Introducing Capital to the Equation

Submission to the Technical and Administrative Services, Plant Biosecurity, Biosecurity Australia, regarding: REVISED DRAFT IMPORT RISK ANALYSIS REPORT FOR APPLES FROM NEW ZEALAND

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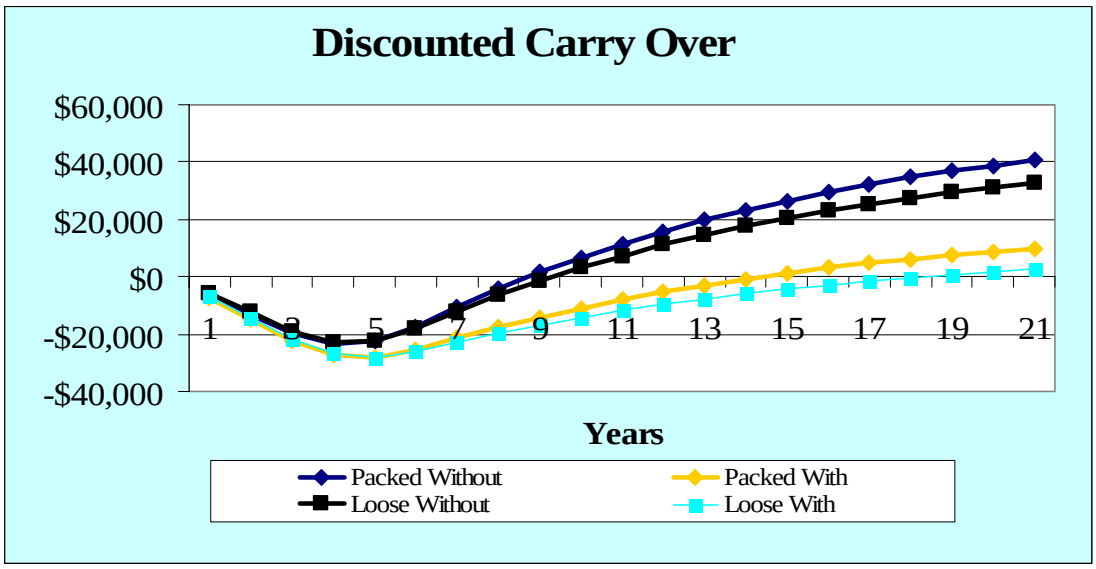
Summary

Import Risk Analysis (IRA) are based a wealth of complex and detailed scientific analysis that attempt to determine the potential risk of exotic species entering Australia after a change in quarantine protocols. This associated risk then helps determine the binary decision of market access into Australia. The economic component associated with this issue is either incomplete and in come cases dated and this submission aims to detail the potential changes to income and ultimately the decision to replant an apple orchard.

Figure 1 highlights one set of results from the analysis. Here there are two production systems presented 'Packed' apples (producer packs apples into cartons) and 'Loose' apples (where apples are sold in bulk) and it details how long an investment in planting one hectare of apples would take to breakeven 'with' and 'without' fire blight being present. The assumptions for this figure are: increased management costs (see Increased Management Costs); fire blight causes a 10% loss in production every 2 years; and the discount rate is 10%. In this scenario the production system with 'Packed' apples takes a further 6 years to pay off the investment ('without fire blight' = year 9, 'with fire blight' = year 15) and the 'loose' apples take a further 9 years to pay off.

Figure 1 Impact of fire blight on an apple orchard



If fire blight does becomes established in Australia it is highly likely that apple production will become a marginal exercise. This could have negative impacts on land prices in the short term until industry adjustment or alternative commodities returning a simular return are established. An exotic outbreak would lead to the issue of compensation being raised and currently for citrus canker the compensation is $20/ tree to replant and $60/ tree to leave the industry.

There are many economic and social issues still not evaluated in regards to the impact of change quarantine regulations and caution should be taken especially when you tern a long term profitable enterprise into a net loss.

Introducing Capital into the Equation

To date the economic analysis of quarantine related matters has been stifled by the limitation in which the economic analysis has been underpinned by Biosecurity Australia's own protocols.

> "3.6
> In keeping with the scope of the Quarantine Act 1908 … and Australia's obligations as a member of the WTO, economic considerations are taken into account only in relation to matters arising from the potential direct and indirect impact of pests and diseases that could enter, establish or spread in Australia as a result of importation.

The potential competitive economic impact of prospective imports on domestic industries is not within the scope of IRA's. " (Biosecurity Australia 2003)

This is unfortunate position as issues pertaining to industries which require a long period to pay back the investment, as in apples, face a bias that short term investment commodities do not face. Consequently important economic and social issues are then overlooked in such Import Risk Analysis.

By limiting the economic discussion and then utilising a qualitative weighting system to rank the economic impact, transparency issues and subjective basis can be raised about the weighting system, especially when the Senate review into the apple decision was:

> **Recommendation 2**
> 3.47 The Committee recommends that Biosecurity Australia review the weighting given to the economic consequences in its risk modelling.
> Senate Rural and Regional Affairs and Transport Legislation Committee, (2005)

It is unfortunate position to be in as without a transparent economic debate there is a lack of data to help justify the final decision in regards to apple imports from New Zealand. The following discussion is based on work currently being undertaken at the Risk and Sustainable Management Group, University of Queensland that aims to identify and fill some of the gaps in the economic arguments to help provide greater discussion on the issues of import risk analysis.

Economic impacts of fire blight

The three main economic reports to consider are: Hinchy and Low (1990), Bhati and Rees (1996) and Arthur (2006). These studies concentrate on the changing producer and consumer surplus from freeing up the Australia markets In 1990 Hinchy and Low estimated that the loss to the Goulburn valley alone was in the magnitude of $39 million for apples, however that Australia even under the most unfavourable assumptions would be better off by $0.2 million a year. Bhati and Rees 1996 estimated that if fire blight infested all of Australia the cost to the apple and pear industries would be around $125.7 million. While Arthur (2006) estimated that Australia at the lowest levels of benefits that Australia would be better off by $90 million even if fire blight became established across all areas, yield decreased by 20% and management costs were raised by 6%. While the

benefits would increase to $96 million if all areas, except WA became infested, this is the more likely scenario of infection as the recommendation, as mentioned, is that there will be no apple imports into WA from New Zealand.

If you considered phasing out the apple industry in Australia the New Zealand production statistics have to be listed as the IRA decision only applies to importing apples from New Zealand and no other sources of apples or other commodities. Between 1999/00 to 2002/03 New Zealand contributed an average of 6.6% of the world apple exports. If during the same time period Australia imported all its requirements for fresh apples from New Zealand then this would have accounted for around 44% of their total apple exports. At the same time if New Zealand had to supply the whole of the Australian market (fresh and produced) then it would have accounted for an average of 87% and in 2002/03 New Zealand could not have supplied enough exports to meet demand (HAL 2004). Under this situation the world price of apples would increase. It also suggests that rationalisation of the apple industry would occur in Australia and some apple producers would remain viable. While in New Zealand there should be an expansion in their apple industry to take advantage of the export opportunities, if the returns are competitive with other industries.

To date an in depth analysis of the impact of a change in biosecurity protocols on farm return have not been conducted to date although the need for such an evaluation was identified in Hinchy and Low (1990). This submission looks at this neglected issue of what would happen to farm scale investment in the apple industry

The Evaluation & Data Sources

This evaluation provides the classic 'with' and 'without' scenario of fire blight and full economic costs (capital and operator labour costs) to help determine the return on a capital investment for two production choices 'packed' and 'loose' apples. A whole farm budget per ha over a 20 year investment time frame was constructed for the two enterprise options and then adjusted for capital and operator labour costs. Then a cost benefit analysis technique was used to determine the return of the alternative investments.

The data for the gross margin budget data was adapted from Department of Primary Industries (2005) and further information concerning the whole farm budget was adapted from Faliveve (2003). The Falivene data is based on citrus production however as the production life cycle is consistent with apple production it was used as a reference for yield patterns and planting cost considerations. The data used in this study was also checked by regional economists.

Capital Costs

Data concerning the capital costs data and the method for estimating producer income was adapted from the data collected during the Adamson, Quiggin and Mallawaarachchi (2006) study. This information was double checked with local economists to ensure the data relevancy for the Goulburn-Broken region.

It was assumed that the farm size was 50 ha and had only 35 ha of apple production. The interest rate was estimated at 10% and this is based on the base variable rate of farm loans detailed on the NAB (2006) and adjusted up to cover for changes to interest rates and deal with monthly repayments. It has been assumed that there are 2 loans, 1 of 25 years for the infrastructure, machinery and specialist machinery for the orchard. The second is for the establishment costs of the orchard itself that lasts 20 years. The difference in the two totals is simply the packing shed costs. The data suggests that the annual cost of replaying capital will be $4,700 and $4,300 for a production with and without a packing shed respectively.

Table 1 Estimated Capital Requirements for Apple Production

Item		COST	Cost/Ha	Life	Annual Cost/ Ha
Infrastructure	Packing Shed	$132,500	$3,786	25	$413
	General	$95,000	$2,714	25	$296
Machinery	Items	$180,000	$5,143	25	$561
	Equipment	$106,600	$3,046	25	$332
Orchard	Equipment	$48,550	$1,387	25	$151
Establishment Costs	Setup	$160,647	$4,590	20	$532
	Planting	$546,490	$15,614	20	$1,808
	Irrigation	$195,000	$5,571	20	$645
TOTAL: Packing		**$1,464,787**	**$41,851**		**$4,738**
TOTAL: Loose		**$1,332,287**	**$38,065**		**$4,325**

Gross Margin Data

Both enterprises consist of 1,480 trees per ha that generate 50 tonnes of fresh produce (approximately 34 kg/tree) of varying quality. Note that the levy is paid on all apples sold and the commission only applies to the fresh market. In Table 2 a 20% yield reduction leads to an income of around $27,000 per ha which is down from $34,000 per ha without fire blight, a loss of $7,000 per ha.

Table 2 Income from 'Loose Apples' 'Without' Fire blight, 20% Yield Loss

Yield Reduction	20%			
Yield	40	T		
	Fresh	**Processing**	**Not Sold**	
Percentage of Yield	80%	20%	0%	
	Amount	**Unit**	**Value**	**Income**
Fresh Market Yield	32	T	$950	**$30,400**
Processing Yield	8	T	$250	**$2,000**
Less Levy	1	Kg	$0.02	**$612**
Less Commission	1	%	15%	**$4,560**
TOTAL Net Return				**$27,228**

Increased Management Costs

Currently Australia has no registered antibiotic chemical control options for fire blight, consequently only preventative management could take place (Department of Agriculture, Fisheries and forestry, 2005). The main overseas options for control once an orchard is infected are: streptomycin, oxytetracycline and a biocontrol agent (*Pantoea agglomerans*). Streptomycin is commonly used to fight human bacterial infections in Australia and was withdrawn from use in the livestock industry in 1999, National Registration Authority (1999). Fire blight can quickly develop resistance to streptomycin (Percy 2005) and was partly withdrawn to help with antibiotic resistance problems in human populations. Oxytetracycline (Mycoshield) can only be used "under a Section 18 Emergency Exemption of FIFRA" for apple growers in the USA (Colt *etal*. 2001). It is another broad-spectrum antibiotic that is registered for use in the livestock industry in Australia but not for the horticultural industry. Blossom Bless® a bio-control agent (*Pantoea agglomerans*) developed in New Zealand and marketed in Italy as Poma Vita® (Elmer *etal* 2005) is also unregistered.

This means Australian producers would have to rely on prevention. This can be achieved by cultural practices (fertiliser, pruning regimes, and growth hormone sprays) to help control new growth and copper, Chlorothalonil and carbamate-dithiocarbamate sprays all fungicides which can be used for prevention (source PUBCRIS, online web site for the Australian Pesticides & Veterinary Medicines Authority, accessed 3/3/06 http://services.apvma.gov.au/PubcrisWebClient/welcome.do;jsessionid=GH7CNPmFB2LDRvlQ9VysFphL0WwGqpC11B5tjMDWn3NDV3ypprDn!-404378391) In the absence of an effective control method, once an orchard is affected, the 20% yield loss on apples may be considered an underestimation in Australia.

For this discussion it is expected that the management costs are approximately $1,000 per Ha (see Table 3) assumptions for the management costs for preventing infestation are based upon: an extra 30 seconds of pruning per tree is required in extra pruning and hygiene maintenance, the extra pruning does not negatively impact on yield; one growth hormone sprayed and one extra copper spray per season. The analysis assumed no increased costs associated with any change in fertiliser management strategies to control vigorous growth.

Table 3 Estimated Management costs per ha (density 1480 trees per Ha)

Pest/disease Management		**'Without'**	**'With'**
	Pesticide + Application Costs	$670	$670
	Copper + Application Costs		**$51**
	Growth + Application Cost		**$195**
Contract labour			
	Thinning ($2.50 /tree	$3,700	$3,700
	Pruning ($2.50/tree)	$3,700	$3,700
	Extra pruning ($0.50/tree)		**$740**
Increased management costs			**$986**

Changing Variable Costs & Return

The biggest change to the variable costs between the two enterprise systems is within the harvesting costs, as illustrated in Table4. There are significantly greater costs associated with 'packed apples' to get them ready for the market and if there is a 20% yield loss the harvest costs obviously fall. In the case of 'loose apples' the harvest costs difference is around $2,000 per Ha, while for 'packed apples' the difference is around $7,000 per ha.

Table 4 Harvesting Costs 'Packing' versus 'Loose' with a 20% yield loss per Ha

	Packed Apples		Loose Apples	
	'Without'	**'With'**	**'Without'**	**'With'**
Picking **(9.6 hrs/T @ $17.50/hr)**	$6,038	$4,830	$6,038	$4,830
Packing, cooling & boxes **($7.48/carton)**	$21,577	$18,412	$0	$0
Fresh Freight ($1.31/carton or $100/T)	$3,779	$3,225	$4,000	$3,200
Other Shed Costs ($0.46/carton)	$1,327	$1,132	$0	$0
Processing Freight **($10/Tonne)**	$100	$80	$100	$80
Total harvest Costs	**$34,599**	**$27,679**	**$10,138**	**$8,110**

Operator labour charges are based on a multiplier of three by the number of hours worked in the orchard by $25 per hour to give a value of $1,778 per ha for both options. This would provide an estimate income of around $62,000 per annum managing the 35 Ha under apples.

The economic return is presented in Table 5 where the return falls by about half to only $6,700 per ha for a 'packed apple' enterprise and the return per ha for 'loose apples' are only 15% of the original $6,800. Logically then a more hands on enterprise 'packing' allows the individual a greater chance of survival if fire blight became endemic in the Australian production system by proving them flexibility in their marketing strategy.

Table 5 Economic Return by Commodity ('with' = 20% yield loss+ management costs) per Ha

	'Packed Apples'		'Loose Apples'	
	'Without'	**'With'**	**'Without'**	**'With'**
Income	$63,850	$51,080	$34,035	$27,228
TOTAL VC	$43,787	$37,853	$21,101	$20,060
Gross Margin	**$20,063**	**$13,227**	**$12,934**	**$7,168**
Operators Labour	$1,778	$1,778	$1,778	$1,778
Capital Repayments	$4,738	$4,738	$4,325	$4,325
Economic Return	**$13,548**	**$6,712**	**$6,831**	**$1,066**

Utilising costs benefit analysis a 20 year time scale was used to determine the profitability of growing apples (assumption investment starts next year, Year 1) the net present value (NPV) for a 'packed' enterprise is around $40,500 and for a 'loose' enterprise it is about $33,000 per Ha. It is important to note that despite a large internal rate of return (IRR) (greater than 20% more than double the discount rate) that the benefit-cost ratio (B/C ratio) is still low but higher in the 'loose apple' option due to the lower start up costs (Table 6).

Table 6 BCA of the industry 'without' fire blight

Case		NPV	B/C Ratio	IRR
Current (no fire blight)	'Packed'	$40,681	$1.14	24.0%
	'Loose'	$32,916	$1.22	22.1%

From the data the yield can fall by roughly 14% and 12% for a 'packed' and 'loose' enterprise respectively before the breakeven is reached. While the enterprises still breakeven when prices fall by 13% and 16% for 'packed' and 'loose' apples respectively. Consequently a 'packed' enterprise is more sensitive to a declining price than a 'loose' enterprise but is more resilient to a declining yield than the 'loose' industry.

Introducing Fire Blight

Table 7 provides a host of alternative outcomes for the industry. Increased management costs apply to a situation where prices received at market do not alter as the volume of trade from New Zealand isn't great enough to alter prices and that the producer never experiences fire blight. In this situation the return from investing is still very healthy and it would be a wise decision to invest.

Table 7 How robust is the investment decision if apples from NZ are allowed in

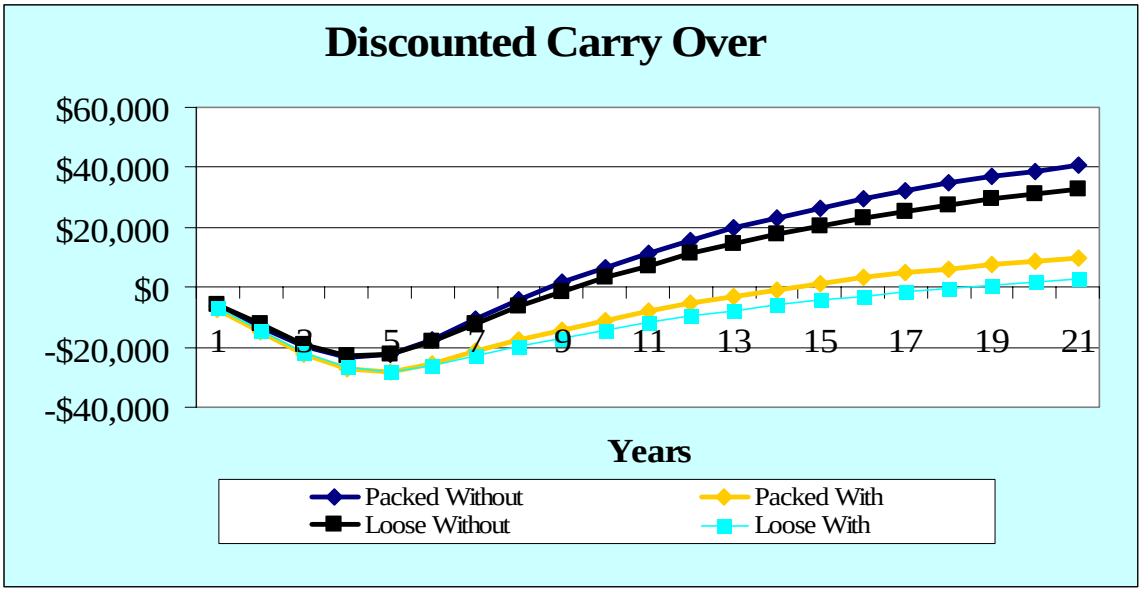
		NPV	B/C Ratio	IRR
Management costs only	'Packed'	$32,152	$1.11	20.5%
	'Loose'	$24,388	$1.15	18.5%
Management costs + Delay in Maturity (1 years)	'Packed'	$14,652	$1.05	14.0%
	'Loose'	$7,241	$1.05	12.1%
Management costs + 10% Yield loss				
Attack every 2 years	'Packed'	$9,971	$1.04	13.7%
	'Loose'	$2,654	$1.02	11.1%
Attack every 5 years	'Packed'	$14,101	$1.05	15.1%
	'Loose'	$6,701	$1.04	12.6%
Management costs + 20% Yield loss				
Attack every 2 years	'Packed'	-$10,680	$0.96	5.2%
	'Loose'	-$17,581	$0.88	0.9%
Attack every 5 years	'Packed'	-$3,338	$0.99	8.6%
	'Loose'	-$10,387	$0.93	5.2%
Management costs + 10% Price	'Packed'	-$263	$1.00	9.9%

decrease	'Loose'	$7,496	$1.05	12.9%
Management costs + 15% Price decrease	'Packed'	-$16,540	$0.95	2.0%
	'Loose'	-$950	$0.99	9.6%
Management costs + 10% price decrease + 10% Yield Loss (every 2 years)	'Packed'	-$17,744	$0.94	1.2%
	'Loose'	-$11,789	$0.92	4.4%

A producer that has increased management costs and experiences a delay in maturity by one year (the situation here is that fire blight impacts heavily on the young trees although not killing the trees it delays the yield maturity by a year). Although still a positive return, the impact on return is significant as both option loose more than $25,000 per ha if trade is allowed and fire blight gets into Australia.

The management costs and a 10% yield loss every two years is based on the possibility that despite spending money on preventative control the orchard is subjected to a yield decline of 10% every two years (annual yield equals 95% of normal). In this case 'loose apples' are more resilient to a fall in price than 'packed apples' are however the reverse is true to adjustments in yield. Although it may be profitable the time required to pay off the investment lengthens considerably. In Figure 2 if fire blight did occur every 2 years and caused a 10% loss then the time required until the discounted carry over is positive moves from year 9 to year 15, a further 6 years and for 'loose apples' the it is year 19 an increase of nine year. This leaves very little room for movement if something else goes wrong and makes currently would make the investment decision unwise for risk adverse producers thinking of currently replanting.

Figure 2 Management Costs + 10% yield loss every 2 year



While increasing the potential yield loss to 20% to either every two or five years, despite spending money on management apples would be an unwise decision based on the data presented. Since there are no chemicals registered for controlling an infected orchard the yield loss here could be an underestimation.

While if management costs are outlaid, there is no loss in yield but the industry faces a 10% decline in price then the investment decision to invest in 'packed apples' is effectively at breakeven and its around about a 15% decrease in price to make 'loose apples' break even. Once a yield loss (10% every two years) is combined into the equation with management costs and a price decrease (10%) then there is no point replanting at all. This means that by allowing apples into Australia you have turned an investment returning $33 - $40,000 into a net loss of $11 - $18,000. Such a reversal in income could provide an outcry for compensation payments to allow the industry to adjust its cost structures or out of the industry all together.

Issue of Compensation

If an IRA decision negatively impacts on the livelihood by turning a profitable industry into a net loss the issue of compensation becomes interesting. Once a decision had been made and that individuals could highlight the cost of the decision to a farm scale production enterprise for compensation. As the industry is currently worth $315 million and that the amount of sunken capital is considerable if you consider the total number of apples tress has been estimated 9.7 million (ABS 2004).

This is a hypothetical example of how the industry may adapt to market liberalisation and it also includes an unlikely scenario that all apples imports from New Zealand would be halted for a period of time in the case of a biosecurity outbreak,. This cost benefit model just highlights other issues to consider how the economics of IRA could include compensation in their models. It is not a definite answer rather a demonstration how costs of future outbreaks could be considered.

The data is based on $96 million net economic welfare is from Aurthur (2006), the current compensation figure for citrus in QLD of $20 and $60/tree Queensland Rural Adjustment Authority (2005) for replanting and leaving industry respectively and current total number of trees mentioned before and assumed that 13% of trees are in WA to give 8.44 million trees potentially affected. Based on the current data approximately 5% of the industry is replanting per annum. Based on the planting density used in this evaluation, $20/tree to replant is $29,600 and the estimate used for this evaluation puts the figure around $25,800, part of the difference would be for operator labour and other living expenses until the crop reached maturity.

The assumptions about number leaving the industry (15%) who initially adjust out in year 1 and the 30% who leave once fire blight establishes in year 5 while a further 20% would seek compensation to replant resistant varieties. It is estimated that annually 15% of the total number of tress to be replanted are not and capital is placed into another enterprise (natural adjustment out of the industry. It has been assumed that the industry keeps moving out.

The loss of imports is just purely speculative as imports from New Zealand are not available ($96 million) and currently there are no other countries exporting apples to Australia and the industry is restructuring so domestic yield if lower. Consequently

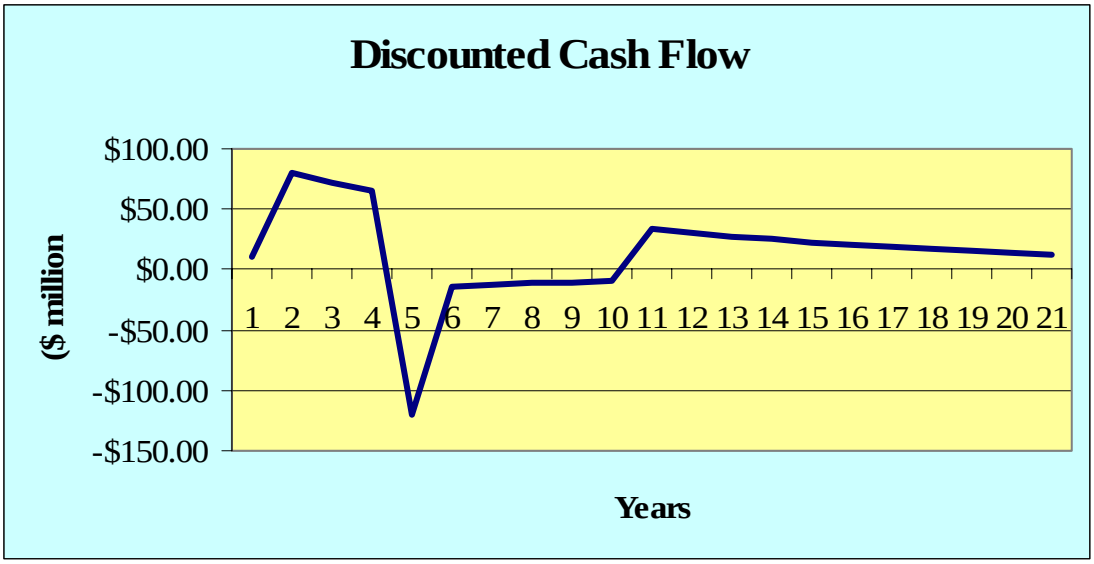
prices would have to rise and this is why the figure is greater than $96 million. It has been assumed that the New Zealand exporters would be locked out of the market for five years.

Table 8 Issues to consider for market liberalisation

Year	Apple Trees ('000)	Adjust Out ('000)	Net Economic Welfare ($'m) (a)	Adjustment ($'m) (b)	Loss of Imports ($'m)	Net Position ($'m)
1	8,439	1,266	$96	$76	$0	$20
2	7,173	0	$96	$0	$0	$96
3	7,119	0	$96	$0	$0	$96
4	7,066	0	$96	$0	$0	$96
5	7,013	2,104	$96	$154	$120	-$178
6	4,909	0	$96	$0	$120	-$24
7	4,872	0	$96	$0	$120	-$24
8	4,836	0	$96	$0	$120	-$24
9	4,799	0	$96	$0	$120	-$24
10	4,763	0	$96	$0	$120	-$24
11	4,728	0	$96	$0	$0	$96
..						
21	4,385	0	$96	$0	$0	$96

The argument is although there are economic benefits according to the partial equilibrium approach it is important to consider if the amount of compensation to be repaid. Based on the above information, society would still be better off by approximately $290 million after 20 years and Figure 2 provides the discounted cash flow.

Figure 3 Adding compensation to the equation



The issues for the gross margin budgets are a guide only and individual farm enterprises costs structures are different. The model has assumed that mechanical harvesting isn't an option as disease mitigation practices might be harder to manage.

The important thing to remember is this analysis is only looking at the apple industry and not the impacts of the pear industry. Australia already imports about 1,000 Tonnes of pears which including quinces (assuming that there are fresh pears being exported) then the domestic market must be fairly competitive with the rest of the world. If Australia does get fire blight from New Zealand then there would be a case for compensation in this industry as well. There are 1 million trees greater than six years old and the industry was worth $99.4 million in 2001/02 (HAL, 2001 various tables)

Issues Still Requiring Research

Several important issues that still require investigation to help with the decision making process are:

- Just because a country gains access to the market it doesn't necessarily mean that they will export to Australia. Despite the WTO wrangling, Gascoine (2000) points out that Canada has not exported salmon to Australia. So we really need to spend dome time determining the economic viability of exporting apples from New Zealand to Australia. Thus in depth analysis of the New Zealand industry would be required to determine if the cost of applying a chlorine solution to the apples would impact on their decision to export. If it not in New Zealand's economic interest to export apples to Australia then the whole issue becomes moot;

- This type of analysis need to be conducted to determine the investment decision for all other industries affected by the potential change in quarantine protocols;

- The impact on the economic return to Australia if any decreased wholesale prices paid to farmers are passed to consumers (Quiggin, 1997); and

- Determine if the regional impacts for localised areas has altered in anyway. If so, would further compensation be required?

Concluding Comments

The need for examining the impacts of turning a profitable industry into a net looser is something that should be considered when undertaking an IRA. Especially when the industry has a lag between investment and return as the longer the lag the greater the impact of the decision as you have turned existing long term profitable investments into net losses.

It would be an unenviable task to tell people who have sunken assets that they are now worthless.

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