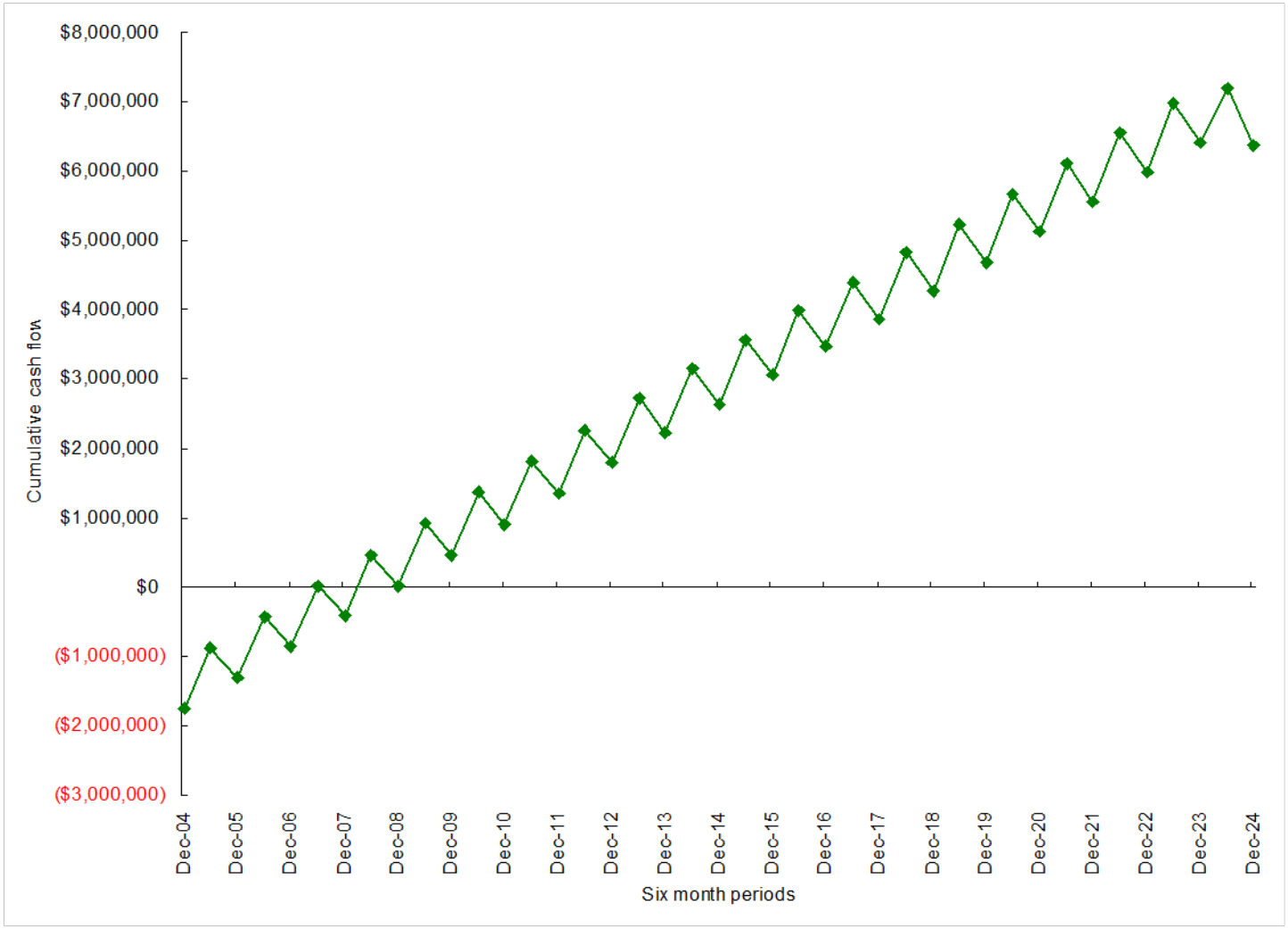


Figure 10 Farm B Expected cash flow

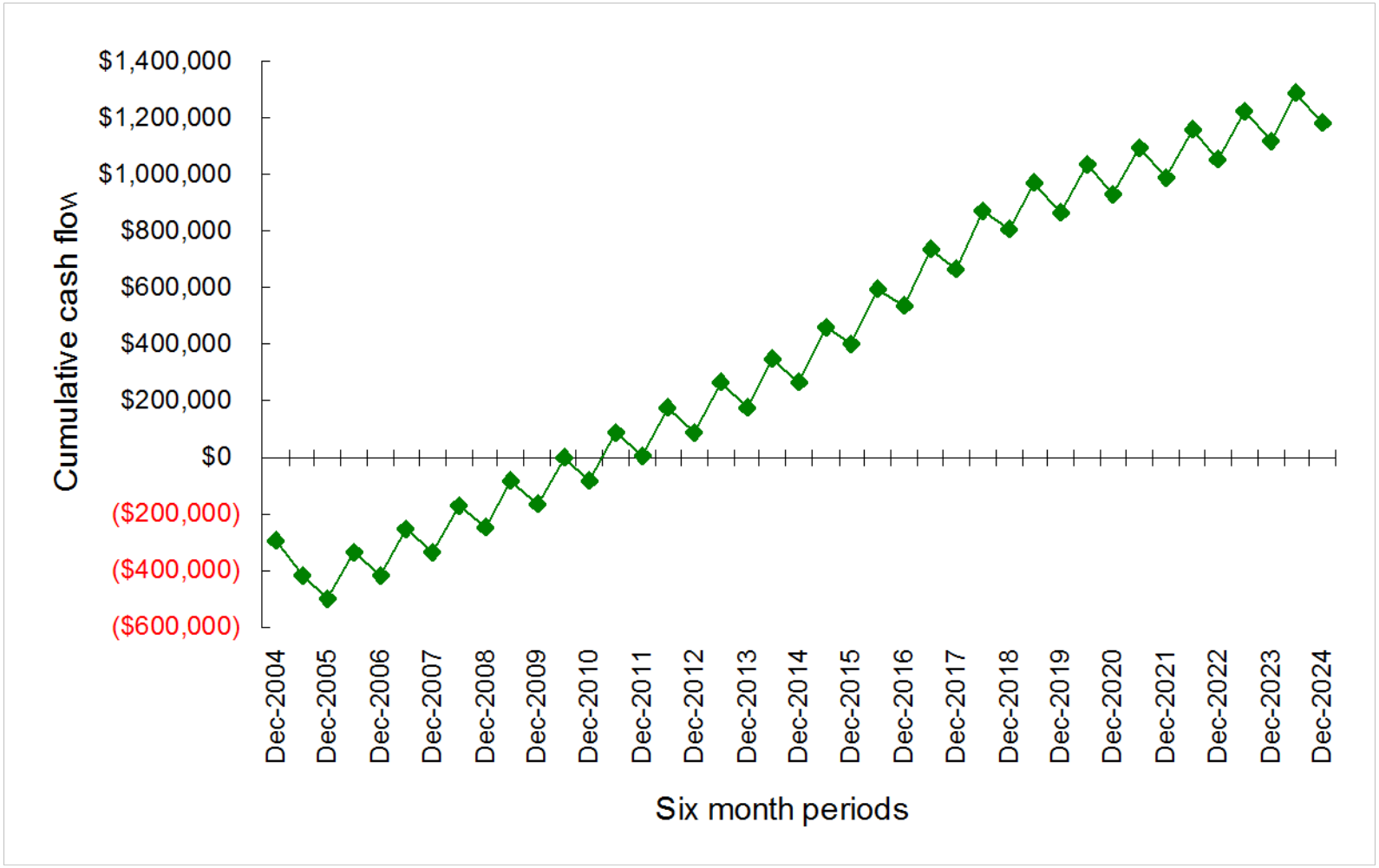


Figure 11 Marginal NPV Distributions

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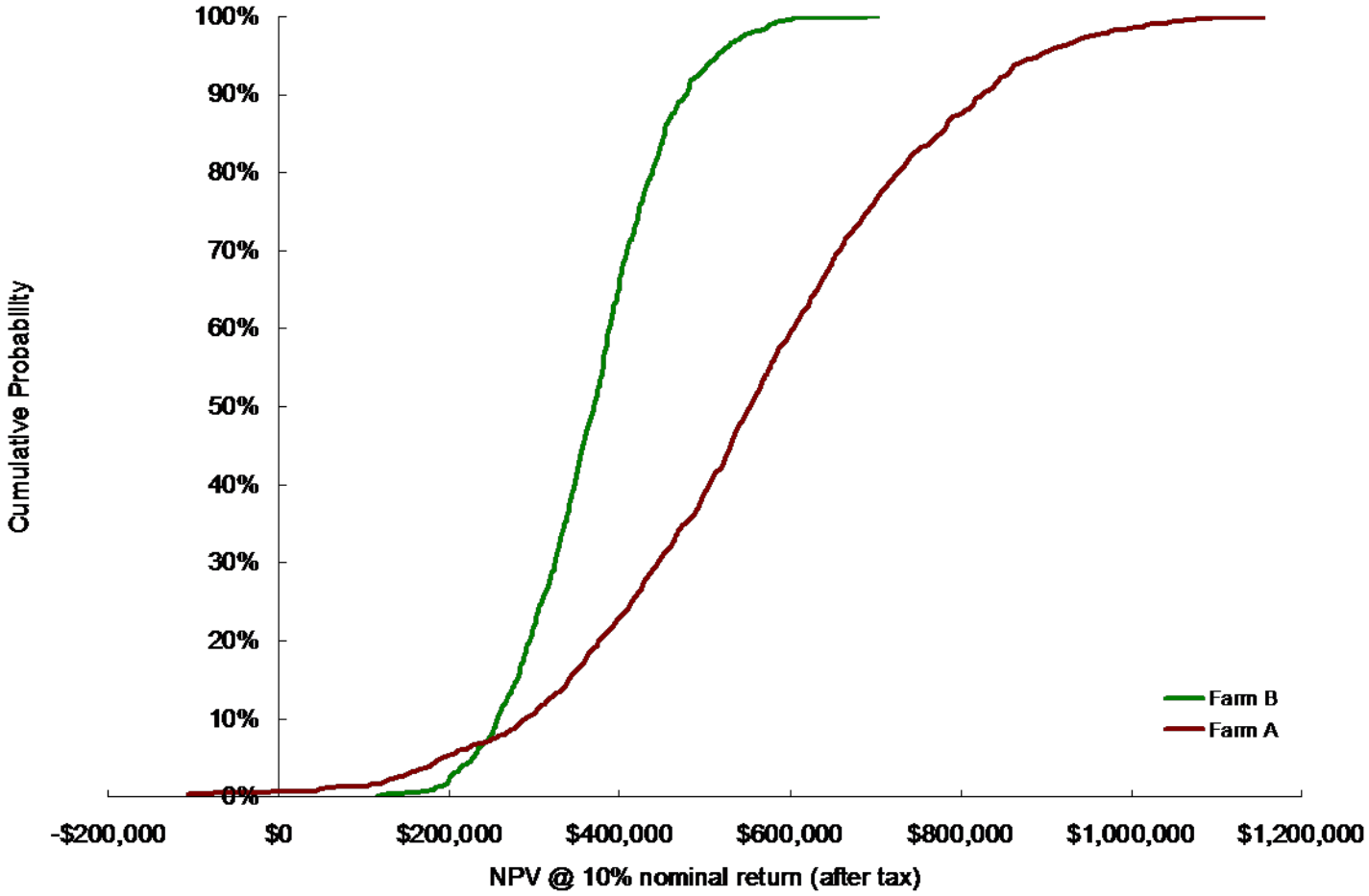

Conclusions

- “With” and “Without” scenario analysis is a robust methodology to assess the economic and financial performance of CPLM investments
- There is no simple “rule-of-thumb” that applies to the viability of investment in alternative irrigation systems
- The impact of increases in energy costs need to be quantified

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- The “with” and “without” scenario approach needs to be developed as a decision support tool
- Further information needed on:
  - the performance of irrigated crops under CPLMs
  - how to optimise crop performance with limited water using CPLMs