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ANALYSTS' EARNINGS FORECAST REVISIONS AND ERRORS IN ANTIDUMPING (AD) PETITION INVESTIGATIONS

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MOHAMMAD BASYAH
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ANALYSTS' EARNINGS FORECAST REVISIONS AND ERRORS
IN ANTIDUMPING (AD) PETITION INVESTIGATIONS

A Dissertation APPROVED FOR THE
DEPARTMENT OF ECONOMICS

BY

Dr. James C. Hartigan
(Chair)

Dr. W. ~~Robert Reed~~
(Member)

Dr. Cynthia Rogers
(Member)

Dr. Aaron Smallwood
(Member)

Dr. James F. Horrell
(Member)

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ABSTRACT

Previous assessments of the value of antidumping (AD) petitions have utilized event studies. These estimate the significance of abnormal returns to security holders of the pertinent firms at important decision dates in the AD investigation. However, security holders have varying degrees of information about the prospects for their firm. The present study estimates the significance of earnings forecast revisions and the accuracy of those forecasts around these dates by brokerage firm analysts. Analysts maintain a professional relationship with the firms that they follow. As such, they are assumed to be better informed than the average security holders. Their earnings forecast revisions, accuracy, and bias should provide a superior estimate of the value of the petitions to the pertinent firms. We provide evidence that analysts expect declining performance from pertinent firms in first year earning when the ITC-Preliminary decision turns out to be negative; but possible improvement in second year earning upon learning the Department of Commerce final decision. We provide no evidence that the filing of an AD petition or the announcement of the verdicts of the investigation affects analysts' expectation about firm five year (long-term) earnings growth. Therefore, our finding shows that the AD petition investigations affect analyst's expectations about firm performance on a short-term basis. We also find that analysts may anticipate their second year earnings forecast three months and one month before the filing date. When we examine analysts' forecast errors in the year following the filing of AD petitions, we find no evidence that the filing of an AD petition affects analysts' forecast accuracy or bias.

CHAPTER I

INTRODUCTION

I.1. Dumping Petition and Analysts' Forecast

Analysts (sell brokerage firms) serve an important function for both firm management and investors. Although this may now be limited by Fair Disclosure, analysts historically have served as a vehicle by which managers transmit information to the market. Despite having the option of directly issuing guidance to the market, managers may prefer to convey their views through an intermediary. This has the advantage of limiting their liability for guidance that may turn out to be mistaken. For example, management may believe that filing an antidumping (AD) petition may result in increased earnings for their firm in the future. However, they may want to be careful about stating this directly through the guidance they provide in their quarterly reports. The petition may be denied. Even if successful, it may not materially affect earnings. Furthermore, an affirmative AD petition requires a positive material injury assessment. To succeed in the petition without an adverse effect on their stock price, managers may be in the position of saying one thing to the investigative authority, and another to its investors. Hence, they may prefer that analysts speak to the market. An AD petition may be construed as less material than a merger or acquisition. However, it may also be considered as more specific than discussions about the economy. Hence, management may prefer that analysts filter the conveyance regarding AD petitions to the market. Because of recent scrutiny of the financial services industry, the study of analysts is inherently interesting. Prior to the Regulation of Fair Disclosure (Reg FD), analysts could move markets, making it difficult to assess the value of a decision through abnormal returns if stock prices are already reflective of the value of petition.

Analysts are likely to be deemed as more independent than management by investors. They are also likely to be considered as better informed than investors because they have better access to management, and because their profession is to follow the companies in the sector in which they are specialized. Hence, how analysts evaluate and respond to the invocation and implementation of a public policy is an interesting issue. To our knowledge, this has never been investigated. We will do so in the context of AD petition.

I.2. Importance of the Study

The use of financial data to analyze trade policy is well established in the international trade literature. However, this has been primarily in the use of event studies to assess the value of administered protection decisions (dumping, subsidies, and the Escape Clause). Examples include Hartigan, Kamma, and Perry (1986, 1989, 1994); Hughes, Lenway, and Rayburn (1997); Krupp and Pollard (1996); Rehbein and Starks (1995), and Lenway, Rehbein, and Starks (1990). Other examples of the use of event studies in the analysis of trade policy are Brander's (1991) and Thompson's (1993, 1994) studies of the U.S./Canada free trade agreement. A different use of financial data in the context of the trade policy is Hartigan and Rogers' (2002) demonstration that the filing of AD petitions and insider buying in the two months preceding the complaint are significantly related.

In the present paper, we continue the invocation of firm level financial data to analyze trade policy. In particular, we specify a time series and cross section (TSCS) panel of average earning forecasts for the firms with publicly traded common stock that are actively followed by analysts and are investigated by the U.S. International Trade Commission in AD complaints. So as to assess the anticipated value of AD relief to the investigated firms, we provide evidence of the statistical significance of the critical decisions in the AD investigations to earnings forecast revisions by analysts. This provides an important supplement to and clarification of the aforementioned event studies. The market response at a decision date in an investigation is likely to reflect a mixture of short and long run influences. For example, an affirmative material injury verdict may be interpreted as bad news regarding near term earnings, as the confidential investigation by the USITC may be construed as disclosing previously unknown negative information about a firm. However, it may be viewed as good news for longer term earnings if it raises the probability that protection will be awarded. We will test for this by considering earnings revisions over the horizons of one year ahead earnings forecast, two years ahead earnings forecast, and of five years long term earnings growth.

The response of analysts' earnings forecasts to announcements of consequence to firms has been investigated previously. Examples are the Chaney, Hogan, and Jeter (1999) study of the reporting of restructuring charges, and the Lys and Sohn (1991) inquiry into corporate accounting disclosures. To our knowledge, however, this is the first examination of analysts' earnings forecast revisions in the context of the implementation of a public policy.

I.3. Objective of the Study

Previous assessments of the value of antidumping (AD) petitions have utilized event studies, which estimate the significance of abnormal returns to security holders of the pertinent firms at important decision dates in the AD investigation. However, security holders have varying degrees of information about the prospects for their firm. The present study examines the effect of filing AD petitions and the verdicts of the investigative decision on analysts' earnings revisions and forecasts. The study also assesses the more immediate effect of filing AD petitions and the verdicts of the investigation, as well as the longer term implications. We estimate the significance of earnings forecast revisions and the accuracy of those forecasts around these dates by brokerage firm analysts. Analysts maintain a professional relationship with the firms they follow. As such, they are assumed to be better informed than the average security holder. Their earnings forecast revisions, accuracy, and bias should provide a superior estimate of the value of the petitions to the pertinent firms. On the other hand, how analysts are compensated may affect their willingness to be candid. That is, they may be biased upwards in their forecasts if their compensation is tied to underwriting of securities by the brokerage for which they work.

1.4. Approach of the Study

Our approach in this study is the following:

First, to examine how brokerage firm analysts adjust their earnings forecasts when AD petitions are filed and when critical decisions are made in the investigation process.

Second, to compare the mean of analysts' forecasts before filing AD petitions and the verdicts of the investigation to the mean of analysts' forecasts subsequent to the filing AD petitions, controlling for the verdicts of the investigation.

Third, to address the analysts' accuracy and bias following the filing of AD petitions and to consider whether analysts become more or less accurate in their forecasts after learning of the filing of AD petitions.

1.5. Bottom Line of the Study

The bottom line of our study is to answer the following questions:

First, are the filing of AD petitions and the verdicts of the investigation viewed by brokerage firm analysts as a signal of better or worse times ahead? Are they viewed the same by analysts versus the markets?

Second, do analysts become more or less accurate in their forecasts after learning of the filing of AD petitions?

1.6. Results of the Study

We found evidence that the AD petition investigations affect analysts' expectations about firm performance on a short term basis. Subsequent to the negative ITC Preliminary decision, analysts tend to revise their one year ahead earnings forecast downward, on average. Furthermore, analysts tend to revise their second year earnings upward subsequent to the final decision of the Department of Commerce. We also found that analysts may adjust their second year earnings forecast revision earlier than the filing date. These adjustments occurred three months and one month before the filing date. At the three months before firm filing an AD petition, analysts were still optimistic about their second year ahead earnings forecast. This may be because the information regarding whether or not the firm making a petition is still noisy at this time. At one month before filing, analysts change their expectation on their second year ahead earnings forecast by revising it downward, on average. This is may be because more information becomes available to analysts and to the market. Moreover, subsequent to the Department of Commerce's final decision, analysts become more optimistic on their second year ahead earnings forecast. Since 95 percent of DoC decisions are in the affirmative, what is uncertain at the time of the decision is the AD duties that the DoC will announce. This revision may indicate that analysts believe that the level of duties will benefit the firm. We found no evidence that the AD petition investigation affects analysts' expectation on a firms' long term performance. When we examine analysts' forecast errors in the year following the filing of AD petitions, we find no evidence that filing an AD petition affects analysts' forecast accuracy and bias.

1.7. Organization of the Study

Chapter II presents the literature review and the motivation of the study. Chapter III presents the empirical research design. The estimation econometrics techniques pertaining to this study are presented in Chapter IV. Chapter V discusses the sources of the data used in this study. Chapter VI lays out the results of the regressions. Finally, the conclusion is presented in Chapter VII.

CHAPTER II

LITERATURE REVIEW AND MOTIVATION

II.1. Introduction

The research about dumping covers both theoretical and empirical studies. This chapter provides an overview of the theoretical studies of dumping. It also presents the landmark empirical dumping studies, with the emphasis on event studies. Section II.2 presents the empirical literature, which focuses primarily on event studies. Section II.3 describes the motivation of the study.

II.2. Empirical Literature[1]

The application of the financial data into the codetermination of security prices and the analysis of economic events (which is called the market model) has been very common in the past decades, and the empirical literature in international trade is no exception in using it. The market model provides a foundation for using security price data to gauge the effect of the stages of litigation, and/or public regulation on the

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[1] This thesis approaches the problem from an empirical perspective. The traditional theory about dumping was initiated by Viner (1923). However, a wave of interest on this phenomenon had not been developed overwhelmingly until Ethier (1982) and Brander and Krugman (1983), who initiated the modern theory of dumping. A seminal development in this interest was Gruenspecht (1988), who shows that an AD law may affect a market equilibrium, even when there were no AD duties imposed. Several additional authors have investigated the AD law's effect in a variety of contexts. These include Pinto (1986), Hartigan (1994, 1995, 1996, 2000), Staiger and Wolak (1992), Prusa (1992, 1994, 1998, 2001), Clarida (1993), Hansen and Prusa (1997), Kolev and Prusa (2002), Cheng, Qiu and Wong (2001). A general consensus appears to be that AD laws affect both domestic and foreign firms' strategic behavior, and the impact on these firms is ambiguous. There are contexts in which a home country AD law can benefit both domestic and foreign firms or benefit either one.

investors' expectations of the affected firms' profitability. This foundation is particularly useful for testing the hypothesis that producers receive net benefits ("producer protection" at the expense of consumers) or net loss ("consumer protection" at the expense of regulated firms) from the litigation and/or government regulation. Or, whether the regulator itself receives net benefits at the expense of both producers and consumers. Based on these hypotheses, the market model explains the effect of the litigation and/or government regulation on the behavior of the regulated firms' security values.

Pioneered by Fama, Fischer, Jensen, and Roll (1969), the general practice of the codetermination of firms' security values and the analysis of economic events is what we call the method of "residual analysis" or "abnormal return." The empirical procedure of this method is conditioned on the absence or existence of the event under study. Under the absence of the event, we invoke the market model of stock return and get the coefficient estimation. Then, under the existence of the event, we determine whether there is a discrepancy between the actual and predicted value of the stock return. This discrepancy is known as the residual or abnormal return. Finally, we ascertain the relationship between residual returns and events through a significant test.

The underlying assumption of the residual method is that stock markets operate in an efficient manner and investors are rational. As Schwert (1981) pointed out:

> The efficient-markets/rational-expectations hypothesis posits that security prices reflect all available information. Hence, unanticipated changes in regulation result in a current change in security prices, and

the price change is an unbiased estimate of the value of the change in future cash flows to the firm. (p.1)

The weak form is that security prices reflect all public information. The strong form is that they reflect all information.

The use of financial data to analyze trade policy is well established in the international trade literature. However, this has been primarily in the use of event studies to assess the value of administered protection decisions (dumping, subsidies, and the escape clause). Hartigan, Kamma, Perry (1986: hereafter HKP) use the capital market event study to analyze whether a firm looking for protection earns an normal return." The abnormal return is defined as the return that is significantly different from the predicted return given the firm's normal relationship with the capital market. HKP focus their analysis on the escape clause petition filed under the Trade Act of 1974 (Section 201). They examine whether the appeal for protection and subsequent USITC (United States International Trade Commission) and Presidential Decision affect the value of the firm's common stock. HKP provide both time series and cross section analysis of how advantageous protection is in benefiting those firms that look for it. HKP conclude that "Protection is beneficial to beleaguered industries. However, the extent of that benefit may be quite narrowly circumscribed and conditional on internal variables for each firm" (p. 616).

Continuing the application of the capital market event study method, HKP (1989) investigate the importance of the distinction between threat of injury and actual injury that the USITC uses as a decision criterion in dumping investigation. HKP's paper focuses on non-steel antidumping petitions filed under the Trade Reform Act of 1979

(Section 731). HKP provide a time series analysis whether a firm looking for a protection earns abnormal return on the dates for which protection decisions are made for each case. HKP find that relief is valuable to the firms seeking protection only if the firms are in the phase of being threatened with injury from dumping, that is, the firms have not been injured yet.

In another paper, HKP (1990) utilize the capital market event study approach to explore the importance of the USITC decision making procedure by focusing on the USITC material injury decision. HKP use a cross section regression to explain the abnormal returns generated on decision dates in the investigation of unfair practices. HKP provide a profile that healthy firms, in term of profitability, are likely to get advantages from protection. That is, the firms are not yet suffering material injury although they are very susceptible to a surge of less than fair value (LTFV) imports. HKP reveal their finding with the reason that the USITC decision tends to deny protection toward firms that are in a pre-injury state.

With the belief that the injury standards and remedies should differ for dumping and subsidization, HKP (1994) show another application of the capital market event study method in investigating subsidy and dumping decisions for the U.S. steel industry. For both dumping and subsidy cases, HKP provide evidence of different market reactions. This suggests that the government should judge dumping and subsidization in a different way. The implication of HKP's study is that the injury standard should be weaker, but the remedy should be stronger under subsidization in comparison with dumping, since the former are more injurious to their home producers.

Other applications of the capital market event study method in assessing the value of administered protection decisions are shown in Begley, Hughes, Rayburn, and Runkle (1998); Hughes, Lenway, and Rayburn (1997); Krupp and Pollard (1996); Rehbein and Starks (1995); and Lenway, Rehbein, and Starks (1990).

Begley, Hughes, Rayburn, and Runkle (1998: hereafter BHRR) investigate the stock price effects of the series of events leading to the 1986 Memorandum Of Understanding (MOU) under which Canada agreed to impose a 15 percent export tariff on lumber shipped to the United States. Similar to previous event study literature, BHRR focus their research on stock price behavior on the event dates when the news related to MOU transpired. Overall, BHRR's results show significant stock market reactions toward the settlement of the dispute leading to the MOU.

Hughes, Lenway, and Rayburn (1997: hereafter HLR) use the capital market event study method to analyze the stock price behavior of both the semiconductor producers and their downstream consumers upon the impact of the 1986 United States/Japan Semiconductor Trade Accord. Under this agreement, the US government imposed price floors for Japanese firms to sell in the U.S. while the Japanese government agreed to provide U.S. firms with a 20 percent target market share to sell in Japan. HLR focus their analysis on the strategic trade model in comparison to the neoclassical trade model. The former support the argument that trade protection will enhance global competitiveness of related domestic industries as long as technological spillover exists among producers, suppliers, and consumers. Likewise, the latter suggests that trade protection benefits domestic producers at the expense of the consumers. The goal of HLR's research is to test whether stock market reaction on both the semiconductor firms and their downstream consumers support the strategic trade policy argument. The overall HLR's results support this argument.

Krupp and Pollard (1996: hereafter, KP) investigate empirically the response of imports to the various stages of antidumping investigations using monthly product specific data from the U.S. chemicals and allied product industry. KP's paper reveals a wide range of behavioral responses that do not necessarily appear to be dependent upon the final outcome of the investigation, and in some cases contradicts the 'accepted wisdom' of the impacts these cases have upon import behavior. Rehbein and Starks (1995: hereafter, RS) provide further empirical evidence on the impact of trade restrictions on foreign competitors. RS' results contradict the previous theoretical and empirical findings that foreign firms benefit from U.S. protection. In fact, RS's results show that Japanese firms did not experience wealth gains upon the imposition of U.S. restrictions. Other empirical literature about the event studies includes Krupp (1994) and Thompson (1994). A different use of financial data in the context of trade policy is Hartigan and Rogers's (2003) demonstration that the filing of AD petitions and insider buying in the two months preceding the complaint are significantly related. Other empirical findings about dumping and macroeconomic studies are Mah (2000), Blonigen and Haynes (2002).

II.3. Motivation

In general, prior studies on the assessment of the value of antidumping (AD) petitions have utilized event studies, which focus on the market's response and estimate the significance of abnormal returns to security holders of the pertinent firms at important decision dates in the AD investigation. However, security holders have varying degrees of information about the prospect for their firm. Analysts maintain a professional relationship with the firms that they follow. As such, they are assumed to be better informed then the average security holders.

Following Chaney, Hogan, and Jeter (1999) and Lys and Sohn (1990), this dissertation examines the reaction of analysts to the announcement of the filing of AD petitions and the verdicts of the investigation. Investigating the analysts' response offers several potential advantages over examining market response.

First, by using analysts' forecasts, we have a clear measure of earning expectations before and after the announcement of the filing of AD petitions and the announcement of the verdicts of the investigative decision.

Second, because analysts' forecast earnings are for finite future intervals, we are able to examine separately their revisions in forecasts for various horizons. In contrast, whether the market reaction is predominantly short-term, long-term, or mixed is essentially indistinguishable.

Third, our focus on analysts' forecasts also enable us to address the analysts' accuracy and bias following the announcement of the filing AD petitions, whether analysts become more or less accurate in their forecast after learning of the filing of AD petitions.

Fourth, if analysts move markets through revision announcements, and they anticipate a filing, event study results will be biased downwards, as the value of the petition will already be reflected in security prices.

CHAPTER III

EMPIRICAL DESIGN

III.1. Introduction

This chapter describes the set up of empirical design. Section III.2 introduces the typical course of an antidumping investigation. Section III.3 describes the sequence of analysts' earnings forecast revisions. Section III.4 presents the consensus estimates of the I/B/E/S (Institute of Brokerage Estimate System). We define analysts' earnings forecast revisions and errors in Section III.5 and Section III.7, respectively. Section III.6 lays out the regression model of analysts' earnings forecast revisions in relation to the filing antidumping petitions and the verdicts of the investigation. The regression model of analysts' forecast errors are presented in Section III.8.

III.2. The Typical Course of an Antidumping Petition Investigation

AD petitions in the U.S. entail a bifurcated investigation process. After a petition is filed, the Department of Commerce (DoC) must make a sufficiency decision within 20 days. That is, it must determine if the evidence submitted with the petition provides an adequate basis for proceeding with the investigation. If sufficiency is satisfied, the USITC must determine if material injury is manifest within 45 days of the petition. If that decision is in the affirmative, the DoC must estimate preliminary AD margins within 160 days of the filing date for the accused foreign firms. Irrespective of the preliminary decision, final AD margins must be made by 235 days after the filing. If this decision is in the affirmative, a final injury determination must be made 280 days after the filing. At any point in the investigation, the negotiation of a voluntary export restraint (VER) may result in termination of the investigation. The verdicts in any of these decisions may result in earnings revisions by analysts. Figure 1 displays the typical course of an antidumping investigation.

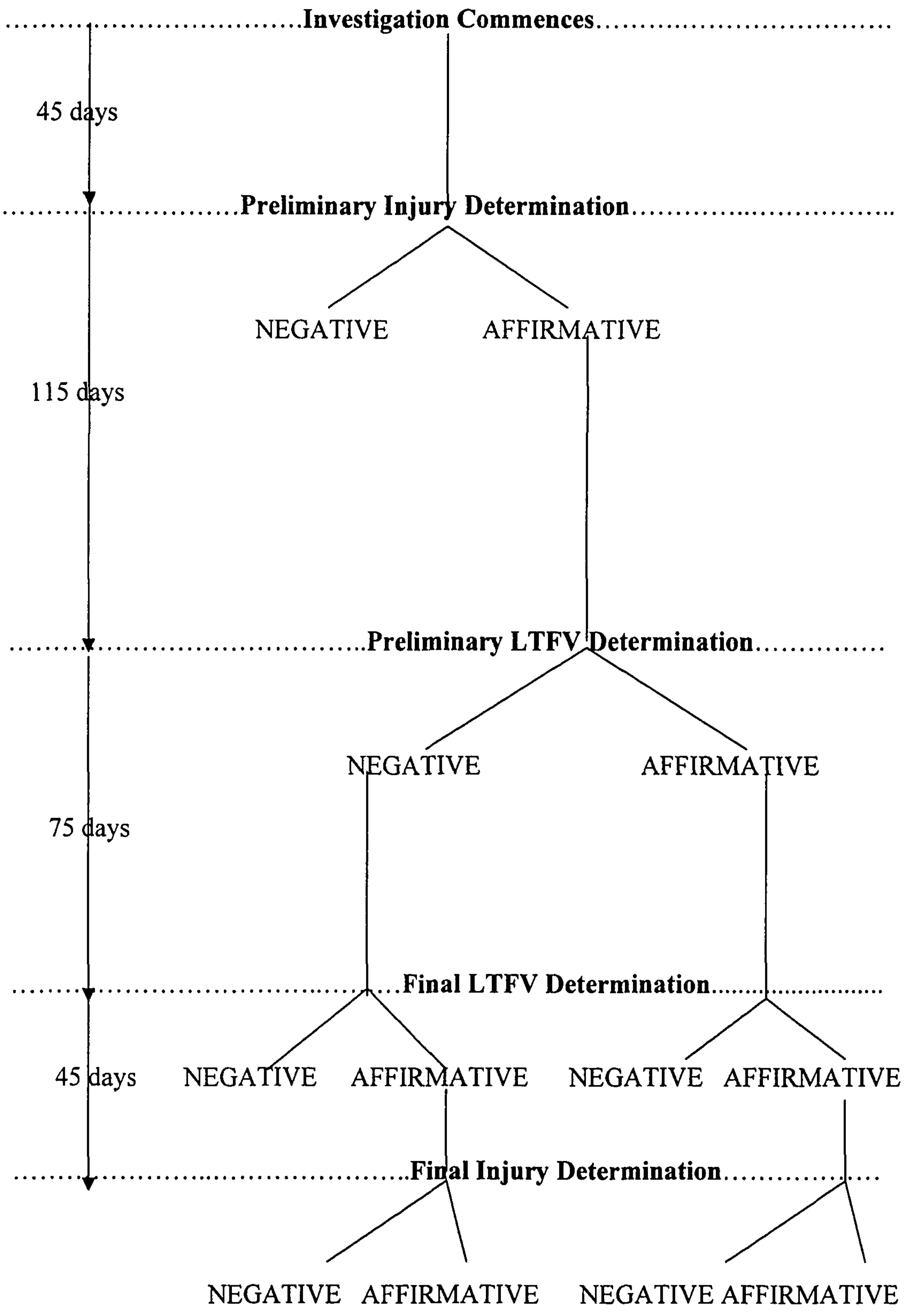


Figure III.1 Typical course of an AD investigation

III.3. The Sequence of Analysts' Earnings Forecast Revisions

An Analyst may make a forecast about the earnings of a firm that he or she covers every month. He or she may release his/her forecast for various horizons. It incorporates the earnings forecast of the current quarter, next second quarter, next third quarter, and next fourth quarter. Besides the quarterly earnings forecasts, analysts also may release the forecasts for the current fiscal year, next second fiscal year, next third fiscal year, next fourth fiscal year, and the next fifth fiscal year. In addition, analysts also may release the forecasts for the five year (or long term) earnings growth. In practice, analysts' forecasts may and/or may not contain all of these horizons. Their forecasts typically do not contain periods beyond the third fiscal year and fourth quarter.

Analysts forecast earnings for a finite future period or interval. The sequence of analysts' earnings forecast horizon is represented in Figure III.2. The twelve-month period is a firm's fiscal period and it is not necessarily related to a calendar year. For example, suppose that a firm X has a January to December fiscal year and suppose also that it currently is the month of January 2002. In January 2002, Analyst A releases his forecast about X's earnings, which incorporate X's earnings for the quarterly period ending March 2002, June 2002, September 2002, and December 2002. Analyst A also releases X's earnings for the yearly period ending December 2002 (current fiscal year, horizon=1), December 2003 (next second fiscal year, horizon=2), December 2004 (next third fiscal year, horizon=3), December 2004 (next fourth fiscal year, horizon=4), and December 2005 (next fifth fiscal year, horizon=5). Analyst A also releases his forecast about X's earnings growth during the next five years (five-year long term earnings growth forecast). Moreover, in February 2002, Analyst A may and/or may not revise the forecast about firm X's earnings that he made last month dependent on the information released between January and February. The forecast process continues to the next succeeding months. Moreover, each firm does not necessarily have the same fiscal period. Another firm may have a March to February fiscal year period or a July to June fiscal year period. However, the sequence of forecast horizon is as similar as to what we have just explained.

III.4. The I/B/E/S (Institute of Brokerage Estimate System) Consensus Estimates

The data of analysts' forecast that we use in this study is the I/B/E/S (Institute of Brokerage Estimate System) 1999 US summary estimate, which provides the consensus forecasts or estimates. The consensus forecasts were obtained by averaging the estimates of the individuals taking part in the forecasts. The following is the explanation of the I/B/E/S consensus estimate.

In practice, many analysts follow and release forecasts for a given company (analysts following), and I/B/E/S releases the consensus estimates, which is the mean of all analysts forecasts, on Thursday before the third Friday of each month. As the glossary of I/B/E/S convention mentions (the third paragraph from the bottom of page 7): "In historical products, 'One Month Ago' refers the last monthly I/B/E/S cycle. The I/B/E/S monthly cycle always occurs on the Thursday before the third Friday each month and as a result, 'One Month Ago' data can either be as of four weeks ago or five weeks ago, dependent on the month." Figure III.3 depicts the I/B/E/S consensus estimate and the time released.

1st quarter earnings announcement period ←------------→← 2nd quarter earnings announcement period ------------→← 3rd quarter earnings announcement period ------------→

|_1__|_2__|_3__|_4__|_5__|_6__|_7__|_8__|_9__|_10_|_11_|_12_| 1st fiscal year

← 1st quarter →← 2nd quarter→← 3rd quarter →← 4th quarter →

←------------ First Year Earnings, Horizon (h)=1 ---------------→

4th quarter earnings announcement period ←------------→← 1st quarter earnings announcement period ------------→← 2nd quarter earnings announcement period ------------→← 3rd quarter earnings announcement period ------------→

|_1__|_2__|_3__|_4__|_5__|_6__|_7__|_8__|_9__|_10_|_11_|_12_| 2nd fiscal year

← 1st quarter →← 2nd quarter→← 3rd quarter →← 4th quarter →

←------------ Second Year Earnings, Horizon (h)=2 ------------→

:

:

:

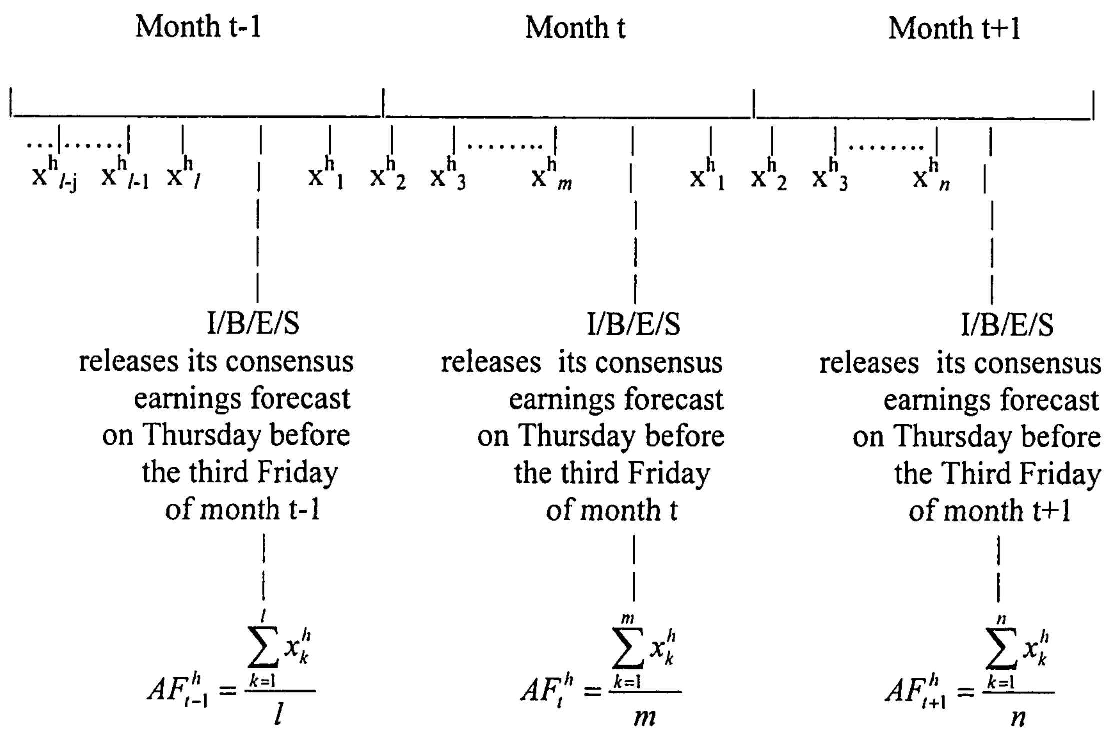
4th quarter earnings announcement period ←------------→← 1st quarter earnings announcement period ------------→← 2nd quarter earnings announcement period ------------→← 3rd quarter earnings announcement period ------------→

|_1__|_2__|_3__|_4__|_5__|_6__|_7__|_8__|_9__|_10_|_11_|_12_| 5th fiscal year

← 1st quarter →← 2nd quarter→← 3rd quarter →← 4th quarter →

←-----------------------Fifth Year Earnings -----------------------→

Figure III.2. The sequence of analysts' earnings forecast horizons



AF^h is the mean (consensus) forecast of various horizons.

x_i^h is the i^{th} analyst's forecast of h horizon ahead earnings.

l,*m*,*n* are the number of analysts (estimates) for a particular month I/B/E/S consensus. I/B/E/S reports that the number of analysts that follow a particular firm is not necessarily the same for each month.

Figure III.3. I/B/E/S consensus estimates

III.5. Analysts' Earnings Forecast Revision

We examine the revisions of analysts' earning per share forecasts for various horizons surrounding the filing dates and the announcement dates of the verdicts of the antidumping investigation. We investigate which decision is most important from the perspective of financial analysts. Analysts' earning forecast revisions are defined as:

$$(3.1)\quad AFrev_{it}^{h} = \frac{\overline{FEPS}_{i,t+1}^{h} - \overline{FEPS}_{i,t-1}^{h}}{P_{i,t-1}},$$

where:

$AFrev_{it}^{h}$ = The analysts' earning forecast revisions of h-year ahead earnings (h=1,2) or earnings growth (h=5) for firm i in month t,

$\overline{FEPS}_{i,t+1}^{h}$ = The mean forecast of h-year ahead earnings (h=1,2) or earnings growth (h=5) for firm i in month t+1,

$\overline{FEPS}_{i,t-1}^{h}$ = The mean forecast of h-year ahead earnings (h=1,2) or earnings growth (h=5) for firm i in month t-1.

$P_{i,t-1}$ = The price (deflation factor) of firm i at the beginning of the period t-1.

According to Lys and Sohn (1990), the price deflation is chosen to facilitate cross-sectional comparison of regression coefficients. We tried to deflate analysts' revision by analysts' forecast at time t-1, and it turned out to be problematic. Forecasts can be small, zero, or negative numbers. Further, it can be contended that the stock price change ($Price_t$ – $Price_{t-1}$) is a function of the analysts' forecast revision ($Forecast_t$ – $Forecast_{t-1}$). As such, dividing both sides by the price at time t-1, we get return as a function of the price deflated analysts' forecast revisions. It became obvious that the way we calculate analysts' forecast revisions is an alternative proxy of stock returns, in which the existing literature approaches the event study by estimating the significance of abnormal returns to security holders in the assessment of the value of AD petitions.

We define an event that happened in month t as an announcement that takes place in the interval between the Thursday before the third Friday of month t-1 and the Thursday before the third Friday of month t. In equation (3.1) above, we use the analysts' forecast (I/B/E/S consensus) of month t+1 instead of month t for the post-event forecast. This is to ensure that the consensus forecast after the event consists of all after-event forecasts. Otherwise, there will be a 'noise' in our post event consensus forecast. For example, suppose that an event takes place in month t (see Figure 3). Specifically, the event happened in the interval between x^h_2 and x^h_3. It is obvious that AF^h_t will not contain a 'pure' post event analysts' forecast, since x^h_1 and x^h_2 are pre-event individual analyst forecasts. For this reason, we use AF^h_{t+1} as a post-event consensus forecast in equation (3.1) above, since AF^h_{t+1} contains only individual analyst post-event forecasts.

III.6. Empirical Regression on Analysts' Earnings Forecast Revisions in Relation to the Filing of Antidumping Petitions and the Verdicts of the Investigation.

To investigate the relation between the revisions of financial analysts' forecast and the announcement of any verdict, we use the Chaney, Hogan, and Jeter (1999) approach with slight modification and estimate the following regression for our sample of firms that filed a petition between 1985 and 1987. We utilized monthly data in our panel. To increase the power of our test, our observation starts from July 1984 and continues through June 1989 for each firm.

$$AFrev_{it}^{h} = \sum_{j=1}^{3} \gamma_j AFrev_{i,t-j}^{h} + \alpha_1 Loss_{it} + \alpha_2 UE_{it} + \alpha_3 Loss * UE_{it}$$

$$+ \sum_{k=1}^{7} \delta_k D_{kit} + \mathrm{M}(f) + \Lambda_m(t) + \varepsilon_{it} \quad , \tag{3.2}$$

where:

$AFrev_{it}^{h}$ = The revision in the mean forecasts for h-year ahead earnings (h=1,2) or earnings growth (h=5) for firm i in month t,

$\sum_{j=1}^{3} \gamma_j AFrev_{i,t-j}^{h}$ = Lags of the analysts' forecast revision for h-year ahead earnings (h=1,2) or earnings growth (h=5) for firm i in month t,

$Loss_{it}$ = A dummy variable that is equal to 1 if in month t (announcement month only) the quarterly net income of firm i is reported to be less than zero, 0 otherwise,

UE_{it} = Unexpected earnings in month t (announcement month only),

$D_{1,it}$ = 1 if firm i petition filing happened in month t, 0 otherwise,

$D_{2,it}$ = 1 if USITC Preliminary decision that happened in month t is NEGATIVE, 0 otherwise,

$D_{3,it}$ = 1 if USITC Preliminary decision that happened in month t is AFFIRMATIVE, 0 otherwise,

$D_{4,it}$ = 1 if DoC Preliminary decision happened in month t, 0 otherwise,

$D_{5,it}$ = 1 if DoC Final decision regarding firm i petition happened in month t, 0 otherwise,

$D_{6,it}$ = 1 if USITC Final decision regarding firm i that happened in month t is NEGATIVE, 0 otherwise,

$D_{7,it}$ = 1 if USITC Final decision regarding firm i that happened in month t is AFFIRMATIVE, 0 otherwise,

$\mathrm{M}(f)$ = Firm specific effects,

$\Lambda_m(t)$ = Time effects (monthly),

ε_{it} = The error term with the assumption of normally distributed $(0, V)$.

Unlike Chaney et al (1999), we set our panel data on a monthly basis and compare the mean of analysts' forecasts before an event to the mean of analysts' forecasts subsequent to the event. This is because the dates of filing an AD petition and the dates of its investigative decision are independent from the dates of quarterly earnings announcements.[2] We also include the lags of the analysts' earnings forecasts revision as the explanatory variables, because there may be inertia in analysts' forecast revision. We assume that we have three lags of the dependent variables as the explanatory variables. This is considering that analysts may not revise their monthly earnings forecast until the information of the next quarterly earnings announcement is released. Moreover, the period between one quarterly earnings announcement to the

[2] Chaney et. al (1999) investigates the effect of reporting restructuring charges on analysts' forecast revisions and errors and uses firm-quarters observation since the majority of the restructuring charges are usually announced simultaneously with a quarterly earnings announcement.

next quarterly earnings announcement is three months. Besides, prior research, such as Lys and Sohn (1990), disclosed positive serial correlation of consecutive analysts' earnings forecasts revisions. The inclusion of the lags of the dependent variable as the explanatory variables may reduce autocorrelation in the estimation.

The next three explanatory variables, such as Loss, UE, and Loss*UE, are our control variables to capture why analysts revise their forecasts even during the periods when there is no dumping investigation. Following Ali (1992), Klein (1990) and Chaney et al (1999), we include a variable Loss in our estimation, because a recent loss may affect analysts' forecast revisions. We expect that the coefficient of variable LOSS would be negative if analysts perceive that current period loss would affect the whole year earnings. In addition to controlling for a recent loss, we also include an indicator variable for the presence of unexpected earnings. The unexpected earnings are calculated as the quarterly actual earnings minus the most recent quarterly analysts' forecast. We set unexpected earnings equal to zero for the months where there are no quarterly earnings announcements. During the months prior to the quarterly earnings announcement, there is no information about the quarterly earnings if none are announced. Hence, unexpected earnings are equal to zero. When the firm announces its quarterly earnings in month t, then unexpected earnings is the discrepancy between the actual earnings and the most recent forecast for that quarter. Analysts may respond to the unexpected earnings by revising their forecast at time t+1. For the months after t+1, the unexpected earnings are set equal to zero again until the next quarterly announcement. We expect that the coefficient on UE would be positive. If the unexpected earnings for a recent quarter are positive, this indicates that the analysts were too pessimistic in their forecast of a recent quarter. Moreover, if analysts perceive that these unexpected earnings will persist into the future, then analysts would revise their whole year earnings upward. Following to Chaney et al (1999), we include an interactive term for loss and unexpected earnings (LOSS*UE) with the expectation that the analysts' response to unexpected earnings may be different in the presence of loss. Also, a loss may make an affirmative AD verdict more likely. With a loss, injury may be more evident. If analysts believe that the information about a loss in a recent quarter dominates the discrepancy between the actual quarterly earnings and their forecast, then we would expect that the coefficient on LOSS*UE would be negative.

It is known that the basic structure of an antidumping investigation may consist of as many as five events, which consist of filing plus four investigative decisions, in which the information is transmitted to the market participants. We examine how important each decision is from the perspective of financial analysts. We consider the filing to be the first important date. The domestic industry may initiate an investigation by filing a petition simultaneously with the U.S. International Trade Commission (USITC) and the Department of Commerce (DoC), in which the industry or union or trade association claims it has suffered material injury by reason of dumped imports from foreign countries. This injury may be represented by the loss of market share and/or profit, sales, inventory, employment, etc (Devault, 1993). For this reason, we include a dummy variable, D1, which corresponds to the filing decision date. We cannot consider a sufficiency decision as an important decision date since it happens within just 20 days, which is less than a month, after the industry initiates a filing. This is because our financial analysts' earnings forecast revisions variable is based on the I/B/E/S consensus earnings released one month after and before the month of the decision date.

The second important decision date is when the USITC concludes its preliminary investigation, which occurs 45 days after the filing date. The USITC makes a preliminary decision whether or not the domestic industry is materially injured by reason of dumped imports. If the material injury decision is negative, the investigation ends. If it is affirmative, the DoC conducts a preliminary dumping investigation of the alleged dumpers. The dumping margin is equal to the percentage difference between the export prices charged by the accused foreign firms in the United States and their home market prices. Or, in the case of sales at a loss, incomplete data, or refusal to comply, it is the difference between the constructed value and the export price. To capture the importance of the USITC preliminary decision to the revisions of analysts' earnings forecast, we include the dummy variables D2 and D3. The dummy variable D2 denotes the negative outcome of the USITC preliminary verdict in the firm-month observations, while the dummy variable D3 represents the affirmative outcome of the USITC preliminary decision. The former is equal to one if the USITC preliminary decision happens to be negative in that firm-month observation and zero otherwise, while the latter is equal to one if the decision is affirmative and zero otherwise. The coefficient of D2 is the marginal effect of the USITC preliminary NEGATIVE decision to the analysts' earnings forecast revisions, while the coefficient of D3 is the marginal effect of the USITC preliminary AFFIRMATIVE decision to the analysts' earnings forecast revisions.

The third important decision is when the DoC makes a preliminary decision regarding dumping margins for the accused foreign firms, which by statute must be released within 160 days of the filing date. This decision happens if the USITC preliminary decision regarding material injury is affirmative. We include a dummy variable, D4, to capture whether there is analysts' reaction to the DoC preliminary verdict. D4 is equal to one if the DoC preliminary happens in that firm-month observation and zero otherwise. Irrespective of the DoC preliminary dumping decision, DoC must make a final decision regarding the dumping margin within 235 days after the filing. To capture how analysts respond to DoC final decision, we include a dummy variable, D5. If the DoC preliminary happens in that firm-month observation, then D5 is equal to one and zero otherwise. All the DoC preliminaries are positive, so a single dummy is used.

The last decision is when the USITC makes a final injury assessment that must be made 280 days after the filing. To capture the importance of the USITC final decision to the revisions of analysts' earnings forecast, we include the dummy variables D6 and D7. The dummy variable D6 characterizes the negative decision of the USITC final verdict in the firm-quarter observations, while the dummy variable D7 corresponds to the affirmative outcome of the USITC final decision. The former is equal to one if the USITC final decision happens to be negative in that firm-month observation and zero otherwise, while the latter is equal to one if the decision is affirmative and zero otherwise. With these two dummy variables, the explanation of the marginal effect of the USITC final verdict is similar to the marginal effect of the USITC preliminary verdict. The coefficient of D6 is the marginal effect of the USITC final NEGATIVE decision to the analysts' earnings forecast revisions, while the coefficient of D7 is the marginal effect of the USITC final AFFIRMATIVE decision to the analysts' earnings forecast revisions.

We incorporate firm specific effects in order to allow for firm specific unobservable heterogeneity, for example, the quality of firm management, the importance of petitioned products to firm, etc. Although we differenced the mean of analysts' forecast revision in our dependent variable, the heterogeneity or the variability of analysts' forecast revision may possibly arise from the variability of stock prices among the firms since we deflated analysts' forecast revision by the stock price. We also include the monthly time dummy variable to control for the potential impact of economy-wide factors such as the business cycle, federal fiscal and monetary policy, supply shock, and exchange rate fluctuations to the analysts' forecast revision. These factors may affect real output, market demand, and competition, which further influence firms' activity and analysts' response to firms' earnings, especially during the months without a dumping investigation.

ε_{it} is the error term, which for simplicity, we assume that it follows an AR(1) process with a zero mean.

In terms of setting up the hypotheses, it is difficult to predict the sign of each of the dummy coefficients of the AD petition investigation (D1 through D7). This is because the AD petition investigation is a standard procedural basis. Moreover, there is a tendency in our sample that unless the ITC concluded a negative decision in its preliminary decision, the investigation will likely to continue through the ITC Final stage. We would expect that the ITC preliminary decision would be important from the point of view of analysts' expectation. Analysts may have formed their expectation in advance of the complaint's date for investigations that completely continue through the final decision. However, when the ITC preliminary decision is negative, this would be an important signal to the analysts about the prospect of the firms' earnings. We would expect that when the ITC Preliminary turns out to be negative, analysts would revise their one year ahead earnings forecast downward, on average. This is because analysts were looking both backward and forward about the one year ahead earnings. The next one year earnings have not been announced yet, but the first and second quarter of that one year horizon may have already been revealed. Another reason is when a firm files a petition, this is a signal that the firm is possibly experiencing an injury. We would also expect that when the probability that the duties being imposed on the foreign firms are higher, or when AD duties are expected to be high, that analysts would revise their second year earnings upward. This is because the benefit of complaints, if any, would be effective after 280 days of the investigation period. It is also possible that there would be a within-investigation effect. For more thorough analysis, see Staiger and Wolak's (1994) discussion of process and outcome filers.

III.7. Analysts' Earnings Forecast Errors

In addition to examining analysts' response to the filing of AD petitions and the verdicts of the investigation through the predictions of future earnings, we assess analysts' accuracy and bias in forecasting future earnings, subsequent to filing an AD petition. If filing AD petitions transmit a signal to the market participants about the healthiness of a firm, besides investigating how analysts respond to the signal, it would be interesting to compare analysts' forecast errors prior and subsequent to an AD petition. In other words, we would like to know whether there is any effect of filing an AD petition to the accuracy and bias of the analysts' forecasts.

We use annual earnings and define the analysts' forecast error in the year subsequent to the filing of an AD petition as the difference between actual earnings and the most recent mean forecast.

$$(3.3)\quad AFerr_{i,t+1} = \frac{EPS_{i,t+1} - \overline{FEPS}_{i,t+1}}{P_{i,t+1}},$$

where

$AFerr_{i,t+1}$ = The analysts' forecast error for year t+1 for firm i,

$EPS_{i,t+1}$ = Actual earnings per share for year t+1 for firm i,

$\overline{FEPS}_{i,t+1}$ = The mean earnings forecast for year t+1 measured in the month prior to the annual earnings announcement for year t+1 for firm i,

$P_{i,t+1}$ = The market price of the stock of firm i at the beginning of year t+1.

III.8. Empirical Regression on Analysts' Earnings Forecast Errors in Relation to the Learning of the Filing of Antidumping Petitions

To consider the accuracy and bias of analysts' forecasts subsequent to filing AD petition, we, again, follow Chaney et al (1999). We estimate the regression using both absolute values of forecast errors and actual forecast errors to assess accuracy and bias, respectively,

$$(3.4)\quad \left|AFerr_{i,t+1}\right| = \gamma\left|AFerr_{i,t-1}\right| + \delta Filing_{it} + \alpha_1 LNA_{i,t+1} + \alpha_2\left|R^M_{i,t+1}\right| + M(f) + \Lambda_Y(t) + \eta_{i,t+1}$$

$$(3.5)\quad AFerr_{i,t+1} = \gamma AFerr_{i,t-1} + \delta Filing_{it} + \alpha_1 LNA_{i,t+1} + \alpha_2 R^M_{i,t+1} + M(f) + \Lambda_Y(t) + \eta_{i,t+1},$$

where

$\left|AFerr_{i,t+1}\right|$ = The absolute value of the analysts' forecast error for firm i for year t+1, the year after filing of an AD petition,

$AFerr_{i,t+1}$ = The analysts' forecast error for firm i for year t+1, the year after filing of an AD petition,

$\left|AFerr_{i,t-1}\right|$ = The absolute value of the analysts' forecast error for firm i for year t-1, the year before filing of an AD petition,

$AFerr_{i,t-1}$ = The analysts' forecast error for firm i for year t+1, the year before filing of an AD petition,

$Filing_{it}$ = 1 if the firm i filed an AD petition in year t, 0 otherwise,

$LNA_{i,t+1}$ = Log of the number of analysts forecasting earnings for a given firm i in year t+1,

$R^M_{i,t+1}$ = Market return from the beginning to the end of period t+1,

$M(f)$ = Firm specific effects,

$\Lambda_Y(t)$ = Time effects (yearly),

$\eta_{i,t+1}$ = The error term which is assumed to be normally distributed (0,V).

We include the lagged forecast error in view of prior research showing the positive serial correlation in analysts' forecast errors of annual earnings. The examples are Ali et al (1992) and Lys and Sohn (1990). Their findings suggest that analysts fail to learn fully from their own past errors. We use analysts' forecast errors from the year t-1, the year prior to filing AD petition $AFerr_{i,t-1}$ instead of the year t, the year of the filing AD petition $AFerr_{it}$ because it is not obvious whether or not the analysts' forecasts for year t incorporate any expectation of filing an AD petition in year t.

Alford and Berger (1998) document that the level of analysts' following is highly associated with the accuracy of analysts' forecast. Lys and Soo (1995) examine empirically the effect of the number of analysts' following a firm on analysts' forecast errors, and find that analysts' earnings forecast accuracy increases with the number of analysts following the firm. Moreover, they also argue the number of analysts following potential proxies for both the intensity of competition in the market and the amount of information revealed by the research of other analysts. As such, we include a variable for the log of the number of analysts (LNA) to capture the effect of analysts' following on the accuracy and bias of the analysts' prediction. We would expect that the coefficient on LNA would be negative.

We include the variable R^M as a control variable (Ali et al, 1996, and Chaney et al, 1999). If analysts' forecasts are efficient, however, they should reflect all information revealed in past stock returns about future earnings. We would expect the coefficient on market return to be zero. Thus, R^M is a test for market efficiency.

The last two variables are firm specific effects and yearly time effects. We included the firm specific effect in the sense that the heterogeneity among the firms may exist due to differences in managerial quality, differences in the importance of product to petitioners, and the variability in price deflation in our dependent variable. We also included the yearly time dummy variable to control for the potential impact of the changing economic activity on forecast errors. In the estimation process, we will test whether it is necessary or not to include these two variables, since we may have a pooling regression with one intercept. Testing for the significance of group fixed effects and time effects are explained in Chapter IV.3.

$\eta_{i,t+1}$ is the error term with (O,*V*). We assume that the disturbance term follows an AR(1) process such that $\eta_{i,t+1} = \rho\eta_{i,t} + u_{i,t+1}$ where $u_{i,t+1} \sim (0, \sigma_u^2)$.

CHAPTER IV

ESTIMATION

IV.1. Introduction

This chapter provides the explanation of the econometric issues and techniques that we believe appropriate to our regression model discussed in Chapter III. Section IV.2 presents the general issues when dealing with a time series cross-section model. The next four sections, which are Section IV.3, Section IV.4, Section IV.5 and Section IV.6, explain the test procedures of the group effects, autocorrelation, panel heteroscedasticity and the possibility of cross-sectional correlation in the error structure, respectively. Section IV.7 describes the endogeneity test as to whether one of the explanatory variables is correlated with the error term. Section IV.8 invokes the Hausman test to check whether the fixed or the random effects are most appropriate to our model. Section V.9 explains the Feasible Generalized Least Squares (GLS) technique if the error terms satisfy the autocorrelation assumption. Section IV.10 describes the Feasible GLS techniques if the error disturbance follows both autocorrelation and heteroscedasticity in the structures. Section IV.11 presents Ordinary Least Squares (OLS) with Panel Corrected Standard Errors if the error structure exhibits autocorrelation, heteroscedasticity, and cross-sectional correlation, in contrast to the Feasible GLS methods, as discussed in more detail in Beck and Katz (1995, 2001). Section IV.12 lays out the existence of biases in dynamic models with common first order autoregressive, AR(1), disturbance process and fixed effects. This topic is explained in more detail in Nickell (1981). Section IV.13 discusses the issues of the application of instrumental variables. Section IV.14 and IV.15 describe the estimation procedure of the analysts' earnings forecast revisions model and the estimation procedure of the analysts' forecast errors model, respectively.

IV.2. Time Series Cross Section (TSCS) Model

The general questions in dealing with pooling time series and cross-section (TSCS) data are the appropriate restriction of the error structure, and whether there are fixed or random effects. If the errors are assumed to be spherical, which is usually not the case for the TSCS model, then TSCS should be estimated by Ordinary Least Squares (OLS), and OLS will provide correct standard errors. Under the spherical disturbance, we assume that all of the error processes have the same variance (homoscedasticity), and they are independent of one another. The latter can be interpreted as no serial and/or spatial (contemporaneous) correlation. Whenever one of these assumptions is violated, the error structures become non-spherical. Under the structure of non-spherical disturbances, OLS is not optimal in the sense that there will be other more-efficient estimators. Under the fixed effect approach, the intercept is assumed to be a group or individual-specific constant term, while under the random effect approach, the intercept is assumed to be a group-specific disturbance.

Let equations (3.2) or (3.4) or (3.5) in the previous chapter be written in general form as

(4.1) $y_{i,t} = x_{i,t}\beta + \varepsilon_{i,t};\ i = 1,\ldots,N; t = 1,\ldots,T$,

where $x_{i,t}$ is a vector of k exogenous variables, and observations are indexed by both group (i) and time (t). The exogenous variables may contain group-specific dummy variables, allowing intercepts to vary by group (fixed) effect. The group (fixed) effects include both firm effect and time effect. The $x_{i,t}$ may also include the lagged values of the dependent variable (Dynamic model). We denote the *NT*x*NT* positive definite covariance matrix of the errors with typical element $E(\varepsilon_{i,t}, \varepsilon_{j,s})$ by *V*.

Following Kmenta (1971), Equation (4.1) can be written in general form as

(4.2) $$y = X\beta + \varepsilon,$$

where

$$y = \begin{bmatrix} Y_{11} \\ Y_{12} \\ \vdots \\ Y_{1T} \\ Y_{21} \\ Y_{22} \\ \vdots \\ Y_{NT} \end{bmatrix}, \qquad X = \begin{bmatrix} X_{11,1} & X_{11,2} & \cdots & X_{11,K} \\ X_{12,1} & X_{12,2} & \cdots & X_{12,K} \\ \vdots & \vdots & & \vdots \\ X_{1T,1} & X_{1T,2} & \cdots & X_{1T,K} \\ X_{21,1} & X_{21,2} & \cdots & X_{21,K} \\ X_{22,1} & X_{22,2} & \cdots & X_{22,K} \\ \vdots & \vdots & & \vdots \\ X_{NT,1} & X_{NT,2} & \cdots & X_{NT,K} \end{bmatrix}$$

$$\varepsilon = \begin{bmatrix} \varepsilon_{11} \\ \varepsilon_{12} \\ \vdots \\ \varepsilon_{1T} \\ \varepsilon_{21} \\ \varepsilon_{22} \\ \vdots \\ \varepsilon_{NT} \end{bmatrix}, \text{ and } \quad \beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_K \end{bmatrix}$$

and the *V* matrix is expressed by

(4.3)

$$V = E(\varepsilon\varepsilon') = \begin{bmatrix} E(\varepsilon_{11}^2) & E(\varepsilon_{11}\varepsilon_{12}) & \cdots & E(\varepsilon_{11}\varepsilon_{1T}) & E(\varepsilon_{11}\varepsilon_{21}) & E(\varepsilon_{11}\varepsilon_{22}) & \cdots & E(\varepsilon_{11}\varepsilon_{NT}) \\ E(\varepsilon_{12}\varepsilon_{11}) & E(\varepsilon_{12}^2) & \cdots & E(\varepsilon_{12}\varepsilon_{1T}) & E(\varepsilon_{12}\varepsilon_{21}) & E(\varepsilon_{12}\varepsilon_{22}) & \cdots & E(\varepsilon_{12}\varepsilon_{NT}) \\ \vdots & \vdots & & \vdots & \vdots & \vdots & & \vdots \\ E(\varepsilon_{1T}\varepsilon_{11}) & E(\varepsilon_{1T}\varepsilon_{12}) & \cdots & E(\varepsilon_{1T}^2) & E(\varepsilon_{1T}\varepsilon_{21}) & E(\varepsilon_{1T}\varepsilon_{22}) & \cdots & E(\varepsilon_{1T}\varepsilon_{NT}) \\ E(\varepsilon_{21}\varepsilon_{11}) & E(\varepsilon_{21}\varepsilon_{12}) & \cdots & E(\varepsilon_{21}\varepsilon_{1T}) & E(\varepsilon_{21}^2) & E(\varepsilon_{21}\varepsilon_{22}) & \cdots & E(\varepsilon_{21}\varepsilon_{NT}) \\ E(\varepsilon_{22}\varepsilon_{11}) & E(\varepsilon_{22}\varepsilon_{12}) & \cdots & E(\varepsilon_{22}\varepsilon_{1T}) & E(\varepsilon_{22}\varepsilon_{21}) & E(\varepsilon_{22}^2) & \cdots & E(\varepsilon_{22}\varepsilon_{NT}) \\ \vdots & \vdots & & \vdots & \vdots & \vdots & & \vdots \\ E(\varepsilon_{NT}\varepsilon_{11}) & E(\varepsilon_{NT}\varepsilon_{12}) & \cdots & E(\varepsilon_{NT}\varepsilon_{1T}) & E(\varepsilon_{NT}\varepsilon_{21}) & E(\varepsilon_{NT}\varepsilon_{22}) & \cdots & E(\varepsilon_{NT}^2) \end{bmatrix}.$$

Different specification of the V matrix leads to different estimation techniques when dealing with pooled TSCS data.

Before we proceed to the estimation techniques for our regression model, we will conduct the testing for the significance of the group effect and testing for the significance of the errors structure. The latter can be broken down into the error structure of autocorrelation, heteroscedasticity and/or cross-sectional correlation. It is important to be able to detect whether there exists heteroscedasticity or autocorrelation in the error structures, and to develop alternative inference and estimation procedures. Although the use of OLS in the regression equation will produce an unbiased estimator, when the error terms are heteroscedastic or autocorrelated, it is no longer efficient. It is not the best unbiased linear estimator of β. Moreover, the standard errors usually computed for the OLS estimator are no longer appropriate and are going to lead to the incorrect calculation of the confidence interval and a misleading hypothesis test. We also check for the possibility of the cross-sectional correlation in the error structure. As explained in Chapter IV.11, if the error structure exhibits autocorrelation, heteroscedasticty, and cross-sectional correlation then FGLS will not be valid unless we have a very large time series (T), compared to the number of cross-sections (N). However, this is not the case in our model. Moreover, FGLS can not be applied if T < N. Beck and Katz (1995) proposed OLS with Panel Corrected Standard Error.

IV.3. Testing for the Significance of the Fixed Effect

Greene (2000), on page 562, discusses the technique for testing for the existence of differences across groups. The significance of the group effect can be tested with an F test for the hypotheses that the constant terms are equal. Under the null hypothesis, the efficient estimator is pooled least squares. The F test is

$$(4.4) \qquad F(N-1, NT-N-k) = \frac{\left(R_u^2 - R_p^2\right) / (N-1)}{\left(1-R_u^2\right) / (NT-N-k)},$$

where R, u and p indicate the regression sum of squares, unrestricted model and pooled model, respectively. The pooled model is the restricted model with only a single overall constant term.

IV.4. Testing for the Significance of the Autocorrelation

Johnston and Dinardo (1997), on pages 182-183, discuss a Durbin-h test for a regression containing lagged dependent variables. Consider the relation

$$(4.5) \quad y_t = \beta_1 y_{t-1} + \cdots + \beta_r y_{t-r} + \beta_{r+1} x_{1t} + \cdots + \beta_{r+s} x_{st} + \varepsilon_t,$$

with $\varepsilon_t = \rho\varepsilon_{t-1} + u_t$, $\quad |\rho| < 1$ and $u \sim N(O, \sigma_\varepsilon^2 I)$.

Durbin's basic result is that under the null hypothesis, $H_0: \rho = 0$. The procedure is the following:

First, estimate the OLS regression of eq. (4.4) and obtain the residuals e's.

Second, estimate the OLS regression of

$$e_t \text{ on } e_{t-1}, y_{t-1}, \ldots, y_{t-r}, x_{1t}, \ldots, x_{st}.$$

Third, if the coefficient of e_{t-1} in this regression is significantly different from zero by the usual t-test, reject the null hypothesis, $H_0: \rho = 0$.

IV.5. Testing for the Heteroscedasticity in the Panel

Examination of the analysts' forecast revisions and unexpected earnings suggests variation in its scales. The unexpected earnings tend to be smaller for larger firms and larger for smaller firms. This makes sense because larger firms tend to be followed by larger number of more qualified analysts. On the other hand, smaller firms tend to be followed by a fewer number of less qualified analysts. Hong, Kubik, and Solomon (2000) found that "inexperienced analysts are more likely to be terminated for inaccurate earnings forecast then their more experienced counterparts" (p. 121).

Greene (2000), on page 511, discusses the tests for heteroscedasticity in panel data. We can relax the classical assumption by allowing σ^2 to vary across *i*. Under the null hypothesis H_0: $\sigma_{\varepsilon_i}^2 = \sigma_u^2 \quad \forall\, i = 1, \ldots, N$, the test statistic is given by:

$$(4.6) \quad NT \ln \hat{\sigma}_{\varepsilon}^2 - \sum_{i=1}^{N} T \ln \hat{\sigma}_i^2 \sim \chi_{N-1}^2,$$

where $\hat{\sigma}_{\varepsilon}^2 = \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\varepsilon}_{it}^2 / NT$

$$\hat{\sigma}_i^2 = \sum_{t=1}^{T} \hat{\varepsilon}_{it}^2 / T$$

Under the null hypothesis, the test statistic given in equation (4.6) has a limiting chi-squared distribution with (*N*-1) degrees of freedom.

IV.6. Testing for the Significance of the Cross-Sectional Correlation

We have many different AD petition investigations constructing our panel data. Each petition involves different firms and a different number of firms. It is possible that different firms are followed by the same analysts. It is also likely that from the analysts' forecast point of view, the macroeconomics factors such as the business cycle, federal fiscal and monetary policy, supply shock, and exchange rate fluctuation that influence these firms affect them all to varying degrees. As such, it would be reasonable to assume correlation of the disturbance across firms.

As explained in Greene (2000) on p. 601, we can use the Lagrange multiplier test developed by Breusch and Pagan (1980) with the test statistics:

(4.7) $\lambda_{LM} = T \sum_{i=2}^{N} \sum_{j=1}^{i-1} \hat{r}_{ij}^2 \sim \chi^2_{\frac{N(N-1)}{2}}$ with N as the number of cross-section,

where r_{ij}^2 is the *ij*th residual correlation coefficient between *i* and *j* computed from the OLS residual and given by:

(4.8) $\hat{r}_{ij}^2 = \dfrac{\hat{\sigma}_{ij}^2}{\hat{\sigma}_{ii}\hat{\sigma}_{jj}}$ with $\hat{\sigma}_{ij} = \dfrac{1}{T}\sum_{t=1}^{T} \hat{e}_{it}\hat{e}_{jt}$ for i,j = 1,2,3…

IV.7. Testing for Endogeneity

We start with the analysts' earnings forecast revision model as expressed in (4.2). We denote the potentially endogenous lagged dependent variables in the explanatory variable. As explained in Wooldridge (2002) on page 120, the procedure of the endogeneity test is as follows: First, regress the suspected endogenous variable on all the exogenous variables and the instrument variables. We choose the lags of the exogenous variables as the instruments, and obtain the residual $\hat{\upsilon}$. Next, lag it three times such that we have υ_1, υ_2, and υ_3. Then, we simply include υ_1, υ_2, and υ_3 in the original regression equation and use an F test to examine whether the coefficients of υ_1, υ_2, and υ_3 are simultaneously equal to zero. The significance of the F statistics will indicate whether or not our suspected variables are endogenous.

IV.8. Hausman Test Whether Fixed Effects or Random Effects

To test whether fixed effects or random effects are most appropriate to our regression model, we implement the Hausman (1978) test to compare the random effects and the fixed effects estimators. The Hausman statistics are distributed as χ^2 with K degrees of freedom. K is the number of common coefficients in the model being compared. The statistic is computed as

(4.9) $$H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'[\hat{V}(\hat{\beta}_{FE}) - \hat{V}(\hat{\beta}_{RE})]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE}).$$

We will conduct all six of the specification tests explained previously into our regression models. We have three regression models: the regression of analysts' forecasts revision [equation (3.2)], the regression of the accuracy of analysts' forecasts [equation (3.4)], and the regression of the bias direction of analysts' forecasts [equation (3.5)]. Based on these test results, we can invoke the appropriate technique in the estimation. As we know in the TSCS model, different assumptions about the error processes lead to different methods of estimation. The following are the estimation techniques for each particular structure of the error term that are relevant to our regression model.

IV.9. Feasible Generalized Least Squares (FGLS) Estimation of the "Autocorrelated" Model[3]

Consider the generic TSCS model:

(4.10) $y_i = X_i\beta + \varepsilon_i$, $\quad i = 1,2,\ldots,N$

where:

y_i is a *Tx1* vector of observations on the *i*th "group;"

X_i is a *TxK* matrix of observations on exogenous variables (including fixed firm and time effects) for the *i*th group;

β is a Kx1 vector of coefficients; and

ε_i is a Tx1 vector of error terms.

The whole "system" of equations can be written as

(4.11) $$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{bmatrix} = \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_N \end{bmatrix} \beta + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_N \end{bmatrix}, \text{ or } y = X\beta + \varepsilon,$$

where $\varepsilon \sim N(0,V)$ with V is a positive definite variance-covariance matrix.

The particular characterizations of the autocorrelation model are

[3] All estimation procedures come from Dr. Bob Reed's econometrics class-notes.

$$E(\varepsilon_{it}^2) = \sigma_u^2 \text{ (Homoscedasticity),}$$

(4.12) $$E(\varepsilon_{it}\varepsilon_{jt}) = 0 \text{ (Cross-sectional independence, no contemporaneous correlation),}$$

$$\varepsilon_{it} = \rho\varepsilon_{i,t-1} + u_{it} \text{ (first order autocorrelation),}$$

where ε_{it} is the error term associated with an observation of the ith group at time t. The key assumption in our model is we let ε_{it} be an autoregressive common process of order one [AR(1)], so that $\varepsilon_{it} = \rho\varepsilon_{i,t-1} + u_{it}$, where u_{it} is a classical error term characterized by mean zero and variance σ_u^2. With the stationary assumption, it can be shown that

(4.13) $$\text{var}(\varepsilon_{it}) \equiv \sigma_{\varepsilon,i}^2 = \frac{\sigma_u^2}{1-\rho^2}.$$

By making the appropriate substitution, we find that

(4.14) $$V = \begin{bmatrix} V_1 & O & \cdots & O \\ O & V_2 & \cdots & O \\ \vdots & \vdots & \ddots & \vdots \\ O & & \cdots & V_N \end{bmatrix} = \begin{bmatrix} \sigma_{\varepsilon,1}^2\Omega_1 & O & \cdots & O \\ O & \sigma_{\varepsilon,2}^2\Omega_2 & \cdots & O \\ \vdots & \vdots & \ddots & \vdots \\ O & O & \cdots & \sigma_{\varepsilon,N}^2\Omega_N \end{bmatrix},$$

where

$$\sigma_{\varepsilon,1}^2\Omega_1 = \sigma_{\varepsilon,2}^2\Omega_2 = \cdots\cdots = \sigma_{\varepsilon,N}^2\Omega_N = \frac{\sigma_u^2}{1-\rho^2}\begin{bmatrix} 1 & \rho & \rho^2 & \rho^3 & \cdots & \rho^{T-1} \\ \rho & 1 & \rho & \rho^2 & \cdots & \rho^{T-2} \\ \rho^2 & \rho & 1 & \rho & \cdots & \rho^{T-3} \\ \vdots & \vdots & \vdots & \vdots & \cdots & \rho \\ \rho^{T-1} & \rho^{T-2} & \rho^{T-3} & \cdots & \rho & 1 \end{bmatrix}$$

and each of the O's represents a TxT matrix of zeros.

Since equation (4.14) is a diagonal square matrix, then the inverse of the V matrix is

$$(4.15)\ V^{-1} = \begin{bmatrix} (\sigma_{\varepsilon,1}^2\Omega_1)^{-1} & 0 & \cdots & 0 \\ 0 & (\sigma_{\varepsilon,2}^2\Omega_2)^{-1} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & (\sigma_{\varepsilon,N}^2\Omega_N)^{-1} \end{bmatrix}.$$

By demonstrating that $(\sigma_{\varepsilon,i}^2\Omega_i)^{-1}(\sigma_{\varepsilon,i}^2\Omega_i) = I_T$, we can find that

(4.16)

$$(\sigma_{\varepsilon,1}^2\Omega_1)^{-1} = (\sigma_{\varepsilon,2}^2\Omega_2)^{-1} = \cdots\cdots = (\sigma_{\varepsilon,N}^2\Omega_N)^{-1} =$$

$$= \frac{1}{\sigma_u^2}\begin{bmatrix} 1 & -\rho & 0 & 0 & \cdots & 0 & 0 & 0 \\ -\rho & 1+\rho^2 & -\rho & 0 & \cdots & 0 & 0 & 0 \\ 0 & -\rho & 1+\rho^2 & -\rho & \cdots & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & \cdots & -\rho & 1+\rho^2 & -\rho \\ 0 & 0 & 0 & 0 & \cdots & 0 & -\rho & 1 \end{bmatrix}.$$

Since $V_i, i = 1,\ldots,N$ is a positive definite variance-covariance matrix, its inverse is positive definite. Therefore, it is possible to find a nonsingular matrix P_i such that

(4.17) $P_i' P_i = V_i^{-1}$.

It can be seen that the matrix

$$(4.18)\qquad P_i = \frac{1}{\sigma_u}\begin{bmatrix} \sqrt{1-\rho^2} & 0 & 0 & 0 & \cdots & 0 & 0 \\ -\rho & 1 & 0 & 0 & \cdots & 0 & 0 \\ 0 & -\rho & 1 & 0 & \cdots & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & \cdots & -\rho & 1 \end{bmatrix}$$

satisfies the condition in equation (4.17).

Now, let's consider equation (4.11) $y = X\beta + \varepsilon$ where $\varepsilon \sim N(0,V)$. Since V is positive definite, there exists a non-singular matrix P such that

(4.19) $V^{-1} = P'P$.

If we pre-multiply the equation $y = X\beta + \varepsilon$ by P we get

(4.20) $Py = PX\beta + P\varepsilon$.

Under the classical assumptions, this transformed equation satisfies the conditions under which OLS is BLUE (Best Linear Unbiased Estimators).[4]

It can also be proved that OLS applied to the transformed equation $Py = PX\beta + P\varepsilon$ produces the Generalized Least Squares (GLS) estimator of β, b_{GLS}:[5]

(4.21) $b_{GLS} = (X'V^{-1}X)^{-1}X'V^{-1}y$ with

(4.22) $Var\, b_{GLS} = (X'V^{-1}X)^{-1}$.

However, we have a limited knowledge about the elements of the V matrix. Therefore, it is important to develop Feasible Generalized Least Squares (FGLS) estimators, for which consistent estimates are substituted for unknown parameters.

The common procedure in implementing FGLS is to begin with a natural estimator of ρ, called $\hat{\rho}$. According to Greene (2000), to get the estimate of ρ we can use:

(4.23) $\hat{\rho} = \dfrac{\sum_{t=2}^{T} e_{i,t}e_{i,t-1}}{\sum_{t=2}^{T} e_{i,t}^2}$,

[4] Proof, see Appendix A-1. All proofs come from Dr. Bob Reed's econometrics class-notes, Greene (2000), and Johnston and Dinardo (1997)
[5] Proof, see Appendix A-2

which is the least squares estimator of ρ in $\varepsilon_{it} = \rho\varepsilon_{i,t-1} + u_{it}$, where u_{it} is a classical error term characterized by mean zero and variance σ_u^2. The second step is to use the estimate of ρ to calculate P^*, the matrix transformer.

Let's define:

$$(4.24)\quad P^* = \begin{bmatrix} P_1^* & O & \cdots & O \\ O & P_2^* & \cdots & O \\ \vdots & \vdots & \ddots & \vdots \\ O & O & \cdots & P_N^* \end{bmatrix},$$

where each of the O's represents a T x T matrix of zeros and P_i^*, i=1, ... , N, is a T x T matrix given by

$$(4.25)\quad P_i^* = \begin{bmatrix} \sqrt{1-\hat{\rho}^2} & 0 & 0 & 0 & \cdots & 0 & 0 \\ -\hat{\rho} & 1 & 0 & 0 & \cdots & 0 & 0 \\ 0 & -\hat{\rho} & 1 & 0 & \cdots & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & \cdots & -\hat{\rho} & 1 \end{bmatrix}.$$

As we have shown previously, pre-multiplying $y = X\beta + \varepsilon$ by P^* produces the transformed variables as explained by Kmenta (1971) as

$$(4.26)\quad Y_{it}^* = \beta_1 X_{it,1}^* + \beta_2 X_{it,2}^* + \cdots + \beta_k X_{it,k}^* + \varepsilon_{it}^*,$$

where $Y_{it}^* = \sqrt{1-\hat{\rho}^2}\,Y_{it}$ for t= 1,

$Y_{it}^* = Y_{it} - \hat{\rho}Y_{i,t-1}$ for t= 2, 3, ... ,T,

and $X_{it}^* = \sqrt{1-\hat{\rho}^2}\,X_{it}$ for t= 1,

$X_{it}^* = X_{it} - \hat{\rho}X_{i,t-1}$ for t= 2, 3, ... ,T,

k= 1, 2, ... , K,

$i = 1, 2, \ldots, N.$

Moreover, as we have previously indicated that the invocation of OLS to this transformed equation produces BLUE estimators, we can prove that[6]

(4.27) $Var\left(P^{*}\varepsilon\right) = \sigma_u^2 I_{NT}$.

The third step of the FGLS estimation is to apply OLS to the transformed equation (4.26) $P^{*}y = P^{*}X\beta + P^{*}\varepsilon$ and to obtain the residual vector.

(4.28) $u = \begin{bmatrix} u_1 \\ \vdots \\ u_i \\ \vdots \\ u_N \end{bmatrix}$

and to use this residual vector to estimate

(4.29) $\hat{\sigma}_u^2 = \dfrac{u'u}{NT - K}$.

The fourth step of the estimation is to use $\hat{\rho}$ and $\hat{\sigma}_u^2$ to estimate $\left(\sigma_{e_i}^2 \Omega_i\right)$ as expressed in equation (4.14), and to use the results to calculate $\hat{V}^{-1}$ as given in equations (4.15) and (4.16).

Finally, we use $\hat{V}^{-1}$ to calculate b_{GLS} and $Var\, b_{GLS}$ as expressed in equation (4.21) and (4.22), respectively.

IV.10. Feasible Generalized Least Squares (FGLS) Estimation of the "Groupwise Heteroscedasticity and Autocorrelated" Model

This model is based on the following characterization:

[6] Proof, see Appendix A-3

$$E\left(\varepsilon_{it}^2\right)=\sigma_i^2 \text{ (Heteroscedasticity),}$$

(4.30) $$E\left(\varepsilon_{it}\varepsilon_{jt}\right)=0 \text{ (Cross-sectional independence, no contemporaneous correlation),}$$

$$\varepsilon_{it} = \rho\varepsilon_{i,t-1} + u_{it} \text{ (first order autocorrelation),}$$

where $u_{it} \sim N\left(0,\sigma_{u,i}^2\right)$, and $\varepsilon_{it} \sim N\left(0,\dfrac{\sigma_{u,i}^2}{1-\rho^2}\right)$.

The procedure of FGLS estimation for this model is similar to the estimation steps for the "Autocorrelated" model except for the following:

(4.31) $\sigma_{\varepsilon,i}^2 = Var\left(\varepsilon_{it}^2\right)=\dfrac{\sigma_{u,i}^2}{1-\rho^2}$,

instead of equation (4.13)

The issue here is how would we estimate the group specific variance

$\sigma_{u,i}^2, i=1,2,\ldots,N$?

This can be estimated using

(4.32) $\sigma_{u,i}^2 = \dfrac{u_i' u_i}{T-K}$.

Once we have obtained $\hat{\rho}$ and $\hat{\sigma}_{u,i}^2$, we use these two estimators to estimate $\left(\sigma_{\varepsilon_i}^2\Omega_i\right)$ as given in equation (4.14) and use the results to calculate $\hat{V}^{-1}$ as expressed in equation (4.15) and (4.16).

Finally, we use $\hat{V}^{-1}$ to calculate b_{GLS} and $Var\, b_{GLS}$ as expressed in equation (4.21) and (4.22), respectively.

IV.11. Ordinary Least Squares (OLS) with Panel Corrected Standard Errors When the Error Structure Exhibits Autocorrelation, Heteroscedasticity and Cross-Sectional Correlation

Sub-chapter IV.9 and IV.10 above discuss the Feasible GLS estimation if the error structure exhibits autocorrelation and both autocorrelation and heteroscedasticity, respectively. The question is what happens to the method of FGLS estimation if the error structure exhibits autocorrelation, groupwise heteroscedasticity and cross-sectional correlation. In the econometrics literature, the FGLS under this error structure is called the Parks or Parks-Kmenta model. The short answer is, according to Beck and Katz (1995, 2001), under this circumstance, the FGLS fails in the sense that the FGLS underestimates the true standard error, unless we have a very large time series (T) compared to the number of cross-sections (N). However, this is not the case in our model.

Feasible Generalized Least Squares was originally introduced by Richard Parks in 1967 in his paper, "Efficient Estimation of a System of Regression Equations When Disturbances Are Both Serially and Contemporaneously Correlated," published in the *Journal of American Statistical Association*, vol.62. This method was further popularized in Kmenta's text. Therefore, the FGLS method is sometimes referred to as the Parks-Kmenta method, Parks method, or Kmenta method.

Hereafter, the Parks-Kmenta method is FGLS for TSCS model where the error structure shows unit-specific serial correlation, panel heteroscedasticity, and cross-sectional correlation.

Beck and Katz (1995, 2001) show that the FGLS approach of the Parks-Kmenta method that we discussed previously produces the extreme overconfidence of the standard errors, which can lead to dramatic underestimates of the true parameter variability in the finding of TSCS studies. As Beck and Katz (1995) pointed out:

> The FGLS formula for standard errors, however, assumes that the error process is known, not estimated. In many applications this is not a problem because the error process has few enough parameters that they can be well estimated. Such is not the case for TSCS models, where the error process has a large number of parameters. This oversight causes estimates of the standard errors of the estimated coefficients to understate their true variability. (p. 634)

Beck and Katz provide evidence using simulated data from Monte Carlo experiments that the Parks-Kmenta method of GLS falsely inflates confidence of the estimated coefficients. This will lead to the incorrect statistical tests.

As Beck and Katz (1995) say in their conclusion, "... the downward bias in standard errors makes the Parks technique unusable unless there are substantially more time period (T) then there are cross-sectional units (N)" (p. 644).

Although OLS does not give correct standard errors for non spherical disturbances, OLS is still consistent. Having shown the problems of the Parks-Kmenta FGLS approach, Beck and Katz advocate a simpler method for estimating TSCS models by retaining OLS parameter estimates, but replacing the OLS standard errors with panel corrected standard errors and using common serial correlation (ρ) instead of unit specific serial correlation (ρ_i).

(4.33) $\hat{\beta} = (X'X)^{-1} X'y$,

(4.34) $Cov(\hat{\beta}) = (X'X)^{-1}(X'VX)(X'X)'$.

Based on these findings, we also invoke the Beck and Katz (1995) approach into our regression model if the error structure shows autocorrelation, panel heteroscedasticity, and cross-sectional correlation. The covariance matrix V under the "Parks" model follows[7]

(4.35)

$$V = \begin{bmatrix} V_{11} & V_{12} & \cdots & V_{1N} \\ V_{21} & V_{22} & \cdots & V_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ V_{N1} & V_{N2} & \cdots & V_{NN} \end{bmatrix}_{NTxNT} = \begin{bmatrix} \sigma^2_{\varepsilon,11}\Omega_{11} & \sigma^2_{\varepsilon,12}\Omega_{12} & \cdots & \sigma^2_{\varepsilon,1N}\Omega_{1N} \\ \sigma^2_{\varepsilon,21}\Omega_{21} & \sigma^2_{\varepsilon,22}\Omega_{22} & \cdots & \sigma^2_{\varepsilon,2N}\Omega_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ \sigma^2_{\varepsilon,N1}\Omega_{N1} & \sigma^2_{\varepsilon,N2}\Omega_{N2} & \cdots & \sigma^2_{\varepsilon,NN}\Omega_{NN} \end{bmatrix}_{NTxNT},$$

where

$$(4.36)\ \sigma^2_{\varepsilon,ij}\Omega_{ij} = \frac{\sigma^2_{\varepsilon,ij}}{1-\rho_i\rho_j} \begin{bmatrix} 1 & \rho_j & \rho_j^2 & \cdots & \rho_j^{T-1} \\ \rho_i & 1 & \rho_j & \cdots & \rho_j^{T-2} \\ \rho_i^2 & \rho_i & 1 & \cdots & \rho_j^{T-3} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \rho_i^{T-1} & \rho_i^{T-2} & \rho_i^{T-3} & \cdots & 1 \end{bmatrix}_{TxT}.$$

Following Beck and Katz (1995), we use common first order autocorrelation where $\rho_i = \rho_j = \rho$.

IV.12. Biases in Dynamic Model With AR(1) Disturbance Process and Fixed Effects

[7] Proof, see Appendix A-4

Greene (2000) shows that if the regression contains any lagged dependent variables and the error term satisfies an AR(1) process, then OLS will be biased and inconsistent.

Consider the following:

(4.37) $y_t = \beta y_{t-1} + \varepsilon_t$,

where $\varepsilon_t = \rho\varepsilon_{t-1} + u_t$, $u_t \sim i.i.d(0, \sigma_u^2)$.

Suppose that $|\beta| < 1$ and $|\rho| < 1$.

In this model y_t represents the deviation from its sample mean, i.e. $y_t = Y_t - \bar{Y}$. It can be seen from equation (4.37) that this model contains a lagged dependent variable as an explanatory variable. This model has also an error term that follows a classical AR(1) process. According to Greene (2000), the regressor and the disturbance in this model are correlated as the following explanation shows.

(4.38) $$Cov(y_{t-1}, \varepsilon_t) = Cov(y_{t-1}, \rho\varepsilon_{t-1} + u_t)$$
$$= \rho\, Cov(y_{t-1}, \varepsilon_{t-1})$$
$$= \rho\, Cov(y_t, \varepsilon_t),$$

where we have now simply used the fact that the process is stationary $Cov(y_{t-1}, u_t) = 0$ and $Cov(y_t, \varepsilon_t) = Cov(y_{t-1}, \varepsilon_{t-1})$.

Also

(4.39) $$Cov(y_t, \varepsilon_t) = Cov(\beta\, y_{t-1} + \varepsilon_t, \varepsilon_t)$$
$$= \beta\, Cov(y_{t-1}, \varepsilon_t) + Cov(\varepsilon_t, \varepsilon_t)$$
$$= \beta\, Cov(y_{t-1}, \varepsilon_t) + Var(\varepsilon_t).$$

Combining equation (4.38) and (4.39) yields

(4.40) $Cov(y_{t-1},\varepsilon_t) = \rho\beta\, Cov(y_{t-1},\varepsilon_t) + \rho\sigma_\varepsilon^2$.

We have shown previously [equation (4.13)] that for an AR(1) process: $\text{var}(\varepsilon_t) \equiv \sigma_\varepsilon^2 = \frac{\sigma_u^2}{1-\rho^2}$, then equation (4.40) becomes

$$(4.41)\ Cov(y_{t-1},\varepsilon_t) = \frac{\rho}{(1-\beta\rho)}\frac{\sigma_u^2}{(1-\rho^2)}.$$

It is obvious from (4.41) that $Cov(y_{t-1},\varepsilon_t)$ is zero if $\rho = 0$, regardless of β.

Define $\hat{\beta}$ as the OLS estimator of β in equation (4.37) as

$$(4.42)\ \hat{\beta} = \frac{\sum_{t=2}^{n} y_t y_{t-1}}{\sum_{t=2}^{n} y_{t-1}^2},$$

then we can prove that[8]

$$(4.43)\ p\lim_{n\to\infty} \hat{\beta} = \beta + \frac{Cov(y_{t-1},\varepsilon_t)}{Var(y_t)}.$$

From (4.37) we know that $Var(y_t) = \beta^2\, Var(y_{t-1}) + Var(\varepsilon_t) + 2\beta\, Cov(y_{t-1},\varepsilon_t)$.

Knowing that the process is stationary and using (4.13) and (4.41), it can be shown that

$$(4.44)\ Var(y_t) = \frac{\sigma_u^2(1+\beta\rho)}{(1-\rho^2)(1-\beta^2)(1-\beta\rho)}.$$

Substituting (4.44) into (4.43) and using (4.41) yields

$$(4.45)\ p\lim_{n\to\infty} \hat{\beta} = \beta + \frac{\rho(1-\beta^2)}{1+\beta\rho}.$$

---

[8] Proof, see Appendix A-5

It is clear from (4.45) that unless $\rho = 0$, OLS will be inconsistent.

Nickel (1981) shows an additional source of bias in the presence of both fixed effects and an error term that follows an autoregressive common process of order 1 (AR(1)). Nickel starts with the following equations:

(4.46) $y_{it} = \beta + \rho\, y_{i,t-1} + \sum_j \beta_j x_{ijt} + f_i + u_{it} \qquad i = 1,\ldots,N; t = 1,\ldots,T$

and

(4.47) $y_{it} = \beta + \sum_j \beta_j x_{ijt} + f_i + \varepsilon_{it} \quad , \qquad i = 1,\ldots,N; t = 1,\ldots,T$

(4.48) $\varepsilon_{it} = \rho \varepsilon_{i,t-1} + u_{it}$,

where $u_t \sim i.i.d\left(0, \sigma_u^2\right)$, f_i is fixed parameter, and $|\rho| < 1$ by assumption.

It can be shown that equations (4.46) and (4.47) share a similar structure. Step one, replacing ε_{it} in (4.47) by (4.48). Step two, solving for $\varepsilon_{i,t-1}$ as a function of $y_{i,t-1}, \beta, x_{ij,t-1}$, and f_i using (4.47). Step three, substitute the expression for $\varepsilon_{i,t-1}$ from step two into the expression for y_{it} from step one, yields

(4.49) $y_{it} = \beta(1-\rho) + \rho\, y_{i,t-1} + \sum_j \beta_j \left(x_{ijt} - \rho\, x_{ij,t-1}\right) + f_i(1-\rho) + \varepsilon_{it}$.

Equation (4.49) makes clear that equation (4.46) and (4.47) have the same structure.

Nickel (1981) shows the asymptotic biases in the AR(1) disturbance model estimated by OLS using fixed effects, and Greene (2000) on page 583 states that "In the dynamic regression model … the finite sample bias is of order 1/T."

The conclusion that we can draw from the Greene (2000) and Nickel (1981) findings is that the presence of both fixed effects and lagged dependent variables as explanatory variables introduces bias. Moreover, there will be an additional source of bias if the error term is correlated. This suggests some possible instruments for Instrumental Variables (IV) estimation of the model. The treatment is the same when one or more of the explanatory variables are endogenous.

IV.13. Two Stage Least Squares (2SLS) Estimation Using Instrumental Variables

One of the major assumptions in the utilization of OLS is that there is no correlation between the explanatory variables and the error term. If this assumption is violated, based on the test as explained in sub chapter V.7, OLS will neither be unbiased nor consistent.

Consider $y = X\beta + u$ where $u \sim N(0, \sigma^2 I)$. Let's denote

(4.50) $$\underset{n\to\infty}{p\lim}\left(\frac{X'X}{n}\right) = \sum_{XX} \ ,$$

as a finite matrix of full rank, and

(4.51) $$\underset{n\to\infty}{p\lim}\left(\frac{X'u}{n}\right) = \sum_{Xu} \neq \mathrm{O} \, ,$$

which states that the error term is correlated with one or more of the explanatory variables. This may occur when one of the regressors is an endogenous variable; when there are lagged dependent variables and fixed effects; when there are fixed effects and autocorrelated disturbances; or when there are lagged dependent variables, fixed effects and an autocorrelated error term. We can prove that the OLS estimation of the model $y = X\beta + u$ will produce inconsistent estimates of β.

Let b be the OLS estimator, $b = (X'X)' X'y$, then

$$b = \beta + (X'X)^{-1} X'u$$

giving

$$\operatorname*{plim}_{n\to\infty} b = \beta + \operatorname*{plim}_{n\to\infty}\left(\frac{X'X}{n}\right)^{-1} \cdot \operatorname*{plim}_{n\to\infty}\left(\frac{X'u}{n}\right).$$

Using (4.47) and (4.48) gives

(4.52) $\operatorname*{plim}_{n\to\infty} b = \beta + \sum_{XX}^{-1} \sum_{Xu} \neq \beta .$

This result shows that the correlation of one or more of the explanatory variables with the disturbance term makes the OLS estimates inconsistent. This suggests the seeking of consistent estimators, which may be obtained by the use of instrumental variables (IV) or instruments.

Suppose that there exists a matrix Z, having the same dimension as X, such that

(4.53) $\operatorname*{plim}_{n\to\infty}\left(\frac{Z'Z}{n}\right) = \sum_{ZZ}$,

is a finite matrix of full rank, and

(4.54) $\operatorname*{plim}_{n\to\infty}\left(\frac{Z'X}{n}\right) = \sum_{ZX}$,

is a finite matrix with rank (Z) = rank (X), and

(4.55) $\operatorname*{plim}_{n\to\infty}\left(\frac{Z'u}{n}\right) = \sum_{Zu} = O .$

Equations (4.54) and (4.55) state that the variables in Z are correlated with the variables in X but are not correlated with the error term. In other words, we can think of Z as consisting of the same variables as X, except that the endogenous variables have been replaced with their instruments, i.e., some other variable that is correlated with the endogenous variable but it is uncorrelated with the error term. Premultiplying $y = X\beta + u$ by Z' yields

(4.56) $Z'y = Z'X\beta + Z'u$.

It is easy to prove that

(4.57) $Var(Z'u) = \sigma^2 (Z'Z)$.

This suggests the use of Generalized Least Squares and the GLS of β in equation (4.56) is given by[9]

(4.58) $b_{GLS} = b_{IV} = \left(X'Z(Z'Z)^{-1}Z'X\right)^{-1} X'Z(Z'Z)^{-1}Z'y$.

We can prove that this estimator, b_{IV}, is consistent.[10]

The instrumental variables estimator in equation (4.58) is equivalent to the Two Stage Least Squares (2SLS) Estimator as the following explanation shows.

Let's define $P_Z = Z(Z'Z)^{-1}Z'$ as a "projection matrix", which is symmetric and idempotent. Then

(4.59) $P_Z X = Z(Z'Z)^{-1}Z'X = Z\, b_{XZ} = \hat{X}$,

where b_{xz} is the OLS estimator that arises when X is regressed on Z, and $\hat{X}$ is the predicted value of X given Z. Then, equation (4.58) can be written as

(4.60) $b_{GLS} = b_{IV} = \left(X'P_Z X\right)^{-1} X'P_Z y = \left(\hat{X}'\hat{X}\right)^{-1} \hat{X}'y = b_{2SLS}$.

[9] Proof, see Appendix A-6

[10] Proof, see Appendix A-7

It is obvious that this generalization of instrumental variables (IV) estimation is equivalent to the Two Stages Least Squares (2SLS) estimation. By comparing (4.58) and (4.60) the Covariance matrix for b_{2SLS} is estimated by

(4.61) $Var(b_{2SLS}) = \hat{\sigma}^2 \left[X'Z(Z'Z)^{-1} Z'X \right] = \hat{\sigma}^2 \left[\hat{X}'\hat{X} \right].$

Although our analysis have been described in terms of matrix Z having the same dimension as X, it is still valid for model where Z has more columns than X, such that rank (Z) ≥ rank (X).

Clearly b_{2SLS} represents a special case of GLS. The 2SLS estimator in equation (4.57) uses the transformed variables, which have been purified from the problem of correlation between the explanatory variables and the error term. Hence, the use of OLS on the equation that uses the transformed variables necessarily produces the minimum variance linear unbiased estimator of β. It is more efficient, and it leads to correct standard errors, confidence intervals, and statistical tests.

To summarize, the four main steps in the 2SLS or instrumental variables estimation are as follows:

Consider the general model $y = X\beta + u$ with $Var(u) = \sigma^2 I$.

Step One: Regress all the endogenous variables in the equation of interest on all exogenous variables included in the equation plus any instruments that do not appear in the equation. Replace all the endogenous variables with their fitted values and let this new matrix be called $\hat{X}$.

Step Two: Calculate the 2SLS estimator of β, $b_{2SLS} = \left(\hat{X}'\hat{X}\right)^{-1} \hat{X}'y$.

Step Three: Use b_{2SLS} from the second step to calculate the residuals, $e = y - X\,b_{2SLS}$. Since b_{2SLS} in the second step is a consistent estimator, as we have previously proved (see appendix 7), the estimator of the residual is also consistent.[11] We use these residuals to estimate σ^2, ρ, and finally the V matrix.

Step Four: we could estimate $b_{2SLS} = \left(\hat{X}'\hat{X}\right)^{-1}\hat{X}'y$, and then use the covariance matrix $Cov(b_{2SLS}) = \left(\hat{X}'\hat{X}\right)^{-1}\left(\hat{X}'\hat{V}\hat{X}\right)\left(\hat{X}'\hat{X}\right)^{-1}$ to estimate panel corrected standard errors if the error terms exhibit the "Parks" model, with the covariance V matrix expressed in equations (4.35) and (4.36). Alternatively, if the error terms exhibit common first order autocorrelation, we could calculate the 2SLS estimator and associated covariance matrix as $b_{2SLS} = \left(\hat{X}'\hat{V}^{-1}\hat{X}\right)^{-1}\hat{X}'\hat{V}^{-1}y$, and $Var(b_{2SLS}) = \left(\hat{X}'\hat{V}^{-1}\hat{X}\right)^{-1}$, with the Covariance V^{-1} matrix expressed in equations (4.15) and (4.16), respectively.

IV.14. Estimation Procedure of Analysts' Forecasts Revision Model in Relation to the Filing of Antidumping Petitions and the Verdicts of the Investigation

We implement all the six specification tests that we discussed previously in our regression models. These tests incorporate the fixed effect test; the error structure test of autocorrelation, of panel heteroscedasticity, and of cross-sectional correlation; the

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[11] Note: In this case we estimate the consistent residual estimator using $e = y - Xb_{2SLS}$ instead of $e = y - \hat{X}b_{2SLS}$, because the original regression equation is $y = X\beta + \varepsilon$. Remember that in the

endogeneity test, and the Hausman test of whether to use fixed effects or random effects.

Reconsider equation (3.2) as follows:

$$AFrev_{it}^{h} = \sum_{j=1}^{3} \gamma_j AFrev_{i,t-j}^{h} + \alpha_1 Loss_{it} + \alpha_2 UE_{it} + \alpha_3 Loss * UE_{it}$$

$$+ \sum_{k=1}^{7} \delta_k D_{kit} + \mathrm{M}(f) + \Lambda_m(t) + \varepsilon_{it} \qquad (4.62)$$

where $\mathrm{M}(f)$ is firm effects with $f = 1, \ldots, 56$ and $\Lambda_m(t)$ is monthly time effects with $t = 84{:}07, 84{:}08, \ldots \ldots \ldots \ldots, 89{:}05, 89{:}06$. Both $\mathrm{M}(f)$ and $\Lambda_m(t)$ are fixed effects.

Let the model of equation (4.62) be expressed in a general form as $y = X\beta + \varepsilon$ with $\varepsilon \sim N(0, V)$. Based on the test as explained in section IV.3, let's assume that group effects do matter in our regression model. Therefore, we incorporate both firm effects $\mathrm{M}(f)$ and time effects $\Lambda_m(t)$ into our estimation. Also, based on the test as explained in section IV.4, section IV.5, and section IV.6, let's assume that the error structure is characterized by groupwise heteroscedasticity, common first order autocorrelation, and cross-sectional correlation.[12]

As discussed previously, there are a number of econometric problems that must be addressed in order to obtain consistent estimates of the impact of the filing of an AD petition and the verdicts of the investigation on the analysts' forecast revisions.

Feasible GLS that we have discussed previously, we estimate the residual e to calculate the parameter of V matrix.

[12] We also conduct estimation with the assumption of common first order autocorrelation only in constructing the variance covariance matrix V. The results of the error structure tests explained in section IV.4, section IV.5, and section IV.6 will determine which underlying assumption of the error structure that is most appropriate in constructing our variance covariance matrix V. It influences the resulting analysis of the impact of the filing of antidumping petitions and the verdicts of the

First, the presence of both group effects and lagged dependent variables as explanatory variables may introduce bias. Second, if the error term is autocorrelated, the inclusion of lagged dependent variables provides an additional source of bias. The following procedure will produce consistent coefficient estimates.

Step One: Regress AF^{h}_{rev} on all the exogenous variables in equation (4.62) plus the set of instruments as tabulated in Table IV.1:

Table IV.1 The Set of All Exogenous and Instrumental Variables

EXOGENOUS VARIABLES	EXOGENOUS VARIABLES LAGGED ONE MONTH	EXOGENOUS VARIABLES LAGGED TWO MONTHS	EXOGENOUS VARIABLES LAGGED THREE MONTHS	EXOGENOUS VARIABLES LAGGED FOUR MONTHS	FIXED EFFECTS
LOSS	LOSS_1	LOSS_2	LOSS_3	LOSS_4	FIRM
UE	UE_1	UE_2	UE_3	UE_4	TIME
LOSSUE	LOSSUE_1	LOSSUE_2	LOSSUE_3	LOSSUE_4	
D1	D1_1	D1_2	D1_3	D1_4	
D2	D2_1	D2_2	D2_3	D2_4	
D3	D3_1	D3_2	D3_3	D3_4	
D4	D4_1	D4_2	D4_3	D4_4	
D5	D5_1	D5_2	D5_3	D5_4	
D6	D6_1	D6_2	D6_3	D6_4	
D7	D7_1	D7_2	D7_3	D7_4	

investigation on analysts' forecast revisions. This will be discussed thoroughly in chapter VI, section VI.2.3

Step Two: Create the predicted value of AF_{rev}^{h} using the estimates from step One. Call this predicted value $AF_{rev}^{h}hat$.

Step Three: Lag $AF_{rev}^{h}hat$ three times and call the new variables $AF_{rev}^{h}hat\_1$, $AF_{rev}^{h}hat\_2$, and $AF_{rev}^{h}hat\_3$.

Step Four: Replace the explanatory variables $\sum_{j=1}^{3}\gamma_j AFrev_{i,t-j}^{h}$ in equation (4.62) with their predicted values $\sum_{j=1}^{3}\gamma_j AFrev_{i,t-j}^{h}hat$ using $AF_{rev}^{h}hat\_1, AF_{rev}^{h}hat\_2$ and $AF_{rev}^{h}hat\_3$, and let the new matrix of the explanatory variables be called $\hat{X}$ from (4.59).

Step Five: Calculate the 2SLS estimator of β, $\hat{\beta} = \left(\hat{X}'\hat{X}\right)^{-1}\hat{X}'y$. We call this estimator a 2SLS estimator.

Step Six: Use $\hat{\beta}$ from step Five to calculate the residuals $e = y - X\hat{\beta}$.

Step Seven: Use these residuals to estimate the inverse of the variance covariance matrix $\hat{V}^{-1}$ and to estimate the variance covariance matrix $\hat{V}$. The details of the procedure are the following:

Step Seven-A: Use the residuals from step Six to calculate common autocorrelation parameter ($\hat{\rho}$) as given in equation (4.23).

Step Seven-B: Construct the transformation matrix P^{*} as expressed in equation (4.24), where the transformation matrix for each group (firm), P_i^{*}, $i = 1, \ldots, N$ is given by equation (4.25).

Step Seven-C: Transform the original equation (4.11), $y = X\beta + \varepsilon$, by premultiplying it by P^* that we obtained from Step Seven-B. This transformed equation is $P^* y = P^* X\beta + P^* \varepsilon$ or $y^* = X^* \beta + \varepsilon^*$ where $y^* = P^* y$, $X^* = P^* X$, and $\varepsilon^* = P^* \varepsilon$.

Step Seven-D: Estimate, using OLS, $P^* y = P^* X\beta + P^* \varepsilon$ and obtain the residuals[13].

Step Seven-E: Use these residuals to estimate $\hat{\sigma}_u^2$ as given in equation (4.28).

Step Seven-F: Use $\hat{\rho}$ that we obtained from Step Seven-A and $\hat{\sigma}_u^2$ that we got from Step Seven-E to estimate $\left(\sigma_{\varepsilon_i}^2 \Omega_i\right)$ and $\hat{V}^{-1}$, as expressed in equation (4.14) and (4.15) or to estimate $\hat{V}$ as given in equation (4.14).

Step Eight: as proposed by Beck and Katz (1995) that we discussed previously, we can use the 2SLS estimator from Step Five[14]. Then, Use the covariance matrix $Cov(\hat{\beta}) = (\hat{X}'\hat{X})^{-1}(\hat{X}'\hat{V}\hat{X})(\hat{X}'\hat{X})^{-1}$ to estimate "Panel Corrected" standard errors if the error structure exhibits autocorrelation, panels heteroscedasticity, and cross-sectional correlation with the covariance matrix V as in equation (4.35) and (4.36). We call this estimator a 2SLS estimator with Panel Corrected Standard Errors.

IV.15. Estimation Procedure of the Absolute and Actual Forecast Errors Model in Relation to the Learning of the Filing of Antidumping Petitions

[13] As we have explained previously in Section IV.2 that the invocation of OLS to this transformed equation produces BLUE estimators.

[14] As we have shown previously the 2SLS estimation in Step Five provides a consistent estimator.

We implement the same procedure as we do in the regression of the analysts' earnings forecasts revision model. First, we do the test of the significance of the fixed effects. Second, we test our belief about the error structure. Then, using the Hausman test, we verify whether fixed effects or random effects are most appropriate to our model. Based on these tests, then we invoke the appropriate estimation technique.

CHAPTER V

Data Description

V.1. Introduction

This chapter provides the explanation of the data sources. Section V.2 describes the sources of the data. Section V.3 lays out the descriptive statistics of the data used to examine the analysts' forecasts revision model. Section V.4 displays the descriptive statistics of the data used to examine the analysts' forecast errors model.

V.2. Data Sources

We develop a panel data set of U.S. firms that filed petitions between 1985 and 1987.[15] This period was selected for several reasons. First, there were major institutional and procedural revisions in how AD petitions were treated in the U.S. in both 1979 and 1984, making the success of AD petitions by U.S. firms more likely. In particular, the 1984 Trade Act allows for the cumulation of allegedly unfair imports over petitions against multiple countries in the assessment of material injury. The number of AD cases investigated increased substantially subsequent to the 1984 change. In 1985, 69 AD cases were initiated compared with only 38 in 1984. The number increased to 83 in 1986. Second, 1987 is included to allow control for the overall effects of market conditions since there was a downturn in the market in that year. Otherwise, it would be difficult to separate general market effects from the effects of the changes in the dumping law. Furthermore, there was another major trade act passed in 1988. Finally, the inclusion of more years or petitions allows for

[15] This data was obtained from Hartigan and Rogers (2003).

more firm-specific complications such as mergers and acquisition. As such, we limit our panel by incorporating only petitions that were filed between 1985 and 1987.

Table C.1 in Appendix C presents the original U.S. firms that participated in filing AD petitions, as were disclosed in U.S. International Trade Commission (USITC) material injury (section 731) investigations during 1985 through 1987. Table C.1 also shows the dates of the verdicts for each petition. The table excludes AD petitions for which investigative reports were not available. The investigation report might not be available even though a petition had been filed. A petition might reach a settlement before the investigation began or before the first decision, or it might fail the sufficiency test. As such, there would be no report available concerning the relevant firms involved in that petition. Table C.1 also rules out petitions involving integrated steel and agricultural products.

Table C.1 excludes petitions involving integrated steel producers because of two reasons. First, we did not want our sample to be dominated by a single industry since 40 percent of U.S. AD petitions are attributed to firms producing prefabricated steel products. Second, several steel investigations may be in process at any point in time. This may complicate the analysis since it makes it difficult (if not impossible) to separate out the effects of the timing of AD petitions. Table C.1 also excludes petitions involving agricultural products because of the differences in the rules regarding material injury imposed by the USITC and unfair pricing imposed by the Department of Commerce. For example, decisions are required concerning whether both processors and growers should be included. Further, sales of products at a loss are handled differently (Hartigan 2000).

As was noted previously, Table C.1 contains U.S. firms that filed petitions as were disclosed in the USITC investigative report during 1985 through 1987. Unfortunately, not all of firms listed in Table C.1 have publicly traded shares in the stock market. As such, we rule out firms that did not have publicly traded shares[16]. Then, we consulted the relevant 1980s issues of Ward's Business Directory and Security Owners Stock Guide to obtain a sample of firms with publicly traded shares. We eliminated firms that went public or private during the period of our investigation. It is possible that firms listed in the original report of Table C.1 did not have publicly traded shares but instead were subsidiaries of a parent company. In the case that the parent company is a U.S. domestic company and has publicly traded shares, then we use the parent company as a substitute for the original firm in our sample. In a situation where the parent company is a foreign company, we excluded it from our sample.

In addition to excluding private and foreign concerns, we eliminated firms with multiple AD petitions filed within 280 days of each other or filed against additional countries while the investigation of its previous petition was still in process. This is to satisfy that the observations are independent in our estimation. We also eliminated pertinent firms involved in mergers and acquisitions during the sample period, since this complicates our analysis. Finally, firms with less than three years of analysts' forecasts data or lack of analysts' forecasts data during the investigation period of its petition were also eliminated. This may be due to brokerages not covering or ceasing to cover or beginning coverage in midst of our sample period. Table C.2 in Appendix

[16] This is also the reason why we exclude petitions involving agricultural products in our original sample of Table C.1 since in any case, most agricultural concerns are not publicly traded in the stock

C identifies the 27 AD petitions and the 56 publicly owned firms in industries pertinent to the petitions included in the sample for the purpose of estimation.

Analysts' forecasts data for several horizons, actual earnings per share both yearly and quarterly, and number of analysts are taken from the 1999 I/B/E/S (Institute Brokerage Estimate System) Summary Estimate CDs. If we found missing analysts forecast data in our firm month observation, then we invoke a zero revision for that observation. This is to keep our panel balanced. Price data and market capitalization data are taken from the CRSP (Center for Research and Security Price, The University of Chicago). The analysts' forecast data in I/B/E/S has been adjusted for stock splits all the way back to the original year in the CDs. Accordingly, we chose the adjusted price in CRSP to make it comparable to the analysts' forecast revision. Financial leverage data is obtained from the Compustat (Research Insight) CD-ROM. We identify the dates of quarterly earnings announcements for each pertinent firm in our sample using the LEXIS-NEXIS database and searching for variations of the letters "earn." From this searching, we also obtained the information about firms' mergers and acquisitions.

In constructing the panel of analysts' forecast revisions, we utilized monthly data. To increase the power of our test, our panel starts from July 1984 and concludes in June 1989. This is taking into account that the first petition in our sample happened in January 1985, and the verdict of the USITC final decision for the last petition in our sample happened in August 1988. Thus, we have 60-time series observations and 56 cross-section observations. Hence, the panel of analysts' forecasts revision contains 3360 observations.

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market.

In contrast to the panel of analysts' forecast revisions, we assembled yearly data in creating the panel of analysts' forecast errors. We do this because we used annual earnings and filing petition data for testing the analysts' forecast errors. As mentioned previously, firms that filed petitions during the period of 1985 to 1987 constructed our sample. As such, we set the panel of analysts' forecast errors from 1984 up to 1989. This is done by including analysts' forecast errors at least for one year period before filing a petition and analysts' forecast errors one and for at most two year periods after filing a petition. By incorporating non-filing observations one-year period before the filing date, we increase the likelihood of discovering the possibility that analysts learn of a petition before it is filed. This takes into account the fact that a firm may communicate to the market through analysts to avoid liability issues. The inclusion of non-filing observations one- and two-year periods after the filing date takes into account other information that becomes available to the market. Moreover, a one year period after a filing date is used to capture the effect of process filers of a petition to the analysts' forecast errors, while two year periods after the filing date is included to apprehend the effect of the outcome filers of a petition to the analysts' forecast errors. As such, we will have six years of time series observations and 56 firms leading to 336 observations that constructed the panel of analysts' forecast errors.

V.3. Data Used to Examine Analysts' Forecasts Revision Model

Table V.1 displays descriptive statistics for the sample of monthly data used to examine analysts' earnings forecast revision. The table shows that the analysts' earnings forecast revision of the next period earnings ($AF_{i,t}^{h=1}$) is negative, on average (0.0053). For our sample of firm-month observations, we found that 51.76% of the one year ahead earnings forecast changes were downward revisions, 16.10% had no change in the forecast, and 32.14% were upward revisions. For the second year ahead earnings forecast ($AF_{i,t}^{h=2}$), 43.93% of the forecast were downward revisions, 27.71% had no change in the forecast, and 28.36% of the forecast were upward revisions. For the forecast of five year long term earning growth ($AF_{i,t}^{h=5}$), 38.84% of the forecast were downward revisions, 30.42% of the forecast had no change, and 30.74% of the forecast were upward revisions.[17, 18]

[17] We have lack of availability of the third year ahead analysts' earnings forecasts from the I/B/E/S CDs, especially during the period of an antidumping petition investigation. As such, we do not incorporate the third year ahead earnings forecasts into our estimation. Similarly, we face data unavailability for the forecast horizons of more than three years ahead earnings, since analysts typically do not make a forecast for more than three years horizons.

[18] Part of the report of no change in the forecasts contains missing firm-month observations of analysts' forecast revisions for which we invoke as a zero revision. The first year ahead earnings forecast contains 20 firm-month missing observations out of 3360 firm-month observations, which is 0.60%. The second year ahead earnings forecasts contains 566 firm-month missing observation out of 3360 form-month observations, which is 16.84%. The five year (long term) earnings growth forecast contains 249 firm-month missing observation out of 3360 firm-month observations, which is 7.41%.

Table V.1 Descriptive Statistics (Analysts' Earnings Forecast Revisions)

Monthly observations (NT=3360 firm-month observations, N=56 firms, T=60 months)

Variable	Mean	Std. Dev.	Minimum	Maximum
$AF_{i,t}^{h=1}$	-0.0053	0.0238	-0.5143	0.1474
$AF_{i,t}^{h=2}$	-0.0033	0.0207	-0.2618	0.4889
$AF_{i,t}^{h=5}$	-0.0050	0.2934	-3.3185	6.0245
$Loss_{it}$	0.0527	0.2234	0	1
UE_{it}	-0.0221	0.4516	-11.88	10.39
$Loss*UE_{it}$	-0.0355	0.3543	-11.88	1.94
$D1_{it}$	0.0196	0.1388	0	1
$D2_{it}$	0.0012	0.0345	0	1
$D3_{it}$	0.0190	0.1367	0	1
$D4_{it}$	0.0190	0.1367	0	1
$D5_{it}$	0.0167	0.1280	0	1
$D6_{it}$	0.0015	0.0385	0	1
$D7_{it}$	0.0152	0.1223	0	1

The description of the variables in Table V.1:

$AF_{i,t}^{h=1}$: the revision in the mean forecasts for horizon equal to one year ahead earnings for firm i in month t deflated by beginning month t price.

$AF_{i,t}^{h=2}$: the revision in the mean forecasts for horizon equal to two year ahead earnings for firm i in month t deflated by beginning month t price.

$AF_{i,t}^{h=5}$: the revision in the mean forecasts for five year long term earnings growth for firm i in month t deflated by beginning month t price.

$Loss_{it}$: 1 if in month t the quarterly net income of firm i is reported to be less than zero, 0 otherwise.

UE_{it} : Unexpected earnings for firm i in month t.

$D1_{it}$: 1 if petition involving firm i was filed in month t, 0 otherwise.

$D2_{it}$: 1 if USITC Preliminary decision regarding firm i occurs in month t is NEGATIVE, 0 otherwise.

$D3_{it}$: 1 if USITC Preliminary decision regarding firm i occurs in month t is AFFIRMATIVE, 0 otherwise.

$D4_{it}$: 1 if DoC Preliminary decision regarding firm i petition occurs in month t, 0 otherwise.

$D5_{it}$: 1 if DoC Preliminary decision regarding firm i petition occurs in month t, 0 otherwise.

$D6_{it}$: 1 if USITC Final decision regarding firm i that occurs in month t is NEGATIVE, 0 otherwise.

$D7_{it}$: 1 if USITC Final decision regarding firm i that occurs in month t is AFFIRMATIVE, 0 otherwise.

V.4. Data Used to Examine Analysts' Forecasts Errors Model

Table V.2 shows the sample of annual data used to examine analysts' earnings forecast errors. The mean analysts' earnings forecast errors, both in the year before and after filing of AD petitions ($AFerr_{i,t+1}$ and $AFerr_{i,t-1}$, respectively), are negative (-0.0096 and -0.0105, respectively). An average of 19.64% of the firm-year observations includes the filing of AD petitions.

Table V.2 Descriptive Statistics (Analysts' Earnings Forecast Errors)

Annual observations (NT=336 firm-year observations, N=56 firms, T=6 years)

Variable	Mean	Std. Dev.	Minimum	Maximum
$AFerr_{i,t+1}$	-0.0096	0.0537	-0.3387	0.3968
$AFerr_{i,t-1}$	-0.0168	0.5960	-0.3423	0.3968
$Filing_{it}$	0.1964	0.3979	0	1
$NA_{i,t+1}$	15.7857	9.7277	1	50
$R^{M}_{i,t+1}$	0.1624	0.1288	-0.1642	0.3719
$mcap_{it}$	3.4053	6.1460	0.0126	40.4071
$finlev_{it}$	2.2694	1.7396	-6.6550	15.1140

The description of the variables in Table V.2:

$AFerr_{i,t+1}$: The analysts' forecast error for firm i for year t+1, the year after filing of an AD petition, deflated by beginning of period price.

$AFerr_{i,t-1}$: The analysts' forecast error for firm i for year t-1, the year before filing of an AD petition, deflated by beginning of period price.

$Filing_{it}$: 1 if petition involving firm i was filed in year t, 0 otherwise.

$NA_{i,t+1}$: the number of analysts forecasting one year ahead earnings for a given firm i in year t+1.

$R^{M}_{i,t+1}$: market return from the beginning to the end of period t+1

$mcap_{it}$: the market capitalization for firm i at the beginning of year t, measured in billion U.S. dollars.

$Finlev_{it}$: the financial leverage for firm i at the beginning of year t.

CHAPTER VI

RESULTS

VI.1. Introduction

This chapter provides the results of the empirical estimations. Estimations are conducted using both SAS proc/IML and STATA. Section VI.2 reports the results of the analysts' forecast revisions regression equation (3.2). Section VI.3 presents the results of the analysts' forecast errors regression equation (3.4), which uses the absolute value of the forecast error as a measure of the forecast accuracy. Section VI.4 lays out the results of the analysts' forecast errors regression equation (3.5), which uses the actual value of the forecast error as a measure of the bias direction of the forecast. For each section, we present, discuss and analyze the results of the specification tests, which further leads to the appropriate estimation techniques, and the estimation results. We also report, for each section, the alternate specification to check the robustness of the estimation results. Finally, a summary concludes each section.

VI.2. The Result of the Analysts' Earnings Forecast Revision Model in Relation to the Filing of Antidumping Petitions and the Verdicts of the Investigation

VI.2.1. Specification Tests

As usual, when we are dealing with Time Series Cross Section (TSCS) data, we need to check whether the intercepts are the same across the firms. If this is the case, we can do a pooling regression. Under the pooling regression, Ordinary Least Squares (OLS) provides consistent and efficient estimators. However, we need to test whether the heterogeneity of analysts' forecast revisions matters across individual firms. Another question is whether the error structure is generated in an uncomplicated (spherical) manner. If it is not, then OLS is not optimal in the sense that there will be other estimators that make more efficient use of the data. Furthermore, if there is an endogeneity problem in our regression model, OLS will provide not only biased estimates but also inconsistent ones. Finally, we conduct the Hausman test for whether fixed effects or random effects are most appropriate to our model. For these reasons, we conduct several specification tests as explained in chapter IV.3 through IV.8. The results of these specification tests will lead to the appropriate technique of estimation.

Table VI.1.a, Table VI.1.b, and Table VI.1.c display the results of the specification tests on the regression equation (3.2) model of analysts' earnings forecasts revisions for the forecast horizons of one year ahead earnings, two year ahead earnings, and five year long term earnings growth, respectively.

For the forecast horizon of one year ahead earnings (Table VI.1.a), we find that fixed effects exist in our model. An F test for no fixed effects is rejected at the 1% level with $F_{114,3232}=1.79$. We also check whether we have one-way fixed effects or two-way fixed effects. The former suggests that our specification is dependent only on the cross section to which the observation belongs; while the latter conveys that our specification depends on both the cross section and the time series to which the observation belongs. We find that we have two-way fixed effects in which the firm effect is significant at the 5% level with $F_{55,3232}$=1.53, and the time effect is significant at the 1% level with $F_{59,3232}$=2.27. We also have a positive first order autocorrelation, which is significant at the 1% level with the T-statistic=4.71. The test of the groupwise heteroscedasticity yields a χ^2 of 5464.04 with 55 degrees of freedom, which greatly exceeds the 5% critical value of 73.31. The result of the cross-sectional correlation test is distributed as a χ^2 with 1540 (which is $\frac{N(N-1)}{2}$) degrees of freedom, which at 5794549.8 greatly exceeds the 1% critical value of 1632.41. The test of the endogeneity that the lagged dependent variables are correlated with the error term yields an F statistic, which is significant at the 5% level ($F_{3,3340}$=2.53). The Hausman test, which is distributed as a χ^2 with 13 degrees of freedom, is significant at the 1% level, which at 74.33 greatly exceeds the critical value of 27.69. The hypothesis that the individual effects are uncorrelated with the other regressors in the model is rejected. As a result of the previously mentioned *F* test for the presence of fixed effects, and the Hausman test for the presence of correlation between the individual effects and the other regressors, we conclude that fixed effects are a more appropriate specification than random effects. The heterogeneity of the analysts' forecast revisions across individual firms exist for the forecast horizon of one year ahead earnings.

Table VI.1.b presents the results of the specification tests of the analysts' earnings forecasts revisions for the forecast horizon of two year ahead earnings. We find the existence of fixed effects. An F test of no fixed effects is rejected at the 1% level with $F_{114,3232}$=2.30. We also have a two-way fixed effect in which firm effects and time effects are significant at the 1% level with $F_{55,3232}$=2.32 and $F_{59,3232}$=2.86, respectively. We also find a significant result of the first order autocorrelation test in the error structure with the T-Statistics=5.41. The panel heteroscedasticity test, which is distributed as a χ^2 with 1540 degrees of freedom, is significant at the 1% level, which at a $\chi^2 = 70109.5$ greatly exceeds the critical value of 1632.4. The F test of the endogeneity of lagged dependent variables is not significant at the 5% level with $F_{3,3340}$=1.74. The Hausman test, which is distributed as a χ^2 with 13 degrees of freedom, is significant at the 1% level, which at 80.61 greatly exceeds the critical value of 27.69.

For the forecast horizon of five year long term earnings growth, Table VI.1.c reports the results of the specification tests. An F test for no fixed effects is not significant at the 5% level with $F_{114,3232}$=0.85. Both firm effects and time effects are not significant at 1% level with $F_{55,3232}$=0.58 and $F_{59,3232}$=0.95, respectively. The test of the first order autocorrelation test in the error structure yields a T-Statistics of 9.45, which is significant at the 1% level. The panel heteroscedasticity test, which is distributed as a χ^2 with 55 degrees of freedom, is significant at the 1% level, which at 6359.64 greatly exceeds the critical value of 73.31. The cross-sectional correlation test, which is distributed as a χ^2 with 1540 degrees of freedom, is significant at the 1% level, which at 5696973 greatly exceeds the critical value of 1632.41. The endogeneity test of lagged dependent variables yields a significant result at the 1% level with $F_{3,3340}$=7.44. The Hausman test of whether fixed effects or random effects are more appropriate, which is distributed as a χ^2 with 13 degrees of freedom, is significant at the 5% level with $\chi^2_{13} = 32.66$, exceeding the critical value of 27.69.

Based on the above specification tests results for each forecast horizon, we conclude that we do have fixed effects and endogeneity in our lagged dependent variables. This implies that a Two Stage Least Squares (2SLS) with instruments is appropriate for our estimation. Moreover, the assumption that the error structures are generated in an uncomplicated (spherical) manner is strongly rejected. Instead, we have first order autocorrelation and panel correlation in the error structure. Following Beck and Katz (1995), we invoke the technique of Panel Corrected Standard Errors (PCSE). The results of 2SLS with PCSE are displayed in Table VI.2.

VI.2.2. Estimation Results

Table VI.2 presents the results of estimating the analysts' earnings forecast revision regression equation (3.2) with the forecast horizon h set equal to 1, 2, and 5, where h=5 represents a five year average growth rate. The estimation technique involves 2SLS with PCSE.

The first column of Table VI.2 presents the effect of filing an AD petition and the verdicts of the investigation on one year ahead earnings forecast revisions. The coefficient on D2, which is the ITC preliminary negative decision, is negative and significant at the 10% level, suggesting that analysts tend to revise their one year ahead earnings forecast downward, on average, upon learning the announcement of the negative ITC preliminary decision. This indicates that analysts believe any incremental information signaled by the negative ITC preliminary decision is more likely to lead to a decline in the first year earnings relative to their prior prediction. The coefficient of other dummy variables about the filing of AD petitions and the announcement of the verdict of the investigation are found to be not statistically significant at conventional levels. Affirmative decisions may not be significant because the good news of that decision is counterbalanced by the bad news of injury, particularly since the petition may occur in the midst of the year for which the forecast is given. The coefficients on lagged dependent variables are significant at the 1% level, suggesting there is inertia in analysts' forecast revisions. The coefficient on the dummy variable for LOSS is negative, as expected, suggesting that analysts tend to revise their one year ahead forecast downward in the presence of current period loss. This is consistent with Chaney et al (1999). The coefficient of Unexpected Earnings (UE) is positive, but it is not statistically different from zero. The coefficient on the interactive variable LOSS*UE is negative but again not statistically significant.

To examine analysts' expectations for firm's earnings two years after filing an AD petition, and the verdicts of the investigation, we next estimate regression equation (3.2) using 2SLS with PCSE specifying h=2 as the dependent variable, where h=2 is a two year ahead earnings forecast. The results are presented in the second column of Table VI.2. Here we find that the coefficient on the dummy variable D5, which is the Department of Commerce final decision, is positive and significant at the 10% level. This suggests that analysts tend to revise their second year earnings forecast upward, on average, upon learning of the announcement of the Department of Commerce final decision. This indicates that dumping exists, which means that the foreign firms (dumpers) are selling their products below their production cost or below their home market price in the U.S. market. Analysts tend to perceive that the petition may be granted to the pertinent firms and the duties and/or penalties might be imposed to the foreign dumpers. This benefit may appear after 280 days of the AD investigation time period since the filing date or may appear earlier, as foreign firms must post a bond in the amount of the DoC preliminary decisions for each export. Analysts tend to perceive that this benefit will positively affect the firm's second year earnings. Since the DoC finds in the affirmative 95 percent of time, the good news associated with the DoC final decision is the amount of the duty. We do not find any statistically significant coefficients on the other dummy variables about the filing of AD petitions and the verdicts of the investigation. The coefficients on lagged dependent variables are statistically significant at the 1% level for the first and second lag and not statistically significant for the third lag. These suggest the existence of inertia in analysts' forecast revisions. The coefficient on the dummy variable for LOSS is negative and statistically significant at the 1% level. This suggests that analysts tend to revise their second year earnings forecasts downward in the presence of current period loss. The coefficient on Unexpected Earnings (UE) is not statistically significant. The coefficient on the interactive term LOSS*UE is negative and statistically significant at the 1% level. This suggests that analysts are cautious and pessimistic in their second year earnings forecast in the presence of a loss.

From the results of these two forecast horizon revisions, we find that when the ITC preliminary decision is announced to be negative, analysts tend to revise their one year ahead earnings forecasts downward. Another finding is when the Department of Commerce final decision concluded that the dumping margins exist, analysts tend to revise their second year ahead earnings forecast upward.

However, when we replace the horizon in forecasted earnings with h=5, none of the coefficients on the dummies about the filing of AD petitions and the announcement of the verdicts of the investigative decision are statistically significant. This suggests that any incremental information signaled by the filing of AD petitions and the announcement of the verdicts of the investigation has a short term effect, which is one and two years, on the value of the firm. The estimation results using the average five year earnings growth as the dependent variable are presented in the third column of Table VI.2.

In summary, the results of Table VI.2 provide evidence that subsequent to ITC preliminary negative decision, analysts tend to revise their first year earnings forecast downward. Furthermore, analysts tend to revise their second year earnings forecast upward upon learning of the Department of Commerce final decision.

VI.2.3. Alternate Specifications

It might be the case that analysts anticipate the event of the filing of AD petitions earlier by revising their forecasts several months before the date of the actual filing of an AD petition, or before the date that the verdicts of an investigation are announced. To explore this possibility, we construct dummy variables for the first, second, and third months prior to the file month, denoted d1lead1, d1lead2, d1lead3, respectively.[19]

The results of the estimation show that analysts may anticipate their revision at one month, two months, or three months before a firm files an AD petition for the earnings forecast horizon of one year ahead earnings, two year ahead earnings, and five year average growth. These are presented in Table VI.3, Table VI.4, and Table VI.5, respectively.

Table VI.3 presents the results of the estimating regression equation (3.2) with the h set equal to 1. The first column displays our previous result, namely the effect of filing AD petitions and the announcement of the verdicts of the investigation on one year ahead earnings forecast revisions using D1 as the dummy variable (it is merely the first column of Table VI.2). When we estimate regression equation (3.2) with D1lead1, D1lead2, and D1lead3 defined as dummy variables equal to one at the one month, two months, and three months before a firm files an AD petition, respectively, our results for the one year ahead forecast revisions are qualitatively unchanged. The coefficient on the dummy variable D2, which is the ITC preliminary negative decision, is negative and statistically significant at the 10% level. The significance of the other coefficients such as lagged dependent variables, LOSS variable, are similar to our main result (the first column). The coefficients on other dummy variables D2 through D7 about the announcement of the verdicts of the investigation are not statistically different from zero. This is consistent with our main result. We do not find evidence to support the hypothesis that analysts may anticipate their first year forecast revisions several months before a firm files an AD petition. These results are presented in the second, third, and fourth column of Table VI.3.

We next estimate regression equation (3.2) specifying h=2 as a two year ahead earnings forecast revision with D1lead1, D1lead2, and D1lead3 defined as before. The results are presented in the second, third, and fourth column of Table VI.4, respectively. The first column displays our previous result, namely the effect of filing

[19] Activity in lead periods was investigated in other research. See Hartigan and Rogers (2003).

AD petitions and the announcement of the verdicts of the investigation on two year ahead earnings forecast revisions using D1 as the dummy variable (it is merely the second column of Table VI.2). Table VI.4 shows that our results are qualitatively unchanged for the two year ahead earnings forecast revisions. The coefficient on the dummy variable D5, which is the Department of Commerce final decision, is positive and significant at the 10% level. The significance of the other coefficients such as lagged dependent variables, LOSS variable, and LOSS*UE variable are similar to our main result (the first column). The coefficients on other dummy variables D2 through D7 about the announcement of the verdicts of the investigative decisions are not statistically different from zero. This is consistent with our main result displayed in the first column. The new interesting findings are that the coefficient on the dummy variable D1lead3 is positive and significant at the 1% level, and the coefficient on the dummy variable D1lead1 is negative and significant at the 1% level. These findings may be interpreted as follows. It appears that the prospect of filing an AD petition seems to be causing a reaction on the part of analysts. Since there are both an upwards and a downwards revision that are statistically significant, it appears to be difficult for analysts to ascertain the effect of the petition on earnings subsequent to the petition. The early optimism may be somewhat tempered by subsequent reassessment. Later, when the firm submits the petition and the Department of Commerce announces the final decision, analysts become more optimistic on their second year earnings forecasts. This is shown by a positive significant coefficient on the D5 variable, which is the Department of Commerce Final Decision.

However, when we replace the horizon in forecast earnings with h=5, with D1lead1, D1lead2, and D1lead3 defined as before, our results for five year long term earnings growth are qualitatively unchanged. Table VI.5 presents the results. None of the coefficients on the verdicts of the investigation are statistically significant. However, the coefficient on D1lead2 is negative and significant at the 10% level. This suggests that analysts tend to revise their five year long term earnings growth forecasts downward in the two months prior to the file month.

Another way to check the robustness of our results is by relaxing the panel correlation assumption in the error structure. Remember that all the exogenous explanatory variables in regression equation (3.2) are dummy variables except the UE (unexpected earnings) variable, which is a continuous variable. Let's assume that the error structure exhibits first order autocorrelation only, without panel correlation. We repeat the estimation regression equation (3.2) using 2SLS with Feasible Generalized Least Squares (FGLS). We set the dummy variables D1, D1lead1, D1lead2, and D1lead3 defined as before, and do the estimation by setting h=1, 2, and 5, where h=1, 2, and 5 are a one year ahead earnings forecast, a two year ahead earnings forecast, and a five year average earnings growth, respectively. Table VI.6 presents the estimation results for the one year ahead earnings forecasts revision; Table VI.7 displays the estimation results for the two year ahead earnings forecasts revision; and Table VI.8 discloses the results for the five year long term earnings growth.

The results of 2SLS using FGLS estimation in these three tables reveal that the standard error of the coefficient estimates are smaller compared to the corresponding coefficient standard error using 2SLS with PCSE. This is as expected, and it does not change the significance of the coefficients that we obtained using 2SLS with PCSE, except for the coefficient on the variable UE (Unexpected Earnings). Using 2SLS with FGLS estimation, we find that the coefficient on the UE variable is positive and significant for one year ahead earnings forecast revisions (Table VI.6).[20] This is as we expected. If analysts perceive that the unexpected earnings will persist into the future, the coefficient on the variable UE will be positive. The coefficient on the dummy variable D2, which is the ITC preliminary negative decision, is negative and significant at the 10% level for one year ahead earnings forecast revisions. This is consistent with our findings using 2SLS with PCSE. Moreover, from Table VI.7, we see that the coefficient on the dummy variable D5, which is the Department of Commerce final decision, is positive and significant at the 5% level for two year ahead earnings forecast revision. This is also consistent with our findings using 2SLS with PCSE. Another finding, the coefficient on the dummy variable D2, which is the ITC preliminary negative decision, is positive and significant at the 5% level for the two year ahead earnings forecast revisions.[21]

However, Table VI.8 reveals that none of the coefficients on the dummy variables about the filing of AD petitions and the announcement of the verdicts of the investigation affects analysts' expectations on a five year long term earnings growth revision. This is consistent with our findings using 2SLS with PCSE. The interesting finding, though, that the coefficient on D1lead2 is negative and significant at the 1% level, suggests that at two months before a firm files an AD petition, analysts

[20] Using 2SLS with PCSE, we found that the coefficient on the variable UE is positive but not statistically different from zero at conventional levels (Table VI.2, column 1)

anticipate the earlier information by revising the five year long term earnings growth downward.

The lack of statistical significance in the five year long term earnings growth estimation may reflect several factors. One is that long term projections are inherently difficult to make. Another is that the AD duties may or may not remain in effect that long. Further, analysts may be pessimistic about the ability of firms to withstand foreign competition, even in the presence of protection.

Although the results of the 2SLS with FGLS estimation are promising,[22] overall these results are rejected since we do have panel correlation in the error structure.

Another robustness check is performed by increasing the number of lagged dependent variables in the explanatory variables in regression equation (3.2). Table VI.9 shows the results of 2SLS with PCSE estimation if we increase the lag of the dependent variable to 12 months (one year). The results of Table VI.9 are consistent with our previous findings that upon learning of the negative ITC preliminary decision, analysts tend to revise their first year earnings forecast downward. Moreover, analysts tend to revise their second year earnings forecast upward upon learning of the Department of Commerce final decision. We should note that we do not increase the number of lagged dependent variables more than 12 months, since the actual annual earnings have been announced anyway. Besides, there is a trade-off

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[21] Using 2SLS with PCSE, we found that the coefficient on the variable D2, which is the ITC preliminary negative decision, is positive but not significantly different from zero at conventional levels for the two year ahead earnings forecast revisions (the second column of Table VI.2)

[22] The 2 SLS with FGLS gives the positive significant coefficient on the control variable, such as, the UE variable, for the forecast horizon of one year ahead earnings. In addition, it yields the negative significant coefficient on the variable D1lead2 for the forecast horizon of five year long term earnings growth revisions. Moreover, it gives the positive significant coefficient on the ITC preliminary negative decision for two year ahead earnings forecasts revisions.

between increasing the lags of the dependent variables in the explanatory variables with the efficient use of the data.

VI.2.4. Conclusion

In summary, the results presented in Table VI.2 appear to be robust to alternative specifications controlling for the possibility that analysts may anticipate their forecast revisions earlier than the AD filing date. We investigate it for one, two, and three months before the filing date. The results of Table VI.2 also tend to be robust to alternative specifications controlling for the different assumptions of the error structure and different techniques of the estimation. Finally, our results seem to be robust to the number of lags of the dependent variables that should be included in the explanatory variables.

Table VI.1.a
SPECIFICATION TESTS ON
ANALYSTS' FORECAST REVISIONS REGRESSION EQUATION (3.2)
With h set equal to One Year Ahead Earnings Forecasts

Specification Tests	Results	Remarks
Fixed Effect Test:		See Chapter IV.3
F Test for no fixed effect	$F_{114,3232} = 1.79$	Pr > F is less than 0.0001
Firm Effect	$F_{55,3232} = 1.53$	Pr > F is equal to 0.0076
Time Effect	$F_{59,3232} = 2.27$	Pr > F is less than 0.0001
Autocorrelation Test	Coefficient on $e_{t-1} = 0.2780$ with the Std. Err = 0.0566 and T-Statistics = 4.71	See Chapter IV.4 H_0: There is no first order autocorrelation in the error structure. Conclusion: Reject H_0
Panels Heteroscedasticity Test	$\chi^2_{n-1=55} = 5464.04$ $\chi^2_C = 73.31$ at 5% level	See Chapter IV.5 H_0: The error variance is homoscedastic. Conclusion: Reject H_0
Cross-Sectional Correlation Test	$\chi^2_{\frac{n(n-1)}{2}=1540} = 5794549.8$ $\chi^2_C = 1632.4$ at 5% level	See Chapter IV.6 H_0: There is no cross-sectional correlation in the error structure. Conclusion: Reject H_0
Endogeneity Test F Test $\nu_1 = \nu_2 = \nu_3 = 0$	$F_{3,3340} = 2.53$	See Chapter IV.7 Pr > F is equal to 0.0554 H_0: There is no correlation between lagged dependent variables with the error term Conclusion: Reject H_0
Hausman Test For Random Effect	$\chi^2_{13} = 74.33$ $\chi^2_C = 27.69$ at 1% level	See Chapter IV.8 H_0: The individual effects are uncorrelated with the other regressors. Conclusion: Reject H_0

Table VI.1.b
SPECIFICATION TESTS ON
ANALYSTS' FORECAST REVISIONS REGRESSION EQUATION (3.2)
With h set equal to Two Year Ahead Earnings Forecasts

Specification Tests	Results	Remarks
Fixed Effect Test:		See Chapter IV.3
F Test for no fixed effect	$F_{114,3232} = 2.31$	Pr > F is less than 0.0001
Firm Effect	$F_{55,3232} = 2.32$	Pr > F is less than 0.0001
Time Effect	$F_{59,3232} = 2.86$	Pr > F is less than 0.0001
Autocorrelation Test	Coefficient on $e_{t-1} = 0.1981$ with the Std. Err = 0.0366 and T-Statistics = 5.41	See Chapter IV.4 H_0: There is no first order autocorrelation in the error structure. Conclusion: Reject H_0
Panels Heteroscedasticity Test	$\chi^2_{n-1=55} = 2772.42$ $\chi^2_C = 73.31$ at 5% level	See Chapter IV.5 H_0: The error variance is homoscedastic. Conclusion: Reject H_0
Cross-Sectional Correlation Test	$\chi^2_{\frac{n(n-1)}{2}=1540} = 4970109.5$ $\chi^2_C = 1632.4$ at 5% level	See Chapter IV.6 H_0: There is no cross-sectional correlation in the error structure. Conclusion: Reject H_0
Endogeneity Test F Test $\nu_1 = \nu_2 = \nu_3 = 0$	$F_{3,3340} = 1.74$	See Chapter IV.7 Pr > F is equal to 0.1450 H_0: There is no correlation between lagged dependent variables with the error term Conclusion: Do Not Reject H_0
Hausman Test For Random Effect	$\chi^2_{13} = 80.61$ $\chi^2_C = 27.69$ at 1% level	See Chapter IV.8 H_0: The individual effects are uncorrelated with the other regressors. Conclusion: Reject H_0

Table VI.1.c
SPECIFICATION TESTS ON
ANALYSTS' FORECAST REVISIONS REGRESSION EQUATION (3.2)
With h set equal to Five Year Long Term Earnings Growth

Specification Tests	Results	Remarks
Fixed Effect Test:		See Chapter IV.3
F Test for no fixed effect	$F_{114,3232} = 0.85$	Pr > F is equal to 0.8640
Firm Effect	$F_{55,3232} = 0.58$	Pr > F is equal to 0.9950
Time Effect	$F_{59,3232} = 0.95$	Pr > F is less than 0.5765
Autocorrelation Test	Coefficient on $e_{t-1} = 0.2210$ with the Std. Err = 0.0870 and T-Statistics = 9.45	See Chapter IV.4 H_0: There is no first order autocorrelation in the error structure. Conclusion: Reject H_0
Panels Heteroscedasticity Test	$\chi^2_{n-1=55} = 6359.63$ $\chi^2_C = 73.31$ at 5% level	See Chapter IV.5 H_0: The error variance is homoscedastic. Conclusion: Reject H_0
Cross-Sectional Correlation Test	$\chi^2_{\frac{n(n-1)}{2}=1540} = 5696973$ $\chi^2_C = 1632.4$ at 5% level	See Chapter IV.6 H_0: There is no cross-sectional correlation in the error structure. Conclusion: Reject H_0
Endogeneity Test F Test $\nu_1 = \nu_2 = \nu_3 = 0$	$F_{3,3340} = 7.44$	See Chapter IV.7 Pr > F is less than 0.0001
Hausman Test For Random Effect	$\chi^2_{13} = 32.66$ $\chi^2_C = 27.69$ at 1% level	See Chapter IV.8 H_0: The individual effects are uncorrelated with the other regressors. Conclusion: Reject H_0

Table VI.2
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS

	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS		
	EARNINGS FORECAST HORIZONS		
INDEPENDENT VARIABLES	ONE YEAR AHEAD EARNINGS	TWO YEAR AHEAD EARNINGS	FIVE YEAR (LONG TERM) EARNINGS GROWTH
AFREV_1	0.6645 *** (0.1055) [6.30]	0.4352 *** (0.1064) [4.09]	0.5991 *** (0.2315) [2.59]
AFREV_2	-0.2422 ** (0.1201) [-2.01]	-0.3949 *** (0.1076) [-3.67]	-0.3834 (0.2405) [-1.59]
AFREV_3	0.3144 *** (0.1081) [2.91]	0.1378 (0.0986) [1.40]	0.2007 (0.2362) [0.85]
LOSS	-0.0112 *** (0.0025) [-4.34]	-0.0159 *** (0.0021) [-7.55]	0.0070 (0.0196) [0.36]
UE	0.0021 (0.0019) [1.08]	-0.0017 (0.0022) [-0.78]	0.0085 (0.0104) [0.82]
LOSS*UE	-0.0000 (0.0027) [-0.02]	-0.0157 *** (0.0031) [-4.94]	-0.0046 (0.0146) [-0.31]
D1	0.0031 (0.0023) [1.32]	0.0013 (0.0022) [0.60]	0.0187 (0.0330) [0.57]
ITC-Prelim NEGATIVE	-0.0182 * (0.0102) [-1.78]	0.0193 (0.0146) [1.32]	0.0064 (0.3443) [0.01]
ITC-Prelim AFFIRMATIVE	0.0020 (0.0024) [0.84]	-0.0008 (0.0022) [-0.37]	0.0231 (0.0272) [0.85]

TABLE VI.2
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS — EARNINGS FORECAST HORIZONS: ONE YEAR	TWO YEAR	FIVE YEAR (LONG TERM) EARNINGS GROWTH
DoC-Prelim	0.0010 (0.0023) [0.43]	-0.0011 (0.0021) [-0.53]	0.0277 (0.0348) [0.79]
DoC-FINAL	0.0013 (0.0023) [0.56]	0.0044 * (0.0023) [1.92]	-0.0248 (0.0391) [-0.63]
ITC-FINAL NEGATIVE	0.0055 (0.0107) [0.52]	0.0076 (0.0086) [0.87]	0.0163 (0.1001) [0.16]
ITC-FINAL AFFIRMATIVE	0.0032 (0.0022) [1.42]	0.0005 (0.0024) [0.23]	0.0279 (0.0427) [0.65]
Observations	3192	3192	3192

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI.3
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS ONE YEAR AHEAD EARNINGS			
AFREV1_1	0.6645 *** (0.1055) [6.30]	0.6631 *** (0.1055) [6.29]	0.6625 *** (0.1054) [6.28]	0.6611 *** (0.1052) [6.28]
AFREV1_2	-0.2422 ** (0.1201) [-2.01]	-0.2435 ** (0.1201) [-2.03]	-0.2428 ** (0.1198) [-2.03]	-0.2431 ** (0.1197) [-2.03]
AFREV1_3	0.3144 *** (0.1081) [2.91]	0.3165 *** (0.1080) [2.93]	0.3163 *** (0.1080) [2.93]	0.3167 *** (0.1078) [2.94]
LOSS	-0.0112 *** (0.0025) [-4.34]	-0.0112 *** (0.0026) [-4.35]	-0.0111 *** (0.0026) [-4.34]	-0.0112 *** (0.0026) [-4.36]
UE	0.0021 (0.0019) [1.08]	0.0021 (0.0019) [1.08]	0.0021 (0.0019) [1.08]	0.0020 (0.0019) [1.08]
LOSS*UE	-0.0000 (0.0027) [-0.02]	-0.0000 (0.0028) [-0.01]	-0.0000 (0.0028) [-0.01]	-0.0000 (0.0028) [-0.02]
D1LEAD3	N/A	N/A	N/A	0.0030 (0.0023) [1.30]
D1LEAD2	N/A	N/A	-0.0006 (0.0024) [-0.24]	-0.0004 (0.0024) [-0.19]
D1LEAD1	N/A	-0.0022 (0.0024) [-0.91]	-0.0022 (0.0024) [-0.91]	-0.0021 (0.0024) [-0.86]

Table VI.3
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS ONE YEAR AHEAD EARNINGS			
D1	0.0031 (0.0023) [1.32]	0.0031 (0.0024) [1.28]	0.0030 (0.0024) [1.26]	0.0031 (0.0024) [1.31]
ITC-Prelim NEGATIVE	-0.0182 * (0.0102) [-1.78]	-0.0182* (0.0102) [-1.78]	-0.0182 * (0.0102) [-1.78]	-0.0183 * (0.0102) [-1.80]
ITC-Prelim AFFIRMATIVE	0.0020 (0.0024) [0.84	0.0019 (0.0024) [0.81]	0.0019 (0.0024) [0.79]	0.0020 (0.0024) [0.83]
DoC-Prelim	0.0010 (0.0023) [0.43]	0.0009 (0.0024) [0.39]	0.0009 (0.0024) [0.39]	0.0010 (0.0024) [0.43]
DoC-FINAL	0.0013 (0.0023) [0.56]	0.0012 (0.0023) [0.53]	0.0012 (0.0023) [0.53]	0.0013 (0.0023) [0.56]
ITC-FINAL NEGATIVE	0.0055 (0.0107) [0.52]	0.0054 (0.0107) [0.50]	0.0054 (0.0107) [0.50]	0.0054 (0.0108) [0.50]
ITC-FINAL AFFIRMATIVE	0.0032 (0.0022) [1.42]	0.0032 (0.0023) [1.40]	0.0031 (0.0023) [1.39]	0.0030 (0.0022) [1.34]
Observations	3192	3192	3192	3192

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI.4
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS TWO YEAR AHEAD EARNINGS			
AFREV2_1	0.4352 *** (0.1064) [4.09]	0.4223 *** (0.1064) [4.06]	0.4309 *** (0.1061) [4.06]	0.4344 *** (0.1051) [4.13]
AFREV2_2	-0.3949 *** (0.1076) [-3.67]	-0.3890 *** (0.1071) [-3.63]	-0.3881 *** (0.1070) [-3.63]	-0.3875 *** (0.1062) [-3.65]
AFREV2_3	0.1378 (0.0986) [1.40]	0.1338 (0.0985) [1.362]	0.1335 (0.0985) [1.36]	0.1342 (0.0976) [1.37]
LOSS	-0.0159 *** (0.0021) [-7.55]	-0.0160 *** (0.0021) [-7.57]	-0.0160 *** (0.0021) [-7.59]	-0.0161 *** (0.0021) [-7.69]
UE	-0.0017 (0.0022) [-0.78]	-0.0017 (0.0022) [-0.77]	-0.0017 (0.0022) [-0.77]	-0.0017 (0.0022) [-0.79]
LOSS*UE	-0.0157 *** (0.0031) [-4.94]	-0.0157 *** (0.0032) [-4.93]	-0.0157 *** (0.0032) [-4.93]	-0.0154 *** (0.0031) [-4.90]
D1LEAD3	N/A	N/A	N/A	0.0086 *** (0.0022) [3.88]
D1LEAD2	N/A	N/A	0.0016 (0.0022) [0.73]	0.0020 (0.0022) [0.89]
D1LEAD1	N/A	-0.0057 *** (0.0022) [-2.54]	-0.0056 ** (0.0022) [-2.50]	-0.0053 ** (0.0022) [-2.35]

Table VI.4
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS TWO YEAR AHEAD EARNINGS			
D1	0.0013 (0.0022) [0.60]	0.0011 (0.0022) [0.50]	0.0012 (0.0022) [0.53]	0.0015 (0.0022) [0.69]
ITC-Prelim NEGATIVE	0.0193 (0.0146) [1.32]	0.0194 (0.0146) [1.32]	0.0195 (0.0147) [1.33]	0.0194 (0.0144) [1.35]
ITC-Prelim AFFIRMATIVE	-0.0083 (0.0022) [-0.37]	-0.0011 (0.0022) [-0.48]	-0.0009 (0.0022) [-0.45]	-0.0007 (0.0022) [-0.33]
DoC-Prelim	-0.0011 (0.0021) [-0.53]	-0.0013 (0.0021) [-0.63]	-0.0013 (0.0021) [-0.60]	-0.0010 (0.0021) [-0.47]
DoC-FINAL	0.0044 * (0.0023) [1.92]	0.0043 * (0.0023) [1.85]	0.0043 * (0.0023) [1.88]	0.0045 ** (0.0023) [1.98]
ITC-FINAL NEGATIVE	0.0076 (0.0086) [0.87]	0.0072 (0.0087) [0.83]	0.0073 (0.0087) [0.84]	0.0074 (0.0087) [0.85]
ITC-FINAL AFFIRMATIVE	0.0005 (0.0024) [0.23]	0.0004 (0.0025) [0.17]	0.0004 (0.0025) [0.18]	0.0000 (0.0024) [0.00]
Observations	3192	3192	3192	3192

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI.5
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS			
	FORECAST HORIZON IS FIVE YEAR LONG TERM EARNINGS GROWTH			
AFREV5_1	0.5991 *** (0.2315) [2.59]	0.5967 *** (0.2314) [2.58]	0.5932 ** (0.2314) [2.56]	0.5912 *** (0.2315) [2.55]
AFREV5_2	-0.3834 (0.2405) [-1.59]	-0.3838 (0.2405) [-1.59]	-0.3911 (0.2400) [-1.63]	-0.3887 (0.2401) [-1.62]
AFREV5_3	0.2007 (0.2362) [0.85]	0.1982 (0.2362) [0.84]	0.1990 (0.2361) [0.84]	0.1953 (0.2362) [0.83]
LOSS	0.0070 (0.0196) [0.36]	0.0067 (0.0196) [0.34]	0.0081 (0.0196) [0.41]	0.0084 (0.0196) [0.43]
UE	0.0085 (0.0104) [0.82]	0.0085 (0.0104) [0.82]	0.0086 (0.0104) [0.83]	0.0086 (0.0104) [0.83]
LOSS*UE	-0.0046 (0.0146) [-0.31]	-0.0043 (0.0147) [-0.29]	-0.0039 (0.0147) [-0.27]	-0.0045 (0.0147) [-0.30]
D1LEAD3	N/A	N/A	N/A	-0.0205 (0.0326) [-0.63]
D1LEAD2	N/A	N/A	-0.0811 ** (0.0329) [-2.47]	-0.820 ** (0.0331) [-2.48]
D1LEAD1	N/A	-0.0418 (0.0329) [-1.27]	-0.0452 (0.0331) [-1.37]	-0.0460 (0.0330) [-1.39]

Table VI.5
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS			
	FORECAST HORIZON IS FIVE YEAR LONGTERM EARNINGS GROWTH			
D1	0.0187 (0.0330) [0.57]	0.0170 (0.0332) [0.51]	0.0134 (0.0331) [0.40]	0.0126 (0.0332) [0.38]
ITC-Prelim NEGATIVE	0.0064 (0.3443) [0.01]	0.0064 (0.3443) [0.02]	0.0042 (0.3441) [0.01]	0.0045 (0.3441) [0.01]
ITC-Prelim AFFIRMATIVE	0.0231 (0.0272) [0.85]	0.0214 (0.0273) [0.78]	0.0177 (0.0273) [0.659]	0.0171 (0.0274) [0.62]
DoC-Prelim	0.0277 (0.0348) [0.79]	0.0263 (0.0348) [0.76]	0.0232 (0.0347) [0.67]	0.0225 (0.0347) [0.65]
DoC-FINAL	-0.0248 (0.0391) [-0.63]	-0.0261 (0.0391) [-0.67]	-0.0288 (0.0390) [-0.74]	-0.0294 (0.0390) [-0.75]
ITC-FINAL NEGATIVE	0.0163 (0.1001) [0.16]	0.0136 (0.1003) [0.13]	0.0103 (0.1011) [0.10]	0.0102 (0.1005) [0.10]
ITC-FINAL AFFIRMATIVE	0.0279 (0.0427) [0.65]	0.0268 (0.0427) [0.63]	0.0258 (0.0426) [0.61]	0.0268 (0.0422) [0.64]
Observations	3192	3192	3192	3192

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI.6
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH FEASIBLE GENERALIZED LEAST SQUARES WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS ONE YEAR AHEAD EARNINGS			
AFREV1_1	0.6274 *** (0.0664) [9.43]	0.6254 *** (0.0665) [9.40]	0.6240 *** (0.0665) [9.38]	0.6224 *** (0.0665) [9.35]
AFREV1_2	-0.2244 *** (0.0751) [-2.98]	-0.2256 *** (0.0751) [-3.00]	-0.2244 *** (0.0751) [-2.99]	-0.2248 *** (0.0751) [-2.99]
AFREV1_3	0.3198 *** (0.0665) [4.80]	0.3219 *** (0.0666) [4.84]	0.3218 *** (0.0666) [4.83]	0.3223 *** (0.0665) [4.84]
LOSS	-0.0108 *** (0.0016) [-6.52]	-0.0108 *** (0.0016) [-6.53]	-0.0108 *** (0.0016) [-6.52]	-0.0108 *** (0.0016) [-6.54]
UE	0.0022 ** (0.0011) [1.97]	0.0023 ** (0.0011) [1.98]	0.0023 ** (0.0011) [1.98]	0.0023 ** (0.0011) [1.98]
LOSS*UE	-0.0007 (0.0015) [-0.50]	-0.0008 (0.0015) [-0.50]	-0.0008 (0.0015) [-0.51]	-0.0007 (0.0015) [-0.46]
D1LEAD3	N/A	N/A	N/A	0.0030 (0.0023) [1.30]
D1LEAD2	N/A	N/A	-0.0008 (0.0023) [-0.36]	-0.0005 (0.0023) [-0.21]
D1LEAD1	N/A	-0.0021 (0.0023) [-0.92]	-0.0022 (0.0023) [-0.95]	-0.0020 (0.0023) [-0.89]

Table VI.6
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH FEASIBLE GENERALIZED LEAST SQUARES WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS ONE YEAR AHEAD EARNINGS			
D1	0.0033 (0.0023) [1.47]	0.0031 (0.0023) [1.37]	0.0031 (0.0023) [1.35]	0.0032 (0.0023) [1.40]
ITC-Prelim NEGATIVE	-0.0169 * (0.0092) [-1.84]	-0.0169 * (0.0092) [-1.84]	-0.0169 * (0.0092) [-1.84]	-0.0169 * (0.0092) [-1.84]
ITC-Prelim AFFIRMATIVE	0.0018 (0.0023) [0.78]	0.0018 (0.0024) [0.75]	0.0017 (0.0024) [0.73]	0.0018 (0.0024) [0.76]
DoC-Prelim	0.0015 (0.0023) [0.67]	0.0015 (0.0023) [0.65]	0.0015 (0.0023) [0.64]	0.0016 (0.0023) [0.68]
DoC-FINAL	0.0012 (0.0026) [0.50]	0.0012 (0.0026) [0.48]	0.0012 (0.0025) [0.47]	0.00131 (0.0026) [0.50]
ITC-FINAL NEGATIVE	0.0058 (0.0081) [0.71]	0.0057 (0.0081) [0.70]	0.0057 (0.0081) [0.70]	0.0057 (0.0081) [0.70]
ITC-FINAL AFFIRMATIVE	0.0030 (0.0027) [1.13]	0.0030 (0.0027) [1.12]	0.0030 (0.0027) [1.12]	0.0028 (0.0027) [1.06]
Observations	3192	3360	3192	3192

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI.7
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH FEASIBLE GENERALIZED LEAST SQUARES WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS TWO YEAR AHEAD EARNINGS			
AFREV2_1	0.4282 *** (0.0461) [9.27]	0.4247 *** (0.0461) [9.20]	0.4237 *** (0.0462) [9.17]	0.4273 *** (0.0461) [9.27]
AFREV2_2	-0.3916 *** (0.0463) [-8.44]	-0.3855 *** (0.0464) [-8.31]	-0.3849 *** (0.0464) [-8.30]	-0.3843 *** (0.0463) [-8.29]
AFREV2_3	0.1336 *** (0.0474) [2.81]	0.1294 *** (0.0475) [2.73]	0.1292 *** (0.0474) [2.72]	0.1300 *** (0.0474) [2.75]
LOSS	-0.0156 *** (0.0015) [-10.41]	-0.0157 *** (0.0015) [-10.44]	-0.0157 *** (0.0015) [-10.45]	-0.0158 *** (0.0015) [-10.56]
UE	-0.0017 (0.0011) [-1.57]	-0.0017 (0.0011) [-1.56]	-0.0017 (0.0011) [-1.57]	-0.0017 (0.0011) [-1.59]
LOSS*UE	-0.0158 *** (0.0014) [-11.15]	-0.0158 *** (0.0014) [-11.15]	-0.0158 *** (0.0014) [-11.15]	-0.0156 *** (0.0014) [-10.99]
D1LEAD3	N/A	N/A	N/A	0.0085 *** (0.0021) [4.04]
D1LEAD2	N/A	N/A	0.0012 (0.0021) [0.55]	0.0019 (0.0021) [0.93]
D1LEAD1	N/A	-0.0058 *** (0.0021) [-2.77]	-0.0057 *** (0.0021) [-2.71]	-0.0053 ** (0.0021) [-2.53]

Table VI.7
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH FEASIBLE GENERALIZED LEAST SQUARES WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS TWO YEAR AHEAD EARNINGS			
D1	0.0015 (0.0021) [0.72]	0.0010 (0.0021) [0.47]	0.0010 (0.0021) [0.49]	0.0014 (0.0021) [0.66]
ITC-Prelim NEGATIVE	0.0195 ** (0.0084) [2.31]	0.0196 ** (0.0084) [2.32]	0.0197 ** (0.0084) [2.33]	0.0196 ** (0.0084) [2.33]
ITC-Prelim AFFIRMATIVE	-0.0010 (0.0021) [-0.47]	-0.0013 (0.0022) [-0.59]	-0.0012 (0.0022) [-0.57]	-0.0010 (0.0022) [-0.45]
DoC-Prelim	-0.0012 (0.0021) [-0.56]	-0.0014 (0.0021) [-0.65]	-0.0014 (0.0021) [-0.64]	-0.0011 (0.0021) [-0.52]
DoC-FINAL	0.0043 * (0.0023) [1.87]	0.0042 * (0.0023) [1.80]	0.0042 * (0.0023) [1.82]	0.0044 * (0.0023) [1.92]
ITC-FINAL NEGATIVE	0.0075 (0.0075) [1.01]	0.0072 (0.0075) [0.96]	0.0073 (0.0075) [0.97]	0.0073 (0.0075) [0.98]
ITC-FINAL AFFIRMATIVE	0.0005 (0.0024) [0.22]	0.0004 (0.0024) [0.15]	0.0004 (0.0024) [0.16]	- 0.0000 (0.0024) [0.01]
Observations	3192	3192	3192	3192

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI.8
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH FEASIBLE GENERALIZED LEAST SQUARES WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS			
	FORECAST HORIZON IS FIVE YEAR LONG TERM EARNINGS GROWTH			
AFREV5_1	0.5096 ** (0.2042) [2.49]	0.5068 ** (0.2043) [2.48]	0.4988 ** (0.2042) [2.44]	0.4955 ** (0.2042) [2.43]
AFREV5_2	-0.3547 * (0.2077) [-1.70]	-0.3547 * (0.2077) [-1.71]	-0.3623 * (0.2075) [-1.75]	-0.3595 * (0.2074) [-1.73]
AFREV5_3	0.2212 (0.2022) [1.09]	0.2190 (0.2023) [1.08]	0.2207 (0.2022) [1.09]	0.2157 (0.2022) [1.07]
LOSS	0.0054 (0.0196) [0.27]	0.0051 (0.0197) [0.26]	0.0062 (0.0197) [0.31]	0.0066 (0.0197) [0.33]
UE	0.0085 (0.0137) [0.62]	0.0086 (0.0138) [0.62]	0.0086 (0.0138) [0.63]	0.0087 (0.0138) [0.63]
LOSS*UE	-0.0035 (0.0182) [-0.19]	-0.0034 (0.0183) [-0.18]	-0.0027 (0.0182) [-0.15]	-0.0035 (0.0183) [-0.19]
D1LEAD3	N/A	N/A	N/A	-0.0288 (0.0280) [-1.03]
D1LEAD2	N/A	N/A	-0.0781 *** (0.0279) [-2.80]	-0.0834 *** (0.0284) [-2.93]
D1LEAD1	N/A	-0.0304 (0.0279) [-1.09]	-0.0445 (0.0283) [-1.57]	-0.0464 (0.0284) [-1.63]

Table VI.8
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH FEASIBLE GENERALIZED LEAST SQUARES WITH DUMMY VARIABLES D1, D1LEAD1, D1LEAD2, AND D1LEAD3 ARE SET EQUAL TO ONE AT THE MONTH OF FILING, AND ONE, TWO, AND THREE MONTHS BEFORE FILING, RESPECTIVELY.

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS FORECAST HORIZON IS FIVE YEAR LONGTERM EARNINGS GROWTH			
D1	0.0256 (0.0276) [0.92]	0.0204 (0.0281) [0.73]	0.0153 (0.0281) [0.5440]	0.0141 (0.0282) [0.50]
ITC-Prelim NEGATIVE	0.0062 (0.1109) [0.05]	-0.0060 (0.1110) [-0.05]	0.0035 (0.1109) [0.03]	0.0038 (0.1108) [0.03]
ITC-Prelim AFFIRMATIVE	0.0217 (0.0287) [0.75]	0.0203 (0.0287) [0.71]	0.0169 (0.0287) [0.59]	0.0162 (0.0287) [0.56]
DoC-Prelim	0.0278 (0.028) [0.97]	0.0271 (0.0285) [0.95]	0.0245 (0.0284) [0.86]	0.0238 (0.0284) [0.83]
DoC-FINAL	-0.0288 (0.0308) [-0.93]	-0.0296 (0.0309) [-0.96]	-0.0320 (0.0309) [-1.04]	-0.0326 (0.0309) [-1.06]
ITC-FINAL NEGATIVE	0.0198 (0.0987) [0.20]	0.0180 (0.0987) [0.18]	0.0151 (0.0986) [0.15]	0.0150 (0.0986) [0.15]
ITC-FINAL AFFIRMATIVE	0.0330 (0.0332) [0.99]	0.0322 (0.0332) [0.97]	0.0307 (0.0332) [0.92]	0.0321 (0.0332) [0.97]
Observations	3192	3192	3192	3192

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI.9
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS — EARNINGS FORECAST HORIZONS: ONE YEAR AHEAD EARNINGS	TWO YEAR AHEAD EARNINGS	FIVE YEAR (LONG TERM) EARNINGS GROWTH
AFREV_1	0.7835 *** (0.1179) [6.64]	0.4137 *** (0.1025) [4.03]	0.5877 ** (0.2357) [2.49]
AFREV_2	-0.3631 ** (0.1483) [-2.44]	-0.3493 *** (0.1059) [-3.29]	-0.5522 *** (0.2141) [-2.57]
AFREV_3	0.3917 ** (0.1586) [2.46]	0.1818 ** (0.0922) [1.97]	0.0044 (0.2114) [0.02]
AFREV_4	-0.0802 (0.1536) [-0.52]	-0.0103 (0.0996) [-0.10]	-0.2063 (0.2085) [-0.98]
AFREV_5	-0.0627 (0.1451) [-0.43]	-0.0458 (0.1060) [-0.43]	-0.1796 (0.2004) [-0.89]
AFREV_6	0.1858 (0.1395) [1.33]	-0.2052 * (0.1075) [-1.90]	0.3203 (0.2008) [1.59]
AFREV_7	-0.2566 * (0.1401) [-1.83]	-0.0362 (0.1075) [-0.33]	0.2789 (0.1969) [1.41]
AFREV_8	-0.0436 (0.1443) [-0.30]	-0.0027 (0.1081) [-0.02]	0.7171 *** (0.2023) [3.54]
AFREV_9	0.0106 (0.1459) [0.07]	0.0049 (0.1080) [0.04]	0.2668 (0.2074) [1.28]

Table VI.9
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS — EARNINGS FORECAST HORIZONS: ONE YEAR AHEAD EARNINGS	TWO YEAR AHEAD EARNINGS	FIVE YEAR (LONG TERM) EARNINGS GROWTH
AFREV_10	-0.0570 (0.1450) -0.3935	0.0636 (0.1075) [0.59]	-0.7998 *** (0.2084) [-3.83]
AFREV_11	-0.2017 (0.1396) [-1.44]	-0.0704 (0.1043) [-0.67]	-0.1331 (0.2099) [-0.63]
AFREV_12	-0.0389 (0.1119) [-0.34]	0.0139 (0.0991) [0.14]	-0.2205 (0.2322) [-0.94]
LOSS	-0.0113 *** (0.0028) [-3.96]	-0.0165 *** (0.0022) [-7.36]	0.0214 (0.0241) [0.89]
UE	0.0053 (0.0036) [1.46]	-0.0037 (0.0035) [-1.05]	0.0209 (0.0235) [0.89]
LOSS*UE	-0.0050 (0.0045) [-1.10]	-0.0214 *** (0.0045) [-4.75]	-0.0219 (0.0302) [-0.72]
D1	0.0036 (0.0025) [1.45]	0.0011 (0.0020) [0.54]	0.0011 (0.0354) [0.0325]
ITC-Prelim NEGATIVE	-0.0182 * (0.0097) [-1.88]	0.0165 (0.0111) [1.47]	0.0179 (0.3343) [0.05]

TABLE VI.9
ESTIMATION RESULTS WITH TWO STAGES LEAST SQUARES OF THE TIME AND FIRM EFFECTS WITH PANEL CORRECTED STANDARD ERRORS

Continued

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST REVISIONS — EARNINGS FORECAST HORIZONS: ONE YEAR	TWO YEAR	FIVE YEAR (LONG TERM) EARNINGS GROWTH
ITC-Prelim AFFIRMATIVE	0.0027 (0.0025) [1.07]	-0.0003 (0.0020) [-0.17]	0.0273 (0.0290) [0.94]
DoC-Prelim	0.0011 (0.0023) [0.47]	-0.0012 (0.0018) [-0.63]	0.0333 (0.0322) [1.03]
DoC-FINAL	0.0017 (0.0021) [0.82]	0.0043 ** (0.0020) [2.15]	-0.0243 (0.0380) [-0.63]
ITC-FINAL NEGATIVE	0.0009 (0.0098) [0.09]	0.0070 (0.0085) [0.82]	-0.0016 (0.0463) [-0.03]
ITC-FINAL AFFIRMATIVE	0.0034 (0.0021) [1.59]	0.0006 (0.0021) [0.32]	0.0261 (0.0427) [0.61]
Observations	2688	2688	2688

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

VI. 3. The Results of the Absolute Forecast Error Model in Relation to the Learning of the Filing of Antidumping Petitions

VI.3.1. Specification Tests

We conduct several specification tests as discussed in Chapter IV.3 through IV.8. Table VI.10 displays the results of these tests for the absolute forecast errors model of the regression equation (3.4). We find that fixed effects exist in our absolute forecast errors model. An F test for no fixed effects is rejected at the 1% level with $F_{60,271}$=2.00. We also check whether we have one way or two way fixed effects. We find that an F test for firm effects is significant at the 1% level with $F_{55,271}$=2.03, which exceeds the critical value of 1.62 at the 1% level. An F test for time effects is not statistically significant at the 5% level with $F_{5,271}$=1.72, which is lower than the critical value of 2.26. One way fixed effects suggests that our specification is dependent only on the cross section to which an observation belongs. The autocorrelation test shows that we have a positive autocorrelation in the error structure, which is significant at the 1% level with the T-Statistic=3.98. The test for the panel heteroscedasticity in the error variances yields a χ^2 of 481.66 with 55 degrees of freedom, which greatly exceeds the critical value of 73.31 at the 5% level. Therefore, the hypothesis that the error variance is homoscedastic is rejected. The Hausman test of whether fixed effects or random effects are appropriate is distributed as a χ^2 with 4 degrees of freedom, which at 57.24 greatly exceeds the 1% critical value of 18.475. Therefore, in the estimation regression equation (3.4) of the absolute analysts' forecast errors model, the hypothesis that the individual effects are uncorrelated with the other regressors in the model is rejected.

Given this result and the F test indicating the presence of one way individual effects, we conclude that fixed effects are preferable to random effects as a specification.

We do not address the issue of cross sectional correlation in our analysts' forecast errors regression model of both equation (3.4) and (3.5), since this may not be appropriate. This is because each firm does not necessarily have the same fiscal period. For example, for the year *t* observation, firm *i* may announce its annual earnings in February in year *t*, because firm *i* has a January to December fiscal period; firm *j* may announce its annual earnings in July in year *t*, because firm *j* has a July to June fiscal period. By the same token, firm *k* may announce its annual earnings in October in year *t*, because firm *k* has an October to September fiscal period, and so on. As such, we neglect the assumption of the cross sectional correlation in the error structure for the regression equation (3.4) and (3.5).

Based on the results of the specification tests above, we estimate regression equation (3.4) using Feasible GLS with one-way fixed effects and with the assumptions of common first order autocorrelation and panel heteroscedasticity.

VI.3.2. Estimation Results

Table VI.11 presents the results of the estimation equation (3.4), which examines the effect of the filing of an AD petition on absolute value of analysts' forecast errors. We define the analysts' forecast errors in absolute values to assess the accuracy of analysts' forecasts, subsequent to a firm filing an AD petition. We find that the coefficient on the dummy variable for filing is positive and not significantly different from zero at conventional levels. This suggests that there is no evidence that analysts become more or less accurate in their forecasts in first year subsequent to a firm filing an AD petition, than in other periods. The coefficient on lagged absolute forecast errors is negative and significant at the 1% level, suggesting that analysts learn from their own past errors. This is in contrast to Chaney et al (1999) using OLS, who find that analysts fail to learn from their own past errors. The coefficient on the variable for analysts following (LNA) is negative and significant at the 1% level, suggesting an inverse relationship between absolute forecast errors and the number of analysts following a firm. This is consistent with Chaney et al (1999) and Alford and Berger (1998), that greater accuracy is associated with higher analysts' following. The coefficient on market return R^M is negative and not significantly different from zero.

Overall, our results provide evidence that the filing of an AD petition does not enable analysts to forecast more or less accurately. Another finding is that the number of analysts' following is inversely related to the absolute forecast errors. In addition, the higher of analysts' following is associated with greater accuracy. However, we have the new result that analysts learn from their prior forecasts.

VI.3.3. Alternate Specifications

The extant literature shows that firm size may be positively correlated with forecast accuracy (Lang and Lundholm, 1996). Next, we repeat the estimation regression equation (3.4) with the addition of a variable for firm size measured as market capitalization (*mcap* variable). The second column of Table VI.12 presents the estimation results. The first column of Table VI.12 is the regression results of the basic regression equation (3.4) from Table VI.11. From the second column of Table VI.12, we find that the coefficient on the variable for market capitalization is negative and significant at the 5% level, suggesting that firm size is positively associated with forecast accuracy. This is consistent with Lang and Lundholm (1996) and Abarbanell et al (1995). Although it is in contrast to Chaney et al (1999), who find an insignificant result using OLS with the market value of equity as a measure of firm size. The coefficient of the *filing* variable remains positive and statistically insignificant at conventional levels. The coefficients on the other variables are consistent with those presented in the first column of Table VI.12.

To consider the possibility that the firm strategy of using debt in their capital structure may be interpreted differently by analysts, we repeat the estimation regression equation (3.4) with an additional variable, *finlev*, which stands for Financial Leverage. The inclusion of the *finlev* variable is to control the impact of financial leverage on the accuracy and bias of analysts' earnings forecasts. Financial leverage is the change in actual earnings per share induced by the introduction of fixed-interest bearing debt, such as bonds or preferred stock, in the capital structure (Levy and Sarnat, 1986; Brigham and Ehrhardt, 2002). The most challenging scenario confronting financial management is that as the use of leverage increases, with the assumption that the firm does not plan to reduce earnings per share, both actual earnings per share may decrease and risk, or its variance, may increase. Knowing that analysts may use a firm financial statement in predicting earnings, the firm strategy in choosing the fixed payment in its capital structure as a lever may affect the accuracy and the direction of the bias of analysts' forecasts. As such, we include the variable *finlev* in our regression as an additional control variable. The third column of Table VI.12 presents the estimation results. We find that the coefficient on the variable *finlev* is positive and not significantly different from zero at the 10% level. The coefficient of *filing* remains positive and not statistically significant at conventional levels.

Finally, we repeat the estimation regression equation (3.4) by including both the firm size (*mcap*) variable and the financial leverage (*finlev*) variable.[23] The fourth column of Table VI.12 presents the estimation results. The results are qualitatively unchanged and consistent with the previous findings.

VI.3.4. Conclusion

In summary, the results presented in Table VI.11 appear to be robust to alternative specifications controlling for potential firm size and for the level of debt structure that the firm is carrying on in its capital structure. We find no evidence that analysts become more or less accurate in first period subsequent to the filing of an AD petition than other periods. We also confirm that higher analysts' following is associated with greater analysts' forecast accuracy. There is, then, a new result that analysts learn from past errors.

[23] On every re-estimation, we repeat the specification tests. The results are consistent with those presented in Table VI.10

Table VI.10
SPECIFICATION TESTS ON
ABSOLUTE ANALYSTS' FORECAST ERROR REGRESSION EQUATION
(3.4)

Specification Tests	Results	Remarks
Fixed Effect Test:		See Chapter IV.3
F Test for NO fixed effect	$F_{60,271} = 2.00$	Pr > F is less than 0.0001
Firm Effect	$F_{55,271} = 2.03$	Pr > F is less than 0.0001
Time Effect	$F_{5,271} = 1.72$	Pr > F is equal to 0.1297
Autocorrelation Test	Coefficient on $e_{t-1} = 0.2200$ with the Std. Err = 0.0552 and T-Statistics = 3.98	See Chapter IV.4 H_0: There is no first order autocorrelation in the error structure. Conclusion: Reject H_0
Panels Heteroscedasticity Test	$\chi^2_{n-1=55} = 481.66$ $\chi^2_C = 73.31$ at 5% level	See Chapter IV.5 H_0: The error variance is homoscedastic. Conclusion: Reject H_0
Hausman Test For Random Effect	$\chi^2_4 = 57.24$ $\chi^2_C = 13.28$ at 1% level	See Chapter IV.8 H_0: The individual effects are uncorrelated with the other regressors. Conclusion: Reject H_0

Table VI. 11
FEASIBLE GLS ESTIMATION RESULTS WITH FIXED EFFECT ON ABSOLUTE FORECAST ERRORS REGRESSION EQUATION (3.4)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST ERRORS IN ABSOLUTE VALUES Coefficients Estimate
$\lvert AFerr_{i,t-1} \rvert$	-0.1148 *** (0.0346) [-3.32]
$Filing_{i,t}$	0.0003 (0.0008) [0.45]
$LNA_{i,t+1}$	-0.0070 *** (0.0022) [-3.19]
$\lvert R^{M}_{i,t+1} \rvert$	0.0034 (0.0029) [1.17]
Wald $\chi^2(60)$	535.68
Observations	336

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI. 12
ALTERNATE SPECIFICATION RESULTS
FOR CONTROLLING FIRM SIZE AND FINANCIAL LEVERAGE
USING FEASIBLE GLS ESTIMATION WITH FIXED EFFECT
ON
ABSOLUTE FORECAST ERRORS REGRESSION EQUATION (3.4)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST ERRORS IN ABSOLUTE VALUES			
	Coefficients Estimate			
$\lvert AFerr_{i,t-1}\rvert$	-0.1148 *** (0.0346) [-3.32]	-0.1201 *** (0.0335) [-3.58]	-0.1143 *** (0.0355) [-3.21]	0.1195 *** (0.0346) [-3.46]
$Filing_{i,t}$	0.0003 (0.0008) [0.45]	0.0001 (0.0008) [0.15]	0.0004 (0.0008) [0.50]	0.0001 (0.0008) [0.23]
$LNA_{i,t+1}$	-0.0070 *** (0.0022) [-3.19]	-0.0062 *** (0.0022) [-2.79]	-0.0070 *** (0.0022) [-3.20]	-0.0062 *** (0.0021) [-2.84]
$\lvert R^M_{i,t+1}\rvert$	0.0034 (0.0029) [1.17	0.0038 (0.0028) [1.33]	0.0031 (0.0029) [1.08]	0.0035 (0.0028) [1.23]
$MCAP_{i,t}$	N/A	-0.0005 ** (0.0002) [-2.49]	N/A	-0.0006*** (0.0002) [-2.73]
$Finlev_{i,t}$	N/A	N/A	0.0008 (0.0008) [1.03]	0.0012 (0.0009) [1.44]
Wald χ^2	$\chi^2(60)$=535.68	$\chi^2(61)$=549.97	$\chi^2(61)$=537.63	$\chi^2(62)$=553.77
Observations	336	336	336	336

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

VI.4. The Results of the Actual Forecast Errors Model in Relation to the Learning of the Filing of Antidumping Petitions

VI.4.1. Specification Tests

Table VI.13 presents the results of the specification test for the actual forecast errors regression equation (3.5). We define the forecast errors in actual value to assess the bias direction of the analysts' forecasts subsequent to a firm filing an AD petition. We find that the fixed effects are not statistically significant at the conventional levels with $F_{60,271}=1.03$. This suggests that in terms of the bias direction of the forecast, we find no evidence of heterogeneity of the analysts forecast errors across individual firms. Further tests on one-way and two-way fixed effects confirm this result. Firm effects and time effects are not statistically significant at the conventional levels, with $F_{55,271}=1.08$ and $F_{5,271}=0.44$, respectively. The test of the autocorrelation in the error structure yields a T-Statistic=-0.26, which is not significantly different from zero at the conventional levels. The panel heteroscedasticity test yields a χ^2 of 547.31 with 55 degrees of freedom, which greatly exceeds the critical value of 73.31 at the 5% level. Finally, the Hausman test of whether fixed effects or random effects are appropriate, is distributed as a χ^2 with 4 degrees of freedom, which at 28.54 exceeds the critical value of 13.27 at the 1% level.

Based on the above specification test results, we invoke OLS with robust standard errors (white heteroscedasticity) for the correction of the standard errors.

VI.4.2. Estimation Results

Table VI.14 presents the results of estimating regression equation (3.5) using OLS with robust (white heteroscedasticity correction) standard errors. Regression equation (3.5) examines the effects of a firm filing an AD petition on analysts' forecast bias. We define the forecast errors in actual values to assess the bias direction of analysts' forecast subsequent to a firm filing an AD petition. We regress the actual forecast errors against the presence of a firm filing an AD petition and other control variables to assess whether analysts' forecasts exhibit more or less upward or downward bias subsequent to a firm filing an AD petition.

From Table VI.14, we find that the coefficient on the filing variable is negative and not statistically significant at the conventional levels. This suggests that we do not find any evidence of the existence of a bias direction of the analysts' forecasts, subsequent to a firm filing an AD petition than in a period not following an AD petition. The coefficient on lagged forecast errors is negative and not significantly different from zero at conventional levels. The coefficient on the variable for analysts following (LNA) is negative and significant at the 1% level, suggesting that more upward bias exists when the following is large. In addition, a negative coefficient implies that, on average, analysts overestimate earnings to a greater extent when the following is large. The coefficient on the variable R^M (market return) is negative and not significantly different from zero at conventional levels.

Overall, our results provide no evidence that in first period subsequent to a filing of an AD petition is associated with the forecast bias to some extent than other periods. Another finding is that the number of analysts' following a firm is inversely related to the actual forecast errors. Likewise, the higher number of analysts' following is associated with greater upward bias (or less downward bias) in their forecasts.

VI.4.3. Alternate Specifications

To check the robustness of our results, we next repeat the estimation of the regression equation (3.5) by including an additional variable for firm size (Lang and Lundholm, 1996, and Abarbanell et al, 1995) measured as market capitalization (*mcap*). The result is reported in the second column of Table VI.15 (the first column is our basic result). The coefficient on variable firm size (*mcap*) is positive and significant at the 1% level, suggesting that larger firms are associated with less upward bias in analysts' forecast. This is in contrast to Chaney et al (1999) who find an insignificant result using OLS with the market value of the equity as a measure of firm size. The coefficient on *filing* remains negative and statistically insignificant at conventional levels. The coefficients on the other variables are consistent with those presented in the first column of Table VI.14.

To consider the possibility that analysts may interpret differently firms with different debt levels in their capital structure, we repeat the estimation of equation (3.5) with an additional variable, *finlev*, denoting financial leverage. The third column of Table VI.15 displays the result. The coefficient on *finlev* is positive and significant at the 5% level. This suggests that analysts' forecasts reflect, on average, more downward bias (or less upward bias) in their forecasts for a firm with a higher level of debt in their capital structure. Accordingly, a positive coefficient implies that, on average, analysts underestimate earnings to a lesser extent when the level of firm debt is higher. With higher leverage, earnings are distributed over fewer shares of equity. This biases earnings per share upward when macroeconomic conditions are favorable. On the other hand, when macroeconomic conditions are unfavorable, earnings per share are low, even negative. Because of the high debt associated with high leverage, interest payments associated with that debt are distributed over fewer shares of equity. This biases reported earnings per share downward.

Finally, we repeat the estimation regression equation (3.5) by including both firm size (*mcap* variable) and firm financial leverage (*finlev* variable). The fourth column of Table VI.15 reports the estimation result. Overall, the results are consistent with the previous results. The coefficient on *filing* is positive and not significantly different from zero at conventional levels. In addition, the coefficient of lagged actual forecast errors is negative and insignificant at the 5% level. Moreover, the coefficient on the variable for analysts' following (LNA) is negative and significant at the 1% level. However, the coefficient on the market return variable (R^M) is negative and statistically insignificant at conventional levels.

VI.4.4 Conclusion

In summary, the main results presented in Table VI.14 appear to be robust to alternative specifications controlling for firm size and for the level of firm debt in the firm capital structure. We find no evidence of biased forecasts in first year subsequent to the filing of an AD petition than in other periods. We also confirm that higher analysts' following is associated with greater upward bias (or less downward bias) in their forecasts.

Table VI.13
SPECIFICATION TESTS ON
ACTUAL ANALYSTS' FORECAST ERROR REGRESSION EQUATION (3.5)

Specification Tests	Results	Remarks
Fixed Effect Test:		See Chapter IV.3
F Test for NO fixed effect	$F_{60,271} = 1.03$	Pr > F is equal to 0.4318
Firm Effect	$F_{55,271} = 1.08$	Pr > F is equal to 0.3304
Time Effect	$F_{5,271} = 0.44$	Pr > F is equal to 0.8210
Autocorrelation Test	Coefficient on e_{t-1} = -0.0143 with the Std. Err = 0.0553 and T-Statistics = -0.26	See Chapter IV.4 H_0: There is no first order autocorrelation in the error structure. Conclusion: Do Not Reject H_0
Panels Heteroscedasticity Test	$\chi^2_{n-1=55} = 547.31$ $\chi^2_C = 73.31$ at 5% level	See Chapter IV.5 H_0: The error variance is homoscedastic. Conclusion: Reject H_0
Hausman Test For Random Effect	$\chi^2_4 = 28.54$ $\chi^2_C = 13.28$ at 1% level	See Chapter IV.8 H_0: The individual effects are uncorrelated with the other regressors. Conclusion: Reject H_0

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI. 14
OLS WITH ROBUST STANDARD ERROR ESTIMATION RESULTS
ON
ACTUAL FORECAST ERRORS REGRESSION EQUATION (3.5)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST ERRORS IN ACTUAL VALUES
	Coefficients Estimate
$AFerr_{i,t-1}$	-0.0499 (0.0534) [-0.93]
$Filing_{i,t}$	-0.0057 (0.0081) [-0.70]
$LNA_{i,t+1}$	-0.0027 * (0.0016) [-1.73]
$R^{M}_{i,t+1}$	-0.0036 (0.0251) [-0.14]
R2	0.0291
$F_{4,332}$ Value	2.49
Observations	336

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

Table VI. 15
ALTERNATE SPECIFICATION RESULTS
FOR CONTROLLING FIRM SIZE AND FINANCIAL LEVERAGE
USING OLS WITH ROBUST STANDARD ERROR ESTIMATION
ON
ACTUAL FORECAST ERRORS REGRESSION EQUATION (3.5)

INDEPENDENT VARIABLES	DEPENDENT VARIABLE IS ANALYSTS' FORECAST ERRORS IN ACTUAL VALUES			
	Coefficients Estimate			
$AFerr_{i,t-1}$	-0.0499 (0.0534) [-0.93]	-0.0533 (0.0529) [-1.01]	-0.0515 (0.0550) [-0.94]	-0.0555 (0.0543) [-1.02]
$Filing_{i,t}$	-0.0057 (0.0081) [-0.70]	-0.0053 (0.0082) [-0.66]	-0.0070 (0.0080) [-0.87]	0.0066 (0.0080) [-0.82]
$LNA_{i,t+1}$	-0.0027 * (0.0016) [-1.73]	-0.0038 ** (0.0017) [-2.15]	-0.0066 *** (0.0023) [-2.88]	-0.0079 *** (0.0025) [-3.21]
$R^{M}_{i,t+1}$	-0.0036 (0.0251) [-0.14]	-0.0020 (0.0250) [-0.08]	-0.0211 (0.0242) [-0.87]	-0.0196 (0.0241) [-0.81]
$MCAP_{i,t}$	N/A	0.0006 ** (0.0002) [2.50]	N/A	0.0007 *** (0.0002) [2.71]
$Finlev_{i,t}$	N/A	N/A	0.0061 ** (0.0026) [2.29]	0.0062 ** (0.0026) [2.34]
R2	0.0291	0.0331	0.0709	0.0764
F Value	$F_{4,332}$=2.49	$F_{5,331}$=4.70	$F_{5,331}$=4.96	$F_{6,330}$=4.20
Observations	336	336	336	336

Note: ***, **, and * denote 99%, 95%, and 90% significance, respectively.
Standard errors are in parentheses.
T-statistics are in square brackets.

CHAPTER VII

CONCLUSION

VII.1. Introduction

Prior studies on antidumping (AD) petition investigations have utilized event studies, which estimate the significance of abnormal returns to security holders of the pertinent firms at the petition date and at important decision dates in the AD petition investigation. In contrast, we examine the effect of the filing of an AD petition and the verdicts of the investigative decision on analysts' forecast revisions and errors (sell side brokerage analysts). While market returns contain a mix of short run and long run influences, analysts forecast a specific number, earnings, for a finite future interval, one year ahead, two year ahead, or a five year growth estimate. Investigation of analysts' response and evaluation to the invocation and implementation of public policy is interesting for a variety of reasons. First of all, the behavior of the financial industry itself is the subject of intense scrutiny these days. Further, as analysts are expected to be better informed than most investors, changes in their earnings estimates around the investigation decision dates are inherently interesting. This is particularly the case prior to Fair Disclosure (Reg FD). If analysts change their earnings forecasts in the month prior to an antidumping filing, it can be inferred that corporate insiders are communicating to the market through the analysts. This may be an important vehicle by which petitioning firms communicate forward looking information to the market about antidumping without incurring potential liability, if the forward looking information (prediction) does not materialize. That is, they avoid a potential class-action lawsuit by issuing guidance through analysts.

We investigate whether analysts revise their earnings forecast subsequent to the filing of AD petitions and the announcement of the investigative decisions. Next, we explore whether analysts become more or less accurate in their forecasts upon learning about the filing of AD petitions. Finally, we investigate whether there is a systematic bias direction in analysts' forecasts subsequent to the filing of AD petitions.

We provide evidence that analysts expect declining performance from pertinent firms in the first year earnings when the ITC preliminary decision turns out to be negative, but a possible improvement in the second year earnings upon learning the Department of Commerce final decision. We provide no evidence that the filing of an AD petition and the announcement of the verdicts of the investigation affects analysts' expectations about a firm's five year long term earnings growth. Therefore, our findings suggest that the AD petition investigations affect analysts' expectations about firm performance on a short term basis. We also find that analysts may anticipate their second year earnings forecasts at one month and three months before the filing date. When we examine analysts' forecast errors in the year following the filing of AD petitions, we find no evidence that the filing of an AD petition affects analysts' forecast accuracy and bias. There are some new implications for the accounting and finance literature regarding learning by analysts. However, some previous results in that literature have been confirmed.

VII.2. Limitation

Our method is not without limitation. For example, there may be other events that influence the analysts' forecast revision besides the AD petition investigations, for which we have not controlled. Another limitation is from the econometrics standpoint. Although we have included the lag of the dependent variables to reduce the effect of autocorrelation, it is possible that the moving average of the second order exists in the error term, for which we have not accounted. It is also possible that the compensation policy of brokerages for sell side analysts may affect the forecasts that they make. Another advantage of using 1980s petitions is that they are not part of the speculative bubble of the mid to late 1990s.

VII.3. Implication for Future Research

Future study could re-investigate the event study that used the market model found in the existing literature from the perspective of financial analysts. Therefore, the researchers will know whether the effect of the event to the firms' value is short-run or long-run or both. These would be important contributions to the event study literature since there is not much literature in the event study focusing on the financial analysts' forecasts.

VII.4. Conclusion

Overall, this study has shown that analysts (sell brokerage firms) do evaluate their earnings forecasts with respect to the invocation and implementation of public policy. Analysts play an important role as an intermediary between firms' management and investors. From the firm management standpoint, the existence of an intermediary will reduce firms' potential liability. From the investors' point of view, analysts are important because they are more independent than the firms' management. As such, our investigation on the effect of AD petition investigations to the analysts' earnings forecast revisions, accuracy, and bias contributes a great deal to the dumping as well as analysts' forecast literature.

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APPENDIX:

Appendix A: MATHEMATICAL PROOFS

Appendix B: PROGRAMMINGS

B.1: Program to calculate analysts' earnings forecast revisions from the I/B/E/S CDs

B.2: Program to calculate unexpected earnings from the I/B/E/S CDs

Appendix C: INDUSTRIES INVOLVED IN THE STUDY

C.1: Firms involved in petitions as were disclosed in USITC material injury (section 731) investigative report during 1985 through 1987

C.2: Firms involved in petitions with publicly traded shares included and deleted from the sample

Appendix A: MATHEMATICAL PROOFS

Appendix A-1

Given the equation $y = X\beta + u$ with $u \sim N(0, V)$, where V is a positive definite variance covariance matrix. Since V is positive definite, there exists a non-singular matrix P such that

(a.1.1) $P'P = V^{-1}$.

Premultiplying $y = X\beta + u$ by P, yields

(a.1.2) $Py = PX\beta + Pu$ or $y_* = X_*\beta + u_*$.

Obviously,

(a.1.3) $E(u_*) = E(Pu) = P\,E(u) = 0$

and

$$\begin{aligned} Var(u_*) = Var(Pu) &= E[\{Pu - E(Pu)\}\{Pu - E(Pu)\}'] \\ &= E[(Pu)(Pu)'] = E[Puu'P] \\ &= P\,VP \end{aligned}$$

Substituting V from (a.1.1), gives

(a.1.4) $Var(u_*) = PP^{-1}(P')^{-1}P' = I$.

From these two results, equation (a.1.3) and (a.1.4), it is clear that the transformed variables in equation (a.1.2) meet the requirement under which Ordinary Least Squares (OLS) is BLUE (Best Linear Unbiased Estimates).

Appendix A-2

$$b_{GLS} = \hat{\beta}^{*}_{OLS} = (X_*'X_*)X_*'y_*$$

(a.2.1)
$$= (X'P'PX)^{-1}X'P'Py$$
$$= (X'V^{-1}X)^{-1}X'V^{-1}y.$$

Accordingly, $Var(b_{GLS}) = (X'V^{-1}X)^{-1}$ as follows

$\hat{\beta}^{*}_{OLS} = b_{GLS}$, implying that $Var(\hat{\beta}^{*}_{OLS}) = Var(b_{GLS})$, therefore

$$Var(b_{GLS}) = (X_*'X_*)^{-1}$$

(a.2.2)
$$= (X'P'PX)^{-1}$$
$$= (X'V^{-1}X)^{-1}.$$

Appendix A-3

(a.3.1) $$P^{*}\varepsilon = \begin{bmatrix} P_1^{*}\varepsilon_1 \\ \vdots \\ P_i^{*}\varepsilon_i \\ \vdots \\ P_N^{*}\varepsilon_N \end{bmatrix},$$

(a.3.2) $$Var(P^{*}\varepsilon) = E\left[P^{*}\varepsilon(P^{*}\varepsilon)'\right]$$

$$= E\left(\begin{bmatrix} P_1^{*}\varepsilon_1 \\ \vdots \\ P_i^{*}\varepsilon_i \\ \\ P_N^{*}\varepsilon_N \end{bmatrix}\begin{bmatrix} \varepsilon_1' P_1^{*'} & \cdots & \varepsilon_i' P_i^{*'} & \cdots & \varepsilon_N' P_N^{*'} \end{bmatrix}\right)$$

$$= \begin{bmatrix} P_1^{*}E(\varepsilon_1\varepsilon_1')P_1^{*'} & & & & \mathrm{O} \\ & \ddots & & & \\ & & P_i^{*}E(\varepsilon_i\varepsilon_i')P_i^{*'} & & \\ & & & \ddots & \\ & \mathrm{O} & & & P_N^{*}E(\varepsilon_N\varepsilon_{N1}')P_N^{*'} \end{bmatrix}.$$

We know that $E(\varepsilon_i\varepsilon_j') = 0 \quad (i \neq j)$.

Equations (5.3) and (5.14) imply that $E(\varepsilon_i\varepsilon_i') = \sigma_{\varepsilon,i}^2\Omega_i$ and equations (5.18) and (5.25) entail $P_i^{*} = \sigma_u P_i$. These two conditions lead to

(a.3.3) $$P_i^{*}E(\varepsilon_i\varepsilon_i')P_i^{*'} = (\sigma_u P_i)(\sigma_{\varepsilon,i}^2\Omega_i)(\sigma_u P_i)'$$

$$= \sigma_u^2\left(P_i\left(\sigma_{\varepsilon,i}^2\Omega_i\right)P_i'\right).$$

The condition in equation (5.15) and (5.16) entail $\left(\sigma_{\varepsilon,i}^2\Omega_i\right)^{-1}\left(\sigma_{\varepsilon,i}^2\Omega_i\right) = I_T$, and equation (5.17) implies $P_i'P_i = \left(\sigma_{\varepsilon,i}^2\Omega_i\right)^{-1}$. These two conditions lead to

$$\left(P_i'P_i\right)\left(\sigma_{\varepsilon,i}^2\Omega_i\right)=\left(\sigma_{\varepsilon,i}^2\Omega_i\right)^{-1}\left(\sigma_{\varepsilon,i}^2\Omega_i\right)=I_T,$$

then,

$$\left(P_i'\right)'\left(P_i'P_i\sigma_{\varepsilon,i}^2\Omega_i\right)P_i'=\left(P_i'\right)^{-1}I_TP_i',$$

therefore,

$$P_i\sigma_{\varepsilon,i}^2\Omega_iP_i'=\left(P_iP_i^{-1}\right)'=I_T.$$

This last condition leads equation (a.3.3) to

(a.3.4) $P_i^{\bullet}E\left(\varepsilon_i\varepsilon_i'\right)P_i^{\bullet'}=\sigma_u^2I_T$.

Therefore, equation (a.3.2) becomes

(a.3.5) $$Var\left(P^{\bullet}\varepsilon\right)=\begin{bmatrix}\sigma_u^2I_T & & & & \mathrm{O}\\ & \ddots & & & \\ & & \sigma_u^2I_T & & \\ & & & \ddots & \\ \mathrm{O} & & & & \sigma_u^2I_T\end{bmatrix}=\sigma_u^2I_{NT}.$$

Appendix A-4

Given that $\varepsilon_{it} = \rho_i \varepsilon_{i,t-1} + u_{it}$, (AR1), then

$$\varepsilon_{it} = u_{it} + \rho_i u_{i,t-1} + \rho_i^2 u_{i,t-2} + \rho_i^3 u_{i,t-3} + \cdots\cdots\cdots \qquad (MA(\infty))$$

$$\sigma_{\varepsilon,ii} = E(\varepsilon_{it}^2) = E[(u_{it} + \rho_i u_{i,t-1} + \rho_i^2 u_{i,t-2} + \cdots\cdots)^2]$$

$$= E[(u_{it}^2 + \rho_i^2 u_{i,t-1}^2 + \rho_i^4 u_{i,t-2}^2 + \cdots\cdots) + (2\rho_i u_{it} u_{i,t-1} + \cdots\cdots)]$$

$$= \frac{\sigma_{u,ii}}{1-\rho_i^2}.$$

Let's denote:

$$E(\varepsilon_{it}^2) = \sigma_{\varepsilon,ii}.$$

$$E(\varepsilon_{it}\varepsilon_{jt}) = \sigma_{e,ij}.$$

$$E(u_{it}u_{jt}) = \sigma_{u,ij}.$$

$$E(u_{it}u_{js}) = 0 \quad (t \neq s).$$

$$\sigma_{\varepsilon,ij} = E(\varepsilon_{it}\varepsilon_{jt}) = E[(u_{it} + \rho_i u_{i,t-1} + \rho_i^2 u_{i,t-2} + \cdots\cdots)(u_{jt} + \rho_j u_{j,t-1} + \rho_j^2 u_{j,t-2} + \cdots\cdots)]$$

$$= E[(u_{it}u_{jt} + \rho_i\rho_j u_{i,t-1}u_{j,t-1} + \rho_i^2\rho_j^2 u_{i,t-2}u_{j,t-2} + \cdots\cdots) + (0 + 0 + \cdots\cdots)]$$

$$= \frac{\sigma_{u,ij}}{1-\rho_i\rho_j}.$$

The Covariance V matrix is

$$V = \begin{bmatrix} V_{11} & V_{12} & \cdots & V_{1N} \\ V_{21} & V_{22} & \cdots & V_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ V_{N1} & V_{N2} & \cdots & V_{NN} \end{bmatrix}_{NTxNT},$$

$$\text{where} \quad V_{ij} = \begin{bmatrix} E(\varepsilon_{i1}\varepsilon_{j1}) & E(\varepsilon_{i1}\varepsilon_{j2}) & \cdots & E(\varepsilon_{i1}\varepsilon_{jT}) \\ E(\varepsilon_{i2}\varepsilon_{j1}) & E(\varepsilon_{i2}\varepsilon_{j2}) & \cdots & E(\varepsilon_{i2}\varepsilon_{jT}) \\ \vdots & \vdots & \ddots & \vdots \\ E(\varepsilon_{iT}\varepsilon_{j1}) & E(\varepsilon_{iT}\varepsilon_{j2}) & \cdots & E(\varepsilon_{iT}\varepsilon_{jT}) \end{bmatrix}_{TxT}$$

$$E(\varepsilon_{it}\varepsilon_{jt}) = \frac{\sigma_{u,ij}}{1-\rho_i\rho_j}.$$

$$E(\varepsilon_{it}\varepsilon_{j,t-s}) = E[(u_{it} + \rho_i u_{i,t-1} + \rho_i^2 u_{i,t-2} + \cdots\cdots)(u_{j,t-s} + \rho_j u_{j,t-s-1} + \rho_j^2 u_{j,t-s-2} + \cdots\cdots)]$$

$$= E(\rho_i^s u_{i,t-s} u_{j,t-s} + \rho_i^{s+1}\rho_j u_{i,t-s-1} u_{j,t-s-1} + \rho_i^{s+2}\rho_j^2 u_{i,t-s-2} u_{j,t-s-2} + \cdots\cdots).$$

$$E(\varepsilon_{it}\varepsilon_{j,t-s}) = \frac{\rho_i^s \sigma_{u,ij}}{1-\rho_i\rho_j}.$$

$$E(\varepsilon_{i,t-s}\varepsilon_{jt}) = \frac{\rho_j^s \sigma_{u,ij}}{1-\rho_i\rho_j}.$$

$$\text{Therefore} \quad V_{ij} = \sigma_{\varepsilon,ij} \begin{bmatrix} 1 & \rho_j & \rho_j^2 & \cdots & \rho_j^{T-1} \\ \rho_i & 1 & \rho_j & \cdots & \rho_j^{T-2} \\ \rho_i^2 & \rho_i & 1 & \cdots & \rho_j^{T-3} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \rho_i^{T-1} & \rho_i^{T-2} & \rho_i^{T-3} & \cdots & 1 \end{bmatrix}.$$

Appendix A-5

$$\underset{n\to\infty}{p\lim}\hat{\beta} = \frac{\underset{n\to\infty}{p\lim}\sum_{t=2}^{n}\left(\frac{y_t y_{t-1}}{n}\right)}{\underset{n\to\infty}{p\lim}\sum_{t=2}^{n}\left(\frac{y_{t-1}^2}{n}\right)}$$

$$= \frac{\underset{n\to\infty}{p\lim}\sum_{t=2}^{n}\left(\frac{(\rho\, y_{t-1} + \varepsilon_t)y_{t-1}}{n}\right)}{\underset{n\to\infty}{p\lim}\sum_{t=2}^{n}\left(\frac{y_{t-1}^2}{n}\right)} =$$

$$= \frac{\rho\, \underset{n\to\infty}{p\lim}\sum_{t=2}^{n}\left(\frac{y_{t-1}^2}{n}\right) + \underset{n\to\infty}{p\lim}\sum_{t=2}^{\infty}\left(\frac{y_{t-1}\varepsilon_t}{n}\right)}{\underset{n\to\infty}{p\lim}\sum_{t=2}^{n}\left(\frac{y_{t-1}^2}{n}\right)}$$

$$= \rho + \frac{Cov(y_{t-1}, \varepsilon_t)}{Var(y_t)},$$

for a stationary process, $Var(y_t) = Var(y_{t-1})$

Appendix A-6

Consider again the model $y = X\beta + u$. Now, instead of assuming the matrix Z has the same dimension as *X*, let's assume that *Z* has more column than *X* such that rank (*Z*) ≥ rank (*X*). Premultiplying both sides of $y = X\beta + u$ by Z' gives

(a.5.1) $Z'y = Z'X\beta + Z'u$.

A rough way of obtaining the OLS estimator of this transformed equation is by premultiplying both sides of equation (a.5.1) by $(Z'X)^{-1}$ to get

(a.5.2) $\hat{\beta}_{IV} = (Z'X)^{-1} Z'y$.

However, with our generalization assumption, this is not possible. Matrix $Z'X$ is invertible, since rank (*Z*) ≥ rank (*X*). A non-square matrix cannot be inverted. To overcome this problem, we premultiply both sides of the original equation $y = X\beta + u$ by $X'Z(Z'Z)^{-1}Z'$ and obtain

(a.5.3) $X'Z(Z'Z)^{-1}Z'y = X'Z(Z'Z)^{-1}Z'X\beta + X'Z(Z'Z)^{-1}Z'u$.

Ignoring the last term and multiplying by $\left[X'Z(Z'Z)^{-1}Z'X\right]^{-1}$ yields the more general instrumental variables estimator

(a.5.4) $b_{IV} = \hat{\beta}_{IV} = \left[X'Z(Z'Z)^{-1}Z'X\right]^{-1} X'Z(Z'Z)^{-1}Z'y$.

Appendix A-7

$$\underset{n\to\infty}{p\lim}\, b_{IV} = \underset{n\to\infty}{p\lim}\left[X'Z(Z'Z)^{-1}Z'X\right]^{-1}X'Z(Z'Z)^{-1}Z'y$$

$$= \underset{n\to\infty}{p\lim}\left[X'Z(Z'Z)^{-1}Z'X\right]^{-1}X'Z(Z'Z)^{-1}(Z'X\beta + Z'u)$$

$$= \beta + \underset{n\to\infty}{p\lim}\left[\left(\frac{X'Z}{n}\right)\left(\frac{Z'Z}{n}\right)^{-1}\left(\frac{Z'X}{n}\right)\right]^{-1}\left(\frac{X'Z}{n}\right)\left(\frac{Z'Z}{n}\right)^{-1}\left(\frac{Z'u}{n}\right)$$

$$= \beta + \left(\Sigma_{ZX}\Sigma_{ZZ}^{-1}\Sigma_{ZX}\right)^{-1}\Sigma_{ZX}\Sigma_{ZZ}^{-1}\Sigma_{Zu} = \beta \text{ using equation (5.53).}$$

Appendix B: PROGRAMMINGS

B.1: Program to calculate analysts' earnings forecast revisions from the I/B/E/S CDs

B.2: Program to calculate unexpected earnings from the I/B/E/S CDs

```
dm log 'clear';
dm output 'clear';
options obs=10000000;
options nocenter ls=76;

*** THIS PROGRAM CALCULATES ANALYSTS' FORECAST REVISIONS ONE-PERIOD
**
*** AHEAD, TWO and THREE PERIODS AHEAD (AND FIVE PERIODS LONG TERM
***
*** GROWTH. THIS IS DONE BY SELECTING PERIODN=1, 2, 3, OR 0
**********;

data one;
   infile 'c:\My Documents\My Research\IBES\us summary\hiout3.us';
      input ticker $6.
            cusip $8. official $6. name $16. dilution 5.3 pd $1.
            canada $1. internat $1. uniform $1. sector 6. start 4.;
   keep cusip ticker;
   proc sort; by ticker;

data onea;
   set one; by ticker;
   if last.ticker then output;

data twoa;
   infile 'c:\My Documents\My Research\IBES\us summary\hiout1.us';
   input ticker $6.
         period 4. enddate 4. periodn $1. numest 2. up 2. down 2.
         median 6. mean 6. stddev 6. high 6. low 6. decimal 1.;

   yr=int(period/100);
   fyr=period-(yr*100);
   yr=yr+1900;
   if yr=1900 then yr=2000;
   crspdate=1+12*(yr-1925)-(12-fyr);

data two1;
   set twoa;
   mean1=mean/100;
   median1=median/100;
   stddev1=stddev/100;
   high1=high/100;
   low1=low/100;
   numest1=numest;
   if periodn ne '1' then delete;
   keep ticker yr fyr crspdate numest1 median1 mean1 stddev1;
   proc sort; by ticker crspdate;

data two2;
   set twoa;
   mean2=mean/100;
   median2=median/100;
   stddev2=stddev/100;
```

```
   high2=high/100;
   low2=low/100;
   numest2=numest;
   if periodn ne '2' then delete;
   keep ticker yr fyr crspdate numest2 median2 mean2 stddev2;
   proc sort; by ticker crspdate;

data two3;
   set twoa;
   mean3=mean/100;
   median3=median/100;
   stddev3=stddev/100;
   high3=high/100;
   low3=low/100;
   numest3=numest;
   if periodn ne '3' then delete;
   keep ticker yr fyr crspdate numest3 median3 mean3 stddev3;
   proc sort; by ticker crspdate;

data two4;
   set twoa;
   mean4=mean/100;
   median4=median/100;
   stddev4=stddev/100;
   high4=high/100;
   low4=low/100;
   numest4=numest;
   if periodn ne '0' then delete;
   keep ticker yr fyr crspdate numest4 median4 mean4 stddev4;
   proc sort; by ticker crspdate;

data two;
   merge two1 two2 two3 two4;
   by ticker crspdate;

data three;
   merge onea(in=a) two(in=b); by ticker; if a and b;
   if (yr ge '1984') and (yr le '1990') then output;

data four;
   set three;
   if (ticker='MTI') or (ticker='TKC') or (ticker='DIS') or
(ticker='NWL')
   or (ticker='ARC') or (ticker='AL') or (ticker='CYL') or
(ticker='CYC')
   or (ticker='KLU') or (ticker='MXM') or (ticker='NII') or
(ticker='COS')
   or (ticker='TYL') or (ticker='NSW') or (ticker='TYC') or
(ticker='WTHG')
   or (ticker='WOR') or (ticker='ACST') or (ticker='AIZ') or
(ticker='GHW')
   or (ticker='BFD') or (ticker='BF') or (ticker='PSM') or
(ticker='DIA')
   or (ticker='MXS') or (ticker='DRM') or (ticker='PPG') or
(ticker='ROK')
   or (ticker='SEEQ') or (ticker='HSI') or (ticker='AS') or
(ticker='TRN')
```

```
   or (Ticker='DMC') or (ticker='ARC') or (ticker='OLN') or
(ticker='GT')
   or (ticker='GM') or (ticker='WMB') or (ticker='ACY') or
(ticker='FRM')
   or (ticker='IRC') or (ticker='GRA') or (ticker='TKR') or
(ticker='BREN')
   or (ticker='IR') or (ticker='FMO') or (ticker='WYMN') or
(ticker='WYG')
   or (ticker='CUM') or (ticker='CR') or (ticker='IDL') or
(ticker='MMR')
   or(ticker='SDW') or (ticker='DOW') or (ticker='STY') or
(ticker='PG')
   or (ticker='OXY') or (ticker='ZE') or (ticker='GE') or
(ticker='NPH')
   or (ticker='WLA') or (ticker='AMX') or (ticker='IGL') or
(ticker='IMA')
   or (ticker='KMG') or (ticker='AS') or (ticker='GW')or
(ticker='PCI')
   or (ticker='AH') or (ticker='CAT') or (ticker='CKL') or
(ticker='AA')
   or (ticker='RLM') or (ticker='DR') or (ticker='AMB') or
(ticker='CUE')
   or (ticker='UTX') or (ticker='LLX') or (ticker='GR') or
(ticker='GT')
   or (ticker='DD') or (ticker='ICX') or (ticker='WH') or
(ticker='WH')
   or (ticker='ALD') or (ticker='TXT') or (ticker='EK') or
(ticker='MMM')
   or (ticker='XIDX') or (ticker='KERN') or (ticker='KNY') or
(ticker='CRI')
   or (ticker='PH') or (ticker='DRCO') or (ticker='QMSI') or
(ticker='AQM')
   or (ticker='TDY') or (ticker='KMG') or (ticker='RAL') or
(ticker='NRT')
   or (ticker='GM') or (ticker='F') or (ticker='ARV') or
(ticker='BCL')
   or (ticker='BARL') or (ticker='BRL') or (ticker='ZENI') or
(ticker='ZEN')
   or (ticker='ZENLV') or (ticker='ZENL') or (ticker='LLY') or
(ticker='ETN')
   or (ticker='T') or (ticker='CMDL') or (ticker='EGLA') or
(ticker='IBM')
   or (ticker='GTE') or (ticker='GILBA') then output;
   keep cusip ticker yr fyr crspdate mean1 numest1 mean2 numest2
        mean3 numest3 mean4 numest4;

data five_lag;
   set four;
   crspdate=crspdate+1;
   m1lag=mean1; na1lag=numest1;
   m2lag=mean2; na2lag=numest2;
   m3lag=mean3; na3lag=numest3;
   m4lag=mean4; na4lag=numest4;
   keep cusip ticker yr fyr crspdate m1lag na1lag m2lag na2lag
        m3lag na3lag m4lag na4lag;

data five_lead;
```

```
   set four;
   crspdate=crspdate-1;
   m1lead=mean1; na1lead=numest1;
   m2lead=mean2; na2lead=numest2;
   m3lead=mean3; na3lead=numest3;
   m4lead=mean4; na4lead=numest4;
   keep cusip ticker yr fyr crspdate m1lead na1lead m2lead na2lead
        m3lead na3lead m4lead na4lead;

data five;
   merge four(in=a) five_lag five_lead;
   by ticker crspdate; if a;

data mti; set five; if (ticker='MTI') then output;
data dis; set five; if (ticker='DIS') then output;
data nwl; set five; if (ticker='NWL') then output;
data arc; set five; if (ticker='ARC') then output;
data al; set five; if (ticker='AL') then output;
data cyl; set five; if (ticker='CYL') then output;
data cyc; set five; if (ticker='CYC') then output;
data klu; set five; if (ticker='KLU') then output;
data mxm; set five; if (ticker='MXM') then output;
data nii; set five; if (ticker='NII') then output;
data cos; set five; if (ticker='COS') then output;
data tyl; set five; if (ticker='TYL') then output;
data nsw; set five; if (ticker='NSW') then output;
data tyc; set five; if (ticker='TYC') then output;
data wthg; set five; if (ticker='WTHG') then output;
data wor; set five; if (ticker='WOR') then output;
data acst; set five; if (ticker='ACST') then output;
data aiz; set five; if (ticker='AIZ') then output;
data ghw; set five; if (ticker='GHW') then output;
data bfd; set five; if (ticker='BFD') then output;
data bf; set five; if (ticker='BF') then output;
data psm; set five; if (ticker='PSM') then output;
data drm; set five; if (ticker='DRM') then output;
data mxs; set five; if (ticker='MXS') then output;
data dia; set five; if (ticker='DIA') then output;
data ppg; set five; if (ticker='PPG') then output;
data rok; set five; if (ticker='ROK') then output;
data seeq; set five; if (ticker='SEEQ') then output;
data hsi; set five; if (ticker='HSI') then output;
data as; set five; if (ticker='AS') then output;
data trn; set five; if (ticker='TRN') then output;
data dmc; set five; if (ticker='DMC') then output;
data cue; set five; if (ticker='CUE') then output;
data oln; set five; if (ticker='OLN') then output;
data gt; set five; if (ticker='GT') then output;
data gm; set five; if (ticker='GM') then output;
data wmb; set five; if (ticker='WMB') then output;
data acy; set five; if (ticker='ACY') then output;
data frm; set five; if (ticker='FRM') then output;
data irc; set five; if (ticker='IRC') then output;
data gra; set five; if (ticker='GRA') then output;
data tkr; set five; if (ticker='TKR') then output;
data bren; set five; if (ticker='BREN') then output;
data ir; set five; if (ticker='IR') then output;
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data fmo; set five; if (ticker='FMO') then output;
data wymn; set five; if (ticker='WYMN') then output;
data wyg; set five; if (ticker='WYG') then output;
data cum; set five; if (ticker='CUM') then output;
data cr; set five; if (ticker='CR') then output;
data idl; set five; if (ticker='IDL') then output;
data mmr; set five; if (ticker='MMR') then output;
data sdw; set five; if (ticker='SDW') then output;
data dow; set five; if (ticker='DOW') then output;
data sty; set five; if (ticker='STY') then output;
data pg; set five; if (ticker='PG') then output;
data oxy; set five; if (ticker='OXY') then output;
data ze; set five; if (ticker='ZE') then output;
data ge; set five; if (ticker='GE') then output;
data nph; set five; if (ticker='NPH') then output;
data wla; set five; if (ticker='WLA') then output;
data amx; set five; if (ticker='AMX') then output;
data igl; set five; if (ticker='IGL') then output;
data ima; set five; if (ticker='IMA') then output;
data kmg; set five; if (ticker='KMG') then output;
data as; set five; if (ticker='AS') then output;
data gw; set five; if (ticker='GW') then output;
data pci; set five; if (ticker='PCI') then output;
data ah; set five; if (ticker='AH') then output;
data cat; set five; if (ticker='CAT') then output;
data ckl; set five; if (ticker='CKL') then output;
data aa; set five; if (ticker='AA') then output;
data rlm; set five; if (ticker='RLM') then output;
data dr; set five; if (ticker='DR') then output;
data amb; set five; if (ticker='AMB') then output;
data utx; set five; if (ticker='UTX') then output;
data llx; set five; if (ticker='LLX') then output;
data gr; set five; if (ticker='GR') then output;
data dd; set five; if (ticker='DD') then output;
data icx; set five; if (ticker='ICX') then output;
data wh; set five; if (ticker='WH') then output;
data ald; set five; if (ticker='ALD') then output;
data txt; set five; if (ticker='TXT') then output;
data ek; set five; if (ticker='EK') then output;
data mmm; set five; if (ticker='MMM') then output;
data xidx; set five; if (ticker='XIDX') then output;
data kern; set five; if (ticker='KERN') then output;
data kny; set five; if (ticker='KNY') then output;
data cri; set five; if (ticker='CRI') then output;
data ph; set five; if (ticker='PH') then output;
data drco; set five; if (ticker='DRCO') then output;
data qmsi; set five; if (ticker='QMSI') then output;
data aqm; set five; if (ticker='AQM') then output;
data tdy; set five; if (ticker='TDY') then output;
data kmg; set five; if (ticker='KMG') then output;
data ral; set five; if (ticker='RAL') then output;
data nrt; set five; if (ticker='NRT') then output;
data gm; set five; if (ticker='GM') then output;
data f; set five; if (ticker='F') then output;
data arv; set five; if (ticker='ARV') then output;
data bcl; set five; if (ticker='BCL') then output;
data barl; set five; if (ticker='BARL') then output;
```

```
data brl; set five; if (ticker='BRL') then output;
data zeni; set five; if (ticker='ZENI') then output;
data zen; set five; if (ticker='ZEN') then output;
data zenlv; set five; if (ticker='ZENLV') then output;
data zenl; set five; if (ticker='ZENL') then output;
data lly; set five; if (ticker='LLY') then output;
data etn; set five; if (ticker='ETN') then output;
data t; set five; if (ticker='T') then output;
data cmdl; set five; if (ticker='CMDL') then output;
data egla; set five; if (ticker='EGLA') then output;
data ibm; set five; if (ticker='IBM') then output;
data gte; set five; if (ticker='GTE') then output;
data gilba; set five; if (ticker='GILBA') then output;

data six;
   set mti dis nwl arc al cyl cyc klu mxm nii cos tyl nsw tyc wthg
       wor acst aiz ghw bfd bf psm drm mxs dia ppg rok seeq hsi as
       trn dmc arc cue oln gt gm wmb acy frm irc gra tkr bren ir fmo
       tyc acst aiz wthg wor nii wymn wyg cum cr idl mmr sdw dow sty
       ek pg oxy ze ge nph wla amx igl ima kmg as gw pci ah cat ckl
       aa rlm al oln dmc arc dr amb cue utx llx gr gt dd icx wh ald
       txt ek mmm xidx kern kny cri ph drco qmsi aqm tdy kmg ral nrt
       gm f arv bcl barl brl zeni zen zenlv zenl lly etn t cmdl egla
       ibm gte gilba;
   afrev1=(m1lead-m1lag);
   afrev2=(m2lead-m2lag);
   afrev3=(m3lead-m3lag);
   afrev4=(m4lead-m4lag);
   na1av=(na1lead+na1lag)/2;
   na2av=(na2lead+na2lag)/2;
   na3av=(na3lead+na3lag)/2;
   na4av=(na4lead+na4lag)/2;
   keep cusip ticker crspdate yr fyr afrev1 afrev2 afrev3 afrev4
        na1av na2av na3av na4av na1lead na2lead na3lead na4lead
        na1lag na2lag na3lag na4lag;

run;
```

Appendix B-2

```
dm log 'clear';
dm output 'clear';
options obs=10000000;
options nocenter ls=76;

*** THIS PROGRAM CALCULATES QUARTERLY UNEXPECTED EARNINGS *****
*** QUARTERLY UNEXPECTED EARNING IS QUARTERLY ACTUAL EARNINGS *
*** MINUS RECENT QUARTERLY ANALYSTS' FORECAST ****************;

data one;
   infile 'c:\My Documents\My Research\IBES\us summary\hiout3.us';
      input ticker $6.
            cusip $8. official $6. name $16. dilution 5.3 pd $1.
            canada $1. internat $1. uniform $1. sector 6. start 4.;
   keep cusip ticker;
   proc sort; by ticker;

data onea;
   set one; by ticker;
   if last.ticker then output;

data two;
   infile 'c:\My Documents\My Research\IBES\us summary\hiout1.us';
   input ticker $6.
         period 4. enddate 4. periodn $1. numest 2. up 2. down 2.
         median 6. mean 6. stddev 6. high 6. low 6. decimal 1.;

   yr=int(period/100);
   fyr=period-(yr*100);
   yr=yr+1900;
   if yr=1900 then yr=2000;
   crspdate=1+12*(yr-1925)-(12-fyr);

data twoa;
   set two;
   mean=mean/100;
   median=median/100;
   stddev=stddev6/100;
   high=high/100;
   low=low/100;
   numest=numest;
   if periodn ne '6' then delete;
   keep ticker yr fyr enddate crspdate numest median mean stddev;
   proc sort; by ticker crspdate;

data three;
   merge onea(in=a) twoa(in=b); by ticker; if a and b;

data four;
   infile 'c:\My Documents\My Research\IBES\us summary\hiout2.us';
   input ticker $6. period 4. declocn 1.
    /* pricing block */
         price 7. prday 2. prshares 8.3
    /* FY Actuals Block */
         fenddat 4. facteps 6. frepflag $1.
```

```
    /* Qtr Actuals Block */
         qtrdat 4. qtraceps 6. qrepflag $1.
    /* Ancillary Data Block */
         andiv 6. epsgr 5.2 epsst 5.2;

   yrf=int(period/100);
   fyrf=period-(yrf*100);
   yrf=yrf+1900;
   if yrf=1900 then yrf=2000;
   crspdate=1+12*(yrf-1925)-(12-fyrf);
   price=price/100;
   qtraceps=qtraceps/100;
   andiv=andiv/100;
   facteps=facteps/100;
   epsgr=epsgr/100;
   epsst=epsst/100;
   proc sort; by ticker crspdate;

data foura;
   set four;
   crspdate=crspdate-3;
   price=price;
   qtraceps=qtraceps;
   andiv=andiv;
   facteps=facteps;
   epsgr=epsgr;
   epsst=epsst;
   keep ticker crspdate qtrdat price qtraceps;

data five;
   merge three(in=a) foura(in=b);
   by ticker crspdate;
   if a and b;

data six;
   set five;
   keep cusip ticker yr fyr enddate mean qtrdat qtraceps price
crspdate;
   if (yr ge '1983') and (yr le '1991') then output;

data seven;
   set six;
   if (ticker='MTI') or (ticker='TKC') or (ticker='DIS') or
(ticker='NWL')
   or (ticker='ARC') or (ticker='AL') or (ticker='CYL') or
(ticker='CYC')
   or (ticker='KLU') or (ticker='MXM') or (ticker='NII') or
(ticker='COS')
   or (ticker='TYL') or (ticker='NSW') or (ticker='TYC') or
(ticker='WTHG')
   or (ticker='WOR') or (ticker='ACST') or (ticker='AIZ') or
(ticker='GHW')
   or (ticker='BFD') or (ticker='BF') or (ticker='PSM') or
(ticker='DIA')
   or (ticker='MXS') or (ticker='DRM') or (ticker='PPG') or
(ticker='ROK')
```

```
   or (ticker='SEEQ') or (ticker='HSI') or (ticker='AS') or
(ticker='TRN')
   or (Ticker='DMC') or (ticker='ARC') or (ticker='OLN') or
(ticker='GT')
   or (ticker='GM') or (ticker='WMB') or (ticker='ACY') or
(ticker='FRM')
   or (ticker='IRC') or (ticker='GRA') or (ticker='TKR') or
(ticker='BREN')
   or (ticker='IR') or (ticker='FMO') or (ticker='WYMN') or
(ticker='WYG')
   or (ticker='CUM') or (ticker='CR') or (ticker='IDL') or
(ticker='MMR')
   or(ticker='SDW') or (ticker='DOW') or (ticker='STY') or
(ticker='PG')
   or (ticker='OXY') or (ticker='ZE') or (ticker='GE') or
(ticker='NPH')
   or (ticker='WLA') or (ticker='AMX') or (ticker='IGL') or
(ticker='IMA')
   or (ticker='KMG') or (ticker='AS') or (ticker='GW')or
(ticker='PCI')
   or (ticker='AH') or (ticker='CAT') or (ticker='CKL') or
(ticker='AA')
   or (ticker='RLM') or (ticker='DR') or (ticker='AMB') or
(ticker='CUE')
   or (ticker='UTX') or (ticker='LLX') or (ticker='GR') or
(ticker='GT')
   or (ticker='DD') or (ticker='ICX') or (ticker='WH') or
(ticker='WH')
   or (ticker='ALD') or (ticker='TXT') or (ticker='EK') or
(ticker='MMM')
   or (ticker='XIDX') or (ticker='KERN') or (ticker='KNY') or
(ticker='CRI')
   or (ticker='PH') or (ticker='DRCO') or (ticker='QMSI') or
(ticker='AQM')
   or (ticker='TDY') or (ticker='KMG') or (ticker='RAL') or
(ticker='NRT')
   or (ticker='GM') or (ticker='F') or (ticker='ARV') or
(ticker='BCL')
   or (ticker='BARL') or (ticker='BRL') or (ticker='ZENI') or
(ticker='ZEN')
   or (ticker='ZENLV') or (ticker='ZENL') or (ticker='LLY') or
(ticker='ETN')
   or (ticker='T') or (ticker='CMDL') or (ticker='EGLA') or
(ticker='IBM')
   or (ticker='GTE') or (ticker='GILBA') then output;
   keep cusip ticker yr fyr enddate mean qtrdat qtraceps price
crspdate;

data mti; set five; if (ticker='MTI') then output;
data dis; set five; if (ticker='DIS') then output;
data nwl; set five; if (ticker='NWL') then output;
data arc; set five; if (ticker='ARC') then output;
data al; set five; if (ticker='AL') then output;
data cyl; set five; if (ticker='CYL') then output;
data cyc; set five; if (ticker='CYC') then output;
data klu; set five; if (ticker='KLU') then output;
data mxm; set five; if (ticker='MXM') then output;
```

```
data nii; set five; if (ticker='NII') then output;
data cos; set five; if (ticker='COS') then output;
data tyl; set five; if (ticker='TYL') then output;
data nsw; set five; if (ticker='NSW') then output;
data tyc; set five; if (ticker='TYC') then output;
data wthg; set five; if (ticker='WTHG') then output;
data wor; set five; if (ticker='WOR') then output;
data acst; set five; if (ticker='ACST') then output;
data aiz; set five; if (ticker='AIZ') then output;
data ghw; set five; if (ticker='GHW') then output;
data bfd; set five; if (ticker='BFD') then output;
data bf; set five; if (ticker='BF') then output;
data psm; set five; if (ticker='PSM') then output;
data drm; set five; if (ticker='DRM') then output;
data mxs; set five; if (ticker='MXS') then output;
data dia; set five; if (ticker='DIA') then output;
data ppg; set five; if (ticker='PPG') then output;
data rok; set five; if (ticker='ROK') then output;
data seeq; set five; if (ticker='SEEQ') then output;
data hsi; set five; if (ticker='HSI') then output;
data as; set five; if (ticker='AS') then output;
data trn; set five; if (ticker='TRN') then output;
data dmc; set five; if (ticker='DMC') then output;
data cue; set five; if (ticker='CUE') then output;
data oln; set five; if (ticker='OLN') then output;
data gt; set five; if (ticker='GT') then output;
data gm; set five; if (ticker='GM') then output;
data wmb; set five; if (ticker='WMB') then output;
data acy; set five; if (ticker='ACY') then output;
data frm; set five; if (ticker='FRM') then output;
data irc; set five; if (ticker='IRC') then output;
data gra; set five; if (ticker='GRA') then output;
data tkr; set five; if (ticker='TKR') then output;
data bren; set five; if (ticker='BREN') then output;
data ir; set five; if (ticker='IR') then output;
data fmo; set five; if (ticker='FMO') then output;
data wymn; set five; if (ticker='WYMN') then output;
data wyg; set five; if (ticker='WYG') then output;
data cum; set five; if (ticker='CUM') then output;
data cr; set five; if (ticker='CR') then output;
data idl; set five; if (ticker='IDL') then output;
data mmr; set five; if (ticker='MMR') then output;
data sdw; set five; if (ticker='SDW') then output;
data dow; set five; if (ticker='DOW') then output;
data sty; set five; if (ticker='STY') then output;
data pg; set five; if (ticker='PG') then output;
data oxy; set five; if (ticker='OXY') then output;
data ze; set five; if (ticker='ZE') then output;
data ge; set five; if (ticker='GE') then output;
data nph; set five; if (ticker='NPH') then output;
data wla; set five; if (ticker='WLA') then output;
data amx; set five; if (ticker='AMX') then output;
data igl; set five; if (ticker='IGL') then output;
data ima; set five; if (ticker='IMA') then output;
data kmg; set five; if (ticker='KMG') then output;
data as; set five; if (ticker='AS') then output;
data gw; set five; if (ticker='GW') then output;
```

```
data pci; set five; if (ticker='PCI') then output;
data ah; set five; if (ticker='AH') then output;
data cat; set five; if (ticker='CAT') then output;
data ckl; set five; if (ticker='CKL') then output;
data aa; set five; if (ticker='AA') then output;
data rlm; set five; if (ticker='RLM') then output;
data dr; set five; if (ticker='DR') then output;
data amb; set five; if (ticker='AMB') then output;
data utx; set five; if (ticker='UTX') then output;
data llx; set five; if (ticker='LLX') then output;
data gr; set five; if (ticker='GR') then output;
data dd; set five; if (ticker='DD') then output;
data icx; set five; if (ticker='ICX') then output;
data wh; set five; if (ticker='WH') then output;
data ald; set five; if (ticker='ALD') then output;
data txt; set five; if (ticker='TXT') then output;
data ek; set five; if (ticker='EK') then output;
data mmm; set five; if (ticker='MMM') then output;
data xidx; set five; if (ticker='XIDX') then output;
data kern; set five; if (ticker='KERN') then output;
data kny; set five; if (ticker='KNY') then output;
data cri; set five; if (ticker='CRI') then output;
data ph; set five; if (ticker='PH') then output;
data drco; set five; if (ticker='DRCO') then output;
data qmsi; set five; if (ticker='QMSI') then output;
data aqm; set five; if (ticker='AQM') then output;
data tdy; set five; if (ticker='TDY') then output;
data kmg; set five; if (ticker='KMG') then output;
data ral; set five; if (ticker='RAL') then output;
data nrt; set five; if (ticker='NRT') then output;
data gm; set five; if (ticker='GM') then output;
data f; set five; if (ticker='F') then output;
data arv; set five; if (ticker='ARV') then output;
data bcl; set five; if (ticker='BCL') then output;
data barl; set five; if (ticker='BARL') then output;
data brl; set five; if (ticker='BRL') then output;
data zeni; set five; if (ticker='ZENI') then output;
data zen; set five; if (ticker='ZEN') then output;
data zenlv; set five; if (ticker='ZENLV') then output;
data zenl; set five; if (ticker='ZENL') then output;
data lly; set five; if (ticker='LLY') then output;
data etn; set five; if (ticker='ETN') then output;
data t; set five; if (ticker='T') then output;
data cmdl; set five; if (ticker='CMDL') then output;
data egla; set five; if (ticker='EGLA') then output;
data ibm; set five; if (ticker='IBM') then output;
data gte; set five; if (ticker='GTE') then output;
data gilba; set five; if (ticker='GILBA') then output;

data eight;
   set mti dis nwl arc al cyl cyc klu mxm nii cos tyl nsw tyc wthg
       wor acst aiz ghw bfd bf psm drm mxs dia ppg rok seeq hsi as
       trn dmc arc cue oln gt gm wmb acy frm irc gra tkr bren ir fmo
       tyc acst aiz wthg wor nii wymn wyg cum cr idl mmr sdw dow sty
       ek pg oxy ze ge nph wla amx igl ima kmg as gw pci ah cat ckl
       aa rlm al oln dmc arc dr amb cue utx llx gr gt dd icx wh ald
       txt ek mmm xidx kern kny cri ph drco qmsi aqm tdy kmg ral nrt
```

```
        gm f arv bcl barl brl zeni zen zenlv zenl lly etn t cmdl egla
        ibm gte gilba;
run;
```

Appendix C: INDUSTRIES INVOLVED IN THE STUDY

Table C.1: Firms involved in petitions as were disclosed in USITC material injury (section 731) investigative report during 1985 through 1987

Table C.2: Firms involved in petitions with publicly traded shares included and deleted from the sample

Table C.1. Firms involved in petitions as were disclosed in USITC material injury (Section 731) investigative report during 1985 through 1987

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-238 File: 1/11/1985 Sufficiency:2/7/1985 USITC(P):9/21/1988 DoC(P):4/18/1989 DoC(F):6/28/1989 USITC(F):8/16/1989	Negative	12 Volt motorcycle batteries	Taiwan	Yuasa-Exide-Battery
TA-731-239 File: 1/28/1985 Sufficiency:2/26/1985 USITC(P):3/14/1985 DoC(P):7/15/1985 DoC(F):12/4/1985 USITC(F):1/10/1986	Negative	Rock salt	Canada	Morton Domtar International Salt Redmond Clay Huck Salt
TA-731- File: 1/30/1985 Sufficiency: USITC(P):3/13/1985 DoC(P):7/16/1985 DoC(F):10/29/1985 USITC(F):11/22/1985	Injury	Photo album	Hongkong South-Korea	Gibson Greetings Kleer-Vu-Industries
TA-731-244 File: 2/19/1985 Sufficiency:3/15/1985 USITC(P):4/5/1985 DoC(P):8/5/1985 DoC(F):12/26/1985 USITC(F):1/27/1986	Threat	Natural bristle paint brushes	PRC	Baltimore Brush Elder & Jenks E Z paintr H&G Industries Joseph Lieberman Purdy Rubberset Thomas Paint Application Wooster Brush

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-247 File: 2/19/1985 Sufficiency:3/15/1985 USITC(P):4/5/1985 DoC(P):9/23/1985 DoC(F):12/6/1985 USITC(F):1/17/1986	Injury	Low fuming brazing copper wire & rod	South-Africa	J W Harries Cerro Metal-Products Century Brass American Brass
TA-731-254 File: 3/25/1985 Sufficiency:4/22/1985 USITC(P):5/9/1985 DoC(P):9/10/1985 DoC(F):11/22/1985 USITC(F):2/4/1986	Negative	Heavy Wallet rectangular welded carbon steel pipe and tubes	Canada	Acme Roll-Forming Bock Industries Bull Moose Tube Copperweld Cyclops Delta Metal-Forming Eugene Welding Ex-L Tube Hanna Steel Independent Tube James Steel & Tube Kaiser Steel Maruichi-American Mid States Tube UNR-Leavitt Welded Tube
TA-731-263 File: 5/13/1985 Sufficiency:6/10/1985 USITC(P):6/27/1985 DoC(P):10/28/1985 DoC(F):1/16/1986 USITC(F):2/19/1986	Threat	Iron construct-ion Casting	Canada	Alhambra Foundry Allegheny-Foundry Bingham & Taylor Campbell Foundry Charlotte pipe & Foundry Deeter Foundry East Jordan Iron-World E L Le baron-Foundry Municipal Castings Neenah Foundry

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
				Opelika Foundry Pinkerton Foundry Tyler Pipe U.S. Foundry & Manuf. Vulcan Foundry
TA-731-266 File: 6/5/1985 Sufficiency:7/3/1985 USITC(P):7/22/1985 DoC(P):1/9/1986 DoC(F):3/25/1986 USITC(F):5/8/1986	Injury	Steel wire nails	PRC	Atlantic Steel Atlas Steel & Wire Continental Steel Davis Walker Dickson Weather-Proof Nail Florida Wire & Nail Keystone Steel Northwestern Steel & Wire Virginia Wire & Fabrics Wire Products Ivaco
TA-731- File: Sufficiency: USITC(P): DoC(P): DoC(F): USITC(F):		Nylon impressio n fabric	Canada	Burlington industries- Inc
TA-731-270 File: 6/24/1985 Sufficiency:7/19/1985 USITC(P):8/8/1985 DoC(P):12/11/1985 DoC(F):4/29/1986 USITC(F):6/6/1986	Injury	64 K DRAMS	Japan	Advanced Micro-Devices AT&T IBM Intel Micron Technology Mostek Motorola National-Semiconductor Texas instruments

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-278-280 File: 7/31/1985 Sufficiency:8/27/1985 USITC(P):9/16/1985 DoC(P):1/14/1986 DoC(F):3/31/1986 USITC(F):5/12/1986	Injury	Cast iron pipe fittings	Brazil Korea Taiwan	Stanley G. Flag ITT Grinnel Stockholm Value 7 Fittings U Brand Clevepak
TA-731-282 File: 9/4/1985 Sufficiency:9/30/1985 USITC(P):10/21/1985 DoC(P):2/19/1986 DoC(F):7/10/1986 USITC(F):8/21/1986	Injury	Candles	PRC	Lenox Candles General Housewares
TA-731-286 File: 9/16/1985 Sufficiency:10/16/1985 USITC(P):10/31/1985 DoC(P):3/3/1986 DoC(F): - USITC(F): -	Threat Withdra-wal 7/20/86	Anhyd-rous sodium metasili-cate	UK	P Q Corp Pennwalt Diamond Shamrock Stauffer Chemicals
TA-731-288 File: 9/30/1985 Sufficiency:10/28/1985 USITC(P):11/14/1985 DoC(P):3/17/1986 DoC(F): - USITC(F): -	Suspended 8/6/1986	EPROMS	Japan	Advanced Micro Devices Intel Mostek Motorola National Semiconductor Rockwell Int'l Seeq Technology Texas Intruments
TA-731- File: 10/24/1985 Sufficiency:12/20/1985 USITC(P):- DoC(P):- DoC(F): - USITC(F): -	Negative	Welded steel fabric	Italy Mexico Vene-zuela	Keystone-Consolidated

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-300 File: 12/6/1985 Sufficiency:12/17/1985 USITC(P):1/27/1986 DoC(P):3/19/1986 DoC(F): - USITC(F): -	Injury/ Threat Suspende d 8/7/1986	DRAMS 256 and above	Japan	Advanced Micro-Devices AT&T IBM Intel Micron Technology Mostek Motorola National-Semiconductor Texas Instruments
TA-731-309 File: 2/24/1986 Sufficiency:3/24/1986 USITC(P):4/10/1986 DoC(P):8/11/1986 DoC(F):12/29/1986 USITC(F):1/26/1987	Injury	Butt weld pipe fittings	Japan	Ladish Mills Iron Works Steel Forgings
TA-731- File: 3/10/1986 Sufficiency: USITC(P):4/24/1986 DoC(P):8/18/1986 DoC(F): 11/10/1986 USITC(F): 12/22/1986	Injury	Brass sheet and strip	Italy Brazil South-Korea Canada Sweden French West-Germa-Ny	Diversified-Industries American Brass Bridgeport Brass Olin Corp Chase of Standard-Oil Co
TA-731-335 File: 5/23/1986 Sufficiency:6/17/1986 USITC(P):9/2/1986 DoC(P):12/29/1986 DoC(F): 3/20/1987 USITC(F): 7/1/1987	Threat	Tubeless steel disc	Brazil	Accuride Budd Motor Wheel

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-338-340 File: 7/16/1986 Sufficiency:8/12/1986 USITC(P):10/9/1986 DoC(P):1/2/1987 DoC(F): 5/26/1987 USITC(F): 6/5/1987	Injury	Urea	USSR GDR Roma- nia	Agrico Chemical American Cyanamid C F Industries Farmland Industries First Mississippi- Chemical Terra Chemical W R Grace
TA-731-341,344-345 File: 8/25/1986 Sufficiency:9/19/1986 USITC(P):10/9/1986 DoC(P):2/6/1987 DoC(F):5/8/1987 USITC(F):6/5/1987	Injury	Tapered roller bearings	Hungar y PRC Roma- nia Italy Japan Yugos- lavia	Timken Torrington Co Amrican NTM- Bearing Brenco Federal mogul Hyatt Clark Koyo L & S Bearing NTM Bower SKF Industries
TA-731-347-348 File: 8/29/1986 Sufficiency:9/25/1986 USITC(P):10/14/1986 DoC(P):2/13/1987 DoC(F): 6/24/1987 USITC(F): 8/12/1987	Injury	Malleable Cast iron pipe fittings	Japan Thailan d	Stanley Flagg Grinnel U Brand Ward Stockham Values
TA-731-211 File: 10/2/1986 Sufficiency:10/27/1986 USITC(P):11/17/1986 DoC(P):3/17/1987 DoC(F): 6/1/1987 USITC(F): 7/14/1987	Negative	Welded carbon steel pipe & tubes	Taiwan	Bernard Epps Bull Moose Tube Hughes Steel & Tube Kaiser Maruichi American Pittsburg Int'l Southwestern Pipe Western Tube & Conduit

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-351-353 File: 10/9/1986 Sufficiency:11/6/1986 USITC(P):11/24/1986 DoC(P):5/13/1987 DoC(F): 7/28/1987 USITC(F): 9/9/1987	Injury	Forged steel crank-shafts	FRG UK	Wyman Gordon Cummins Engine Norton Manuf. Kellogg Crankshafts Modern Machine-Works Atlas Industries
TA-731-356-363 File: 10/30/1986 Sufficiency:11/25/1986 USITC(P):12/15/1986 DoC(P): - DoC(F): - USITC(F): -	Negative	Portland hydraulic cement	Colum-bia French Greece Japan Mexico Korea Spain Venezu-ela Turkey	Ideal Basic-Industries Kaiser Cement Lehigh Portland-Cement Moore McCormack Medusa Cement
TA-731- File: 10/31/1986 Sufficiency: USITC(P):12/10/1986 DoC(P):3/3/1987 DoC(F): 7/1/1987 USITC(F): 8/11/1987	Injury	Aspirin	Turkey	Dow Chemicals Sterling Drug Norwich Eaton
TA-731- File: 11/5/1986 Sufficiency: USITC(P):12/22/1986 DoC(P):4/20/1987 DoC(F): 7/7/1987 USITC(F): 8/12/1987	Injury	Industrial phosphor-ric acid	Belgium Israel	Occidental-Petroleum FMC

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-367-370 File: 11/26/1986 Sufficiency:12/22/1986 USITC(P):1/12/1987 DoC(P):6/30/1987 DoC(F): 11/18/1987 USITC(F): 12/22/1987	Injury	Color picture tubes	Canada Japan Korea Singa-pore	General Electric RCA North American-Philips Zenith Sony Toshiba Westinghouse
TA-731-371 File: 12/23/1986 Sufficiency:1/20/1987 USITC(P):2/6/1987 DoC(P):5/14/1987 DoC(F):10/5/1987 USITC(F):11/12/1987	Negative	Fabric Neoph-rene laminated	Taiwan	Rubatex Kirkhill
TA-731-374 File: 2/10/1987 Sufficiency:3/5/1987 USITC(P):3/27/1987 DoC(P):8/26/1987 DoC(F): - USITC(F): -	Suspende d 1/19/1988	Potassiu m chloride	Canada	Amax Potash Int'l Mineral & Chemicals Kaiser Chem Kerr McGee Lundberg New Mexico Potash Texas Gulf
TA-731-376 File: 4/2/1987 Sufficiency:4/24/1987 USITC(P):5/18/1987 DoC(P):9/16/1987 DoC(F): 2/4/1988 USITC(F): 3/14/1988	Injury	Stainless steel butt weld fittings	Japan	Alloy Piping American Fittings Bestweld Custom Alloy Davis Pipes & Metal Flowline Flo Mac Franke Gerlin Ladish Taylor Forge

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-377 File: 4/22/1987 Sufficiency:5/18/1987 USITC(P):6/8/1987 DoC(P):11/24/1987 DoC(F): 4/15/1988 USITC(F): 5/31/1988	Injury	Internal combust-ion engine fork lift truck	Japan	Allis Chalmers AG Materials-Handling Baker Material Caterpillar Clark Equipment Hyster Pettibone Taylor Machine White Lift Truck Yale Materials
TA-731- File: 7/14/1987 Sufficiency: USITC(P):9/2/1987 DoC(P):2/2/1988 DoC(F):6/30/1988 USITC(F):8/15/1988	Threat	Electrical conductor aluminu m redrow rod	Venezu-ela	Alcoa Reynold Metals Kaiser Aluminum Alcan
TA-731-379-380 File: 7/20/1987 Sufficiency:8/14/1987 USITC(P):9/10/1987 DoC(P):2/1/1988 DoC(F): 6/21/1988 USITC(F): 7/29/1988	Injury	Brass sheet & Strip	Japan Nether-land	American Brass Bridgeport Brass Olin Revere Cooper Diversified-Industries Hussey Copper Miller Co MRM industries United Tech
TA-731-383 File: 8/4/1987 Sufficiency:8/27/1987 USITC(P):9/18/1987 DoC(P):1/15/1988 DoC(F): 4/1/1988 USITC(F): 5/13/1988	Negative	Bimetallic cylinders	Japan	Xaloy Bimex Wexco Wisconsin-Bimetallic Cast

Table C.1. *Continued*

Case No: Events: Dates	Outcome	Industry	Against	Firms
TA-731-384				
File: 9/1/1987		Nitrile rubber	Japan	B F Goodrich Copolymer Goodyear Uniroyal
Sufficiency:9/28/1987				
USITC(P):10/16/1987				
DoC(P):2/15/1988				
DoC(F): 4/29/1988				
USITC(F): 6/10/1988	Injury			
TA-731-385-386				
File: 11/6/1987		Granular polytetra-fluoro-ethylene resin	Japan	Du Pont I C I Allied Signal Ausimont USA
Sufficiency:12/3/1987				
USITC(P):12/21/1987				
DoC(P):4/20/1988				
DoC(F):7/5/1988				
USITC(F):8/16/1988	Injury			

Table C.2. Firms involved in petitions with publicly traded shares included in and deleted from the sample

Date Filed	Industry	No. of firms	Firms	Ticker	Deleted (v)	
					(v)	Reason
1/28/85	Rock Salt	1	Morton Thiokol	MTI		
1/30/85	Photo Album	2	Disney Walt	DIS		
			Kleer Vu Industries	KVU	v	See Note 1
2/19/85	Natural bristle paint brushes	1	Newell	NWL		
2/19/85	Low fuming brazing copper wire & rod	2	Atlantic Richfield	ARC		
			Alcan	AL		
3/25/85	Heavy Wallet rectangular welded carbon steel pipe and tubes	4	Cyclops	CYL	v	See Note 2
			Kaiser Aluminum	KLU	v	See Note 1
			National Intergroup	NII		
			Copperweld	COS		
5/13/85	Iron construction castings	1	Tyler	TYL		
6/5/85	Steel wire nails	2	Northwestern Steel & Wire	NSW	v	See Note 1
			Keystone-Consolidated	KES	v	See Note 3
6/24/85	64 K DRAMS	9	Amer Tel and Tel	T	v	See Note 4
			Adv. Micro D	AMD	v	See Note 4
			IBM	IBM	v	See Note 4
			Intel	INTC	v	See Note 4
			Micron	DRAM	v	See Note 4
			United Technology	UTX	v	See Note 4
			Nat. Semiconductor	NSM	v	See Note 4
			Motorola	MOT	v	See Note 4
			Texas Instruments	TXN	v	See Note 4

Table C.2. *Continued*

Date Filed	Industry	No. of firms	Firms	Ticker	Deleted (v) (v)	Deleted (v) Reason
7/31/85	Cast iron pipe fittings	3	ITT Grinnel Worthington Ind. Amcast Industrial	TYC WHTG ACST		
9/4/85	Candles	2	Gen. Housewares Brown Forman	GHW BFD.B	v v	See Note 1 See Note 1
9/16/85	Anhydro us-sodium metasilica te	3	Pennwalt Diamond Shamrock PPG Industries	PSM DRM PPG		
9/30/85	EPROMS	8	Advanced Micro D Intel United Technology Motorola National-Semiconductor Texas Instruments Rockwell Int'l Seeq Technology	AMD INTC UTX MOT NSM TXN ROK SEEQ	v v v v v v	See Note 4 See Note 4 See Note 4 See Note 4 See Note 4 See Note 4
10/24/85	Welded steel wire fabric products	1	Keystone-Consolidated	KES	v	See Note 3
2/24/86	Butt weld pipe fittings	3	Hi-Shear Industries Armco Trinity Indusries	H S I AS TRN		
3/10/86	Brass sheet and strip	5	Diversified Ind. Atlantic Richfield Quantum Chem. Olin Corp Chase of Standard-Oil Co.	DMC ARC CUE OLN SRD	v v v	See Note 1 See Note 1 See Note 1
5/23/86	Tubeless steel disc	2	Goodyear General Motor	GT GM		

Table C.2. *Continued*

Date Filed	Industry	No. of firms	Firms	Ticker	Deleted (v) (v)	Reason
7/16/86	Urea	5	Williams American-Cyanamid First Mississippi Inspiration-Resources W R Grace	WMB ACY FRM IRC GRA		
8/25/86	Tapered roller bearings	4	Timken Brenco Ingersoll-Rand Federal Mogul	TKR BRN IR FMO		
8/29/86	Malleable cast iron pipe fittings	3	ITT Amcast Industrial Worthington Ind.	TYC ACST WTHG		
10/2/86	Welded carbon steel pipe & tubes	2	Kaiser Aluminum National Intergroup	KLU NII	v	See Note 1
10/9/86	Forged steel crankshafts	3	Wyman Gordon Cummins Engine	WYMN CUM		
10/30/86	Portland hydraulic cement	3	Crane Ideal Basic Ind. Moore McCormack	CR IDL MMR	v	See Note 5
10/31/86	Aspirin	2	Dow Chemicals Sterling Drug Proctor and Gamble	DOW STY PG	v	See Note 6
11/5/86	Industrial phosphoric acid		Occidental-Petroleum FMC	OXY FMC	v	See Note 7

Table C.2. *Continued*

Date Filed	Industry	No. of firms	Firms	Ticker	Deleted (v)	
					(v)	Reason
11/26/86	Color picture tubes	3	Zenith General Electric North American-Phillips	ZE GE NPH	 v	 See Note 1
12/23/86	Fabric neophrene laminate	1	Warner Lambert	WLA		
2/10/87	Potassium chloride	4	AMAX Int'l mineral & Chemicals Kaiser Aluminum Kerr McGee	AMX IGL KLU KMG	 v	 See Note 1
4/2/87	Stainless steel butt weld pipe fittings	2	Armco Gulf & Western	AS GW		
4/22/87	Internal combustion engine fork lift trucks	4	Allis-Chalmers Caterpillar Clark Equipment FMC	AH CAT CKL FMC	v	See Note 1 See Note 7
7/14/87	Electrical conductor aluminum redrow rod	4	Alcoa Reynold Metals Kaiser Aluminum Alcan	AA RLM KLU AL	 v	 See Note 1
7/20/87	Brass sheet and strip	7	Olin Revere Copper Diversified Ind. Atlantic Richfield Nat'l Distillary & Chemicals United Technology Louisiana Land & Exploration	OLN RVB DMC ARC DR UTX LLX	 v v	 See Note 1 See Note 1

Table C.2. *Continued*

Date Filed	Industry	No. of firms	Firms	Ticker	Deleted (v)	
					(v)	Reason
9/1/87	Nitrile rubber	2	B. F. Goodrich Goodyear	GR GT		
11/6/87	Granular polytetra-fluoroethy-lene resin	3	E. I. Dupont I. C. Industries Allied Signal	DD ICX ALD		

Note 1: Lack of I/B/E/S data
Note 2: Merged with "Y" (Steel Fabrication & Component Business of Allegany Corp.) and became CYC.
Note 3: Overlapping investigation between a petition filed on 6/5/85 and a petition filed on 10/24/85.
Note 4: Overlapping investigation between petition filed on 6/24/85, 9/30/85, and on 12/6/85.
Note 5: Acquired by Southdown (SDW) in March 1988.
Note 6: Merged with Eastman Kodak (EK) in January 1988.
Note 7: Overlapping investigation between a petition filed on 11/5/86 and a petition filed on 4/22/87.