Computers—A Challenge to Security Analysts

Introduction

If an accusing finger can be pointed at Australian security analysts it could be at our slowness to use all the resources available to make objective investment decisions. In other areas of management Australia has not been backward in using sophisticated aids in the decision-making process. Australia is not a leader in computer technology, but we are certainly no laggard in adapting this technology to many and varied business and scientific applications, except in the field of security analysis.

The reason for this neglect by security analysts cannot be that computers are not available. Many large and a good number of small companies in Australia now run their own data processing departments. The major financial institutions as well as The Sydney Stock Exchange Limited have been most progressive in their acceptance of advanced computing systems. Why then have Australian analysts as a body ignored this important investment tool? Can the leeway be made up or will we forever be relegated to the investment analysis backwaters? Is computer technology too difficult for the untrained to take up the challenge?

It is the writer’s opinion that there is no good reason why we in Australia should not embrace the computer and why we should not be as advanced in the use of this technology as are analysts in the U.S.A. and the U.K.

Areas of Interest

Handing large volumes of investment information efficiently and making the fullest possible use of this information are two problems that may be solved by the use of electronic data processing.

A medium-size computer system can handle efficiently considerably more data than the largest manually organised investment research department. It constitutes a most effective means of recording, retrieving and processing, fast and accurately, up-to-date financial information.

There are four basic elements in operating an E.D.P. system—input, storage, processing and output. The computer programs and the data are input with both programs and data normally stored on magnetic or punched card files when not actually being processed. During processing the programs instruct electronic impulses to operate on the data to bring about the required result. The result, or output, is printed on paper, or punched into cards for further processing, or displayed on television like cathode tubes.

Computers read, sort, classify, edit, select, move, retrieve, calculate, change, delete and write data. They are particularly useful in maintaining and revising a large file of information which under normal circumstances would be uneconomical to maintain and of doubtful value because the data, more often than not, would be out of date before it could be used to the best advantage.

A file of investment information, or in computer jargon a databank, is a basic requirement of most computer systems designed for use by financial analysts. When such a databank is made available to Australian analysts they will be able to use the computer in the following areas:

1. Investment Data Retrieval
2. Security Selection
3. Fundamental Analysis
4. Technical Analysis
5. Portfolio Analysis.

This article will consider the first two areas and will be limited to general issues only. The constraints as well as the potential of the computer as an investment tool will be discussed. Later articles will examine the other subjects in detail.

Investment Databank

The investment databank may be created by individual users or by an organisation which makes it available, at a price, to computer users. The databank will contain historical balance sheets, profit and loss statements and market data for a large number of listed companies. Usually it will be stored on tape or disk, but can be transferred to and from different computer systems by medium of punched cards.

In the U.S.A., Standard and Poor provides a wealth of balance sheet and profit and loss statements data with their “Compustat” service. Essentially the service is the sale and maintenance of an investment data bank for selected companies traded in the major security markets. The data is stored and up-dated on magnetic tape and suitably formatted for immediate processing by the user. The accompanying list shows those items which the U.S.A. sub-

The author has drawn on his experience in the fields of both Security Analysis and Computers to present this article which sets out his initial findings on the subject.
scriber expects to find in the databank, in his terminology.

**Databank Information**

**Balance Sheet Statistics**
1. Cash and Equivalent
2. Receivables
3. Inventories
4. Current Assets
5. Investment and Advances to Subsidiaries
6. Investments and Advances—Other
7. Gross Plant
8. Net Plant
9. Intangibles
10. Total Asset/Liabilities
11. Debt in Current Liabilities
12. Current Liabilities
13. Long Term Debt
14. Deferred Taxes and Investment Credit
15. Minority Interest and Subsidiary Preferred Stock
16. Preferred Stock (Involuntary)
17. Preferred Stock at Redemption Value
18. Common Equity
19. Total Invested Capital

**Income Account Statistics**
20. Net Sales
21. Unconsolidated Subsidiaries—Remitted Earnings
22. Cost of Goods Sold
23. Labour and Related Expenses
24. Pension and Retirement Expenses
25. Selling and Advertising Expenses
26. Incentive Compensation Expenses
27. Research and Development Expenses
28. Rental Expense
29. Operating Income
30. Depreciation and Amortisation
31. Fixed Charges
32. Minority Interest
33. Deferred Taxes
34. Investment Credit
35. Income Taxes
36. Non-Recurring Expenses (Not Net of Taxes)
37. Net Income
38. Preferred Dividends
39. Available for Common
40. Common Dividends
41. Non-Recurring Income or Expense Net of Taxes

**Other Items**
42. Stock Price-High
43. Stock Price-Low
44. Stock Price-Close
45. Number of Shares Outstanding
46. Dividends per Share
47. Adjustment Factor
48. Number of Shares Traded
49. Amount of Convertible Debt and Preferred Stock
50. Number of Shares Reserved for Conversion
51. Number of Common Shares Purchased or Sold Net
52. Carry Forward Tax Loss
53. Unconsolidated Subsidiaries—Excess Equity
54. Unconsolidated Subsidiaries—Unremitted Earnings
55. Market Value of Stock Rights and Spin-offs
56. Earnings per Share as Reported
57. Capital Expenditure
58. Inventory Valuation
59. Inventory Cost
60. Number of Employees

With the presentation of a voluminous data base in a form readily usable for computers, not only can traditional tests be applied, but many new ones can be devised and used. For example, compound growth rates computed by the log-linear least squares’ method, or stability factors calculated by taking the standard error of fit in per cent, which for those mathematically inclined is the antilog of the square root of the sum of the squares of the difference between the observed and the trend values in logs, divided by the number of observations minus one.

Apart from the Standard and Poor’s service there are a number of other computer based services available to computer users in the U.S.A. Dun and Bradstreet has its “Million Dollar Directory” and the Bureau of Census has over 100 economic time series on punched cards. Other organisations offer similar services to financial institutions and stockbrokers operating their own E.D.P. systems.

The cost of the file creation will limit the size of the data collected for each company. It is interesting to note that the highly regarded “Compustat” tape has only 41 items of balance sheet and income statement statistics. Many of these would not be readily available to Australian analysts. There will, however, be other items which Australian analysts will require over and above those maintained by Standard and Poor.

The items best suited for inclusion in any Australian investment databank service will be determined by looking at the investment decision-making techniques most commonly employed by Australian analysts. Nevertheless, many Australian analysts will be surprised at the limited number of items that will be made available. It should be remembered, however, that their more sophisticated counterparts in the U.S.A. accept quite readily the limitations of the “Compustat” and similar services. Australian analysts will have to accept a compromise between quality and cost if any progress is to be made in this country towards developing the necessary techniques in applying computers to the investment decision process.

The difficulties associated with the creation of an Australian investment databank can be overcome, but the limitations and the constraints must be clearly recognised from the outset. These are:

1. Problems associated with the collection of original data.
2. The need for clear definition of balance sheet and income statement items.
3. Problems associated with the updating and adjustment of data stored on file.
4. The system requirements and the physical capacity of magnetic files.

A large force of skilled security analysts will be required to select and code data for up-date and revision purposes. Qualitative disclo-
sures (Notes to balance sheets, etc.) are not usually maintained on file. Historical data sometimes will be confused by takeovers and changes in accounting procedures. As most analysts use different techniques in adjusting historical data original information is usually left unadjusted by the organisation making the service available. The analyst using the service can write his own programs to adjust the data the way he feels best. This, however, means he must know how the databank is constructed.

Clear definition of the items maintained on file will be of paramount importance. For example, Standard and Poor in their "Computstat" service define Receivables as:

A. "Receivables" represent claims against others (after Applicable Reserves) collectable in money generally within 12 months. This includes, but is not limited to:
   1. Trade, miscellaneous and other receivables
   2. Amounts due from unconsolidated subsidiaries when listed as part of current assets
   3. Income tax refunds
   4. Money due from sales of debentures
   5. Unbilled shipments
   6. Amounts due from officers and employees when listed as current asset
   7. Store property covered by investors' commitments to purchase
   8. Commercial paper issued by subsidiaries to parent company

B. Excluded from receivables is the following item:
   1. Advances on purchases of materials and supplies (treated as inventory item).

All the items maintained on file are listed similar to the foregoing in the covering manual. Non-standard source data will be a problem with or without computers, and inter-firm comparisons will still be questionable owing to variations in accounting procedures. Where an item does not fit any of the standard classification a supplementary list of Special Treatment Companies is included for the analyst's attention. The point being that unless the analyst is familiar with the terms his computer solutions will be suspect.

The maintenance and revision of the databank will be a major undertaking. A skilled and computer-trained staff will be needed. Because of problems in this area potential users have delayed their entry into computer based investment analysis. When we in Australia have a central organisation providing the basic data then we will be able to use this latest investment tool.

In most computer systems the capacity of the file storage area will determine the physical size of the databank. Another associated problem is that different users operate different makes of computers and even within the same make there are many different models. Some computer systems do not use magnetic tapes, others do not use magnetic disk files and some use neither. This is a real limitation for a commercially minded organisation considering the creation of an investment databank in Australia.

The economics of the databank creation will determine the limits of the file. There will of necessity have to be some compromise between the computer system requirements and cost. Many analysts will object to this compromise. But if we are to make a start in this direction we should not be too demanding at this early stage of what the investment databank should contain. An incomplete list of company statistics will be better than none.

**Data Retrieval**

Because of the computer's ability to fetch, sort and classify data at speeds which are measured in billions of a second its greatest potential in the security industry will be in the area of inquiry handling.

Instant investment information will be made available to analysts with access to an inquiry terminal. The databank can be interrogated and the relevant section of the file searched for the required information. The computer will carry out any processing need and transmit the information back to the inquiry terminal.

In the U.K., Intinco Limited has provided an investment service called SCAN (Stockmarket Computer Answering Network) which provides immediate financial information for stockbrokers, banks and other large investors. SCAN is one of the most advanced computer-based inquiry answering services in the world. The SCAN databank contains information on about 7,000 companies, of which at least 2,500 are British companies. The data relating to the British records includes details of all capital issues for each of the companies as well as information from balance sheets and income statements. 1,000 American companies are maintained on file. The databank is being enlarged as the service grows.

SCAN subscribers, by pressing the correct terminal keys, can get immediate answers to their questions including the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Information Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>Price: Dividend Yield; Earnings Yield: Price Earnings Ratio:</td>
</tr>
<tr>
<td>AJ</td>
<td>Price: Price Index; Price Retained Cash Flow:</td>
</tr>
<tr>
<td>AK</td>
<td>Six selected Profitability Ratios on most recent available data:</td>
</tr>
<tr>
<td>C</td>
<td>Five-year Trend and Volatility factor of two selected per share values:</td>
</tr>
<tr>
<td>JA</td>
<td>Gross Redemption Yield and Running Yield of a dated loan stock:</td>
</tr>
<tr>
<td>JB</td>
<td>Net Redemption Yield and Net Running Yield of a dated loan stock:</td>
</tr>
</tbody>
</table>
One of the first tasks undertaken by Intinco Limited was the creation of the databank. And, with the introduction of SCAN direct communication by the investor with a real-time computer system became a reality.

**Security Selection**

Traditionally a stock has been added to a basic list of approved investments after it has been brought to the attention of, say, the investment committee and after having been subjected to certain multiple screening tests. The computer is particularly valuable where multiple screening techniques are concerned.

The analyst can describe the attributes of the type of stock he is looking for, thus providing the computer with a "profile" of the companies that would interest him. Attributes such as dividend yield, price earning ratios, industry and profitability trends can determine the stocks with the desired characteristics.

Some computer manufacturers have developed "package" programs which help the analyst achieve the foregoing objectives. The I.B.M. package produces a series of computer printed reports containing the following data:

**Report 1**

This report contains a list of companies that meet standards specified by the security analyst. One or any combination of the following criteria may be specified:

1. Price earnings ratio
2. Dividend yield
3. Operating income margin
4. Net profit margin
5. Return on common equity

The security analyst may request, for example, information on:

1. All companies with a dividend yield over 3.5 per cent
2. All companies with a P/E ratio under 15
3. All companies in a given industry with a dividend yield between 3.0 per cent and 5.0 per cent, a P/E ratio under 12 and a return on ordinary over 10 per cent.

All industries, or as many as three industry groups may be specified.

**Report 2**

This report contains a ten-year financial history for a company selected by the analyst. Balance sheet, income statement and market data as well as per-share data and selected ratios are presented.

**Report 3**

This report contains a set of ratios describing a company's financial performance for a single year. To enable the analyst to identify changing conditions within the company, average ratios are computed for three, five and ten-year periods. Industry ratios are shown for the same periods.

**Report 4**

This report presents information on a company's growth. Annual compound growth rates are computed by fitting a log-linear least squares' trend line through the data. A stability factor is calculated for sales and earnings per share. Growth and stability factors for the company and the industry net income and net sales are computed.

Company sales and net income are compared with industry sales and net income and the general economy for a ten-year period. Annual percentage changes in company sales and earnings are calculated.

**Report 5**

This comparative analysis report contains five years' financial and market information for up to five companies. The financial analyst can use this report to compare the performance of selected companies.

Honeywell is another computer manufacturer which offers financial analysis package programs to the user. The computer-produced reports are similar to those just described.

Under Australian conditions the programs would need to be modified extensively. They rely on the "Compustat" service. The need for such a service in Australia is once again demonstrated.

**Concluding Remarks**

James E. Fanning noted that "... sophisticated management tools can be regarded largely as those methods drawn from these fields of scientific know-how:—

1. Systems analysis and design
2. Management science
3. Economic science, particularly econometrics.

"A knowledge of systems concepts has particular usefulness in the treatment of the information flows associated with the investment decision-making process—enabling an investment organisation to employ computers and other data processing equipment when and where called for."

It is this knowledge which will be highly useful to the investment organisation in Australia where that organisation wants to obtain the best possible investment performance for its clients. Nevertheless, until we have produced an investment databank of Australian companies we will, as a country, fall still further behind overseas analysts. The day is not far away when statistics of Australian companies will be maintained on foreign-controlled databanks. By not acting now we may be leaving our profession open to takeover by foreign analysts.

**Bibliography:**


Feuerstein, A. E., and Maggi, P. G., "Computer Investment Re-
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virtue of their positions in their companies but also had substantial assets to enable them to take up, at the appropriate time, the shares to which they were entitled. Probably share option plans served a useful purpose in the U.S.A., where high turnover of executive staff is traditional, in enabling companies to secure and hold valuable employees, although it is not known to what extent their development up to 1964 was merely a response to competition once the movement towards their inauguration had got under way. To go even further, was that development a symptom of mass psychology and, after all that has happened in the U.S.A., would a corresponding development in Australia now be indicative of a state of euphoria rather than of detached reasoning as to what is best for companies, their shareholders and their senior employees?

The Future

Have share option plans for em-

COMPUTERS

(From previous page)


employees a future in Australia? If so, in what form and to what extent? Are we likely to see a great increase in their number and a consequential cycle of:

1. Abuse until we have what Erwin N. Griswold (Harvard Business Review, November-December 1960) described in the U.S.A. as a “fairyland” where “the ground is strewn with quite a bit of gold” for influential executives of companies,

2. Concern on the part of security analysts and then of stock exchanges as to the real nature of what is happening, and finally

3. Aid to ineffective shareholders through changes in company and/or tax laws to lay down frameworks, impose restrictions and ensure adequate publicity?

In the ultimate case for a share option plan for employees must not rest on its effectiveness or otherwise as a vehicle for getting tax-free remuneration into the hands of senior employees, however much this aspect may appeal to those concerned. The real point is effectiveness in providing an incentive whereby the interests of shareholders and senior employees are made to coincide. To do this the plan must not only be specifically designed to function as an incentive scheme but it must be demonstrated that it provides a more effective incentive scheme than any available alternatives — taking into account such aspects as real burden of cost through dilution of equity on the one hand and the need for substantial personal financial participation by employees on the other.

It has yet to be shown that the great majority of Australian senior employees would not prefer to receive immediate cash rewards on good results — and if company results are good the shareholders should benefit. Perhaps share option plans are only really appropriate for companies whose share prices are depressed and which are too illiquid to finance a share purchase plan for their employees.

Further Reading

Apart from the U.S. and Australian publications mentioned previously, it is suggested that reference be made to other articles that have appeared over the years in the Harvard Business Review. Many U.S. text-books on financial management refer in some measure to share option plans for employees, but “The Financial Manager” by Cohen & Robbins is particularly recommended for its historical summary and discussion of the recent position in the U.S.A.

WORKING PARTIES

SYDNEY

Working Parties as listed below are at present conducting studies on the following companies:

Company
Thomas Nationwide Transport Ltd.
Pioneer Concrete Services Ltd.

Members
J. B. Cutler
E. F. Baptist
A. Smith
M. E. Baume
R. A. C. Keene
J. J. Jago

J. Troy
T. V. Davies
W. Hawkins.