Commerce Division
Discussion Paper No. 50

Quantification of Phytosanitary Barriers to Trade

Dr Hugh Bigsby

June 1998

International Trade Policy Research Centre
Commerce Division
PO Box 84
Lincoln University
CANTERBURY

Telephone No: (64) (3) 325 2811
Fax No: (64) (3) 325 3847
E-mail: bigsbyh@kea.lincoln.ac.nz

ISSN 1174-5045
ISBN 1-877176-27-3

Paper presented at the International Agricultural Trade Research Consortium 1997 Annual Meeting, December 14-16, 1997, San Diego, CA.

Hugh Bigsby is a Senior Lecturer in Forest Economics in the Commerce Division at Lincoln University.

Abstract

The Sanitary Phytosanitary Code (SPS) is an effort to reduce the technical barriers to trade created by phytosanitary regulations, or trade barriers related to plant and animal health. A key feature of SPS is risk assessment and risk management in determining appropriate quarantine actions which provide an acceptable level of risk to the importer and which can be justified on technical and trade terms. The major problem so far has been in quantifying the effects of phytosanitary regulations in a way that permits objective comparisons. The paper presents a conceptual model for quantifying quarantine related trade barriers. The model provides a basis for combining the two basic components of pest risk analysis, probability of establishment and economic effects, into a management framework and an objective measure. The model framework provides a systematic basis for defining and measuring acceptable risk and for justifying quarantine actions relative to acceptable risk.

Contents

List of Figures

1. Introduction

One of the outcomes of the Uruguay Round of GATT was that it was able to provide for reductions in a range of trade barriers. The common feature of the barriers which will be reduced is that they were 'quantifiable'. These barriers include actions such as tariffs, export subsidies, embargoes, import bans, quotas, supply management regimes, domestic price supports, licensing and exchange controls. The way in which these barriers were dealt with was by developing a system which converts the barriers into tariff-equivalent levels of protection. What remains as problems to be resolved are a range of barriers to trade which were largely non-quantifiable in terms of tariff-equivalent levels of protection. These barriers include many institutional factors such as bilateral agreements, state trading, customs procedures, and administrative practices, but in addition, include a class of barriers which are termed 'Technical Barriers to Trade'. Technical barriers to trade are barriers which arise due to technical specifications. Among the most prevalent of these barriers are requirements related to sanitary and phytosanitary standards (SPS) which deal with concerns about human, animal and plant health (Hillman, 1978; 1991).

There is concern that with the reduction in the availability of quantifiable barriers to trade, countries will turn to technical barriers to trade as a way of blocking imports rather than meeting legitimate sanitary and phytosanitary concerns (Ndayisenga and Kinsey, 1994). This concern has lead to major efforts internationally to address these concerns and to ensure that sanitary and phytosanitary measures do not evolve as major trade barriers. The purpose of this paper is to present a methodology which provides quantifiable measures of the levels of protection associated with SPS, and which can be used to benchmark and compare technical barriers.

2. SPS and Trade

The Uruguay Round was the first round of GATT to make substantial progress on non-tariff barriers to trade. This success was in part caused by the inclusion of agricultural trade barriers as an area for negotiation which meant that a wide variety of trade barriers needed to be considered. The key problem which was faced by negotiators was that of finding a common denominator for measuring the level of protection given by actions as diverse as export subsidies and supply management. The way in which this was resolved was to convert non-tariff barriers into a tariff of equivalent effective protection. What this resulted in was a process of 'tariffication' of the easily quantifiable non-tariff restrictions. The key success of this approach was that different trade barriers could then be compared, reduced or negotiated in a common framework.

What remains to be resolved are what are termed technical barriers to trade. These are generally non-quantifiable rules and standards and are typically related to health, safety or the environment. One of the key features of these types of barriers which differentiates them from the trade barriers dealt with earlier is that they are not specifically targeted at trade or production issues. Under GATT rules, countries are allowed to adopt health, safety or environmental policies which take precedence over others. The caveat to this though is that these policies are only allowed as long as the purpose of the policy or standard is to meet a legitimate domestic objective, and as long as domestic and foreign producers are treated the same[1].

This is where problems arise for Sanitary-Phytosanitary Standards (SPS) since they do not easily fit into the generally allowed category. Although the underlying policy objectives, such as keeping out unwanted pests or diseases, are broadly applicable to all parties, the application of the policies a likely to be uneven. The main reason for this is because under SPS domestic and foreign producers are likely to be treated differently by regulatory or quarantine officials. This is because of differences in perceived risk and the potential for introducing unwanted pests or diseases. In addition, individual foreigners are treated differently, again because of differences in perceived risk and their potential for introducing unwanted pests or diseases.

Another characteristic of SPS is that it has historically been an activity of scientists with a focus on an assessment of probability of occurrence as the key criteria for applying trade barriers (Smith, 1993; Patterson, 1990). This is an objective, but one sided application of standards in a trading environment. One of the key changes under the Uruguay Round of GATT has been a focus on risk assessment and management with an overall objective of minimising negative trade impacts (Papasolomontos, 1993). Risk assessment requires consideration of economic consequences as well as probability of occurrence. Risk

[1] These provisions are contained in Article 2, Technical Regulations and Standards of the Agreement on Technical Barriers to Trade.

management requires the consideration of trade-offs in probability of establishment and economic consequences in the context of choosing the least trade distorting path. Both of these are considerable departures from past practice in the quarantine area.

The process of developing a system for meeting the TBT objectives of the Uruguay Round of GATT is now in place. The International Plant Protection Convention (IPPC) has produced standards for quarantine measures for plants (FAO, 1996) and the International Office of Epizootics (OIE) is doing the same for animals. A common theme of the activity of the IPPC and the OIE is a need to develop systems which will measure whether health or phytosanitary standards are being imposed in a way which is consistent with both internal and external standards. The key features of the system will be transparency of decisions, the use of internationally accepted methodologies, and a linking of economics and science.

The major problem faced by the IPPC and the OIE is the lack of a system which can convert diverse technical barriers related to plant and animal health into a common framework which allows for comparison in a trade forum. In other words, what kind of a measure will adequately combine the key features of risk analysis, risk of introduction and economic consequences, in a way which facilitates comparison and negotiation? The greatest need is to convert barriers to values which are common in a trade environment, or in other words, currency measures. A way for eliciting a value for a barrier is by measuring implicit or explicit economic effects. This could be done in the context of measuring the value of a technical barrier being in place. Examples of this would include measuring the additional costs associated with compliance with a regulation, new labelling or packaging, or reducing residues. This could also be done in the context of measuring the value of an outcome without a technical barrier in place. In this case the consequences of an economic impact such as a pest infestation could be measured.

One of the key factors in handling trade barriers such as SPS, is that a methodology must be developed which is able to incorporate a probability of occurrence and provide an estimate of economic effects. The implication though, is that they should be considered together (FAO, 1996). One way for the two factors to be combined is to calculate, for example, Pest Risk as,

$$\text{Pest Risk} = \text{Economic Effect} \times \text{Probability of Establishment}$$

In this sense, Pest Risk is otherwise synonymous with expected value. Management options considered could then be approached in the context of changing Pest Risk by altering probability of establishment or the economic effects towards some benchmark or acceptable level of Pest Risk or expected value. The critical component in the process is determining the appropriate framework for combining probability of establishment and economic effects. This must be done in a way that a benchmark level of acceptable pest risk can be established, and so that initial assessment of Pest Risk and subsequent management strategies can be systematically evaluated against the benchmark.

3. Iso-Risk Framework

The Iso-Risk Framework is a proposed framework for linking probability of establishment and economic effects, and expressing expected outcomes in a way which meets the need for benchmarking, comparison and evaluating management alternatives in a trade environment. The generalised approach comes from discussions during the development of the draft Pest Risk Analysis Standards by the IPPC working group (Orr, 1995) and has been further developed in New Zealand (Bigsby, 1996; Bigsby and Crequer, 1996).

The Iso-Risk framework has two components to reflect the fact that regulations are directed at controlling individual pests but are applied to traded commodities. The first component is a measure of pest risk which allows individual pests to be assessed relative to benchmarks and against each other. The second component is a measure of commodity risk, reflecting the fact that the same commodities from different sources will present different pest risks, in terms of both types and numbers. Commodity risk is based on a quantification of the risks presented by individual pests and thus the discussion deals with pests before moving to commodities.

3.1 Pest Evaluation

The basic framework of the Iso-Risk Analysis is illustrated in Figure 1. Economic impacts, measured in dollars, are plotted on the vertical axis, and probability of establishment, ranging between 0 and 1 is plotted on the horizontal axis. Both axis are plotted on a log scale. The graph allows any particular probability of establishment and economic effect combination to be plotted.

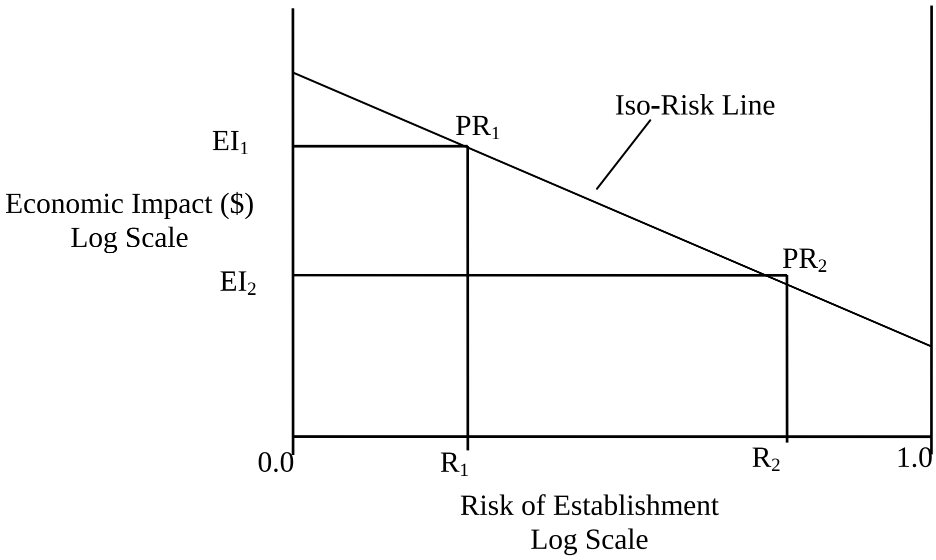

Figure 1
Iso-Risk Framework

One feature of this framework is that pests which have different potential economic consequences and probability of establishment, can also have the same combined Pest Risk. For example, in Figure 1, a pest which has an economic impact of EI_1 and a probability of establishment of R_1 produces a Pest Risk of PR_1, where,

$$PR_1 = EI_1 \times R_1$$

In Figure 1, PR_1 yields the same Pest Risk as a different pest which has an economic impact of EI_2 and a probability of establishment of R_2, shown as PR_2. One way of looking at the relation between PR_1 and PR_2 is that they both lie on the same line, called the 'Iso-Risk Line' in Figure 1, which is a locus of points in which pests all have the same Pest Risk. The iso-risk line is formed by plotting combinations of probability of establishment and economic effects which yield the same Pest Risk, or expected value.

As is shown in Figure 2, there can be any number of Iso-Risk lines representing different levels of Pest Risk. The higher the Iso-Risk line, the higher the Pest Risk. In this example, IR_3 would have a higher Pest Risk, or expected value, than IR_2. This also means that pests can be ranked with respect to each other, and that the Pest Risk for any particular pest can then be said to be higher or lower relative to other pests.

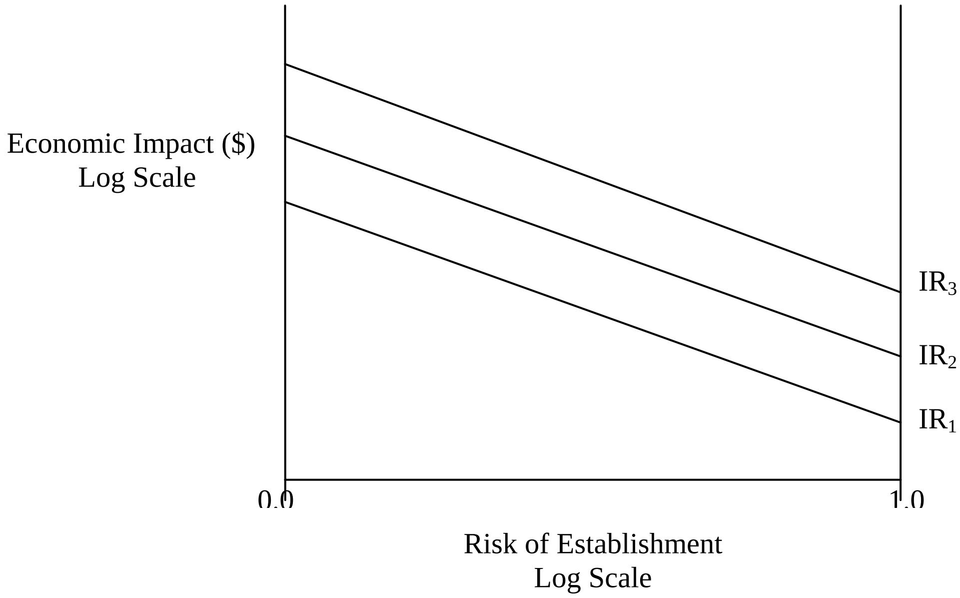

Figure 2
Iso-Risk Map

An important requirement for analysing management options and determining Appropriate Level of Protection (ALP), is to provide a benchmark Pest Risk or Maximum Acceptable Pest Risk (MAPR). The framework described thus far provides the basis defining and determining MAPR, for evaluating pests against MAPR, and for determining ALP. Since all points on an Iso-Risk line have the same expected value,

> *maximum acceptable Pest Risk then becomes the highest Iso-Risk line that will be accepted by the quarantine authority.*

In Figure 2, any one of the lines which are plotted could represent MAPR. As will be discussed it the next section, the main problem is in determining MAPR. In the context of this framework though,

> *ALP is the action required to ensure that the maximum acceptable Pest Risk will not be exceeded by the expected value of Pest Risk.*

Evaluating individual pests against MAPR is then straight forward. If the Pest Risk of a particular pest is greater than MAPR, then ALP will be implemented to reduce Pest Risk to the MAPR. For example, if the Iso-Risk Line in Figure 1 has been determined to be the

MAPR which is acceptable, then it becomes a standard against which any particular pest could be evaluated. As is shown in Figure 3, any pest which provides a Pest Risk greater than the MAPR lies above the Iso-Risk line (MAPR) corresponding to this level of Pest Risk. In this example, a pest which resulted in a Pest Risk of PR_2 would exceed the benchmark MAPR and be subject to actions to reduce the Pest Risk to acceptable levels. ALP would be any actions which were sufficient to reduce Pest Risk to MAPR. The pest corresponding to PR_1 falls below and within acceptable limits, requiring a different ALP.

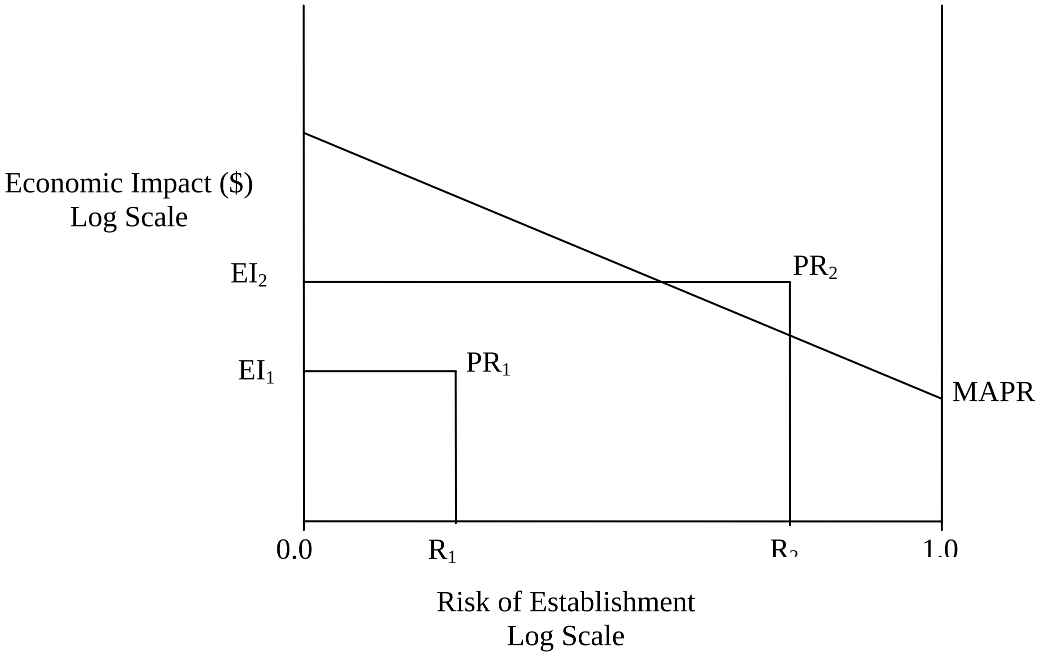

Figure 3
Benchmark Pest Risk

3.2 Commodity Evaluation

The process described thus far for ALP is a pest-based approach. The Iso-Risk framework has been shown to be adequate for evaluating a single pest which may have an impact on a range of economically important host plants. The problem with this approach though, is that it is commodities rather than pests which are traded, and it is commodities rather than pests which are subjected to quarantine measures. Perceived risk and ALP will be applied to commodities, each with their own particular source/pest/pathway circumstance, rather than to particular pests. In this context, commodity will refer to a specific product and country/pathway combination.

The problem with the pest-focussed approach is when the same commodity imported from different sources has different numbers or types of pests associated with them. In this sense, a 'dirty' commodity can be considered to be one with many associated pests versus the same commodity from another location which is 'clean' or has few pests. There is also a problem when commodities use differing pathways which offer different probabilities of introduction. This means that the pest-based approach which results in MAPR is useful for some types of analysis such as categorising pests into quarantine and non-quarantine, but would be inadequate for measuring the risk associated with a commodity. In terms of commodity Pest Risk, it is the cummulative expected value of all the associated pests for a particular commodity which define its risk rather than the pests taken individually.

For a commodity, the expected value would then be summed across all the asscociated pests for that commodity.

$$EVC = \sum_{i=1}^{n} (R_i \times E_i)$$

Where EVC is the expected value of pest risk for a particular commodity, R_i is the probability of establishment of pest i, and E_i is the economic impact of pest i. Since EVC is the sum of a number of individual Pest Risks, when plotted it forms a single axis measuring EVC, as is shown in Figure 4. The axis begins at 0, corresponding to an EVC of zero, and extends indefinitely. The EVC for any particular commodity can be plotted on the axis.

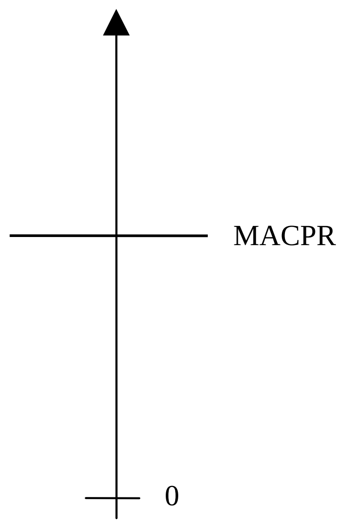

Figure 4
Commodity Pest Risk

Using a measure of EVC, a quarantine authority would consider commodities in terms of composite Pest Risk. A commodity with a large number of pests with moderate or low expected values that resulted in the same EVC as a commodity with only a few pests but individually with higher Pest Risk would be considered with the same degree of seriousness.

Similar to the MAPR discussed previously, a Maximum Acceptable Commodity Pest Risk (MACPR) can also be defined.

> *Maximum Acceptable Commodity Pest Risk (MACPR) is the highest EVC that will be accepted by the quarantine authority.*

MACPR also forms the basis for defining ALP.

> *ALP is the action required to ensure that the maximum acceptable commodity Pest Risk (MACPR) will not be exceeded by the EVC.*

In the context of Figure 4, MACPR is a cutoff point on the axis. Commodities which present an EVC above this level would be subject to quarantine action which reduced EVC to acceptable levels.

In terms of determining ALP for a commodity rather than a pest, an additional basis for separating pest and commodity risk analysis revolves around the question of whether you treat pests or commodities equitably in the application of quarantine measures. Equitable treatment in this context refers to the expected value of an outcome. As such, a quarantine treatment would have to produce the same expected value in order to be equitable. An equitable treatment of pests would mean that any commodity that a pest was associated with would be subject to the same standards. For any pest this would also mean the same treatment since this would bring the same expected value per pest.

The equitable treatment of pests would mean that you could not impose stricter measures on the 'dirty' commodity than on the 'clean' commodity. This is not inuitively satisfying because it is implicitly allocating the same risk or expected value on both commodities. An equitable treatment of commodities would mean that each commodity would be subject to the same standards in terms of expected value of risk. For any commodity then, sufficient measures would be put in place to ensure that the EVC was the same. Quarantine treatment would be directed at reducing the pest risk associated with the commodity to an acceptable level.

3.3 Summary

The Iso-Risk framework provides two important outcomes. Firstly, it allows all pests to be evaluated on the same basis using the common measure of Pest Risk. This in turn allows pests to be evaluated relative to one another on a common basis. Irrespective of how the pest manifests its impacts, its choice of hosts, or its rate of spread, as long as the effects can be assigned a dollar value and a probability of occurrence, then there is a common unit of comparison. Pest Risk can then be said to be higher or lower relative to other pests.

The second outcome of the Iso-Risk framework is that it provides the basis for evaluating pests against a standard. If the Iso-Risk line in Figure 1 has been determined to be the maximum level of Pest Risk, or maximum amount of expected economic impacts which is acceptable, then it becomes a standard against which any particular pest could be evaluated. Any pest which provides a Pest Risk greater than the maximum acceptable Pest Risk (MAPR) lies above the Iso-Risk line corresponding to this level of Pest Risk.

Using Iso-Risk in the context of a maximum Pest Risk provides regulatory authorities with an opportunity to use objective criteria in quarantine decisions and in justifying these decisions in a trade environment. Firstly, it provides a definitive guide as to appropriate types and levels of quarantine measures. Since an objective is to make sure that Pest Risk is at or below the acceptable level, evaluating the effect of quarantine measures in the Iso-Risk framework means that this can be done relative to a particular criteria. Secondly, the Iso-Risk framework provides a transparent and measurable criteria for justifying decisions to trading partners. In particular, decisions can be shown to be consistent within an overall domestic policy context (MAPR).

4. Implementing Iso-Risk as a Trade Tool

In the context of the Iso-Risk framework, the key questions to be resolved by any regulatory agency could be summarised as follows:

- What is an appropriate benchmark (MAPR or MACPR)?
- Should there be more than one benchmark?
- How extensive is the benchmark?

The first point relates to the problem of arriving at an MAPR which adequately describes the regulatory agency's perception of acceptable Pest Risk in an Iso-Risk framework. The second point addresses the issue of whether from an operational perspective, there is scope for having more than one category of acceptable Pest Risk or MAPR to aid in decision-making. The final point concerns the tails of the MAPR line. The issue here is whether the regulatory authority perceives the same acceptable Pest Risk when either economic impacts or probabilities of entry are very high.

One approach to addressing the first point, what is an appropriate benchmark, is to start from the basis of a country's current regulatory treatment of pests and commodities, measuring pre and post-quarantine values for Pest Risk and EVC. Values for MAPR and MACPR implicit in existing quarantine regulations should emerge from the analysis. However, such an analysis may show inconsistencies among EVC's for different commodities and PR's for different pests.

4.1 MAPR

To establish MAPR, pests would first need to be evaluated for probability of entry and potential economic impacts post-quarantine treatment, as is shown in Figure 5. An estimate of Pest Risk for each pest (or a sufficient sample) is plotted, the result being a 'pest map', such as shown in Figure 5, which shows relative Pest Risk associated with individual pests (individual dots). The pest map measures how pests are currently categorised and handled from a quarantine perspective in the Iso-Risk framework. MAPR should emerge from the pattern of plotted results. MAPR would be represented by a line above which there would be no plots. By definition, any pest which carries a Pest Risk higher than MAPR would be unacceptable, and quarantine action would be taken to shift the Pest Risk below MAPR.

4.2 MACPR

To establish MACPR, a similar process as was used to determine MAPR can be followed. The only difference would be that commodities rather than individual pests would be evaluated. This requires an estimation of EVC for each commodity being traded (or a sufficient sample) which is then plotted. The result would be a commodity map, such as shown in Figure 6, which shows relative EVC associated with individual commodities (individual dots). The result would measure how commodities are currently categorised and handled from a quarantine perspective. MACPR should again emerge from the pattern of plotted results. MACPR would be represented by a line above which there would be no plots. By definition, any commodity which carries an EVC higher than MACPR would be unacceptable, and quarantine action would be taken to shift the EVC below MACPR

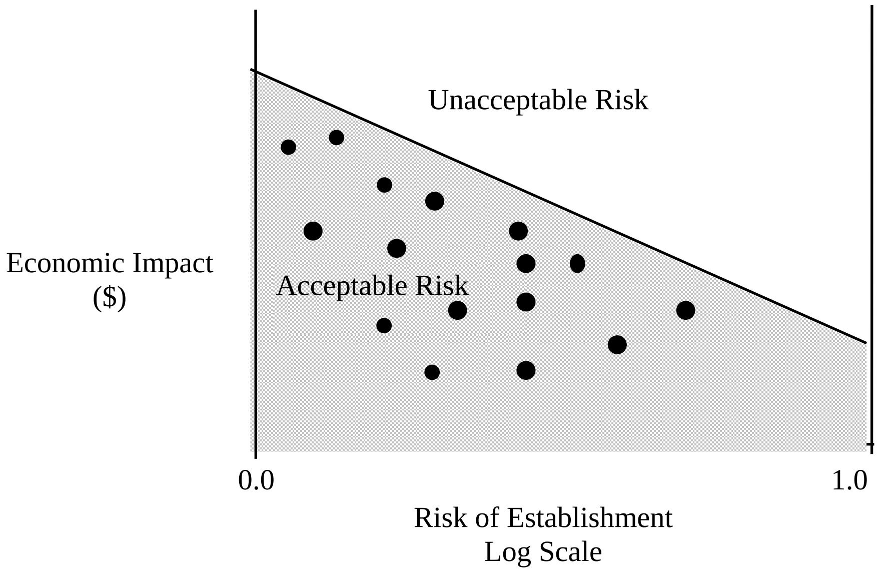

Figure 5
Pest Risk after Quarantine Measures

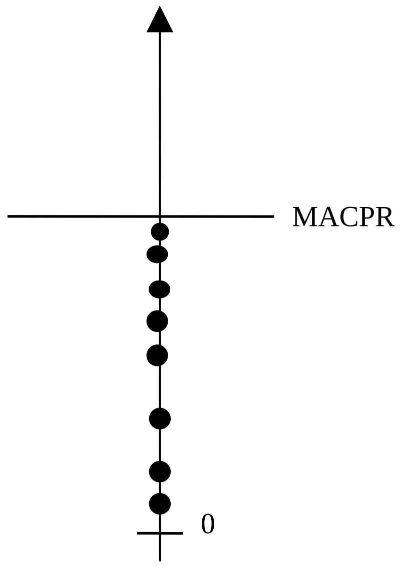

Figure 6
Commodity Pest Risk after Quarantine Measures

The question of whether there should be more than one benchmark can be examined in terms of how quarantine strategies are formulated in the context of the Iso-Risk framework. Quarantine actions, or ALP, will be designed to manipulate trade in a commodity so that EVC for that commodity does not exceed MACPR. Since EVC is the product of economic impact and probability of establishment, in theory either of these could be modified as part of a quarantine action. While an action which reduced the economic consequence, or reduced both the economic consequence and the probability of establishment, can not be ruled out, in practice quarantine actions will modify only the probability of establishment. In all cases, data input into decisions on quarantine strategies should be objective and based on efficacies of controlling measures such as area freedom, quality systems used during production and after harvest, and disinfestation treatments.

Since quarantine actions are directed at commodities, any single measure will potentially impact more than one pest associated with the commodity. Evaluation of quarantine strategies will then require that EVC be the basis for measurement. This creates two decision rules for determining ALP, one based on individual pests associated with a commodity, and the other on a combination of all the pests associated with a commodity.

The decision rule based on single pests is based on the fact that no single pest can present a Pest Risk greater than MACPR. Since risk management is generally focussed on managing risk of introduction, once a value for MACPR has been chosen, potential economic consequences are treated as fixed and a Maximum Acceptable Risk of Establishment (AR) can be calculated for any pest. AR is the level of risk of pest establishment that can be accept which will leave total Pest Risk below MACPR. Although all pests will have the same MACPR, AR will depend on potential economic consequences. Pests with a high economic impact will have a lower accepted value of AR than pests with a low economic impact.

Decison Rule 1 ALP is any quarantine action which ensures that the Maximum Acceptable Risk of Establishment (AR) for any particular pest and commodity combination is not exceeded.

The decision rule based on a combination of pests on a commodity is based on the fact that no combination of pests on a commodity can present an EVC greater than MACPR. Again, since risk management is generally focussed on managing risk of introduction, once a value for MACPR has been chosen, potential economic consequences for any particular pest are treated as fixed and ALP focusses on reducing combinations of risk of introduction so that EVC is below MACPR.

Decison Rule 2 ALP is any quarantine action which ensures that the EVC for any particular commodity is not exceeded.

Quarantine actions can be broadly separated into the following categories (MAF, 1995):

- Non-actionable (non-quarantine)
- Basic Risk Management
- Additional Risk Management

A non-actionable pest is one for which no quarantine measures are imposed because the pest is not considered to have any potential to establish or to cause crop, environmental, animal, or human problems. Basic risk management involves some action and could include standard practices such as inspection of commodities for the pest upon arrival. Additional risk management generally covers offshore activities. This could include actions such as an additional declaration (AD) on a phytosanitary certificate from the exporting country which guarantees that the shipment has been inspected or treated in a particular way. Additional risk management can also include mandatory off-shore treatment (OST) of commodities (here, "treatment" may refer to a quality production system as well as disinfestation treatment) which is audited by the importing country. Basic risk management is generally used for all commodities regardless of whether an AD or OST has also been applied for a specific pest, as a routine compliance check for basic quarantine pests and screening for new pests.

This categorisation of quarantine strategies requires definitions of quarantine and non-quarantine pests. It is possible to define three different categories of pests in terms of their estimated Pest Risk with basic risk management in place. If Pest Risk is less than MACPR, basic risk management will be sufficient, and the pest can be considered to be a basic quarantine pest. Similarly, if Pest Risk is greater than MACPR, the pest can be considered to be a serious quarantine pest. The various quarantine classifications are shown in Figure 7.

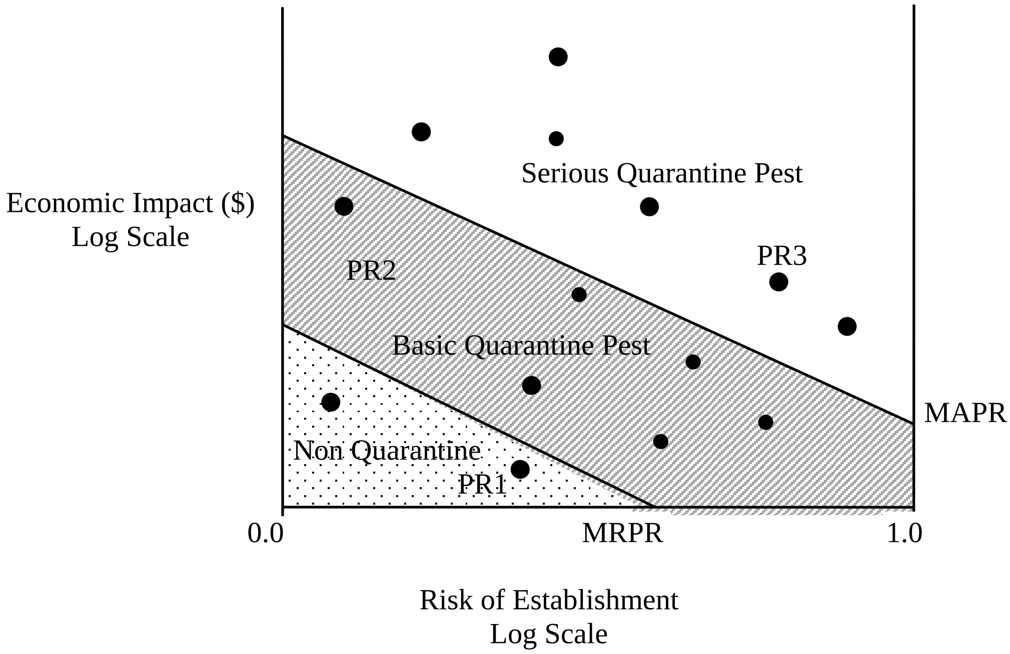

Figure 7
Iso-Risk and Management Options

Figure 7 shows Pest Risk with basic risk management and thus a pest which presents a level of Pest Risk above MAPR, such as PR_3, would be categorised as a Serious Quarantine Pest. This is a pest which requires more than basic risk management to reduce the Pest Risk to acceptable levels. The pest associated with PR_3 would be subject to additional risk management, such as offshore treatment, to reduce the probability of establishment by a sufficient amount. In this context, a serious quarantine pest could also be defined as a pest for which the probability of establishment under basic risk management exceeded AR. A Basic Quarantine Pest, shown in Figure 7 as PR_2, would be one in which basic risk management resulted in a Pest Risk which was less than MAPR. ALP would be that the commodities the pest is associated with would only require basic risk management.

The remaining class of pests are those which have been classified as non-actionable, or non-quarantine pests. This may be because a pest is deemed to have no potential to affect an area. In the context of Figure 7, this would be a Pest Risk at the origin or along one of the axis, indicating a zero potential for either or both of an economic impact and introduction. The non-actionable designation may also arise even if there is a potential to establish and have an effect. In Figure 7, this is shown as the shaded area below Mininmum Required Pest Risk (MRPR). MRPR is the minimum Pest Risk which is required to have a pest be considered a basic quarantine pest.

This leaves the final point of how extensive a benchmark should be. The reason that this point is raised is because a situation may arise where a quarantine authority considers that any potential economic impact or probability of establishment above a particular level is unacceptable. In this case, both MAPR and MACPR would be conditional, as they would apply to a restricted range of economic impacts and probabilities of establishment. This concept is illustrated by the modified Iso-Risk line shown in Figure 8.

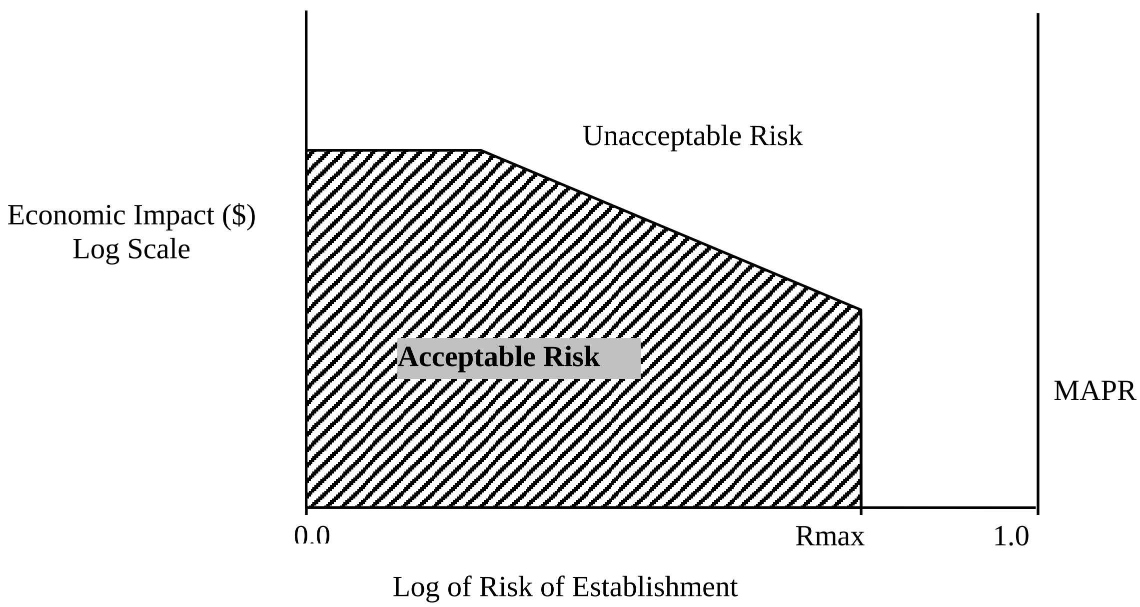

Figure 8
<u>Iso-Risk with Maximum Level of Economic Impacts and Probability of Establishment</u>

5. Conclusions

The paper has introduced a methodology for quantifying technical trade barriers that contain elements of risk and economic impacts in way in which they can be dealt with in a trade forum. The important change is that barriers can be treated on the basis of expected outcome rather than the technical characteristics of barrier. As such, it is possible to step beyond only considering whether the barrier involves an insect or a bacteria, and instead focus on whether a potential event behind the barrier is above, below or within an expected dollar value.

This then provides the basis for even treatment of technical barriers in a trade environment. Any two events which fall above or below a particular benchmark should then be expected to be subject to technical barriers or SPS which have similar effects. An important point is that two exporters can now be subject to different technical standards but in a way in which the GATT rules on equal treatment should not be violated. This is because the outcome of the trade barrier must be similar. In the early stages of establishing Iso-Risk, a country would only be able to determine whether it is treating its trading partners consistently. This, internal consistency would relative the domestic MAPR. At a later stage, when a number of countries basing decisions on Iso-Risk, a country could then establish, or perhaps be challenged, as to whether its treatment of trading partners was consistent with international norms. In this case the international norm would relate to an international MAPR.

Values derived from an Iso-Risk analysis can also be expressed as a per unit tariff equivalent to make them comparable to other non-tariff barriers. All that is required is for the expected value, or Pest Risk, to be spread over the volume of the commodity which is subject to the technical trade barrier. It is conceivable that the development of an international MAPR could be the basis for reducing technical barriers to trade, since comparisons are being made within a common forum of risk.

It is less likely that the calculation of unit tariff equivalents and their comparison to standard tariffs would become the basis for reductions in technical barriers to trade. The main reason for this is that SPS differs substantially from general trade issues. The essence of the difference is that winding back tariffs between nations is a gain-gain game a la Ricardo (assuming equal bargaining power and in the long run after adjustments have been made), while winding back SPS restrictions is a gain-gain game with Russian Roulette thrown in.

This is because in SPS the game takes on a different type of risk and the downside always looms more ominously. SPS is made all the more complicated by the inability of science to define how many chambers there are in the gun, how big the bullets are and how many are loaded. This results in more conservative approaches to SPS which focus on the potential bad effects of pests and diseases and largely ignore the welfare gains to trade. The development of international standards and the use of tools such as Iso-Risk should make the SPS interchange less conservative and trade-offs more possible. It is hard to see how this would extend to comparing health standards to automobile tariffs.

References

Bigsby, H.R. (1996). Quantifying Technical Trade Barriers: Phytosanitary Measures. Proceedings of the NZAES Conference, Blenheim. July 5-6, 1996. Pp 124-128.

Bigsby, H. and Crequer, J. (1996). A conceptual Model for the Management of Pest Risk. Paper to be presented at the SEEM 2 Conference, Decision Making and Risk Assessment in Biology. University of Otago, June, 1996.

FAO (1996). International Standards for Phytosanitary Measures. International Plant Protection Convention. FAO, Rome.

Hillman, J. (1991). Technical Barriers to Agricultural Trade. Westview Press, Boulder.

Hillman, J. (1978). Nontariff Agricultural Trade Barriers. University of Nebraska Press, Lincoln.

MAF (1995). Procedures for Plant Pest Risk Analysis. Draft MAFRA Standard 155.01.02. Ministry of Agriculture, Wellington.

Ndayisenga, F. and Kinsey, J. (1994). The structure of nontariff trade measures on agricultural products in high-income countries. Agribusiness 10(4):275-292.

Orr, R.L. (1995). A plant quarantine risk-based framework for standardising the acceptable level of risk and appropriate level of protection. Animal and Plant Health Inspection Service, USDA.

Papasolomontos, A. (1993). Present global activities in the harmonization of plant quarantine. In International Approaches to Plant Pest Risk Analysis. Proceedings of the APHIS/NAPPO International Workshop on the Identification, Assessment and Management of Risksdue to Exotic Agricultural Pests. Alexandria, Virginia. NAPPO Bulletin 11.

Patterson, E. (1990). International efforts to minimize the adverse trade effects of national sanitary and phytosanitary regulations. J. World Trade 24(2):91-102.

Smith, J.R. (1993). Welcoming Remarks. In International Approaches to Plant Pest Risk Analysis. Proceedings of the APHIS/NAPPO International Workshop on the Identification, Assessment and Management of Risksdue to Exotic Agricultural Pests. Alexandria, Virginia. NAPPO Bulletin 11.