# Determinants of Firms' Exit In The Indian Electronics Industry

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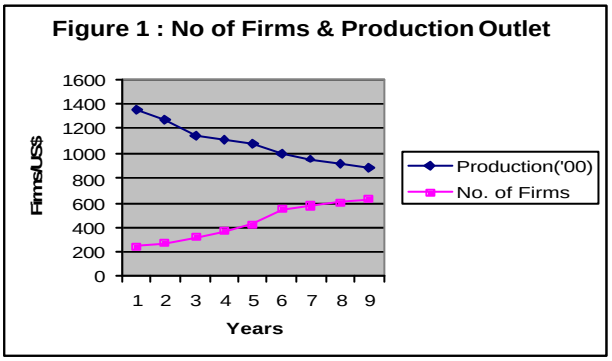
## PART - I
## INTRODUCTION

The beginnings of the Indian electronics industry reach back to the early 1960s. At that time, the electronics industry concentrated on developing and maintaining fundamental communication systems, such as radio-broadcasting, telephonic and telegraphic communication, and aimed at enhancing defense capabilities. Later, at the end of the 1980s, the electronics industry experienced a rapid growth as a result of outstanding economic changes. The latter were due to the liberalization and globalization efforts of the Indian government in order to trigger off economic growth and to promote the creation of an export-oriented electronics industry. By 1991, foreign and domestic private investments were encouraged. Foreign investment norms were eased, 100 % foreign equity was allowed, custom tariffs were reduced and many consumer electronic products were delicensed. These initiatives attracted a large amount of foreign investment and collaborations.

Today, the electronics industry as a whole, with the exception of aerospace and defense electronics, has been fully delicensed. Fiscal investment and trade policies for the electronics sector have also been liberalized. All components, raw materials and capital goods are freely importable. Sector specific schemes have been introduced to attract foreign investment and provide a duty free environment for export of electronic hardware and software under the export oriented schemes.

As India has become more open to foreign trade and investment, it has also emerged as a mass market for consumer electronics and telecom. For the time being, the consumer electronics segment also shows higher growth than the industrial electronics field. Reasons for this are the slow growth rates in core sector industries like steel, cement, petro-chemicals /refineries, textiles or paper mills to which the industrial electronics production is closely linked as it forms part of their supply chain. The existing demand for industrial electronics products is derived from process improvements of user industries, such as energy conservation and replacement markets; whereby value added services, such as application engineering and software system integration etc. are the key competence areas of the industry.

**Figure 1 : No of Firms & Production Outlet**




Though GOI did a great deal in providing favorable conditions for the electronic industry, its results on production of electronic products are positive, but on the other hand, the number of production units (firms) is continuously declining over time. Figure 1 clearly elucidates the above said statement, in year 2000 as 1 in X axis on Figure 1, production was $24500 and the production of firms were 1355 but in the next year i.e. 2001, production increased upto $27200, while the number of firms declined and came to lower level i.e. 127400. Similarly, in 2009 as in year 2008, production output is $625'00.Same pattern in production and exit of firms is followed in all subsequent years. Exit behaviors of firms in an industry is a major area of concern as it adversely affects other firms' operating in different industries which are supporting the electronic industry. The purpose of this paper is to derive the determinants influencing the decision of the firms' to exit from the Indian electronics industry. Defining

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which factor (beyond the product price) will have an impact on a firm's decision to exit from the industry provides both the government and the electronic industry organization powerful policy making information on the exit decision. This information can be used to focus on balanced flow of firms i.e. entry and exit to maintain a healthy electronics industry.

This paper examines how the probability of exit of a firm in a particular industry is related to the characteristics of the firms. It studies an industry in a developing country- The Indian electronics Industry. The products consist of Consumer Electronics, Industrial Electronics, Computer Hardware, Communication & Broadcasting, Strategic Electronics and Components. This is an important industry because it affects, in a major way, the productivity of other sectors of the economy and has received policy favors in recent years. It may be remarked that we do not know of similar studies of exit in electronic industry in other developing countries. Most previous studies of exit have used data from the manufacturing sector as whole or a group of industries (e.g. Evans-1987, Shapiro and Khemani-1987, henceforth, Audretch-1991, Mehmood-2000, Disney and Haskel and Heden-2003).

Needless to say, there are merits in studying a narrowly defined industry, in which firms face similar industry characteristics, even though the results for the industry may not be applicable to other countries. The established empirical regularities of previous studies (all related to developed countries) cannot hold and can be assumed to hold for the Indian electronics industry. In what follows, we use a reduced form approach to study the patterns in the Indian electronic industry and check whether the results are consistent with any of the existing previous studies. The next section introduces the methodology and data used to estimate the probability of firm exit and explains the hypothesis and the potential relationships between explanatory variables and the probability of a firm exiting the electronic industry in India. The third section explains the characteristics of data which we had used in our analysis. A result of the variables used in the regression framework is discussed in the fourth section and the fifth section summaries and concludes the results.

## PART - II
## METHODOLOGY

We look at firm exit in the Indian electronic industry as a dependent variable. A firm '***i***' is said to have exited the industry in the first time period (2000, 2001, 2002,2003) or second time period (2005,2006,2007,2008),if that firm '***i***' was not in activity in these time periods, but was in activity in the year 1999 or 2004 respectively. We have used firm identification number and every year production output to follow the enterprise changes from year-to-year and thus define the exit. To be on the safe side in computing life span, we checked the identification number and production output simultaneously. The probability of a firm exiting an industry is explained by the firm specific characteristics viz; firm age, excess revenue over variable cost, share of profit in revenue, innovation and advertising expenditure, financial strength or risk associated and effectiveness of its asset in raising revenue.

Firm age is defined as any positive real number determined by subtracting firm '***i***' year of establishment from 1999 for the first time period regression and 2004 for the second time period regression. For example, in the year 1999, age of firm '***i'*** (which exited (survived) in first time period and whose year of establishment is 1934) is 65 yrs (1999 – 'year of establishment') and in year 2004, age of firm ***I*** (which exited (survived) in the second time period and whose year of establishment is 1987) is 17 yrs (2004 – 'year of establishment').A number of studies examined the negative relationship between exit and firm age. Evans (1987) pioneering study on the relationship between firm dissolution and firm age uses US small business data and Disney, Haskel, Heden (2003) uses UK's ARD database to prove this relationship. Thus, it was expected that exit is negatively related with age or in other words, older firms have less likelihood of exit than newer firms.

The excess revenue over variable cost characteristic of a firm is termed as return over variable cost (ROVC) and defined as the net sales to variable (operating) cost ratio. Based on economic shut-down rule, it is hypothesized that firms earning lower return over variable cost will exit the industry[1].

A firm's profitability is also likely to be an important factor in the exit decision. As a firm fails to maintain an acceptable level of profits, its likelihood of survival diminishes. The profitability measure is defined by a proxy

[1] Hal R.Varian, Intermediate Microeconomics(sixth edition), page no.385.

variable Profit-Margin (PRM). It is a ratio of profit after tax to net sales, and measures a firm's profitability relative to sales. The relation between exit and profit-margin is expected to be negatively related[2].

One instrument that may enhance the survival of firms, at least under the entrepreneurial regime, is its innovative ability or competence. A firm's innovative competence (IC) is defined as a ratio between R&D expenditure to net sales. As the empirical results imply, **the technology conducive firms** are successful in reducing their cost and tend to promote their survival. Audretch (1991) in his study on new firm survival under new technology found that there is negative impact of innovation on firm exit decision. Firm exit is expected to be negatively related to innovation as greater R&D expenditure (innovation) is likely to improve firm efficiency and hence reduces the probability of a firm's exit.

The advertising dependency (AD) character of a firm implies the possibility of product differentiation in the industry in which it is operating. Presence of product differentiation in an industry gives the firm a power to differentiate their product and reduce the competition. It is measured by using a ratio of adverting expenditure to net sales, which evaluates how effective the firm's advertising campaign has been in generating sales. Shapiro and Khemani (1987) in their finding on the symmetry between entry and exit barriers found the negative impact of advertising expenditure on firm exit because advertising expenditure is a kind of sunk cost. Thus, it is expected that higher the ratio, less the probability of exit.

Financial strength or risk associated with a firm is defined by proxy named as debt ratio (DR) which is a ratio of total debt to total asset; it implies how much the firm relies on debt to finance assets. Higher the reliance on debt for asset formation, the more risky the firm is; since excessive debt will lead to a very huge interest and principle repayment burden (Kornai,1998).It is expected that debt ratio has a positive impact on firm exit decisions.

The return on asset or asset utilizing ability of a firm is determined by asset turnover ratio (ATR), which is a measure to assess the effectiveness of a firm in generating sales from asset or how efficiently a firm is using its assets to generate sales. Bragg and Dalton (2004) in their study on finding factors that effects the decision to exit in dairy industry introduced this measure and found that exit of dairy firms are negatively associated with asset turnover ratio. Hence, it is expected here that exit is negatively related with asset turnover ratio.

| Variable | Definition |
|---|---|
| AGE | Firm's age in year 1999 and 2003 |
| ROVC | Return over variable cost is the ratio of Net Sales to Variable Cost |
| PRM | Profit Margin of a firm is the ratio of Profit after Tax to Net Sales |
| IC | Innovative Competence is a ratio of R&D expenditure to Net Sales |
| AD | Advertising Dependency is a ratio of Advertising Expenditure to Net Sales |
| DR | Debt Ratio is a ratio of Total Debt to Total Assets |
| ATR | Asset Turnover Ratio is a ratio of Net Sales to Total Assets |

*Table 1.1 : Definition of explanatory variables*

Thus, we have used the Linear probability Model (LPM) technique to estimate the following relationship between dependent variable which is Exit and independent variables age, return over variable cost (ROVC),Profit Margin (PRM),innovative competence(IC),advertising dependency (AD),debt ratio(DR) and asset turnover ratio(ATR).

$$\mathbf{Pr(EXIT_{it} = 1) = F(AGE_{ij}, ROVC_{ij}, PRM_{ij}, IC_{ij}, AD_{ij}, DR_{ij}, ATR_{ij})}$$

Probability of firm '***i***' exit in the period $t \in \{Iperiod, IIperiod\}$ is a function of firm level characteristics existing in the year $j \in \{1999, 2003\}$ .Thus in equation form, the above relationship is estimated through the below given equation.

[2] Bernsetin and Wild, Analysis Of Financial Statements (fifth edition), page no.249.

$$E(Y_i \mid X_i) = P_i \quad b_0 + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i} + b_4 X_{4i} + b_5 X_{5i} + b_6 X_{6i} + b_7 X_{7i} + m_i$$

Left hand side of this equation is the expected probability of firm '***i***' to exit and is conditional upon the values of right hand side variables (X).

| | |
|---|---|
| $X_1$ | Age of firm (AGE) |
| $X_2$ | Return over variable cost (ROVC) |
| $X_3$ | Profit-Margin (PRM) |
| $X_4$ | Innovative Competence (IC) |
| $X_5$ | Advertising Dependency (AD) |
| $X_6$ | Debit Ratio (DR) |
| $X_7$ | Asset Turnover Ratio (ATR) |

*Table : 1.2*

$Y_{it}$ =Exit$_{it}$ ∈ {0, 1}.Since the probability must lie between 0 and 1, we have the restriction

$0 \leq E(Y_i \mid X_i) \leq 1$

That is conditional expectation, or conditional probability, must lie between 0 and 1.
Where $Y_i$ = 1 if the firm '***i***' is exited from industry or 0 if the firm '***i***' is still in the industry.

## PART - III
## DATA USED AND DATABASE CONSTRUCTION

The analysis of determinants of firm exit is conducted using dataset for Indian firms under NIC Code (32) classification which covers the manufacturers of Radio, Television and other Instruments and accessed from Prowess Database- a service provided by Center for Monitoring Indian Economy (CMIE). The dataset contains information about 132 firms operated in Indian electronic industry during the study period (1999-2008).Out of 132 firms, only 89 firms have the full information about all the firm level characteristics on yearly basis for the year 1999-2008 and it also satisfied our criteria of exit and survival. Any discrepancy in data forces us to drop the firm from our sample. Over the time period 2000-2008, out of total 89 firms, 15 firms had exited the Industry.
In the LPM regression for the first time period, 89 firms were active in 1999 in the Indian electronics industry and 8 of those firms had exited the industry by 2002.In the LPM regression for the second time period, 73 firms were active in 2004 and 8 of these firms had exited the Industry by 2008. The data is based on reported balance sheet, profit & loss account etc. It is structured by years from 1999 to 2008, thus making it possible to investigate firm exit in the electronics industry over time and all values are expressed in INR.

## PART - IV
## EMPIRICAL RESULTS

As we all know that LPM always suffers the problem of Heteroscedasticity[3], thus we have used the weighted least square method and assigned weights ($w_i$)[4] to each observation for estimating the efficient estimates. The estimating regression equation is shown below :

$$\frac{Y_i}{\sqrt{w_i}} = b_0 \frac{1}{\sqrt{w_i}} + b_1 \frac{X_{1i}}{\sqrt{w_i}} + b_2 \frac{X_{2i}}{\sqrt{w_i}} + b_3 \frac{X_{3i}}{\sqrt{w_i}} + b_4 \frac{X_{4i}}{\sqrt{w_i}} + b_5 \frac{X_{5i}}{\sqrt{w_i}} + b_6 \frac{X_{6i}}{\sqrt{w_i}} + b_7 \frac{X_{7i}}{\sqrt{w_i}} + \frac{m_i}{\sqrt{w_i}}$$

$$\sqrt{w_i} = \sqrt{E(Y_i \mid X_i)\left[1 - E(Y_i \mid X_i)\right]} = \sqrt{Y_{i(1-\bar{Y}i)}}$$

After transforming the data according to the calculated weights, we run the regression model for two successive periods. In the model of the first time period, the dependent variable (Exit) equals one if a firm that was active in 1999 exited the industry by 2004, otherwise it is zero. The probability of exit is related to a set of time-dependent

[3] Proof is given in the Appendix.
[4] Calculations of weights are given in the Appendix.

firm level characteristics as explained in table 1.1. In the model of second period ,the dependent variable(exit) equals one if a firm that was active in 2004 and had exited the industry by 2008.Using similar time dependent characteristics in our models allows us to test the robustness and consistency of the results. There might be possibility of Autocorrelation in our data, thus, we checked it using Durbin-Watson'd' test which was near about 2 for each period data, clearly accepting the null hypothesis $H_0$:ρ=0.

Table 1.3 and 1.4 report the LPM estimation results of the explanatory variables in an extended (first column of Tables) and restricted (second column) for the first time period and second time period respectively with their associated't' values and measures of goodness of fit. The restricted model excludes the variables Innovative competence (IC), Advertising Intensity (AD) and Financial Strength (DR), which are significant or insignificant in any one time period regression or includes the variables into the model which are consistently significant in both the time periods.

The value of $R^2$ for extended and restricted models for the first time period regression are .932 and .926 respectively and for the second time period regression with extended and restricted model are .941 and .957 respectively. This implies that near about 90 percent of variation in the probability of firm exit is explained by our extended and restricted models in the both the time periods.

In the extended models for both time periods, four variables (AGE, ROVC, PRM, ATR) are consistently significant at either 5 percent or 10 percent level of significance and remaining variables (IC,AD, DR) are significant or insignificant in any one time period. On the basis of consistency criteria i.e. Variables which are significant in any one of these time periods must also be significant in other time periods. We dropped these variables in the restricted Models. In the restricted Models, all the four variables which were significant in extended models are again found to be significant. However, the magnitudes of coefficients in both models are trivial. This kind of significances (inter- comparison of variables) between different time periods are used to find out the basic determinants of firm exit which are regular at all instances .

The negative sign on the variable age indicate that the likelihood of exit is reduced if a firm is older in the industry. Results from age variable support the Jovanovic's[3] predictions of the theory of firm growth in which entrepreneurs learn from their abilities overtime. Each year, extra survival gained by a firm reduces its probability of exit. Profit-margin provides a pushing force on exit decisions when it is positive or higher. When profit component in sales is higher, the probability of exit will be lower. Higher profit earnings allow a firm to develop distinct capabilities which enhances its ability to adapt to the changing competitive environment with diminution in its liquidity constraint and improves its survival prospects.

**Table 1.3 : First Period Regression Results**

| | Extended Model | Restricted Model |
|---|---|---|
| **CONSTANT** | **0.4591**<br>***5.921*** | **0.3604**<br>***5.526*** |
| **AGE** | **-0.0081***<br>***-2.614*** | **-0.00492****<br>***-2.387*** |
| **ROVC** | **-0.0043***<br>***-4.735*** | **-0.0042***<br>***-4.476*** |
| **PRM** | **-0.00035****<br>***-1.909*** | **-0.00031***<br>***-4.43*** |
| **IC** | **0.06532***<br>***2.923*** | |
| **AD** | **0.00353**<br>***0.217*** | |
| **DR** | **-0.00023**<br>***-0.344*** | |
| **ATR** | **0.00252***<br>***3.016*** | **0.0026***<br>***3.002*** |
| **$R^2$** | **0.932** | **0.926** |
| ***Adjusted $R^2$*** | **0.922** | **0.915** |

***- t-values are in italics***

***-*means significant at 5% level of significance***

***-**means significant at 10% level of significance***

***Table 1.3: First period regression Results:*** Negative sign on ROVC variable is consistent with the hypothesized result, higher ROVC reduces the likelihood of exit. Firms who are able to reduce per unit costs are less likely to exit. High asset turnover ratio represents the efficient use of assets, it may indicate that current management has undertaken the optimum investment to generate desired level of sales growth and also higher turnover increases the cash flows. The positive and significant coefficient rejects our hypothesis about the negative relationship. In Indian electronics industry, case firms having higher Asset turnover ratio (ATR) are more likely to exit is inconsistent with the previous studies on relationship between asset turnover ratio and exit.

**Table 1.4 : Second Period Regression Results**

| | Extended Model | Restricted Model |
|---|---|---|
| CONSTANT | 0.3063<br>*6.234* | 0.2898<br>*6.474* |
| AGE | -0.0076*<br>*-2.48* | -0.00432*<br>*-3.512* |
| ROVC | -0.0053*<br>*-5.665* | -0.0022*<br>*-6.262* |
| PRM | -0.00041**<br>*-2.083* | -0.0011**<br>*-2.613* |
| IC | 0.00795*<br>*0.776* | |
| AD | 0.0232*<br>*2.425* | |
| DR | -0.0003**<br>*-2.244* | |
| ATR | 0.00124*<br>*4.34* | 0.0015*<br>*6.294* |
| $R^2$ | 0.941 | 0.957 |
| *Adjusted* $R^2$ | 0.928 | 0.939 |

***- t-values are in italics***
***-*means significant at 5% level of significance***
***-**means significant at 10% level of significance***

***Table 1.4: Second period regression results:*** A positive association is found between Exit and IC. This illustrates that the firms that devote a greater share of net sales on R&D activities are more likely to exit from the industry. The reason might be that R&D expenditure is not helpful in increasing the efficiency of firms because they have high dependence on imported inputs, since most of the firms are not engaged in manufacturing facilities, while believing in assemblage of imported kits. This relationship is also inconsistent with previous studies.

Advertising dependency (AD) of a firm is positively associated to exit which implies that, although in consumer electronics industry, advertising plays an important role in generating sales through product differentiation, but when we consider the whole electronic industry i.e. Industrial electronics, strategic electronics etc., it would not be able to successfully raise sales revenue. This association is insignificant in the first time period but became significant in the second time period.

Debt ratio (DR) is found to be positively associated with Exit but it is insignificant in the first time period while significant in second time period indicating that greater the total debt to net sales, the higher the probability of a firm's exit. While one would expect high indebtness (high share of total debt on net sales), it is likely to lead to liquidity problems and high cost of financing, decreasing the financial performance i.e. greater part of revenue will be exhausted up by the debtors in the form of principle amount and interest payment and increasing the probability of firm exit.

## PART - V
## CONCLUSION

Many argue that low demand and hence low prices are the driving forces behind many firms ' exit from Indian electronic s industry and, therefore, price intervention will sluggish the number of firms choosing to exit the industry. This research identified an additional factor that affects a firm's decision to exit the electronic industry. Linear probability model is used to derive the determinants that play a significant role in the exit decision for a sample of firms from Indian electronic industry. Results from regression indicate that there are several factors, in addition to ROVC, which influence

a firm's exit decision. These additional factors include the firm's age, share of profit in net sales (profit-margin), asset utilization (asset turnover ratio), innovative competence, advertising dependency and financial strength (debt ratio). Results from regression returned expected sign on all variables, except on asset turn over ratio which is quite interesting. The likelihood of exit decreases as the firm's age and profit-margin grows. Higher ROVC is a good symbol of specialization in production process, thus likelihood of exit is lowered as the ROVC increases. Innovative competence and exit is positively related in Indian electronics industry. Interestingly, we also found that exit and asset turnover ratio of a firm is positively associated, which is pretty contradiction to the previous studies. Relationship of Advertising dependency and the debt ratio with probability of firm exit are also positive.

Since previous studies of Exit have focused on industries in developed countries, it would be interesting to study those industries in developing countries, which are facing heavy competition from foreign firms and experiencing heavy decline in number of production units or firms.

## APPENDIX

### 1.1 PROOF: LPM ALWAYS SUFFERS THE PROBLEM OF HETEROSCEDASTICITY

On the assumption of E($m_i$) = 0.

$$E(Y_i \mid X_i) = b_0 + b_1 X_{1i} + b_3 X_{3i} + b_4 X_{4i} + b_5 X_{5i} + b_6 X_{6i} + b_7 X_{7i} = Y_i$$

$$m_i = Y_i - b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i}$$

Now when

$$Y_i = 1 \Rightarrow m_i = 1 - b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i}$$

And when

$$Y_i = 0 \Rightarrow m_i = -b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i}$$

Which implies that $m_i$ follows the below given probability distribution

| P | $m_i$ |
|---|---|
| 0 | $-b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i}$ 1 |
| 1 | $1 - b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i}$ |

Now, by definition

Var ($m_i$) = E[$m_i$ - E($m_i$)]$^2$ = E($m_i^2$) since , E($m_i$) = 0 as assumed

Therefore, using the preceding probability distribution of $m_i$, we obtain

Var ($m_i$) = E($m_i^2$) = $(-b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i})^2 (1 - Y_i)$

+ $(1 - b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i})^2 (Y_i)$

Putting the value of $Y_i$ as given in above equation 1.1 we will get

$= (b_0 + b_1 X_{1i} - b_3 X_{3i} + b_4 X_{4i} + b_5 X_{5i} + b_6 X_{6i} + b_7 + X_{7i})(1 - b_0 - b_1 X_{1i} - b_3 X_{3i} - b_4 X_{4i} - b_5 X_{5i} - b_6 X_{6i} - b_7 X_{7i})$

Var ($m_i$) = $E(Y_i \mid X_i)\left[1 - E(Y_i \mid X_i)\right] = Y_i (1\text{-}Y_i)$

Which implies that the variance of $m_i$ is heteroscedastic because it depends on the conditional expectation of Y, which of course, depends on the value taken by X. Thus, ultimately the variance of $m_i$ depends on X and thus is not homoscedastic.

### 1.2: CALCULATION OF WEIGHTS

Running the OLS regression on

$$\hat{Y}_i = b_0 + b_1 X_{1i} + b_3 X_{3i} + b_4 X_{4i} + b_5 X_{5i} + b_6 X_{6i} + b_7 X_{7i} + m_i$$

Despite the heteroscedasticity problem and obtain $\hat{Y}_i$ = estimate of true $E(Y_i \mid X_i)$.

Then obtain. $w_i = E(Y_i \mid X_i)\left[1 - E(Y_i \mid X_i)\right] = Y_i\,(1\text{-}Y_i)$

Some of the estimated probabilities before correcting for heteroscedasticity were negative and some were in excess of 1;in these cases they were assumed to be .01 and .99,respectively,to facilitate the computation of the weights $w_i$.

**Weights for first time period regression are given in table below :**

| NO | Y | $\hat{Y}_i$ | $w_i$ | NO | Y | $\hat{Y}_i$ | $w_i$ |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 0.0719 | 0.0667 | 41 | 0 | -0.227 | 0.0099 |
| 2 | 0 | -0.0547 | 0.0099 | 42 | 0 | 0.0644 | 0.0603 |
| 3 | 0 | -0.343 | 0.0099 | 43 | 0 | 0.2898 | 0.2058 |
| 4 | 0 | 0.1368 | 0.1181 | 44 | 1 | 0.9948 | 0.0052 |
| 5 | 0 | 0.0797 | 0.0733 | 45 | 1 | 0.3992 | 0.2398 |
| 6 | 1 | 0.3496 | 0.2274 | 46 | 0 | 0.1441 | 0.1233 |
| 7 | 0 | -0.0742 | 0.0099 | 47 | 0 | 0.0685 | 0.0638 |
| 8 | 0 | -0.2102 | 0.0099 | 48 | 0 | 0.0544 | 0.0514 |
| 9 | 0 | 0.0716 | 0.0665 | 49 | 0 | 0.1978 | 0.1587 |
| 10 | 0 | 0.0353 | 0.0341 | 50 | 0 | 0.0869 | 0.0793 |
| 11 | 0 | 0.0357 | 0.0344 | 51 | 0 | 0.0473 | 0.0451 |
| 12 | 0 | 0.1602 | 0.1345 | 52 | 0 | 0.0806 | 0.0741 |
| 13 | 0 | -0.0389 | 0.0099 | 53 | 0 | -0.205 | 0.0099 |
| 14 | 0 | 0.031 | 0.0300 | 54 | 0 | 0.0458 | 0.0437 |
| 15 | 0 | 0.0726 | 0.0673 | 55 | 0 | 0.14 | 0.1204 |
| 16 | 0 | 0.183 | 0.1495 | 56 | 0 | 0.0352 | 0.0340 |
| 17 | 0 | 0.2642 | 0.1944 | 57 | 0 | 0.0893 | 0.0813 |
| 18 | 0 | 0.1677 | 0.1396 | 58 | 0 | 0.1786 | 0.1467 |
| 19 | 0 | -0.0075 | 0.0099 | 59 | 0 | -0.0349 | 0.0099 |
| 20 | 0 | 0.0597 | 0.0561 | 60 | 0 | 0.0881 | 0.0803 |
| 21 | 1 | 0.2713 | 0.1977 | 61 | 0 | 0.0209 | 0.0205 |
| 22 | 0 | 0.1311 | 0.1139 | 62 | 1 | 0.3543 | 0.2288 |
| 23 | 0 | -0.2407 | 0.0099 | 63 | 0 | 0.0639 | 0.0598 |
| 24 | 0 | -0.0311 | 0.0099 | 64 | 0 | 0.118 | 0.1041 |
| 25 | 0 | -0.0231 | 0.0099 | 65 | 0 | 0.0795 | 0.0732 |
| 26 | 0 | 0.1245 | 0.1090 | 66 | 0 | 0.1726 | 0.1428 |
| 27 | 0 | 0.0664 | 0.0620 | 67 | 0 | -0.0546 | 0.0099 |
| 28 | 0 | 0.0798 | 0.0734 | 68 | 0 | 0.1863 | 0.1516 |
| 29 | 1 | 0.4032 | 0.2406 | 69 | 0 | 0.0961 | 0.0869 |
| 30 | 0 | 0.6492 | 0.2277 | 70 | 1 | 0.3714 | 0.2335 |
| 31 | 0 | 0.0128 | 0.0126 | 71 | 0 | 0.04 | 0.0384 |
| 32 | 0 | 0.1192 | 0.1050 | 72 | 0 | 0.1407 | 0.1209 |
| 33 | 0 | -0.0614 | 0.0099 | 73 | 0 | 0.1076 | 0.0960 |
| 34 | 0 | 0.1081 | 0.0964 | 74 | 0 | 0.2978 | 0.2091 |
| 35 | 0 | -0.1316 | 0.0099 | 75 | 0 | -0.1397 | 0.0099 |
| 36 | 0 | -0.0289 | 0.0099 | 76 | 0 | 0.1712 | 0.1419 |
| 37 | 0 | 0.082 | 0.0753 | 77 | 1 | 0.5749 | 0.2444 |
| 38 | 0 | -0.0206 | 0.0099 | 78 | 0 | 0.1351 | 0.1168 |
| 39 | 0 | -0.0376 | 0.0099 | 79 | 0 | -0.0295 | 0.0099 |
| 40 | 0 | 0.0724 | 0.0672 | 80 | 0 | 0.1415 | 0.1215 |
| | | | | 81 | 0 | 0.079 | 0.0728 |

**Weights for Second time period regression are given in table below :**

| NO | Y | $\hat{Y}_i$ | $w_i$ | NO | Y | $\hat{Y}_i$ | $w_i$ |
|---|---|---|---|---|---|---|---|
| 1 | 0 | 0.0404 | 0.0388 | 40 | 0 | 0.0012 | 0.0012 |
| 2 | 0 | 0.0307 | 0.0298 | 41 | 0 | -0.1597 | 0.0099 |
| 3 | 0 | 0.0436 | 0.0417 | 42 | 0 | 0.0388 | 0.0373 |
| 4 | 1 | 0.2415 | 0.1832 | 43 | 0 | 0.0825 | 0.0757 |
| 5 | 0 | -0.1514 | 0.0099 | 44 | 0 | -0.2471 | 0.0099 |
| 6 | 0 | 0.1860 | 0.1514 | 45 | 0 | 0.0517 | 0.0491 |
| 7 | 0 | 0.1246 | 0.1091 | 46 | 0 | 0.1408 | 0.1210 |
| 8 | 0 | -0.0503 | 0.0099 | 47 | 0 | 0.0788 | 0.0726 |
| 9 | 0 | 0.1483 | 0.1263 | 48 | 0 | -0.1001 | 0.0099 |
| 10 | 0 | 0.1136 | 0.1007 | 49 | 0 | 0.0688 | 0.0641 |
| 11 | 1 | 0.7892 | 0.1664 | 50 | 0 | 0.0726 | 0.0673 |
| 12 | 0 | 0.1643 | 0.1373 | 51 | 0 | 0.0371 | 0.0357 |
| 13 | 1 | 0.7071 | 0.2071 | 52 | 0 | 0.0983 | 0.0886 |
| 14 | 0 | -0.0030 | 0.0099 | 53 | 0 | 0.0600 | 0.0564 |
| 15 | 0 | 0.0979 | 0.0883 | 54 | 0 | 0.0441 | 0.0422 |
| 16 | 0 | 0.0373 | 0.0359 | 55 | 0 | 0.1382 | 0.1191 |
| 17 | 0 | 0.0897 | 0.0816 | 56 | 0 | -0.0086 | 0.0099 |
| 18 | 0 | -0.0149 | 0.0099 | 57 | 0 | 0.0870 | 0.0794 |
| 19 | 0 | 0.0953 | 0.0862 | 58 | 0 | 0.0804 | 0.0739 |
| 20 | 0 | 0.0842 | 0.0771 | 59 | 0 | 0.0433 | 0.0414 |
| 21 | 0 | -0.3681 | 0.0099 | 60 | 0 | -0.1332 | 0.0099 |
| 22 | 0 | 0.0338 | 0.0326 | 61 | 0 | 0.1707 | 0.1415 |
| 23 | 0 | 0.0018 | 0.0018 | 62 | 0 | 0.0927 | 0.0841 |
| 24 | 1 | 0.3883 | 0.2375 | 63 | 0 | 0.0845 | 0.0774 |
| 25 | 0 | 0.0337 | 0.0326 | 64 | 1 | 1.3384 | 0.0099 |
| 26 | 0 | 0.0296 | 0.0287 | 65 | 0 | 0.0920 | 0.0835 |
| 27 | 1 | 0.3848 | 0.2367 | 66 | 0 | 0.3151 | 0.2158 |
| 28 | 0 | -0.0168 | 0.0099 | 67 | 0 | 0.1092 | 0.0973 |
| 29 | 0 | 0.0160 | 0.0158 | 68 | 0 | 0.0482 | 0.0458 |
| 30 | 1 | 0.3216 | 0.2182 | 69 | 0 | 0.0233 | 0.0228 |
| 31 | 0 | 0.1168 | 0.1032 | 70 | 0 | 0.0861 | 0.0787 |
| 32 | 0 | -0.0281 | 0.0099 | 71 | 0 | 0.1249 | 0.1093 |
| 33 | 0 | 0.1534 | 0.1299 | 72 | 0 | -0.0596 | 0.0099 |
| 34 | 0 | 0.1078 | 0.0962 | 73 | 0 | 0.0498 | 0.0473 |
| 35 | 0 | 0.0454 | 0.0434 | | | | |
| 36 | 0 | 0.0145 | 0.0142 | | | | |
| 37 | 0 | 0.0588 | 0.0553 | | | | |
| 38 | 0 | -0.0946 | 0.0099 | | | | |
| 39 | 0 | 0.0768 | 0.0709 | | | | |

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