Capital Structure in Agricultural Sole Proprietorships
- Relation to Economies of Scale, Economies of Size, Investment, and Risk

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Selected Poster prepared for presentation at the
2015 Agricultural & Applied Economics Association and Western Agricultural Economics
Association Joint Annual Meeting, San Francisco, CA, July 26-28

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Capital Structure in Agricultural Sole Proprietorships - Relation to Economies of Scale, Economies of Size, Investment, and Risk

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“In choices related to growth, consequences of financial alternatives are likely to be at least as important as those of production alternatives. Moreover, and more important still, production and financial alternatives are interrelated” (Baker, 1968).

Introduction

The level of farm debt has been a recurrent theme in agricultural economics. However, the implications of debt-choice models in agricultural finance, does not seem to be reflected in related areas of agricultural economic research, despite the early insight of Baker indicated by the quote above.

Furthermore, agricultural debt-choice models of sole proprietorships, does not take economies of scale and size into account (Collins 1985), although this has been a central question in general economics of agricultural production.

The Collins (1985) model assumes that the cost of debt (K) is independent of the debt-to-asset ratio. In a footnote it is recognized that this conflicts with financial theory. But justified by the claim that it is in line with agricultural banking practice. This may not be universally true, and there is reason to believe that the cost of debt (K) may have become more dependent on the debt-to-asset ratio after the financial crisis.

A model is developed were the cost of debt and the cost of equity is dependent on the debt-to-asset ratio. With a given equity at any point in time, the size of the farm, the debt-to-asset ratio and the cost of capital is interdependent in the model.

This means that...

...the wealth of the farmer determines optimal farm size...

Consider a “U” shaped Weighted Average Cost of Capital (WACC) in the debt-to-asset ratio (Figure 1).

- Cost of debt should be increasing in debt-to-assets (pre-tax)
- Cost of equity should be above the cost of debt at any level
- The value of the tax shield reduce the cost of debt (after tax)

Now consider a sole proprietor farm with a given equity position. If the farmer considers growth in farm size by purchase of land debt-to-asset ratio and the cost of capital will be increasing in the farm size (acreage) (Figure 2).

Agricultural production economics

In agricultural production economics the “L” shaped average cost function is a common empirical finding (Chavas 2008) (Figure 3).

minimum of the average cost curve (pre cost of capital or assuming cost of capital that is independent of the debt-to-asset).

Empirical challenges

Putting the model to the empirical test is challenging as the relation between the individual risk premium (R) and the debt-to-asset ratio is difficult to estimate empirically as it is usually only the aggregate cost of debt (K) that is observed. The market rates of interest (i) is affected by the farmers choice of financial products (fixed and adjustable rate loans) which constitutes the farmer’s choice of interest rate risk (K = R + i). Data that is expected to be available in the autumn this year will provide information on the risk premium paid for mortgage loans of Danish farmers.

Results & Discussion

Our work so far indicates that transforming capital cost or the WACC as independent of the debt-to-asset ratio is problematic, but our research is not (yet) able to quantify the problem.

Conclusion

For many years the work on agricultural finance (finance of sole proprietorship) has indicated an important interrelation between financial position, financial decisions and production decisions related to risk. The farmers financial position is however, ignored in the bulk of the production economic research in agricultural economics. We claim that this poses a serious problem for applied purposes of this research.

One of the insights provided here is that the wealth of the farmer matters for production economics. Interesting question follow: What happens in case of a shock to the farmers equity position? What happens if the farm growth is based on rented land (tenant farming) instead of owned land? etc.

Further research

Future research may shed light on the magnitude of the problem by getting access to more detailed information on the composition of cost of debt (K) by improving the models of the market interest rate (i) and the individual risk premiums (R). As the market interest rate (i), the individual risk premium (R) and the opportunity cost of equity capital cannot be assumed to constant over time or place, the implications of changes with regard to optimal farm size and investment behavior are interesting topics for further research.

References:


** Based on Chavas 2008.

*Based on Collins (1985) & Moss et al. (2012)