CHAPTER 6

RESULTS AND ANALYSIS

Some data attached in the appendix are used in this chapter to estimate the trends and comparison of economic loss from road accidents and determine the road accident related factors.

This chapter is comprised of four sections; first, the model of estimated earning labor force in Thailand, second the trends of economic loss from road accidents, third the cost indicator of road accidents in relation to the base year 1985. The last section is devoted to the road accident related factors.

6.1 Data Analysis and Interpretation of Earning Function

The multiple regression is used to study how several independent variables (characteristics of labor force) act together to determine the value of dependent variable (total individual income).

The conclusion we draw from regression analysis will be acceptable when the independent variables are statistically independent of each other. This model found that it is not a linear model. The model is modified by adding school square term and age square term. The result of fitting these data to the earning function model is presented in table 6.1.1

Table 6.1.1 : Results of Regression Analysis of Earning Function Model :

Dependent Variable : The total income

Variables	Coefficient	Standard error	t statistic
Constant	- 4226.40	2060.30	- 2.051
AGE	154.38	19.79	7.800 ***
AGE^2	- 1.57	0.255	- 6.173 ***
SCHOOL	248.18	319.11	0.778
$SCHOOL^2$	-24.44	23.51	- 1.040
SEX	351.26	436.66	0.804
OCCP1	3332.35	1965.04	1.696 **
OCCP2	2932.74	2035.21	1.441 *
OCCP3	1845.23	1715.97	1.075
R Square	0.968		
Adjusted R Square	0.963		
F	197.99		

*** denote at 1% level of significance

** denote at 5% level of significance

* denote at 10 % level of significance

The regression result in table 6.1.1 demonstrates that 96% of the dependent variable variation can be explained by these independent variables. The relatively high adjusted R square indicates that independent variables are good proxies for determining the total income of each individual.

However, the school, $school^2$, occp3 and sex variables are not significant but these factors need to be kept in the model. The deleting of all of these variables, which have the relationship in economic theory, may result in others estimations being.

Statistic F = 197.99, significant at (8, 52) degrees of freedom with $p < 0.001$. means that overall the independent variables have influence to the dependent variables. The regression coefficient for two quantitative variables are positively related to the total individual income of labor force as follows:

AGE : the age of individual

SCHOOL : the years of schooling of individual

The regression coefficient for the qualitative variables are positively related to the total income of labor force as follows:

Sex : the male /female of individual

Occp1 : the group of professional, administration and clerical occupation

Occp2 : the group of sales and services occupation

Occp3 : the group of production, agriculture and labor occupation

6.2 Data Analysis and Interpretation of Economics Loss

6.2.1 Information and Calculation of All Loss at Constant Price

A. Cost of Treatment (TL1)

The information and calculation of cost of treatment for road accidents patients are shown in table 6.2.1. The cost of treatment are adjusted to 1988 constant prices by using consumer price index of health and personal care items.

Table 6.2.1 : Loss in Treatment Year 1981 – 1995

Year	No. of Injured Persons (persons)	Total Cost of Treatment at 1988 Price (Baht)
1981	79,009	265,555,570
1982	74,565	250,618,930
1983	82,106	275,964,834
1984	90,006	302,517,366
1985	86,058	289,247,823
1986	90,096	302,819,864
1987	97,338	327,160,805
1988	110,294	370,706,958
1989	124,173	417,355,387
1990	142,236	478,066,575
1991	159,477	536,014,955
1992	178,451	599,788,087
1993	138,773	466,427,155
1994	144,945	487,171,741
1995	166,642	560,097,093

Remarks : 1. Cost of treatment per one person is estimated to be 4,542 Baht at 1994 price.

2. column3 = column 2 * 4,542 * 0.72 (CPI at 1988)

B. Cost of damaged properties(TL2)

The information and value of cost on damaged properties from road accidents are shown in table 6.2.2. The cost on damaged properties are adjusted to 1988 constant prices by using consumer price index of non food and beverages items

Table 6.2.2 : Net Losses Damaged Properties of Road Accidents 1981 –1995

Year	Net Losses Incurred During Year (Baht)	CPI at 1988 of non food and beverages items	Total Loss on Damaged Properties (Baht)
1981	543,261,000	1.30	706,239,300
1982	611,102,000	1.21	739,433,420
1983	754,500,000	1.18	890,310,000
1984	1,035,432,000	1.15	1,190,746,800
1985	1,127,476,000	1.09	1,228,948,840
1986	1,232,465,000	1.06	1,306,412,900
1987	1,565,419,000	1.03	1,612,381,570
1988	2,175,186,000	1.00	2,175,186,000
1989	3,375,429,000	0.97	3,274,166,130
1990	5,071,429,000	0.92	4,665,714,680
1991	6,377,378,000	0.88	5,612,092,640
1992	7,770,881,000	0.85	6,605,248,850
1993	11,362,063,000	0.81	9,230,271,030
1994	14,188,417,000	0.78	11,066,965,260
1995	18,787,622,000	0.75	14,090,716,500

Remarks: Since, CPI of mobile vehicles items is not available, this loss are adjusted to 1988 constant prices by using CPI of non food and beverages items.

C. Opportunity Cost of Injured Persons (TL3)

The information and calculation of opportunity cost of injured persons shows in table 6.2.3. The number of work days lost are 23. Average individual income is 26,580 Baht per year. The earning figure is estimated from the earning function (section 6.1) by assuming average value of all independent variables.

Table : 6.2.3 Value of Opportunity Cost of Injured Persons 1981 – 1995

Year	No. of Injured Persons (Persons)	Total Value of Opportunity Cost of Injured Persons (Baht)
1981	79,009	132,332,499
1982	74,565	124,889,225
1983	82,106	137,519,677
1984	90,006	150,751,419
1985	86,058	144,138,898
1986	90,096	150,902,161
1987	97,338	163,031,816
1988	110,294	184,731,874
1989	124,173	207,977,868
1990	142,236	238,231,661
1991	159,477	267,108,683
1992	178,451	298,888,313
1993	138,773	232,431,468
1994	144,945	242,768,976
1995	166,642	279,109,371

Remark : Loss of Injured Persons = Injured Persons * (23/365) year * 26,580 Baht / year

D. Opportunity Cost of Disabled Persons (TL4)

The information and calculation of opportunity cost of disabled persons are shown in table 6.2.4. The number of work days loss are 6,000. Average individual income is 26,580 Baht per year. The earning figure is estimated the same as the opportunity cost of injured persons.

Table 6.2.4 : Value of Opportunity Cost of Disabled Persons 1981 – 1995

Year	No.of Disabled Persons (persons)	Total Value of Opportunity Cost of Injured Persons (Baht)
1981	5,544	2,422,348,274
1982	5,661	2,473,469,260
1983	5,739	2,507,549,918
1984	5,863	2,561,729,425
1985	6,003	2,622,899,836
1986	6,139	2,682,322,521
1987	6,244	2,728,200,329
1988	6,370	2,783,253,699
1989	6,477	2,830,005,370
1990	6,526	2,851,415,014
1991	6,660	2,883,747,945
1992	6,698	2,926,567,233
1993	6,761	2,954,093,918
1994	6,849	2,992,543,890
1995	6,891	3,010,895,014

Remarks : Column3 = column 2 * (6,000/365) * 26,580 Baht/year

E. Opportunity Cost of Family Care (TL5)

This loss is equal the loss in opportunity cost of injured persons. This study assumed to take care the injured persons on the basis of the ratio 1 : 1 (one relative : one patient) as shown in table 6.2.5

Table : 6.2.5 Value of Opportunity Cost of Family Care 1981 – 1995

Year	No. of Families Care (Persons)	Total Value of Opportunity Cost of Families Care (Baht)
1981	79,009	132,332,499
1982	74,565	124,889,225
1983	82,106	137,519,677
1984	90,006	150,751,419
1985	86,058	144,138,898
1986	90,096	150,902,161
1987	97,338	163,031,816
1988	110,294	184,731,874
1989	124,173	207,977,868
1990	142,236	238,231,661
1991	159,477	267,108,683
1992	178,451	298,888,313
1993	138,773	232,431,468
1994	144,945	242,768,976
1995	166,642	279,109,371

Remarks : column3 = column 2 * (23/365 year) * 26,580 Baht / year

F. Income Foregone (TL6)

The information and calculation of income foregone shows in table 6.2.6. Based on the earning function in section 6.1, average individual income is summation of the total income from age at death to 60 years.

Table : 6.2.6 Value of Foregone Income 1981 – 1995

Year	No. of Deaths (Persons)	Total Value of Income Foregone (Baht)
1981	6,567	4,754,202,926
1982	6,355	4,634,874,760
1983	6,322	4,241,471,714
1984	5,655	4,119,060,872
1985	4,315	3,126,021,206
1986	4,208	3,051,450,588
1987	4,411	3,247,366,660
1988	5,428	4,001,698,106
1989	6,617	4,857,593,823
1990	8,335	6,231,871,945
1991	10,155	7,802,220,213
1992	11,044	8,396,102,092
1993	12,321	9,391,863,507
1994	13,367	10,192,006,622
1995	14,479	11,140,169,911

6.2.2 Calculation for Total Direct Loss (TDL)

To calculate the total direct loss from all losses of road accident to 1988 constant prices as shown in table 6.2.7

TDL = TL1 + TL2

If

TDL = Total direct loss
TL1 = Total loss on treatment
TL2 = Total loss on damaged properties

Table 6.2.7 Total Direct Loss from Road Accidents

Year	TL1 (Treatment)	TL2 (Properties)	TDL (Total Direct)
1981	265,555,570	706,239,300	971,794,870
1982	250,618,930	739,433,420	990,052,350
1983	275,964,834	890,310,000	1,166,274,834
1984	302,517,366	1,190,746,800	1,493,264,166
1985	289,247,823	1,228,948,840	1,518,196,663
1986	302,819,864	1,306,412,900	1,609,232,764
1987	327,160,805	1,612,381,570	1,939,542,375
1988	370,706,958	2,175,186,000	2,545,892,958
1989	417,355,387	3,274,166,130	3,691,521,517
1990	478,066,575	4,665,714,680	5,143,781,255
1991	536,014,955	5,612,092,640	6,148,107,595
1992	599,788,087	6,605,248,850	7,205,036,937
1993	466,427,155	9,230,271,030	9,696,698,185
1994	487,171,741	11,066,965,260	11,554,137,001
1995	560,097,093	14,090,716,500	14,650,813,593

Remarks : column4 = column2 + column3

6.2.3 Calculation for Total Indirect Loss (TIDL)

To calculate the total indirect loss from all losses of road accident to 1988 constant prices as shown in table 6.2.8

TIDL = TL3 + TL4 + TL5 + TL6

If

TIDL = Total indirect loss
TL3 = Total loss opportunity cost of injured persons.
TL4 = Total loss opportunity cost of disabled persons.
TL5 = Total loss opportunity cost of families care.
TL6 = Total loss of income foregone.

Table 6.2.8 : Total Indirect Loss from Road Accidents Unit : Baht

Year	TL3	TL4	TL5	TL6	TIDL
1981	132,332,499	2,422,348,274	132,332,499	4,754,202,926	7,441,216,198
1982	124,889,225	2,473,469,200	124,889,225	4,634,874,760	7,358,122,410
1983	137,519,677	2,507,549,918	137,519,677	4,241,471,714	7,024,060,986
1984	150,751,419	2,561,729,425	150,751,419	4,119,060,872	6,982,293,135
1985	144,138,898	2,622,899,836	144,138,898	3,126,021,206	6,037,198,838
1986	150,902,161	2,682,322,521	150,902,161	3,051,450,588	6,035,577,431
1987	163,031,816	2,728,200,329	163,031,816	3,247,366,660	6,301,630,621
1988	184,731,874	2,783,253,699	184,731,874	4,001,698,106	7,154,415,553
1989	207,977,868	2,830,005,370	207,977,868	4,857,593,823	8,103,554,929
1990	238,231,661	2,851,415,014	238,231,661	6,231,871,945	9,559,750,281
1991	267,108,683	2,883,747,945	267,108,683	7,802,220,213	11,220,185,524
1992	298,888,313	2,926,567,233	298,888,313	8,396,102,092	11,920,445,951
1993	232,431,468	2,954,093,918	232,431,468	9,391,863,507	12,810,820,361
1994	242,768,976	2,992,543,890	242,768,976	10,192,006,622	13,670,088,464
1995	279,109,371	3,010,895,014	279,109,371	11,140,169,911	14,709,283,667

6.2.4 The Trends of Economic Loss from Road Accidents at 1988 Constant Price

To obtain the trends of economic loss from road accidents at 1988 constant prices in section 6.2.2 and total indirect loss in section 6.2.3 as shown in table 6.2.9

$$TLRA_{co} = TDL_{co} + TIDL_{co}$$

If

$TLRA_{co}$ = Total constant economic loss of road accident

TDL_{co} = Total constant direct economic loss

$TIDL_{co}$ = Total constant indirect economic loss

Table 6.2.9 The Trends of Economic Loss at Constant Price

Year	TDL	TIDL	Total Loss
1981	971,794,870	7,441,216,198	8,413,011,068
1982	990,052,350	7,358,122,410	8,348,174,760
1983	1,166,274,834	7,024,060,986	8,190,335,820
1984	1,493,264,166	6,982,293,135	8,475,557,301
1985	1,518,196,663	6,037,198,838	7,555,395,501
1986	1,609,232,764	6,035,577,431	7,644,810,195
1987	1,939,542,375	6,301,630,621	8,241,172,996
1988	2,545,892,958	7,154,415,553	9,700,308,511
1989	3,691,521,517	8,103,554,929	11,795,076,446
1990	5,143,781,255	9,559,750,281	14,703,531,536
1991	6,148,107,595	11,220,185,524	17,368,293,119
1992	7,205,036,937	11,920,445,951	19,125,482,888
1993	9,696,698,185	12,810,820,361	22,507,518,546
1994	11,554,137,001	13,670,088,464	25,224,225,465
1995	14,650,813,593	14,709,283,667	29,360,097,260

6.2.5 Information and Calculation the Trends of Economic Loss at Current Price

The economic loss at constant 1988 price are adjusted to the current price in each year by using consumer price index of all items as shown in table 6.2.10

Table 6.2.10 The Trends of Economic Loss at Current Price

Year	Economic Loss at Constant Price	Consumer Price Index of All Items	Economic Loss at Current Price
1981	8,413,011,068	0.82	6,898,669,076
1982	8,348,174,760	0.86	7,197,430,294
1983	8,190,335,820	0.89	7,289,398,880
1984	8,475,557,301	0.90	7,628,001,571
1985	7,555,395,501	0.92	6,950,963,861
1986	7,644,810,195	0.94	7,186,121,583
1987	8,241,172,996	0.96	7,911,526,076
1988	9,700,308,511	1.00	9,700,308,511
1989	11,795,076,446	1.05	12,384,830,268
1990	14,703,531,536	1.12	16,467,955,320
1991	17,368,293,119	1.18	20,494,585,880
1992	19,125,482,888	1.23	23,524,343,952
1993	22,507,518,546	1.27	28,584,548,553
1994	25,224,225,465	1.33	33,548,219,868
1995	29,360,097,260	1.41	41,397,737,137

6.3 Results of The Cost Indicator of Road Accidents

6.3.1 The Cost Indicator at Constant Price

From section 6.2.4, the trends of economic loss at constant price are constructed to the cost indicator of road accidents in relation to the base year 1985 as shown in table 6.3.1

Table 6.3.1 : Cost Indicator of Road Accidents at Constant Price

Year	Economics Loss at Constant Price (Baht)	Cost Indicator in relation to the base year 1985
1981	8,413,011,068	111.35
1982	8,348,174,760	110.49
1983	8,190,335,820	108.40
1984	8,475,557,301	112.18
1985	7,555,395,501	100.00
1986	7,644,810,195	101.18
1987	8,241,172,996	109.08
1988	9,700,308,511	128.39
1989	11,795,076,446	156.11
1990	14,703,531,536	194.61
1991	17,368,293,119	229.88
1992	19,125,482,888	253.14
1993	22,507,518,546	297.90
1994	25,224,225,465	333.86
1995	29,360,097,260	388.60

Remarks : Year 1985 for base year

6.3.2 The Cost Indicator at Current Price

From section 6.2.5, the trends of economic loss at current price are constructed to the cost indicator of road accidents in relation to the base year 1985 as shown in table 6.3.2

Table 6.3.2: Cost Indicator of Road Accidents at Current Price

Year	Economics Loss at Current Price (Baht)	Cost Indicator in relation to the base year 1985
1981	6,898,669,076	99.25
1982	7,197,430,294	103.55
1983	7,289,398,880	104.87
1984	7,628,001,571	109.74
1985	6,950,963,861	100.00
1986	7,186,121,583	103.38
1987	7,911,526,076	113.82
1988	9,700,308,511	139.55
1989	12,384,830,268	178.17
1990	16,467,955,230	236.92
1991	20,494,585,880	294.85
1992	23,524,343,952	338.43
1993	28,584,548,553	411.23
1994	33,548,219,868	482.64
1995	41,397,737,137	595.57

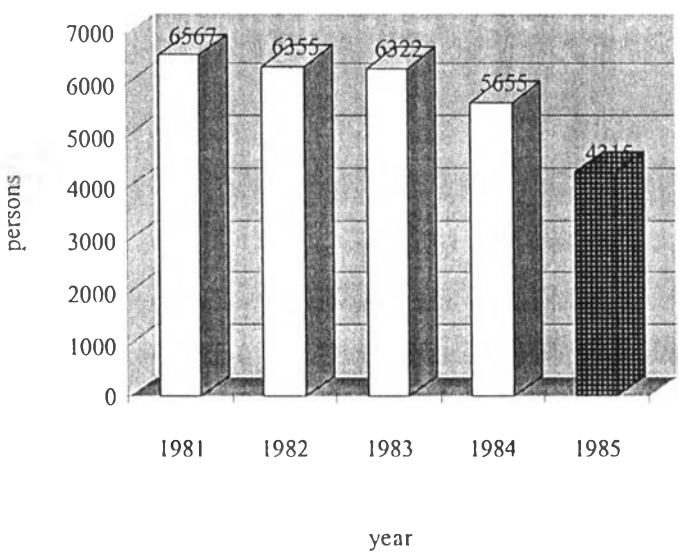
Remarks : Year 1985 for based year

The cost indicator of road accidents both at constant prices and current prices are higher than the based year, except the year 1981 of

economic loss at current price. This result displays the social cost from road accidents after the based year has considerably increased year after year.

Considering the cost indicator of road accidents at constant price of the years 1981 - 1985 and current price of the years 1982 - 1985, the trends are higher than in the base year as shown in figure 6.1, because the value of income foregone in these years was higher than the base year. The economic loss in both of these periods, which are used to construct the cost indicator of road accidents is rather higher than the base year.

Figure 6.3.1 Death of Persons from Road Accidents in 1981 - 1985



From this figure the years 1981 - 1984, the number of deaths from road accidents is higher than the year 1985.

The difference of cost indicator at constant price and current price is that the cost indicator at constant price indicates the magnitude of problem but at current price indicates the magnitude of problem and the price effect of the economic loss due to road accidents.

6.4 Data Analysis and Interpretation of the Factors of Road Transportation Budgets

The multiple regression is used to test how the impact of total road transportation budgets to the number of deaths from road accidents. It defined in section 5 .5 as follows:

$$Y_t = \beta_0 + \beta_1 \text{totalbudgets} + \beta_2 X4 + \ldots\ldots\ldots\ldots\ldots + \beta_9 X_{11} + \beta_{10} D_1 + \beta_{11} D2 + \beta_{12} D_3 + \varepsilon_1$$

The conclusion we draw from regression analysis will be acceptable when the independent variables are statistically independent of each other. Unfortunately as we see the correlation matrix of road accident as shown in appendix 2 (table 2.1).

Through testing the multicollonearity, the model is modified by(i) deleting X_4 variable (alcohol consumption); (ii) change the vehicles registration to the form of increasing the number of them for each year; and lastly (iii) add AR(1), AR(2) and AR(3) to correct the autocorrelation. The result of fitting total road transport budgets and other data to the number of deaths from road accidents is presented in table 6.5.1.

Table 6.4.1 : Results of Regression Analysis of the Factor of Total Budgets for Road Transportation

Dependent Variable : The number of deaths from road accidents

Variables	Coefficient	Standard error	t – statistic
Constant	10513.09	16767.52	0.6270
Totalbudgets	3.09E-08	3.31E-08	0.9307
X5	2.1363	15.8424	0.1348
X6	42.7673	19.4271	2.2014
X7	13.9888	32.8108	0.4263
X8	-0.0006	0.0013	-0.4945
X9	0.0174	0.0157	1.1054
X10	0.0011	0.0006	1.6181
X11	8.66E-05	0.0004	0.2075
D1	-708.5242	577.4597	-1.2270
D2	66.5475	865.9457	0.0769
D3	154.3008	532.5297	0.2890
R Square	0.983	Observations	35
Adjusted R Square	0.970	Durbin – Watson	1.912
F	74.627		

The regression result in Table 6.5.1, the total road budgets for road transportation variable is not a significant explanatory, at 5% level of significance, for number of deaths from road accidents.

This study investigates the combining of road transportation budgets for direct and indirect road safety. Testing and fitting the model uses the same methodology as the total road transportation budgets. The regression result of combining road transportation budgets for direct and indirect road safety is not a significant explanation, at 5% level of significance, for dependent number of deaths from road accidents.

Both of the results, this study will consider the road transportation budgets into 3 categories such as direct, indirect and neither direct nor indirect for road safety through the number of deaths from road accidents.

6.5 Data Analysis and Interpretation of Road Accident Related Factors

To explain the road accident related factors, a Least Square estimation method is used. The number of deaths from road accidents between 1962 and 1996, the set of independent quantitative and qualitative variables related to the road accidents which are used in the regression equations are shown in appendix 3 .

The multiple linear regression model defined in section 5.4 is as follows.

$$Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots\ldots + \beta_{11} X_{11} + \beta_{12} D_1 + \beta_{13} D2 + \beta_{14} D_3 + \varepsilon_t$$

Multiple regression allows us to study how several independent variables act together to determine the value of the dependent variable. The coefficients of these independent variables quantify their nature. The standard errors associated with each of the regression coefficients are used to quantify the precision with which we estimate how the different independent variable affect the dependent variable.

The conclusion we draw from regression analysis will be acceptable when the independent variables are statistically independent of each other, i.e , when the value of one of the independent variables does not depends on the values of any of the other independent variables. Unfortunately as we see the correlation matrix of road accidents model as shown in appendix 2 (Table 2.2) the independent variables may contain some redundant information and tend to vary together; this situation is called multicollinearity. Severe multicollinearity indicates that a substantial part of information in one or more of the independent variables is redundant. This makes it difficult to separate the effects of the different independent variables on the dependent variables.

Through testing the multicollinearity, the model is modified by:(i) transformation of the budgets variables (X1, X2, X3) to the form in percentage of budget allocation for road transportation in each year;(ii) change the vehicles registration to the form of incremental the number of them at each year; (iii) deleting the independent variables (X3, X11) which

are high correlated with other independent variables; (iv) add square term in x4 variables owing to the fact that the value of alcohol consumption is not linear in shape; (v) test the model for linearity, heteroskedasticity, multicollinearity and autocorrelation. The result of fitting these data to the mortality model shows in Table 6.4.1

Table 6.5.1 : Results of Regression Analysis of Road Accidents Model :

Dependent Variable : The number of deaths from road accidents

Variables	Coefficient	Standard error	t statistic
Constant	16125.7578	3157.2822	5.107
X1	-1248.5733	235.7659	-5.296 ***
X2	-194.3747	37.8452	-5.136 ***
X4	2.580E-05	2.045E-06	12.613 ***
X4^2	- 8.705E-15	1.4447E-15	-6.026 ***
X5	-0.5620	25.8858	- 0.022
X6	4.2716	26.1007	0.164
X7	75.7645	36.9932	2.048 *
X8	0.0044	0.0026	- 1.713
X9	0.0629	0.0246	2.571 **
X10	0.0021	0.0017	1.272
D1	-2127.7915	504.2694	- 4.220 ***
D2	-863.8537	752.0032	- 1.149
D3	-789.7986	1019.8691	- 0.774
R Square Adjusted R Square F	0.989 0.982 150.9648	Observations Durbin – Watson	35 1.8313

*** denote at 1% level of significance
** denote at 5% level of significance
* denote at 10 % level of significance

The regression result in Table 6.1.1 demonstrates that 98 % of the variation of the dependent variable can be explained by these independent variables. The relatively high adjusted R square indicates that independent variables are good proxies for determining the road accidents.

Statistic F = 150.96, significant at 13, 21 degrees of freedom with p < 0.001. It means that overall the independent variables have influence on the dependent variables.

6.4.1 Quantitative Independent Variables

From the regression result, the quantitative independent variables could be explained as follows:

1. Road Transportation Budgets for Direct Road Safety

The road transportation budgets for direct road safety is a significant explanatory variable for the dependent variable. The sign of the coefficient is just opposite to the dependent variables. It indicates that an increase in this budget will cause significant reduction in number of deaths from road accidents.

2. Road Transportation Budgets for Indirect Road Safety

Likewise road transportation budgets for direct road safety, this variable is a significant explanatory variable for the dependent variable. The coefficient of indirect road safety budgets is negative for the number of deaths from road accidents. The value of the coefficient for indirect road safety is higher than the value of coefficient for direct road safety. It points out this budget leading to reduce in number of deaths from road accidents, which is less than the direct budget for road safety.

3. Alcohol Consumption

Alcohol consumption is a significant explanatory variable for the dependent variable. The positive coefficient indicates that the higher the alcohol consumption, the more number of death persons may occur.

Square term of alcohol consumption was added to the regression model. The square term of alcohol consumption is a significant explanatory variable for the dependent variable but the sign of coefficient is just the opposite of what we expected. However, the result of the coefficient of the square term of alcohol consumption is the decreasing rate of a very low level.

4. Economic Growth

Economic growth of agricultural, manufacturing and services sectors are regarded as proxies of the increasing demand of transport on the roads. Based on the regression result, the economic growth of services sector is a significant explanatory variable for the dependent variable. The positive coefficient indicates the positive impact of economic growth in the services sector on the number of deaths from road accidents. Another two variables, economic growth of agricultural and manufacturing sectors, are not significant explanatory variables for the dependent variable.

5. Vehicles Registration

This variable modifies to the increasing of each type of vehicles registration, which are regarded as a proxies of traffic volume, because of the multicollinearity problem among all types of vehicle registration. The positive coefficient of the incremental bus registration points out that the higher incremental of bus registration has more risk for the number of deaths from road accidents.

6.4.2 Qualitative Independent Variables

The regression result, the qualitative independent variables could be explained as follows:

1. Traffic Law Legislation

The coefficient of the speed limits is negative for the number of deaths from road accidents. This is consistent with the general understanding of strict enforcement of this law. It shows that the speed limits law enforcement on the basis of full level can decrease the number of deaths from road accidents. Therefore, strengthening the speed limits law enforcement, will reduce the risk behavior of individuals.