COMPUTER-BASED ENTERPRISE FINANCIAL MODELING - DATABASE QUERIES AND AD-HOC MODELS

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Executive Summary - To manage the vast financial affairs of a complex organization, management needs to store planning/budgetary data of all organizational units in a huge Planning Details database. Database queries and ad-hoc models can be developed to mine data in the Planning Details database and to assist management in search of solutions to unique and emerging corporate issues. The paper will present how database queries and ad-hoc models can be effectively developed and used in complex organizations.

I. SUMMARY OF PRIOR WORK

Trần, Tô and Saleem have published an article entitled "Computer-Based Enterprise Financial Modeling: Processes, Environment and Tools" in *Phát triển Kinh tế* (No 119, September 2000). The prior article provides an overview of computer-based enterprise modeling for complex business organizations. It includes corporate organization, alternative corporate planning processes, planning environment, and planning tools. This article expands on the prior article by illustrating how database queries and ad-hoc models can be used to support business organizations in managing major corporate changes.

Complex business organizations frequently organize themselves using a complex hierarchical structure with many nodes and layers. The top node represents the corporate headquarters, the terminal nodes (Ter) represent either administrative units or products, and the intermediate (Int) nodes represent the headquarters of subsidiaries and divisions such as divisions. The top layer of Figure 1 is the corporate headquarters (HQ). The second layer consists of a number of organizational units: one headquarters administrative unit (A0) and numerous subsidiaries (S1 and S2). The third layer consists of subsidiary administrative units (A1 and A2) and divisions (D1, D2, D3 and D4). The fourth layer consists of division administrative units (A11, A12, A23 and A24) and products (P1, P2, P3, P4, P5, P6 and P7). Two or more organizational units may be responsible for the same product such as in the case of P2. This type of organization can be described using data as illustrated in Table 1, and the codes denote:

- HQ for headquarters,
- A0 for the administrative unit that belongs to the headquarters,
- S1, S2...Sn for the subsidiaries,
- A*x* for the administrative unit that belongs to a subsidiary S*x*,
- D1, D2...Dn for the divisions,
- A*xy* for the administrative unit that belongs to a subsidiary S*x* and a division D*y*,
- P1, P2, P3...Pn for the products.

A hypothetical business organization and its economic data are enclosed in Table 2. It contains 69 terminal-node detailed records on capital investment (1-CI), production (2-Prod), revenue (3-Rev), cost (4-Cost), cash flow (5-CF) and net income (6-NI). Lower-level organizational units submit their capital investment plans and production plans to be stored in this database along with management's direct inputs. The direct inputs can be management's estimates on administrative, production and capital investment activities.

A reporting subsystem is built to combine terminal-node data into intermediate-node data and generates standard reports for planning purposes. These reports contain enough information to support three planning types: operational, tactical and strategic. Data for operational planning are for one year, 5 years for tactical planning, and 10+ years for strategic planning. The report also shows economic data for each terminal as well as intermediate node.

II. WHY DATABASE QUERIES AND AD-HOC MODELS?

The Planning Details database of a large and complex organization may contain planning data of hundreds of terminal organizational units. The traditional consolidated reporting system only consolidates data from terminal nodes upward the hierarchy to create financial plans for intermediate and top nodes. Such reporting system fails to address two very critical issues: corporate-level re-organization and corporate-level constraints.

Corporate-level re-organization is a fact of life. Business organizations change constantly. They shred unprofitable units and/or projects, combine small units into bigger ones, add new units, and move terminal units from one intermediate node to another. Corporate financial modeling systems must be able to accommodate corporate-level organization activities.

Summarized planning data of terminal nodes may not meet corporate-level goals, objectives and/or constraints defined by the management of an intermediate node or the top node. Higher level management may want to make broad decisions and see their financial impact on the whole intermediate node. For example, management wants to cut operational budget for the entire intermediate node by 10% (or by an arbitrary amount), it needs to know the impact of the cut on the entire intermediate node first and subsequently its terminal nodes. When such a situation arises, an ad-hoc model is needed to assist management in exploring and understanding the situation before making decisions that may affect terminal nodes.

There are hundreds of corporate-planning scenarios that require the use of either database queries and/or ad-hoc models. The next section describes four scenarios in which database queries and ad-hoc models are proved to be very useful.

III. THREE DATABASE QUERIES AND ONE AD-HOC MODEL

Three database queries and one

ad-hoc model are presented using data in the Planning Details database to illustrate on how these new tools can help management cope with changes.

The first database query deals a cost-containment issue. This is a corporate-level constraint situation. For example, the long-term administrative costs (Step 2 of Figure 2) of two organizational units (A11 and A12) are out of control. The costs are getting higher and higher every year from 1999 to 2013. Management needs to use database queries to come up with a solution as follows:

- One - Define the extraction criteria to extract administrative 4-Cost records for A11 and A12.
- Two - Display the extracted administrative cost records of divisions D1 and D2. They are higher and higher from 1999 to 2013.
- Three - Define the extraction criteria to extract related production records that belong to divisions D1 and D2.
- Four - Summarize production records into two groups, S1-D1 and S1-D2.
- Five - Compute annual administrative unit costs for each division: D1 and D2. The computed unit costs show that the 1999 unit costs are lowest (0.04 and 0.03), and the unit costs are higher as time goes by.
- Six - Use the lowest administrative unit costs in 1999 (0.04 for D1 and 0.03 for D2) to compute the ideal administrative costs for A11 then A12. The computed administrative costs are lower as time goes by. Management may use these computed administrative unit costs to contain future administrative costs.

The second database query deals with the impact of adding new projects to the capital investment portfolio. For example, net incomes from production projects are on the decline (Step 5 of Figure 3), i.e., 276 in 2000, 220 in 2201, 179 in 2002, 150 in 2003, etc. Management needs to assess whether new capital investments would reserve this trend as follows:

- One - Define the extraction criteria for net income records from production projects.
- Two - Display the extracted net income records from production projects. The three production projects are P1, P2 and P3. P2 is stewarded by two divisions, D1 and D2.
- Three - Define the extraction criteria for net income records from capital projects.
- Four - Display the extracted net income records from capital investment projects P4, P5, P6 and P7.
- Five - Summarize net incomes by production and by capital investment separately to show the two trends. Production-based net incomes start to drop significantly in 2001. Capital investment based net incomes are positive between 2001 and 2008. As a result, this database query shows the increases in net incomes between 2001 and 2004 (262, 311, 357 and 370) that can be contributed by new investment projects.

The third database query deals with a corporate reorganization issue. For example, high administrative costs from D1 and D2 lower the corporate profitability (Step 3 of Figure 4). The combined administrative costs for both D1 and D2 are 20 in 1999, 21 in 2000, 22 in 2001, etc. Management is considering removing two divisional headquarters D1 and D2 and hand over the production projects to the subsidiary headquarters, S1. Management wants to see how much this strategy would help profitability. This situation can be resolved using one database query as follows:

- One - Define the extraction criteria for net income records from two administrative units, A11 and A12, that belong to divisions D1 and D2, respectively.
- Two - Display the extracted net income records from the two administrative units.
- Three - Extract headquarters net income records, i.e., 60 in 1999, 29 in 2000, 107 in 2001, etc. Combine net income records from administrative units A11 and A12 to create combined net incomes of -20 of 1999, -21 of 2000, -22 of 2001, etc. Remove the net incomes of the two administrative units from the headquarters' net incomes to show the effect of the corporate restructuring on net incomes such as 80 in 1999, 50 in 2000, 130 in 2001, etc.

The ad-hoc model deals with a corporate-level capital budgeting issue. This is a corporate-level constraint issue. Due to new projects that drain cash from the company's coffer, management sees a negative cash flow of 75 during 2000 (Step 1 of Figure 5). A significant negative cash flow in a given year may not be acceptable to the company. Management wants to reduce this cash deficit down to zero by transferring it to the surrounding years of 1999 and 2001, or 40 in 1999 and 35 in 2001 as illustrated in Step 4 of Figure 5. This transfer will have an unknown impact on net incomes of the future years, and management wants to understand it before making final decisions as follows:

- One - Display the headquarters' cash flows and net incomes. The negative cash flow amount of 75 is not a good thing to this company, and management wants to reduce this deficit to zero.
- Two - Explain the direct impact of a capital budget change on cash flow. An increase in capital investment (CI) leads to a decrease in net cash flow (CF) and vice versa.
- Three - Explain the indirect impact of a capital budget change on cash flow. The first part of it (a) points out that an increase in capital investment (CI) will lead to an increase in tax-based depreciation expenses. Next (b), an increase in tax-based depreciation expense will lead to a decrease in taxable income. Tax-based depreciation schedule is used here. (c) points out a decrease in taxable income that will lead to a decrease in tax expense. Finally (d), a decrease in tax expense will lead to an increase in cash flow.
- Four - Show how the spreading of the deficit impacts the net cash flows. The new net cash flows are 110 in 1999, 0 in 2000, 67 in 2001, etc.
- Five - Explain the impact of a capital budget change on net income. It is similar to that on cash flow. The difference is that GAAP depreciation schedule is used instead of tax-based deprecation schedule.
- Six - Show the spreading of the deficit impacts the net incomes. The new net incomes are 61 in 1999, 28 in 2000, 107 in 2001, etc.

Note: The tax-based depreciation expenses are derived using American tax laws. For properties

Table 1- Organizational units and nodes

	L2	L3	L4	Node Type	Act.
1	HQ			Top	Com
2	A0			Ter	Adm
3	S1			Int	Com
4	S1	A1		Ter	Com
5	S1	D1		Int	Com
6	S1	D1	A11	Ter	Adm
7	S1	D1	P1	Ter	Prod
8	S1	D1	P2	Ter	Prod
9	S1	D2		Int	Com
10	S1	D2	A12	Ter	Adm
11	S1	D2	P2	Ter	Prod
12	S1	D2	P3	Ter	Prod
13	S2	A2		Ter	Adm
14	S2	D3		Int	Com
15	S2	D3	A23	Ter	Adm
16	S2	D3	P4	Ter	CI
17	S2	D3	P5	Ter	CI
18	S2	D4		Int	Com
19	S2	D4	A24	Ter	Adm
20	S2	D4	P6	Ter	CI
21	S2	D4	P7	Ter	CI

Table 2 - Planning Details Table

Rec#	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
38	S2	A2		Ter	Adm	5-CF	-30	-32	-33	-35	-36	-38	-40	-42	-44	-47	-49	-51	-54	-57	-59
39	S2	A2		Ter	Adm	6-NI	-30	-32	-33	-35	-36	-38	-40	-42	-44	-47	-49	-51	-54	-57	-59
40	S2	D3	A23	Ter	Adm	4-Cost	10	11	11	12	12	13	13	14	15	16	16	17	18	19	20
41	S2	D3	A23	Ter	Adm	5-CF	-10	-11	-11	-12	-12	-13	-13	-14	-15	-16	-16	-17	-18	-19	-20
42	S2	D3	A23	Ter	Adm	6-NI	-10	-11	-11	-12	-12	-13	-13	-14	-15	-16	-16	-17	-18	-19	-20
43	S2	D3	P4	Ter	CI	1-CI	0	150	75	16	8	8	4	0	0	0	0	0	0	0	0
44	S2	D3	P4	Ter	CI	2-Prod	0	0	50	80	120	160	160	160	120	80	40	40	20	10	5
45	S2	D3	P4	Ter	CI	3-Rev	0	0	84	120	180	240	160	160	120	80	36	36	18	6	3
46	S2	D3	P4	Ter	CI	4-Cost	0	0	40	56	80	104	104	104	80	56	32	32	20	14	11
47	S2	D3	P4	Ter	CI	5-CF	-20	-150	-16	52	78	97	48	50	27	16	3	3	-1	-5	-5
48	S2	D3	P4	Ter	CI	6-NI	-4	-30	18	28	51	74	21	21	11	1	-12	-12	-4	-7	-6
49	S2	D3	P5	Ter	CI	1-CI	0	100	100	12	0	0	0	0	0	0	0	0	0	0	0
50	S2	D3	P5	Ter	CI	2-Prod	0	0	80	90	105	120	120	120	90	60	30	30	15	8	4
51	S2	D3	P5	Ter	CI	3-Rev	0	0	128	180	210	180	180	180	90	60	30	27	14	5	2
52	S2	D3	P5	Ter	CI	4-Cost	0	0	58	60	69	78	78	78	60	42	24	24	15	11	8
53	S2	D3	P5	Ter	CI	5-CF	-40	-100	-11	81	104	76	75	75	20	12	4	2	-1	-4	-4
54	S2	D3	P5	Ter	CI	6-NI	-16	-40	30	68	82	56	56	56	9	2	-6	-8	-2	-4	-4
55	S2	D4	A24	Ter	Adm	4-Cost	10	11	11	12	12	13	13	14	15	16	16	17	18	19	20
56	S2	D4	A24	Ter	Adm	5-CF	-10	-11	-11	-12	-12	-13	-13	-14	-15	-16	-16	-17	-18	-19	-20
57	S2	D4	A24	Ter	Adm	6-NI	-10	-11	-11	-12	-12	-13	-13	-14	-15	-16	-16	-17	-18	-19	-20
58	S2	D4	P6	Ter	CI	1-CI	0	50	50	9	9	9	0	0	0	0	0	0	0	0	0
59	S2	D4	P6	Ter	CI	2-Prod	0	0	28	45	90	135	135	90	90	90	45	45	23	11	6
60	S2	D4	P6	Ter	CI	3-Rev	0	0	47	68	135	203	135	90	90	90	41	41	20	7	3
61	S2	D4	P6	Ter	CI	4-Cost	0	0	27	36	63	90	90	63	63	63	36	36	23	16	12
62	S2	D4	P6	Ter	CI	5-CF	-10	-50	-26	29	54	78	43	30	18	18	3	3	-1	-6	-6
63	S2	D4	P6	Ter	CI	6-NI	-1	-5	6	13	39	65	21	9	9	9	-5	-5	-3	-7	-6
64	S2	D4	P7	Ter	CI	1-CI	0	50	40	15	10	5	0	0	0	0	0	0	0	0	0
65	S2	D4	P7	Ter	CI	2-Prod	0	0	25	50	75	100	100	100	75	50	25	25	13	6	3
66	S2	D4	P7	Ter	CI	3-Rev	0	0	0	75	113	150	100	100	75	50	23	23	11	4	2
67	S2	D4	P7	Ter	CI	4-Cost	0	0	20	35	50	65	65	65	50	35	20	20	13	9	7
68	S2	D4	P7	Ter	CI	5-CF	-30	-50	-32	17	39	59	31	30	19	11	2	2	-1	-3	-3
69	S2	D4	P7	Ter	CI	6-NI	-15	-25	-12	22	36	50	17	17	10	4	-4	-4	-7	-5	-4

that are classified as five-year properties, the tax laws assume that the properties are placed in operation in the middle of the first year; therefore, six annual depreciation factors are used (second half of the first year, four full years, and first half of the sixth year). These factors are 20%, 32%, 20%, 12%, 9% and 7%. The GAAP-based depreciation expenses are derived using a longer 10-year deprecation schedule and the straight-line method; therefore, the annual depreciation factors are all 10%. The tax rate of 35% is used to calculate tax expenses. The formulas used in the calculations of tax implications appear as follows:

Change in Depreciation Expense = Change in Capital Expenditure * Annual Deprecation Rate

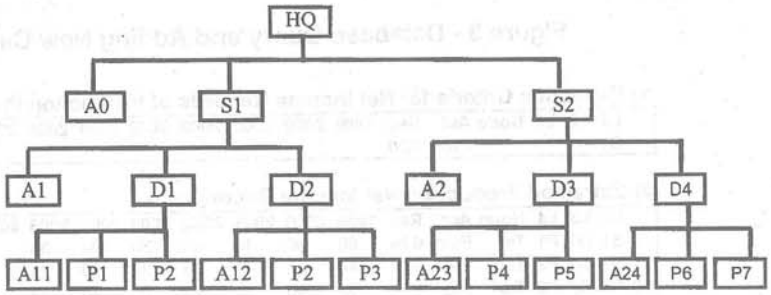
Change in Tax Expense = Change in Depreciation Expense * Tax Rate

Tax Implication on Cash Flow (Net Income) = Change in Tax Expense

IV. CONCLUDING REMARKS

To survive in the long run, all companies must adapt. Changes are numerous in large and complex organizations. To understand these changes, the company needs to assess their financial impacts thoroughly using database queries and ad-hoc models. Consequently, new business strategies can be formed to manage these changes. Thus, database queries and ad-hoc models have emerged as a powerful tool to manage changes in complex enterprises ■

Figure 1 - Example of an Organization



References

1. Trần Văn Hiển and Tô Thu Thủy, "Computer-Based Enterprise Financial Modeling: Processes, Environment and Tools," Economic Development Review (Vietnamese version- *Phát triển Kinh tế*), Number 119, September 2000.
2. Trần Văn Hiển and Tô Thu Thủy, "Computer-Based Production Models - Theory, Practice and Issues," Economic Development Review (Vietnamese version- *Phát triển Kinh tế*), Numbers 113 and 114, March and April 2000.
3. Trần Văn Hiển and Tô Thu Thủy, "Computer-Based Capital Investment Models - Theory, Practice and Issues" Economic Development Review (Vietnamese version- *Phát triển Kinh tế*), Numbers 116 and 117, June and July 2000.

Note - This is the last part of a 4-article series on Computer-Based Financial Evaluation on Capital Projects, Production Projects and Enterprise Modeling contributed by Prof. Dr. Trần Văn Hiển, Tô Thu Thủy and Dr. Naveed Saleem.

Figure 2 - Database Query and Cost Containment

1) Extraction Criteria for Administrative Costs

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
S1		A11		Adm	4-Cost															
S1		A12		Adm	4-Cost															

2) Extracted Administrative Cost Records

	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
7	S1	D1	A11	Ter	Adm	4-Cost	10	11	11	12	12	13	13	14	15	16	16	17	18	19	20
22	S1	D2	A12	Ter	Adm	4-Cost	10	11	11	12	12	13	13	14	15	16	16	17	18	19	20

3) Extraction Criteria for Production Records

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
S1				Prod	2-Prod															

4) Extracted Production Records

	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
11	S1	D1	P1	Ter	Prod	2-Prod	125	125	100	100	80	80	80	50	50	50	10	10	0	0	0
17	S1	D1	P2	Ter	Prod	2-Prod	100	90	80	70	60	50	40	30	0	0	0	0	0	0	0
26	S1	D2	P2	Ter	Prod	2-Prod	120	100	90	80	70	50	40	30	0	0	0	0	0	0	0
32	S1	D2	P3	Ter	Prod	2-Prod	200	300	250	200	150	125	100	80	60	40	20	10	5	0	0

5) Analysis - Production Summary

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
S1	D1			Prod	2-Prod	225	215	180	170	140	130	120	80	50	50	10	10	0	0	0
S1	D2			Prod	2-Prod	320	400	340	280	220	175	140	110	60	40	20	10	5	0	0

6) Analysis - Administrative Cost/Unit of Production

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
S1	D1	A11	Ter	Adm	4-Cost	0.04	0.05	0.06	0.07	0.09	0.10	0.11	0.18	0.30	0.31	1.63	1.71			
S1	D2	A12	Ter	Adm	4-Cost	0.03	0.03	0.03	0.04	0.06	0.07	0.10	0.13	0.25	0.39	0.81	1.71	3.59		

7) Analysis - Ideal Administrative Costs (unit cost in 1999 * production)

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
S1	D1	A11	Ter	Adm	4-Cost	10	10	8	8	6	6	5	4	2	2	0	0	0	0	0
S1	D2	A12	Ter	Adm	4-Cost	10	13	11	9	7	5	4	3	2	1	1	0	0	0	0

Figure 3 - Database Query and Adding New Capital Investment Projects

1) Extraction Criteria for Net Income Records of Production Projects

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
S1				Prod	6-NI															

2) Extracted Production Net Income Records

	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
15	S1	D1	P1	Ter	Prod	6-NI	60	59	45	45	33	33	33	16	23	27	5	6	0	0	0
21	S1	D1	P2	Ter	Prod	6-NI	46	40	34	28	32	29	23	18	0	0	0	0	0	0	0
30	S1	D2	P2	Ter	Prod	6-NI	52	40	34	29	36	29	23	18	0	0	0	0	0	0	0
36	S1	D2	P3	Ter	Prod	6-NI	78	137	107	78	49	34	20	8	-4	10	12	6	3	0	0

3) Extraction Criteria for Net Income Records of Capital Investment Projects

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
S2				CI	6-NI															

4) Extracted Capital Investment Net Income Records

	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
48	S2	D3	P4	Ter	CI	6-NI	-4	-30	18	28	51	74	21	21	11	1	-12	-12	-4	-7	-6
54	S2	D3	P5	Ter	CI	6-NI	-16	-40	30	68	82	56	56	56	9	2	-6	-8	-2	-4	-4
63	S2	D4	P6	Ter	CI	6-NI	-1	-5	6	13	39	65	21	9	9	9	-5	-5	-3	-7	-6
69	S2	D4	P7	Ter	CI	6-NI	-15	-25	-12	22	36	50	17	17	10	4	-4	-4	-7	-5	-4

5) Net Income Trend Analysis

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total NI from Prod Projects	236	276	220	179	150	126	99	59	20	38	17	12	3	0	0
Total NI from CI Projects	-36	-100	41	131	207	244	115	104	40	15	-28	-30	-15	-23	-21
Combined Net Incomes	200	176	262	311	357	370	215	162	60	53	-11	-18	-12	-23	-21

Figure 4 - Database Query and Corporate Restructuring Issue

1) Extraction Criteria for Net Income Records of 2 Admin Groups

Rec#	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	S1	D1	A11		Adm	6-NI															
	S1	D2	A12		Adm	6-NI															

2) Extracted Administrative Net Income Records

Rec#	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
9	S1	D1	A11	Ter	Adm	6-NI	-10	-11	-11	-12	-12	-13	-13	-14	-15	-16	-16	-17	-18	-19	-20
24	S1	D2	A12	Ter	Adm	6-NI	-10	-11	-11	-12	-12	-13	-13	-14	-15	-16	-16	-17	-18	-19	-20

3) Net Incomes with Restructuring

Rec#	L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	HQ			Int		6-NI	60	29	107	149	186	191	27	-35	-147	-164	-239	-258	-264	-287	-298
	S1	D1&D2			Adm		-20	-21	-22	-23	-24	-26	-27	-28	-30	-31	-33	-34	-36	-38	-40
Net Incomes with restructuring							80	50	130	172	211	217	54	-7	-118	-133	-207	-224	-228	-249	-258

Figure 5 - Ad-hoc Model and Corporate-Level Capital Budgeting Issue

1) Unaltered HQ Cash Flows and Net Incomes

L2	L3	L4	Node	Act	Rec	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
HQ			Int		5-CF	147	-75	105	308	333	316	161	98	-58	-108	-199	-218	-253	-282	-295
HQ			Int		6-NI	60	29	107	149	186	191	27	-35	-147	-164	-239	-258	-264	-287	-298

2) Explanation of Direct Impact of a CI Change on Cash Flow

CI Increase (Decrease) ==> CF Decrease (Increase)

3) Explanation of Indirect Impact of a CI Change on Cash Flow

CI Increase (Decrease) (a)==> Increase (Decrease) in Tax-Based Depreciation Expense (b)==>
Decrease (Increase) in Taxable Income (c)==> Decrease (Increase) in Tax Expense (d)==> Increase (Decrease) in Cash Flow

4) Ad-hoc Model - Capital Investment Change on Cash Flows

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Changes in Capital Budget	40	-75	35												
HQ Cash Flows	147	-75	105	308	333	316	161	98	-58	-108	-199	-218	-253	-282	-295
Direct Impact of CI Change on CF	-40	75	-35												
Cash Flows without Tax Impl.	107	0	70	308	333	316	161	98	-58	-108	-199	-218	-253	-282	-295
Tax Implications from 1999 CI	3	4	3	2	1	1									
Tax Implications from 2000 CI		-5	-8	-5	-3	-2	-2								
Tax Implications from 2001 CI			2	4	2	1	1	1							
Cash Flows with Tax Impl.	110	0	67	308	334	316	160	99	-58	-108	-199	-218	-253	-282	-295

5) Explanation of Impact of a CI Change on Net Income

CI Increase (Decrease) ==> Increase (Decrease) in GAAP-Based Depreciation Expense ==>
Decrease (Increase) in Taxable Income ==> Decrease (Increase) in Tax Expense ==> Increase (Decrease) in Net Income

6) Ad-hoc Model - Capital Investment Change on Net Incomes

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Changes in Capital Budget	40	-75	35												
HQ Net Incomes	60	29	107	149	186	191	27	-35	-147	-164	-239	-258	-264	-287	-298
Tax Implications from 1999 CI	1	1	1	1	1	1	1	1	1	1					
Tax Implications from 2000 CI		-3	-3	-3	-3	-3	-3	-3	-3	-3	-3				
Tax Implications from 2001 CI			1	1	1	1	1	1	1	1	1	1			
Cash Flows with Tax Impl.	61	28	107	149	186	191	27	-35	-147	-164	-241	-257	-264	-287	-298