Direction de
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Audit,
Evaluation and
Control Branch

CONSUMER AND CORPORATE AFFAIRS CANADA

EVALUATION OF THE EFFECTIVENESS OF CONSUMER PRODUCTS COMPLIANCE ACTIVITIES

AN ANALYSIS BASED ON TORONTO DISTRICT OFFICE FILES

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PRIVATE

Mr. Ken Tiedemann
Audit Evaluation and Control
Bureau of Policy Coordination
Consumer and Corporate Affairs
17th Floor, Place du Portage, Phase I
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HULL, Québec
K1A 0C9

Dear Mr. Tiedemann:

We are pleased to submit our final report, the Evaluation of the Effectiveness of Consumer Products Compliance Activities - An Analysis Based on Toronto District Office Files.

We enjoyed working on this challenging and unique assignment and wish to express our gratitude for the significant encouragement from yourself and the officers of the Consumer Products Branch who so generously gave us their time and advice.

Yours very truly,

PEAT, MARWICK and PARTNERS

David Zalinger (MS)

David Zalinger
Managing Partner

DZ:nl

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EXECUTIVE SUMMARY

EVALUATION OF THE EFFECTIVENESS OF CONSUMER PRODUCTS COMPLIANCE ACTIVITIES - AN ANALYSIS BASED ON TORONTO DISTRICT OFFICE FILES

STUDY OBJECTIVES AND BACKGROUND

This study had two objectives. The first objective was to determine the feasibility of measuring the effectiveness of different compliance activities undertaken by the Consumer Products Sub-activity. Given that such measurement was feasible, the second objective was to determine the effectiveness of these compliance activities. The study was also intended to make recommendations regarding the feasibility of extending the pilot to other parts of Canada and to other program areas.

In dealing with the Consumer Products compliance activities, we were concerned with the effectiveness of activities relating to the enforcement of the standards and regulations overseeing the quality, quantity and labelling disclosure of information for a wide variety of traded goods. These activities include actions associated with inspection and enforcement as well as complaints and enquiries. We were also interested in determining the effectiveness of trader education compliance activities; however, it should be noted that we only looked at trader education performed on a regular basis, as part of inspection and enforcement, and not at the delivery of formal trader education, such as seminars, media interviews, etc. Thus, in studying the relative effectiveness of the different compliance activities, we investigated whether, for example, trader education and warning letters had a relatively greater impact on an establishment's compliance than did an information letter or an oral warning.

Methodology and Data Collection Approach

The Toronto office was selected as the pilot site for the study. As a preliminary step, we examined the establishment files and MIS reporting format in order to determine the type of information retained on the various compliance activities. We found that data on compliance activities and about particular establishments are available in the establishment files and in the MIS. The pilot site retained compliance activity data in establishment files from the date of first contact with an establishment, although we determined that this is not a uniform practice across Canada. The MIS data had been collected for just over two years.

Once we had identified that the data kept on compliance activities were useful and amenable to statistical manipulation, we developed an analytic design. The design used was a historical design with differing levels/types of treatments. Since compliance activities are performed on establishments at different points in time and encompass different actions, we felt the use of such a design coupled with a statistical modelling approach would allow us to determine the effects of these varying treatments (actions) on compliance.

A random sample of 898 establishments was selected from a list of establishments available at the pilot site. Our sampling strategy ensured that establishments in all trade levels and product classes were selected. Data on the history of compliance were extracted from the establishment files. We were only interested in the data collected for inspections, enforcement actions and complaints which occurred since January, 1980.

The information extracted from the establishment files was recorded as data items for inclusion into a database, and statistical models* were based on these items.

STUDY RESULTS

Feasibility

The above description of our methodology and data collection approach responds to the first objective of the study. We were able to confirm that a pilot study aimed at determining the effectiveness of different compliance activities was feasible to undertake. Indeed, we found that appropriate and useful data on compliance activities are collected, both in hardcopy files and in the MIS. We were able to use an establishment list kept by the pilot site as a frame for sample selection. Using our analytic methodology, we were able to determine the effects of varying activities on compliance.

Effectiveness of Compliance Activities

In our analysis of the data, we developed basic models which related increases in percentage compliance between consecutive inspections to a number of explanatory factors. The major findings which deal with program effectiveness are shown in Exhibit 1 and are described below:

- Trader education, written warnings and trader commitment as part of inspections are all effective instruments in bringing about increases in labelling compliance.
- The one enforcement action which is effective in bringing about an increase in quality compliance is trader commitment.

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* All models used in the analysis were ultimately put in linear regression format. The final models created were the result of a long series of exploratory analyses, using as principal tools, stepwise regression (forward selection), all possible subsets regression, basic residual analysis and general logical reasoning. Final model specification, after data reduction, rested primarily on the best of all subsets routine, which looks at all combinations of variables, and chooses as best, the one with the lowest C_p statistic. The models were constructed as a series of iterations based on logical thinking and various kinds of exploratory analytical techniques.

EXHIBIT 1

INCREMENTAL EFFECTS OF PROGRAM INTERVENTION VARIABLES FOR LABELLING, QUALITY, QUANTITY AND MEAN PERCENTAGE COMPLIANCE

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Time Between Inspections	-	-	-1%	-
Previous Actions:				
- Trader Education	+19%	-	-	+16%
- Written Warning	+10%	-	-	-
- Trader Commitment	+10%	+24%	-	+19%

- Both trader education and trader commitment as part of inspections are effective in bringing about an increase in mean* compliance for all regulatory areas.

These results indicate that what occurs in an inspection, rather than the fact of an inspection itself, is usually the most important factor in determining increases in compliance. In relation to the area of quantity compliance, however, we found that the time between inspections was an important factor in determining increases in compliance. The positive effects of an inspection in quantity compliance are less if the time between inspections is large.

Enforcement actions such as trader education, written warnings and/or trader commitment all have incremental effects on compliance. Other mechanisms, such as oral warnings and trader correction, were not seen to have significant impacts.

We also developed models which looked at differences in the probability of an action occurring in the current versus the previous inspection. These difference models were created for actions in which all lots or items were found acceptable, or in which either seizure and detention or a written warning occurred. Our findings are summarized in Exhibit 2. The models describe the effect of various program intervention variables (i.e., previous actions, time between inspections and number of past inspections) on each of the three specific actions. These models demonstrate the relationship among enforcement actions, as highlighted below:

- The program intervention variables which are effective in increasing the probability of having an inspection with all lots acceptable (in all regulatory areas) tend to be enforcement actions which are not too severe, such as trader education and trader correction.

- A written or oral warning indicating that more severe action could be taken if a violation is repeated, is effective in decreasing the probability of products being seized and detained in a subsequent inspection.

- The two main enforcement actions which are effective in decreasing the probability of a written warning are an information letter and a seizure and detention.

Our analysis also showed that complaints and referrals have an effect on mean percentage compliance (i.e., compliance in all or any regulatory area). We found that inspections which occurred as a result of complaints or referrals tended to have a lower percentage compliance than inspections undertaken for other reasons. We can therefore surmise that the referrals and complaints are

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* The mean compliance was derived by calculating the mean of any or all percentage compliance values for labelling, quality and/or quantity. The mean compliance is, therefore, a summary of an establishment's overall performance.

EXHIBIT 2

PROGRAM EFFECTIVENESS SHOWN IN THE OTHER DIFFERENCE MODELS

1) Increase in Probability of An Inspection with all Lots Acceptable

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Previous Actions:				
- Trader Education	+19%	+29%	-	+26%
- Trader Correction	+41%	+13%	+30%	+49%
- Seizure and Detention	-	-	+22%	-
- Volantary Disposal/Return	+22%	-	-	+16%
- Trader Commitment	+36%	-	-	+30%

2) Decrease in Probability of An Inspection with a Seizure and Detention

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Time Between Inspections	-	-	-1%	-
Previous Actions:				
- Oral Warning	-	-	-	+25%
- Written Warning	+38%	+7%	+4%	+8%

3) Decrease in Probability of An Inspection with a Written Warning

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Number of Inspections in Last 5 Years	-	-	+5%	-
Previous Actions:				
- Information Letter	+35%	+87%	+75%	+18%
- Trader Education	-	-	-	+4%
- Seizure and Detention	+29%	+31%	-	+6%
- Trader Commitment	-	+22%	-	+8%

aiding inspectors in identifying problems. When a complaint or referral was the reason for a previous inspection, we found there was an increase in compliance in the current inspection, indicating a positive effect on subsequent compliance.

Extension

As long as comparable data on compliance activities can be found in other district offices (which we believe is the case), there should be no problem in extending this pilot into a national study. If a national study were undertaken, it would be necessary to add some variables into the models to allow for regional differences, such as the province and the community size. As well, we recommend that a national study should commence no earlier than April, 1986. This would ensure that a sufficient number of establishments have been inspected under the MIS reporting system. For modelling purposes, we believe that a large number of establishments should have at least two inspections under the MIS method of reporting.

Before a national study is undertaken, consideration should be made as to whether the present form of the analysis is adequate for the Consumer Products Sub-activity or whether further refinement to the analysis is necessary. Further types of analysis can still be performed on the present database and the database can be supplemented with more extensive information.

With respect to the extension of this pilot to other programs, we believe our approach is completely generalizable, as long as data are available regarding compliance activities for these programs. Modification would have to be made for program differences such as the inspection processes used and enforcement actions undertaken.

Our approach and methodology to determine the effectiveness of compliance activities, to the best of our understanding, has been the first of its kind in this area. We have been able to actually assess the relative effectiveness of compliance activities, and using our methodology, such measurements can be extended nationally and to other program areas.

IMPLICATIONS OF THE FINDINGS

As noted above, the findings of this study provide the first (to our knowledge) quantification of the effect that compliance activities are having on compliance levels. Thus, these findings are important in their own right. They indicate that the inspection function is having an incremental impact on compliance levels and that certain actions are substantially more effective than others in achieving increased compliance. These findings imply that the inspection function has significant and valuable results from the perspective of the Sub-activity objective of protecting against product misrepresentation through detection, deterrence and control (monitoring).

The findings are also important in light of current strategies being considered to enhance the inspection function. We believe that the results of the study have various applications to improving the cost-effectiveness of inspections.

It should be noted that we are referring here to the general applicability of the findings if they were derived from a national sample of establishments rather than a sample of establishments from the Toronto District Office. If such a national study were to be undertaken and results such as those found in the pilot study were revealed, then the following types of applications to inspection improvement are feasible. These applications are described in relation to the objectives of the inspection function.

Deterrence

This study was able to identify which inspection/enforcement activities are most effective in contributing to the achievement of the deterrence objective (if this is measured in terms of improved compliance). The effect of these activities on deterrence was measured at the level of the individual trader. We were not able to determine the overall effect of the inspection activities on bringing about deterrence in the marketplace. In order to measure the latter effect, it would be necessary to employ a different methodological approach to the one used here (e.g., a survey of traders, inspection of never-inspected establishments, etc.).

The study results clearly indicate that less stringent activities (such as trader education) and negotiating activities (such as trader commitment and written warning) are having a greater impact on compliance levels than other, more stringent activities. This implies that some shift to educational and negotiation activities from more stringent compliance activities may actually reduce risk. Assuming these activities are less costly as well, the overall cost-effectiveness of compliance activities will be greatly increased. Some of the resources freed up could be used for, among other things, undertaking more stringent and costly actions against establishments where compliance is known to be problematic.

If the database included a larger sample of establishments from across Canada, there are a number of further refinements which could be made in terms of how best to expand the education and negotiating activities described above:

- A database which is expanded nationally could be used to determine whether there are geographic (provincial, urban/rural) differences in the effectiveness of compliance activities. This information could then be used to make decisions regarding inspection resources and activities on a district-specific basis, if differences resulting from the geographic factor were identified.

- An expanded database could identify whether certain inspection activities would be more effective in increasing compliance in particular trade levels, industry types, sizes of establishments, product classes (and any combination of the above). Should such an analysis determine differences in the effectiveness of compliance activities, then the information could be used to make decisions regarding inspection resources and activities on the basis of particular types of establishments, product classes, etc.

Detection

The inspection function serves as a means of identifying or detecting the level of marketplace non-compliance. The Sub-activity already uses two mechanisms (the dollars at risk and a tiered priority system) to determine how best (cost-effectively) to allocate resources toward the detection objective.

Another mechanism of resource allocation for the purposes of detection brought forth in this study, is the use of complaints and referrals.* The findings clearly show that when an inspection is the result of a complaint or referral, there is an increased tendency for non-compliance to be detected. As well, when a subsequent inspection is carried out, compliance levels tend to improve (a deterrence effect).

We are not suggesting that all inspection resources be devoted to following-up on complaints and referrals nor that all complaints and referrals be followed-up. Clearly this is impractical and not feasible. However, we are suggesting that using complaints and referrals as another method of priority setting could bring desirable results both from a detection and deterrence perspective. Of course, the selection of complaints and referrals which are to be acted upon would require some assessment of the factors which would truly warrant the expenditure of resources on an inspection (e.g., the estimated degree of non-compliance, the severity of the non-compliance, the segment size implicated). The fact that consumers have been able to detect the non-compliance would certainly be another important factor to consider in these decisions.

Another approach to resource allocation for the purposes of detection which could be developed from the data collected in a national study would be an establishment risk index. The risk index could be developed for each establishment which has been inspected or for a number of prototype establishments (e.g., large retail food stores in urban British Columbia, small retail food stores in urban British Columbia, etc.). The index would be

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* The Sub-activity currently uses complaints and referrals as a tool to isolate problems and change inspection emphasis.

created on the basis of various known characteristics of low and high compliance establishments.* Inspection resources could then be allocated according to known probabilities of identifying non-compliance, with low-compliance (high-risk) establishments being inspected more frequently than high-compliance (low-risk) establishments.** The beauty of such an indicator is that the data needed to develop it are currently being collected as part of the MIS.

It should be noted that our methodology was not directed toward making a judgment on the effectiveness of compliance activities in detecting non-compliance across the full spectrum of establishments. It would be necessary to employ a much different range of methodologies, such as the conduct of shadow inspections to determine what has been missed in inspected establishments and the conduct of inspections outside the regular schedule of establishments to determine the extent of non-compliance where there is presently no inspection.

Monitoring

Another component of the inspection function is a monitoring element or the identification of the overall state of compliance or non-compliance in the marketplace. The risk index which was described above can be used as an indicator for monitoring purposes. A risk index developed for all the establishments which have been inspected across Canada would provide one measure of the overall current risk in the marketplace. This is because most establishments, according to program personnel are inspected, therefore, a fairly complete picture of the level of risk in the marketplace could now be determined.

It is not advisable, however, to alter inspection strategies to respond only to the risk indices since the following scenario would likely result. More inspection resources would be concentrated on the high risk establishments (low-compliance) and low risk (high-compliance) establishments would be inspected much less frequently or never at all. The level of risk of non-compliance for formerly high risk establishments would continue to be recorded whereas the level of risk in low-risk establishments would not. Thus, if there was increasing non-compliance in formerly low risk establishments, it would not be recorded in the Sub-activity database. If these low-risk establishments became higher-risk (at least relative to others), the inspection process would not be maximizing detection any longer with these establishments being excluded nor be obtaining an accurate assessment of overall risk in the system.

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* Such a risk index has been successfully applied to over 30,000 highway-railway crossings in Canada as a means of determining inspection and upgrading requirements.

** The risk index could, in fact, be strengthened by using seriousness of non-compliance as well, i.e., incorporating into the definition of risk the probability of non-compliance multiplied by expected severity of non-compliance.

In order to avoid such a scenario, inspections would have to be conducted, at least in part, on a random basis, so that both high and low risk establishments could be inspected. This could allow for:

- continuous updating of the priority allocations based on detection (i.e., continuous assessment of which establishments are high-risk)
- a continuous monitoring of the overall level of risk in the system (a form of performance measurement)
- a deterrent effect on all establishments (since they all have a chance of being inspected).

Summary of Implications

In summary, the results of the study point to several strategies which can be used for the improved cost-effectiveness of the inspection function:

- expansion of known effective, less costly inspection actions for purposes of deterrence
- expansion of the use of complaints and referrals as priority setting and resource allocation mechanisms for purposes of detection
- use of a risk index in combination with random sampling as priority setting and resource allocation mechanisms for the purposes of detection, monitoring and deterrence.

I - INTRODUCTION

BACKGROUND

The Consumer Products Branch is part of the Consumer Affairs Bureau, one of the four operational bureaux of the Department of Consumer and Corporate Affairs. The responsibilities of the Consumer Products Branch include:

- The administration of a wide range of Acts and regulations in whole or in part. These are the:
  - Consumer Packaging and Labelling Act
  - Precious Metals Marking Act
  - Textile Labelling Act
  - National Trade Mark and True Labelling Act.
- In an advisory and consultative role, the development of standards and regulations under Acts whose responsibility lie under other federal departments. These acts are:
  - Food and Drugs Act
  - Canada Agricultural Products Standards Act
  - Fish Inspection Act.
- The administration of two voluntary programs:
  - Care Labelling Program
  - Canada Standard Size Program.
- The monitoring (under the Traded Goods Component) of developments in the market and the preparation of recommendations for legislative/regulatory changes in consultation with consumer/trade associations, other departments and levels of government and international standard writing associations.

The Consumer Products compliance activities comprise its inspection and enforcement, trader education and consumer information, complaints and enquiries and program development, implementation and evaluation activities. Compliance activities relate to the enforcement of the standards and regulations overseeing the quantity, quality, labelling and other disclosure of

information for a wide variety of traded goods identified under the relevant Acts and regulations (specified above). The activities are aimed at protecting against product mis-representation through detection, control and deterrence and enhancing the ability of the consumer to differentiate among product choices.

The key operational work elements comprising the Consumer Products Sub-Activity are described below.

Inspections and Enforcement

Inspections are undertaken to ensure that a high degree of compliance is maintained at the trade levels of manufacturing, import/wholesale and retail in predefined product classes (food, textile, precious metals and non-food). The district office staff of the Consumer Products Sub-activity have responsibility for undertaking these inspections and enforcement activities.

A visit to an establishment, other than one which is scheduled or planned, may be initiated for a number of reasons, including a complaint, a referral from another region or government agency, a follow-up to a previous visit, a sample pick-up or a problem-product blitz. The activities which may form part of an inspection are:

- Inspection of products for compliance with quality, quantity and/or labelling regulatory areas. Inspections in the quality area deal with product composition, performance and claims. Advertising and packaging claims are included in inspections of product labelling.

- Enforcement actions such as providing trader education, giving an oral warning and seizing and detaining products. Other actions performed on the part of the trader include, returning the goods to the supplier, correcting the problem, disposing voluntarily of the non-compliant products or providing a commitment to correct the problem. Some enforcement actions, such as sending an information letter on a written warning, are noted in an establishment report for later in-office activities. (Definitions for all actions are included in Appendix A.)

- Completion of an establishment report. The report includes the reason for the visit or inspection and the reinspection date. Also included in this report is a summary, by product, of:

  - the regulatory area of compliance the product is being examined for

  - the number sampled

  - the number accepted

- the number marginal (applicable for quantity, only)
- the number defective
- the problem found
- enforcement actions (up to a maximum of three).

Another enforcement action which is not performed in an inspection or through trader education is a visit to an establishment where no establishment report is completed. This occurs for release of seizures, sample pick-up, or non-inspection walk-throughs carried out to maintain an inspection presence. In-office enforcement activities may involve product evaluations or label reviews, advertising reviews, writing letters (for information and warning purposes) and referrals to other regions or government agencies.

Complaints and Enquiries

The Branch handles complaints and enquiries received from consumers, industry, other government agencies and the media concerning departmental activities, services and legislation. The complaints and enquiries activity is a useful tool for isolating problems and trends in the marketplace, identifying the need for new regulations, clarifying policy, changing inspection emphasis, etc. This activity is also beneficial in that it may result in timely corrective action being taken in an important product area.

Trader Education and Consumer Information

The Sub-activity is responsible for the preparation and delivery of seminars, media interviews, meetings and materials for traders, trade organizations, consumers and consumer organizations. The purpose of this activity is to develop a higher level of consumer and trade awareness and understanding of legislative requirements. These information activities are performed as an alternative to direct inspection for achieving marketplace compliance.

STUDY PURPOSE

The purpose of this study was to identify the feasibility of developing a quasi-experimental design aimed at determining the effectiveness of different compliance activities. The study was intended to make recommendations regarding the feasibility of extending the pilot to other parts of Canada and to other program areas. The study was also intended to follow-up, in a preliminary manner, ideas related to the trade-off analysis discussed in the earlier evaluation of inspections (final report, dated September, 1985).

The design was implemented as a pilot project so that the relative effectiveness of the inspection, enforcement and complaints and enquiries compliance activities described above could be determined. We did not deal with enquiries since these are more often requests for information rather than the reason for initiating an inspection. The effectiveness of the trader

education compliance activities was also to be determined; however, we looked at trader education performed on a regular basis as part of the inspection/enforcement activity rather than the delivery of formal trader education (e.g., seminars, media interviews, etc.). This was because no file documentation regarding seminars, media interviews, etc. was available.

METHODOLOGY

Overall Design and Data Collection Approach

The Toronto district office was selected as the pilot site for the study. The reason for the selection of this location was that the Toronto area would have a large number of establishments in all trade levels and product classes.

As a first step to the study, it was necessary to become familiar with the file and MIS information retained by the Sub-activity. We examined a preliminary sample of establishment files in order to determine what records are kept on compliance activities and what additional descriptive information is collected on each establishment. We also had discussions with program staff regarding the format of the new MIS and any changes to the manner in which inspection findings have been recorded prior to and after the implementation of the MIS. This information helped us to identify an additional data source to the establishment files and also forewarned us of differences in the calculation of compliance indicators over time.

At the early stages of the study, we investigated the possibility of using a quasi-experimental design involving a control and treatment group. Such a design could only be used if establishments which had never been inspected could be found, i.e., a control group. We determined that it would be possible to find such establishments but that they would be few in number and primarily at the retail trade level.

This information led us to a more feasible and practical approach - a historical design with differing levels/types of treatments. Since compliance activities are performed on establishments at different points in time and encompass different specific actions, we felt that we would be able to determine the effects of these varying treatments (actions) on compliance through a statistical modelling approach.

The next step involved the design of the sample. Our sampling strategy ensured that establishments in all trade levels and product classes were selected. The list of establishments kept by the Toronto distict office was used as the frame for sample selection. Approximately 900 establishments were selected at random from a total of about 8,530 establishments. Data on the history of compliance activities were extracted from the establishment files.

Details on the methodology used in the study are provided in the sections below.

Data Collection and Sampling Design

Prior to beginning our data collection, we did an exploratory review of files at the Ottawa and Toronto district offices. At the same time, we interviewed district office staff regarding the filing systems and the lists on establishments retained by the offices. We also met with individuals responsible for the MIS at headquarters and in Toronto in order to determine the applicability of the information in the system to our study. It was our original intention to use the MIS to obtain information about the establishments in our sample; however, we found that the format of the MIS print-out was not conducive for this purpose.* Therefore, we collected all the data from establishment files.

From our review of establishment files, we were able to identify the forms and correspondence which contained information relevant to our study. These were:

- establishment report forms filled out by inspectors during an inspection
- letters addressed to the establishment for such purposes as trader information and written warning
- complaint letters written by consumers
- seizure and detention forms, resulting from inspections
- sample record forms, which may have been taken for a variety of purposes, such as surveys, ad hoc and inspection related reasons
- photocopied establishment report forms sent from other regions for referral purposes.

Examples of an establishment report, a seizure and detention form and sample record form are included in Appendix B.

The establishment files in the Ottawa and Toronto district office differed somewhat in that the forms and letters contained in the establishment files in the Ottawa office only date back three years while the Toronto office keeps all information from the date of first contact with an establishment.

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* The MIS print-out not only contained information for the establishments in our sample, but it contained information for all establishments which had an inspection since the initiation of the MIS. However, the print-out did not list establishments in any particular order and the information for inspections was too detailed for our requirements.

The selection of establishments to be included in the study was based on a systematic sample chosen from a list of establishments available at the pilot site. This list classified establishments according to product classes (food, textile, precious metals, and non-food) for each of three trade levels (manufacturing, retail and import/wholesale). For each trade level, a sample of 300 establishments was chosen. However, because certain establishment files were not available or not valid,* the next establishment on the list was chosen (if it was available and valid). The final sample consisted of 898 establishments drawn from an approximate total of 8,530 establishments. Descriptive statistics of the final sample are shown in Appendix C.

Data Items

The data items which were recorded for each establishment in the final sample are shown are Exhibit I-1. We were only interested in the data collected for inspections, enforcement actions and complaints and enquiries which occurred since January, 1980. Information on the data items was collected from the establishment files and transformed into a database for modelling purposes.

It should be noted that the data items for establishment ratings are only applicable for inspections which took place prior to the initiation of the MIS (i.e., prior to July, 1983). Establishments were given a rating of good, average or poor. This rating was based mainly on the opinion of the inspector. After the MIS was put in place, establishment ratings were no longer recorded.

With respect to percentage compliance, the data items also differ, depending on whether the inspection was conducted before or after the initiation of the MIS. Prior to the MIS, an overall compliance rating for an establishment was not recorded. However, the number of acceptable lots and number of sampled lots** were recorded and we used this data, whenever they were available, to calculate percentage compliance. If the inspection was conducted after the initiation of the MIS, we were able to determine percentage compliance from the actual number of units sampled and number of units found acceptable. These were recorded according to quantity, quality and labelling categories of inspection. The number of units found to be marginal in the quantity category of inspection was also recorded. These units were considered as acceptable in the calculation of percentage quantity compliance. For each of the three categories of inspection, we calculated overall percentage compliance ratings for all the products inspected in an establishment.

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* If the file did not contain data/information for the time frame being considered in our study (i.e., January 1980 to June 1985), it was considered invalid.

** A lot may contain one or more items.

EXHIBIT I-1

DATA ITEMS

1. Establishment Identification

- identification number
- establishment type
- establishment size
- establishment zone.

2. Inspections Since January, 1980

- pre vs. post MIS inspection
- date of inspection
- inspection rating
- reason for the inspection
- quantity - number sampled
  - number acceptable
  - number marginal
- quality - number sampled
  - number acceptable
- labelling - number sampled
  - number acceptable
- action codes
- date of the next scheduled inspection.

3. Enforcement Actions Since January 1, 1980

Dates and regulatory area (quality/quantity/labelling) for each action below:

- information letter
- warning letter
- sample
- referrals
- complaints
- seizure/detention
- prosecution.

The database which was developed for modelling purposes required the creation of variables and multiple records. Since in the modelling phase, described below, we compared compliance in consecutive inspections for each establishment, we considered any consecutive inspections as one case. For example, if an establishment was inspected at times T_1, T_2, T_3 and T_4, then we compared compliance at T_1 versus T_2, T_2 versus T_3 and T_3 versus T_4, which provided us three cases or records. This creation of multiple records increased the sample size and allowed for a more reliable estimation of the results in the modelling phase. Even though in our modelling we were actually comparing compliance in any consecutive inspections, for the sake of brevity, we will refer to this as "inspections of an establishment". Descriptive statistics on the number of consecutive inspections are shown in Appendix C.

The main objective in the modelling phase was to relate changes in compliance between consecutive inspections to a number of explanatory factors. In particular, we wanted to relate what occurred in the previous inspection and circumstances leading up to the re-inspection to the change in compliance in the current inspection. The history of inspections and enforcement actions was also considered. Since many of the data items involved dates in which activities took place, many variables had to be created with this in mind. For example, if we compared compliance in inspections at time T_1 versus T_2, with T_1 referred to as the current inspection and T_2 referred to as the previous inspection, we were then able to create variables which indicated:

- The enforcement actions which occurred or did not occur in the previous inspection (i.e., at time T_2).
- The reason for current and previous inspections (i.e., at time T_1 and T_2, respectively).
- The number of months between inspections (i.e., at time T_1 and T_2).
- The number of complaints and referrals received in between inspections (i.e., between T_2 and T_1).
- The number of inspections and the number of inspections with particular enforcement actions, such as information letters and trader education, in the last 3 and 5 years from the current inspection. In other words, if the current inspection occurred in January, 1985, then we considered what happened in the inspections which took place in the last 3 and 5 years from January, 1985 (i.e., between T_1-36 and T_1 for 3 year variables and T_1-60 and T_1 for 5 year variables).
- Percentage of inspections in the last 5 years from the current inspection (i.e., between T_1-60 and T_1) with particular enforcement actions, such as written warnings and trader commitment.

A complete list of variables in the database is shown in Appendix D.

Analytical Methodology

Models

All models used in the analysis were ultimately put in linear regression format. The final models created were the result of a long series of exploratory analyses, using as principal tools stepwise regression (forward selection), all possible subsets regression, basic residual analysis and general logical reasoning. Final model specification, after data reduction, rested primarily on the best of all subsets routine, which looks at all combinations of variables, and chooses as best, the one with lowest C_p statistic (refer to Appendix D for further information on the use of C_p statistic). In no case did we begin with a pre-determined model specification and merely estimate model values. The models were constructed as a series of iterations based on logical thinking and various kinds of exploratory analytical techniques.

In developing the final models, several scenarios were considered. These scenarios were based on whether the current and the previous inspection occurred before (pre-MIS) or after the introduction of the MIS (post-MIS). The four scenarios which could be considered were:

Current Inspection	Previous Inspection
Post-MIS	Post-MIS
Post-MIS	Pre-MIS
Pre-MIS	Pre-MIS
Pre/Post-MIS	Pre/Post-MIS

Although all these scenarios were considered, all the results in this report show only the difference in compliance measures for consecutive inspections which occurred post-MIS. Post-MIS data is considered by program personnel and ourselves to be more accurate and consistent than data collected before the introduction of the MIS. Variables which were found to be significant in other scenarios were maintained in the final model, even if these variables were not significant in the post-MIS model. Variations among the models were slight, which increased confidence in their final validity.

We developed a basic difference model which looked at the increase in percentage compliance between inspections of establishments inspected for labelling, quantity and quality regulatory areas. As well, we developed other models which looked at differences in the probability an action occurring in the current versus the previous inspection. These models are referred to as "other difference models" in this report. Other difference models were created for actions in which all lots or items were found to be acceptable, or in which either a seizure and detention or a written warning occurred. Difference

models for these actions were created in accordance with each one of the categories for inspection (i.e., labelling, quantity or quality) under consideration. A basic and other difference models were also developed for the mean compliance. That is, the mean of the labelling, quality and/or quantity percentage compliance.

Our models used the compliance indicators which are collected as part of the inspection process. We are aware that there are a number of biases associated with these indicators, as pointed out in a concurrent study investigating the indicators of the Sub-activity. Because our models use differences, we feel many of the biases are eliminated. This is because any systematic bias would be eliminated by differencing. If the bias is random, then the bias associated with the indicators is not really problematic and, for our purposes, the use of differences is just an additional safeguard.

All variables in the final models were classified as one of two types -- program intervention and control. Program intervention variables were variables which were related to program effectiveness. Control variables were included in the model to allow for better estimation of the incremental factors, although they were not in themselves measures of effectiveness, i.e., they were included as statistical matching variables. Thus, program intervention variables were generally variables which indicated what occurred in the previous inspection or between inspections, or the actual number of past inspections, while control variables indicated the history of compliance activities or described the establishment. For example, an enforcement action which occurred in the previous inspection would be a program intervention variable, while the fact that the establishment was in the food business would be a control variable.

Model Validation

Given the pilot nature of this study, we were more concerned with qualitative than quantitative validation.* In particular, we focused on model specification -- how certain were we that the correct variables were included in the model. This confirmation was done principally by comparing model results from different databases:

- data from inspections which were conducted following the introduction of the MIS
- data from inspections preceding the introduction of the MIS

* By quantitative validation, we mean such procedures as split sample or jack-knifing procedures, which produce quantitative estimates of coefficient reliability. Qualitative validation refers to such issues as face validity (does the model make sense) and model specification (validity of the form of the model).

- data from establishments which had one inspection after and another inspection before the introduction of the MIS

- data from establishments which had inspections either before or after the introduction of the MIS.

By analyzing and comparing results from these different model-building exercises, we confirmed that the correct variables were being included in the final models.

Significance Levels

All significance levels in this report are based on the regression models. In modelling, the significance level is an indication of how strong a relationship exists between two variables when other conditions are controlled. Thus, if the apparent effect of a variable can be explained by these other conditions, then it would not be reported as significant. To illustrate this, consider the example discussed below.

Initially, in analyzing descriptive statistics which compare compliance in the current inspection with the previous inspection, we find that:

- Traders which previously committed to eventual correction of the violative product(s), had a higher mean increase in compliance than traders which made no such previous commitment.

- Establishments which deal in food products, had a lower mean increase in compliance than establishments in all other product classes (textile, precious metals and non-food). However, there was no significant difference in the increases of the other three product classes.

- Establishments which were given an oral warning in their previous inspection, had a higher mean increase in compliance than establishments which had no such warning.

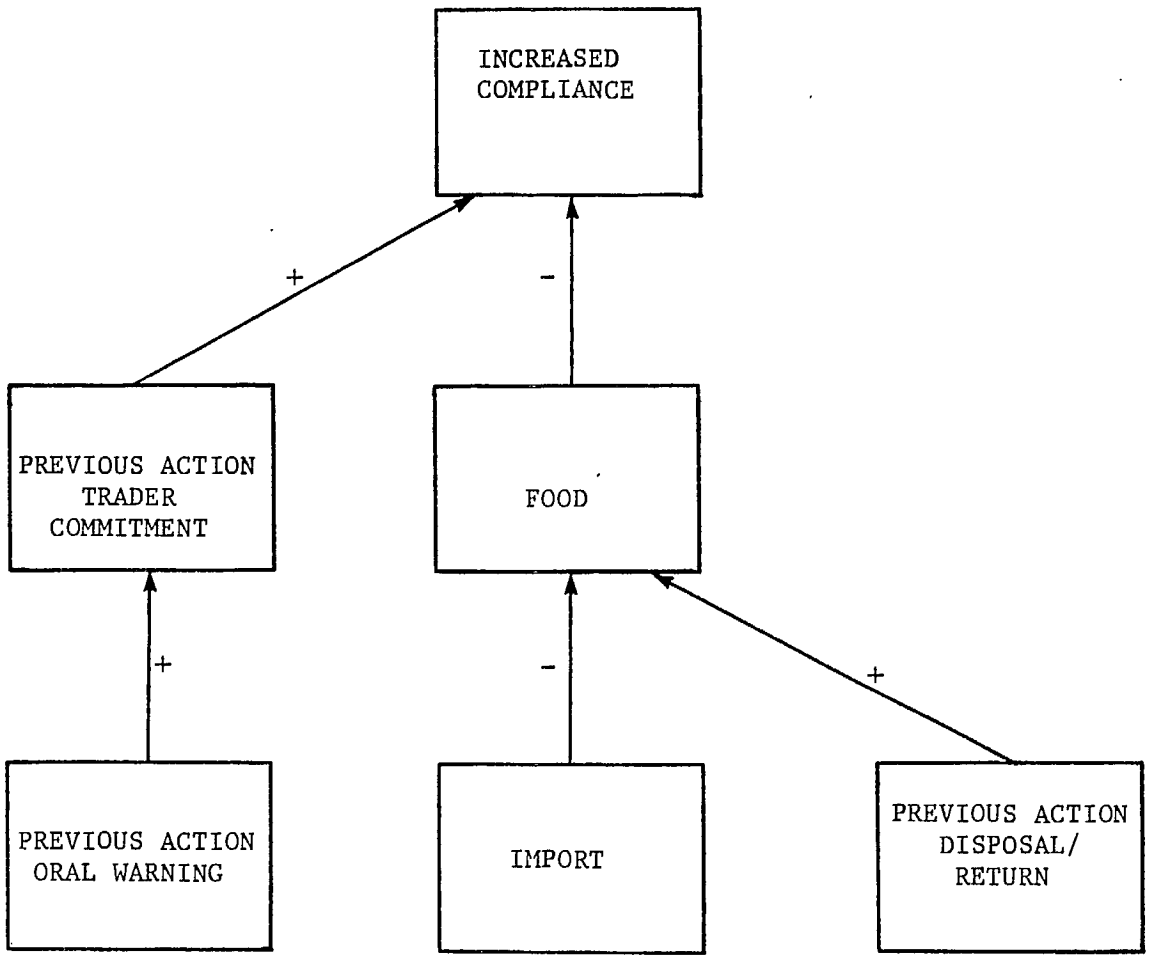
- Importers had a higher mean increase in compliance than retailers and manufacturers. But there was no significant difference in the increases of retailers and manufacturers.

- Establishments with previous action voluntary disposal or return had a lower mean increase in compliance than establishments without this previous action.

Each of these relationships, on their own, is statistically significant. However in analyzing the interrelationships, we come up with the picture shown in Exhibit I-2. Analyzing this Exhibit, we see the following:

EXHIBIT I-2

EXAMPLE



- The incremental effects of previous action oral warning seems mainly due to the effect of previous action trader commitment. Traders which are given oral warnings also tend to commit to correcting the non-compliance.

- When food is introduced as a control variable, the import effect disappears. There is a negative relationship between food and import which indicates that importers tend to deal in products other than food. There is also a negative relationship between food and increase in compliance i.e, food establishments tend to have a lower mean increase in compliance. These two negative relationships produce a positive effect between import and increase in compliance (i.e., a negative multiplied by a negative produces a positive). Therefore, the model shows that importers tend to have a higher increase in compliance than all other trade levels, primarily because of their negative relationship with food.

- The effect of previous action disposal/return seems mainly due to the effect of food establishments. When food is taken into account, there is no difference in the increase in compliance.

Thus, in reporting differences in the increases in compliance, only previous action trader commitment and food are described as significant.

Significance levels are reported in the p notation. For example, p=.0324 implies a level of significance of .0324, i.e., we are 96.76% confident that the observed differences were not due to chance. Final models were based on the C_p statistic, so there was no necessary significant cut-off. However, almost all variables were significant at p=.2000. In reporting the regression models, t-values are also shown in order to illustrate the strength of relationships. The absolute value of the t-score, like the significance level, indicates the strength of the relationship. A t-score of 14 indicates a stronger relationship than one of 9, even though both have significance levels of .0000.

Missing Data

There is no definitive way of handling missing data. We felt that in order to make full usage of the percentage compliance value available in our database, it was necessary to impute values for the missing data. For many variables, a missing data item was imputed by the average of all known values, but for some we tried to maximize what was known about the establishment. For example, if we knew how many inspections occurred in the last year, say X, then we assumed that in the last 3 years (if this value is missing) 3 times X, occurred.

It should be noted that missing values for percentage compliance were never imputed, because these values were used to create the dependent variables in our basic models. As independent variables, missing values of percentage compliance were also not substituted. Missing values for percentage compliance occur mainly because a given establishment is not always inspected for all regulatory areas (i.e., labelling, quality and quantity). Thus, if an establishment was inspected for quality, but percentage quality compliance data were not available for consecutive inspections, then this set of inspection results could not be included in the basic model (but was included in the other difference models). There is, therefore, variation in the characteristics of establishments in the sub-sample for which a model was developed. This is true even when we were comparing the sub-sample for all models in a regulatory area.

LIMITATIONS

Given the restricted scope, time and budget available for this work, there are certain limitations of the study which are referred to below:

- First, the study was a pilot, conducted at the Toronto district office. Thus, the study results apply to that district office only and the establishments in its catchment area. Extrapolation of the findings to Canada as a whole cannot be made without a broader study involving district offices across Canada. Such a broader study may reveal distinctions among particular districts with respect to the effectiveness of compliance activities.

- Second, although the study involved an extensive data collection and analytical effort, we were not able to exhaust the type of data which could be collected and the analyses which could be undertaken. We believe that the study provides an excellent indication of the type of analyses that can be performed, but certainly, further work is possible, using either the existing database only or supplementing it with other data.

- Third, our study was limited to undertaking a review of files and the conduct of analyses on the data collected. We also reviewed some associated documents and spoke to program personnel in order to provide us with a solid understanding of the inspection process. However, a more in-depth study (e.g., interviews with traders, inspectors, etc.), which would provide a deeper understanding of the study results, could not be undertaken. We believe this type of work should be conducted as part of the ongoing evaluation of the Sub-activity.

These limitations should be kept in mind when reviewing this report. We do not, however, believe any of these limitations compromise the validity or usefulness of the findings.

REPORT ORGANIZATION

The next three chapters describe the results of our analyses in each category of inspection, namely, labelling, quality and quantity. A subsequent chapter describes our findings in relation to the mean compliance.

All these four chapters are organized in essentially the same manner and include:

- the final increase in percentage compliance models
- descriptive statistics for some variables
- other difference models, with related descriptive statistics.

The final chapter of the report summarizes the overall results of the study.

There are several appendices to the report. The appendices are introduced in the report in relation to the sections to which they pertain. Appendix A contains definitions for terminology used in this report. Examples of some forms found in the establishment files are included in Appendix B. A description of the final sample is shown in Appendix C. Appendix D contains a description of the modelling phase of this study. Detailed summaries for all labelling, quality, quantity and mean compliance models, other than increase in percentage compliance models, are provided in Appendices E, F, G and H, respectively.

II - LABELLING

This chapter will focus on compliance in the area of labelling.* In the Consumer Products Management Information System Definition and Instructions Manual (April, 1984), a problem-type label:

> "Refers to non-compliance with relevant legislation in respect to required label information or label information which is permitted, or prohibited assuming the product itself is in compliance. Compliance of labels may be determined without examining the product itself. Also includes acceptable and/or required marks under the Precious Metals Marking Regulations, assuming the article itself is in compliance."

The models and descriptive tables in this chapter, include only those inspections of establishments for which labelling was an area in which compliance was measured.

MODEL FOR INCREASE IN PERCENTAGE COMPLIANCE

As discussed in Chapter I, our basic models are difference models, which look at changes in compliance percentage between inspections. Thus our first model here relates changes in labelling compliance to a number of explanatory factors.

The final percentage compliance difference model for labelling is shown in Exhibit II-1 and II-2. The most important program intervention variable explaining increase in percentage compliance is previous action trader education. The coefficient for previous action trader education, .19, indicates that given two establishments similar in every respect except that only one has been given trader education in the previous inspection, the establishment with trader education is expected to have an increase in labelling compliance of 19% more than the one without trader education. In other words, trader education had an incremental effect of 19% in terms of increasing labelling compliance.

The other major findings are as follows:

- establishments which committed to eventual correction of all future production or shipments of goods in the previous inspection increased compliance by 10% compared to similar establishments which did not make such a commitment

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* This includes advertising and packaging.

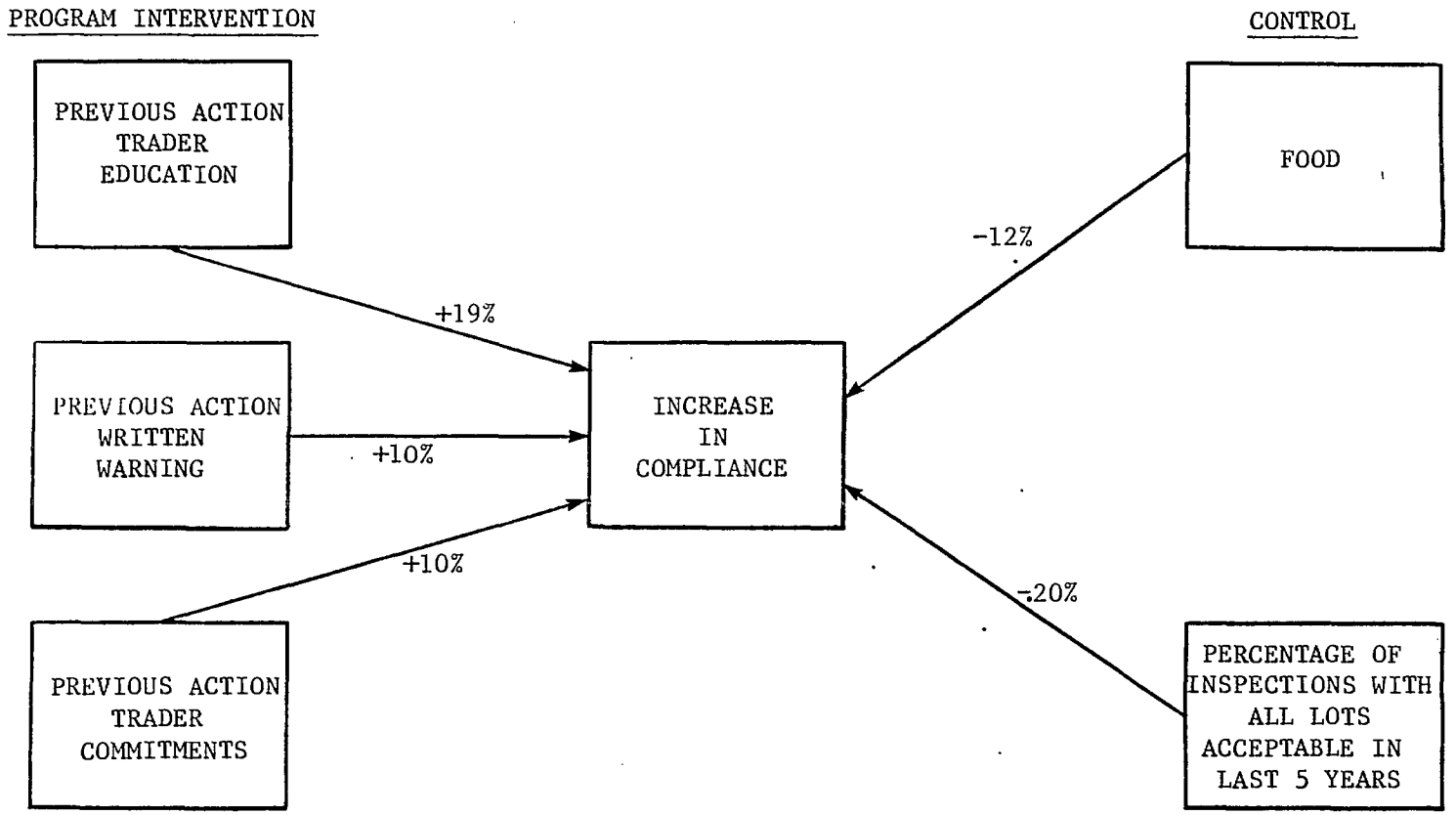
EXHIBIT II-1

MODEL FOR INCREASE IN PERCENTAGE COMPLIANCE: LABELLING

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Trader Education	.19	3.35	.001	Increase in compliance of 19% when action in the previous inspection involved trader education.
	Previous Action Trader Commitment	.10	1.85	.065	Increase in compliance of 10% when action in the previous inspection involved trader commitment
	Previous Action Written Warning	.10	1.60	.110	Increase in compliance of 10% when action in the previous inspection involved a written warning.
Control	Percentage of Inspection with all lots Acceptable in last 5 Years	-.0020	3.42	.001	For each 1% increase in the percentage of past inspections with all lots Acceptable, compliance decreased .20%
	Food	-.12	2.42	.016	Average decrease of 12% for food establishments
	Constant	.11			
					$C_p = 4$
					$R^2 = 0.111$
					N = 357

EXHIBIT II-2

LABELLING COMPLIANCE



- an establishment which received a written warning in the previous inspection, had an increase in compliance of 10% more than an establishment which did not receive a written warning (everything else being equal).

These findings are the basic ones related to program effectiveness. In other words, they tell us trader education, trader commitment, and written warnings as part of inspections are all effective instruments in bringing about increases in labelling compliance.

The other variables are matching or control variables. Their inclusion in the model allows for better estimation of the incrementality factors, but they are not measures of effectiveness. However, their interpretation may be interesting in terms of general patterns, and is provided below:

- each extra percent of past inspections which had all lots acceptable, decreased compliance by .20% (regression towards the mean effect*)

- food establishments tend to decrease in labelling compliance by 12% more than other establishments. This also implies that there is no difference between the increases in compliance for establishments in the other product classes (i.e., textile, precious metals and non-food).

These results are highlighted further in the descriptive statistics shown in Exhibit II-3. For example, we see:

- 60.0% of establishments which had previous action trader education, increased compliance by more than 10%, while only 23.8% of establishments which had previous action trader education increased by more than 10%

- of those establishments which had previous action trader commitment, 45.0% had increases in percentage compliance of more than 10% compared to 25.6% of establishments which had no previous action trader commitment

---

* Regression toward the mean signifies that particularly high values in one inspection will tend to be lower in the next (and vice-versa) due to normal statistical variability.

EXHIBIT II-3

LABELLING: VARIABLES IN THE FINAL MODEL BY CHANGES IN PERCENTAGE COMPLIANCE

	VARIABLE		CHANGE IN COMPLIANCE: DECREASE 10% +	DECREASE 0-10%	INCREASE 0-10%	INCREASE 10% +	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Actions:							
	Trader Education	- With	8.0%	15.9%	16.0%	60.0%	100.0%	(26.7%)
		- Without	23.1	43.7	9.4	23.8	100.0	(1.2)
	Trader Commitment	- With	13.4	31.7	10.0	45.0	100.0	(20.0)
		- Without	22.6	41.4	10.4	25.6	100.0	(1.7)
	Written Warning	- With	9.5	38.2	14.3	38.0	100.0	(14.9)
		- Without	22.5	40.0	9.8	27.6	100.0	(3.4)
	Food		25.7	28.1	18.2	28.0	100.0	(4.4)
	Non Food/Textiles/ Precious Metals		18.2	46.6	5.8	29.3	100.0	(5.0)
MEAN %*	Percentage of Past Inspections with all lots Acceptable		33.2%	57.7%	14.4%	17.9%	36.5%	

*N.B. These percentages are the mean values of the variable for each group of establishments. Establishments were divided into four groups based on the change in compliance. There is also one column - TOTAL - which is all establishments in the labelling subsample. For example, the first percentage in this row is 33.2% which indicates that establishments which had major decreases in compliance had a mean percentage of past inspections with all lots acceptable of 33.2% compared to a mean of 36.5% for the complete subsample.

- of those with previous action written warning, only 9.5% had major decreases in compliance, while 38.0% had major increases. In comparison, of those with no previous action written warning about equal percentages had major decreases and increases (i.e., 25.5% versus 27.6%)

- 25.7% of food establishments decreased more than 10% in compliance, while only 18.2% of other types of establishments decreased more than 10% in compliance.

In terms of net change and here net change refers to the overall mean percentage increase in compliance, we find:

- the average increase in compliance for establishments which received some education in the previous inspection was 26.7%, as opposed to 1.2% for those which did not

- establishments which did not receive a written warning in the previous inspection had an average increase of 3.4%, while those which did increased an average of 14.9%

- establishments which committed to eventual correction of the non-compliant product(s) in their previous inspections had a mean percentage increase in compliance of 20.0%, compared to 1.7% for those which had made no such commitment.

These descriptive statistics provide further evidence that when trader education, trader commitment and written warnings occur in an inspection, there is a higher tendency for increased percentage compliance in a subsequent inspection. Labelling compliance does not tend to increase as much when these actions do not occur in an inspection.

Effects of Other Variables

The section above dealt with the variables that entered the final model. This section focuses on those variables that are not in the final model.

The mean percentage increase in compliance for some establishment and all program intervention variables are shown in Exhibits II-4, II-5 and II-6. It should be noted that in these Exhibits, we describe variables excluded from the final model as well as some of those which are included. Also shown in these Exhibits is a description of the subsample for which labelling is an area in which compliance was measured. Labelling is probably the one area in which compliance is measured throughout all product classes and trade levels.

EXHIBIT II-4

NET CHANGE IN LABELLING COMPLIANCE
BY TYPE OF ESTABLISHMENT

	% OF CASE	NET CHANGE**
Trade Level		
Manufacture	35.6	2.8
Retail	33.6	2.0
Wholesale/Import	30.8	10.0
Product Class		
*Food	37.0	4.4
Textile	29.7	5.6
Precious Metals	7.8	-6.1
Non-Food	25.5	7.6
Establishment Size		
Small	27.2	4.8
Medium	24.9	9.2
Large	47.9	2.5

N = 357

* Variable in the final model.

** Mean percentage increase.

EXHIBIT II-5

NET CHANGE IN LABELLING COMPLIANCE
BY NUMBER OF PAST INSPECTIONS,
AND TIME BETWEEN INSPECTIONS

	% OF CASE	NET CHANGE*
Number of Inspections in Last 3 Years		
1	22.4	3.8
2-3	46.2	5.3
More than 3	31.4	4.7
Number of Inspections in Last 5 Years		
1-3	30.5	3.8
4-5	35.6	5.1
6-9	25.5	7.2
More than 9	8.4	-0.2
Time Between Current and Previous Inspections		
0-3 Months	20.4	6.4
3-6 Months	21.3	8.4
6-9 Months	20.2	2.6
9-12 MOnths	18.5	5.5
More than 12 Months	19.6	0.6

N = 357

* Mean percentage increase.

EXHIBIT II-6

NET CHANGE IN LABELLING COMPLIANCE
BY ACTIONS IN THE PREVIOUS INSPECTION

ACTION IN THE PREVIOUS INSPECTION	% OF CASES WITH ACTION	NET CHANGE** WITH ACTION	NET CHANGE** WITHOUT ACTION
*Trader Education	14.0	26.7	1.2
Information Letter	6.4	4.7	4.8
Trader Correction	50.7	10.5	-1.2
Oral Warning	3.4	9.6	4.6
*Written Warning	11.8	14.9	3.4
Seizure & Detention	7.0	5.5	4.7
*Trader Commitment	16.8	20.0	1.7
Voluntary Disposal/Return	8.7	0.0	33.1

N = 357

---

* Variable in the final model.

** Mean Percentage increase.

Exhibit II-4 describes establishment characteristics (trade level, product class and establishment size) and changes in compliance. Key features are indicated below:

- import establishments had a mean increase of 10.0%, compared to 2.8% and 2.0% for manufacturing and retail establishments, respectively
- establishments which deal in precious metals had a mean decrease in compliance, while establishments which deal in other products had a mean increase in compliance
- medium-size establishments had a higher mean increase in compliance (9.2%) than small (4.8%) and large (2.5%) size establishments.

Exhibit II-5 describes changes in compliance by number of past inspections and time between inspections. We see that:

- as the number of past inspections (for the last 3 years) increased, there are not large differences in the mean increase in compliance
- as the number of past inspections (for the last 5 years) increased the mean increase in compliance seems to increase and then decrease substantially (for 6-9 inspections increases of 7.2% compared with -0.2% for more than 9 inspections)
- as the number of months between inspections increased, the percentage increase in compliance appears to decrease (increases of 6.4% for 0-3 months versus 0.6% for more than 12 months).

Exhibit II-6 shows the changes in compliance by actions in the previous inspection. Some of the important findings relating to variables not in the final model are:

- the average increase in compliance for establishments which corrected the non-compliance in their previous inspection was 10.5%, as opposed to -1.2% for those which did not
- establishments which were given an oral warning in their previous inspection had a mean increase of 9.6% in compliance versus 4.6% for those establishments which were not

- establishments which had a previous action of voluntary disposal/return had no change in compliance, while establishments without this action had a mean increase of 33.1%. This indicates a negative relationship between this action and increases in compliance.

Each of the foregoing Exhibits (11-4 to 11-6) showed the relationship of specific control and program variables to increases in labelling compliance. These relationships, on their own, are statistically significant. However, in analyzing the interrelationships with the final model variables, and hence interpreting their exclusion from the model, we derived the picture shown in Exhibit II-7. Analyzing this Exhibit, we see the following:

- the import effect disappears when food is controlled for

- the precious metals effect disappears when percentage acceptable is controlled for

- the number of past inspections (for the last 5 years) effect disappears when food is controlled for. Food establishments are inspected more often then establishments in other product classes (in the area of labelling)

- the effect of time between inspections seems mainly due to the percentage of past inspection with all lots acceptable effect, i.e., the establishments with higher percentage of past inspections with all lots acceptable tend not to be re-inspected as quickly as establishments which have lower percentages of past inspections with all lots acceptable

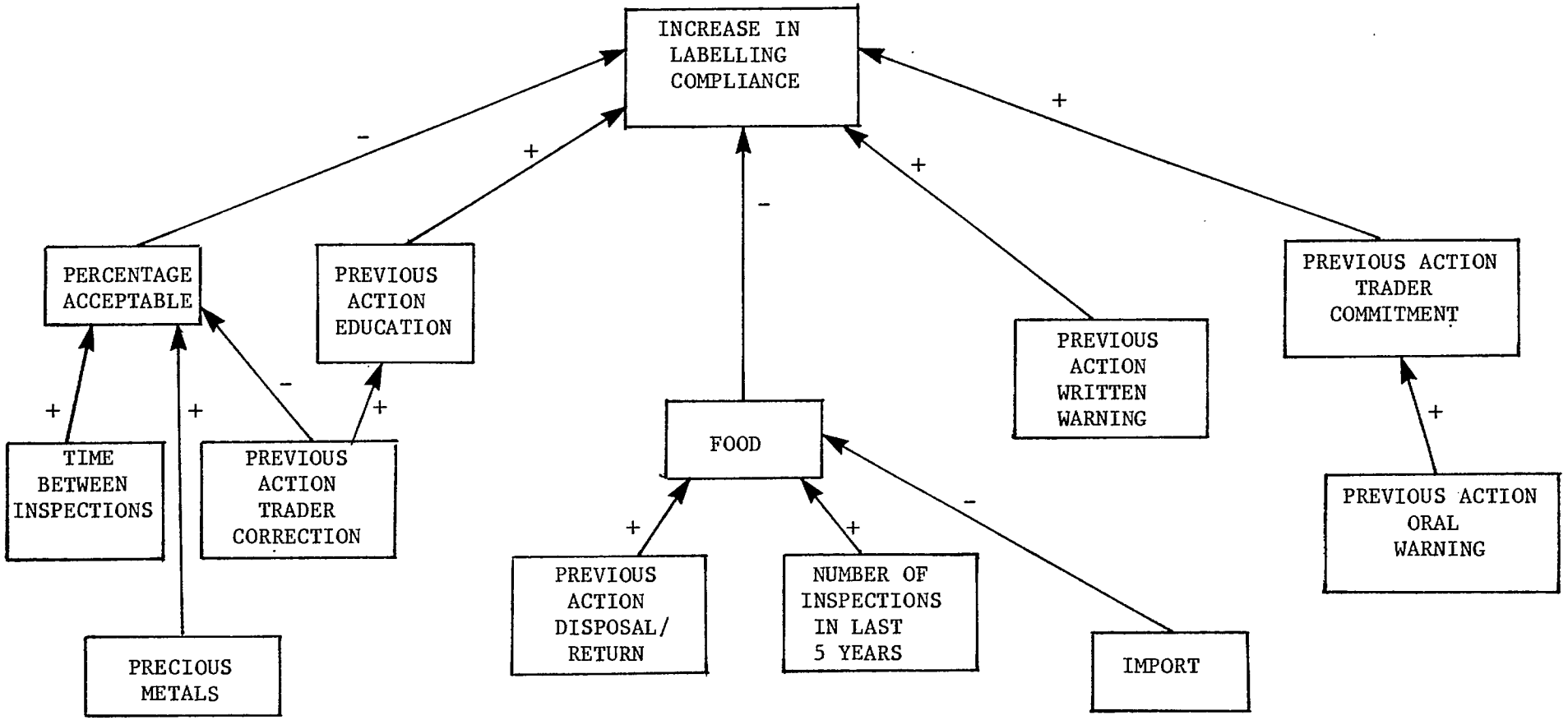
- establishments with previous action trader correction are establishments which had a low percentage of past inspections acceptable and had previous action trader education

- the effect of previous action oral warning seems mainly due to the effect of previous action trader commitment. Establishments which are given oral warnings also tend to commit to correcting the non-compliance

- the effect of previous action disposal/return seems mainly due to the effect of food establishments. When food is taken into account, there is no difference in the increase in compliance for establishments which had and those which did not have previous action disposal/return.

EXHIBIT II-7

EFFECTS OF OTHER INFLUENCES ON
INCREASE IN LABELLING COMPLIANCE



OTHER DIFFERENCE MODELS

Supplementary models were developed for changes or differences in the probability of an inspection with actions: all lots acceptable, a seizure and detention, and a written warning. The influence of program intervention and control variables on these changes is elaborated in Appendix E. Exhibits II-8, II-9 and II-10, illustrate the final other difference models. If we compare these models with the increase in percentage compliance model, we see that some of the same program intervention variables are having an incremental effect. For example:

- in Exhibit II-8, a previous action of trader education increased the probability of an inspection with all lots acceptable by 19%. Also, the probability of an inspection with all lots acceptable increased by 36%, when there was trader commitment in the previous inspection

- in Exhibit II-9, a previous action written warning decreased the probability of an inspection with a seizure and detention by 38%.

In addition to the variables that are common to the basic model (increase in percentage compliance), a number of other variables were identified as significantly influencing the probability of an inspection with a particular action. We can observe that:

- in Exhibit II-8, the probability that the next inspection will have all lots acceptable increased by 41% when the trader had to correct some non-compliance in the last inspection. Also, there was a 22% increase in probability of an inspection with all lots acceptable when voluntary disposal or returning of products was an enforcement action in the previous inspection

- in Exhibit II-10 a previous action information letter decreased the probability of an inspection with a written warning by 35%. With a seizure and detention as an enforcement action, there was a 29% decrease in probability that the next inspection will result in a written warning.

The results of the other difference models are shown further in the descriptive statistics in Exhibits II-11, II-12 and II-13. These Exhibits indicate the change in compliance status between the previous and current inspections for each of the three actions under consideration. For example, in the all lots acceptable model (Exhibit II-11), a change in compliance status from "unacceptable to acceptable" means that some of the lots were unacceptable in the

EXHIBIT II-8

LABELLING: INSPECTION WITH ALL LOTS ACCEPTABLE

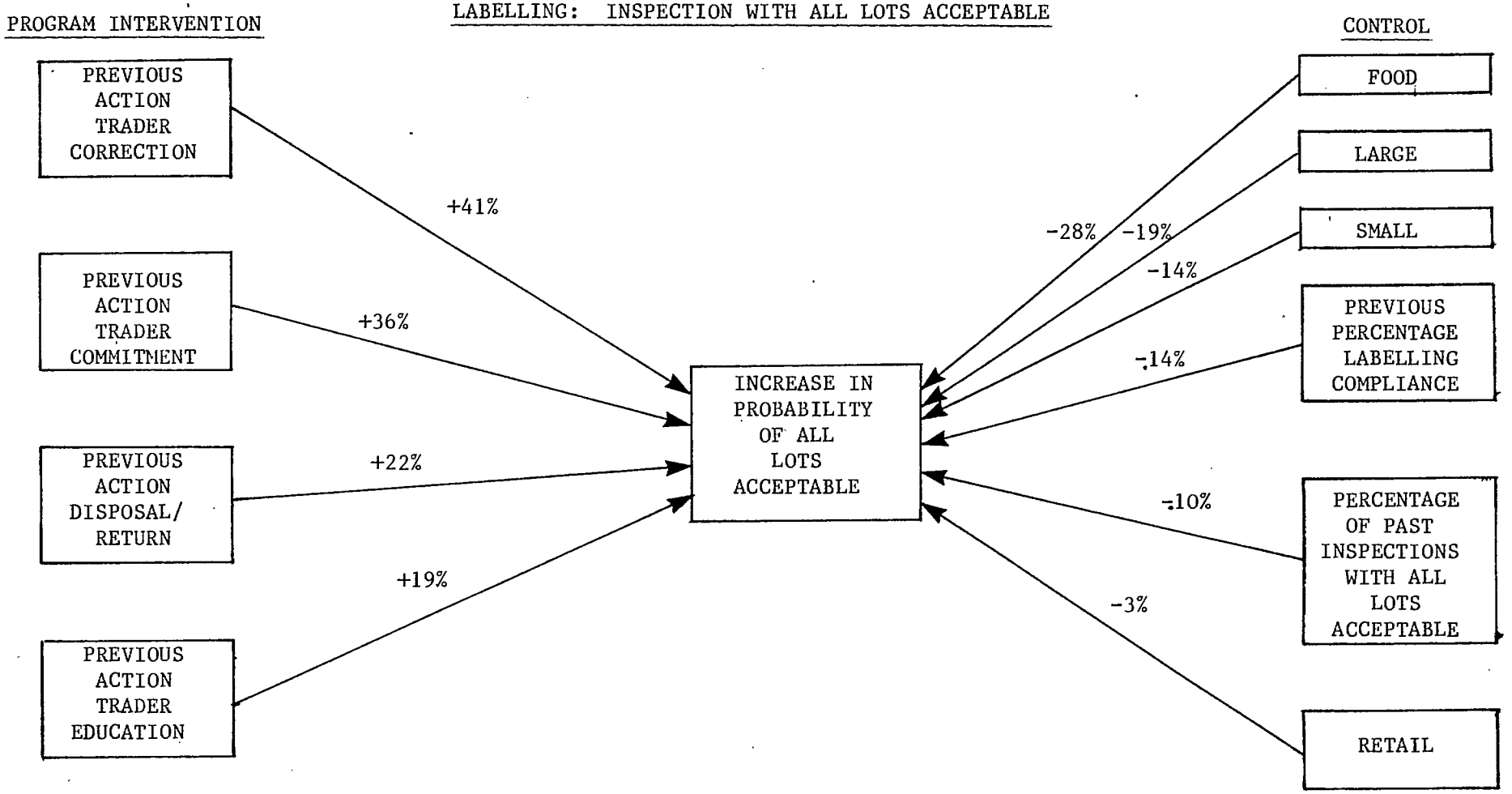


EXHIBIT II-9

LABELLING: INSPECTIONS WITH SEIZURES AND DETENTIONS

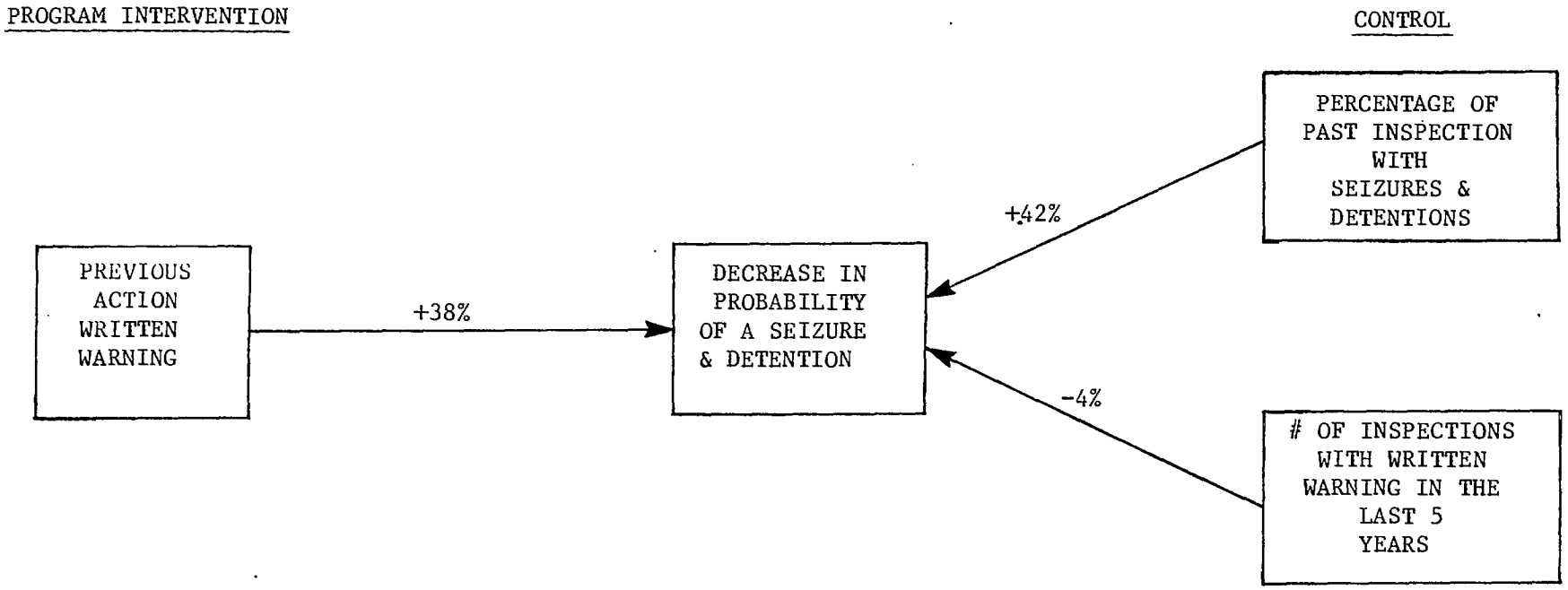


EXHIBIT II-10

LABELLING: INSPECTIONS WITH WRITTEN WARNINGS

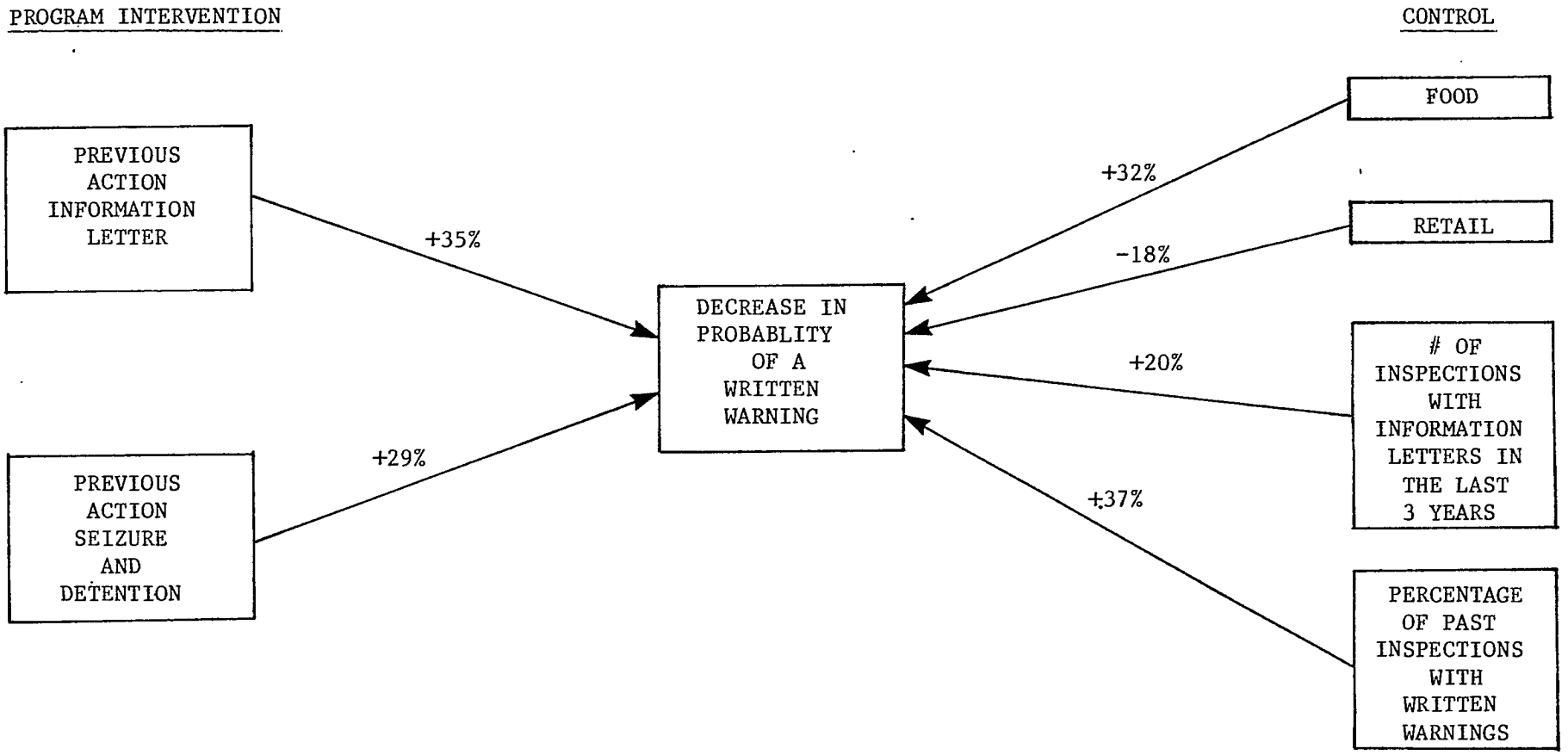


EXHIBIT II-11

LABELLING: VARIABLES IN THE FINAL ALL LOTS ACCEPTABLE MODEL
BY CHANGE IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

			CHANGE IN COMPLIANCE STATUS				
	VARIABLE		UNACCEPTABLE TO ACCEPTABLE	NO CHANGE	ACCEPTABLE TO UNACCEPTABLE	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action:						
	Trader Education	- With	46.6%	53.4%	0.0%	100.0%	(46.6%)
		- Without	16.3	70.0	13.7	100.0	(2.6)
	Trader Commitment	- With	39.0	61.0	0.0	100.0	(39.0)
		- Without	15.9	69.4	14.7	100.0	(1.2)
	Trader Correction	- With	29.0	71.0	0.0	100.0	(29.0)
		- Without	11.9	64.3	23.8	100.0	(-11.9)
	Voluntary Disposal/ Return	- With	9.1	90.9	0.0	100.0	(9.1)
		- Without	21.5	65.8	12.7	100.0	(8.8)
	Food		13.4	79.6	7.0	100.0	(6.4)
	Non-Food/Textile/Precious Metals		25.0	60.3	14.7	100.0	(10.3)
	Retail		12.3	79.2	8.5	100.0	(3.8)
	Manufacture/Import		24.4	62.4	13.2	100.0	(11.1)
	Large		17.3	66.9	15.8	100.0	(1.5)
	Medium		24.3	70.8	4.9	100.0	(19.4)
	Small		22.7	66.4	10.9	100.0	(11.6)
MEAN %*	Previous Percentage Labelling Compliance		51.0%	66.0%	96.2%	66.4%	
	Percentage of Inspections with all lots Acceptable		23.7	33.1	68.1	35.3	

* N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the labelling subsample.

EXHIBIT II-12

LABELLING: VARIABLES IN THE FINAL SEIZURE AND DETENTION MODEL
BY CHANGE IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	SEIZURE TO NO SEIZURE	NO CHANGE	NO SEIZURE TO SEIZURE*	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action Written Warning - With	25.4%	73.3%	1.5%	100.0%	(23.9%)
	- Without	2.3	97.4	0.3	100.0	(2.0)
MEAN %**	Percentage of Past Inspections with seizures and detentions	37.2%	3.7%	14.3%	5.7%	
MEAN #**	Number of Inspections with a Written Warning in the last 5 Years	0.48	0.14	0.50	0.16	

* Small Sample Size

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the labelling subsample.

EXHIBIT II-13

LABELLING: VARIABLES IN THE FINAL WRITTEN WARNING MODEL BY CHANGE IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

	VARIABLE	CHANGE IN COMPLIANCE STATUS: WARNING TO NO WARNING	NO CHANGE	NO WARNING TO WARNING*	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action:					
	Seizure and Detention - With	57.5%	42.5%	0.0%	100.0%	(57.5%)
	- Without	10.2	89.1	0.7	100.0	(9.5)
	Information Letter - With	55.0	42.0	2.6	100.0	(52.6)
	- Without	10.7	88.8	0.5	100.0	(10.2)
	Food	31.6	67.8	0.6	100.0	(31.1)
	Non Food/Textile/Precious Metals	3.5	95.8	0.7	100.0	(2.8)
	Retail	14.0	85.3	0.7	100.0	(13.2)
	Manufacture/Import	14.5	84.9	0.6	100.0	(13.9)
MEAN %**	Percentage of Past Inspections with written warnings	6.7%	1.5%	3.7%	2.2%	
MEAN #**	Number of Inspections with information letters in the past 3 years	0.11	0.03	0.00	0.04	

* Small Sample Size

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the labelling subsample.

previous inspection and in the current inspection, all lots were acceptable. On the other hand, a change in compliance from "acceptable to unacceptable" means that all lots were acceptable in the previous inspection and some were unacceptable in the current inspection. No change in compliance status means that the establishments had either all lots acceptable or some lots unacceptable in both the previous and current inspections. The net change in compliance status is also shown in these Exhibits. This is simply the difference between the changes in compliance status. Thus, in Exhibit II-11, this is the difference between the percentage of establishments that changed from "unacceptable to acceptable" and those that changed from "acceptable to unacceptable".

Focusing on the program intervention variables only, we see that the occurrence or non-occurrence of specific actions has a large effect on change in compliance status, for example:

- in Exhibit II-11, 46.6% establishments which had a previous action trader education changed from the unacceptable to acceptable status whereas only 16.3% of establishments without this action had a similar change in status. In terms of the net change in status, an overall net change of 46.6% is shown for establishments with versus 2.6% without the action. A similar finding is apparent for all the other program intervention variables (i.e., trader commitment, trader correction, voluntary disposal). In all cases with the action, the net change is from the unacceptable to acceptable status and without the action, the net change is either from the acceptable to unacceptable status or the reverse.

- in Exhibit II-12, we see that with the program intervention variable, previous action written warning, 25.4% of establishments changed from a seizure status in the previous inspection to no seizure in the current inspection. Without a written warning, only 2.3% of establishments had a similar change in status. Because a written warning generally precedes a seizure, a very small percentage of establishments changed from a no seizure to seizure situation, without a written warning (i.e., 0.3%). It should be noted that with a previous action written warning very few establishments (1.5%) changed from a no seizure to seizure situation, indicating the effectiveness of the written warning.

- in Exhibit II-13, 57.5% of establishments which had a seizure and detention changed from the warning to no warning status compared to 10.2% of establishments which did not have this action. In terms of net change, an overall net change of 57.5% is shown for

establishments with versus 9.5% for establishments without the action. This indicates that seizure and detention actions have a strong effect on improving compliance status (i.e., from warning to no warning). A similar effect on compliance status is found with a previous action information letter.

Exhibit II-14, summarizes the net change in compliance status for the three actions under consideration (all lots acceptable, seizure and detention, written warning) by the occurrence or non-occurrence of various enforcement actions in the previous inspection. We can observe that within each action, there are several enforcement actions which on their own are having an effect on changing compliance status, although they did not appear in the final other difference model. For example, in addition to the variables in the final model, oral warning and written warning are having an effect on changing compliance status with respect to all lots acceptable.

The Exhibit also shows that among actions, there are several enforcement actions which on their own are having an effect on changing compliance status although they do not appear in all the final other difference models. For example, we see that trader commitment, on its own has a statistically significant effect on all changes in compliance status being considered although it only appears in the final all lots acceptable model. We find a similar effect with trader education and written warning. We can therefore infer that trader education, written warning and trader commitment are having an effect at different stages of the inspection process. It is also interesting to note that these three enforcement actions all entered our basic (change in percentage labelling compliance) model.

EXHIBIT II-14

LABELLING: NET CHANGE IN COMPLIANCE STATUS BY ACTION

ACTION IN THE PREVIOUS INSPECTION	ACCEPTABLE NET CHANGE		SEIZURE & DETENTION NET CHANGE		WRITTEN WARNING NET CHANGE	
	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION
Trader Education	46.6%*	2.6%	6.5%	5.0%	16.1%	13.4%
Information Letter	3.3	9.2	23.7	3.6	52.6*	10.2
Trader Correction	29.0*	-11.9	5.0	5.4	14.2	13.3
Oral Warning	12.5	8.7	29.4	4.3	35.3	12.0
Written Warning	9.3	8.7	23.9*	2.0	NA	NA
Seizure and Detention	6.1	9.0	NA	NA	57.5*	9.5
Trader Commitment	39.0*	1.2	12.0	3.7	30.1	10.1
Voluntary Disposal/Return	9.1*	8.8	7.9	5.0	26.3	12.6

* Variables in the final model.

III - QUALITY

This chapter will deal with the regulatory area of quality compliance. Included under quality are problems related to:

- grades (permanent and condition defects)
- composition/substitution
- package misrepresentation
- claims/performance (misrepresentation and care of textiles).

The results in this chapter include only inspections in which an establishment was inspected for quality compliance.

MODEL FOR INCREASE IN PERCENTAGE COMPLIANCE

The increase in percentage quality compliance between consecutive inspections was modelled to determine what program intervention variables had an incremental effect on compliance. The final difference model is shown in Exhibits III-1 and III-2. The only program intervention variable in the final model is previous action trader commitment. Its coefficient of .24 indicates that given an establishment with trader commitment in its previous inspection and another without this previous action (everything else being equal), the establishment with the action will have an increase in compliance of 24% more than the other.

The control variables in this model indicate that:

- retailers increased compliance by 22% more than manufacturers and importers (everything else being equal)
- establishments with a greater number of inspections having written warnings decreased more in compliance (12% for every extra inspection).

These findings are further borne out by analyzing the descriptive statistics in Exhibit III-3. For example, of the establishments which committed to taking some future action in their previous inspection, 22.2% increased in compliance by more than 10%, while only 3.7% decreased in compliance by more than 10%. In comparison, of the establishments which had no previous action trader commitment, about equal percentages increased and decreased by more than 10% (i.e., 30.1% versus 26.0%). In terms of net change, we find that establishments which had this action increased on average of 13.5% as opposed to -0.8%

EXHIBIT III-1

MODEL FOR INCREASE IN COMPLIANCE PERCENTAGE: QUALITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Trader Commitment	.24	2.45	.016	Increase in compliance of 24% when action in the previous inspection involved Trader Commitment
Control	Retail	.22	2.42	.017	Average increase of 22% for retail establishments
	# of Inspections in last 5 years with Written Warnings	-.12	1.86	.066	For each inspection with a written warning in the last 5 years, compliance rate decreased by 12%
	Constant	-.15			
					$C_p = 2$
					$R^2 = 0.313$
					N = 107

EXHIBIT III-2

QUALITY COMPLIANCE

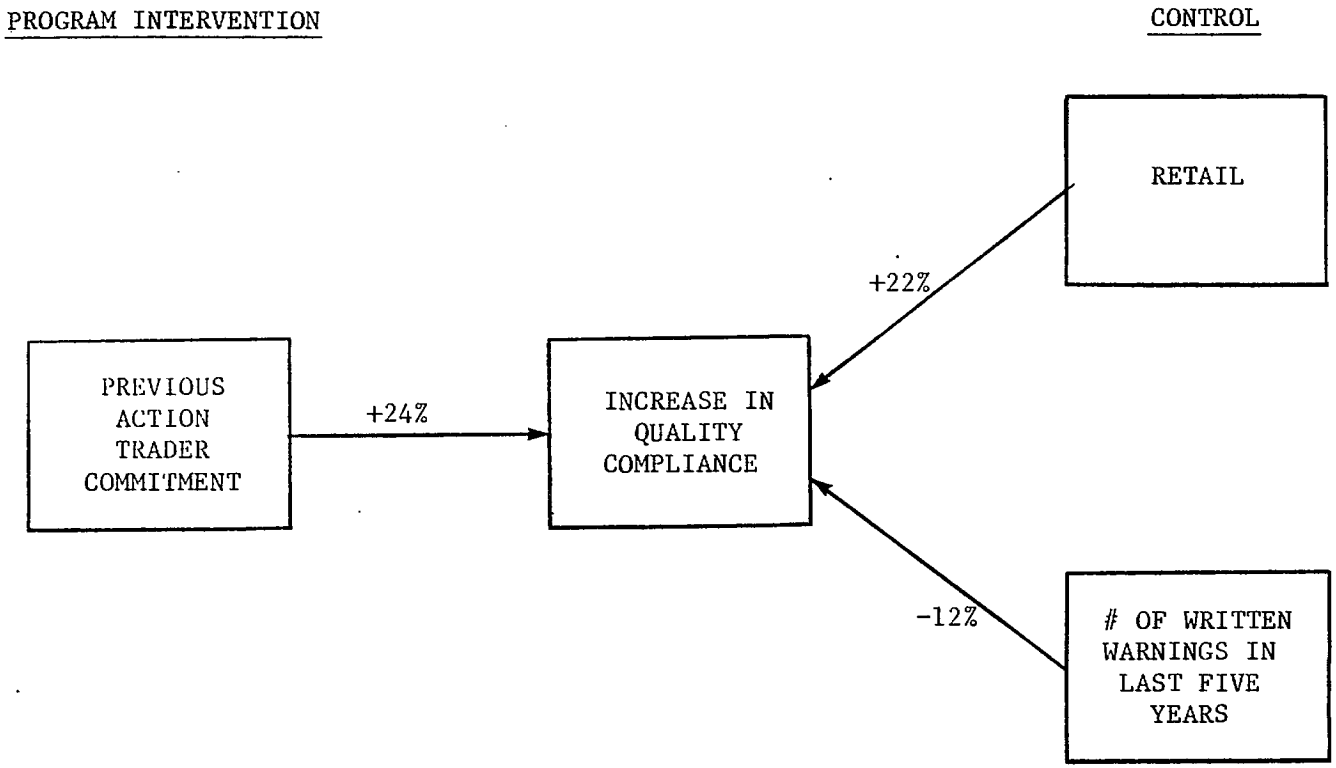


EXHIBIT III-3

QUALITY: VARIABLES IN THE FINAL MODEL BY CHANGES IN PERCENTAGE COMPLIANCE

		CHANGE IN COMPLIANCE					
	VARIABLE	DECREASE 10% +	DECREASE 0-10%	INCREASE 0-10%	INCREASE 10% +	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action Trader Commitment - With	3.7%	74.1%	0.0%	22.2%	100.0%	(13.5)
	- Without	28.8	36.3	10.0	25.0	100.0	(-0.8)
	Retail	26.0	32.9	11.0	30.1	100.0	(6.2)
	Manufacture/Import	14.7	73.5	0.0	11.8	100.0	(-4.4)
MEAN #*	Number of Inspections with a Written Warning in the Last 5 Years	0.58	0.18	0.46	0.21	0.30	

* N.B. These values are the means of the variable for the four groups of establishments (based on change in compliance) and for all establishments in the quality subsample.

for those which did not have this action. These descriptive statistics support the model finding that when trader commitment occurs in an inspection, there is a higher tendency for an increased percentage quality compliance than when there is no trader commitment.

Effects of Other Variables

Descriptive results for some establishment and all program intervention variables are shown in Exhibits III-4, III-5 and III-6. In Exhibit III-4, we see that the majority of the establishments inspected for quality were large food-retailers. Also shown in Exhibit III-4 are findings which relate to variables not in the final model. These are:

- establishments which deal in food products increased compliance by 4.7%, whereas establishments which deal in textiles and non-food products decreased compliance by 14.3% and 4.4%, respectively

- large-size establishments had a lower increase in compliance (1.7%) than medium (3.6%) and small (7.1%) size establishments.

Exhibit III-5 shows the changes in compliance by number of past inspections and time between inspections. Some of the results are:

- as the number of inspections (in the last 3 years) increases, there is a reduction in the mean percentage increase

- there does not appear to be any definite trend with increase in percentage compliance and the number of inspections in the last 5 years

- similarly, for time between inspections there is no definite trend.

Described in Exhibit III-6 are changes in percentage compliance by the occurrence or non-occurrence of enforcement actions in the previous inspections. Some important findings for variables not included in the final model are:

- the mean percentage increase for establishments which had no previous action trader correction was 8.1%, while the establishments which had this previous action had a decrease of 0.3%

- oral warnings appear to have a negative affect on increase in quality compliance (-10.9% for establishments with oral warnings and 4.1% for those without)

EXHIBIT III-4

NET CHANGE IN QUALITY COMPLIANCE
BY TYPE OF ESTABLISHMENT

	% OF CASE	NET CHANGE**
Trade Level		
Manufacture	12.1	-7.3
*Retail	68.2	6.2
Wholesale/Import	19.6	-2.6
Product Class		
Food	85.0	4.7
Textile	6.5	-14.3
Precious Metals	0.0	NA
Non-Food	7.5	-4.4
Establishment Size		
Small	13.1	7.1
Medium	22.4	3.6
Large	64.5	1.7

N = 107

---

* Variable in the final model.

** Mean percentage increase.

EXHIBIT III-5

NET CHANGE IN QUALITY COMPLIANCE BY NUMBER OF INSPECTIONS AND TIME BETWEEN INSPECTIONS

	% OF CASE	NET CHANGE*
Number of Inspections in Last 3 Years		
1	17.8	14.4
2-3	32.7	3.3
More than 3	49.5	-1.6
Number of Inspections in Last 5 Years		
1-3	21.5	13.7
4-5	24.3	0.3
6-9	40.2	2.6
More than 9	14.0	-7.8
Time Between Current and Previous Inspections		
0-3 Months	22.4	-0.2
3-6 Months	27.1	5.5
6-9 Months	27.1	-4.3
9-12 Months	10.3	8.7
More than 12 Monts	13.1	12.6

N = 107

** Mean percentage increase.

EXHIBIT III-6

NET CHANGE IN QUALITY COMPLIANCE BY ACTIONS IN THE PREVIOUS INSPECTION

ACTIONS IN THE PREVIOUS INSPECTION	% OF CASES WITH ACTION	NET CHANGE** WITH ACTION	NET CHANGE** WITHOUT ACTION
Trader Education	7.5	5.6	2.6
Information Letter	13.1	-3.2	3.7
Trader Correction	62.6	-0.3	8.1
Oral Warning	8.4	-10.9	4.1
Written Warning	27.1	0.7	3.6
Seizure and Detention	16.8	-3.4	4.1
*Trader Commitment	25.2	13.5	-0.8
Voluntary Disposal/Return	22.4	11.6	0.3

N = 107

---

* Variable in the final model.

** Mean percentage increase.

- establishments which had products seized and detained in their previous inspection had a mean percentage increase in compliance of -3.4% compared to 4.1% for those which did not

- the mean percentage increase for establishments with previous action disposal/return was 11.6% compared to 0.3% for establishments without.

These relationships on their own are statistically significant, but these variables do not enter the model. The reasons for this are illustrated in Exhibit III-7. We see that:

- the number of inspections in the last 3 years is positively correlated with the number of inspections with written warnings in the last 5 years, indicating that establishments with many previous written warnings are inspected more frequently

- the effect of previous action trader correction disappears when both previous action trader commitment and number of written warnings are controlled for

- the effect of previous action oral warning is mainly due to its relationship to the retail trade level. Establishments which received oral warnings in their previous inspection tend not to be at the retail trade level

- the effect of previous action seizure and detention is mainly due to its relationship to the retail trade level. Establishments which received a seizure and detention in their previous inspection tend not to be in the retail trade level

- the effect of previous action disposal/return is also due to its relationship to the retail trade level. Establishments which voluntarily disposed or returned products in their previous inspection tend to be retailers.

OTHER DIFFERENCE MODELS

The models for the change in probability of an inspection with: all lots acceptable, a seizure and detention, and a written warning are each illustrated in Exhibits III-8, III-9 and III-10, respectively. (These models are summarized further in Appendix F.)

EXHIBIT III - 7

EFFECTS OF OTHER INFLUENCES ON INCREASE IN QUALITY COMPLIANCE

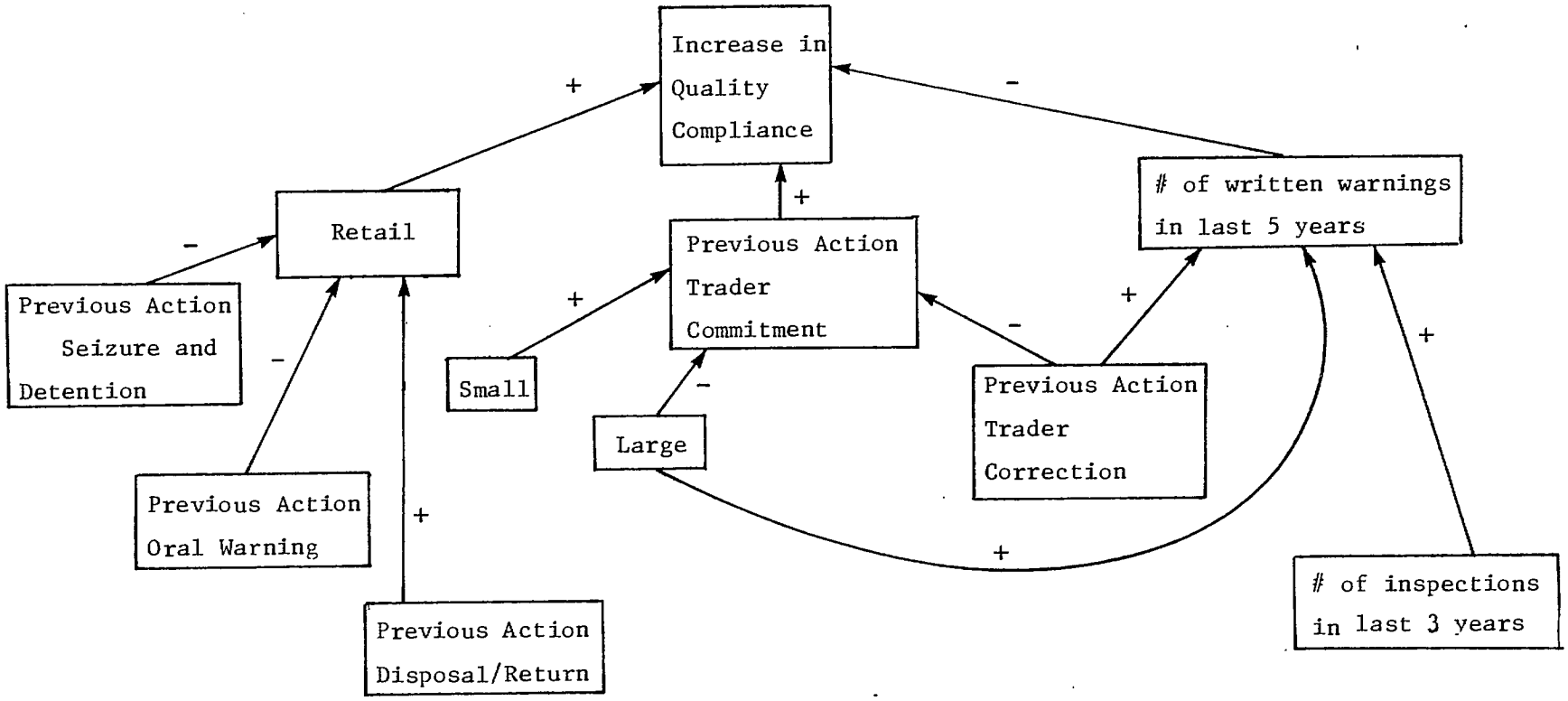


EXHIBIT III - 8

QUALITY: INSPECTIONS WITH ALL LOTS ACCEPTABLE

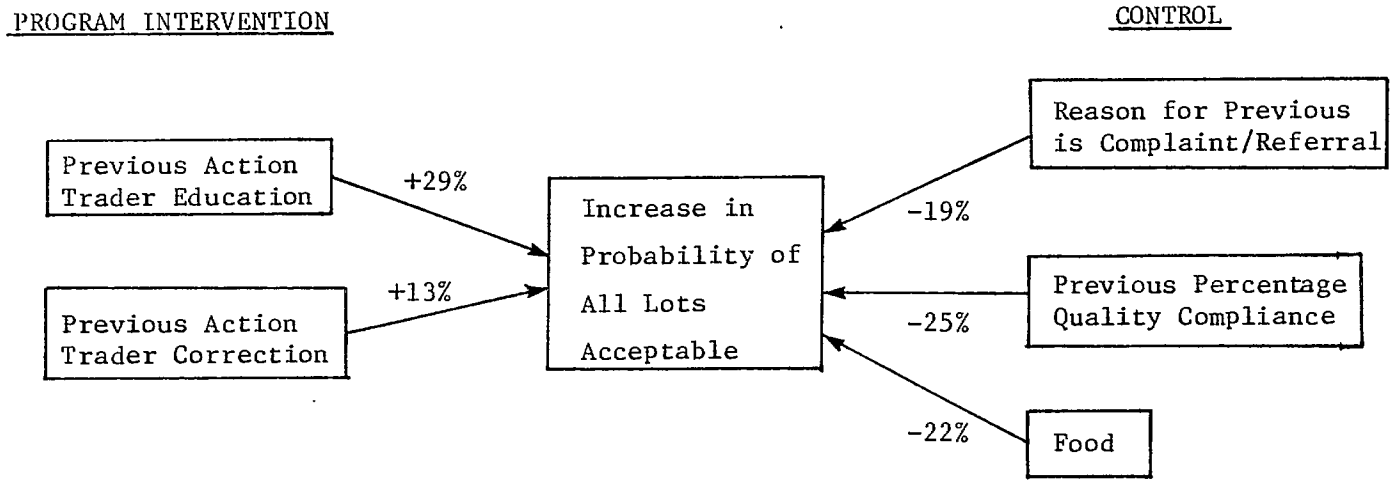


EXHIBIT III - 9

QUALITY: INSPECTIONS WITH SEIZURES AND DETENTION

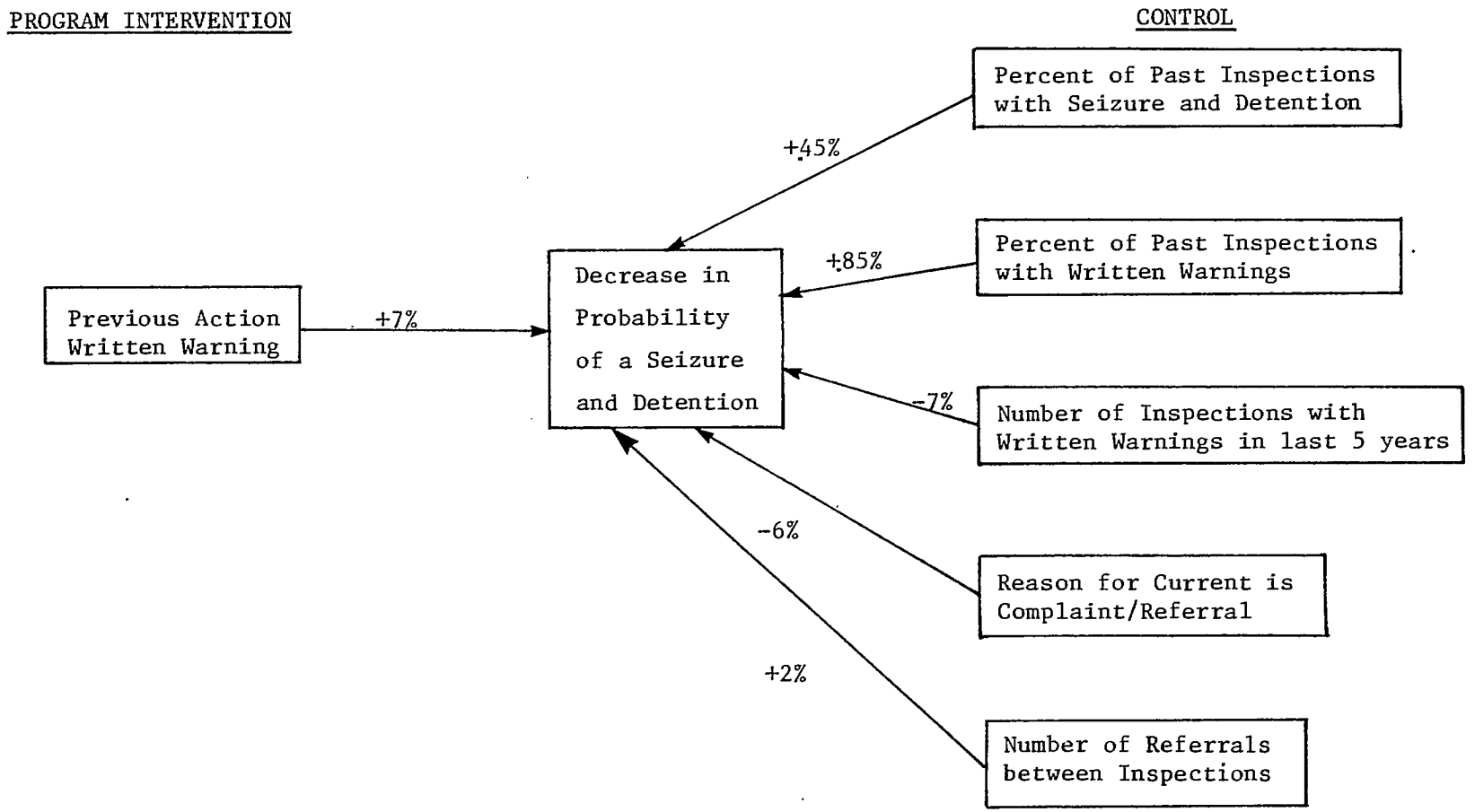
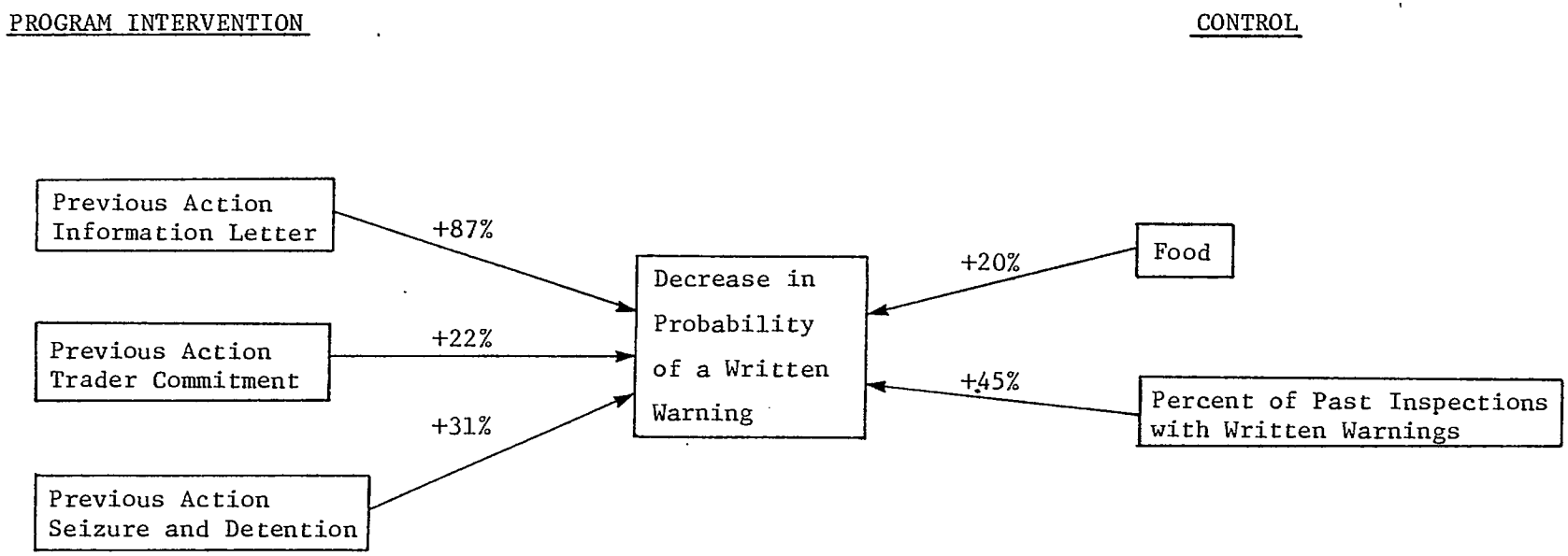


EXHIBIT III - 10

QUALITY: INSPECTIONS WITH WRITTEN WARNINGS



A number of variables which relate to program effectiveness were found to be significant in improving the probability of an inspection with a particular action. We found that:

- in Exhibit III-8, previous actions of trader education and trader correction are both effective instruments in increasing the probability of an inspection with all lots acceptable. Each of these actions increased the probability by 29% and 13%, respectively

- in Exhibit III-9, the probability of an inspection with a seizure and detention decreased by 7% when a written warning was given in the previous inspection

- in Exhibit III-10, the program intervention variable previous action trader commitment had an incremental effect in the decrease in probability of an inspection with a written warning model. This action decreased the probability of an inspection with a written warning by 22%. It should be noted that previous action trader commitment was also found to be incremental in the basic model discussed above. The other program intervention variables which were incremental in decreasing the probability of an inspection with a written warning were previous actions of an information letter and a seizure and detention. When an information letter is a part of the enforcement actions undertaken in the previous inspection, the probability of an inspection with a written warning decreased by 87%. Similarly, when a seizure and detention is an enforcement action, the probability decreased by 31%.

Descriptive statistics for these difference models are shown in Exhibits III-11, III-12 and III-13. The major findings are:

- in Exhibit III-11, we see that when trader education is an enforcement action there is a higher net change in compliance status than without this action. With this action there was a net change from the unacceptable to acceptable status of 38.9% and a net change from the unacceptable to the acceptable of only 10.6% without this action. A similar result is shown for previous action trader commitment. We can observe net changes of 30.0% with trader commitment compared to 6.7% without trader commitment

- in Exhibit III-12, 22.8% of establishments which had a written warning changed from the seizure to no seizure status compared to 4.3% of establishments which did not

EXHIBIT III-11

QUALITY: VARIABLES IN THE FINAL ALL LOTS ACCEPTABLE MODEL
BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	UNACCEPTABLE TO ACCEPTABLE	NO CHANGE	ACCEPTABLE TO UNACCEPTABLE	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action:					
	Trader Education - With	38.9%	61.1%	0.0%	100.0%	(38.9%)
	- Without	15.2	80.2	4.7	100.0	(10.6)
	Trader Commitment - With	30.0	70.0	0.0	100.0	(30.0)
	- Without	12.6	81.5	5.9	100.0	(6.7)
	Reason for Previous is					
	Complaint/Referral	13.2	81.1	5.7	100.0	(7.5)
	Planned/Sample/Other	19.8	76.7	3.4	100.0	(16.4)
	Food	10.7	87.6	1.7	100.0	(9.1)
	Non Food/Textile/Precious Metals	35.4	54.2	10.4	100.0	(25.0)
MEAN %	Percentage Quality Compliance in the Previous Inspection	40.2%	55.8%	85.7%	54.3%	

* N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status and for all establishments in the quality subsample.

EXHIBIT III-12

QUALITY: VARIABLES IN THE FINAL SEIZURE AND DETENTION MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLINACE STATUS				
	VARIABLE	SEIZURE TO NO SEIZURE	NO CHANGE	NO SEIZURE TO SEIZURE*	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action Written Warning - With	22.8%	77.2%	0.0%	100.0%	(22.8%)
	- Without	4.3	95.2	0.5	100.0	(3.7)
	Reason for Current is					
	- Complaint/Referral	11.3	88.7	0.0	100.0	(14.5)
	- Planned/Sample/Other	6.0	93.4	0.6	100.0	(5.4)
MEAN %**	Percentage of Past Inspections with:					
	- Written Warnings	11.9%	2.7%	0.0%	3.5%	
	- Seizures and Detentions	4.6	20.7	0.0	9.7	
MEAN #**	Number of Inspections with a Written Warning in the last 5 Years	0.46	0.25	0.00	0.27	
	Number of Referrals received between inspections	2.05	0.51	0.00	0.65	

* Small Sample Size

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the quality subsample.

EXHIBIT III-13

QUALITY: VARIABLES IN THE FINAL WRITTEN WARNING MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	WARNING TO NO WARNING	NO CHANGE	NO WARNING TO WARNING*	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Actions:					
	Information Letter - With	70.4%	25.9%	3.7%	100.0%	(66.7%)
	- Without	17.1	82.5	0.5	100.0	(16.6)
	Trader Commitment - With	42.4	57.6	0.0	100.0	(42.4)
	- Without	17.5	81.5	0.9	100.0	(15.7)
	Seizure & Detention - With	57.6	42.4	0.0	100.0	(57.6)
	- Without	16.8	82.1	1.1	100.0	(16.6)
	Food	33.6	65.8	0.6	100.0	(32.9)
	Non Food/Textile/Precious Metals	5.4	93.4	1.1	100.0	(4.3)
MEAN %**	Percentage of Past Inspections with written warnings	7.2%	2.4%	5.6%	3.5%	

* Small Sample Size

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the quality subsample.

have this action. As indicated in an earlier chapter, a written warning generally precedes a seizure and detention, therefore the fact that no establishments which had a written warning changed from a no seizure to seizure situation, reflects the effectiveness of a written warning

- in Exhibit III-13, we see that 70.4% of establishments which received an information letter changed from the warning to no warning status compared to only 17.1% of establishments which received no information letter. In terms of net change, there is an overall change from the warning to no warning status of 66.7% with versus 16.6% without previous action information letter. Similar findings are found with the other two program effectiveness variables -- previous action trader commitment and previous action seizure and detention.

A summary of the net change in compliance status for the three actions (all lots acceptable, seizure and detention and written warning) by various other enforcement actions in the previous inspection, is provided in Exhibit III-14. This Exhibit shows that some intervention variables which are not in the final model are related, on their own, to the change in compliance status. For example, in addition to written warnings, previous actions of -- information letter, oral warning and trade commitment are having an effect on changing the seizure and detention compliance status.

Another interesting result which is shown in this Exhibit is that although previous action trader commitment only entered the final model for a written warning, on its own, it has a statistically significant effect on all changes in compliance status. We see that in the case of an inspection with all lots acceptable, there is a net change of 30.0% with trader commitment versus 6.7% without trader commitment. The net change in status of an inspection with a seizure and detention is 16.9% with versus 5.4% without trader commitment. Thus, we can conclude that trader commitment is effective in improving the compliance status at different stages of an inspection. It is also interesting to note that trader commitment was also effective in bringing about an increase in percentage quality compliance.

EXHIBIT III-14

QUALITY: NET CHANGE IN COMPLIANCE STATUS BY ACTION

ACTION IN THE PREVIOUS INSPECTION	ACCEPTABLE NET CHANGE		SEIZURE & DETENTION NET CHANGE		WRITTEN WARNING NET CHANGE	
	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION
Trader Education	38.9*	10.6	6.5	8.5	22.6	22.1
Information Letter	9.1	14.3	29.6	5.5	66.7*	16.6
Trader Correction	17.3*	8.5	5.6	10.9	22.4	21.8
Oral Warning	8.3	14.0	35.7	6.5	42.9	20.9
Written Warning	15.6	12.9	22.8*	3.7	NA	NA
Seizure and Detention	8.0	14.6	NA	NA	57.6*	16.6
Trader Commitment	30.0	6.7	16.9	5.4	42.4*	15.7
Voluntary Disposal/Return	3.6	15.6	8.6	8.1	25.7	21.5

* Variables in the final model.

IV - QUANTITY

This chapter centres on compliance in the area of quantity. According to the Consumer Products MIS Manual, a quantity problem:

> "Refers to a product of which the actual quantity is less than the declared quantity (below tolerance re: net contents)."

The models and descriptive tables that are shown in this chapter are only applicable to inspections in which products were examined for quantity reasons.

MODEL FOR INCREASE IN PERCENTAGE COMPLIANCE

The final model for the difference in percentage quantity compliance is shown in Exhibits IV-1 and IV-2. The only program intervention variable in this final model is time between current and previous inspections. Its coefficient of -.01 indicates that given two establishments that have been previously inspected, the establishment that has not been reinspected will decrease in quantity compliance by 1% per month more than the establishment that has been reinspected.

The results for the control variables indicate that:

- establishments which has a higher percentage of past inspections with written warnings tend to decrease in compliance by .54% for every 1% difference more than other establishments (everything else being equal)

- establishments which were previously inspected for complaint or referral reasons had an increase in compliance of 13% more than those which were not previously inspected for these reasons (everything else being equal)

- when all lots were acceptable in the previous inspection, an establishment decreased in compliance 1% more than a similar establishment which did not have all lots acceptable (i.e., regression towards the mean effect)

- for establishments which differ only on the basis of size, the small-size establishments increased in quantity compliance by 10% more than the large and medium size ones.

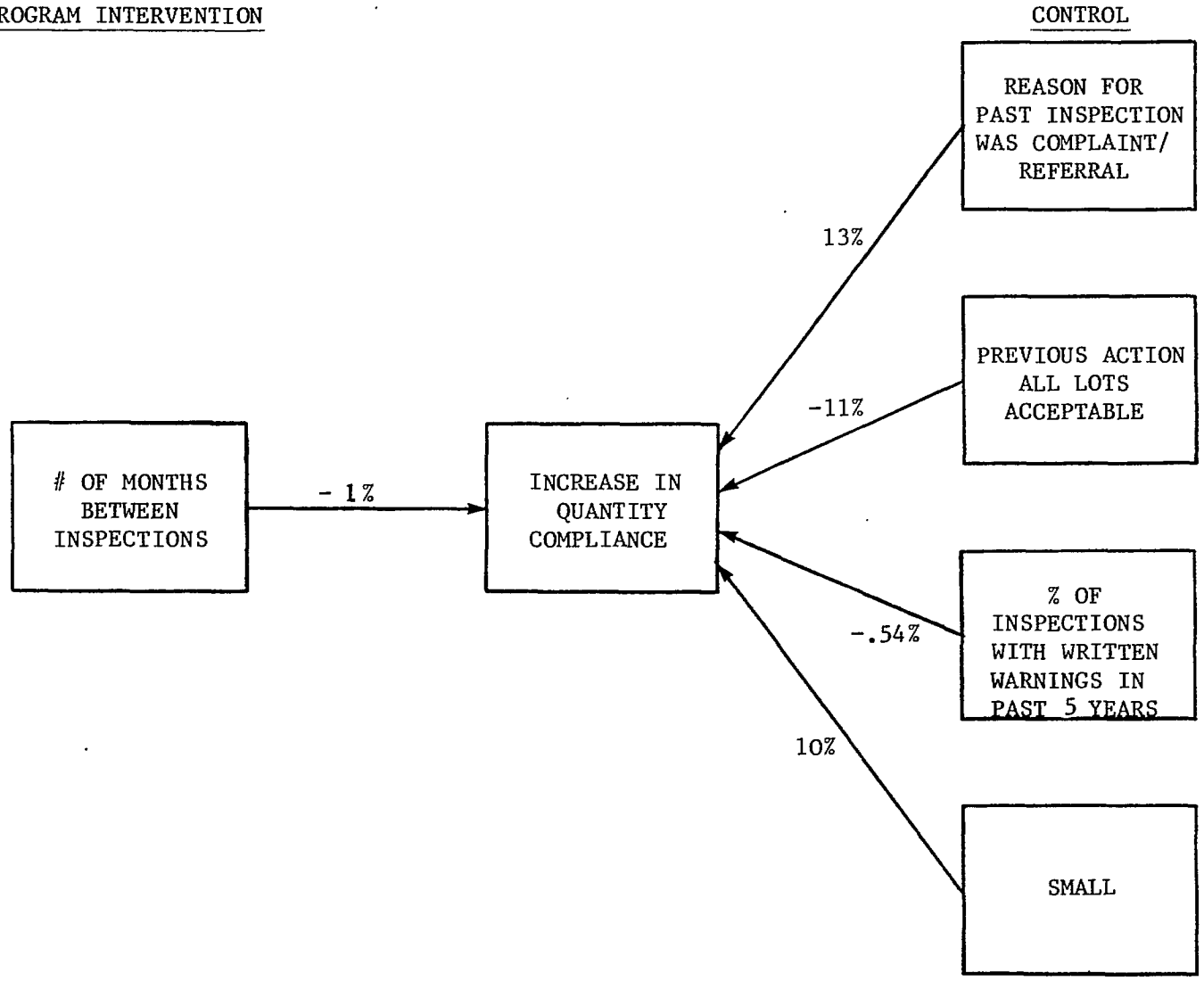
EXHIBIT IV-1

MODEL FOR INCREASE IN COMPLIANCE PERCENTAGE: QUANTITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Time between inspections	-.01	2.00	.049	Compliance decreased 1% for each extra month between inspection
Control	Percentage of Inspections with written warnings in the past 5 years	-.0054	2.06	.042	For each 1% increase in percentage of past inspections with written warnings, compliance decreased .54%
	Reason for Previous Inspection was referral/complaint	.13	2.02	.047	Average increase of 13% when the reason for the previous inspction in referral/complaint
	Previous Action all lots acceptable	-.11	1.88	.064	Compliance decreased 11% when all lots were acceptable in the previous inspection
	Small	.10	1.10	.276	Average increase of 10% for small establishments
	Constant	.10			
					$C_p = 6$ $R^2 = 0.162$ N = 88

EXHIBIT IV-2

QUANTITY COMPLIANCE



These results are shown further in the descriptive statistics provided in Exhibit IV-3 where we see:

- the average number of months between inspections for establishments which decreased in compliance is greater than for those which increased in compliance (8.17 and 8.63 versus 7.73 and 5.38). Thus, the longer the time between inspections, the greater the likelihood of decreased compliance

- similarly, for the mean percentage of past inspections with written warnings (the mean percentage for those which decreased in compliance was 10.7% and 3.3% versus 3.1% and 2.7% for those which increased in compliance)

- no establishments which were previously inspected for complaint or referral reasons decreased more than 10%. In comparison, 15.4% of establishments which were previously inspected for other than complaint or referral reasons decreased more than 10%

- of the establishments which had all lots acceptable in their previous inspection, none had large increases in percentage compliance, while of the establishments which did have all lots acceptable, 16.7% had large increases in compliance

- 40.0% of small-size establishments had major increases in compliance, compared to only 16.9% of large and medium size establishments.

Effects of Other Variables

Although some variables are not in the final model, they may have some statistically significant effects on their own. Exhibits IV-4, IV-5 and IV-6 show the mean percentage increase in quantity compliance for some control and program intervention variables. Some of the interesting relationships which involve variables not in the final model are described below:

- in Exhibit IV-4, the mean percentage increase for importers was 10.5, compared to -1.3 and 0.9 for manufacturers and retailers, respectively

- in Exhibit IV-5, the number of inspections occurring in the last 3 years appears to be negatively related to percentage increase in compliance. There is a mean percentage increase for establishments with no more than 3 inspections and a mean percentage decrease for those with more than 3 inspections

EXHIBIT IV-3

QUANTITY: VARIABLES IN THE FINAL MODEL BY CHANGES IN PERCENTAGE COMPLIANCE

		CHANGE IN COMPLIANCE					
	VARIABLE	DECREASE 10% +	DECREASE 0-10%	INCREASE 0-10%	INCREASE 10% +	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Reason for the Previous is						
	- Complaint/Referral	0.0%	40.0%	30.0%	30.0%	100.0%	(13.3%)
	- Planned/Sample/Other	15.4	43.6	24.4	16.7	100.0%	(-0.3)
	Previous Action All Lots Acceptable - With	7.7	76.9	15.4	0.0	100.0	(-7.4)
	- Without	14.7	37.3	26.7	21.3	100.0	(2.8)
	Small	20.0	20.0	20.0	40.0	100.0	(8.2)
	Large/Medium	13.3	44.6	25.3	16.9	100.0	(0.8)
MEAN %*	Percentage of Past Inspections with Written Warnings	10.7%	3.3%	3.1%	2.7%	4.2%	
MEAN #*	Number of Months Between Current and Previous Inspections	8.17	8.63	7.73	5.38	7.75	

* N.B. These values are the means of the variable for the four groups of establishments (based on change in compliance) and for all establishments in the quantity subsample.

EXHIBIT IV-4

NET CHANGE IN LABELLING COMPLIANCE
BY TYPE OF ESTABLISHMENT

	% OF CASE	NET CHANGE**
Trade Level		
Manufacture	20.5	-1.3
Retail	70.5	0.9
Wholesale/Import	9.1	10.5
Product Class		
Food	87.5	0.9
Textile	0.0	NA
Precious Metals	0.0	NA
Non-Food	12.5	3.8
Establishment Size		
*Small	5.7	8.2
Medium	25.0	2.2
Large	69.3	0.4

N = 88

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* Variable in the final model.

** Mean percentage increase.

EXHIBIT IV-5

NET CHANGE IN QUANTITY COMPLIANCE
BY NUMBER OF PAST INSPECTIONS
AND TIME BETWEEN INSPECTIONS

	% OF CASE	NET CHANGE**
Number of Inspections in Last 3 Years		
1	11.4	0.6
2-3	34.1	4.3
More than 3	54.5	-0.4
Number of Inspections in Last 5 Years		
1-3	12.5	2.4
4-5	23.9	2.9
6-9	44.3	-1.4
More than 9	19.3	4.7
*Time Between Current and Previous Inspections		
0-3 Months	14.8	9.8
3-6 Months	29.5	4.2
6-9 Months	27.3	-4.5
9-12 MOnths	11.4	0.8
More than 12 Months	17.0	-1.4

N = 88

* Variable in the final model

** Mean percentage increase.

EXHIBIT IV-6

NET CHANGE IN QUANTITY COMPLIANCE
BY ACTIONS IN THE PREVIOUS INSPECTION

ACTION IN THE PREVIOUS INSPECTION	% OF CASES WITH ACTION	NET CHANGE*	
		WITH ACTION	WITHOUT ACTION
Trader Education	3.4	2.0	1.3
Information Letter	10.2	-0.7	1.5
Trader Correction	70.5	2.8	-2.2
Oral Warning	4.5	0.2	1.3
Written Warning	19.3	-1.6	2.0
Seizure & Detention	11.4	4.9	0.8
Trader Commitment	22.7	1.8	1.1
Voluntary Disposal/Return	8.0	3.8	1.1

N = 88

* Mean percentage increase.

- in Exhibit IV-6, we find that three other previous actions -- trader correction, written warning and seizure and detention are effective, on their own, in increasing percentage compliance. Establishments with previous action trader correction had a mean increase of 2.8% compared to -2.2% for inspections without this action. Establishments which did not receive a written warning had a mean percentage increase of 2.0%, while those which received a warning had a percentage decrease of 1.6%. The mean increases in compliance for establishments which had products seized and detained was 4.9%, compared to only 0.8% increases for the other establishments.

To understand the exclusions of the variables -- import, number of inspections in the last 3 years and previous actions of trader correction, written warning and seizure and detention from the final model, we must study their interrelationship with the variables in the model. These interrelationships are illustrated in Exhibit IV-7. We see that:

- the import variable is positively related to small establishments, i.e., importers tend to be small establishments

- the number of inspections (in the last 3 years) effect disappears when time between inspections is controlled for. The more time between the current and the previous inspections, the less likely it is that an establishment will have had several inspections in the last 3 years

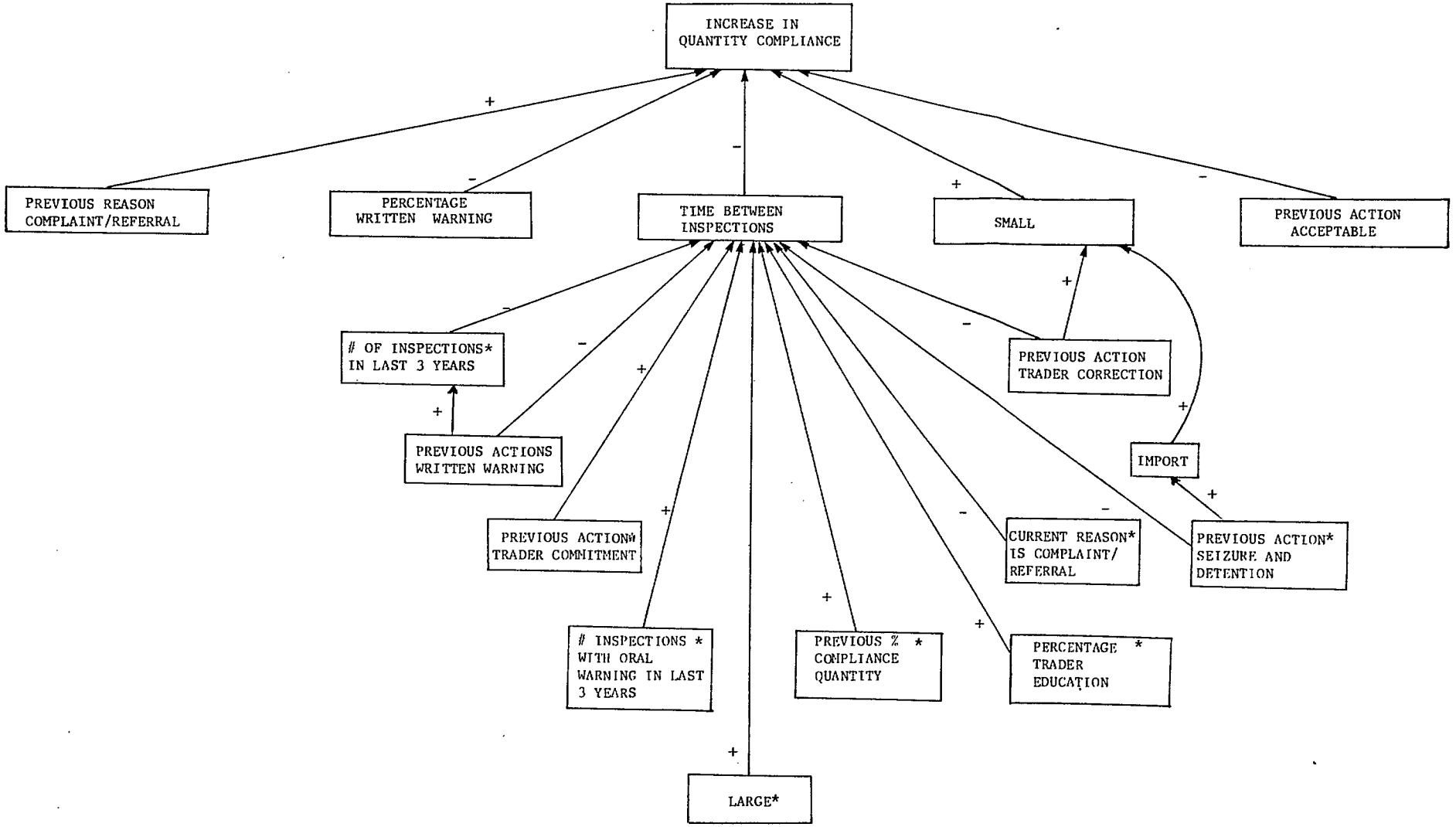
- the effect of previous action trader correction seems mainly due to the effect of time between inspections and small establishment variables. Establishments which corrected any non-compliance in the last inspection, tend to be small establishments which were reinspected sooner than they would have been, if they did not have to make any corrections

- when both the number of inspections (in the last 3 years) and time between inspections are controlled for, the effect of previous action written warning disappears

- establishments which had products seized and detained in their last inspection are small importers which have been reinspected sooner than they would have had they not had products seized and detained.

EXHIBIT IV - 7

EFFECTS OF OTHER INFLUENCES ON INCREASE IN QUANTITY COMPLIANCE



* These variables were in the final Time Between Inspections model (for quantity only) which is included in Appendix D.

Also shown in Exhibit IV-7 are variables which were not described above, but were included since they were variables in the model for time between inspections.* The time between inspections model is summarized in Appendix G. Some of the major findings, other than those listed above, are:

- establishments are reinspected sooner when the reason for reinspection is because of complaints or referrals (everything else being equal)

- for establishments which are similar except with respect to size, the large-size establishments will not be reinspected as soon as small and medium size establishments

- establishments which make a commitment (everything else being equal) will be given more time to make a correction before they are reinspected.

OTHER DIFFERENCE MODELS

Additional models were developed for the difference in probability of an action having occurred in consecutive inspections. The three actions which were considered were -- all lots acceptable, a seizure and detention, and a written warning. These models are illustrated in Exhibits IV-8, IV-9 and IV-10. A more complete summary for each model is included in Appendix G.

The program intervention variables which have an incremental effect are:

- in the all lots acceptable model, previous action trader correction and previous action seizure and detention (Exhibit IV-8)

- in the seizure and detention model, time between inspections and previous action written warning (Exhibit IV-9)

- in the written warning model, number of inspections in the last 5 years and previous action information letter (Exhibit IV-10).

All of these intervention variables, except previous action information letter, also showed a statistically significant relationship, either through the model and/or on their own, with the increase in percentage compliance variable.

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* This model was developed to further our understanding of the affects of the inspection process on the time between inspections.

EXHIBIT IV - 8

QUANTITY: INSPECTION WITH ALL LOTS ACCEPTABLE

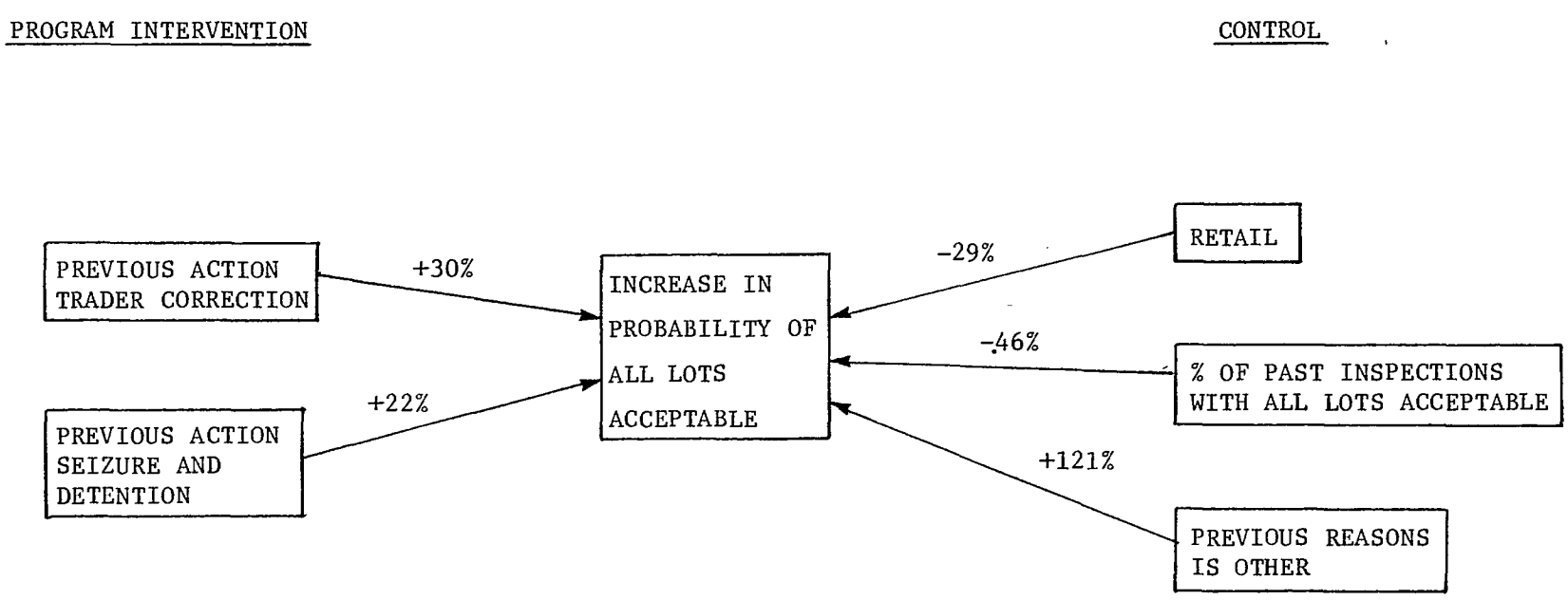


EXHIBIT IV - 9

QUANTITY: INSPECTIONS WITH SEIZURES AND DETENTIONS

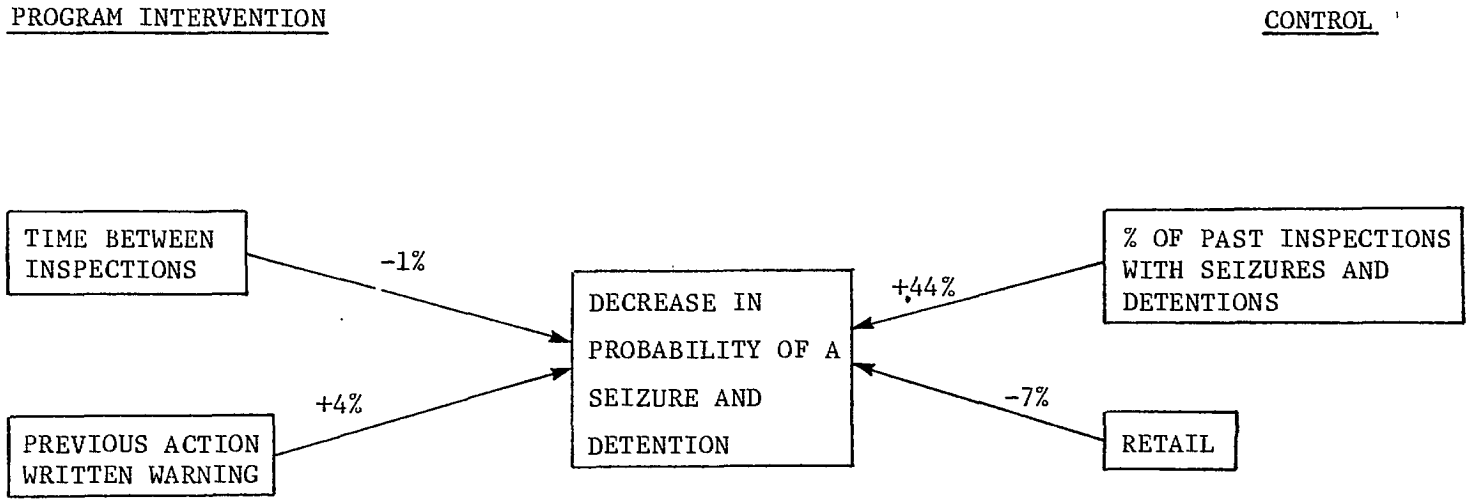
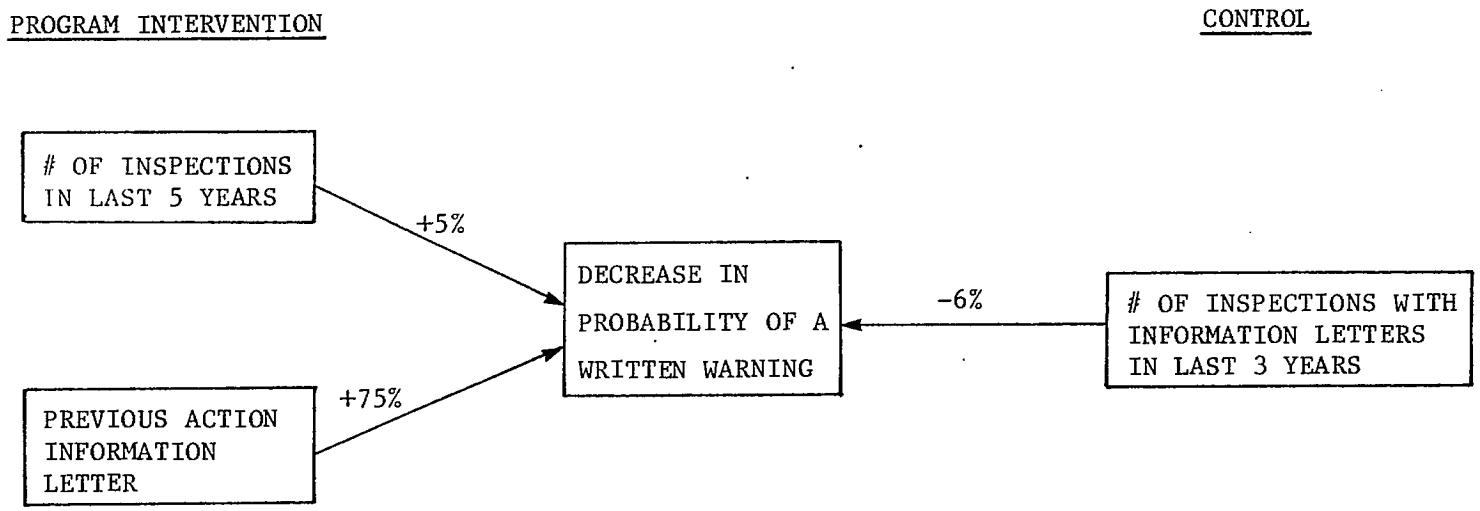


EXHIBIT IV - 10

QUANTITY: INSPECTIONS WITH WRITTEN WARNINGS



The program intervention variable, time between inspections, was in the percentage compliance model as well as in the model for the probability of an inspection with a seizure and detention. In the latter model, its coefficient, -.01, implies that if one establishment is reinspected before the other, then the probability of a seizure and detention for the reinspected establishment will be lower, by 1% per month, than for the non-reinspected establishment (everything else being equal).

The results for all the difference models in this section are highlighted further in the descriptive statistics shown in Exhibit IV-11, IV-12 and IV-13. For example, in Exhibit IV-11, we find that none of the establishments which had previous action trader correction changed from the acceptable to unacceptable status, while 33.9% of establishments which had no previous action trader correction changed from the acceptable to unacceptable status. In terms of net change, establishments which had previous action trader correction had a net change from the unacceptable to acceptable status whereas the establishments which did not have previous action trader correction had a net change from the acceptable to unacceptable status. This indicates that trader correction is an effective tool in improving compliance status with respect to all lots acceptable. Similar findings depicting the other enforcement actions which were found to be effective in each model are evident in Exhibit IV-11, IV-12 and IV-13.

A summary of the net change in compliance status by enforcement actions in the previous inspection is provided in Exhibit IV-14. In addition to those actions which are in the final models, we see that some actions, on their own, have a statistically significant effect in changing compliance status. For example, in addition to trader correction and seizure and detention, we find that trader education, oral warning, and trader commitment are having an effect on changing compliance status with respect to all lots acceptable.

Exhibit IV-15 provides descriptive statistics of the time between inspections and net change in compliance. In this Exhibit, we see that there appears to be a relationship with all three actions even though time between inspections is a variable in the seizure and detention model only. The findings indicate that:

- as the number of months increase from under 9 months to over 9 months, the net change in compliance status of an inspection with all lots acceptable increased substantially from the unacceptable to acceptable status

- the net change in compliance status of an inspection with a seizure and detention was 20.6% for 0 to 3 months and 9.5% for more than 12 months

- as time increased from less than 3 months to more than 12 months, the net change in compliance status of an inspection with a written warning is reduced from 38.2% to 4.8%.

EXHIBIT IV-11

QUANTITY: VARIABLES IN THE FINAL ALL LOTS ACCEPTABLE MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	UNACCEPTABLE TO ACCEPTABLE	NO CHANGE	ACCEPTABLE TO UNACCEPTABLE	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Actions:					
	Trader Correction - with	15.3%	84.7%	0.0%	100.0%	(15.3%)
	- without	12.5	53.5	33.9	100.0	(-21.4)
	Seizure & Detention - with	26.3	68.4	5.3	100.0	(21.1)
	- without	12.6	74.1	13.3	100.0	(-0.7)
	Reason for Previous is					
	- Other	50.0	50.0	0.0	100.0	(50.0)
	- Planned/Complaint/Referral/ Sample	13.8	73.7	12.5	100.0	(1.3)
	Retail	4.7	87.2	8.1	100.0	(-3.5)
	Manufacture/Import	26.5	55.8	17.7	100.0	(8.8)
MEAN %*	Percentage of Past Inspections with All Lots Acceptable	23.3%	20.1%	58.6%	25.3%	

* N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the quantity subsample.

EXHIBIT IV-12

QUANTITY: VARIABLES IN THE FINAL SEIZURE AND DETENTION MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	SEIZURE TO NO SEIZURE	NO CHANGE	NO SEIZURE TO SEIZURE*	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action Written Warning - With	20.0%	77.1%	2.9%	100.0%	(17.1%)
	- Without	7.6	91.5	0.8	100.0	(6.7)
	Retail	5.8	93.0	1.2	100.0	(4.7)
	Manufacture/Import	16.2	82.4	1.4	100.0	(14.7)
MEAN %**	Percentage of Past Inspections with Seizures & Detentions	14.4%	4.6%	14.3%	5.7%	
MEAN #**	Number of Months Between Current & Previous Inspections	5.13	7.27	6.00	7.03	

* Small Sample Size.

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the quantity subsample.

EXHIBIT IV-13

QUANTITY: VARIABLES IN THE FINAL WRITTEN WARNING MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	WARNING TO NO WARNING	NO CHANGE	NO WARNING TO WARNING*	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Action Information Letter - With	61.5%	30.8%	7.7%	100.0%	(53.8%)
	- Without	18.4	81.5	0.0	100.0	(18.4)
MEAN #**	Number of Inspections in the Last 5 Years	8.30	5.93	9.00	6.47	
	Number of Inspections with Trader Correction in the Last 3 Years	2.09	2.11	3.00	2.11	

* Small Sample Size

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the quantity subsample.

EXHIBIT IV-14

QUANTITY: NET CHANGE IN COMPLIANCE STATUS BY ACTIONS IN THE PREVIOUS INSPECTION

ACTION IN THE PREVIOUS INSPECTION	ACCEPTABLE NET CHANGE		SEIZURE & DETENTION NET CHANGE		WRITTEN WARNING NET CHANGE	
	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION
Trader Education	33.3	0.0	22.2	8.3	22.2	21.4
Information Letter	0.0	2.1	15.4	8.5	53.8*	18.4
Trader Correction	15.3*	-21.4	8.2	10.7	19.4	25.0
Oral Warning	42.9	0.0	28.6	8.2	28.6	21.1
Written Warning	2.9	1.7	17.1*	6.7	NA	NA
Seizure and Detention	21.1*	-0.7	NA	NA	42.1*	18.5
Trader Commitment	45.5	-5.3	13.6	8.3	36.4*	18.9
Voluntary Disposal/Return	4.5	1.5	9.1	9.1	13.6	22.7

* Variables in the final model.

EXHIBIT IV-15

QUANTITY: NET CHANGE IN COMPLIANCE STATUS BY TIME BETWEEN INSPECTIONS

TIME BETWEEN CURRENT AND PREVIOUS INSPECTION	ACCEPTABLE NET CHANGE	SEIZURE & DETENTION NET CHANGE	WRITTEN WARNING NET CHANGE
0-3 months	5.9	20.6*	38.2
3-6 months	0.0	2.3*	25.6
6-9 months	-17.5	10.0*	15.0
9-12 months	18.8	0.0*	12.5
more than 12 months	23.8	9.5*	4.8

* Variable in the final model.

Although the time between inspections variable is not in the all lots acceptable and written warning probability models, its effect was probably controlled for by certain variable(s) in these models. For the all lots acceptable model, these variables would probably be previous action seizure and detention, and previous action trader correction. For the written warning model, the effect of time would probably disappear as a result of the number of inspections in the last 5 years. These variables -- previous action seizure and detention, previous action trader correction and number of inspections in the last 5 years, are suspected because of their interrelationship with the time between inspections variable, shown in Exhibit IV-7. (Although the number of inspections, shown in Exhibit IV-7, was for the last 3 years, we know from our analysis that this in itself, is highly correlated with the number of inspections in the last 5 years.) Finally, it should be mentioned, that time between inspections was also effective in increasing percentage compliance in our basic model.

V - MEAN COMPLIANCE

This chapter focuses on mean compliance. The mean compliance was derived by calculating the mean of any or all percentage compliance values for labelling, quality and/or quantity. Therefore, this new compliance measure is a summary of an establishment's overall performance.

MODEL FOR INCREASE IN MEAN COMPLIANCE

The basic difference model for this chapter is summarized in Exhibit V-1 and illustrated in Exhibit V-2. In this model, we looked at the difference in mean compliance between consecutive inspections and related this to a number of explanatory factors.

With respect to program effectiveness, the findings are:

- given an establishment which made a commitment in its last inspection and an establishment which made no commitment, the former increased in compliance by 19% more than the later (everything else being equal)

- an establishment which was given some education in the last inspection increased in compliance by 16% over the increases of a similar establishment which was not given some education.

These results tell us that trader commitment and trader education, as part of actions taken in an inspection, are effective in bringing about an increase in mean compliance.

The results with respect to the control variables (i.e., variables which are not related to program effectiveness) show that:

- when reinspection occurred because of a complaint or referral, the establishment had a decrease in compliance of 14% more than a similar establishment which was not reinspected for a complaint or referral

- each extra percent of past inspections which had all lots acceptable, decreased mean compliance by .17%

- an establishment which was previously inspected because of a complaint(s) or a referral(s) will have an increase in percentage compliance of 9% over the increases of a similar establishment which was not inspected for a complaint or referral

EXHIBIT V-1

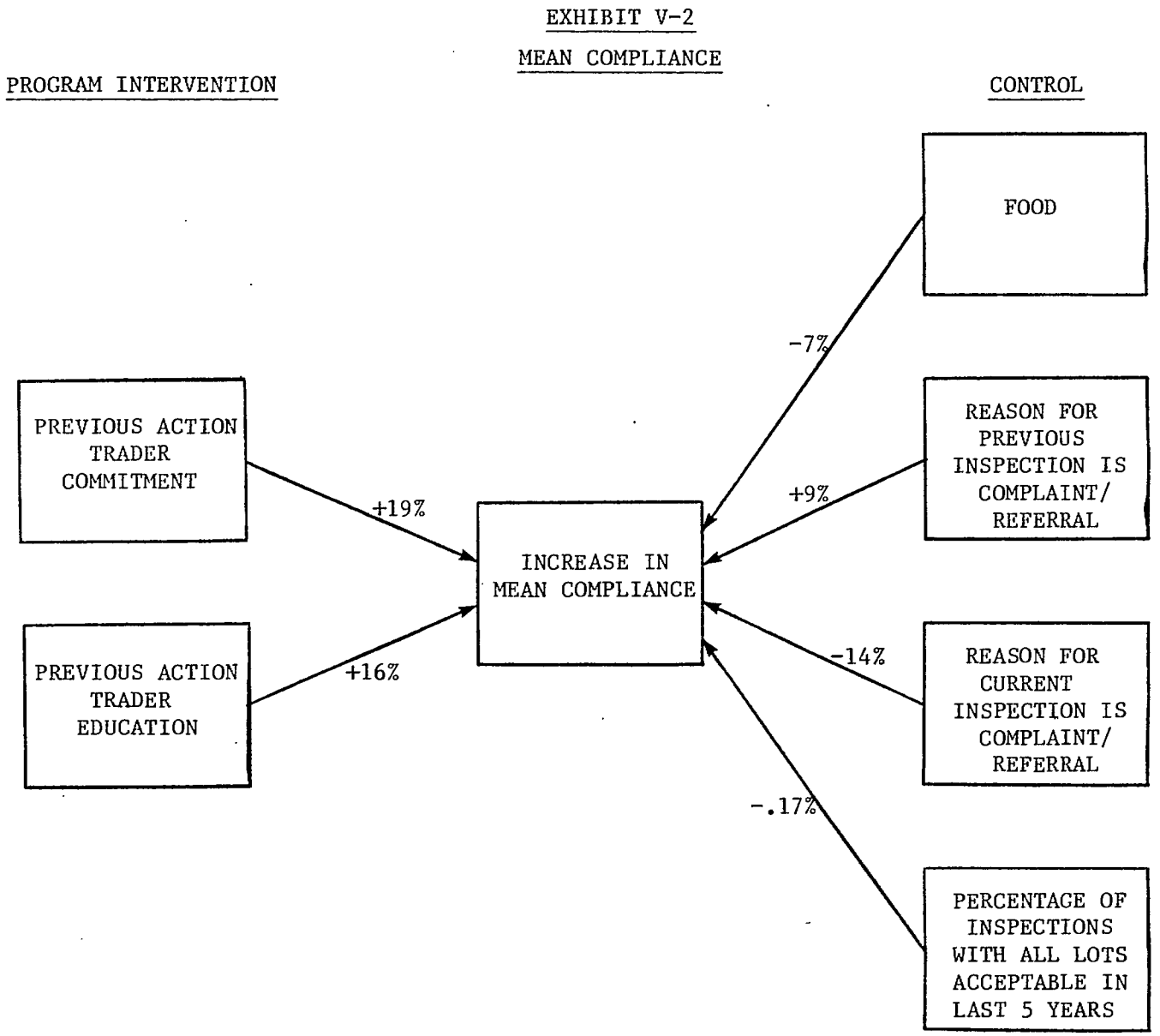
MODEL FOR INCREASE IN COMPLIANCE PERCENTAGE: MEAN COMPLIANCE*

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Trader Commitment	.19	3.67	.000	Increase in compliance of 19% when action in the previous inspection involved Trader Commitment
	Previous Action Trader Education	.16	2.70	.007	Increase in compliance of 16% when action in the previous inspection involved Trader Education
Control	Reason for Current Inspection is Referral/Complaint	-.14	3.16	.002	Average decrease of 14% when the reason for the current inspection was a referral(s) or complaint(s)
	Percentage of Inspections will all lots Acceptable in last 5 years	-.0017	2.97	.003	For each 1% increase in the percentage of past inspections with all lots Acceptable compliance decreased .17%
	Reason for Previous Inspection is Referral/Complaint	.09	2.04	.042	Average increase of 9% when the reason for the previous inspection is referral(s) or complaint(s)
	Food	-.07	1.51	.131	Average decrease of 7% for food establishments
	Constant	.07			
					$C_p = 5$ $R^2 = 0.122$ N = 403

* This is the mean of any or all percentage compliance values for labelling, quality and/or quantity.

EXHIBIT V-2

MEAN COMPLIANCE



- food establishments, overall, decreased in compliance by 7% more than textile, precious metals and non-food establishments.

Note that the effects of the percentage of past inspections with all lots acceptable, the reason for current inspection is complaint/referral and the reason for previous inspection is complaint/referral variables are a result of a regression towards the mean effect.*

These results are highlighted further in the descriptive statistics shown in Exhibit V-3. For example, in terms of program effectiveness, we see that:

- of those establishments which had previous action trader commitment, a larger percentage had major increases in compliance than major decreases in compliance (percentages of 50.7 versus 9.9). In comparison, of those establishments which had no previous action trader commitment, about equal percentages had major increases and decreases in compliance (percentages of 25.3 versus 26.5)

- 50.9% of establishments which were given some education had a large increase in compliance, while only 26.6% of establishments which were not given some education also had large increases in compliance.

Overall, in terms of net change, the Exhibit shows that:

- the mean increases for establishments with and without previous action trader commitment were 22.6% and -1.7%, respectively

- establishments which had previous action trader education had a mean increase of 22.5%, while establishments which did not have this previous action had a mean decrease of 0.4%.

These descriptive statistics clearly support the findings of the model. That is, when trader commitment and trader education occur in an inspection, there is a greater tendency for an overall increase in percentage compliance than when these actions do not occur.

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* Regression toward the mean signifies that particular high values in one inspection will tend to be lower in the next (and vice-versa) due to normal statistical variability.

EXHIBIT V-3

MEAN COMPLIANCE: VARIABLES IN THE FINAL MODEL BY CHANGES IN PERCENTAGE COMPLIANCE

		CHANGE IN COMPLIANCE					
	VARIABLE	DECREASE 10% +	DECREASE 0-10%	INCREASE 0-10%	INCREASE 10% +	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Actions:						
	Trader Commitment - with	9.9%	29.5%	9.9%	50.7%	100.0%	(22.6%)
	- without	26.5	38.9	9.3	25.3	100.0	(-1.7)
	Trader Education - with	13.2	17.0	18.9	50.9	100.0	(22.5)
	- without	25.1	40.3	8.0	26.6	100.0	(-0.4)
	Reason for Current is						
	- Complaint/Referral	27.7	29.7	10.9	31.7	100.0	(-3.5)
	- Planned/Sample/Other	22.2	39.7	8.9	29.1	100.0	(4.6)
	Reason for Previous is						
	- Complete/Referral	17.7	39.8	8.0	34.5	100.0	(10.3)
	- Planned/Sample/Other	25.8	36.2	10.0	27.9	100.0	(-0.4)
	Food	26.2	28.0	12.2	33.5	100.0	(3.0)
	Non Food/Textile/Precious Metals	21.7	43.5	7.5	27.2	100.0	(2.3)
MEAN %*	Percentage of Past Inspections with All Lots Acceptable	35.0%	55.9%	20.5%	19.1%	36.7%	

* N.B. These values are the means of the variable for the four groups of establishments (based on change in compliance) and for all establishments in the mean compliance subsample.

Effects of Other Variables

The mean percentage increases in compliance for some variables which were in the final model and some variables which were excluded are shown in Exhibits V-4, V-5 and V-6. For variables which were excluded from the final model, we see that:

- in V-4, importers had an average increase of 6.3%, compared to no increase for manufacturers and 1.8% for retailers. Also, establishments which were classified as large had a mean percentage decrease in compliance (-0.9%), whereas those classified as small and medium had mean percentage increases in compliance (4.6% and 7.1%, respectively)

- in V-5, the number of inspections (in the last 3 years) appears to be negatively related to mean percentage increase. As the number of inspections increased, there was a decrease in the mean percentage increase (increases of 3.9%, 3.2% and 0.9% for 1, 2 to 3 and more than 3 inspections, respectively). However, there does not appear to be any relationship between mean percentage increase and the other two variables -- number of inpsections in the last 5 years and time between inspections

- in V-6, establishments which corrected some non-compliance in their last inspection had a mean increase in compliance of 9.2%, compared with an increase of -4.0% for those which made no corrections. Also, the mean increase for establishments with and without previous action oral warning were 20.5% and 1.8%, respectively.

Each of these relationships on its own is statistically significant. However, in order to understand why some variables were excluded from the final model their interrelationships with variables in the model must be examined. For this reason, we created the picture shown in Exhibit V-7. In this Exhibit, we see the following:

- the effect of importers seems mainly due to the effect of food, i.e., importers tend not to deal in food products

- similarly, the effect of large establishments disappears when food is controlled for. Establishments which have been classified as large are generally food stores (probably because size is based on square footage and impact on the marketplace)

EXHIBIT V-4

NET CHANGE IN MEAN COMPLIANCE BY TYPE OF ESTABLISHMENT

	% OF CASES	NET CHANGE**
Trade Level		
Manufacture	37.5	0.0
Retail	30.3	1.8
Wholesale/Import	32.3	6.3
Product Class		
*Food	40.7	3.0
Textile	28.0	4.7
Precious Metals	6.9	-4.4
Non-Food	24.3	1.5
Establishment Size		
Small	26.3	4.6
Medium	25.3	7.1
Large	48.4	-0.9

N = 403

* Variable in the final model.

** Mean percentage increase.

EXHIBIT V-5

NET CHANGE IN MEAN COMPLIANCE
BY NUMBER OF PAST INSPECTIONS
AND TIME BETWEEN INSPECTIONS

	% OF CASE	NET CHANGE*
Number of Inspections in Last 3 Years		
1	20.8	3.9
2-3	44.4	3.2
More than 3	34.7	0.9
Number of Inspections in Last 5 Years		
1-3	28.5	2.4
4-5	34.2	4.1
6-9	26.0	3.4
More than 9	10.9	-3.1
Time Between Current and Previous Inspections		
0-3 Months	21.6	1.8
3-6 Months	22.1	2.9
6-9 Months	19.6	1.5
9-12 MOnths	17.1	6.2
More than 12 Months	19.6	1.0

N = 403

* Mean percentage increase.

EXHIBIT V-6

NET CHANGE IN MEAN COMPLIANCE
BY ACTIONS IN THE PREVIOUS INSPECTION

ACTION IN THE PREVIOUS INSPECTION	% OF CASES WITH ACTION	NET CHANGE** WITH ACTION	NET CHANGE** WITHOUT ACTION
*Trader Education	13.2	22.5	-0.4
Information Letter	7.4	2.3	2.6
Trader Correction	50.1	9.2	-4.0
Oral Warning	4.0	20.5	1.8
Written Warning	14.9	5.7	2.0
Seizure & Detention	8.2	1.0	2.7
*Trader Commitment	7.9	22.6	-1.7
Voluntary Disposal/Return	17.6	3.4	2.5

N = 403

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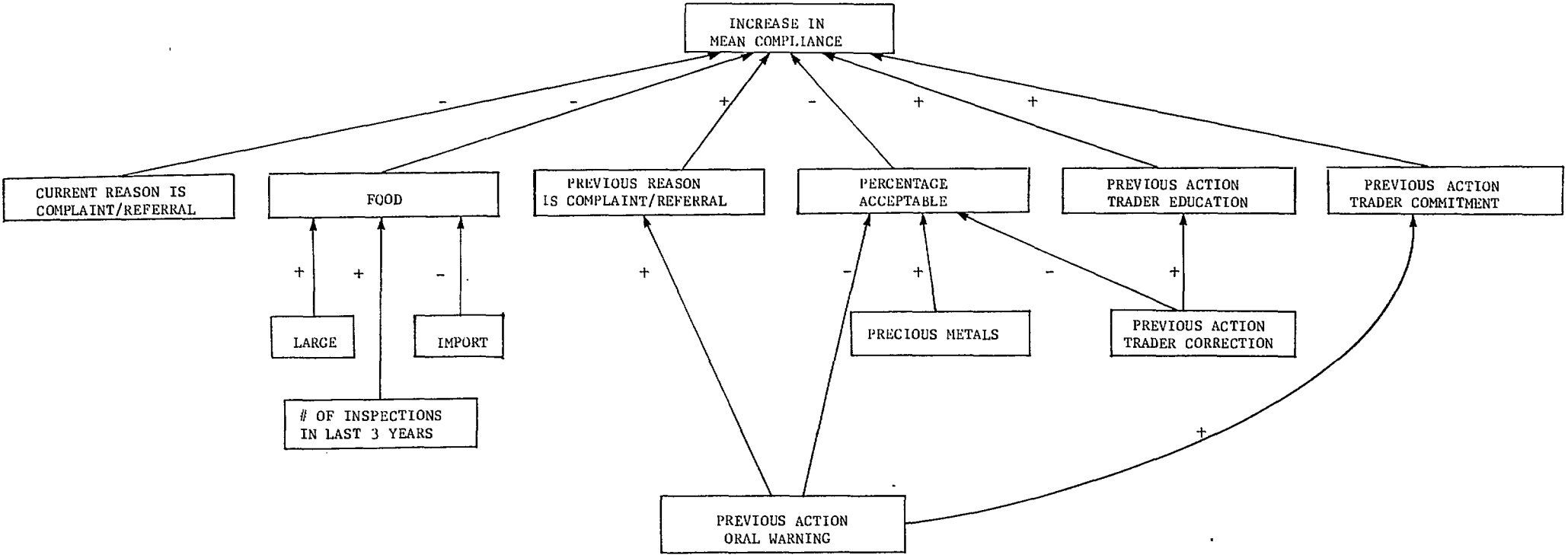
* Variable in the final model.

** Mean Percentage increase.

EXHIBIT V - 7

EFFECTS OF OTHER INFLUENCES ON INCREASE IN MEAN COMPLIANCE



- the effect of the number of inspections (in the last 3 years) disappears when food is controlled for. Food establishments are inspected more often than establishments in other product classes

- when both previous action trader education and the percentage acceptable are controlled for, the effect of previous action trader correction disappears. Establishments which made some correction in their last inspection were also given some education and tended to have a low percentage of past inspections which were acceptable

- the effect of previous action oral warning seems mainly due to its relationship with three variables: previous reason complaint/referral, percentage acceptable and previous action trader commitment. Establishments which were given an oral warning also committed to future compliance and were inspected for complaint or referral reasons, in their last inspection. These establishments also tended to have a low percentage of past inspections with all lots acceptable

OTHER DIFFERENCE MODELS

The difference models for the probability of an inspection with with actions of: all lots acceptable, a seizure and detention, and a written warning are shown in Exhibits V-8, V-9 and V-10. (Detailed summaries for these models are included in Appendix H.) In these models, we find that the variables which indicated program effectiveness in the percentage compliance model are also having an incremental effect for the all lots acceptable and written warning models. For example:

- in Exhibit V-8, an establishment which committed to future compliance will increase in probability of an acceptable inspection by 30% compared with a similar establishment which made no such commitment. This is also true for previous action trader education which shows an increase of 26%

- in Exhibit V-10, we see that when given two similar establishments except one had previous action trader commitment, then this establishment will have a decrease in probability of an inspection with a written warning by 7% more than the other. Also a trader who was educated in his last inspection will have a decrease in probability of an inspection with a written warning by 5% more than a trader who was not educated (everything else being equal).

EXHIBIT V - 8

MEAN COMPLIANCE: INSPECTION WITH ALL LOTS ACCEPTABLE

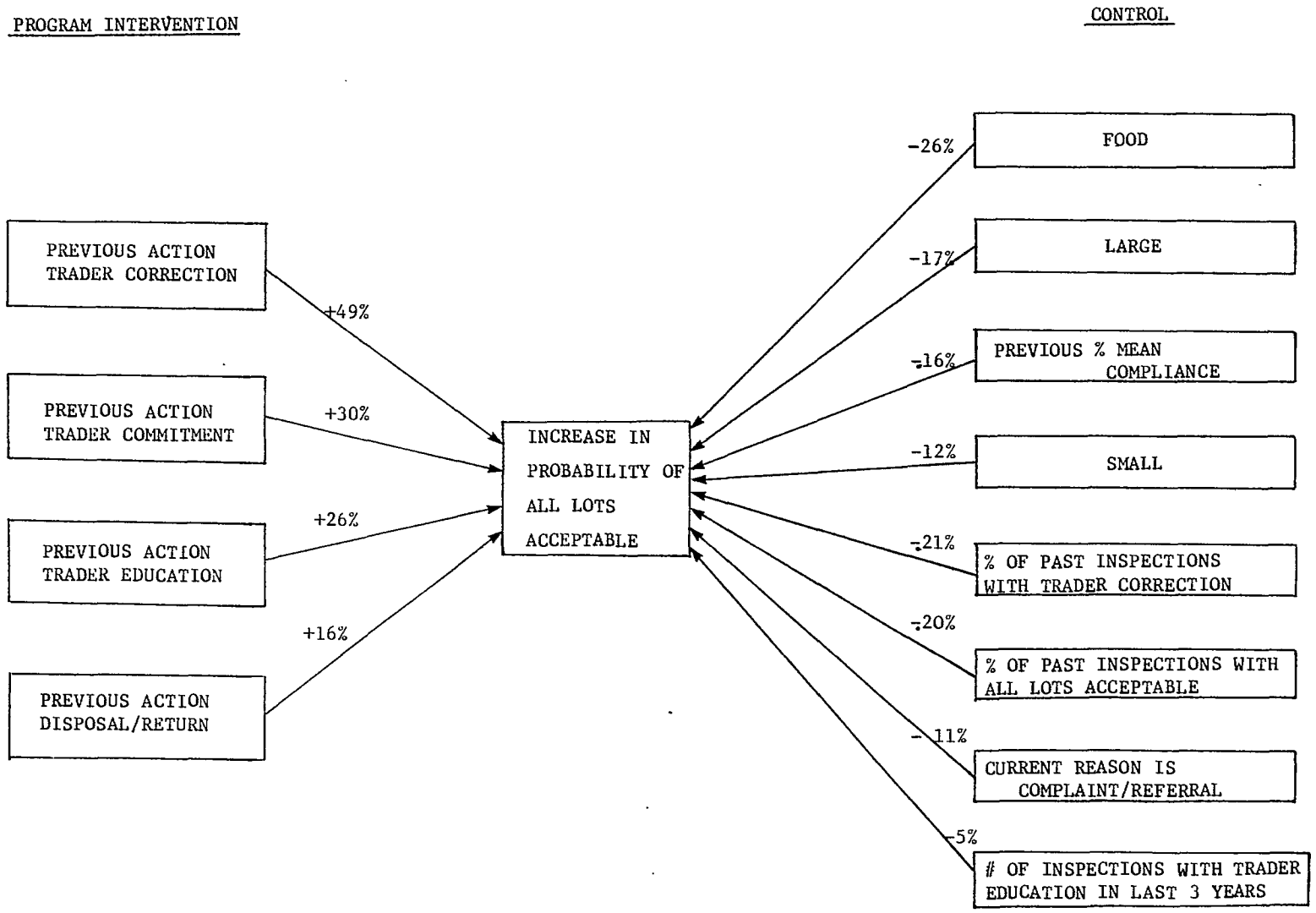
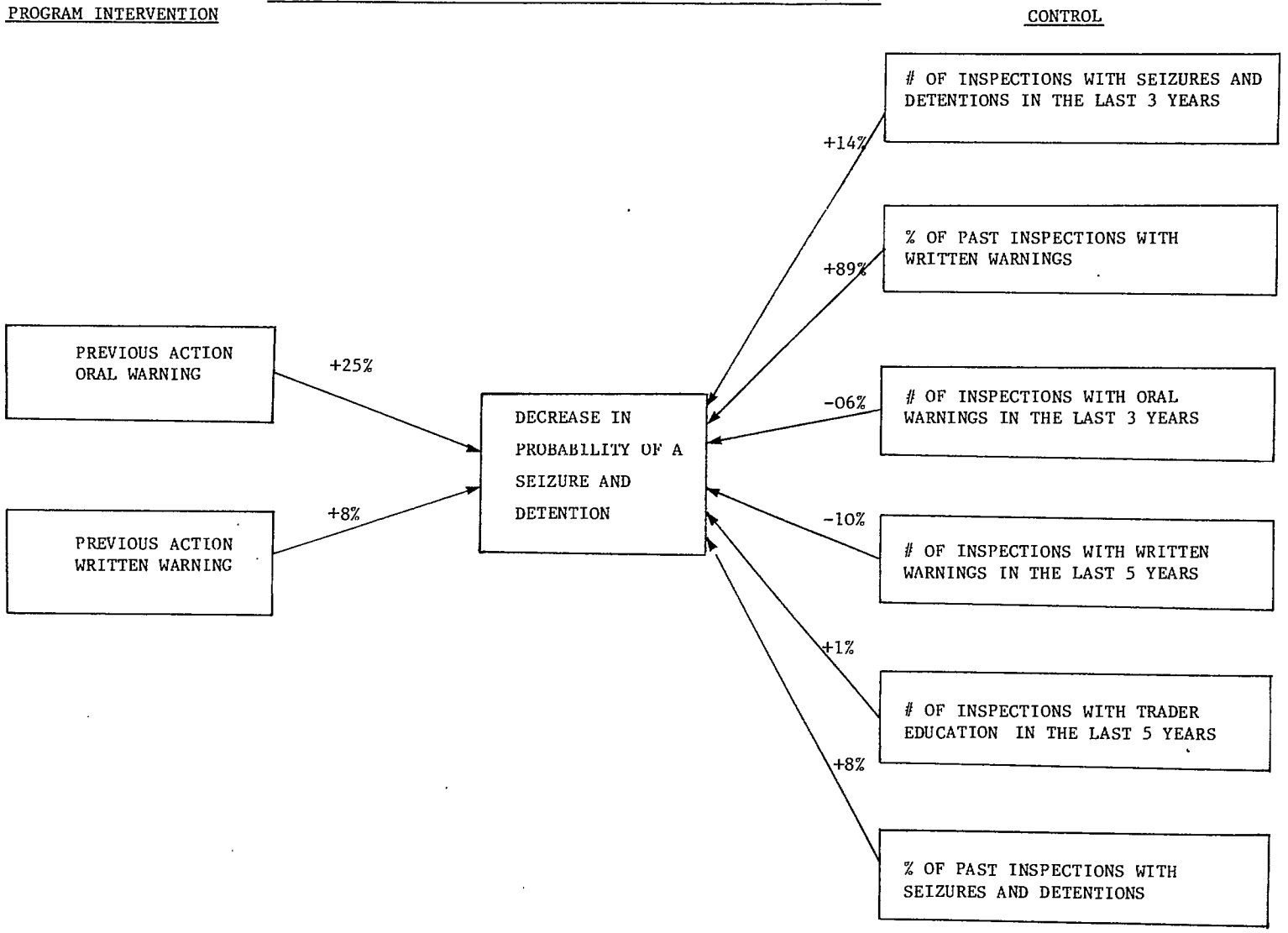


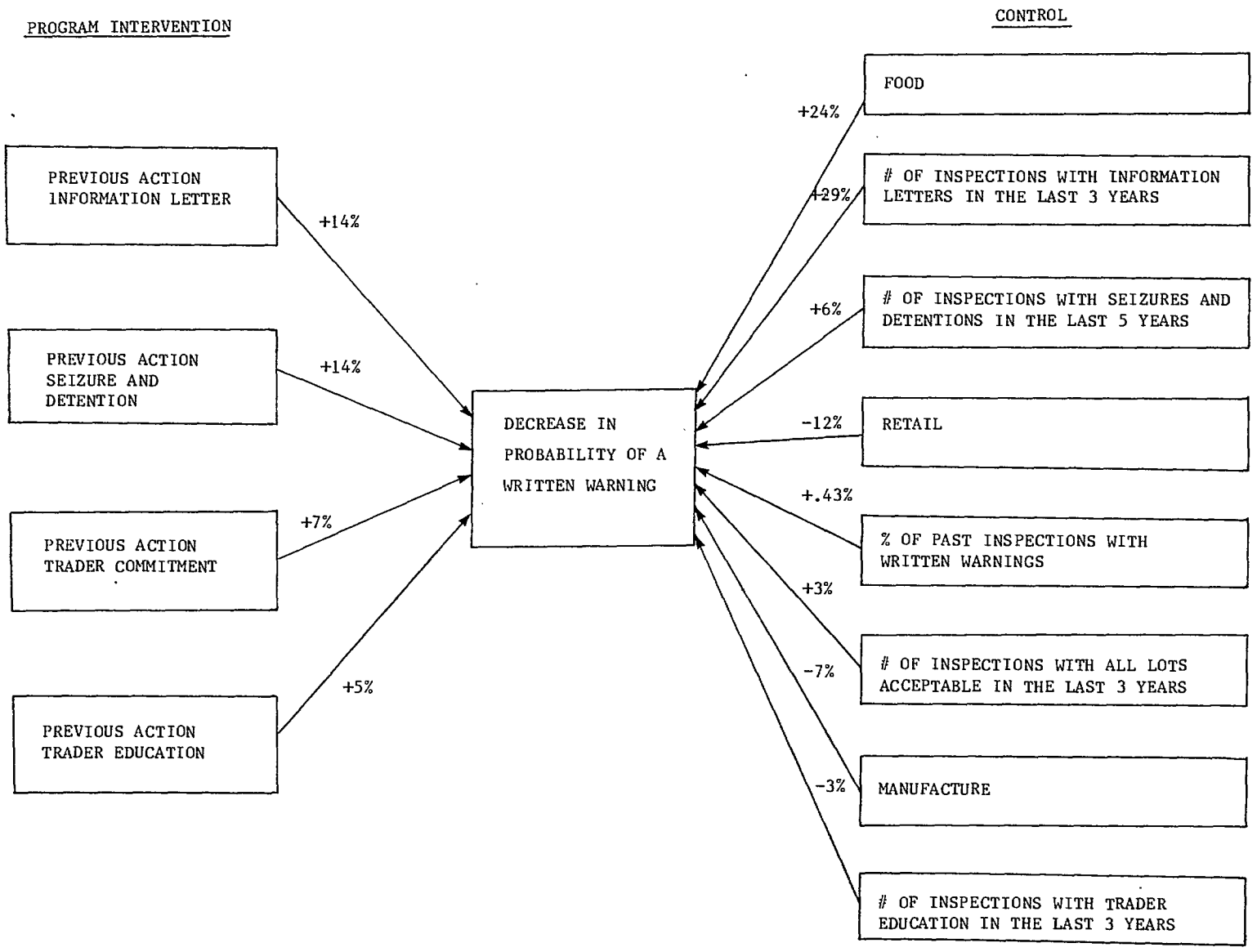
EXHIBIT V - 9

MEAN COMPLIANCE: INSPECTIONS WITH SEIZURES AND DETENTIONS



EXHBIIT V - 10

MEAN COMPLIANCE: INSPECTIONS WITH WRITTEN WARNINGS



Some of the other interesting results relating to variables not in the percentage compliance model are:

- in Exhibit V-8, we find that two other enforcement actions besides trader commitment and trader education are effective in increasing the probability of all lots acceptable. These actions are -- trader correction, and voluntary disposal or return

- in Exhibit V-9, we find that previous actions of an oral warning and a written warning are effective in decreasing the probability of an inspection with a seizure and detention. Each of these reduced the probability by 25% and 8%, respectively

- in Exhibit V-10, we find that in decreasing the probability of an inspection with a written warning, both previous action information letter and previous action seizure and detention are effective variables. Each of these previous actions reduced the probability by 14%.

All the above results are highlighted further in the descriptive statistics shown in Exhibits V-11 to V-14. The following features are described:

- Exhibit V-11 shows that of the establishments with previous action trader correction, 29.7% changed from the unaceptable to the acceptable status, while only 12.8% of the establishments without previous action trader correction had a similar change in status. In terms of net change, establishments with previous action trader correction had an overall change from the unacceptable to acceptable status of 29.7%, while those without previous action trader correction had an overall change from the acceptable to unacceptable status of 11.0%. Although the descriptive statistics for the other previous action variables (i.e., trader commitment, trader education, and voluntary disposal or return) do not show such a clear difference between those establishments with and without the action, there is enough of a difference to see their effect

- Exhibit V-12 shows that a higher percentage of establishments which had previous action oral warning changed from the seizure to no seizure status then establishments which did not have this action (i.e., 29.4% versus 5.2%). Similar results are shown for previous action written warning

EXHIBIT V-11

MEAN COMPLIANCE: VARIABLES IN THE FINAL ALL LOTS ACCEPTABLE MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	UNACCEPTABLE TO ACCEPTABLE	NO CHANGE	ACCEPTABLE TO UNACCEPTABLE	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Actions:					
	Trader Correction - With	29.7%	70.3%	0.0%	100.0%	(29.7%)
	- Without	12.8	63.3	23.9	100.0	(-11.0)
	Trader Commitment - With	39.0	61.0	0.0	100.0	(39.0)
	- Without	17.3	68.2	14.5	100.0	(2.8)
	Trader Education - With	45.0	55.0	0.0	100.0	(45.0)
	- Without	17.6	68.7	13.7	100.0	(3.9)
	Voluntary Disposal/Return - With	11.8	88.2	0.0	100.0	(11.8)
	- Without	22.2	65.0	12.8	100.0	(9.4)
	Reason for Current is					
	- Complaint/Referral	22.7	62.7	14.6	100.0	(8.2)
	- Planned/Sample/Other	20.9	68.2	10.9	100.0	(10.0)
	Food	14.7	76.8	8.5	100.0	(6.2)
	Non Food/Textile/Precious Metals	25.8	60.1	14.1	100.0	(11.8)
	Large	17.6	66.7	15.7	100.0	(1.9)
	Medium	25.7	69.0	5.3	100.0	(20.4)
	Small	23.9	65.0	11.1	100.0	(12.8)
MEAN %*	Previous Percentage Mean Compliance	52.0%	68.6%	96.7%	68.4%	
	Percentage of Past Inspections with:					
	- All Lots Acceptable	25.5	34.0	67.5	36.2	
	- Trader Correction	45.8	40.5	17.1	38.9	
MEAN #*	Number of Inspections with Trader Education in the Last 3 Years	0.80	0.64	0.67	0.68	

* N.B. These values are the means of the variable for the three groups of establishments (based on change in [redacted] for [redacted]

EXHIBIT V-12

MEAN COMPLIANCE: VARIABLES IN THE FINAL SEIZURE AND DETENTION MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	SEIZURE TO NO SEIZURE	NO CHANGE	NO SEIZURE TO SEIZURE*	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Actions:					
	Oral Warning - With	29.4%	70.6%	0.0%	100.0%	(29.4%)
	- Without	5.2	94.3	0.4	100.0	(4.8)
	Written Warning - With	24.3	74.3	1.4	100.0	(22.9)
	- Without	3.0	96.8	0.2	100.0	(2.7)
MEAN %**	Percentage of Past Inspections with:					
	- Written Warnings	9.9%	1.7%	7.1%	2.2%	
	- Seizures and Detentions	33.8	3.8	14.3	5.7	
MEAN #**	Number of Inspections with:					
	- Seizures & Detentions in the last 3 Years	1.31	0.16	0.00	0.23	
	- Written Warnings in the last 5 Years	0.43	0.15	0.50	0.16	
	- Oral Warnings in the last 3 Years	0.31	0.24	0.00	0.28	
	- Trader Education in the last 5 Years	1.78	1.25	1.50	1.29	

* Small Sample Size.

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the mean compliance subsample.

EXHIBIT V-13

MEAN COMPLIANCE: VARIABLES IN THE FINAL WRITTEN WARNING MODEL BY CHANGES IN COMPLIANCE STATUS FROM PREVIOUS TO CURRENT INSPECTION

		CHANGE IN COMPLIANCE STATUS				
	VARIABLE	WARNING TO NO WARNING	NO CHANGE	NO WARNING TO WARNING	TOTAL	NET CHANGE
% OF ESTABLISHMENTS	Previous Actions:					
	Information Letter - With	56.4%	41.0%	2.6%	100.0%	(53.8%)
	- Without	10.8	88.7	0.5	100.0	(10.3)
	Seizure & Detention - With	54.5	45.5	0.0	100.0	(54.5)
	- Without	10.5	88.8	0.7	100.0	(9.7)
	Trader Commitment - With	30.1	69.9	0.0	100.0	(30.1)
	- Without	11.2	88.0	0.8	100.0	(13.6)
	Trader Education - With	16.1	83.9	0.0	100.0	(16.1)
	- Without	14.3	85.0	0.7	100.0	(2.8)
	Food	31.6	67.9	0.5	100.0	(31.0)
	Non Food/Textile/Precious Metals	3.5	95.8	0.7	100.0	(2.8)
	Retail	14.0	85.3	0.7	100.0	(13.2)
	Manufacture	8.3	90.6	1.1	100.0	(7.2)
	Import	22.0	78.0	0.0	100.0	(22.0)
MEAN %**	Percentage of Past Inspections with Written Warnings	6.5%	1.5%	3.7%	2.2%	
MEAN #**	Number of Inspections with:					
	- Seizures & Detentions in the last 5 Years	1.59	0.16	0.33	0.37	
	- Information Letters in the last 3 Years	0.12	0.03	0.00	0.04	
	- Trader Education in the last 3 Years	1.65	1.22	1.33	1.29	
	- All Lots Acceptable in the last 3 Years	1.00	1.11	0.68	1.09	

* Small Sample Size.

** N.B. These values are the means of the variable for the three groups of establishments (based on change in compliance status) and for all establishments in the mean compliance subsample.

EXHIBIT V-14

MEAN COMPLIANCE: NET CHANGE IN COMPLIANCE STATUS BY ACTIONS

ACTION IN THE PREVIOUS INSPECTION	ACCEPTABLE NET CHANGE		SEIZURE & DETENTION NET CHANGE		WRITTEN WARNING NET CHANGE	
	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION	WITH ACTION	WITHOUT ACTION
Trader Education	45.0*	3.9	6.5	5.6	16.1*	13.6
Information Letter	8.8	9.6	23.1	4.1	53.8*	10.3
Trader Correction	29.7*	-11.0	5.4	6.0	14.3	13.5
Oral Warning	17.6	9.2	29.4*	4.8	35.3	13.1
Written Warning	7.8	9.8	22.9*	2.7	NA	NA
Seizure and Detention	10.5	9.5	NA	NA	54.5*	9.7
Trader Commitment	39.0*	2.8	12.0	4.3	30.1*	10.5
Voluntary Disposal/Return	11.8*	9.4	7.7	5.5	25.6	12.8

* Variables in the final model.

- Exhibit V-13 shows that an overall higher percentage of establishments with each action (i.e., information letter, seizure and detention, trader commitment and trader education) are changing from the warning to no warning status than without the action

- Exhibit V-14 shows the net change in compliance status by the occurrence or non-occurrence of enforcement actions. We can observe that several actions have a statistically significant effect on their own, even though they are excluded from the final model. For example, in changing the compliance status with respect to a seizure and detention, information letter and trader commitment are having an effect in addition to the variables in the final model.

Although, previous action trader commitment was only in the final probability models for inspections with all lots acceptable and a written warning, a statistically significant relationship was also evident with the decrease in probability of an inspection with a seizure and detention. This relationship probably disappeared because of an interrelationship with a variable in the seizure and detention model. Since, we found a positive relationship between previous action oral warning and previous action trader commitment, earlier, we can assume that the effect of trader commitment disappeared when controlling for previous action oral warning. As trader commitment was also found to be effective in increasing the percentage mean compliance, we can infer that trader commitment is leaving an effect on compliance at various stages in the inspection process.

The other enforcement action which was found to be effective in increasing the percentage compliance was trader education. This action was also found to be effective in changing the compliance status for the all lots acceptable and written warning models. However, no relationship was evident on changing compliance status with respect to a seizure and detention. Our methodology, on its own, cannot explain why this is occurring (i.e., more detailed review of files and case studies would have to be conducted).

VI - SUMMARY

This study was concerned first, with identifying whether it was feasible to determine the effectiveness of different compliance activities and second (given that this was feasible), to determine the effectiveness of the compliance activities undertaken by the Consumer Products Sub-activity. Chapter VI summarizes our findings in relation to these two study objectives.

FEASIBILITY

With respect to the feasibility objective, we were concerned with identifying the characteristics of the Sub-activity database and determining a suitable design for measuring the relative effectiveness of compliance activities. We were also interested in assessing the feasibility of extending this pilot study to the rest of Canada and to other program areas. These topics are described below.

Types of Data on Establishments and Compliance Activities

Data on establishment characteristics, inspections and enforcement and complaints and referrals are kept in an establishment file. The data on establishment characteristics are basic facts, such as the establishment's trade level, product class, size and location. With respect to data about inspections and enforcement, copies of establishment reports which were filled out during an inspection, letters written to the trader for information and warning purposes, seizure and detention forms and sample record forms are kept on file. Copies of any complaints and referrals from another region or government agency are also kept in the establishment file. The establishment files are arranged by trade level, product class (and sub-classes) and then alphabetically by the name of the establishment. Some files are kept separate, for example, closed files, files for zones outside the Metropolitan Toronto area, and files of the head office of chain stores. In the district office used as the pilot site (Toronto), there is no information kept on formal trader education activities (e.g., seminars).

The MIS retains all basic establishment characteristics and all data from the establishment reports (such as, the number of items sampled and accepted and enforcement actions by product). This system began as a pilot in Toronto on July 1, 1983 and was nationalized on April 1, 1984.

Number of Years of Data Retained

The number of years of compliance activity data which are kept on file will depend on the district office. We found that the Toronto district office generally keeps all information from the date of first contact with an establishment. This may not be true of all district offices. For example, in the Ottawa office, the information on compliance activities only goes back three years.

With respect to the MIS, information on establishments which have been inspected only since its implementation are contained in the system. Program staff informed us that establishments are added to the system when they are inspected for the first time under the MIS recording format.

Availability of Lists for Sampling Purposes

Both the Ottawa and Toronto district offices have establishment lists. These lists are used as a tool for scheduling future inspections and as a record of when an establishment was inspected last. As inspections occur and plans are made for the next inspection, this list is updated.

The establishment list is not a complete list of all establishments in a district, especially at the retail level. This is because formal notice of an opening or closing of an establishment is not given to the Consumer Products Branch. Additions or deletions are made to the list on an ad hoc basis -- when an opening or closing is noticed by an inspector, when a new establishment applies for a CCA number, when a complaint is made about a new establishment, etc.

Analytical Design Used to Determine Effectiveness of Compliance Activities

At the beginning of the study we investigated the possibility of using a quasi-experimental design involving a control and treatment group. This could only be done if we could find establishments which had never been inspected, i.e., a control group. We determined that it would have been possible to find such establishments but there would be no guarantees that the control establishments would represent all trade levels and product classes. According to program personnel, establishments which have never been inspected are few in number and primarily in the retail trade level. Therefore, we selected a more feasible and practial approach -- a historical design (quasi-experimental) with differing levels/types of treatments. With this approach, a random sample of inspected establishments representing all trade levels and product classes was chosen. With different types of compliance activities being performed on establishments at different points in time and with different frequencies (i.e., significantly different treatments), we were able to determine the effects of these varying treatments on compliance.

Feasibility of Extension of Study
Nationally and Into Other Program Areas

As long as comparable data can be found in other district offices (which we expect will be the case), there should be no problem in extending this pilot into a national study. If a national study were undertaken, it would be necessary to add some variables into the models to allow for regional differences, such as province, community size and rural/urban variables.

We recommend that before this pilot becomes a national study, enough time should be given so that most (if not all) establishments will have been inspected under the new MIS system. For modelling purposes we believe that a large number of establishments should have at least two inspections under the MIS method of inspection. In our sample, we found that about 43% of the establishments had undergone at least two inspections under the new MIS.

As mentioned previously, the new MIS has been in place in Toronto for 2 years and in other parts of the country for just over one year. Thus, in order to meet the criterion of at least two inspections under the new MIS, we believe the national study should commence no earlier than April, 1986, at which time it would have been in place 2 years on a national level. This time lapse would ensure that there will be a sufficient number of establishments which have been inspected and that the required data on the inspections are available.

Before a national study is undertaken, consideration should be made as to whether the present form of the analysis is adequate for the Consumer Products Sub-activity or whether further refinement to the analysis should be undertaken. This refinement may involve more analysis of the present database or an augmentation of the present database. Our approach and methodology to determine the effectiveness of compliance activities, to the best of our understanding, has been the first of its kind. We have by no means, however, exhausted the types of analysis which may be performed, but we have illustrated how the effectiveness of the program can be determined.

With respect to the extension of this pilot to other programs, we believe our approach is completely generalizable, as long as files are available which contain information regarding compliance activities for these programs. Modification would have to be made to compensate for program differences, such as product classes inspected, inspection processes used and enforcement actions undertaken.

In summary, it is possible to determine the relative effectiveness of various compliance activities. A national study would enhance the results found in this study and further the understanding about effects of the Sub-activity. Since our modelling included the indicators of compliance currently used by inspectors, comparison with extant data can be validly made.

EFFECTIVENESS OF COMPLIANCE ACTIVITIES

Using a historical quasi-experimental design and statistical modelling, as described above, we were able to determine the relative effectiveness of different compliance activities. Our analyses were quite extensive and only major findings are included here.

Effect of Compliance Activities on Compliance

In order to determine the relative effectiveness of different compliance activities on compliance, we developed a basic model which related increases in percentage compliance (between consecutive inspections) to a number of explanatory variables. The major findings which relate to program effectiveness are summarized in Exhibit VI-1 and described below:

EXHIBIT VI-1

INCREMENTAL EFFECTS OF PROGRAM INTERVENTION VARIABLES FOR LABELLING, QUALITY, QUANTITY AND MEAN PERCENTAGE COMPLIANCE

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Time Between Inspections	-	-	-1%	-
Previous Actions:				
- Trader Education	+19%	-	-	+16%
- Written Warning	+10%	-	-	-
- Trader Commitment	+10%	+24%	-	+19%

- Trader education, written warnings and trader commitment as part of inspections are all effective instruments in bringing about increases in labelling compliance.

- The one enforcement action which is effective in bringing about an increase in quality compliance is trader commitment.

- Both trader education and trader commitment as part of inspections are effective in bringing about an increase in mean* compliance for all regulatory areas.

These results indicate that what occurs in an inspection, rather than the fact of an inspection itself, is usually the most important factor in determining increases compliance. In relation to the area of quantity compliance, however, we found that the time between inspections was an important factor in determining increases in compliance. The positive effects of an inspection in quantity compliance are less if the time between inspections is large.

In terms of increasing percentage compliance, enforcement actions -- trader education, written warnings and/or trader commitment -- all have incremental effects. However, this is not to say that other mechanisms are not having any effect. The reason why other actions do not appear in the models is because enforcement actions do not occur at random, but generally in steps or groups. Therefore, interrelationships between enforcement actions can cause the effects of some actions to disappear. Some of the interrelationships which we found in the models are described below:

- Oral warnings are related to trader commitment. When a trader is given an oral warning, he usually also commits to future compliance.

- Trader correction, on the other hand, is negatively related to trader commitment. Traders which correct any non-compliance, do not necessarily make a commitment to future correction.

- Trader correction was also found to be related to trader education. When a trader was provided with some guidance as to the regulations, the trader tended to correct the violative product.

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* The mean compliance was derived by calculating the mean of any or all percentage compliance values for labelling, quality and/or quantity. The mean compliance is, therefore, a summary of an establishment's overall performance.

Effect of Compliance Activities on
Probability of an Action Occurring

We also developed models which looked at differences in the probability of an action occurring in the current versus the previous inspection. These difference models were created for actions in which all lots or items were found acceptable, or in which either a seizure and detention or a written warning occurred. Our findings are summarized in Exhibit VI-2. The models describe the effect of various program intervention variables (i.e., previous actions, time between inspections and number of past inspections) on each of the three specific actions. These models demonstrate the relationship among enforcement actions, as highlighted below:

- The program intervention variables which are effective in increasing the probability of having an inspection with all lots acceptable (in all regulatory areas) tend to be enforcement actions which are not too severe, such as trader education and trader correction.

- A written or oral warning indicating that more severe action could be taken if a violation is repeated, is effective in decreasing the probability of products being seized and detained in a subsequent inspection.

- The two main enforcement actions which are effective in decreasing the probability of a written warning are an information letter and a seizure and detention.

It is interesting to note that in each regulatory area, the descriptive statistics for these difference models (shown in the preceeding chapters) indicated that most of the variables in the basic model also showed an effect on the occurrence or non-occurrence of each action.

Effect of Complaints and Referrals on Mean Compliance

The impact of complaints and referrals was shown in the model for the increase in mean percentage compliance. In this model, we found that when a complaint or referral was the reason for the current inspection, there was a decrease in compliance. Thus, inspections which occur as a result of complaints or referrals tend to have a lower percentage compliance than inspections for other than complaint or referral reasons (everything else being equal). We can therefore surmise that referrals and complaints are aiding inspectors in identifying problems. When a complaint or a referral was the reason for the previous inspection, we found there was an increase in compliance in the current inspection, indicating a positive effect on subsequent compliance.

EXHIBIT VI-2

PROGRAM EFFECTIVENESS SHOWN IN THE OTHER DIFFERENCE MODELS

1) Increase in Probability of An Inspection with all Lots Acceptable

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Previous Actions:				
- Trader Education	+19%	+29%	-	+26%
- Trader Correction	+41%	+13%	+30%	+49%
- Seizure and Detention	-	-	+22%	-
- Volantary Disposal/Return	+22%	-	-	+16%
- Trader Commitment	+36%	-	-	+30%

2) Decrease in Probability of An Inspection with a Seizure and Detention

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Time Between Inspections	-	-	-1%	-
Previous Actions:				
- Oral Warning	-	-	-	+25%
- Written Warning	+38%	+7%	+4%	+8%

3) Decrease in Probability of An Inspection with a Written Warning

PROGRAM INTERVENTION VARIABLES	Labelling	Quality	Quantity	Mean
Number of Inspections in Last 5 Years	-	-	+5%	-
Previous Actions:				
- Information Letter	+35%	+87%	+75%	+18%
- Trader Education	-	-	-	+4%
- Seizure and Detention	+29%	+31%	-	+6%
- Trader Commitment	-	+22%	-	+8%

Summary: Effectiveness of Compliance Activities

In summary, we were able to uncover a number of important findings relating to the effectiveness of compliance activities. From a very broad perspective, we were able to demonstrate that the inspection function is having an impact on increasing compliance. Specifically, we were able to identify that certain inspection/enforcement actions are having a greater effect than others on compliance. We were able to quantify the extent of this effect and, further, to reveal substantial differences in effectiveness among compliance activities. Also, we were able to identify that there are differences in the type of actions which are effective in increasing compliance among the regulatory areas of quality, quantity and labelling.

We can also infer that the inspection activities are having an effect on deterring non-compliance. In collecting the information on past inspection histories, we observed that many traders who had taken action on the specific problems detected in the previous inspection and had done so for the full range of products inspected in the current inspection. This implies that there is a deterrence effect on individual traders resulting from the activities undertaken in the previous inspection. The quantification of this effect would require more detailed file examination respecting the products which were inspected in a sequence of inspections within each establishment. In order to understand more fully the deterrence effect of inspections, it would also be necessary to conduct an awareness and behaviour survey of traders to determine their awareness of the Sub-activity and the actions they take toward compliance without the impetus of an inspection or knowledge of an impending inspection.

IMPLICATIONS OF THE FINDINGS

The findings of this study provide the first (to our knowledge) quantification of the effect that compliance activities are having on compliance levels. Thus, these findings are important in their own right. They indicate that the inspection activity is having an incremental impact on compliance levels and that certain actions are substantially more effective than others in achieving increased compliance. These findings imply that the inspection function has significant and valuable results from the perspective of the Sub-activity objective of protecting against product misrepresentation through detection, deterrence and control (monitoring).

The findings are also important in light of current strategies being considered to enhance the inspection function. We believe that the results of the study have various applications to improving the cost-effectiveness of inspections.

It should be noted that we are referring here to the general applicability of the findings if they were derived from a national sample of establishments rather than a sample of establishments from the Toronto District Office. If such a national study were to be undertaken and results such as those found in the pilot study were revealed, then the following types of applications to inspection improvement are feasible. These applications are described in relation to the objectives of the inspection function.

Deterrence

This study was able to identify which inspection/enforcement activities are most effective in contributing to the achievement of the deterrence objective (if this is measured in terms of improved compliance). The effect of these activities on deterrence was measured at the level of the individual trader. We were not able to determine the overall effect of the inspection activities on bringing about deterrence in the marketplace. In order to measure the latter effect, it would be necessary to employ a different methodological approach to the one used here (e.g., a survey of traders, inspection of never-inspected establishments, etc.).

The study results clearly indicate that less stringent activities (such as trader education) and negotiating activities (such as trader commitment and written warning) are having a greater impact on compliance levels than other, more stringent activities. This implies that some shift to educational and negotiation activities from more stringent compliance activities may actually reduce risk. Assuming these activities are less costly as well, the overall cost effectiveness of compliance activities will be greatly increased. Some of the resources freed up could be used for, among other things, undertaking more stringent and costly actions against establishments where compliance is known to be problematic.

If the database included a larger sample of establishments from across Canada, there are a number of further refinements which could be made in terms of how best to expand the education and negotiating activities described above:

- A database which is expanded nationally could be used to determine whether there are geographic (provincial, urban/rural) differences in the effectiveness of compliance activities. This information could then be used to make decisions regarding inspection resources and activities on a district-specific basis, if differences resulting from the geographic factor were identified.

- An expanded database could identify whether certain inspection activities would be more effective in increasing compliance in particular trade levels, industry types, sizes of establishments, product classes (and any combination of the above). Should such an analysis determine differences in the effectiveness of compliance activities, then the information could be used to make decisions regarding inspection resources and activities on the basis of particular types of establishments, product classes, etc.

Detection

The inspection function serves as a means of identifying or detecting the level of marketplace non-compliance. The Sub-activity already uses two mechanisms (the dollars at risk and a tiered priority system) to determine how best (cost-effectively) to allocate resources toward the detection objective.

Another mechanism of resource allocation for the purposes of detection brought forth in this study, is the use of complaints and referrals.* The findings clearly show that when an inspection is the result of a complaint or referral, there is an increased tendency for non-compliance to be detected. As well, when a subsequent inspection is carried out, compliance levels tend to improve (a deterrence effect).

We are not suggesting that all inspection resources be devoted to following-up on complaints and referrals nor that all complaints and referrals be followed-up. Clearly this is impractical and not feasible. However, we are suggesting that using complaints and referrals as another method of priority setting could bring desirable results both from a detection and deterrence perspective. Of course, the selection of complaints and referrals which are to be acted upon would require some assessment of the factors which would truly warrant the expenditure of resources on an inspection (e.g., the estimated degree of non-compliance, the severity of the non-compliance, the segment size implicated). The fact that consumers have been able to detect the non-compliance would certainly be another important factor to consider in these decisions.

Another approach to resource allocation for the purposes of detection which could be developed from the data collected in a national study would be an establishment risk index. The risk index could be developed for each establishment which has been inspected or for a number of prototype establishments (e.g., large retail food stores in urban British Columbia, small retail food stores in urban British Columbia, etc.). The index would be created on the basis of various known characteristics of low and high compliance establishments.** Inspection resources could then be allocated according to known probabilities of identifying non-compliance, with low-compliance (high-risk) establishments being inspected more frequently than high-compliance (low-risk) establishments.*** The beauty of such an indicator is that the data needed to develop it are currently being collected as part of the MIS.

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* The Sub-activity currently uses complaints and referrals as a tool to isolate problems and change inspection emphasis.

** Such a risk index has been successfully applied to over 30,000 highway-railway crossings in Canada as a means of determining inspection and upgrading requirements.

***The risk index could, in fact, be strengthened by using seriousness of non-compliance as well, i.e., incorporating into the definition of risk the probability of non-compliance multiplied by expected severity of non-compliance.

It should be noted that our methodology was not directed toward making a judgment on the effectiveness of compliance activities in detecting non-compliance across the full spectrum of establishments. It would be necessary to employ a much different range of methodologies, such as the conduct of shadow inspections to determine what has been missed in inspected establishments and the conduct of inspections outside the regular schedule of establishments to determine the extent of non-compliance where there is presently no inspection.

Monitoring

Another component of the inspection function is a monitoring element or the identification of the overall state of compliance or non-compliance in the marketplace. The risk index which was described above can be used as an indicator for monitoring purposes. A risk index developed for all the establishments which have been inspected across Canada would provide one measure of the overall current risk in the marketplace. This is because most establishments, according to program personnel are inspected, therefore, a fairly complete picture of the level of risk in the marketplace could now be determined.

It is not advisable, however, to alter inspection strategies to respond only to the risk indices since the following scenario would likely result. More inspection resources would be concentrated on the high risk establishments (low-compliance) and low risk (high-compliance) establishments would be inspected much less frequently or never at all. The level of risk of non-compliance for formerly high risk establishments would continue to be recorded whereas the level of risk in low-risk establishments would not. Thus, if there was increasing non-compliance in formerly low risk establishments, it would not be recorded in the Sub-activity database. If these low-risk establishments became higher-risk (at least relative to others), the inspection process would not be maximizing detection any longer with these establishments being excluded nor be obtaining an accurate assessment of overall risk in the system.

In order to avoid such a scenario, inspections would have to be conducted, at least in part, on a random basis, so that both high and low risk establishments could be inspected. This would allow for:

- continuous updating of the priority allocations based on detection (i.e., continuous assessment of which establishments are high-risk)
- a continuous monitoring of the overall level of risk in the system (a form of performance measurement)
- a deterrent effect on all establishments (since they all have a chance of being inspected).

Summary of Implications

In summary, the results of the study point to several strategies which can be used for the improved cost-effectiveness of the inspection function:

- expansion of known effective, less costly inspection actions for purposes of deterrence
- expansion of the use of complaints and referrals as priority setting and resource allocation mechanisms for purposes of detection
- use of a risk index in combination with random sampling as priority setting and resource allocation mechanisms for the purposes of detection, monitoring and deterrence.

APPENDIX A

DEFINITIONS

- Enforcement Actions
- Reason for Visit
- Establishment Size

APPENDIX A

DEFINITIONS

The definitions in this Appendix were taken from the Consumer Products Management Information System - Definiton and Instructions Manual, New System 1984. Definitions for enforcement actions, reason for inspection and establishment size are shown in Exhibit A-1, A-2 and A-3, respectively.

EXHIBIT A-1

ENFORCEMENT ACTIONS

Trader Education - only to be used when guidance and/or direction through the use of the Act, Regulations or departmental guidelines is provided and where no other action is taken.

Information Letter - a letter directed to the trade noting specific requirements of legislation, but making no warnings to the trade implying the possibility of more stringent action.

Trader Correction - the correction of violative product prior to resale by the trader. (Includes instore advertising, - e.g., sale product not permitted until correct made - see action trader commitment.)

Recall - the supplier has instituted a removal from the market of contravening stock or where the trader has agreed to correct a national problem by going out and removing items.

Voluntary Disposal/Removal - the dealer, in the presence of the inspector, has removed the violative items for sale and has disposed of them, (e.g., exported, sent to charitable organization, destroyed, - agricultural product culls not included).

Forfeiture - the act by the dealer of releasing possession of seized goods to the Crown.

Oral Warning - a verbal notice to a dealer which specifies the nature of the violation in question, the specific legislation and sections violated, and explicitly advises the trader that more stringent action may be considered if the situation is repeated or is not rectified.

Written Warning - a formal written notice to a dealer which specifies the nature of the violation in question, the specific legislation and sections violated, and explicitly advises the trader that more stringent action may be considered if the situation is repeated or is not rectified.

Seizure and Detention - action taken to ensure control of the product and/or where alternative actions have failed to maintain control.

Refusal at Entry - the act of disallowing the entry into Canada of goods found to be in contravention of federal legislation.

EXHIBIT A-1

ENFORCEMENT ACTIONS (Cont'd)

Referral to another Region/District - the act of forwarding information regarding the goods and noted violations to some other region, district or within a district/zone for their notification and possible follow-up action.

Referral to Another Government Agency - the act of forwarding information regarding goods and the noted violations to another government agency for their notification and possible follow-up.

Return to Supplier - the voluntary act by the dealer of transferring his possession of the violative product to another party, (e.g., return to supplier or responsible party).

Prosecution Recommended - a recommendation by the inspector that prosecution action be initiated.

Inspector Correction - the act by the inspector of correcting noted violations with or without trader assistance (e.g., as in grading shell eggs found to be undergrade).

Show Cause Hearing - a recommendation by the inspector that a meeting within the district office between the Trader, Inspector and District and/or Regional Management be held to discuss trader's record of compliance, and his intentions regarding future compliance, with a record of the proceedings kept on file.

Trader Commitment - a dealer has agreed to eventual correction of all future productions or shipments of goods, based on a mutually agreed period of time with the inspector. This would include next label printing, next importation or any other period of time agreed upon, including newspaper and magazine ads, while allowing continued sale of existing product, (i.e., sale of product is permitted to continue without corrections made - see action trader correction).

Results Pending - indicates an incomplete inspection for a particular product. Completion of inspection data is dependent on submission of further documentation to substantiate performance claims.

EXHIBIT A-2

REASONS FOR VISIT

Planned - the primary reason for the visit is to meet district scheduling requirements, regardless of whether referrals or complaints were also handled.

Complaint - the primary reason for the visit is to investigate a complaint, regardless of whether referrals were handled or a full inspection took place.

Referral - the primary reason for the visit is to follow-up referral(s) from other districts/regions, other government agencies, regardless of whether complaints were also handled or a full inspection took place.

Sample Pick-Up - sample has been obtained as part of the national sample program.

Regional/Local Sample Pick-Up - sample has been obtained as part of the regional or district sample program.

Other - survey, problem-product blitz, sample other then the reasons indicated above (these would include: ad hoc samples, complaint samples, developmental samples, samples picked up as the result of an inspection), etc.

EXHIBIT A-3

ESTABLISHMENT SIZE

Small - a small establishment that has a very limited distribution area - primarily supplies own municipality and possibly those adjacent to it, (e.g., 7,000 square feet or metric equivalent).

Medium - a medium establishment that has a somewhat larger distribution area and impacts onto marketplace more than the small establishment but is not a major part of the industry.

Large - a large establishment that has a very definite impact on the marketplace - supplies an extensive area and is considered a major participant of that industry, (e.g., 15,000 square feet or metric equivalent).

APPENDIX B

EXAMPLES OF FORMS

- Establishment Report
- Notice of Seizure and Detention
- Sample Record

EXHIBIT B-1

Consumer and Corporate Affairs Canada / Consommation et Corporations Canada

Consumer Products / Produits de consommation

ESTABLISHMENT REPORT / **RAPPORT D'INSPECTION**

Reg Rég	District	Zone	Est I D No — N° d'ident	Est Type Type d'établ	Size — Gr	Reason for visit Raison de la visite	452954
Page of de	Reinspection Date Date de M Y-A	TIME TEMPS	Food — Aliments	Textiles	Precious metal Metaux précieux	Non-food Autres produits	

Establishment — Commerce	Owner/Mgr — Prop/gérant
Address — Adresse	Telephone No. — N° de téléphone
City — Ville / Province	Postal Code — Code postal

Product — Produit	Qty — Qté	Details — Détails	Product Code / Code de Produit	Country of Origin / Origine pays	Units Available / Nombre disponible	INSPECTION RESULTS — RÉSULTATS D'INSPECTION: Type / Genre	Number Sampled / Nombre d'échantillon	Number Accepted / Nombre conforme	Number Marginal / Nombre de cas limites	Number Defective / Nombre en violation	Problem Found / Problème trouvé	ACTION TAKEN MESURES PRISES: 1	2	3

I have read this report and acknowledge its receipt
J'ai lu ce rapport et en accuse réception
DEALER
COMMERÇANT ▶

Date D-J M Y-A

You are invited to forward any comments or questions you may have concerning this inspection to
Vous êtes invité(e) à présenter vos commentaires ou questions concernant cette inspection à

I D No.
N° d'ident.

Reference -- Reference

Supervisor — Surveillant

Inspector — Inspecteur

Office Telephone No
N° de telephone de bureau

CCA-1566 (9-84)

Canada

Consumer and Corporate Affairs Canada | Consommation et Corporations Canada

Field Operations | Opérations extérieures

EXHIBIT B-2

NOTICE OF SEIZURE AND DETENTION
AVIS DE SAISIE ET DE RÉTENTION

ISSUED TO - ÉMIS À	ADDRESS - ADRESSE

LOCATION OF PRODUCT - PRODUIT SITUÉ À	DATE OF SEIZURE / DATE DE LA SAISIE

	DESCRIPTION OF PRODUCT OR ARTICLE - DESCRIPTION DU PRODUIT OU DE L'ARTICLE	TAG NUMBER / NUMÉRO DE L'ÉTIQUETTE	QUANTITY / QUANTITÉ	ESTIMATED VALUE / VALEUR ESTIMATIVE
1				
2				
3				
4				
5				

OWNER OR PARTY RESPONSIBLE - PROPRIÉTAIRE OU PERSONNE RESPONSABLE	ADDRESS - ADRESSE

REASON FOR SEIZURE - MOTIF DE LA SAISIE

NAME OF ACT - TITRE DE LA LOI

- ☐ CANADA AGRICULTURAL PRODUCTS STANDARDS / NORMES DES PRODUITS AGRICOLES DU CANADA
- ☐ CANADA DAIRY PRODUCTS / PRODUITS LAITIERS DU CANADA
- ☐ CONSUMER PACKAGING AND LABELLING / EMBALLAGE ET ÉTIQUETAGE DES PRODUITS DE CONSOMMATION
- ☐ FISH INSPECTION / INSPECTION DU POISSON
- ☐ FOOD AND DRUGS / ALIMENTS ET DROGUES
- ☐ HAZARDOUS PRODUCTS / PRODUITS DANGEREUX
- ☐ MAPLE PRODUCTS INDUSTRY / INDUSTRIE DES PRODUITS DE L'ÉRABLE
- ☐ PRECIOUS METALS MARKING / POINÇONNAGE DES MÉTAUX PRÉCIEUX
- ☐ TEXTILE LABELLING / ÉTIQUETAGE DES TEXTILES
- ☐ WEIGHTS AND MEASURES / POIDS ET MESURES

SECTION OF ACT / ARTICLE DE LA LOI

NAME OF REGULATION / RÈGLEMENT

SECTION - ARTICLE

WARNING – AVERTISSEMENT

No person shall remove, alter, or interfere with a product under seizure without the written permission of an inspector.

Nul ne doit enlever, ni modifier, ni rien faire d'autre qui affecte un produit saisi sans la permission écrite d'un inspecteur.

AUTHORITY TO MOVE OR TO CORRECT

AUTORISATION DE DEPLACER OU DE CORRIGER

SIGNATURE OF RECIPIENT - SIGNATURE DE LA PERSONNE QUI REÇOIT L'AVIS

INSPECTOR - INSPECTEUR

COPIES TO - COPIES À

DISTRICT MANAGER - GÉRANT OU DISTRICT

Products or articles seized may be released by an inspector, once they have been brought into compliance with the applicable Act and Regulations. For further information or assistance contact:

Les produits ou articles saisis peuvent être libérés par un inspecteur lorsque lesdits produits ou articles satisfont aux exigences de la loi et des règlements pertinents. Pour tout renseignement ou assistance s'adresser à:

CCA 737 (3-79)

1 WHITE Trader / BLANCHE Commerçant
2 GOLDEN ROD District / VERGE D'OR District
3 BLUE Region / BLEUE Région
4 BUFF Inspector / CHAMOIS Inspecteur

4

EXHIBIT B-3

132611

Consumer and Corporate Affairs Canada / Consommation et Corporations Canada

SAMPLE RECORD **FICHE DE L'ÉCHANTILLON**

H.P.B. Code - Code de D.P.S.

Official Sample No. - N° de l'échantillon: A-

Date D-J M Y-A

☐ Consumer Products / Produits de consommation ☐ Product Safety / Sécurité des produits ☐ Weights and Measures / Poids et Mesures

Inspector - Inspecteur	District	Region - Région (A O O Pr P)	Follow-up Reference - N° de référence

Common Product Name / Description - Nom commun du produit / description	CA / Trade Mark / Brand - Marque de commerce	Cost / Unit Coût / Unité	Units - Unités	Total

Style	Lot No - N° de lot	Lot Size Taille du lot	Serial No N° de série	Country of origin Pays d'origine	☐ Taken Prélevé ☐ Referral Renvoi ☐ Purchase Achat ☐ Voluntary À titre gratuit	Received from - Reçu de

Trade Level Niveau du commerce	Name Nom	Address Adresse	R	District	Zone	Establishment ID No. N° d'identité d'étab.	Est. Type Genre de Ets	Size Gr	Rev. V.
Manufacturer Fabricant									
Importer Importateur									
Distributor Distributeur									
Vendor Vendeur									
Consumer Other Consommateur autre									

Applicable legislation / violation - Violation / législation applicable

Title - Titre	Sect. Art. Loi Art	Sched. Part Annexe part	Sched. Item Annexe art.	Reg. sect Reg. art.

Procurement - Acquisition

☐ Inspection ☐ Regional / Régional ☐ Survey / Sondage
☐ Complaint / Plainte ☐ Ad hoc ☐ L.M.A. / E.L.M
☐ Development / Développement ☐ Official / Officiel ☐ Other / Autre
☐ Compliance / Conformité ☐ Programmed / Cédulé

Step Étape	Date sent Envoyé le	Destination	Initials Initiales	Date Received Reçu le	Initials Initiales

Comments - Commentaires

Disposal Method - Moyen de disposition

Certification — Signature — Date

I have received no benefit / Je n'ai pas reçu de bénéfices

Signature — ID No - N° d'ce

Test Results / Comments - Résultats d'essai Commentaires

Lab No / N° du laboratoire

Signature — Date D-J M Y-A

Code de produits	Country / Pays		Type / Genre								

Supervisor's Signature / Signature du surveillant

1. White - Headquarters / Blanche - Bureau central
2. Pink - Receipt / Rose - Reçu
3. Green - With sample / Vert - Avec échantillon
4. Blue - Region / Bleue - Région
5. Buff - Inspector / Chamois - Inspecteur

CCA-939 (11-83)

APPENDIX C

THE FINAL SAMPLE - DESCRIPTION OF ITS CHARACTERISTICS

APPENDIX C

THE FINAL SAMPLE - DESCRIPTION OF ITS CHARACTERISTICS

Exhibits C-1 to C-4 display the characteristics of the establishments in the final sample. Highlights are described below:

- the sample was comprised of 302 manufacturers, 295 retailers, and 301 importers (Exhibit C-1)
- as shown in Exhibit C-2, the precious metals product class had the smallest number of establishments represented in the sample, while textiles was the largest product class represented (11% and 34.3%, respectively)
- 32.1% of the final sample was made up of large establishments (Exhibit C-3)
- the sample was mainly comprised of large food retailers, small textile manufacturers and retailers, and large non-food manufacturers and importers (Exhibit C-4).

The types of compliance activities undertaken in these establishments (since January, 1980) are shown in Exhibits C-5 to C-8. In these Exhibits, we see that:

- an inspection is the compliance activity which was used most often. Ninety-nine percent of the establishments had been inspected at least once, compared to 36% to 0.4% for other compliance activities (Exhibit C-5)
- 88% of all establishments have been inspected at least once, since the implementation of the MIS and only 43% have been inspected two or more times since the MIS (Exhibit C-6)
- 79% of all inspections were planned and the remaining 21% were for referral, complaint, sample pick-up or other reasons (Exhibit C-7)
- 43% of all inspections had no enforcement actions. The enforcement actions which were most often taken in an inspection were trader correction and trader education (Exhibit C-8).

EXHIBIT C-1

ESTABLISHMENTS BY PRODUCT CLASS AND TRADE LEVEL

PRODUCT CLASS — TRADE LEVEL

FREQUENCY TABLE

	Manufacture	Retail	Import	TOTAL
Food	71	115	51	237
Textiles	115	104	89	308
Precious Metals	28	44	27	99
Non-Food	88	32	134	254
TOTAL	302	295	301	898

PERCENTAGE TABLE

	Manufacture	Retail	Import	TOTAL
Food	7.9	12.8	5.7	26.4
Textiles	12.8	11.6	9.9	34.3
Precious Metals	3.1	4.9	3.0	11.0
Non-Food	9.8	3.6	14.9	28.3
TOTAL	33.6	32.9	33.5	100.0

EXHIBIT C-2

ESTABLISHMENTS BY SIZE AND PRODUCT CLASS

ESTABLISHMENT SIZE — PRODUCT CLASS

FREQUENCY TABLE

	Food	Textiles	Precious Metals	Non-Food	TOTAL
Small	82	151	54	72	359
Medium	64	84	29	67	244
Large	88	71	15	114	288
Missing	3	2	1	1	7
TOTAL	237	308	99	254	898

PERCENTAGE TABLE

	Food	Textiles	Precious Metals	Non-Food	TOTAL
Small	9.1	16.8	6.0	8.0	40.0
Medium	7.1	9.4	3.2	7.5	27.2
Large	9.8	7.9	1.7	12.7	32.1
Missing	0.3	0.2	0.1	0.1	0.8
TOTAL	26.4	34.3	11.0	28.3	100.0

EXHIBIT C-3

ESTABLISHMENTS BY SIZE AND TRADE LEVEL

ESTABLISHMENT SIZE

TRADE LEVEL

FREQUENCY TABLE

	Manufacture	Retail	Import	TOTAL
Small	115	133	111	359
Medium	82	67	95	244
Large	101	94	93	288
Missing	4	1	2	7
TOTAL	302	295	301	898

PERCENTAGE TABLE

	Manufacture	Retail	Import	TOTAL
Small	12.8	14.8	12.4	40.0
Medium	9.1	7.5	10.6	27.2
Large	11.2	10.5	10.4	32.1
Missing	0.4	0.1	0.2	0.8
TOTAL	33.6	32.9	33.5	100.0

EXHIBIT C-4

ESTABLISHMENTS BY PRODUCT CLASS, SIZE AND TRADE LEVEL

PRODUCT CLASS	ESTABLISHMENT SIZE	TRADE LEVEL			
		Manufacture	Retail	Import	TOTAL
Food	Small	28	33	21	82
	Medium	21	28	15	64
	Large	19	54	15	88
	Missing	3	0	0	3
	TOTAL	71	115	51	237
Textiles	Small	52	56	43	151
	Medium	33	25	26	84
	Large	30	23	18	71
	Missing	0	0	2	2
	TOTAL	115	104	89	308
Precious Metals	Small	18	27	9	54
	Medium	8	10	11	29
	Large	2	6	7	15
	Missing	0	1	0	1
	TOTAL	28	44	27	99
Non-Food	Small	17	17	38	72
	Medium	20	4	43	67
	Large	50	11	53	114
	Missing	1	0	0	1
	TOTAL	88	32	134	254

EXHIBIT C-5

COMPLIANCE ACTIVITIES

ACTION*	ESTABLISHMENTS WHICH HAD AT LEAST ONE ACTION		NUMBER OF TIMES ACTION OCCURRED	
	Number	Percentage	Per Est.	Total
Inspection	891	99.2	3.45	3,089
Referral	323	36.0	1.27	1,140
Complaint	169	18.8	0.33	299
Sample Pick-up	140	16.9	0.33	300
Warning Letter	121	13.5	0.29	257
Information Letter	89	9.9	0.17	150
Seizure and Detention	83	9.2	0.18	160
Prosecution**	4	0.4	0.004	4

*These are forms and letters which were found in the establishment files, dated after 1979.

**This information was obtained from the prosecution files.

EXHIBIT C-6

NUMBER OF INSPECTIONS

Total Number of Inspections Since 1980	Number of Establishments	Percentage With At Least One Post-MIS*	Percentage With At Least Two Post-MIS*	PERCENTAGE OF TOTAL
0	7	0.0	0.0	0.8
1	278	86.3	0.0	31.0
2	139	84.0	36.7	15.5
3	118	86.4	34.7	13.1
4	94	86.2	31.9	10.5
5	91	94.5	53.8	10.1
6	59	98.3	71.2	6.6
7	31	100.0	77.4	3.5
8	24	95.8	75.0	2.7
9	17	100.0	88.2	1.9
10	14	85.7	85.7	1.6
11	11	100.0	100.0	1.2
12	15	100.0	100.0	1.7
TOTAL	898	88.4	43.2	100.0**

* This percentage is not of the total number of establishments, but a percentage of the number of establishments which have been inspected x number of times.

** This column adds up to 100.2 rather than 100.0 because the computer rounds off each percentage to the nearest whole percent.

EXHIBIT C-7

REASON FOR INSPECTIONS AND
INSPECTIONS PRE VERSUS POST MIS

REASON FOR INSPECTION*	NUMBER	PERCENTAGE
Planned	2,448	79.0
Referral	282	9.1
Complaint	152	4.9
Sample Pick-up	9	0.3
Other	207	6.7
TOTAL	3,098	100.0

PRE/POST MIS INSPECTIONS	NUMBER	PERCENTAGE
Pre	1,812	58.5
Post	1,286	41.5

*Inspections are assumed to be planned, unless otherwise stated.

EXHIBIT C-8

ACTIONS TAKEN IN AN INSPECTION***

ACTION	NUMBER	PERCENTAGE OF TOTAL*
All Lots Accepted**	1,332	43.0
Trader Education	706	22.8
Information Letter	31	1.0
Trader Correction	1,000	32.3
Recall	3	0.1
Voluntary Disposal/Removal	125	4.0
Forfeiture	0	0.0
Oral Warning	245	7.9
Written Warning	51	1.6
Seizure and Detention	128	4.1
Sample Pick-Up	6	0.2
Refusal at Entry	13	0.4
Referral to Another Region/District	548	17.7
Referral to Another Government Agency	48	1.5
Return to Supplier	93	3.0
Prosecution Recommended	1	0.0
Inspector Correction	34	1.1
Show Cause Hearing	1	0.0
Trader Commitment	191	6.2
Results Pending	24	0.8

* Percentage out of a total of 3,098 inspections.

** All lots accepted, only if no other actions were taken in the inspection.

*** These are actions which were recorded as part of an inspection.

Exhibit C-9, describes the number of consecutive post-MIS inspections which have been examined under each regulatory area. We found that labelling was the area in which compliance was measured the most frequently (357 times) and quantity the least frequently (88 times). Overall, there were 403 consecutive inspections in which an establishment was measured for compliance in at least one regulatory area since the initiation of the MIS.

Also included in the Exhibit is a description of the enforcement actions which can be undertaken during the previous inspection or in between the current and the previous inspections. The actions were most frequently used by the inspectors are trader correction, all lots acceptable, (i.e., no enforcement actions), trader commitment, written warning and trader education.

EXHIBIT C-9

NUMBER OF CONSECUTIVE POST-MIS INSPECTIONS AND NUMBER WITH ENFORCEMENT ACTIONS IN THE PREVIOUS INSPECTION BY REGULATORY AREA

	REGULATORY AREA			
	LABELLING	QUALITY	QUANTITY	MEAN
Number of Consecutive Inspections*	357	107	88	403
Number with Actions in the Previous Inspection**				
All lots acceptable	115	6	13	128
Trader Education	50	8	3	53
Information Letter	23	14	9	30
Trader Correction	181	67	62	202
Oral Warning	12	9	4	16
Written Warning	42	29	17	60
Seizure and Detention	25	18	10	33
Trader Commitment	60	27	7	71
Voluntary Disposal	31	24	20	32

* This includes consecutive (Post-MIS) inspections which had a percentage compliance value in both inspections, only.

** These actions could either have been recorded as an action taken in an inspection or information, in terms of a letter or an official report form, found in the establishment file.

APPENDIX D

MODELLING

- DATABASE FOR MODELLING
- MODEL SELECTION AND C_p Statistic

APPENDIX D

MODELLING

Contained in this Appendix are descriptions of the database and the variable selection criteria which were used in the modelling phase of the study.

Database for Modelling

The database was created from information collected from the establishment files of the Toronto district office. In particular, data items were recorded from:

- establishment report forms
- letters addressed to the establishment
- complaint forms
- seizure and detention forms
- sample record forms
- photocopies of establishment report forms from another district (for referral purposes).

Information was also collected from prosecution files, but was not used in the modelling due to the small numbers. A listing of the data items is shown in Exhibit D-1.* Only forms and letters dated January 1, 1980 and later were considered in this study.

It should be noted that not all forms and letters dated January 1, 1980 and later were recorded, and that some action codes, per inspection, were also not recorded. The maximum number of actions recorded for each data item is shown in the Exhibit D-1. This limitation should not affect the results greatly since only 15 establishments had the maximum of 12 inspections, 27.5% of all inspections had the maximum of 3 actions, and for each of the enforcement actions with separate forms or letters, up to 6 establishments had the maximum number. Because of this, some variables have been added to the database and others have been modified. Details are provided in a later section.

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* A show cause hearing was also considered as an enforcement action but it does not appear on this list, since no evidence of a show cause hearing was found in the establishment files sampled. If a show cause hearing occurred, a record of the proceedings would have been kept on file.

EXHIBIT D-1

DATA ITEMS

1. Establishment Identification

- identification number
- establishment type
- establishment size
- establishment zone.

2. Inspections Since January, 1980 (maximum: 12)

- pre vs post MIS inspection
- date of inspection
- inspection rating
- reason for the inspection
- quantity
  - number sampled
  - number acceptable
  - number marginal
- quality
  - number sampled
  - number acceptable
- labelling
  - number sampled
  - number acceptable
- action codes (maximum: 3 per inspection)
- date of the next scheduled inspection.

EXHIBIT D-1 (Cont'd)

DATA ITEMS

3. Enforcement Actions since January 1, 1980

Dates and under which area (quality/quantity/labeling) the action applies to:

- information letter (maximum: 8)
- warning letter (maximum: 8)
- sample (maximum: 8)
- referrals (maximum: 24)
- complaints (maximum: 8)
- seizure/detention (maximum: 15)
- prosecution (maximum: 2).

Quality Control

The data were inputed with 100% (manual) verification and checks were made by computer. Such checks included:

- that dates for all forms and letters were between January, 1980 and June, 1985
- that the date of the next scheduled inspection was not before the date of the present inspection
- that the number sampled was greater than or equal to the number acceptable (plus number marginal, if applicable)
- that the codes for all data items were valid.

Variables

The following is a description of dependent and independent variables in the database used for modelling. This database considers each inspection of an establishment as one case. Since an establishment in our sample may be inspected a maximum of twelve times, therefore an establishment may be represented from zero to twelve times.*

Dependent Variables

One of the main objectives of this study was to determine how inspections affect establishments in terms of compliance. Compliance can be measured in several different ways. The measures we considered in the models were:

- Percentage Compliance:

$$\% \text{ quantity} = \frac{\text{number acceptable} + \text{number marginal}}{\text{number sampled}}$$

$$\% \text{ quality} = \frac{\text{number acceptable}}{\text{number sampled}}$$

$$\% \text{ labeling} = \frac{\text{number acceptable}}{\text{number sampled}}$$

$$\text{mean \%} = \frac{\% \text{ quantity} + \% \text{ quality} + \% \text{ labeling}}{3}$$

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* The database for modelling was created from another data file which had one case for each establishment in the sample.

- Establishment Ratings:

  good = 1.0
  average = 0.5
  poor = 0.0

- Dummy Variables for the following action codes:

  - all sampled lots were acceptable

  - seizure and detention

  - written warning.

- Differences from the current and the previous inspections in all the above measures.

Due to the different methods of measuring compliance pre- and post-MIS, some of the above measures may not apply. For example, there were no establishment ratings for inspections post-MIS, and for pre-MIS inspections the units of sampled items were in lots rather than individual items and in many cases this information was not available.

A fifth type of compliance measure was also used -- an imputed establishment rating. This new establishment rating was based upon the relationship between the pre-MIS establishment rating and the amount of time before the next scheduled inspection. As shown in Exhibit D-2, 83% of establishments which received a good rating were scheduled to have their next inspection at least 9 months from the time of the current inspection. Also, 48% of establishments which received an average rating were scheduled to have their next inspection between 4 and 8 months from the time of the current inspection, and 61% of poorly rated establishments were scheduled for an inspection within 2 months time. For establishments which were scheduled for inspections in three months time, about equal percentages had ratings of average or poor. Using these qualitative inspection ratings (i.e., poor, average and good), we developed quantitative ratings, (on a scale from 1 to 0), as follows:

Rating	Value
Poor	0.00
Average	0.50
Good	1.00

For inspections without ratings we knew the number of months until the next inspection. Thus, we used the information about establishments with ratings to assign qualitative ratings and quantitative values, as follows:

EXHIBIT D-2

CURRENT INSPECTION RATING VERSUS TIME
UNTIL NEXT SCHEDULED INSPECTION

Number of Months Until Next Scheduled Inspection	Inspection Rating					
	Good		Average		Poor	
0-2	48	(4.4%)	63	(23.3%)	157	(61.3%)
3	14	(1.3%)	35	(13.0%)	34	(13.3%)
4-8	123	(11.2%)	130	(48.1%)	43	(16.8%)
9+	912	(83.1%)	42	(15.6%)	22	(8.6%)
Total	1,097	(100.0%)	270	(100.0%)	256	(100.0%)

Number of Months Until Next Inspection	Rating	Value
0-2	Poor	0.00
3	Average-Poor	0.25
4-8	Average	0.50
9+	Good	1.00

The names of all variables used as dependent variables are listed in Exhibit D-3.

Independent Variables

There were some independent variables which were included in all the modelling and some which were only used in certain situations. The variables which were common to all analyses are listed in Exhibit D-4 and described below:

- establishment characteristics
- reason for present or previous inspections
- previous inspection action codes of actions which were not used as a dependent variable
- what happened in between inspections
- history of the number of inspections and the number of inspections with certain enforcement actions
- overall performance of the establishment in the last 5 years.

The independent variables which were not common to all analyses are shown in Exhibit D-5. The inclusion of these variables in the development of a model depended upon three factors. These factors take into account the regulatory area, the scenario and the dependent variable being modelled.

With respect to the first factor, models were developed for each regulatory area, i.e., labelling, quality and quantity. Thus, if we were creating models for one particular area, the percentage compliance in the other areas were excluded as independent variables. For example, if we were modelling percentage labelling compliance, the previous percentage quantity and quality compliance could not be included as independent variables.

The scenario factor had to be considered since some differences exist in the compliance measures which were recorded before and after the introduction of the MIS. In particular, this applies to the percentage compliance and the establishment ratings. The percentage compliance measure was recorded for the three regulatory areas in all inspections after the initiation of the MIS,

EXHIBIT D-3

DEPENDENT VARIABLES

TYPE	VARIABLE NAME	DESCRIPTION
Percentage Compliance	QTE_AC1	Current Percentage Quantity Compliance
	QLE_AC1	Current Percentage Quality Compliance
	LAB_AC1	Current Percentage Labelling Compliance
	MN_AC1	Current Mean Percentage Compliance
Establishment Rating	RATE1	Current Establishment Rating
Action Codes		Actions in Present Inspection:
	A_AC	All lots acceptable
	A_SD	Seizure and detention
	A_WW	Written warning
New Rating	NEWRATE	New Rating for Current Inspection

Difference		Current		Previous*
	DIFF_QTE	= QTE_AC1	-	P_QT_A1
	DIFF_QLE	= QLE_AC1	-	P_QL_A1
	DIFF_LAB	= LAB_AC1	-	P_LB_A1
	DIFF_MN	= MN_AC1	-	P_M_AC1
	DIFF_RT	= RATE1	-	P_RATE1
	DIFF_AC	= A_AC	-	PA_AC
	DIFF_SD	= A_SD	-	PA_SD
	DIFF_WW	= A_WW	-	PA_WW
	DIFF_NRT	= NEWRATE	-	NEWPRATE

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* The description of the variables is shown in Exhibit D-6.

EXHIBIT D-4

COMMON INDEPENDENT VARIABLES

Type	Variable Name	Description
Establishment Characteristics*	MANUFACT	Manufacture trade level
	RETAIL	Retail trade level
	FOOD	Product class food
	TEXTILE	Product class textile
	P_METAL	Product precious metal
	LARGE	Size of establishment - large
	SMALL	Size of establishment - small
	METRO	Establishment within the metropolitan Toronto Area
Reason for Present and Previous Inspections	R_CM_RF	Reason for current is complaint/referral
	R_SAMPLE	Reason for current is sample pick-up
	R_OTHER	Reason for current other than planned
	PR_CM_RF	Reason for previous is complaint referral
	PR_SAMPL	Reason for previous is sample pick-up
	PR_OTHER	Reason for previous is other than planned
Previous Inspection Action Codes*	PA_ED	Trader education
	PA_TC	Trader correction
	PA_IL	Information letter
	PA_OW	Oral warning
	PA_DR	Destroy/return
	PA_CM	Trader Commitment
	PA_N_ED	New trader education

* These dummy variables were used to indicate the presence or absence of each independent variable (i.e., 1 or 0).

EXHIBIT D-4 (Cont'd)

COMMON INDEPENDENT VARIABLES

Type	Variable Name		Description
Duration			Time in between inspections:
	N_TIME		Number of months
	N_COMPLN		Number of complaint forms
	N_REFER		Number of referrals from other regions/departments
	N_SAMPLE		Number of sample pick-up forms
History	Last 3 Years	Last 5 Years	
	INSP3_1	INSP5_1	Number of inspections
			Number of inspections with:
	AC_3_1	AC_5_1	All lots acceptable
	ED_3_1	ED_5_1	Trader education
	TC_3_1	TC_5_1	Trader correction
	IL_3_1	IL_5_1	Information letters
	OW_3_1	OW_5_1	Oral warnings
	WW_3_1	WW_5_1	Written warnings
	DR_3_1	DR_5_1	Destroy/return to supplier
	SD_3_1	SD_5_1	Seizure and detention
	CM_3_1	CM_5_1	Trader commitment
	N_ED3_1	N_ED5_1	New trader education
Performance			What percentage of the inspections in the last 5 years which had:
	PER_AC		All acceptable lots
	PER_ED		Trader education
	PER_TC		Trader correction
	PER_IL		Information letter
	PER_OW		Oral warnings
	PER_WW		Written warnings
	PER_DR		Destroy/return
	PER_SD		Seizure and detention
	PER_CM		Trader commitment
	PER_RF		Referrable to another region/department
	PER_N_ED		New trader education

EXHIBIT D-5

COMPLIANCE MEASURES AS INDEPENDENT VARIABLES

Variable Name	Description
P_QT_A1	previous percentage quantity compliance
P_QL_A1	previous percentage quality compliance
P_LB_A1	previous percentage labeling compliance
P_M_AC1	previous mean percentage compliance
GOOD	previous rating was good
POOR	previous rating was poor
P_RATE1	previous rating 1=good, .5=average, 0=poor
NEWPRATE	new establishment rating from the previous inspection
PA_AC	previous action acceptable
PA_WW	previous action written warning
PA_SD	previous action seizure and detention

while before the initiation of the MIS, an overall percentage compliance was recorded for only some inspections. Establishment ratings were only recorded prior to the initiation of the MIS. Therefore, percentage compliance measures and establishment ratings could only be included on the basis of the current and previous inspections being considered. For example, if post-MIS inspections were being used for the current and previous inspections, then we were only able to include percentage compliance data. The four scenarios considered were:

Current Inspection	Previous Inspection
Post-MIS	Post-MIS
Post-MIS	Pre-MIS
Pre-MIS	Pre-MIS
Pre/Post-MIS	Pre/Post-MIS

Exhibit D-6 shows the compliance measures for both the independent and dependent variables which could be used in each of the above scenarios.

With respect to the third factor, an independent compliance measure variable was only included in the modelling if it was not used to create the dependent variable. This applies to the basic and other difference models. For example, in the model for the difference in percentage labelling compliance, since the difference variable was created using the percentage labelling compliance for the current and previous inspections, then the percentage labelling compliance for the previous inspection could not be used as independent variable. However, the other compliance measures which could be included as independent variable are previous actions - all lots acceptable, written warning and seizure and detention.

Finally, a few of notes should be made about the modifications made to some of the independent variables in the database:

- the new trader education variable was created because generally when there were more than 3 action codes in an inspection, the least severe actions were not recorded. Since trader education was considered the least severe of all actions, it was left out if there were 3 or more action codes which were more severe. This new trader education variable shows trader education as an action when it is recorded on its own or when there are three other more severe actions recorded

- for actions in the previous inspection if there were information letters, seizure and detention forms or written warnings in the establishment file, dated between inspection dates, then they were considered as actions of the previous inspection regardless of whether or not the actions were recorded as part of the previous inspection.

EXHIBIT D-6

COMPLIANCE MEASURES AS INDEPENDENT AND DEPENDENT VARIABLES

Compliance Measure	Post vs Post	Post vs Pre**	Pre vs** Pre	Pre/Post vs Pre/Post
Percentage Compliance	I&D	D	-	I&D
Establishment Rating	-	I*	I&D	-
Action Codes	I&D	I&D	I&D	I&D
New Establishment Rating	I&D	I&D	I&D	I&D
Difference:				
- Percentage Compliance	D	-	-	D
- Establishment Rating	-	-	D	-
- Action Codes	D	D	D	D
- New rating	D	D	D	D

I = independent (previous inspection)
D = dependent (current inspection only or current-previous inspection)

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* In this situation dummy variables were created for each establishment rating

** Percentage compliance could be used for Pre-MIS, but this data was only available for some inspections.

Model Selection and C_p Statistic

The major technique for final model selection was based on selecting, via "the best of all possible subsets algorithm, "the model which minimizes Mallow's C_p statistic. The best of all possible subsets routine looks at all combinations of variables for each size subset, and selects the one which is best according to some criterion (in one case, the C_p statistic). Thus unlike stepwise regression, which often does not converge to the optimal model, our algorithm guarantees selection of the best model.

The C_p statistic is an estimate of standardized total squared error. Its use is based on the premise that total squared error is the appropriate criterion for model selection, rather than residual sum of squares. By allowing the use of "biased" estimates, we can get better predictive and explanatory models. Unlike R^2, C_p does not always go up with extra estimated parameters, and unlike adjusted R^2, it is an estimate of meaningful parameters.

The C_p statistic is derived as follows:

v_j = the expected value of the true model for the j'th observation

u_j = the expected value of a particular fitted model for the j'th observation

Y_j = estimated value for j'th observation

$$\text{Total Square Error} = \sum_{j=1}^{N} (v_j - Y_j)^2$$

$$= \sum_{j=1}^{N} (v_j - u_j)^2 + \sum_{j=1}^{N} \text{Var } Y_j$$

Since bias = $v_j - u_j$, we have

$$\text{Total Square Error} = \sum (\text{bias})^2 + \sum \text{Var } Y_j$$

Let $\sum (\text{bias})^2 = SSB$

Γ_p = standardized total squared error with p parameters in model

$$\Gamma_p = \frac{SSB_p}{\sigma^2} + \frac{1}{\sigma^2} \sum \text{Var } Y_j = \frac{SSB_p}{\sigma^2} + P$$

Since $\sum \text{Var } Y_j = p\ \sigma^2$

If RRS_p is residual sum of squares, $E(RSS_p) = SSB_p + (N-p)\ \sigma^2$

The $\Gamma_p = \dfrac{E\,(RSSp) + (N-p)\,\sigma^2}{\sigma^2} + p$

$$= \frac{E(RSSp) + (N-2p)\sigma^2}{\sigma^2}$$

$$= \frac{E\,(RSSp)}{\sigma^2} - (N-2p)$$

Now define C_p as an estimator of Γ_p

$$C_p = \frac{RSS}{S^2} - (N-2p)$$

When there is no bias, $E\,(C_p) = p$, since

$$E\,(RSS) = (N-p)\,\sigma^2.$$

APPENDIX E

LABELLING: PROBABILITY MODELS

APPENDIX E

LABELLING PROBABILITY MODELS

Contained in this Appendix are the difference in probability models of an inspection with:

- all lots acceptable
- a seizure and detention
- a written warning.

All Lots Acceptable

The final model for the increase in probability of an inspection with all lots acceptable is shown in Exhibit E-1. The results which reflect program effectiveness are:

- when trader correction was a part of the previous inspection, the probability of an inspection with no enforcement actions, increased by 41% (everything else being equal)
- given two similar establishments, the establishment which committed to future compliance will have an increase in probability of 36% over the increases of the other establishment, that the next inspection will have all lots acceptable
- when a trader was given some education in the previous inspection, there was an increase in probability that the current inspection had all lots acceptable. There was an increase of 22% more than for a similar establishment which was given no education
- an establishment which voluntarily dispose or returns to the supplier the non-compliant product(s), has a probability increase of 19%, more than other establishments, that it will have all lots acceptable in the next inspection (everything else being equal).

Seizure and Detention

Exhibit E-2, summarizes the final model for decrease in probability of an inspection with a seizure and detention. The only program intervention variable in this model is previous action written warning. Its coefficient of

MODEL FOR INCREASE IN PROBABILITY OF AN INSPECTION WITH ALL LOTS ACCEPTABLE: LABELLING

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Trader Correction	.41	6.95	.000	Increase in probability of 41% when action in the previous inspection involved Trader Correction
	Previous Action Trader Commitment	.36	5.15	.000	Increase in probability of 36%, when action in the previous inspection involved Trader Commitment
	Previous Action Trader Education	.22	3.14	.002	Increase in probability of 22% when action with previous inspection involved Trader Education
	Previous Action Voluntary Disposal/Return to Supplier	.19	2.00	.046	Increase in probability of 19% when action in the previous inspection involved Voluntary Disposal or returning goods to the supplier
Control	Food	-.28	4.07	.000	Average decrease of 28% for food establishments
	Large	-.19	3.23	.001	Average decrease of 19% for large establishments
	Small	-.14	2.13	.034	Average decrease of14% for small establishments
	Previous Percentage Compliance: Labelling	-.0014	1.77	.078	For each 1% in previous compliance: labelling, the probability increased by .14%

EXHIBIT E-1 (Cont'd)

MODEL FOR INCREASE IN PROBABILITY OF AN INSPECTION WITH ALL LOTS ACCEPTABLE: LABELLING (Cont'd)

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Control (Cont'd)	Percentage of Inspections, with all lots Acceptable in last 5 Years	-.0010	1.09	.277	For each 1% increase in the percentage of past inspections with all lots acceptable, probability decreased .10%
	Retail	-.03	0.39	.700	Average decrease for retail establishments of 3%
	Constant	.13			C_p = 10 R^2 = 0.319 N = 409

MODEL FOR DECREASE IN PROBABILITY OF AN INSPECTION WITH A SEIZURE AND DETENTION: LABELLING

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Written Warning	.38	4.63	.000	Decrease in probability of 38% when action in the previous inspection involved a written warning
Control	Percentage of Inspections in last 5 years with seizures and detentions	.0042	7.32	.000	For each 1% increase in the percentage of past inspections with seizures and detentions, probability decreases .42%
	# of Inspections with Written Warnings in the last 5 years	-.04	1.66	.097	For each inspection with a written warning in the last 5 years, probability increased 4%
	Constant	-.01			
					$C_p = 7$
					$R^2 = 0.156$
					N = 459

.38 implies that, given an establishment which received a written warning prior to the current inspection and another establishment which did not receive such a warning, the establishment with the warning will have a decrease in probability that products will be seized and detained in the current inspection, a decrease of 38% over the decreases of the other (everything else being equal).

Written Warning

The model for decrease in probability of an inspection with a written warning is shown in Exhibit E-3. The major findings reflecting program effectiveness are:

- when an establishment receives an information letter prior to its current inspection, then this establishment will have a decrease in probability that a written warning will be an enforcement action in the current inspection. It will have a decrease of 35% more than that of a similar establishment which did not receive such an information letter

- an establishment which had a product(s) seized and detained in its previous inspection will have a decrease in probability that a written warning will result from the current inspection. Everything else being equal, this will be a decrease of 29% more than that of similar establishments which did not have products seized and detained.

MODEL FOR DECREASE IN PROBABILITY OF AN INSPECTION WITH A WRITTEN WARNING: LABELLING

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Information Letter	.35	2.33	.020	Decrease in probability of 35% when action in the previous inspection involved an information letter
	Previous Action Seizure and Detention	.29	5.33	.000	Decrease in Probability of 29% when action in the previous inspection involved a seizure and detention
Control	Food	.32	8.47	.000	Average decrease of 32% for food establishments
	Retail	-.18	4.79	.000	Average increase of 18% for retail establishments
	# of Inspections in last 3 years with information letters	.20	2.05	.041	Each inspection with an information letter in the past 3 years, decreased probability by 20%
	Percentage of Inspections with Written Warnings in Past 5 Years	.0037	2.00	.046	For each 1% increase in the percentage of past inspection with a written warning, probability decreased by .37%
	Constant	.02			$C_p = 7$ $R^2 = 0.305$ N = 457

APPENDIX F

QUALITY: PROBABILITY MODELS

APPENDIX F

QUALITY: PROBABILITY MODELS

The other difference in probability models for establishments which have been inspected in the regulatory area of quality are described in this Appendix.

All Lots Acceptable

A summary of the model for increases in probability of an inspection with all lots acceptable is shown in Exhibit F-1. The findings related to program effectiveness tell us that trader education and trader correction as part of an inspection are effective instruments in bringing about an increase in the probability of an inspection with all lots acceptable. The probability increases with these actions were 29% for trader education and 13% for trader correction (everything else being equal).

Seizure and Detention

The program intervention variable which was incremental in decreasing the probability of an inspection with a seizure and detention, shown in Exhibit F-2, is previous action written warning. Its coefficient of .07 implies that when an establishment receives a written warning prior to an inspection, the probability it will have products seized and detained will decrease by 7% over the decreases of a similar establishment which received no such warning.

Written Warning

The major results in the model for decrease in probability of an inspection with a written warning, shown in Exhibit F-3, are:

- when an establishment receives an information letter in the previous inspection, there is an 87% decrease in probability that a written warning will result from the current inspection compared to a similar establishment which did not receive an information letter

- given two similar establishments, the establishment which has committed to future compliance, will have a decrease in probability of 22% more than the other establishment

- an establishment will have a decrease in probability of receiving a written warning if it had products seized and detained in its previous inspection. It will have of a decrease of 31% over the decreases of another establishment which did not have products seized and detained in its previous inspection (everything else being equal).

EXHIBIT F-1

MODEL FOR INCREASE IN PROBABILITY OF AN INSPECTION WITH ALL LOTS ACCEPTABLE: QUALITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Trader Education	.29	2.68	.008	Increase in probability of 29% when action in the previous inspection involved trader education
	Previous Action Trader Correction	.13	1.87	.063	Increase in probability of 13% when action in the previous inspection involved trader correction
Control	Reason for Previous Inspection is Complaint/Referral	-.19	2.52	.013	Average decrease of 19% when the reason for the previous inspection was a complaint/ referral
	Previous Percentage Compliance: Quality	-.0025	3.20	.002	For each 1% increase in the previous percentage compliance: quality, probability decreased .25%
	Food	-.22	2.96	.004	Average decrease of 22% for food establishments
	Constant	.38			$C_p = 5$ $R^2 = 0.154$ N = 168

MODEL FOR DECREASE IN PROBABILITY OF AN INSPECTION WITH A SEIZURE AND DETENTION: QUALITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Written Warning	.07	1.79	.075	Decrease in probability of 7% when action in the previous inspection involved a written warning
Control	Percentage of Inspections with Seizures and Detentions in the last 5 years	.0045	5.25	.000	For each 1% increase in the percentage of past inspections with seizures and detentions, probability decreased .45%
	Percentage of Inspections with Written Warnings in the last 5 years	.0085	3.37	.001	For each 1% increase in the percentage of past inspections with written warnings, probability decreased .85%
	# of Inspections with Written Warnings in the last 5 years	-.07	1.78	.077	For each inspection with a written warning in the last 5 years, there was an increase in probability of 7%
	Reason for Current Inspection is complaint/referral	-.06	1.70	.091	Average increase of 6% when the reason for the current inspection is complaint/ referral
	# of Referrals between Inspections	.02	2.37	.018	For each referral received between inpsection, probability decreased 2%
	Constant	.02			$C_p = 4$ $R^2 = 0.272$ N = 274

EXHIBIT F-3

MODEL FOR DECREASE IN PROBABILITY OF AN INSPECTION WITH A WRITTEN WARNING: QUALITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Information Letter	.87	4.59	.000	Decrease in probability of 87% when action in the previous inspection involved an Information Letter
	Previous Action Trader Commitment	.22	3.79	.000	Decrease in probability of 22% when action in the previous inspection involved trader commitment
	Previous Action Seizure and Detention	.31	4.30	.000	Decrease in probability of 31% when action in the previous inspection involved seizure and detention
Control	Food	.20	3.94	.000	Average decrease of 20% for food establishment
	Percentage of Inspections with Written Warnings in the last 5 years	.0045	1.83	.068	For each 1% increase in the percentage of past inspections with a written warning, probability decreased by .45%
	Constant	.09			$C_p = 4$ $R^2 = 0.285$ N = 244

APPENDIX G

QUANTITY: OTHER MODELS

APPENDIX G

QUANTITY OTHER MODELS

Included in this Appendix is a summary of the models for quantity compliance. These models include:

- the time between the current and the previous inspections
- an increase in probabilty of an inspection with all lots acceptable
- a decrease in probability of an inspection with a seizure and detention
- a decrease in probabilty of an inspection with a written warning.

The results for each model are described below.

Time Between Inspection

The model for the time between the current and the previous inspections for establishments with compliance activities in the regulatory area of quantity is shown in Exhibit G-1. The program intervention results imply that:

- an establishment which had been inspected more often tended to be reinspected sooner, by .78 of a month per inspection which occurred in the last 3 years, than a similar establishment which had been inspected less often
- establishments with previous action trader correction were reinspected 1.37 months sooner than an establishment without this action (everything else being equal)
- when a seizure and detention occurred in the previous inspection, the time until reinspection decreased by 1.85 months (everything else being equal)
- when a commitment for future compliance was made by the trader, he was allowed more time (1.73 months) to comply until he is reinspected than was another trader who made no such commitment.

MODEL FOR THE TIME BETWEEN THE CURRENT AND THE PREVIOUS INSPECTIONS: QUANTITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Number of Inspections in the Last 3 Years	-.78	4.05	.000	For each inspection in the last 3 years, the number of months decreased by .78
	Previous Action Trader Correction	-1.37	1.76	.081	Decrease in the number of months by 1.37 when action in the previous inspection involved trader correction
	Previous Action Seizures and Detentions	-1.85	1.68	.095	Decrease in the number of months by 1.85 when action in the previous inspection involved a seizure and detention
	Previous Action Trader Commitment	1.73	1.53	.128	Increase in the number of months by 1.73 when action in the previous inspection involved trader commitment
Control	Reason for Current Inspection is Complaint/Referral	-3.51	4.28	.000	Decrease in the number of months when the reason for the current inspection is a complaint/referral by 3.51
	Percentage of Inspections with Trader Education in the last 5 years	0.0613	3.47	.001	For each percentage of past inspections with trader education, the number of months increased .0613
	Previous Percentage Compliance: Quantity	0.0507	2.44	.016	For each percentage of quantity compliance in the previous inspection, compliance in the number of months increased by .0507

EXHIBIT G-1 (Cont'd)

MODEL FOR THE TIME BETWEEN THE CURRENT AND THE PREVIOUS INSPECTIONS: QUANTITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Control (Cont'd)	Large	1.55	2.22	.029	Average increase of 1.55 months for large establishments
	# of Inspections with Oral Warnings in the last 3 years	.79	1.20	.232	For each inspection with an oral warning in the past 3 years, the number of months increased by .79
	Constant	4.96			
					C_p = 10
					R^2 = 0.380
					N = 124

Some of the other results are:

- establishments are reinspected 3.51 months sooner when the reason for reinspection is because of a complaint or referral (everything else being equal)

- for establishments which are similar except with respect to size, the large size establishments will not be reinspected as soon as small and medium size establishments. Small and medium size establishments will be reinspected 1.55 months sooner than large ones.

All Lots Acceptable

Exhibit G-2 describes the results of the final model for increase in probability of an inspection with all lots acceptable. The major findings which provide an indication of program effectiveness are:

- when trader correction is a part of the actions taken in an inspection, there is a 30% increase in probability that all lots will be acceptable in the next inspection (everything else being equal)

- an establishment which had products seized and detained will have an increase in probability that the next inspection will have all lots acceptable. This increase will be 22% more than the increase of a similar establishment which did not have products seized and detained.

Seizure and Detention

The results in the model for decrease in probability of an inspection with a seizure and detention, shown in Exhibit G-3 indicate:

- given two similar establishments which have previously been inspected, if one establishment is re-inspected before the other, the establishment which is reinspected last will have a 1% increase per month, in probability of having products seized and detained in the reinspection

- establishments with previous action written warning will have a decrease in probability of a seizure and detention in their next inspection of 4% more than the decrease of establishments without previous action written warning (everything else being equal).

EXHIBIT G-2

MODEL FOR INCREASE IN PROBABILITY OF AN INSPECTION WITH ALL LOTS ACCEPTABLE: QUANTITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Trader Correction	.30	3.15	.002	Increase in probability of 30% when action in the previous inspection involved trader correction
	Previous Action Seizure and Detention	.22	1.88	.063	Increase in probability of 22% when action in the previous inspection involved seizure and detention
Control	Retail	-.29	3.25	.002	Average decrease of 29% for retail establishments
	Percentage of Inspections with all lots Acceptable in the last 5 years	-.0046	3.08	.003	For each 1% increase in percentage of past inspections with all lots acceptable, decreased probability by .46%
	Reason for Previous Inspection is Other Reasons	1.21	2.98	.003	Average increase of 121% when reason for the previous inspection is other reasons
	Constant	.10			$C_p = 3$ $R^2 = 0.296$ N = 124

EXHIBIT G-3

MODEL FOR DECREASE IN PROBABILITY OF AN INSPECTION WITH A SEIZURE AND DETENTION: QUANTITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Time between inspections	-.01	1.54	.125	For each extra month between inspection, probability increased 1%
	Previous Action Written Warning	.04	0.65	.514	Decrease in probability of 4% when action in the previous inspection involved a written warning
Control	Percentage of Inspection with Seizures and Detentions in the last 5 years	.0044	2.01	.047	For each 1% increase in percentage of past inspections with a seizure and detention, probability decreased .44%
	Retail	-.07	1.37	.173	average increase of 7% for retail establishments
	Constant	.16			
					$C_p = 4$
					$R^2 = 0.072$
					N = 154

Written Warning

The summary of the model for decrease in probability of an inspection with a written warning is shown in Exhibit G-4. The results indicate that both the number of inspections in the last five years and previous action information letter are effective in decreasing the probability of a written warning. The coefficient of .05 for the number of inspections variable implies that for each additional time an establishment is inspected, there is a decrease in probability of 5% over the decrease of a similar establishment which has not been inspected as often. For previous action information letter, the coefficient of .75 indicates that an establishment which receives an information letter prior to an inspection will have a 75% decrease in probability of having a written warning in the inspection, compared to another establishment which does not receive an information letter (everything else being equal).

EXHIBIT G-4

MODEL FOR DECREASE IN PROBABILITY OF AN INSPECTION WITH A WRITTEN WARNING: QUANTITY

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	# of Inspections in the last 5 years	.05	4.46	.000	For each inspection in the past 5 years, probability decreased 5%
	Previous Action Information Letter	.75	3.81	.000	Decrease in probability of 75% when action in the previous inspection involved an information letter
Control	# of Inspections in last 3 years with Trader Correction	-.06	2.81	.006	For each inspection with trader correction in the last 3 years, probability increased 6%
	Constant	.02			$C_p = 4$
					$R^2 = 0.198$
					N = 154

APPENDIX H

MEAN COMPLIANCE: PROBABILITY MODELS

APPENDIX H

MEAN COMPLIANCE: PROBABILITY MODELS

Contained in this Appendix are the other difference in probability models relating to mean compliance.

All Lots Acceptable

In the model for increases in probability of an inspection with all lots acceptable, shown in Exhibit H-1, the results indicate that:

- when a trader corrects any non-compliance in the previous inspection, the probability that his next inspection will have all lots acceptable increases by 49% over the increases of a similar trader

- traders who commit to future compliance will have an increase in probability of an acceptable inspection by 30% more than traders who make no commitment (everything else being equal)

- given two similar traders, one which receives some education and the other which does not receive some education, the former will have an increase of 26% in probability of an acceptable inspection

- traders who voluntarily dispose or return to the supplier the violative product have higher increases in probability that the next inspection will have all lots acceptable. They have an increase of 16% over the increase in probability of traders who take no such action (everything else being equal).

Seizure and Detention

Exhibit H-2 describes the model for the decrease in probability of an inspection with a seizure and detention. The results indicate that both an oral warning and a written warning are effective in decreasing the probability of a seizure and detention. The difference in the decreases in probability of a seizure and detention for those traders which received an oral warning compared to those traders which did not receive such a warning was 25% (everything else being equal). Traders which received a written warning prior to being inspected, had a decrease in probability of a seizure of 8% more than a similar establishment which received no written warning prior to being inspected.

EXHIBIT V-1

MODEL FOR INCREASE IN PROBABILITY OF AN INSPECTION WITH ALL LOTS ACCEPTABLE: MEAN COMPLIANCE

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Trader Correction	.49	6.92	.000	Increase in probability of 49% when action in the previous inspection involved trader correction
	Previous Action Trader Commitment	.30	4.38	.000	Increase in probability of 30% when action in the previous inspection involved trader commitment
	Previous Action Trader Education	.26	3.46	.001	Increase in probability of 26% when action in the previous inspection involved trader education
	Previous Action Voluntary Disposal/ Return to Supplier	.16	1.73	.084	Increase in probability of 16% when action in the previous inspection involved voluntary disposal/returning goods to supplier
Control	Food	-.26	4.71	.000	Average decrease of 26% for food establishments
	Large	-.17	2.95	.003	Average decrease of 17% for large establishments
	Previous Percentage Mean Compliance	-.0016	2.01	.045	Each 1% of mean compliance in the previous inspection, decreased probability by .16%
	Small	-.12	1.92	.055	Average decrease of 12% for small establishments

EXHIBIT H-1 (Cont'd)

MODEL FOR INCREASE IN PROBABILITY OF AN INSPECTION WITH ALL LOTS ACCEPTABLE: MEAN COMPLIANCE

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Control (Cont'd)	Percentage of Inspections with Trader Correction in the last 5 years	-.0021	1.89	.059	For each 1% increase in percentage of past inspections with trader correction, probability decreased by .21%
	Percentage of Inspections with all lots Acceptable in the last 5 years	-.0020	1.89	.060	For each 1% increase in percentage of past inspections with all lots acceptable probability decreased by .20%
	Reason for Current Inspection is Complaint/Referral	-.11	2.03	.043	Average decrease of 11% when reason for current inspection is complaint or referral
	# of Inspections with Trader Education in the last 3 years	-.05	1.75	.080	For each inspection in the last 3 years which involved trader education, probability decreased 5%
	Constant	.29			$C_p = 12$ $R^2 = 0.314$ N = 440

MODEL FOR DECREASE IN PROBABILITY OF AN
INSPECTION WITH A SEIZURE AND DETENTION: MEAN COMPLIANCE

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Oral Warning	.25	3.91	.000	Decrease in probability of 25% when action in the previous inspection involved an oral warning
	Previous Action Written Warning	.08	2.57	.010	Decrease in probability of 8% when action in the previous inspection involved a written warning.
Control	# of Inspections with Seizures and Detentions in the last 3 years	.14	4.45	.000	For each inspection with a seizure and detention in the last 3 years, probability decreased by 14%
	Percentage of Inspections with Written Warnings in the last 5 years	.0089	3.95	.000	For each 1% increase in percentage of past inspections with a written warning, probability decreased .89%
	# of Inspections with Oral Warnings in the last 3 years	-.06	2.91	.004	For each inspection with an oral warning in the last 3 years, increased probability by 6%
	# of Inspections with Written Warnings in the last 5 years	-.10	2.64	.009	For each inspection with written warning, in the last 5 years, there was a decrease in probability of 10%
	# of Inspections with Trader Education in the last 5 years	.01	1.83	.068	For each inspection with trader education in the last 5 years there was a decrease in proabability of 1%

EXHIBIT H-2 (Cont'd)

MODEL FOR DECREASE IN PROBABILITY OF AN
INSPECTION WITH A SEIZURE AND DETENTION: MEAN COMPLIANCE

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Control (Cont'd)	Percentage of Inspections with Seizures and Detentions in the last 5 years	.0008	0.69	.491	For each 1% increase in percentage of inspections with a seizure and detention, probability decreased .08%
	Constant	.00			$C_p = 8$ $R^2 = 0.243$ N = 475

Written Warning

The final decrease in probability of an inspection with a written warning model is shown in Exhibit H-3. In this model, we find that the program intervention variables which have an incremental effect are previous action information letter, seizure and detention, trader commitment, and trader education. Establishments which had these actions had greater decreases in probability of a written warning than establishments which did not have these actions (everything else being equal). The decrease in probability was greater by 18% for an information letter, 6% for a seizure and detention, 8% for trader commitment and 4% for trader education.

EXHIBIT H-3

MODEL FOR DECREASE IN PROBABILITY OF AN INSPECTION WITH A WRITTEN WARNING: MEAN COMPLIANCE

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Program Intervention	Previous Action Information Letter	.14	2.36	.019	Decrease in probability of 14% when action in the previous inspection involved an information letter
	Previous Action Seizure and Detention	.14	2.42	.016	Decrease in probability of 14% when action in the previous inspection involved a seizure and detention
	Previous Action Trader Commitment	.07	1.78	.076	Decrease in probability of 7% when action in the previous inspection involved trader commitment
	Previous Action Trader Education	.05	1.06	.290	Decrease in probability of 5% when action in the previous inspection involved trader education
Control	Food	.24	6.38	.000	Average decrease of 24% for food establishments
	# of Inspections with Information Letters in the last 3 years	.29	3.76	.000	For each inspection with an information letter in the last 3 years there was a decrease in probability of 29%
	# of Inspections with Seizures and Detentions in the last 5 years	.06	3.77	.000	Average increase of 6% for retail establishments
	Retail	-.12	2.64	.009	Average increase of 12% for retail establishments

MODEL FOR DECREASE IN PROBABILITY OF AN
INSPECTION WITH A WRITTEN WARNING: MEAN COMPLIANCE

Type of Variable	Variable	Coefficient	t-Value	Significance	Interpretation
Control (Cont'd)	Percentage of Inspections with Written Warnings in last 5 Years	.0043	2.42	.016	For each 1% increase in percentage of past inspections with written warnings, probability decrease .43%
	# of Inspections with all lots Acceptable in last 3 years	.03	2.39	.017	For each inspection with all lots acceptable in the last 3 years, probability decresed by 3%
	Manufacture	-.07	2.16	.032	Average increase of 7% for manufacture establishments
	# of Inspectors with Trader Education in the last 3 years	-.03	1.98	.049	For each inspection with trader education in the last 3 years tere was an increase in probability of 3%
	Constant	.01			
					$C_p = 16$
					$R^2 = 0.355$
					N = 475