AUSTRALIAN AGRIBUSINESS GROUP

Does Agriculture Improve Portfolio Performance?

July 2011

Executive Summary

⇒ Investors in Australia have traditionally overlooked and under-invested in agriculture because of perceptions of high risk and poor returns. This paper investigates these perceptions and demonstrates that quite the reverse is true.

⇒ 30 years of data for Australian shares, Australian cash, Australian 10-year bonds, Australian listed property trusts, international shares and international bonds were compared against agriculture as an investment.

⇒ The top 25% of agriculture can produce returns almost as good as Australian shares.

⇒ Returns from top agriculture are substantially less volatile than Australian shares, listed property and international shares.

⇒ Agriculture is not correlated to other asset classes and provides a strong inflation hedge.

⇒ The addition of agriculture to a portfolio can substantially reduce volatility for limited (if any) reduction in overall returns.

⇒ The Top 25% segment of Australian agriculture is a sensible choice when considering diversification, stability of returns or absolute returns for a portfolio.

1 Introduction

This paper answers the question: *does an allocation to agriculture improve portfolio performance?* We look at how agriculture performs from a returns perspective and what impact it has if included in an investment portfolio.

This 2011 report is an update to the paper AAG released in 2005. The data now covers a 30 year time span.

Diversification is one of the fundamental strategies for managing investment risk. The alternatives can include:

⇒ *Between securities* i.e. between listed equities, bonds or cash;
⇒ *Within securities* i.e. investing in multiple listed equities; and
⇒ *Between industries* i.e. agriculture and manufacturing.

Most investors would be very familiar with all of these methods of diversification through the use of equities, property and fixed interest securities such as bonds. Agriculture or farmland is another form of diversification and is sometimes considered to be part of the property asset class but historically has been underinvested.

In Australia, media reporting of droughts, floods, natural disasters and financial failures have produced an overwhelmingly negative attitude towards agriculture as an investment class. However, the data presented in this report demonstrates that the top 25% of Australian farmers produce excellent, stable returns, in both an absolute and comparative sense.

The benefits of including agriculture in portfolios has been reported previously in numerous research journals including in 1985 ([12]), 1992 ([13]), 1999 ([14]), 2002 ([15]), 2005 ([16]), 2008 ([17]), 2009 ([18]), 2010 ([19]) and 2010 ([20]). This paper similarly demonstrates the tangible benefits of including an allocation to agriculture in investment portfolios.

2 Data Sources

We have used a common time series which covers 30 years from 1980/01 to 2009/10.

Agricultural data is less readily available in Australia than in some countries. The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) collects data on farm performance [3] each year and this is available towards the end of the following financial year. We have used the Farm Surveys data as our source data for agricultural returns.

Comparative returns data for other asset classes has been accessed from several sources including:

⇒ Standard and Poor's – historical All Ordinaries Price and Accumulation indices data and Listed Property Trust Price and Accumulation indices data [1];
⇒ Reserve Bank of Australia – historical cash rates [2]; and
⇒ Wren Research Investment Advisers – Australian 10-Year and USA Treasury Bond data and MSCI World (ex Australia) price and accumulation data [4].

The methodology used is explained throughout this report.

3 How has Agriculture Performed Over the 30-year Period?

The ABARES farm performance data is segregates by industry.

Industries include (1) Wheat and other crops, (2) Mixed crops and livestock, (3) Sheep, (4) Beef, (5) Sheep and beef and (6) dairy. ABARES also has a catch-all category called "all broadacre" which includes all of these enterprises except dairy.

The figure below illustrates the returns for the top 25% of performers by agri sector over 30 years (Figure 1).

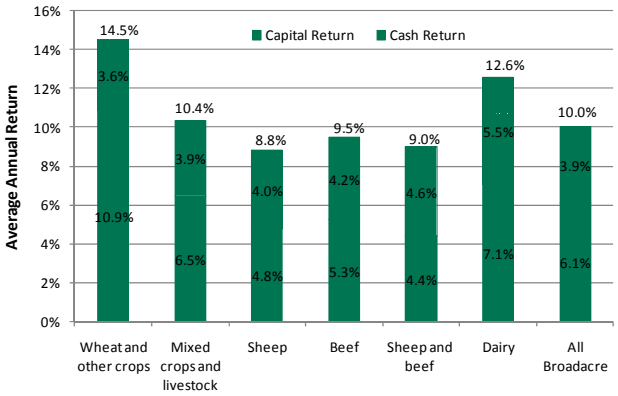

Figure 1 – Chart showing the average annual returns by industry broken up by source of total return

Average annual returns across all industries are good, with "wheat and other crops" being the standout at 14.5% per annum with a large component of that coming from the cash return (Figure 1). Average annual return from the dairy sector at 12.6% is also excellent.

Across the All Broadacre category (all of the sectors above excluding dairy) the average annual return is 10.0% (Figure 1).

The performance of the All Broadacre category by financial performance is broken down into Average, Bottom 25% and Top 25% as seen in the following chart (Figure 2).

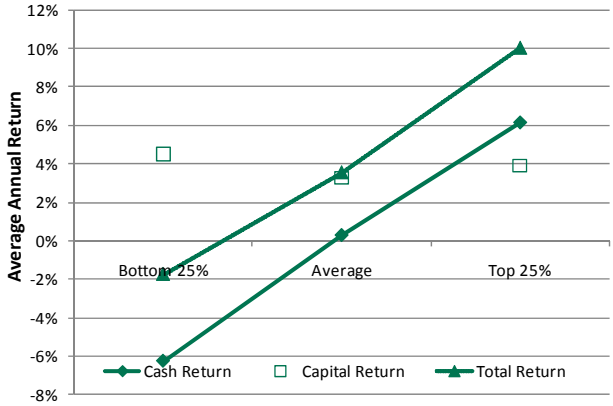

Figure 2 – Chart showing the "all broadacre" returns segregated by performance

Obviously the top 25% of performers produce higher returns (by definition), but it is interesting to note that capital growth is similar for the better and worse performers (Figure 2).

It is commonly understood that scale is an important element to achieving good cash/income returns. ABARES segregates their data by business turnover. We have used that as a proxy for business scale. An analysis of the ABARES data as seen in Figure 3 clearly illustrates that scale is fundamental to annual cash returns.

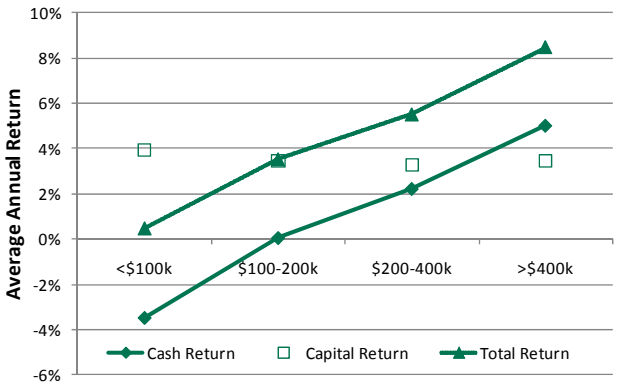

Figure 3 – Chart showing the "all broadacre" returns by farm business turnover

It is clear that the larger the business is, the better the cash return (Figure 3). The "law of diminishing returns" would apply here such that after a certain size, the business would not necessarily continue to make ever higher returns.

We would consider the ABARES's upper end segment of just $400,000 turnover and above to be a small farm unit. However, this is the only data available on the scale issue and the survey data would include the majority of professional, well scaled farmers. So, we are comfortable that the advantage of scale is well illustrated.

Again, it is interesting to note that capital growth is not correlated to the size of the business (Figure 3). This is understandable as the size of a parcel of agricultural land does not necessarily relate to its value on a dollar per unit area basis.

As there is limited time series data on other agri sectors we have used the "all broadacre" category as a proxy for the performance of agriculture in general in this report.

4 How Does Agriculture Compare to Other Asset Classes?

Overall returns are derived from two sources – (1) capital growth and (2) dividends or operational income, sometimes called cash returns.

A price index, such as the All Ordinaries Index, is a measure of changes in the underlying capital value.

An accumulation index is a total returns index, taking into account both capital growth and annual distributions. Accumulation indices assume the dividends are reinvested back into the underlying assets.

Returns from agricultural property reflect the capital growth component of particular agriculture investments and could be compared to a price index. When you add to that the income or dividends from farming operations, an accumulation index or total returns index is created.

Throughout this report the Top 25% of agriculture means an accumulation index of the 25% best performing farms as measured by ABARES. Given that there are a substantial number of farms that are not run on commercial lines we have used the top 25% of performers as a measure of the professional, well scaled commercial operations in broadacre agriculture.

For the sake of this paper, we have assumed that the dividends (cash returns) from farming operations are reinvested in the underlying capital (property), but in reality this cannot always occur.

We have used the annual returns data to assess the growth in value of $1,000 from 30 June 1980 to 30 June 2010 and to produce an index for each asset class.

The growth in the $1,000 for each asset class is illustrated in Figure 4.

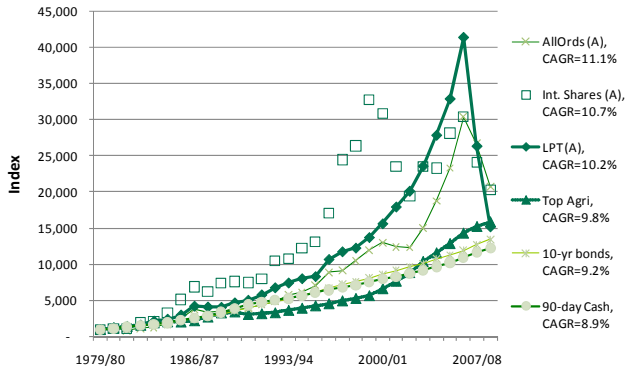

Figure 4 – Chart showing the growth of $1,000 from 30 June 1980 to 30 June 2010 if invested in the various asset classes (CAGR=Compound Annual Growth Rate, (A) = Accumulation Index)

Compound Annual Growth Rate (CAGR) is the percent return required to reach the 2009 income figures produced when we calculated the index (Figure 4) assuming the dividends are reinvested and compounded.

The CAGR differs to the average annual return, which is simply the arithmetic mean of the annual returns.

Over the 30 year period:

- Total returns from All Ordinaries would have returned $23,661, a CAGR of 11.1% (Figure 4).
- International shares came second delivering $21,307, a CAGR of 10.7%.
- Australian listed property came next with $18,309 (CAGR=10.2%).
- Top Agri delivered $16,531 and a CAGR of 9.8%.
- Bonds and cash came in after this.

Over a much shorter time frame (the 5 years to 2010) a different picture is seen:

- Top Agri delivered a CAGR of 8.0%.
- All Ordinaries delivered 7.8%.
- Bonds and cash came in third and fourth respectively with 5.7% and 5.8%.
- International shares came fifth delivering with a CAGR of -1.6%.
- Australian listed property came last with a CAGR of -4.1%.

This shorter time series helps to demonstrate the low volatility of Top Agri and its lack of correlation with other asset classes (discussed in Section 6).

The other side to the returns equation is at what level of risk or volatility were these returns achieved. Whilst the movement in the lines for each asset class (Figure 4) provide a visual assessment of volatility, this is discussed in the next section.

5 What is the Volatility of Agriculture Compared to Other Assets?

The simple philosophy of "don't put all your eggs in one basket" is why an investor wouldn't just invest in the momentarily highest returning asset class.

Given that an investor cannot always choose when they sell their investment, a high level of volatility may mean that an investment is sold when it is well below its peak or average value. This is one reason why an investor should consider assets other than the momentarily highest returning asset classes.

This concept is demonstrated in the following chart (Figure 5) where we see that each of the two example asset classes has a different level of volatility. While Australian shares produce a higher return, the chart visually illustrates that returns from Australian shares come at substantially more volatility than Top Agri.

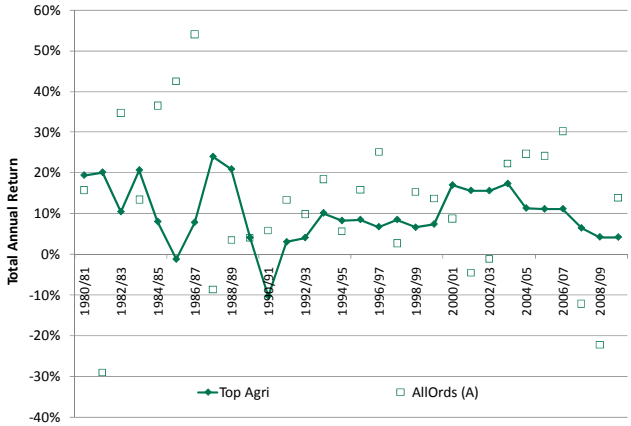

Figure 5 – Chart showing the annual returns and volatility of All Ordinaries and Top Agri accumulation returns

It is evident that top agri is substantially less volatile than the returns from Australian shares (Figure 5).

The *standard deviation* of returns is a measure of "dispersion of a set of data from the mean" (6), in other words it is a measure of volatility or risk. It is a way of quantifying the volatility we see in Figure 5.

We have plotted the standard deviation of each asset class against the CAGR of each in Figure 6. This chart brings together the concepts of returns and risk as previously discussed.

Figure 6 shows that while equities (both Australian and international) and listed property produced higher returns than Top Agri over the period it was at significantly greater risk or volatility. In our opinion, given the demonstrated risk, an investor should *demand an even higher rate of return* from those asset classes to the right hand side of Figure 6 below, than they have actually delivered..

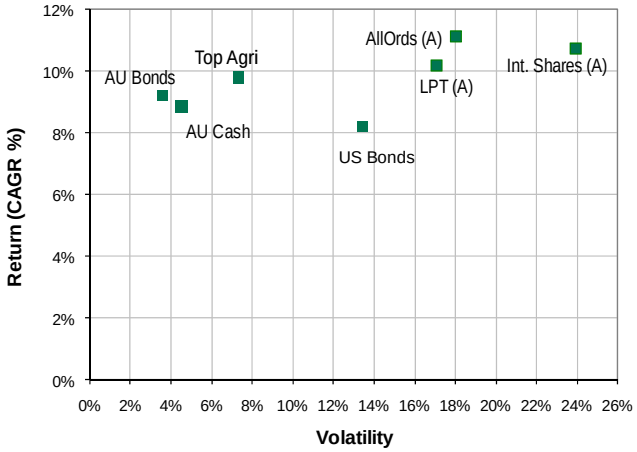

Figure 6 – Chart showing the risk-return balance for each asset class. Note: (A) = Accumulation Index, LPT = Listed Property Trusts.

Over this period, an investor may have chosen to forgo some returns for greater certainty of returns and invest in less volatile sectors such as fixed interest or, we suggest, Top Agri.

The Sharpe Ratio can assist in understanding the more optimum assets when considering risk and return together. Put simply, the Sharpe Ratio is a measure of reward to risk. Or more specifically, it is a measure of the risk free rate of return for an asset compared to its volatility.

The higher the value, the better the investment (from a reward/risk perspective). A high Sharpe Ratio doesn't necessarily mean the highest return or the lowest risk; rather it means that that's the best you could have done when reward and risk were taken together.

The Sharpe Ratios for the assets subject of this paper are outlined in Figure 7.

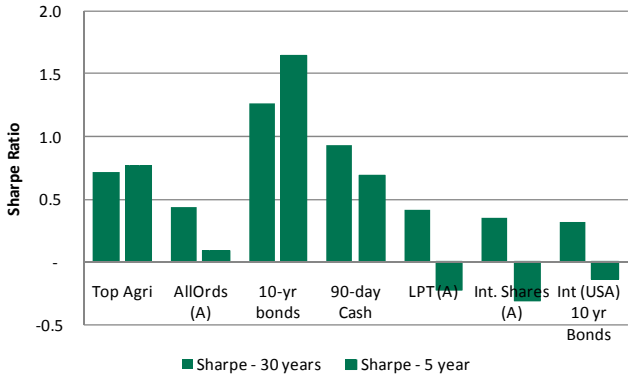

Figure 7 – Sharpe Ratios over 5 and 30 years assuming risk free rate of 4.75%

Clearly, 10 year Australian Bonds are the better performer when considering the Sharpe Ratio, particularly over the last 5 year period.

However, Top Agri performs very well against the other asset classes, in particular over the last 5 years when returns for the more mainstream asset classes have suffered substantially during the Global Financial Crisis. In fact, the performance of Top Agri improved over this period.

6 Is Agriculture Correlated to Other Asset Classes?

A correlation analysis was performed on the returns data for each asset class. The results are outlined in Figure 8 comparing Top Agri against other asset classes.

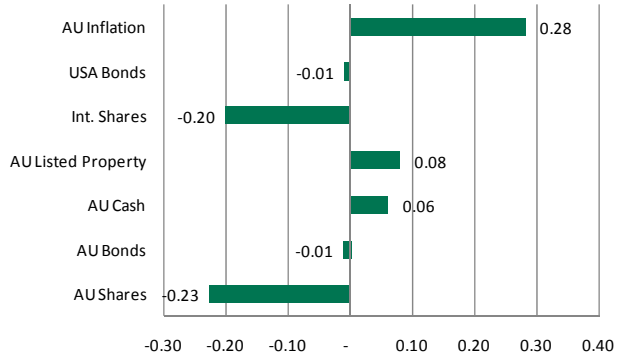

Figure 8 – Correlation of Top Agri versus other asset classes

Correlation analysis assists us in deciding which asset classes are related (perform in the same way) and to what extent.

A correlation value of 1 indicates that two particular asset classes are exactly linked – i.e. the annual returns for each asset move exactly together – and a value of close to 1 means a strong correlation.

Low correlation between two assets means that the extent of returns from each is weakly related.

A positive correlation value means that when returns for one asset class increases, returns for the other tend to increase, while a negative correlation value means that when returns for one asset class increase, returns for the other tend to decrease. Well performing but negatively correlated assets are useful for inclusion in investment portfolios because they help to smooth overall portfolio returns.

The analysis demonstrates that agriculture is not strongly correlated to any of the major asset classes used in this analysis. Agriculture shows a weak negative correlation to equities (both Australian and international) (Figure 8).

The extent to which risks can be diversified depends on the degree to which assets are correlated (8).

Incorporating two asset classes into a portfolio that are negatively correlated will help to smooth out returns of the portfolio as a whole.

This smoothing occurs as each asset class has different levels of risk and return and so each behaves differently over time (6).

7 How Does Agriculture Impact on a Portfolio?

7.1 The Two Asset Portfolio Scenario

To determine the impact of the inclusion of agricultural assets in a portfolio, we designed a set of very basic portfolios.

The investments included in the portfolio included Top Agri and Australian shares. We changed the proportion of agriculture in the portfolio from 0% to 100% and assumed a rebalancing of the portfolio each year to the relevant weighting of agriculture.

When a negatively correlated asset is included in a portfolio, one could expect the volatility of returns to decrease as outlined in Section 6. This is what occurred in our portfolio analysis when we started adding Top Agri (Figure 9).

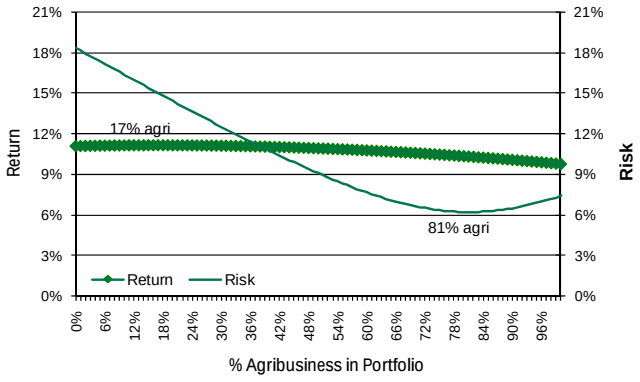

Figure 9 – Chart showing the impact on portfolio risk (thin line) and return (heavy line) with the addition of Top Agri

Figure 9 clearly demonstrates that adding Top Agri to a portfolio of Australian shares reduces returns only slightly, but can very quickly reduce overall portfolio risk.

Over the period of analysis the highest return would have been generated by the inclusion of 17% Top Agri in the portfolio. The lowest risk (volatility) however, would have been generated with 81% agriculture in the portfolio (Figure 9).

When each of the portfolios' return and volatility are plotted against each other, rather than in a separate lines (as per Figure 9), we see the same pattern illustrated slightly differently (Figure 10).

Each point plotted in Figure 10 is a portfolio with a relevant percentage of Top Agri included.

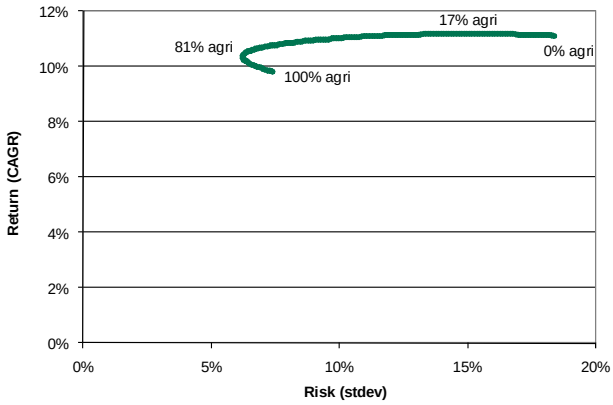

Figure 10 – Chart showing the impact of the addition of agriculture in a portfolio of All Ordinaries shares

Despite the common misconception that agriculture is risky, the inclusion of Top Agri assets can actually very quickly help to reduce risks in a portfolio.

7.2 The Multi Asset Portfolio Scenario – Constrained

The portfolio analysis above is a very simple one for the sake of demonstration. Most portfolios would include more than just Australian shares.

To determine the impact of the inclusion of agricultural assets in a more balanced portfolio, we used a balanced portfolio asset allocations outlined in Table 1 as a start point for our analysis. The Base portfolio is the average default strategy for 15 largest Australian superannuation funds as provided by APRA in its 2010 survey of funds. Given there is no index for measuring returns for "Alternatives" we have reduced that allocation to zero and distributed this on a weighted basis to the other asset classes to produce the Adjusted Base Portfolio.

Table 1 Diversified Base Portfolios		
	Base Portfolio	Adjusted Base Portfolio
Alternatives	9.7%	
Cash	12.8%	14.2%
Aus Fixed Interest	9.2%	10.2%
International Fixed Interest	4.9%	5.4%
International Equities	23.7%	26.3%
Australian Property*	9.6%	10.7%
Australian Equities	30.0%	33.3%

* combined listed and unlisted property

From the Adjusted Base Portfolio we added Top Agri investments and then re-weighted the other assets in proportion to the Adjusted Base Portfolio. We assumed a rebalancing of the portfolio each year to the relevant weighting of each asset class above.

The impact of including agriculture in the portfolio is illustrated in Figure 11 where a very similar pattern to that seen in Figure 9 is achieved. Again it is clear that adding Top Agri only slightly reduces returns but very quickly reduces the risk of the overall portfolio.

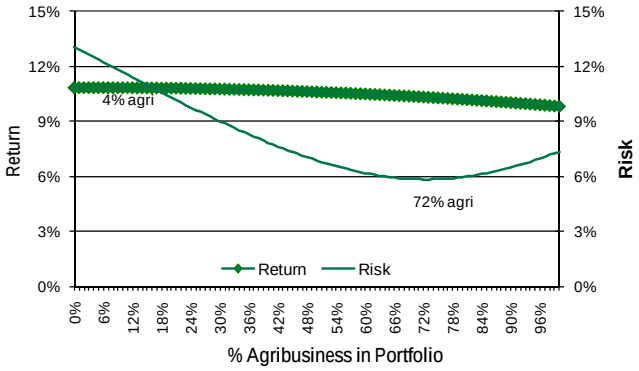

Figure 11 – Chart showing the impact on return (heavy line) and risk through the addition of agriculture to a balanced portfolio

When each of the portfolios' returns and volatility are plotted against each other, rather than in a line (as per Figure 11), we see a similar pattern emerge in Figure 12 in a balanced portfolio as we did in Figure 10 for the agriculture and All Ordinaries portfolio alone. The highest return is achieved with 4% agri and the lowest risk is achieved with 72% agri.

Again, the most noticeable impact is the substantial reduction in volatility, with only a marginal loss of returns, through the addition of agriculture assets.

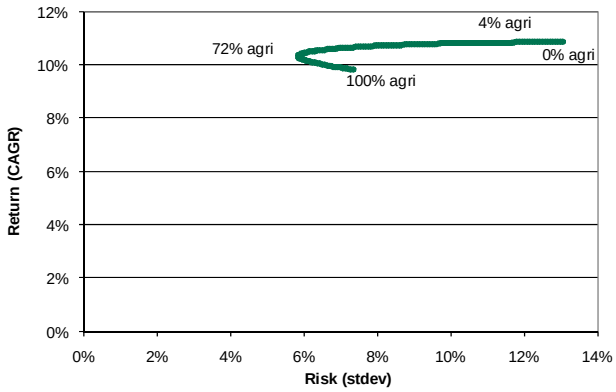

Figure 12 – Chart showing the impact of the addition of agriculture in a balanced portfolio

An often discussed weighting for agriculture in a portfolios is between 0% and 10%, and while the analysis in this paper is theoretical, it does challenge this limited weighting. We are not suggesting investors should have 70-80% Top Agri in their portfolio, however, we are suggesting a heavier weighting of Top Agri should be considered, in comparison to the traditional view.

7.3 The Multi Asset Portfolio Scenario – Optimised

The portfolio used in the section above could be considered a constrained portfolio given that the allocations to each asset class are in fixed proportions.

If there was no limit to the allocations to each asset class (other than the total adding to 100%!) then there is an infinite number of portfolios that could be plotted on the risk-return chart.

That said, there is still a set of allocations which are the efficient set of allocations and an efficient frontier can be plotted as illustrated in Figure 13. We have done this "with agri" and "without agri" the inclusion of agri. Note, we have adjusted the scale of the y-axis to make the chart easier to read.

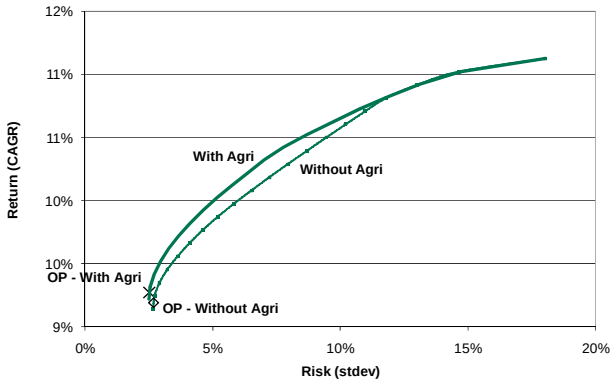

Figure 13 – Efficient frontier for an unconstrained portfolio of diversified assets showing the optimal portfolio

Clearly, the addition of has the impact of shifting the curve up and left. That is, adding agri to a diversified portfolio decreases risk or volatility for a given level of return.

All portfolios on the efficient frontier are, by definition, efficient, but there is one set of allocations which is described as the optimal portfolio. This set of allocations is optimal as its return per unit of risk is greater than any of the efficient portfolios.

We have used the Hoadley Portfolio Optimiser (which implements the Markowitz algorithm for mean variance optimization) to find the efficient set of portfolios in an unconstrained environment and to find the optimal portfolio for both the "with agri" and "without agri" portfolios (Table 2).

Table 2 Optimal Portfolio

	With Agri	Without Agri
Top Agri	13%	0%
Cash	28%	33%
Aus Fixed Interest	49%	56%
International Fixed Interest	3%	3%
International Equities	1%	2%
Australian Property*	3%	3%
Australian Equities	3%	3%

The risk-return of the two portfolios from Table 2 are also plotted in Figure 13. Here, we see that the shift is up and left. That is, by adding agriculture, the return of the optimal portfolio increases and risk decreases.

The optimal portfolios outlined in Table 2 will challenge the long held notion of a balanced portfolio due to their substantial allocations to cash and Australian Fixed Interest Securities. Comparing the two optimal portfolios we see that agri comes in and replaces cash and fixed income securities suggesting that top agri behaves more closely like cash and fixed income securities rather than equities or listed property.

Agri is definitely worthy of consideration for inclusion in diversified portfolio of assets.

8 Investing in Top Agri

There are limited options for investment in Top Agri – and almost no options for retail investment. Whilst there are a small number of equities with significant exposure to production agriculture, their track record over the last few years would suggest that they do not fall into the Top Agri segment.

For the professional or institutional investor, there are various funds which offer exposure to production agriculture. A fund has issues with minority shareholders, liquidity and in focusing investment to suit the specific needs of an investor – in time, returns, risk, SRI issues and commodity focus to name a few.

AAG Investment Management Pty Ltd (AAGIM) offers a direct (or private account) and low cost investment option into Top Agri production. Each mandate is separately agreed (there is pooling of funds). Investments can be either active (investor takes the operational risk) or passive (land is leased to a local professional farmer). These two styles of investment, and the direct mandate provide an array of options for the professional investor.

AAGIM has invested over $390m into Top Agri production agriculture over the last four years, and its track record mirrors the performance of the related time series for Top Agri in this paper.

9 Conclusions

The inclusion of Top Agri does improve portfolio performance and should be considered as part of a well-managed and diversified portfolio.

Historically agriculture has often been overlooked as an investment option. The perception of agriculture by the general public is that it is risky and does not produce good returns.

Past media reporting of droughts, floods and natural disasters as well as reporting of specific sectors that are struggling to perform has produced an overwhelmingly negative attitude towards agriculture investments.

The successful performers in agriculture do not gain nearly as much attention as those that are underperforming. There is a significant differentiation between average farms which do not produce attractive returns and the Top 25% of farms (Top Agri) which have historically produced returns almost as good as the All Ordinaries, but with considerably lower volatility.

There is a lack of quality data available on returns for agriculture assets in Australia and until now, there has been limited analysis of what data is available. This combined with the perceptions about agriculture have meant that investors have generally overlooked agriculture.

The fact is that Top Agri can produce returns close to those of Australian shares, yet returns from Top Agri are substantially less volatile.

Agriculture is negatively correlated to other asset classes and the addition of agriculture to a portfolio can substantially reduce volatility and improve returns.

10 References

1. Standard and Poor's – www.standardandpoors.com.au
2. Reserve Bank of Australia – www.rba.gov.au
3. Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) – farm surveys data 1980/81 to 2009/10.
4. Wren Research Investment Advisers – www.wrenresearch.com.au
5. Carroll, M. 2003. *Farm performance from a wealth creation perspective.* (Michael Carroll is Head of Agriculture, National Australia Bank).
6. Investopedia – www.investopedia.com
7. Elton, J, Gruber, M, Brown, S and Groetzmann, W 2003. *Modern Portfolio Theory & Investment Analysis.* John Wiley & Sons Inc, USA
8. Hunter, J and Coggin, T 1990 "An analysis of the diversification benefit from international equity investment". *Journal of Portfolio Management, 17:1 pp33.*
9. Strong, R 2000. "Portfolio Construction, Management & Protection". South-Western College Publishing, USA
10. APRA, 2010. *Statistics - Superannuation Fund-level Profiles and Financial Performance*
11. Hoadley Portfolio Optimizer Pro version 3.2a
12. Kaplan, H., 1985. Farmland as a portfolio investment. *The Hournal of Portoflio Management, Vol 11, 2: 73-78*
13. Lins, D., Sherrick, B. and Venigall, A., 1992. Institutional Portfolios: Diversification through farmland investment. *Journal of the American Real Estate and Urban Economics Association. Vol20, 4: 549-571.*
14. Painter, M., 1999. Should Saskatchewan Farmland be Part of Your Investment Portfolio?. *Canadian Journal of Agricultural Economics 48, 39-50.*
15. Hardin, W., and Cheng, P., 2002. Farmland investment under conditions of certainty and uncertainty. *Journal of Real Estate Finance and Economics, Vol 25, 1: 81-98.*
16. Hardin, W., and Cheng, P., 2005. Farmland in a mixed-asset portfolio: a mean semi-variance approach. *Journal of Real Estate Portfolio Management, Vol 11, 2: 187-195.*
17. Painter, M. and Eves, C., 2008. The financial gains from adding farmland to an international investment portfolio. *Journal of Real Estate Portfolio Mnagement, Vol 14, 1: 63-73.*
18. Waggle, D., and Johnson, D., 2009, An analysis of the impact of timberland, farmland and commercial real estate in the asset allocation decisions of institutional investors. *Review of Financial Economics, Vol 18: 90-96.*
19. Nartea, G., and Eves, C., 2010. Role of farm real estate in a globally diversified asset portfolio. *Journal of Property Investment & Finance Vol 28, 3: 198-220.*
20. Painter, M., 2010. The portfolio diversification impact of a farmland real estate investment trust. *2010 IABR & ITLC Conference Proceedings, Orlando, FL, USA.*

11 About AAG and Contact Details

Australian Agribusiness Group was formed in 1997 and provides expertise in research, investment management and agriculture consulting nationally.

AAG is a leading provider of research into agricultural investments in Australia.

AAG sources and manages investments in the Australian agriculture sector on behalf of national and international clients.

AAG undertakes commissioned research reports and feasibility studies. AAG facilitates mergers and acquisitions, and raises debt and equity capital for agri entities.

AAG focuses on agribusiness and particularly the commercial aspects of this dynamic sector.

For more information about AAG, please visit our websites at www.ausagrigroup.com.au and www.aagim.com.au.

12 Conditions of Use of this Report