

# Developments in Business Simulation & Experiential Exercises, Volume 13, 1986

## A DECISION SUPPORT SYSTEM FOR CAPITAL FUNDS FORECASTING

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### ABSTRACT

A decision support system was constructed to guide and instruct business students in preparing a Capital Funds forecast. The systems objective is to gather complete information from the three sources of capital funding - operations, long-term debt and new equity. The DSS supports forecasting funds flows for individual or group capital projects projecting sources of cash in order of accessibility. Memory aids are included to explain the terminology and concepts used in the forecasting procedures. The DSS was made available for students in a business policy course. Those students using the DSS were better able to analyze a capital investment problem than those who did not use it.

### INTRODUCTION

Business Policy includes capital budgeting as a significant part of strategic planning. The acquisition of buildings, equipment and other capital assets involve major financial commitment and resources. These are non-routine, semi-structured decisions. This is the type of decision where microcomputer based Decision Support Systems (DSS) have been suggested [1,21]. In evaluating capital investment projects its unlikely that an organization will have access to unlimited capital funds to accept all positive flow projects. A major planning concern is determining what funding, if any, may be available for the potential capital projects pool.

In this paper, we describe the development of the DSS, the capital funds forecasting model, and an application of the DSS in a Business Policy Class.

### THE DECISION SUPPORT SYSTEM

A microcomputer based DSS was developed to assist with forecasting available capital funds. As an interactive model it enables the forecaster to project the availability of capital funds from several sources which may be combined to indicate total capital funds. Several major parameters can be adjusted to evaluate the effects on specific funds sources and upon total available funds. The DSS can also determine the sensitivity of capital funds to and the relationship of changes in major variables. For example, an increase in operating income will not only provide additional cash flow from operations, it will also increase a company's long term debt capacity based on the company's debt to equity ratio.

The capital funds DSS was designed to include several proposed capital projects. Each project may be evaluated individually in terms of its demands on the capital funds available for the period in question. Furthermore, the cumulative demand of several projects may be compared with the cumulative sources.

The DSS directs the decision maker to recognize the extent to which a project or group of projects may use various sources of capital funds. It is also possible to use the DSS with a bottoms up approach. Starting from the total capital funds required, the planner can determine the financial parameters or requirements necessary to generate the targeted capital funds pool.

### General Design

The general design for the capital funds DSS is interactive and menu driven. The analysis of funding sources follows the budget worksheets similar to those presented in Tables 1 through 6. The following discussion explains the representations, operations, and memory aids designed to assist the user forecast capital capacity.

Figure 1 is the main menu of the DSS, listing the four data entry screens which correspond to Tables 1 through 4. The screen display represents three separate work areas, a worksheet area on the upper right, a menu commands and/or help area on the left and an entry area for user input on the bottom. This software architecture design permits the user to enter data, see the effect on worksheet forecasts and ask for help without changing screens. Since all the transactions are performed on the same screen, the relationships among the financial variables are made very explicit. This is intended for instructional purposes. This architecture is consistent throughout the DSS.

After presenting the opening environment and selecting the "Next Screen," the Cash Financing from Operations screen (see Figure 2.) prompts for data, one account category at a time. The only user control in mid data entry is to pause and ask for a definition of terms or further explanation of some of the accounts or other parameters (see Figure 3.). Subsequently, the user may proceed or return to any of the sources of funding screens. All entered data may be changed whenever the appropriate screen is displayed.

After the "New Source of Equity" form is completed, the capital funds DSS prompts for any number of capital projects together with the level of funding to produce Capital Funds Utilization (see Table 6). The user then may print a hard copy of any or all the tables (screens), return to change any of the data or enter other projects and their funding levels.

A dictionary of definitions is available throughout the session. It includes all terms used in the capital funds DSS. Additionally, short explanations are presented beyond just a technical meaning. With repetition, those not fully comfortable with the capital budgeting process, may become better versed. Once invoked, the menu driven dictionary is RAM resident (see Figure 3).

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FIGURE 1.  
OPENING MENU

MENU *****	
F1: Definitions *	LIST OF SCREENS 1. Cash Financing From Operations 2. Long Term Debt Financing Part 1 3. Long Term Debt Financing Part 2 4. New Equity Financing
F2: Previous Screen	
F3: Next Screen *	
F4: End Program *	
Please select an option with a * next to it.	

FIGURE 3.  
DICTIONARY DEFINITIONS SCREEN

Long Term Debt/Equity Ratio	13: Previously Approved Capital Expenses
Long term debt divided by company equity, a measure of financial leverage. A company cannot usually add new borrowing beyond a maximum long term debt to equity ratio approved by its creditors.	14: Beginning Cash Balance
	15: Minimum Required Cash Balance
	16: Net Cash Flow from Operations
	17: Current Assets
	18: Fixed Assets
	19: Current Liabilities
	20: Long Term Debt
	21: Working Capital
	22: Current Ratio
	23: Long Term Debt to Equity Ratio
	24: Equity
	25: Increment in Long Term Debt to Equity Ratio
	Press the UP arrow to see the rest of the list or enter the NUMBER of the definition you wish to see ?

FIGURE 2.  
CASH FINANCING FROM OPERATIONS SCREEN

MENU *****	Cash Financing From Operations
F1: Definitions * F2: Previous Screen F3: Next Screen F4: End Program	Net Income after Taxes \$ 23,456.00
	Non-Cash Expenses
	Depreciation \$ 3,555.00
	Depletion \$ .0
	Deferred Taxes \$ 8,432.00
	Other \$ .00
	Gross Cash from Operations
	Dividends \$ 1,200.00
	Previously Approved Capital Expenses \$ 6,432.00
	Net Cash Flow from Operations
	Beginning Cash Balance \$ 17,832.00
	Minimum Cash Balance
	Cash Financing from Operations
Please select an option with a * by it.	
Please enter the Minimum Cash Balance ?	

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The DSS is programmed in Turbo Pascal, compiled and may be run from any IBM or compatible microcomputer with 5 1/4 inch disk drives. It requires 32k of RAM, runs from working memory and may be called within a network. It operates within an MS-DOS environment and will save ASCII files for later recall.

### CAPITAL FUNDS FORECASTING MODEL

The capital funds DSS includes three basic sources of funds [3] for long term investments:

1. Cash Financing from Operations
2. Long Term Debt Financing
3. New Equity Financing

The DSS also shows a summary of capital funds available and a section which relates the funds available to the requirements of specific capital projects.

#### Cash Financing From Operations

Many companies prepare annual cash budgets. These detailed cash flow projections contain specific expectations for collections and disbursements for a projected year. Included are the effects of changes in levels of inventories, accounts receivable, and accounts payable. Similarly, the effects of scheduled dividend payments, previously authorized capital asset purchases, and other miscellaneous cash flows are entered. Cash budgets also may include a minimum required cash balance. Constructed as specified this budget projects the amount of cash from operations that would be available in excess of the required operating balance. When available, this information may be entered directly into Part 1 of the Capital Funds Forecast (see Table 1.).

If a completed cash budget is not available for the capital budget period, the DSS model estimates annual cash flow from operations. This estimate is based upon the income forecast for the period adjusted for non-cash expenses and other cash flows.

Table 1 shows the data entry screen for the estimated annual cash flow. Non-cash expenses, e.g. depreciation, depletion, and deferred income taxes, are items that are subtractions in forecasting net income after taxes. However, these items do not require cash payments during the planning period. Depreciation is an accrued expense that represents a write-off of the original cost of fixed assets (buildings and equipment etc.). Similarly depletion is the periodic write-off of the original cost of a natural resource. In both of these accounts the actual cash outflow has already occurred in a prior period. With deferred income taxes, an income reducing expense of the budget period will not require a cash payment until some future time. These items and any other non-cost expenses are added back to net income after taxes to compute Gross Cash Flow From Operations.

The next adjustment is the subtraction of the cash payments that are not a part of regular ongoing operations and have not been accounted for in the projected income. The major items here are cash dividends and previously approved capital expenditures. After this subtraction, we arrive at the estimated Net Cash Flow From Operations for a budgeting

period. The available cash flow would be augmented also by any cash balance held at the beginning of the period. However, it is necessary to recognize that some cash must be reserved as a minimum operating balance. Its purpose is to facilitate cash transactions with customers, employees, and suppliers as well to provide funds for contingencies and liquidity risk reduction. After the minimum required cash balance is subtracted, the result is, Cash Financing From operations that would be available for the Capital funds Budget.

Table 1  
CASH FINANCING FROM OPERATIONS

Net Income After Taxes	\$ 2,000,000
Non-Cash Expenses	
Depreciation	\$ +2,000,000
Depletion	\$ + 50,000
Deferred Taxes	\$ + 25,000
Other Non-Cash Expenses	\$ -0-
-----	
Gross Cash Flow From Operations	\$ 2,275,000
- Dividends	\$ - 200,000
- Previously Approved Capital Expenses	\$ - 800,00
-----	
Net Cash Flow From Operations	\$ 1,275,000
+ Beginning Cash Balance	\$ + 40,000
- Minimum Required Cash Balance	\$ - 30,000
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Cash Financing from Operations	\$ 1,285,000

#### Long Term Debt Financing

Capital budgeting involves the acquisition of long term assets. Here, the most appropriate debt financing is long term debt. This way the debt is repaid through the productive use of the capital asset over its useful life. The long term debt to equity ratio indicates the current proportion of long term debt financing relative to equity financing. This ratio is considered to be very important by both creditors and equity holders [4]. Additionally, creditors are concerned with their legal asset recovery preference compared to owners, the higher the ratio the more risk to creditors. To the extent that the debt must be serviced regularly a high debt-equity ratio also increases owners risk although their proportional risked is lower as the ratio increases.

There may also be a financial leverage advantage to owners to increase the debt to equity relationship. Over time, the risk and return requirements of both lenders and owners should be reflected in a company's debt to equity ratio. The Capital Funds DSS treats long term debt financing capacity from two sources. Part 1 is Long Term Debt Financing Capacity From Operations. Part 2 is Expanded (contracted) Long Term Debt Capacity.

Long Term Debt Financing (Part 1) is illustrated in Table 2. It is based on the assumption that maintaining the company's current long term debt to equity ratio. Multiplying the existing ratio by the projected increase in equity from any new retained earnings for the capital budget period yields the new ratio. (The addition to retained earnings is found by subtracting cash dividends from net income after taxes.)

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Table 2  
LONG TERM DEBT FINANCING

Income after Tax	\$ 2,000,000
- Dividends	\$ - 200,000
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Incremented Retained Earnings	\$ 1,800,000
x Long Term Debt Equity Ratio	\$ X.70
<hr style="border-top: 1px dashed black;"/>	
LT Debt Financing Capacity From Operations	\$ 1,260,000
	<hr style="border-top: 1px dashed black;"/>

Long Term Debt Financing (Part 2) is illustrated in Table 3. An increase in the long term debt to equity ratio increases borrowing capacity. This increased capacity may be achieved by negotiation with creditor financial institutions, simply by asking for more debt financing. Also, management may adjust company policy to enlarge a ratio that has been held below the requirements of lenders [5]. Recognize that the long term debt to equity ratio might be reduced by a tightened credit or management policy change. This would reduce long term debt financing capacity. In either case, the total equity is multiplied by the increment to the long term debt to equity ratio to calculate the adjustment to long term debt capacity.

Table 3  
LONG TERM DEBT FINANCING (Part 2)

Total Equity	\$ 12,000,000
x Increment in LT Debt/Equity Ratio	\$ x .02
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Expanded Long Term Debt Capacity	\$ 240,000

### New Equity Financing

Equity financing is provided directly from company owners. Such new investment provides funds for the capital budget. This addition to owners equity increases the debt financing capacity as reflected by a corresponding drop in the debt to equity ratio. These sources are illustrated in Table 4.

Table 4  
NEW EQUITY FINANCING

New Equity	\$ 300,000
x Long Term Debt/Equity Ratio	x .70
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Equity Supported Long Term Debt	\$ 210,000

### Capital Funds Summary

The capital funds DSS has approached the three sources of capital investment funds, operations, debt, and equity in order of their accessibility. That is, funds from operation are generated without any special capital budgeting effort. However, long term debt requires an application to creditors, and new equity is generally not sought while a company has

unused debt capacity. Note, however, that the capital funds DSS allows a user to eliminate long term debt and/or the expansion of such debt by specifying a zero debt ratio or increment to the debt ratio.

Table 5 is a summary of the potential capital funds available for the capital budget period. It itemizes funds from operations, long term debt (parts 1 and 2), new equity, and new equity supported debt together with the accumulated total. The order of accumulation is based upon relative accessibility.

Table 5  
CAPITAL FUNDS SUMMARY

Source of funds	Funds Available	Accumulated Total
Cash Financing From Operations	1,285,000	1,285,000
Long Term Debt Financing (Part 1)	1,260,000	2,545,000
Long Term Debt Financing (Part 2)	240,000	2,785,000
New Equity Financing	300,000	3,085,000
Equity Supported Debt	210,000	3,295,000

### Capital Projects Requirements

The final section of this capital funds DSS directs the user to enter the capital funds requirements of individual projects or groups of projects. Table 6 shows the information that would be presented based on three projects requiring a total of \$2.9 million capital funds. The \$2.9 million represents the total funds requirement for the long-term assets plus any associated net increase in working capital. Capital investment projects often require increases in current assets e.g. inventories, supplies, or accounts receivable. To some extent these short-term assets can be financed through current liabilities, e.g. accounts payable to suppliers. Ordinarily most companies will maintain a current ratio greater than 1.00. That means a portion of the increased level of current assets must be funded from one or more of our capital funds sources. The projected net increase in working capital is that amount which will require long term funding.

Based on Table 6 a user can see that either project #2 or #3 could be funded solely from operations. Project #1 will require capital funds from operations plus 17% of the long term debt capacity available due to the projected increase in returned earnings. To fund all three projects management would have to employ all of the funds generated from operations, all of the increased long term debt capacity-including a expansion based on increasing the debt to equity ratio, and 38% of the potential new equity funds.

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Table 6  
CAPITAL FUNDS UTILIZATION

Projects	Capital Required	Capital Funds Utilized by Source	Percentage of Funds by Source
#1	\$1,500,000	Operations: \$1,285,000	100%
		L.T. Debt #1: \$ 215,000	17%
#2	\$ 800,000	Operations: \$800,000	62%
#3	\$ 600,000	Operations: \$600,000	47%
#1+#2+#3	\$2,900,000	Operations: \$1,285,000	100%
		L.T. Debt 1: \$1,260,000	100%
		L.T. Debt 2: \$ 240,000	100%
		New Equity : \$ 115,000	38%

### CLASSROOM APPLICATION

The capital funds DSS has been used in an undergraduate business policy class as a student aid for a case analysis. A portion of this case involved an evaluation of whether a company would have sufficient capital funds to undertake a plant expansion.

This was a senior level class for students who have completed all other required courses. The case was used spring term for one section with 36 students. Groups of three students prepared the case as a graded assignment worth 10% of the course grade. Although the case was required, the use of the computer DSS for capital funds forecasting was optional. The program disk could be checked out from the instructor as an instructional resource for preparing the case. Ten of the twelve groups did check out the program disk and eight of the groups incorporated the DSS output into their written case report.

The case analysis required the consideration of four alternative financial operating budget forecasts and the implication of each forecast for the company's capital investment plans. The students had to evaluate both the financial return (primarily using a discounted cash flow approach) and the financial feasibility of a proposed plant expansion plan.

All of the groups that used the DSS program identified the two budget alternatives that would not generate enough

capital funds to make the project feasible even though it showed a desirable internal rate of return. They were also able to identify the amount of new equity that would solve the problem. Five of the groups using the DSS calculated the incremental increase in the debt-equity ratio that would solve the problem. Only two of the four groups not using the DSS in their reports correctly identified the budget alternatives where there were insufficient funds for the expansion plan. Neither of these groups included a sensitivity analysis in their case reports to show what conditions would generate the required capital funds.

The above results indicate the capital funds DSS was quite useful to students analyzing a business policy case. They were able to use the DSS without special assistance from the course instructor. This analytical tool will be made available to students in future classes as its use did not require any class time for instruction but it did enhance the students performance.

### SUMMARY

This decision support system was constructed to guide users through the steps to build a Capital Funds forecast. The DSS supports forecasting funds flows for both individual and group capital projects projecting sources of cash in order of accessibility. The DSS program was used as an instructional/analytical resource for students to prepare case assignments in a business policy course. The DSS enabled those students who used it to analyze more accurately the conditions necessary for the feasible funding of a proposed capital expansion project.

### REFERENCES

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