Appendix H. Regression Output for Section 9

Exhibit H-1. Regression of seven independent variables on fractional publication counts in an expanding journal set, referenced in footnote 23 in section 9.1

Stepwise Fit

Response:
Pubs - Fract Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

665 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
60697915	2122	28604.107	0.9246	0.9244	6.1717356	21853.31

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	39.4828123	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00314631	1	21270594	743.620	0.0000
	X	Postdocs by Field (Lag1)	0.78923983	1	40597995	1419.306	0.0000
	X	Degrees Awarded - S&E PhD by Field (Lag1)	0.68425651	1	2073023	72.473	0.0000
	X	Acad R&D Exp-Other by Instit (Defl, Lag2)	0.00706362	1	2854567	99.796	0.0000
		Acad R&D Exp Tot Subpart-Basic Res by Instit (Defl, Lag2)	0	1	4914.262	0.172	0.6786
	X	Degrees Awarded - S&E Total by Field (Lag1)	0.02171279	1	496397.6	17.354	0.0000
	X	1994 Carnegie Class - R_1	116.148503	1	3351208	117.158	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	6.7422e8	0.8377	2440	2
2	Postdocs by Field (Lag1)	Entered	0.0000	54929601	0.9059	522.39	3
3	Degrees Awarded - S&E PhD by Field (Lag1)	Entered	0.0000	9325777	0.9175	198.49	4
4	1994 Carnegie Class - R_1	Entered	0.0000	2542660	0.9207	111.63	5
5	Acad R&D Exp-Other by Instit (Defl, Lag2)	Entered	0.0000	2635812	0.9240	21.519	6
6	Degrees Awarded - S&E Total by Field (Lag1)	Entered	0.0000	496397.6	0.9246	6.1717	7

Exhibit H-2. Regression of seven independent variables on whole publication counts in an expanding journal set, referenced in footnote 25 in section 9.1

Stepwise Fit

Response:
Pubs - Whole Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

665 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
115706385	2122	54527.043	0.9393	0.9391	6.2658119	23226.82

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	62.4130422	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00423268	1	38495133	705.982	0.0000
	X	Postdocs by Field (Lag1)	1.53467264	1	1.535e+8	2815.180	0.0000
	X	Degrees Awarded - S&E PhD by Field (Lag1)	0.786983	1	2742187	50.290	0.0000
	X	Acad R&D Exp-Other by Instit (Defl, Lag2)	0.01151292	1	7583276	139.074	0.0000
		Acad R&D Exp Tot Subpart-Basic Res by Instit (Defl, Lag2)	0	1	14498.95	0.266	0.6062
	X	Degrees Awarded - S&E Total by Field (Lag1)	0.03823387	1	1539199	28.228	0.0000
	X	1994 Carnegie Class - R_1	154.947168	1	5964052	109.378	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	1.5593e9	0.8185	4213.4	2
2	Postdocs by Field (Lag1)	Entered	0.0000	2.0179e8	0.9244	516	3
3	Degrees Awarded - S&E PhD by Field (Lag1)	Entered	0.0000	15549918	0.9326	232.92	4
4	Acad R&D Exp-Other by Instit (Defl, Lag2)	Entered	0.0000	5388300	0.9354	136.14	5
5	1994 Carnegie Class - R_1	Entered	0.0000	5763070	0.9385	32.484	6
6	Degrees Awarded - S&E Total by Field (Lag1)	Entered	0.0000	1539199	0.9393	6.2658	7

Exhibit H-3. Regression of four independent variables, including patents, on fractional publication counts in an expanding journal set, referenced in footnote 28 in section 9.4

Stepwise Fit

Response:
Pubs - Fract Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

407 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
72827491	2382	30574.094	0.9188	0.9187	5	24657.71

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	67.3262273	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00334695	1	29607440	968.383	0.0000
	X	Postdocs by Field (Lag1)	0.88266915	1	68559594	2242.408	0.0000
	X	Patents 1988 to 2001 by Instit (revised)	-0.046918	1	114341.1	3.740	0.0532
	X	S&E PhD Recips by Field (SED) (Lag1)	1.20200815	1	13002952	425.293	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	7.4715e8	0.8327	2528.1	2
2	Postdocs by Field (Lag1)	Entered	0.0000	64127426	0.9041	432.69	3
3	S&E PhD Recips by Field (SED) (Lag1)	Entered	0.0000	13084282	0.9187	6.7398	4
4	Patents 1988 to 2001 by Instit (revised)	Entered	0.0532	114341.1	0.9188	5	5

Exhibit H-4. Regression of three independent variables on fractional publication counts in an expanding journal set, referenced in footnote 29 in section 9.5

Stepwise Fit

Response:
Pubs - Fract Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

407 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
72941833	2383	30609.246	0.9187	0.9186	4	24659.46

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	68.1922215	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00330742	1	29995842	979.960	0.0000
	X	Postdocs by Field (Lag1)	0.88245521	1	68528777	2238.826	0.0000
	X	S&E PhD Recips by Field (SED) (Lag1)	1.17793041	1	13084282	427.462	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	7.4715e8	0.8327	2522.5	2
2	Postdocs by Field (Lag1)	Entered	0.0000	64127426	0.9041	429.46	3
3	S&E PhD Recips by Field (SED) (Lag1)	Entered	0.0000	13084282	0.9187	4	4

Exhibit H-5. Regression of three independent variables (adjusted for the ratio of whole to fractional actual publication counts) on fractional publication counts in an expanding journal set, referenced in footnote 30 in section 9.5

Stepwise Fit

Response:
Pubs - Fract Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

407 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
63298211	2383	26562.405	0.9295	0.9294	4	24320.97

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	60.4513144	1	0	0.000	1.0000
	X	Inst Spec F/W adj Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00366163	1	35126032	1322.397	0.0000
	X	Inst-Spec F/W Adj Postdocs by Field (Lag1)	0.8917834	1	67414540	2537.968	0.0000
	X	Inst-Spec F/W Adj S&E PhD Recips by Field (SED) (Lag1)	1.05475006	1	10320264	388.529	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Inst Spec W/F adj Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	7.602e+8	0.8472	2778.4	2
2	Inst-Spec W/F Adj Postdocs by Field (Lag1)	Entered	0.0000	63481105	0.9180	390.53	3
3	Inst-Spec W/F Adj S&E PhD Recips by Field (SED) (Lag1)	Entered	0.0000	10320264	0.9295	4	4

Exhibit H-6. Regression of the three independent variables on whole publication counts in an expanding journal set, referenced in footnote 31 in section 9.6

Stepwise Fit

Response:
Pubs - Whole Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

407 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
142335396	2383	59729.499	0.9339	0.9338	4	26255.22

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	106.785766	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00478389	1	62754726	1050.649	0.0000
	X	Postdocs by Field (Lag1)	1.66409752	1	2.4369e8	4079.964	0.0000
	X	S&E PhD Recips by Field (SED) (Lag1)	1.4454426	1	19702091	329.855	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	1.7562e9	0.8160	4247.8	2
2	Postdocs by Field (Lag1)	Entered	0.0000	2.3402e8	0.9247	331.86	3
3	S&E PhD Recips by Field (SED) (Lag1)	Entered	0.0000	19702091	0.9339	4	4

Exhibit H-7. Regression of the relative citation index, three independent variables, and interaction terms on whole publication counts in an expanding journal set, referenced in footnote 32 section 9.6

Stepwise Fit

Response:
Pubs - Whole Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

806 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
100712491	1980	50864.894	0.9412	0.9410	8	21551.8

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	-105.18611	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00659971	1	12506097	245.869	0.0000
	X	Postdocs by Field (Lag1)	2.94701721	1	20531877	403.655	0.0000
	X	S&E PhD Recips by Field (SED) (Lag1)	0.43206293	1	187819.2	3.693	0.0548
	X	Relative Citation Index - Cites (whole, exp)	49.9595241	1	9369606	184.206	0.0000
	X	Relative Citation Index x Academic R&D Exp	-0.0004636	1	3175236	62.425	0.0000
	X	Relative Citation Index x S&E PhD Recipients	0.11453748	1	582134	11.445	0.0007
	X	Relative Citation Index x Postdocs	-0.1017794	1	3241881	63.735	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	1.3995e9	0.8168	4185.8	2
2	Postdocs by Field (Lag1)	Entered	0.0000	1.8304e8	0.9237	589.28	3
3	S&E PhD Recips by Field (SED) (Lag1)	Entered	0.0000	15277718	0.9326	290.92	4
4	Relative Citation Index - Cites (whole, exp)	Entered	0.0000	5456017	0.9358	185.66	5
5	Relative Citation Index x Postdocs	Entered	0.0000	5749174	0.9391	74.631	6
6	Relative Citation Index x Academic R&D Exp	Entered	0.0000	3010502	0.9409	17.445	7
7	Relative Citation Index x S&E PhD Recipients	Entered	0.0007	582134	0.9412	8	8

Exhibit H-8. Regression of the average relative citation index, three independent variables, and interaction terms with the average relative citation index on whole publication counts in an expanding journal set, referenced in footnote 33 in section 9.6

Stepwise Fit

Response:
Pubs - Whole Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

806 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
99059734	1980	50030.168	0.9422	0.9420	8	21518.9

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	-125.98424	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00673367	1	13031600	260.475	0.0000
	X	Postdocs by Field (Lag1)	2.81537484	1	18522098	370.219	0.0000
	X	S&E PhD Recips by Field (SED) (Lag1)	0.42423354	1	181067.4	3.619	0.0573
	X	Avg Relative Citation Index (Whole - Exp)	54.8541752	1	11022363	220.314	0.0000
	X	Avg Relative Citation Index X Academic R&D Exp	-0.0004813	1	3469778	69.354	0.0000
	X	Avg Relative Citation Index x S&E PhD Recipients	0.12402239	1	681348.6	13.619	0.0002
	X	Avg Relative Citation Index X Postdocs	-0.0920854	1	2624394	52.456	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	1.3995e9	0.8168	4288.8	2
2	Postdocs by Field (Lag1)	Entered	0.0000	1.8304e8	0.9237	632.18	3
3	S&E PhD Recips by Field (SED) (Lag1)	Entered	0.0000	15277718	0.9326	328.81	4
4	Avg Relative Citation Index (Whole - Exp)	Entered	0.0000	7255356	0.9368	185.79	5
5	Avg Relative Citation Index X Academic R&D Exp	Entered	0.0000	5675102	0.9401	74.36	6
6	Avg Relative Citation Index X Postdocs	Entered	0.0000	2838778	0.9418	19.619	7
7	Avg Relative Citation Index x S&E PhD Recipients	Entered	0.0002	681348.6	0.9422	8	8

Exhibit H-9. Regression of the three independent variables on whole publication counts in an expanding journal set, referenced in footnote 34 in section 9.7

Stepwise Fit

Response:
Pubs - Whole Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

3789 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
69425593	22695	3059.07	0.8299	0.8299	4	182183.1

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	-1.8959674	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00241673	1	4092781	1337.917	0.0000
	X	PhD Recips by Field (SED) (Lag1)	2.62363322	1	12563444	4106.949	0.0000
	X	Postdocs by Field (Lag1)	2.06080778	1	79048916	25840.83	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Postdocs by Field (Lag1)	Entered	0.0000	3.1139e8	0.7627	8971.9	2
2	PhD Recips by Field (SED) (Lag1)	Entered	0.0000	23352914	0.8199	1339.9	3
3	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	4092781	0.8299	4	4

Exhibit H-10. Regression of the NRC SQR, the three independent variables, and interactions terms on whole publication counts in an expanding journal set, referenced in footnote 35 section 9.7

Stepwise Fit

Response:
Pubs - Whole Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

3789 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
67779133	22692	2986.9175	0.8340	0.8339	7.2798043	181644.3

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	6.77183764	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00204293	1	2690937	900.908	0.0000
	X	PhD Recips by Field (SED) (Lag1)	1.51719691	1	1264732	423.424	0.0000
	X	Postdocs by Field (Lag1)	3.31691211	1	6231740	2086.345	0.0000
	X	1993 NRC SQR	-3.4580711	1	142477.1	47.700	0.0000
		NRC SQR x Total Acad R&D Exp	0	1	3822.623	1.280	0.2579
	X	NRC SQR x Postdocs	-0.307957	1	994581.4	332.979	0.0000
	X	NRC SQR x S&E PhD Recipients	0.35551129	1	954113.8	319.431	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Postdocs by Field (Lag1)	Entered	0.0000	3.1139e8	0.7627	9737.3	2
2	PhD Recips by Field (SED) (Lag1)	Entered	0.0000	23352914	0.8199	1920.8	3
3	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	4092781	0.8299	552.51	4
4	NRC SQR x Postdocs	Entered	0.0000	690683	0.8316	323.27	5
5	NRC SQR x S&E PhD Recipients	Entered	0.0000	813300.4	0.8336	52.981	6
6	1993 NRC SQR	Entered	0.0000	142477.1	0.8340	7.2798	7

Exhibit H-11. Regression of three independent variables on fractional publication counts in an expanding journal set, referenced in footnote 36 in section 9.7

Stepwise Fit

Response:
Pubs - Fract Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

3789 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
29846184	22695	1315.0995	0.8288	0.8288	4	163020.7

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	-2.6238037	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.0015231	1	1625622	1236.121	0.0000
	X	PhD Recips by Field (SED) (Lag1)	2.04981259	1	7668860	5831.391	0.0000
	X	Postdocs by Field (Lag1)	1.26420508	1	29747879	22620.25	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Postdocs by Field (Lag1)	Entered	0.0000	1.2969e8	0.7437	11283	2
2	PhD Recips by Field (SED) (Lag1)	Entered	0.0000	13212912	0.8195	1238.1	3
3	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	1625622	0.8288	4	4

Exhibit H-11. Regression of NRC SQR, three independent variables, and interaction terms on fractional publication counts in an expanding journal set, referenced in footnote 37 in section 9.7

Stepwise Fit

Response:
Pubs - Fract Counts - Exp J Set

Stepwise Regression Control

Prob to Enter	0.250
Prob to Leave	0.100

Direction:

3789 rows not used due to missing values.

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
28308630	22691	1247.5708	0.8377	0.8376	8	161828.1

Lock	Entered	Parameter	Estimate	nDF	SS	F Ratio	Prob>F
X	X	Intercept	4.82626485	1	0	0.000	1.0000
	X	Acad R&D Exp-Tot by Field (Defl, Lag2)	0.00169712	1	85123.63	68.232	0.0000
	X	PhD Recips by Field (SED) (Lag1)	1.06344217	1	610927.6	489.694	0.0000
	X	Postdocs by Field (Lag1)	2.47757003	1	2464870	1975.735	0.0000
	X	1993 NRC SQR	-3.0825978	1	108731.1	87.154	0.0000
	X	NRC SQR x Total Acad R&D Exp	-0.0001409	1	8917.434	7.148	0.0075
	X	NRC SQR x Postdocs	-0.2957023	1	630874.8	505.683	0.0000
	X	NRC SQR x S&E PhD Recipients	0.31669872	1	734299.9	588.584	0.0000

Step History

Step	Parameter	Action	"Sig Prob"	Seq SS	RSquare	Cp	p
1	Postdocs by Field (Lag1)	Entered	0.0000	1.2969e8	0.7437	13122	2
2	PhD Recips by Field (SED) (Lag1)	Entered	0.0000	13212912	0.8195	2533.5	3
3	Acad R&D Exp-Tot by Field (Defl, Lag2)	Entered	0.0000	1625622	0.8288	1232.4	4
4	NRC SQR x Postdocs	Entered	0.0000	796202.8	0.8334	596.24	5
5	NRC SQR x S&E PhD Recipients	Entered	0.0000	605941.7	0.8369	112.54	6
6	1993 NRC SQR	Entered	0.0000	126492.4	0.8376	13.148	7
7	NRC SQR x Total Acad R&D Exp	Entered	0.0075	8917.434	0.8377	8	8