Southeast SAS Users Group (SESUG) Conference 2013
St. Pete Beach, Florida -- October 20-23, 2013

PA-12
Increasing College Tuition and Its Impacts on Student Loans: An Econometric Analysis

Harjanto Djunaidi, Association of American Education Analytics
Monica Djunaidi, Association of American Education Analytics

Abstract

This study utilizes, applies and combines econometric analyses; managerial economics; multivariate statistical approaches; managerial accounting and SAS programming to examine one of the current and most heated and discussed topics in the US college history. The relationships among student loans, tuition and colleges spending as well as revenue generated from endowment returns are examined, analyzed, evaluated and scrutinized to answer many unsettled questions on their relationships. The results show that student loans do correlate positively and significantly with college tuition, administrative expenses, salary paid to the full professors, and money spent on public service activities. Any increases on these expense categories will have positive direct effects on the amount of loans that college students have to take. Investment returns generated from endowment are negatively and significantly related with the loans. Any inefficiency in managing college resources may lead and add college operational cost which only can be balanced by increasing tuition charged to the enrolled students, assuming revenues generated from other sources such as alumni's contributions do not change. Consequently, borrowers have to take more loans to complete their program of studies. Tax payers, currently enrolled students and alumni have no choice but to bail out their respective college from any inefficiency and operational cost increases. Otherwise, the colleges are risked to face both liquidity and solvency problems. Therefore, managing and controlling college spending are vital to reduce the cost of education. These efforts along with the ability to increase endowment fund and it investment returns are the most important key strategies to cope with the new realities.

Introduction

In the beginning of 2013, there were many articles that have been written in the media about college cost and student loans. The society has asked the real reasons behind such an increasing in the college cost. The American public becomes weary knowing that the total national student loans surpassed $ 1 trillion mark as reported in various media. The potential

default of the loans is imminent, partly due to prolonged weak job market in the US and the phenomenal and fundamental structural changes that have happened in the industry and the US economy. Recent studies showed that there are 7 million student loans borrowers who cannot pay their loans as expected (John Sandman). The structural changes in the job market and in the new economy seem to have changed the situation from bad to worse. After the 2008 housing and financial crises, some of the old skills learned at US colleges are no longer fit and needed in the new economy. Students graduated in certain fields cannot find a proper job simply because the new economy does not need such skills anymore. Consequently, this group of students is taking jobs which do not require a college degree. This means time and money have been wasted. This new reality needs to be considered very seriously by the students or college applicants before making their final decision what to study. At the same time, this new fact needs to be observed by the US colleges of what programs that they need to offer to their clientele. Otherwise, economic resources and tax payers' money will be wasted even more. Because of the the increasing public outcries, on August 22nd, 2013, the administration announced to tie College Affordability Rating (CAR) with the federal financial aid such as Pell grant. Colleges with higher CAR[1] will receive more federal money compared to those with lower rating. Pressures are coming from all directions to urge colleges' administrators to increase and improve their operational efficiency so that tuition and student debts can be minimized.

The phenomenal and fundamental structural changes surely will affect the whole infrastructures that have been built for years by the colleges. The relevant question that one might ask is what type of investments is needed and right for the society? Are we going to put more money in the college sport programs and facilities or if building new infrastructures in science, math and engineering is a better choice? Given tremendous changes that are occurring in the industry, the risk of failures on any type of college investments are increasing. For example, do the administrators need to prioritize their spending on building more classrooms or to increase the quality of teaching? In the past the answer to such a question will be both. However, given a decreasing public and private funding, will the decision to go both ways are reasonable? When resources get tighter then prioritizing investment and choices becomes more relevant. US colleges will certainly have to face the same problems that most manufacturing companies in the US have experienced many years ago. The only different on this current issue facing the US colleges compared to the manufacturing industry is that colleges cannot relocate their operation and classrooms to other locations (countries) as the manufacturing industry has done in the past. Survival choices are somewhat more limited for the colleges. Therefore, the only option for most of them to survive the phenomenal changes that are taking place is to change their mindsets

---

[1]Complete CAR ratings are available on the following book: College Affordability Rating: Strategy to Increase Federal Financial Aid, Academy Data Analytics Publisher, First Edition 2013. AAEA has calculated the CAR rating for most US colleges. The results can be read through the following website or link: (http://www.aaea.us/recent-education-policy-changes/).

and to adapt their operational paradigms. Institutional Research Intelligence (IRI) which is an education analytics approach offers such survival tools and way out to cope with the changes.

One simple thing that colleges can do to increase its efficiency is to compare between the money spent and the value it has created. Every single penny paid for good or services need to be linked with the amount of returns generated as the results of that spending. In other words, the time for spending sprees that do not generate more or increase the value of education has come to an end, not just now, but supposed to be many years ago.

Many families, potential students and various groups in the society are seeking for answers on the cause of college cost increases. With so many financial and tax privileges that have been given to the colleges, the tuition should not be increased every year. However, in the real word, it just goes perfectly to the other way around. What factors that have caused the college cost to increase annually? Are there any justifiable reasons for its increases? Most past analyses and studies have mentioned that the college cost rising has surpassed the inflation rate, without further explanations. Therefore, the tax payers are puzzled what will be the real reasons behind it continuous increases? Apparently the tax payers, students and their family are getting tired of supporting the college by constantly taking the student loans or making contributions and paying for something they should not. There are pressing questions which the society has been waiting for many years ago to find the possible answers to such long and overdue questions.

There are two objectives in writing this paper. The first objective is to help finding answers of the society's questions. The second purpose is to make the colleges aware that they need to change the way to manage their institutions. The college administrators need to understand that the old ways in managing colleges has passed many years ago. With more limited resources that the society has, college decision makers have to change their old operating mindsets. They just cannot simply pass the whole college operational inefficiency or budget deficit to the tax payers, the society or the students to finance them. With the student loans are over $1 trillion which is higher than the credit card loans, the college administrators have to control their spending by increasing and improving their institution's operational efficiency or if necessary to cut some of the benefits such as health insurance or matching retirement fund or even abandon the faculty members' life-time labor contracts (tenure system). The students who actually have bailed the college out for many years may not be able to keep financing the budget shortages simply because they are having a hard time to find jobs. That is the reason why the recent data show there are 7 million borrowers who are running behind in their loans payment. If each of them, on average has $10k outstanding loans then there are $70 billion worth of bad loans[2]. This may not be the issues many years ago when the job markets are stronger to absorb

[2] This bad loans need to be bailed out. Sadly, the "good" borrowers have to pay for it, and the money does not come directly from the taxpayers' pockets as it was in 2008 bank bailed out. On July 12, 2013, the regulator announced that they have switched, transferred or shifted the loans servicers to four profit financial institutions and 4 non-profit organizations as reported by Credit.Com on August 14, 2013. There is a good chance that good borrowers' outstanding loan balances swell after their loans got transferred to

college graduates. But the reality has changed as the time lapses. Therefore, the US colleges have to adapt their policy, operation, management styles, strategies and mindsets as well to cope with these recent dynamic changes in order to survive. Ignoring this fact may potentially lead to many college closures, take-over, mergers or college dilutions. On Thursday, August 22, 2013, the regulator announced that it has made the plan to link college affordability ratings with federal financial aid awards (CNBC).

Theoretical Background and the Econometrics Model

The amount of loans that students will take depends on many factors, but these factors can be grouped into their academic credentials, revenue and cost factors. The last two factors will be the focus of this study. Theoretically, one can explain and analyze such an increase in the college cost using economic theories combined with comparative equilibrium analyses. In this paper, it is assumed that the education industry meets all the requirements for perfect competition (PC) market structure assumptions as discussed in the standard economics theory. However, this market structure may not be true in the real life. For example, products or education services offered by each college are not homogeneous, even though the name of the courses is the same. Chemistry 101 taught at the University of Chicago (UC) may not be the same as that of the University of Nowhere's. For the UC offers different levels (variants) of Chem 101, though the name is the same. The perfect competition assumption can be justified because the education industry has been around for years, and therefore may meet the long-run condition assumption[3].

As shown in Figure 1, before any tuition increases, a particular college operates at point B_0 where the tuition curve/ horizontal line (T_0) touches the average cost (AC_0) at its lowest or

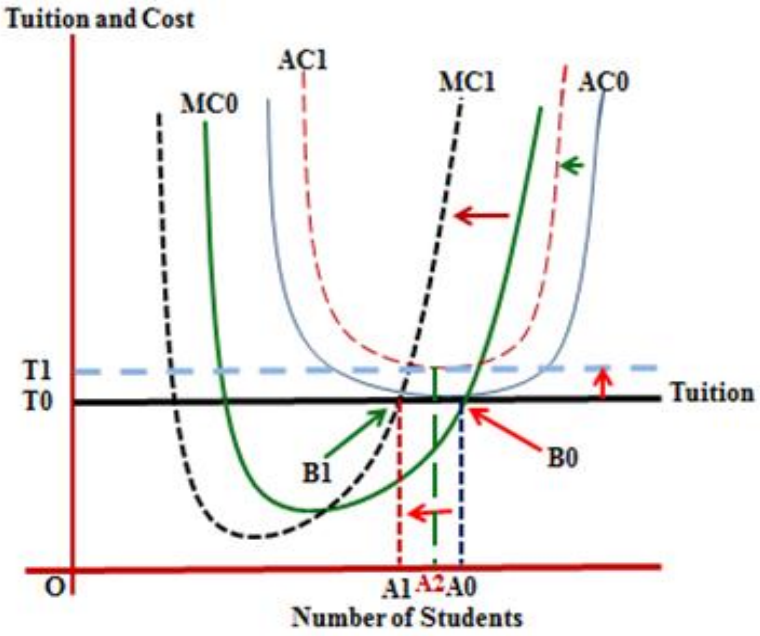
---

the new servicers. Though, one does not know the real reasons of the transferring loans policy to other servicers, it can also be inferred as selling (accounting jargon for it is factoring) the outstanding loans to those mentioned companies. The buyers of the loans will pick the borrowers with good payment history. The regulators will get their money back (perhaps including the bad loans from the buyers), and use the in-flow cash for the next cycle in the loans business. The new owners of the loans will pass any "transaction cost" plus "profit margin" plus the bad loans (if they are included in the agreed purchase price) to the borrowers. Another possible horrifying story is that when the loan got transferred from Department of Education to the new servicer entities; either profit, semi-profit or not-profit organizations then the total original borrowed amount and not the last and current loan balance was transferred. This means, payments that have been done prior to that will not showed up on the borrowers' account with the new loan servicer institutions. Therefore, the borrowers have to pay twice to different entities from the same originated loans. Therefore, the "new loans" that the "good" borrowers have to pay may increase tremendously. New owners of the loans and the regulator are the apparent winners of this transaction, and the students are the clear losers, which is a tragic and unfortunate.

[3] All information is assumed to be revealed in the long-run which leads institution to operate at a break-even point.

minimum point and the number of enrolled students at that point equal to OA_0.

Figure 1 - College Cost and Tuition



Operating at point B_0 (the ideal point/IP) signifies four important points: (1). The college is operating at its most efficient and lowest cost and at the same time (2). Fulfill its legal status as a non-profit (breakeven) organization and therefore exempt from paying tax; and (3). Delivering best possible education values to their customers such that students' and their family members' utility function (satisfaction) are max out and (4). All resources are employed efficiently. Needless to say that currently, not too many US colleges if none at all even know where (at what point) they are operating at this moment. As results the colleges are managed without any accurate and not even with enough strategic information. Surprisingly, almost all college administrators have only one common goal, and that is to increase student enrollment (exception to top-tier schools). The most recent example of this unfortunate decision occurred in Virginia. The state university has made a dicision to reduce the financial support and grants to the lower income students. Two reasons were cited. (1). The institution has increased its enrollment and (2). The support program runs through AccessUVa is too expensive. (http://www.businessweek.com/articles/2013-08-08/uva-tells-low-income-students-to-borrow-for-school?campaign_id=yhoo). Using Figure 1 above, one might agree with the school administrators in Virginia if they are operating at any point prior reaching point B_0 where increase in enrollment will lower the average cost (AC_0). However, beyond that point, any attempt to increase student enrollment will results on higher average operational cost. This analysis is confirmed in the real world as shown what has happened in the state of Virginia. When the pool of money is not enough for everyone, then the buyers for the education have to pay more education cost from their own pocket. The school's administrators can avoid such decisions if they keep the

enrollment at IP (ideal point), and award the financial aids based on the probability of success from each applicant. This IRI tool (how to calculate the probability of failure) has been written and presented by the authors at 2012 SCSUG meeting in Houston, TX and at 2013 MWSUG meeting in Columbus, OH.

When the US economy experiences a significant structural change in more recent years, it also affects the college operating cost. For example, inrease insurance premiums, utilities and classrooms maintanance cost or teaching, staff and administrators' salaries and other fringe benefits have pushed the operational cost up. Increasing operational cost is shown by the shift of the average cost up from AC_0 to $AC_1$and the marginal cost moves from MC_0 to MC_1. Under the new condition, the college cannot operates at its original ideal point (IP) anymore. When the IP changes, the institution no longer can enroll OA_0 number of students, unless it is able to raise enough alumni contributions[4] and endowment fund where its return can be used to offset the additional operating cost. But the AC will not drop back from AC_1 to AC_0. This means the institution has to operate at a higher operational cost to provide the same level of services to the same enrolled student (OA_0). This is one of the obvious reasons why alumni always get invited to attend annual fund drive. While all fund raising efforts are expensive, time-consuming, require a hardwork and inconvinience, then the colleges have no choice, but turn to their currently enrolled students to fill the budget gap if not enough money is generated. Successful fund-raising campaigns may lead the college to keep their tuition at T_0. However, chances are pretty good that the admistrators who are operating under the dark (with no strategic information) will charge the tuition at T_1 so long the school Board stamps it.

Data and SAS Codes

This paper examines the relationships among the college cost, tuition and student loans by applying econometric approaches. Spending supposed to be the main drivers in college cost increases over many years in the past and therefore may explain the reasons behind the student loans increase. This is the maintained hypothesis which this study tries to answer. Knowing such relationships will shed the light and give directions to the decision makers of what needs to be done to keep the college cost reasonable, competitive and therefore lower the amount of loans that students have to take.

In addition to the four cost categories as listed below which serve as the independent variables in the equation, this study also considers other variables which may lower the tuition such as revenue generated from endowment investment or alumni contributions. This paper looks closely on public and not-for-profit institutions and their undergraduate programs.

NCES/IPEDS has classified college cost into four categories. These four categories make up a 100 percent of college total spending. These four-group of cost are admin_share,

[4]The Alumni Office is pretty active in contacting its members for their contributions.

research_share instruction_share, and pubserv_share variables. Following the NCES/IPEDS definition, these four variables show the facts where the revenue generated from tuition and other sources is spent. The definitions of these variables are:

1. Admin_share: Academic and institutional support and operations and maintenance share of education and related expenses.
2. Instruction_share: Instruction share of education and related expenses.
3. Pubserv_share: Public service-related share of expenses.
4. Research_share: Research-related share of expenses.

The data set contents all US public and not-for profit colleges and universities along with other education organizations. Some of the early year's shares data are missing. Therefore, some schools may have more data/observations than others. If the data are not available, then the schools will be deleted from this study. We are not trying to fill the missing observations using the most common technique. Therefore, whatever we got from the data source, it will be presented in the analyses. This approach will certainly help avoiding any unnecessary discussions regarding the accuracy of the data and it permits one to focus on the important issues and try to find the answer which may help fixing the broken wheels.

The following three variables are added in the analyses:

1. `loan_avg_amount`: Average amount of student loans received by full-time first-time degree/certificate-seeking undergraduates.
2. `tuitionfee02_tf`: In-state tuition and fees for full-time undergraduates (Sticker price).
3. `eandg01_sum`: Total education and general expenditures, current year total (adjusted).

The `loan_avg_amount` is the dependent variable in the equation while the `tuitionfee02_tf` will be added in the right hand side of the equation. Total education and general expenses are shown by variable `eandg01_sum`. To eliminate the inflation effects which may possibly skew the analyses, this study has transformed all these cost variables in the 2010 constant dollar as presented by `hepi_scalar_2010` variable. The following SAS codes are used to produce the results:

```
DATA FAC; SET LOV.ALLOUT2_OUT;
If admin_share='.' Then Delete;
If instruction_share='.' Then Delete;
If pubserv_share='.' Then Delete;
If research_share='.' Then Delete;
Rtuition=(tuitionfee02_tf)/(hepi_scalar_2010);
TEDGEN=(eandg01_sum)/hepi_scalar_2010;
EFFIC1=(admin_share*TEDGEN);
EFFIC2=(instruction_share*TEDGEN);
EFFIC3=(research_share*TEDGEN);
EFFIC4=(pubserv_share*TEDGEN);
L1RLOANS=LAG(RLOANS);
RLOANS=(loan_avg_amount)/(hepi_scalar_2010);
RUN;
```

```
PROC REG DATA=FAC;
MODEL RLOANS= L1RLOANS RTUITION L1RINVEST EFFIC1 EFFIC2 EFFIC3 EFFIC4/COLLIN
DW DWPROB;
RUN;
```

The collinearity and autocorrelation problems on regression residuals are checked using the `COLLIN and DW` in the PROC REG option. Without the lagged dependent (L1RLOANS) variable, the above model suffers autocorrelation problem. Therefore, this variable is added into the right-hand-side of the equation. The results of econometric estimation and other regression output are presented in Appendix-1.

SAS Output

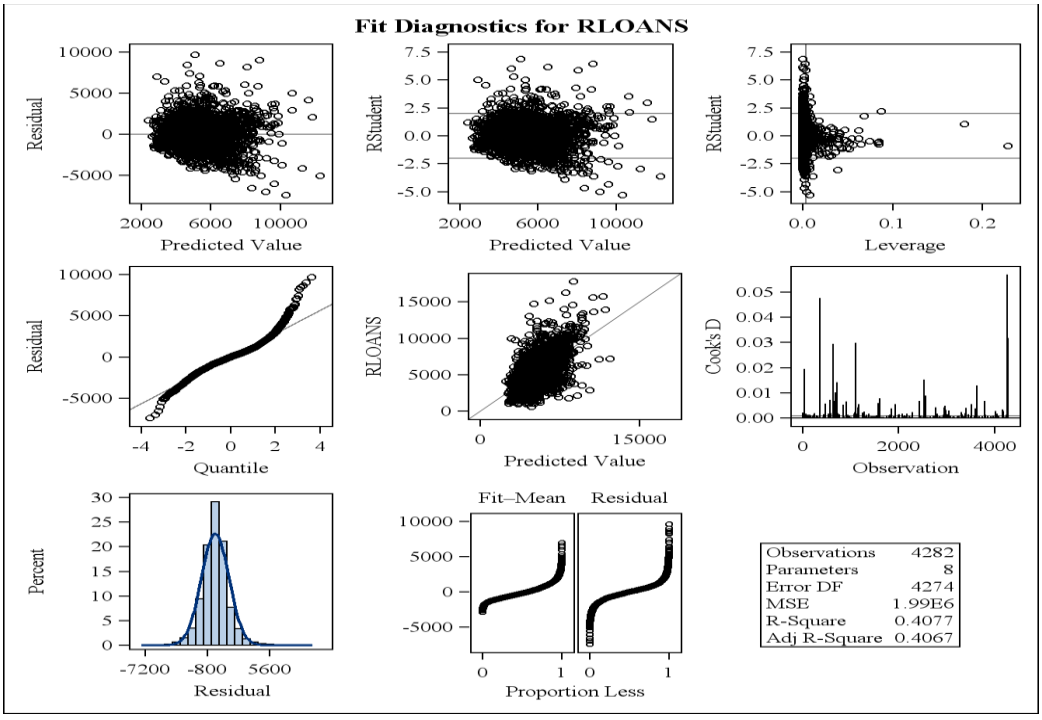
Appendix 1- Regression Results on Student Loans and College Cost

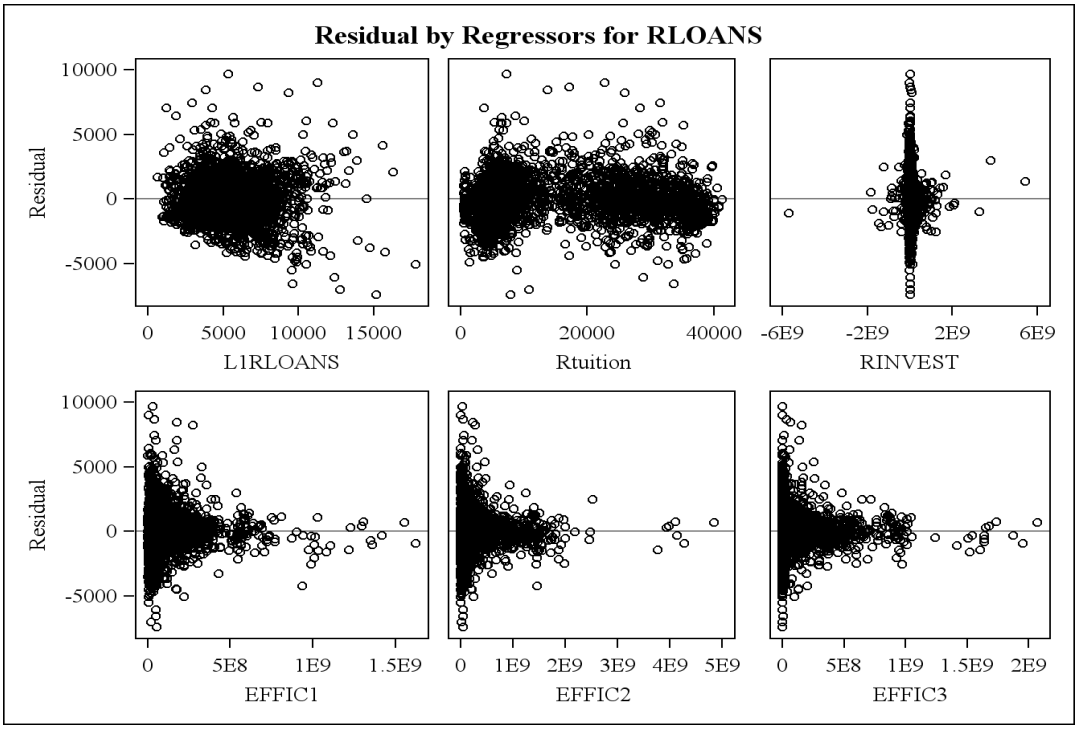
Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	7	5843036715	834719531	420.23	<.0001
Error	4274	8489550013	1986324		
Corrected Total	4281	14332586728			

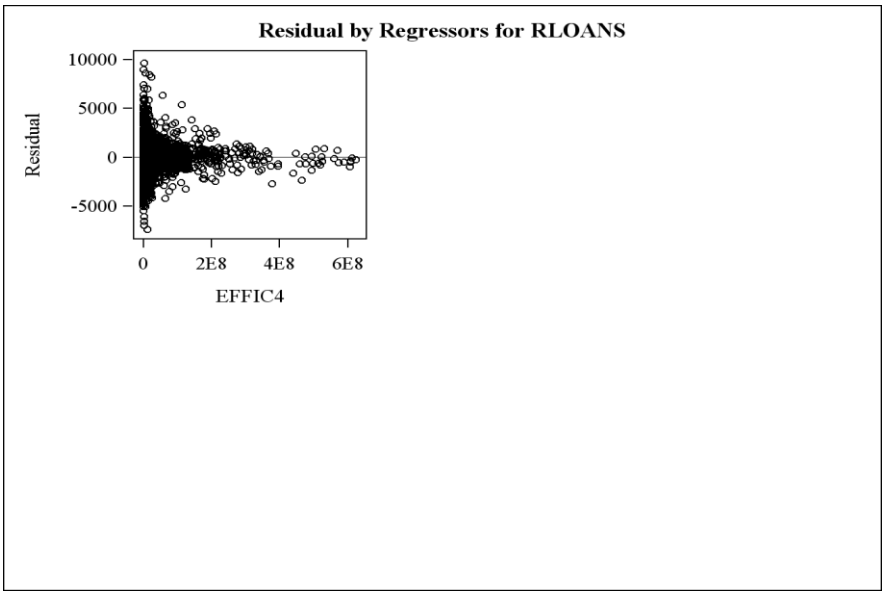
Parameter Estimates					
Variable	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	1	2020.27141	66.87905	30.21	<.0001
L1RLOANS	1	0.52361	0.01259	41.59	<.0001
Rtuition	1	0.03764	0.00218	17.30	<.0001
RINVEST	1	-5.91853E-7	1.118555E-7	-5.29	<.0001
EFFIC1	1	0.00000107	4.172359E-7	2.56	0.0104
EFFIC2	1	-3.55467E-7	2.296351E-7	-1.55	0.1217
EFFIC3	1	-1.34582E-8	3.292702E-7	-0.04	0.9674
EFFIC4	1	9.009399E-7	5.267979E-7	1.71	0.0873

Collinearity Diagnostics										
			Proportion of Variation							
Number	Eigenvalue	Condition Index	Intercept	L1RLOANS	Rtuition	RINVEST	EFFIC1	EFFIC2	EFFIC3	EFFIC4
1	4.53770	1.00000	0.00291	0.00259	0.00797	0.00377	0.00452	0.00239	0.00395	0.01068
2	1.66950	1.64864	0.01254	0.01262	0.04932	0.00979	0.00285	0.00335	0.00870	0.01981
3	0.93815	2.19929	0.00017182	0.00006718	0.00507	0.90267	0.00049425	0.00031380	0.00012667	0.01953
4	0.38879	3.41633	0.01020	0.00546	0.09164	0.07379	0.01870	0.00453	0.03854	0.61010
5	0.27050	4.09574	0.06247	0.03082	0.80569	0.00650	0.00785	0.00064323	0.00256	0.21321
6	0.09870	6.78061	0.00268	0.01474	0.00011245	0.00290	0.62229	0.00004671	0.51330	0.00191
7	0.05380	9.18394	0.85235	0.87746	0.03961	0.00030074	0.03300	0.03695	0.00688	0.00613
8	0.04287	10.28814	0.05668	0.05625	0.00059080	0.00028094	0.31030	0.95177	0.42594	0.11864

Durbin-Watson D	1.939
Pr < DW	0.0199
Pr > DW	0.9801
Number of Observations	4282
1st Order Autocorrelation	0.030







Results and Conclusion

The estimation output shows that student loans are positively and significantly related with its lagged variable; college tuition; and money spent on administrative and public services. Positive correlation means, the higher the spending on these expense groups, the more loans that the students have to take. On the other hand, the student loans have a negative relationship with returns from investment. Other spending on research and teaching have no significant impact on

student loans. We have long hypothesized that the interest rates with all the hypes on student loans that the Law Makers are trying to do will not cure the real problems for they may not be the right prescriptions. It just tries to treat the symptoms and not the real disease or illness. On the other hand, this study statistically shows that managing and controlling college operating cost will bring the cost of education down significantly, and therefore may ease the student loan problems.

We further our study by taking a sample of 50 universities which is randomly taken across the US from IPEDS and NCES data. We use two years of data i.e., 2008 and 2009 and applied regression analyses to test the maintained hypotheses that fringe benefit and faculty salary have zero impact on college tuition. The dependent variable (X150) is the in-state tuition and fees (sticker price). There are four independent variables in the model and these variables are paid fringe benefit (X99), and salary paid by each institution to its faculty member by rank i.e., Full (X185), Associate (X188) and Assistant Professor (X191). Test the Heterokedasticity on the residual for cross sectional data are used in the analyses. The results show that in any of the four regressions the null hypotheses of Homokedastic fail to be rejected. Two models were estimated for each academic year. The first estimated model is applied on nominal data while the second model was estimated after the variables are transformed (constant dollar) to minimize and remove the inflation effects. The results are shown in Appendix – 2 and Appendix - 3.

Variable fringe-benefit and full professors' salary are significant and they have a negative and positive parameter estimate, respectively. This shows that expenditure on fringe-benefit has negative impacts on student tuition and therefore it is not the reason why tuition kept increasing. In fact, with its negative sign, it shown that faculty member and staff fringe benefits are declining over time. On the other hand, full professors' salaries have a significant positive impact on student tuition. The positive parameter estimate indicates that increasing tuition may have been used to cover full professors' salary increase. Salaries for other faculty member ranks such as Associate and Assistant Professors do not have practically zero impacts on student tuition. This could mean that full professors may have been overpaid. Needless to say, that most of the full professors are also the decision makers in many aspects at the Department level. One may ask a critical question. Could conflict of interests occur when college administrators have to decide who will get the most pie from the departmental budget?

Appendix 2- Regression Results on College Cost and Faculty Members' Salary and Fringe Benefits

Number of Observations Read	50
Number of Observations Used	50

Analysis of Variance					
Source	**DF**	**Sum of Squares**	**Mean Square**	**F Value**	**Pr > F**
Model	4	8377863986	2094465997	32.61	<.0001
Error	45	2890080568	64224013		
Corrected Total	49	11267944554			

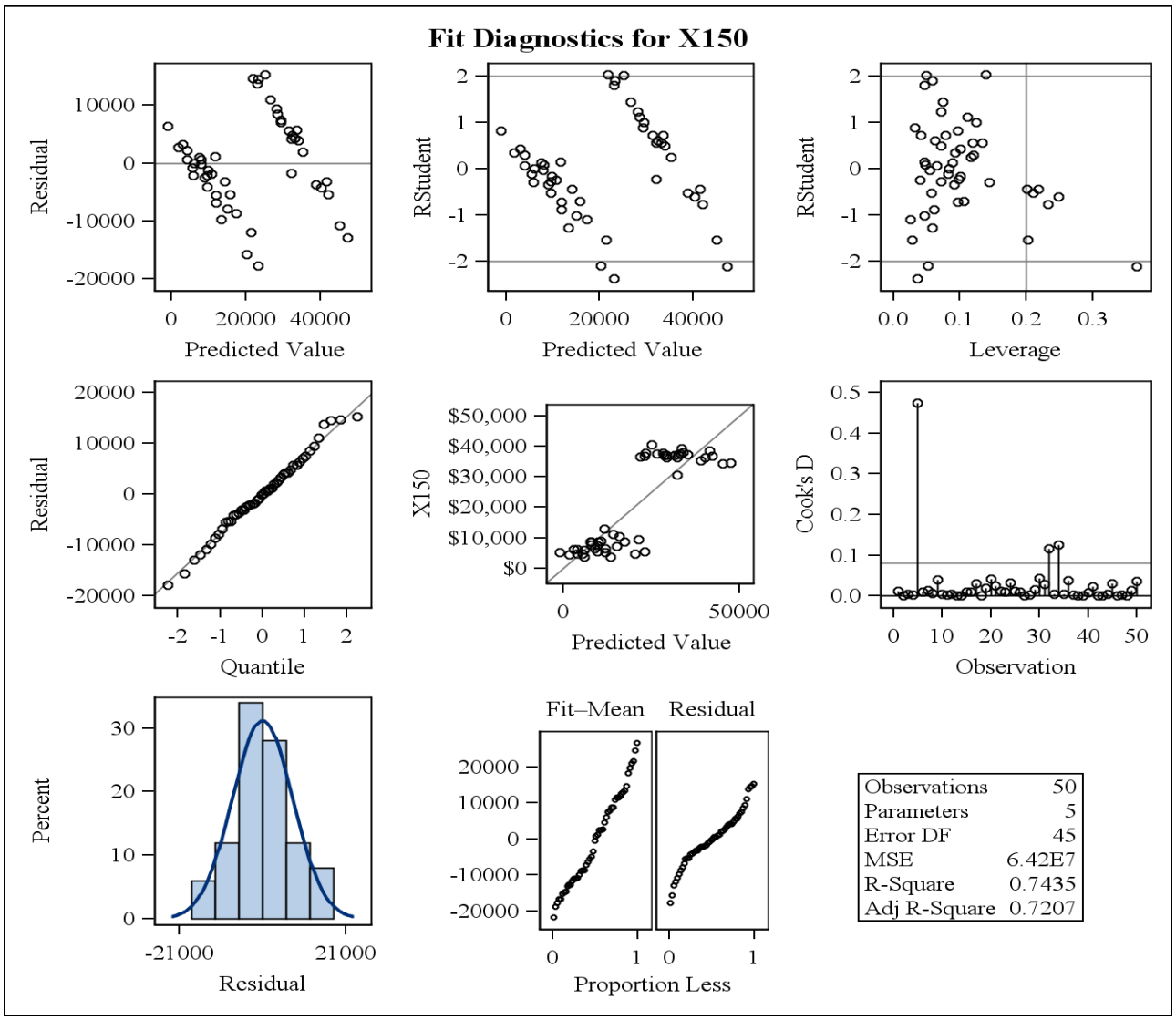
Root MSE	8013.98856	**R-Square**	0.7435
Dependent Mean	20676	**Adj R-Sq**	0.7207
Coeff Var	38.75911		

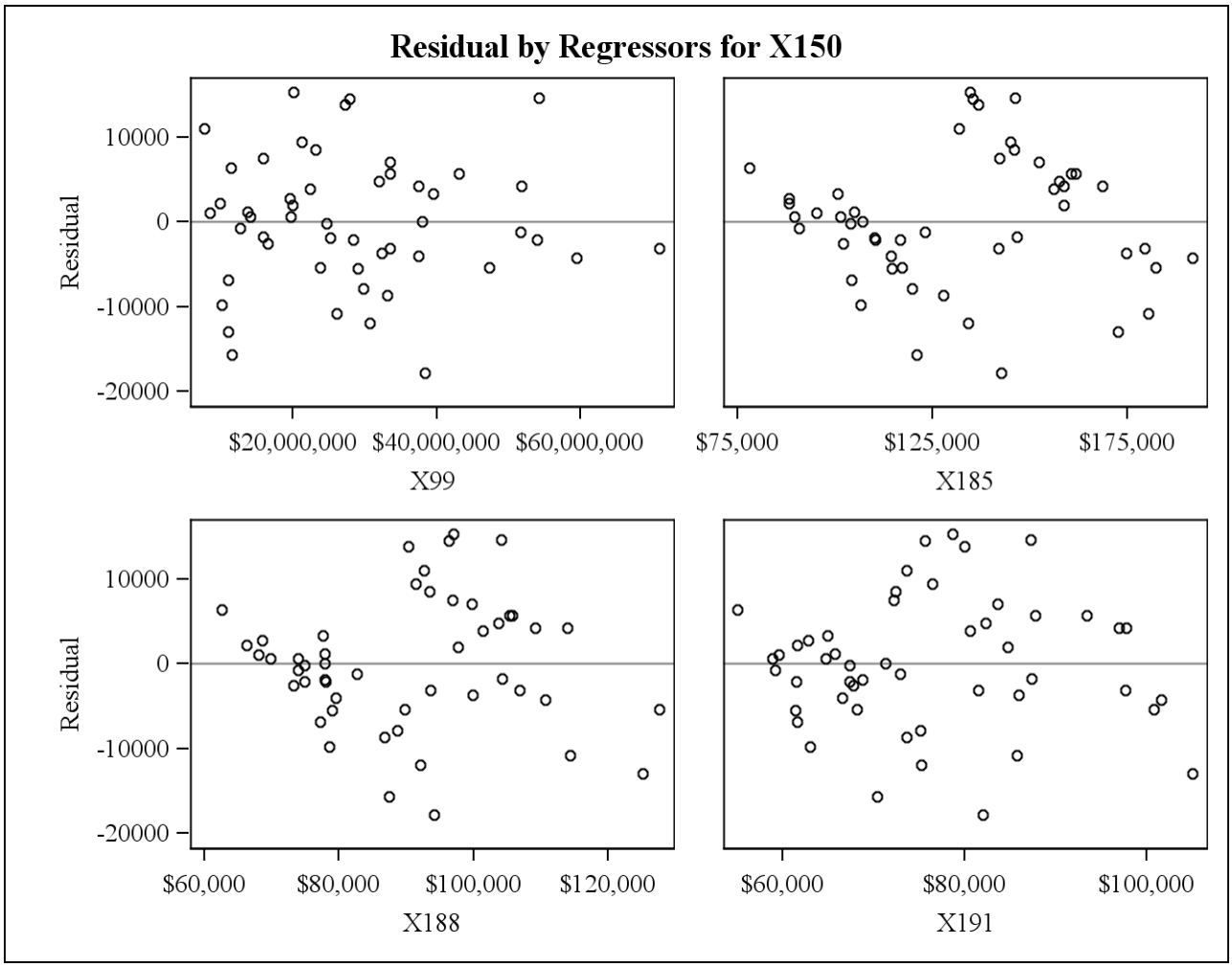
Parameter Estimates					
Variable	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	1	-39656	8324.24230	-4.76	<.0001
X99	1	-0.00026394	0.00009244	-2.86	0.0065
X185	1	0.41777	0.13657	3.06	0.0037
X188	1	0.14897	0.28822	0.52	0.6078
X191	1	-0.00797	0.30282	-0.03	0.9791

Collinearity Diagnostics							
			Proportion of Variation				
Number	**Eigenvalue**	**Condition Index**	**Intercept**	**X99**	**X185**	**X188**	**X191**
1	4.82521	1.00000	0.00077308	0.00564	0.00016132	0.00007850	0.00010080
2	0.14663	5.73646	0.01097	0.82083	0.00065410	0.00061305	0.00050181
3	0.02467	13.98399	0.49196	0.04940	0.04096	0.00355	0.00224
4	0.00222	46.57513	0.44949	0.00360	0.73214	0.03273	0.50749
5	0.00126	61.82450	0.04680	0.12054	0.22609	0.96302	0.48966

Test of First and Second Moment Specification		
DF	**Chi-Square**	**Pr > ChiSq**
14	18.26	0.1950

Durbin-Watson D	2.137
Number of Observations	50
1st Order Autocorrelation	-0.079




Residual by Regressors for X150
Residual
10000
0
-10000
-20000
$20,000,000
$40,000,000
$60,000,000
X99
$75,000
$125,000
$175,000
X185
$60,000
$80,000
$100,000
$120,000
X188
$60,000
$80,000
$100,000
X191

Number of Observations Read	50
Number of Observations Used	50

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	9198570801	2299642700	37.17	<.0001
Error	45	2784401395	61875587		
Corrected Total	49	11982972196			

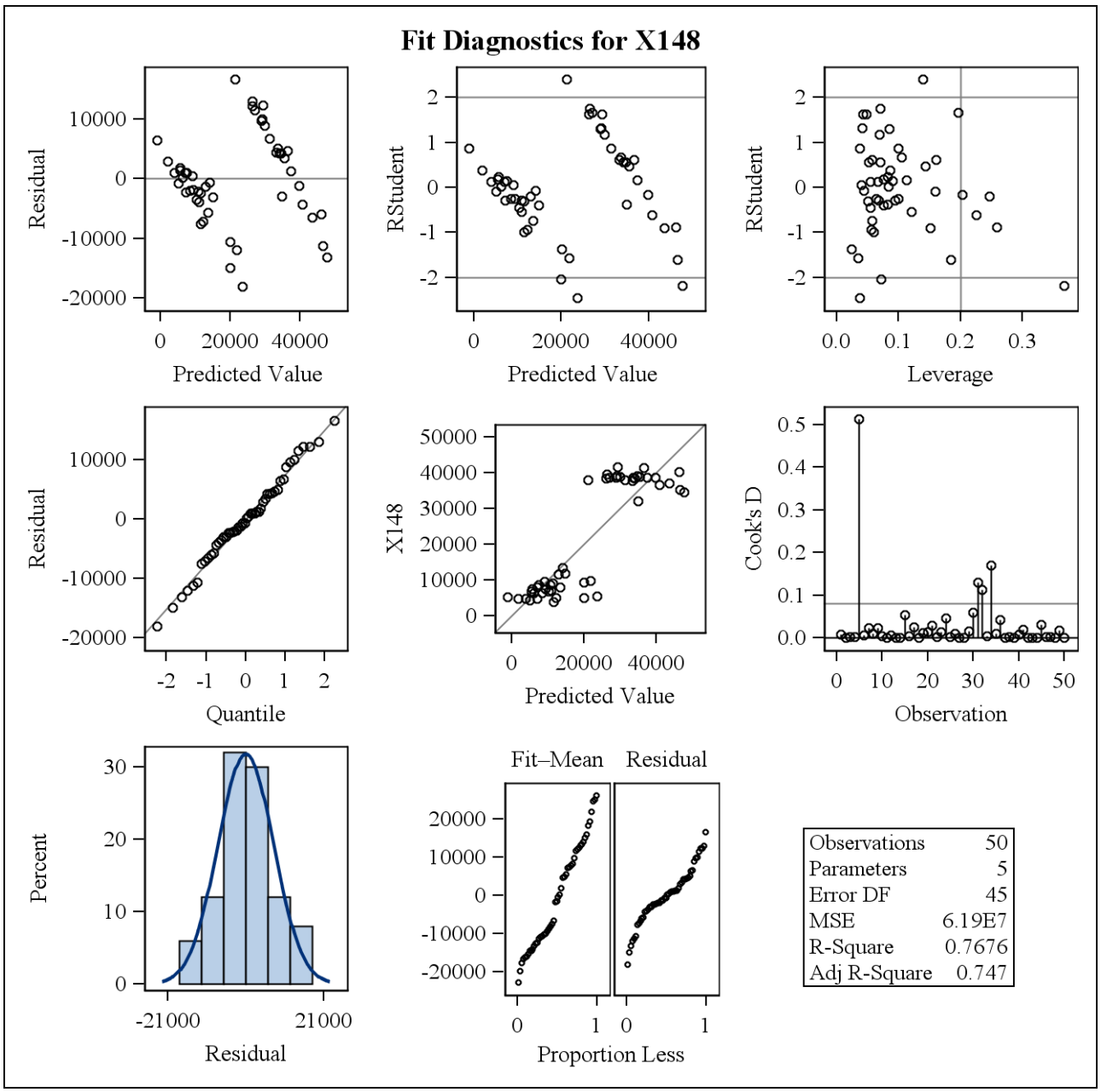
Root MSE	7866.10365	R-Square	0.7676
Dependent Mean	21595	Adj R-Sq	0.7470
Coeff Var	36.42629		

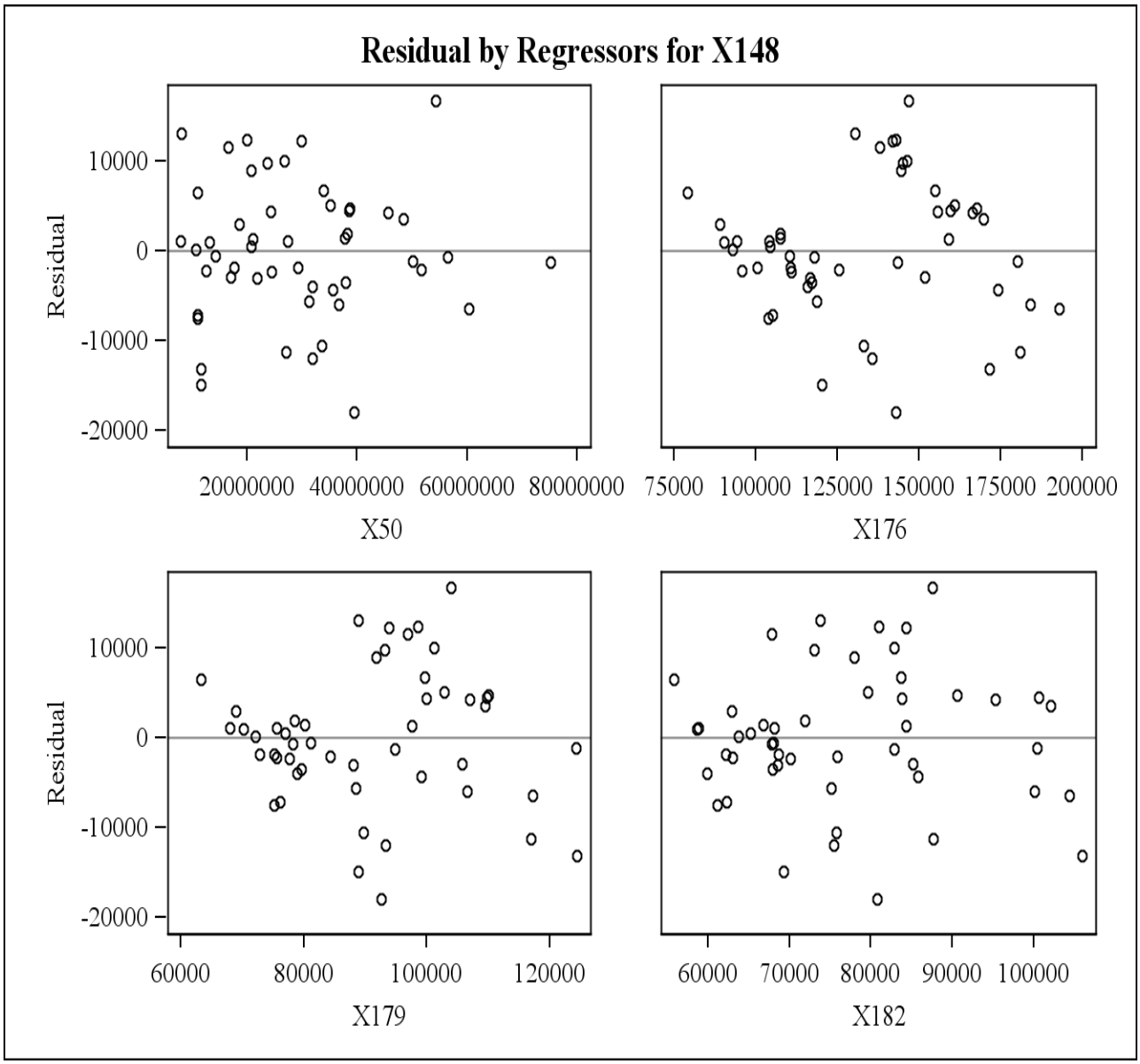
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-40401	8257.58991	-4.89	<.0001
X50	1	-0.00030775	0.00009005	-3.42	0.0014
X176	1	0.50530	0.14035	3.60	0.0008
X179	1	-0.02099	0.29388	-0.07	0.9434
X182	1	0.07209	0.25770	0.28	0.7809

Collinearity Diagnostics							
Number	Eigenvalue	Condition Index	Proportion of Variation				
			Intercept	X50	X176	X179	X182
1	4.82909	1.00000	0.00075525	0.00539	0.00014343	0.00007178	0.00013035
2	0.14337	5.80362	0.01235	0.79583	0.00052090	0.00056568	0.00061588
3	0.02375	14.25819	0.49676	0.07271	0.03701	0.00325	0.00410
4	0.00259	43.14793	0.24823	0.01407	0.42013	0.00068676	0.75599
5	0.00119	63.77120	0.24191	0.11200	0.54220	0.99543	0.23916

Test of First and Second Moment Specification		
DF	Chi-Square	Pr > ChiSq
14	18.29	0.1939

Durbin-Watson D	2.203
Number of Observations	50
1st Order Autocorrelation	-0.105




Residual by Regressors for X148
Residual
10000
0
-10000
-20000
20000000
40000000
60000000
80000000
X50
75000
100000
125000
150000
175000
200000
X176
60000
80000
100000
120000
X179
60000
70000
80000
90000
100000
X182

Number of Observations Read	50
Number of Observations Used	50

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	17256352823	4314088206	32.03	<.0001
Error	45	6060536668	134678593		
Corrected Total	49	23316889490			

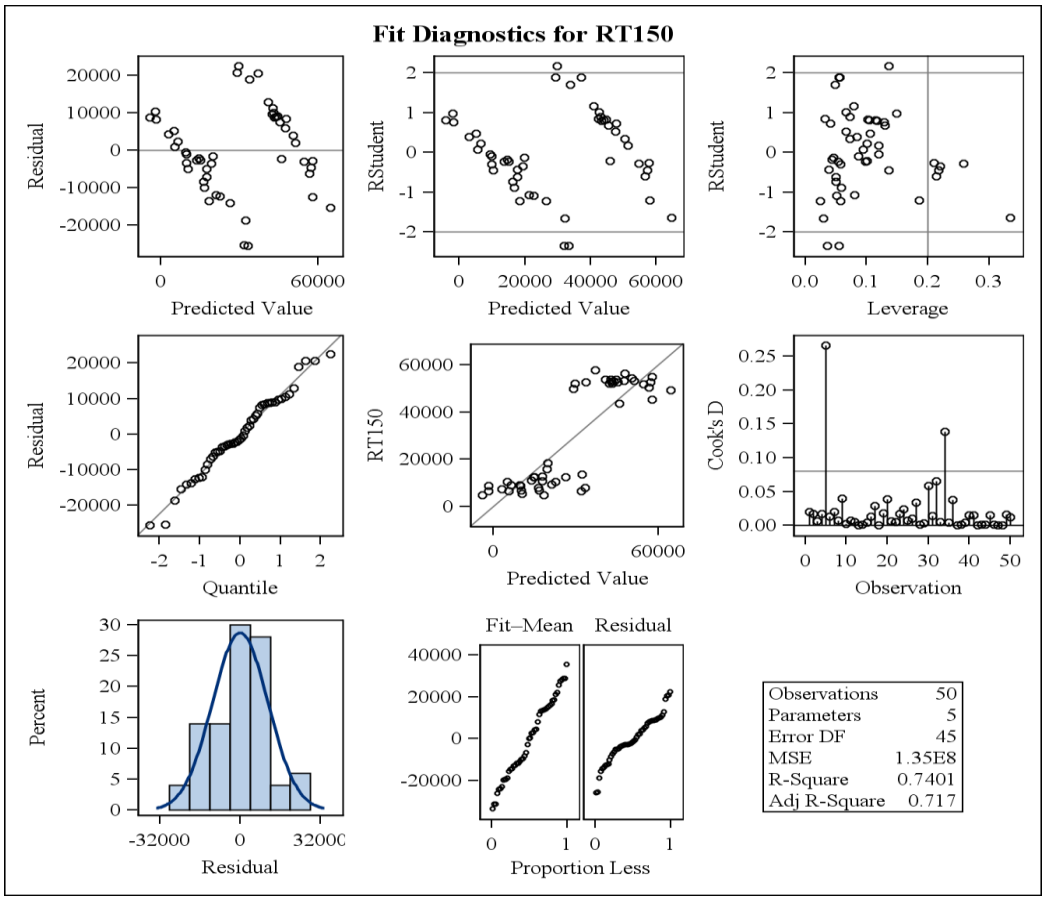
Root MSE	11605	R-Square	0.7401
Dependent Mean	29161	Adj R-Sq	0.7170
Coeff Var	39.79722		

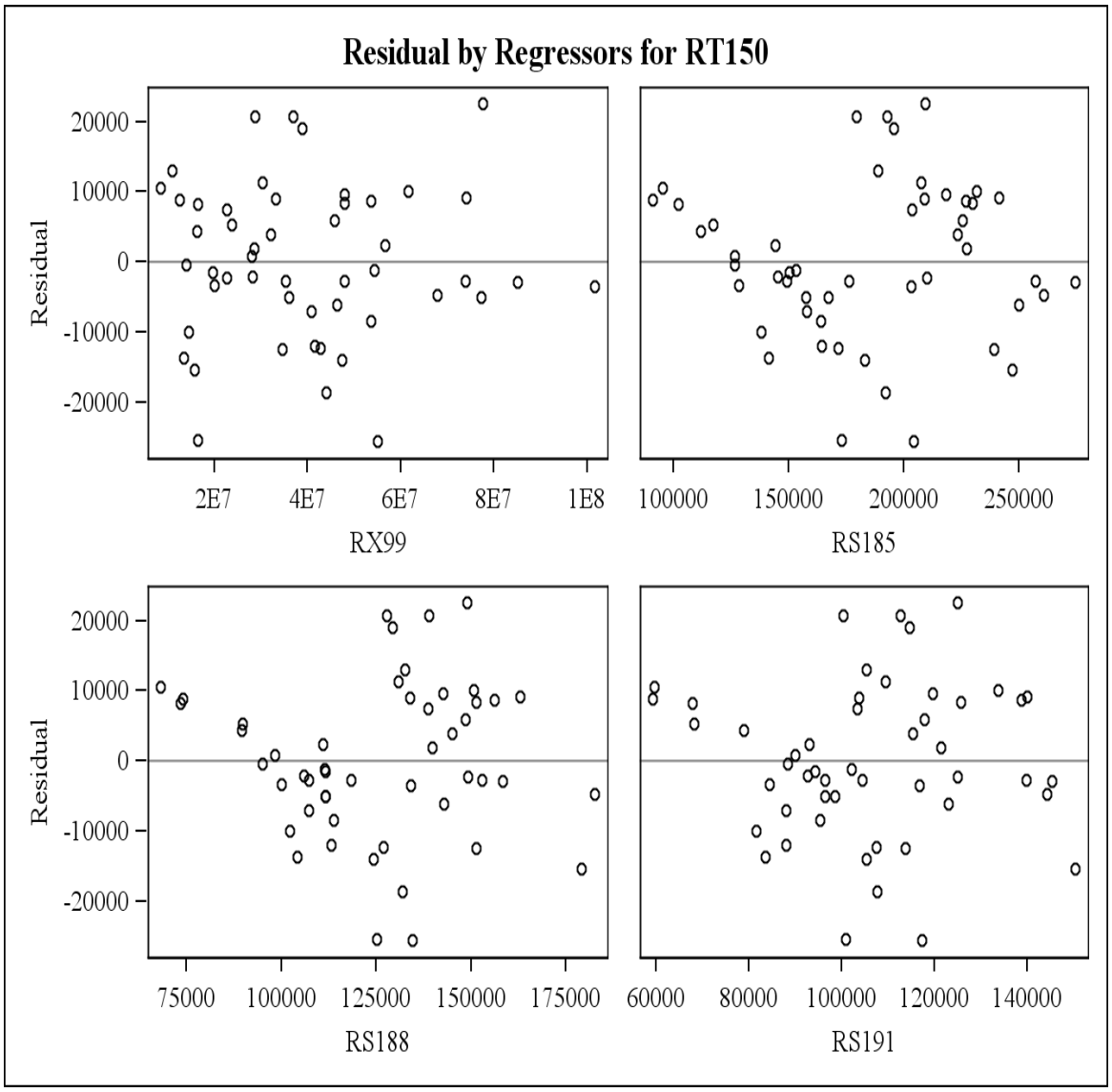
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-41804	9709.11926	-4.31	<.0001
RX99	1	-0.00028972	0.00009507	-3.05	0.0039
RS185	1	0.45103	0.13856	3.26	0.0022
RS188	1	0.14463	0.30478	0.47	0.6374
RS191	1	-0.17501	0.31004	-0.56	0.5752

Collinearity Diagnostics							
			Proportion of Variation				
Number	Eigenvalue	Condition Index	Intercept	RX99	RS185	RS188	RS191
1	4.81547	1.00000	0.00119	0.00557	0.00016685	0.00007522	0.00010276
2	0.14814	5.70135	0.02170	0.78902	0.00055497	0.00050487	0.00041955
3	0.03270	12.13570	0.57207	0.07988	0.02712	0.00323	0.00301
4	0.00251	43.82929	0.35336	0.00641	0.75006	0.03003	0.42669
5	0.00118	63.81669	0.05168	0.11912	0.22209	0.96616	0.56978

Test of First and Second Moment Specification		
DF	**Chi-Square**	**Pr > ChiSq**
14	16.15	0.3043

Durbin-Watson D	2.173
Number of Observations	50
1st Order Autocorrelation	-0.100




Residual by Regressors for RT150
Residual
20000
10000
0
-10000
-20000
2E7
4E7
6E7
8E7
1E8
RX99
100000
150000
200000
250000
RS185
75000
100000
125000
150000
175000
RS188
60000
80000
100000
120000
140000
RS191

Number of Observations Read	50
Number of Observations Used	50

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	18855338404	4713834601	35.62	<.0001
Error	45	5955406582	132342368		
Corrected Total	49	24810744985			

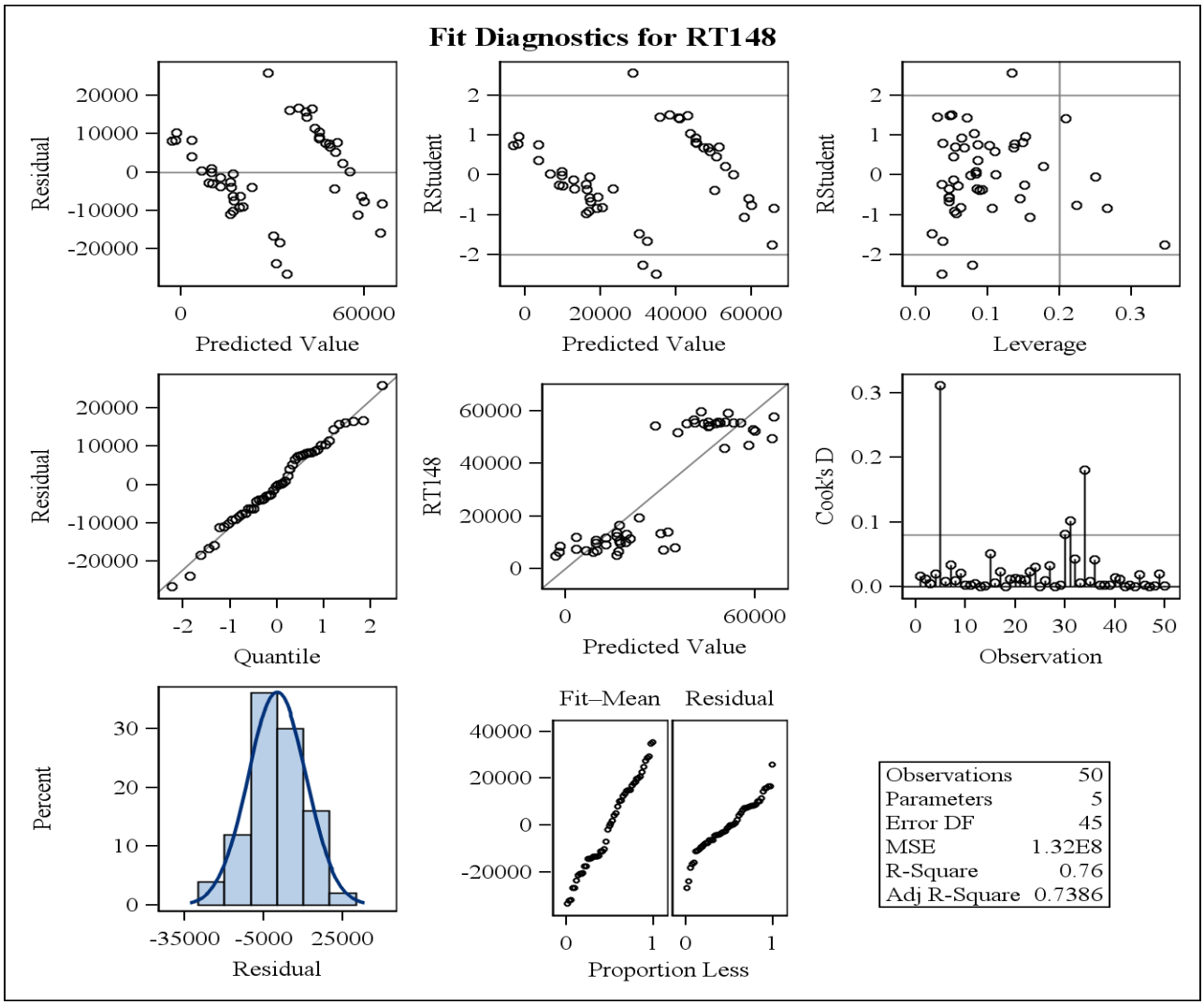
Root MSE	11504	R-Square	0.7600
Dependent Mean	30453	Adj R-Sq	0.7386
Coeff Var	37.77619		

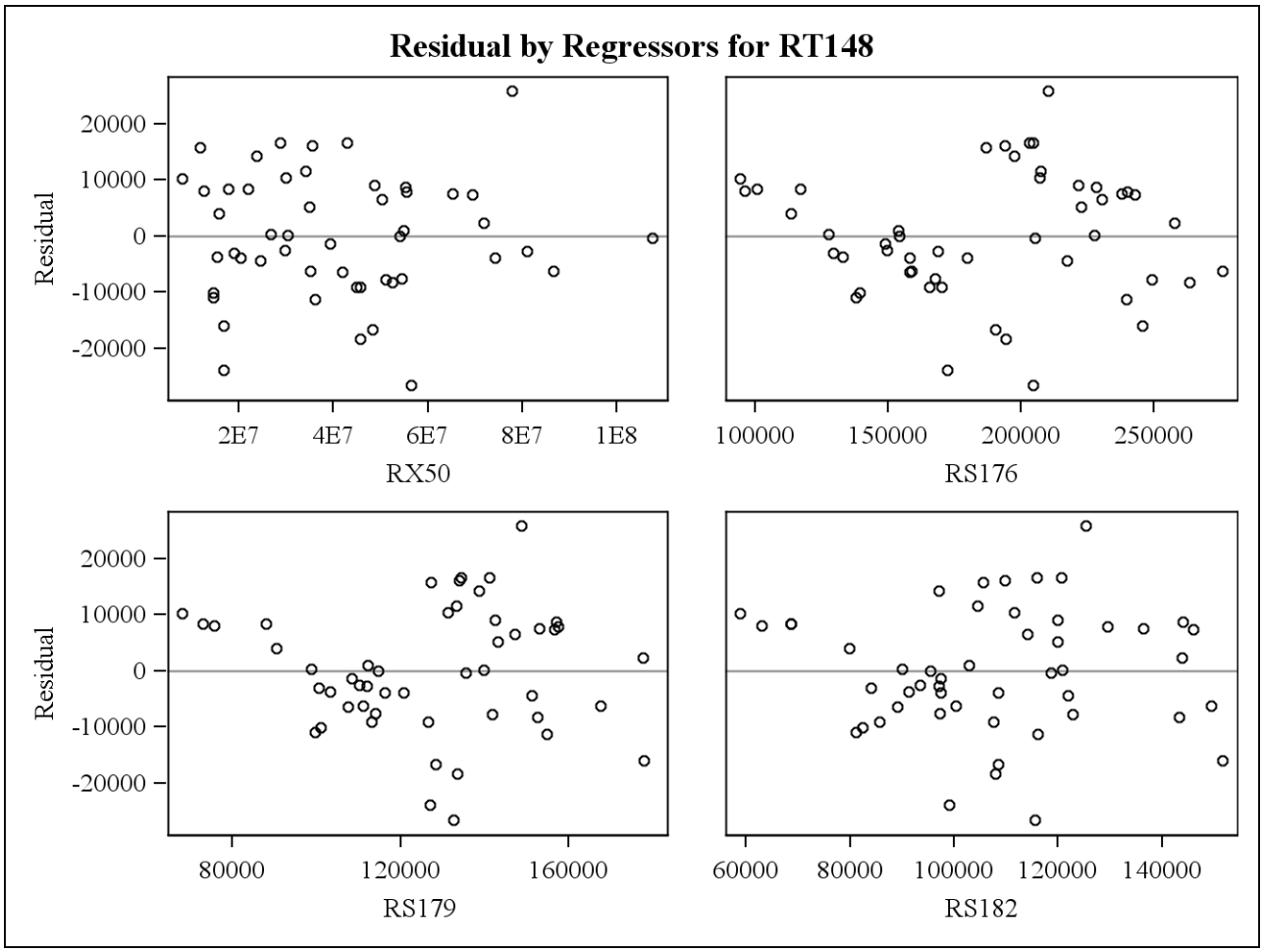
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-42382	9794.94601	-4.33	<.0001
RX50	1	-0.00034495	0.00009322	-3.70	0.0006
RS176	1	0.54645	0.14303	3.82	0.0004
RS179	1	-0.12751	0.30088	-0.42	0.6737
RS182	1	0.01374	0.26923	0.05	0.9595

Collinearity Diagnostics							
			Proportion of Variation				
Number	Eigenvalue	Condition Index	Intercept	RX50	RS176	RS179	RS182
1	4.81984	1.00000	0.00114	0.00535	0.00014990	0.00007479	0.00013023
2	0.14479	5.76961	0.02430	0.76637	0.00043112	0.00049693	0.00048880
3	0.03143	12.38348	0.56411	0.11088	0.02508	0.00334	0.00471
4	0.00272	42.08063	0.22394	0.01553	0.50521	0.00026767	0.65634
5	0.00122	62.86808	0.18651	0.10187	0.46912	0.99582	0.33833

Test of First and Second Moment Specification		
DF	**Chi-Square**	**Pr > ChiSq**
14	17.69	0.2214

Durbin-Watson D	2.223
Number of Observations	50
1st Order Autocorrelation	-0.119





Appendix 3 - List of Fringe Benefits and Salary by Faculty Ranks at Selected US Colleges

Institution_Name	Tuition_and_Fees	Fringe_Benefit	Salary_Full	Salary_Associate	Salary_Assistant
The University of Alabama	$6,400	$29,035,733	$114,719	$79,023	$61,476
University of Alaska Anchorage	$4,690	$12,639,761	$90,819	$73,949	$59,241
University of Arizona	$5,542	$37,475,240	$114,485	$79,512	$66,642
University of Arkansas	$6,400	$16,527,661	$102,042	$73,267	$67,788
California Institute of Technology	$34,437	$10,968,408	$172,596	$125,200	$105,072
University of Colorado Boulder	$7,278	$29,860,653	$119,856	$88,648	$75,140
Yale University	$35,300	$32,323,868	$174,715	$99,833	$85,981
University of Delaware	$8,646	$33,111,860	$127,730	$86,780	$73,632
George Washington University	$40,437	$20,107,403	$134,738	$97,027	$78,712
Georgetown University	$37,947	$22,396,450	$156,059	$101,353	$80,629
University of Florida	$3,778	$53,984,974	$116,678	$77,974	$67,387
Emory University	$36,336	$33,563,221	$152,415	$99,720	$83,643
University of Georgia	$6,030	$37,985,226	$106,971	$77,889	$71,303
University of Idaho	$4,632	$14,036,387	$89,730	$69,887	$58,972

Institution_Name	Tuition_and_Fees	Fringe_Benefit	Salary_Full	Salary_Associate	Salary_Assistant
University of Chicago	$38,453	$33,504,217	$179,519	$106,800	$97,696
Northwestern University	$37,125	$43,120,537	$161,764	$105,318	$93,477
University of Notre Dame	$36,847	$27,227,568	$136,704	$90,280	$80,081
University of Kentucky	$7,736	$24,691,868	$104,119	$74,875	$67,393
University of Louisiana at Lafayette	$3,574	$10,120,317	$106,498	$78,609	$63,038
Johns Hopkins University	$37,700	$27,911,148	$135,295	$96,379	$75,694
Harvard University	$36,173	$59,500,810	$191,703	$110,600	$101,619
University of Massachusetts Amherst	$10,417	$23,803,337	$117,104	$89,738	$68,222
Massachusetts Institute of Technology	$36,390	$37,436,225	$158,590	$109,179	$96,988
Williams College	$37,640	$7,666,765	$131,906	$92,679	$73,649
University of Michigan-Ann Arbor	$11,037	$71,026,597	$141,985	$93,644	$81,548
University of Mississippi	$5,106	$10,993,440	$104,154	$77,196	$61,619
University of Missouri-St Louis	$8,595	$8,467,239	$95,257	$68,121	$59,626
Washington University in St Louis	$37,248	$19,917,977	$158,766	$97,686	$84,827
The University of Montana	$5,180	$11,341,423	$78,135	$62,563	$55,088
University of Nevada-Reno	$4,563	$11,547,532	$120,887	$87,481	$70,484
Dartmouth College	$36,915	$15,898,996	$142,229	$96,939	$72,261
Princeton University	$34,290	$26,090,139	$180,337	$114,290	$85,823
Columbia University in the City of New York	$39,326	$33,525,776	$160,631	$105,763	$87,808
Cornell University	$36,504	$54,302,568	$146,131	$104,104	$87,337
Duke University	$37,295	$32,010,383	$157,571	$103,759	$82,325
University of North Carolina at Chapel Hill	$5,397	$38,434,266	$142,750	$94,074	$82,027
North Dakota State University-Main Campus	$6,271	$9,801,755	$88,322	$66,337	$61,690
Ohio State University-Main Campus	$8,679	$51,670,939	$123,145	$82,652	$73,000
University of Oklahoma Norman Campus	$7,423	$28,472,556	$110,310	$74,872	$61,544
University of Pennsylvania	$37,526	$51,819,150	$168,603	$113,906	$97,777
Brown University	$37,718	$21,263,700	$144,910	$91,394	$76,494
University of Rhode Island	$8,678	$19,737,146	$101,477	$73,960	$64,790
University of South Carolina-Columbia	$8,838	$25,213,924	$110,061	$77,931	$68,817

Institution_Name	Tuition_and_ Fees	Fringe_Benefit	Salary_Full	Salary_Associate	Salary_Assistant
The University of Tennessee	$6,250	$39,605,415	$100,654	$77,563	$64,942
Vanderbilt University	$37,005	$23,155,170	$145,944	$93,476	$72,459
Rice University	$30,486	$15,863,036	$146,593	$104,307	$87,364
Utah State University	$4,450	$19,592,389	$88,258	$68,623	$62,887
University of Vermont	$12,844	$13,745,980	$104,978	$77,903	$65,832
University of Virginia-Main Campus	$9,490	$30,729,592	$134,160	$92,132	$75,258
Stanford University	$36,798	$47,375,405	$182,240	$127,594	$100,794

Concluding Comments

The current student loans problems may not be solved sooner as many people, students and their family members, as well as the society are hoping for. At present, there are no (long-run) policies geared toward solving the issues. However, as time passes by, the problem will be more complex and may get worse. US colleges need to help avoiding this potential tragedy from occurring by lowering their operational cost.

References

Christine DiGangi., Government to Switch Student Loan Servicers: What You Need to Know., Credit.Com., August 17, 2013. Cited from ABCNews.
http://abcnews.go.com/Business/government-switch-student-loan-servicers/story?id=19975798

CBNC., Obama Wants to Shake Up Colleges on Costs., Thursday, August 22, 2012.
http://www.cnbc.com/id/100980702?__source=yahoo%7Cfinance%7Cheadline%7Cheadline%7Cstory&par=yahoo&doc=100980702%7CObama%20wants%20to%20%27shake%20up%27

Harjanto Djunaidi and Monica Djunaidi., College Affordability Rating: Strategy to Increase Federal Financial Aid. Academy Data Analytics Publisher. First Edition, 2013 (http://www.aaea.us/recent-education-policy-changes/).

Harjanto Djunaidi., *Various Latest Research Results*. Association of American Education Analytics. (http://www.aaea.us and http://www.IRIntelligence.org).

Harjanto Djunaidi and Monica Djunaidi., Few SAS PROCs that Help Improving College Recruitment and Enrollment Strategies. *2013 MidWest SAS Users Group Annual Conference*. Columbus, Ohio, September 22-24, 2013.

Harjanto Djunaidi and Monica Djunaidi., SAS PROC REPORT: How it Help Improving College Student Retention Rate. *2013 MidWest SAS Users Group Annual Conference*. Columbus, Ohio, September 22-24, 2013.

Harjanto Djunaidi., Predicting Students Enrollment Using SAS. *2012 South Central SAS Users Group Conference*. Houston, Texas, November 5-6, 2012.

Harjanto Djunaidi and Monica Djunaidi., *Institutional Research Intelligence: Go Beyond Reporting*. Academy Data Analytics Publisher. First Edition, 2013.

Harjanto Djunaidi and Monica Djunaidi., *Education Analytics and its Applications*. Academy Data Analytics Publisher. Upcoming book, 2014.

Harjanto Djunaidi and Monica Djunaidi., *Student Loans: Blessings or Courses*. Academy Data Analytics Publisher. Upcoming book, 2014.

Harjanto Djunaidi., Predicting Students Enrollment Using SAS. *2012 South Central SAS Users Group Conference*. Houston, Texas, November 5-6, 2012.

Harjanto Djunaidi., Data-driven Decision: Managing Higher Education Institutions more Effectively. *2012 North Carolina Community College System Conference*. Raleigh, October 7-9, 2012.

Harjanto Djunaidi., Institutional Research Intelligence: Go Beyond Reporting. *2012 South Central SAS Users Group Conference*. Houston, Texas, November 5-6, 2012.

John Sandman., $1 Trillion in Student Loans and 7 Million Borrowers in Default, MainStreet, New York, Published on August 14, 2013.

Karen Weis, UVa Tells Low-Income Students to Borrow for School, Bloomberg Business Week., New York, August 8, 2013.

SAS/STAT® 9.3

CONTACT INFORMATION:

Your comments and questions are valued and encouraged. Contact the author at:

Name: Dr. Harry Djunaidi, MBA, MAcc, MSc
Enterprise: Association of American Data Analytics (AAEA)
Address: 3250 Chad Court, Murfreesboro, TN 37129
Work Phone: 615-785-7632

E-mail: harry.djunaidi@IRIntelligence.org
Web: http://www.aaea.us/ and http://www.IRIntelligence.org/