

# Principles of Auditing: An Introduction to International Standards on Auditing

## Chapter 8 – Analytical Procedures

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# Analytical procedures

- Analytical procedures (AP) are evaluations of financial information through analysis of plausible relationships among both financial and non-financial data.
- AP encompass such investigation as necessary of identified fluctuations or relationships that differ from expected values by a significant amount.

# Analytical procedures (Continued)

A basic premise of using analytical procedures is that there exist plausible relationships among data and these relationships can reasonably be expected to continue.

# General analytical procedures

***Trend analysis*** is the analysis of changes in an account balance over time.

***Ratio analysis*** is the comparison of relationships between financial statement accounts, the comparison of an account with non-financial data or the comparison of relationships between firms in an industry.

**trend analysis**  
**ratio analysis**  
reasonableness tests  
statistical analysis  
data mining analysis

# General analytical procedures (Continued)

*Reasonableness testing* is the analysis of account balances or changes in account balances within an accounting period in terms of their 'reasonableness' in light of expected relationships between accounts.

*Statistical analysis* is the analysis of data using statistical methods.

trend analysis  
ratio analysis  
**reasonableness tests**  
**statistical analysis**  
data mining analysis

# General analytical procedures (Continued)

*Data mining* is a set of computer-assisted techniques that use sophisticated statistical analysis, including artificial intelligence techniques, to examine large volumes of data with the objective of indicating hidden or unexpected information or patterns. For these tests auditors generally use computer-aided audit software (CAATs).

trend analysis  
ratio analysis  
reasonableness tests  
statistical analysis  
**data mining analysis**

# Required analytical procedures

The auditor's responsibility is to perform analytical procedures near the end of the audit that assist the auditor when forming an overall conclusion on whether the financial statements are consistent with the auditor's understanding of the entity.

completion



# CAAT

- *CAAT – Computer-assisted audit techniques* – Applications of auditing procedures using the computer as an audit tool.
- CAATs can be used to select sample transactions from key electronic files, to sort transactions with specific characteristics or to test an entire population.
- CAATs generally include data manipulation, calculation, data selection, data analysis, identification of unusual transactions, regression analysis and statistical analysis.

# Theoretical view of analytical review

The review process consists of four diagnostic processes:

- Mental representation
- Hypothesis generation
- Information search
- Hypothesis evaluation.

# **Performing analytical procedures may be thought of as a four-phase process:**

- Phase one – formulate expectations (expectations)
- Phase two – compare the expected value to the recorded amount (identification)
- Phase three – investigate possible explanations for a difference between expected and recorded values (investigation)
- Phase four – evaluate the impact of the differences between expectation and recorded amounts on the audit and the financial statements (evaluation).

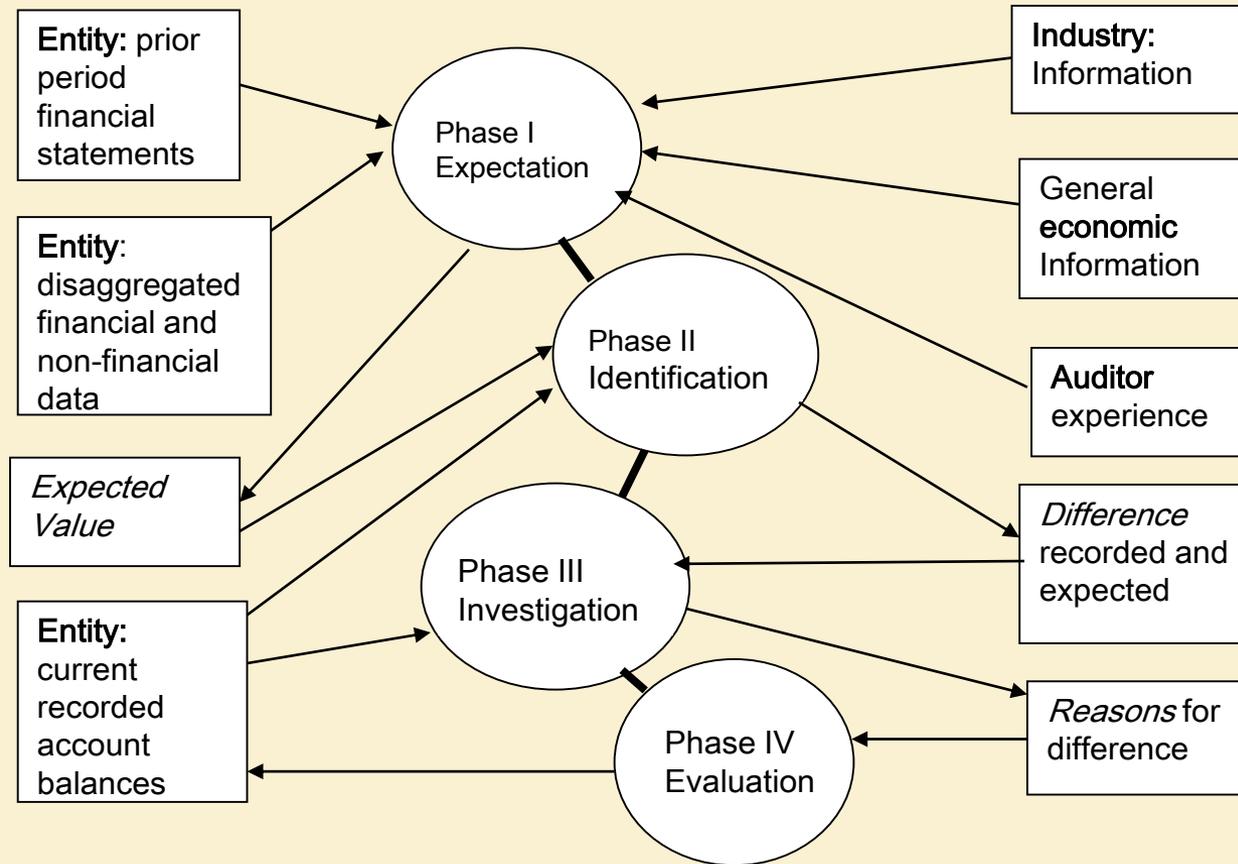


Illustration 8.1 The Analytical Review Process

# Formulating expectations

Expectations are developed by identifying plausible relationships that are reasonably expected to exist based on the auditor's understanding of the client and of his industry. These relationships may be determined by comparisons with the following sources:

- comparable information for prior periods;
- anticipated results (such as budgets and forecasts, or auditor expectations);
- similar industry information;
- non-financial information.

# Designing and performing substantive analytical procedures ISA 520

1. Determine suitability of a particular analytical procedures for given assertions.
2. Evaluate the reliability of data from which the auditor's expectation of recorded amounts or ratios is developed.
3. Develop an expectation of recorded amounts or ratios that is sufficiently precise to identify a misstatement.
4. Determine the amount of any difference of recorded amounts from expected values that is acceptable.

# Sources for comparison of information

- Comparable information for prior periods
- Anticipated results (such as budgets and forecasts, or auditor expectations)
- Elements of financial information within the period
- Similar industry information
- Non-financial information.

# **The effectiveness of an analytical procedure is a function of the nature of the account and other characteristics of the account**

- Nature of the account
  - Balance based on estimates or accumulations of transactions
  - The number of transactions represented by the balance
  - The control environment.
- Characteristic of the account
  - Number of transactions
  - Fixed vs. variable
  - Level of detail (aggregation)
  - Reliability of the data.

# Trend analysis

- It works best when the account or relationship is fairly predictable.
- The number of years used in the trend analysis is a function of the stability of operations.
- The most precise trend analysis would be on disaggregated data (for example, by segment, product, or location and monthly or quarterly rather than on an annual basis).
  - At an aggregate level it is relatively imprecise because a material misstatement is often small relative to the aggregate account balance.

# Ratio analysis

- It's most appropriate when the relationship between accounts is fairly predictable and stable.
- It's more effective than trend analysis because comparisons between the balance sheet and income statement can often reveal unusual fluctuations that an analysis of the individual accounts would not.
- Like trend analysis, ratio analysis at an aggregate level is relatively imprecise.

## **There are five types of ratio analysis analytical procedures**

- Ratios that compare client and industry data
- Ratios that compare client data with similar prior period data
- Ratios that compare client data with client-determined expected results
- Ratios that compare client data with auditor-determined expected results
- Ratios that compare client data with expected results using non-financial data.

# Ratios

- Liquidity: Current ratio  
Quick ratio
- Solvency: Debt to equity  
Times interest earned  
Debt to service coverage
- Profitability: Net profit margin  
Gross margin  
Return on investment
- Activity: Receivable turnover  
Inventory turnover  
Asset turnover

# Reasonableness testing

- Analysis of account balances or changes in account balances in light of expected relationships between accounts.
- Involves the development of an expectation based on financial data, non-financial data or both.

# Trend analysis, ratio analysis, reasonableness tests

## Comparison of the three methods

- Number of independent predictive variables considered
  - Trend analysis single, financial predictor
  - Ratio analysis two or more financial or non-financial
  - Reasonableness tests, statistical analysis, data mining many variables
- Use of external data (reasonableness tests)
- Statistical precision (most precise with statistics and data mining analysis).

# Going concern problem indications

- ✓ *Financial indications*
  - ✓ Net liability, borrowings near maturity, adverse ratios, losses, late payments, change to cash on delivery.
- ✓ *Operating indications*
  - ✓ Management turnover, loss of market or licence or supplier, shortages and labour problems.
- ✓ *Other indications*
  - ✓ Non-compliance with statutory requirements, legal proceedings, changes in legislation.

# Analytical procedures are used throughout the audit

- To assist the auditor in planning the nature, timing and extent of audit procedures
- As substantive procedures
- As an overall review of the financial statements in the final stage of the audit.

planning

completion



‘The auditor shall design and perform analytical procedures near the end of the audit that assist the auditor when forming an overall conclusion as to whether the financial statements are consistent with the auditor’s understanding of the entity’.  
– ISA 520

# Tests of controls over information used for analytics

WHY? When those controls are effective, the auditor will have more confidence in the reliability of the information and, therefore, in the results of analytical procedures.

HOW? Controls over non-financial information can often be tested in conjunction with tests of accounting-related controls.

# Analytical procedures as substantive tests

Substantive procedures in the audit are designed to reduce detection risk relating to specific financial statement assertions. Substantive tests include tests of details (either of balances or of transactions) and analytical procedures.

Auditors use analytical procedures to identify situations that require increased use of other procedures (i.e. tests of control, substantive audit procedures), but seldom to reduce audit effort.

# Substantive analytical procedures advantages and disadvantages

- Advantages:
  - Understanding of the client's business obtained during planning procedures
  - Enable auditors to focus on a few key factors that affect the account balance
  - More efficient in performing understatement tests.
- Disadvantages:
  - Time consuming to design and require greater organisation
  - Less effective when applied to the entity as a whole
  - Will not necessarily deliver the desired results every year
  - In periods of instability and rapid change, difficult to develop a sufficiently precise expectation
  - Require corroboration.

## **Corroborate explanations for significant differences found with analytical procedures**

The following techniques may be used:

- inquiries of persons outside the client's organisation;
- inquiries of independent persons inside the client's organisation;
- evidence obtained from other auditing procedures;
- examination of supporting evidence.

# CAATs generally include file interrogation tools

- Data manipulation
- Calculation
- Data selection
- Data analysis
- Identification of exceptions and unusual transactions (e.g. Benford's law)
- Regression analysis
- Statistical analysis.

# GAS

- *Generalised audit software (GAS)* packages contain numerous computer-assisted audit techniques for both doing analytical procedures and statistical sampling bundled into one piece of software (e.g. ACL, Idea).
- File interrogation is a CAAT that allows the auditor to perform automated audit routines on client computer data.

# File interrogation audit tasks using GAS

- Convert client data into common format
- Analyse data
- Compare data on separate files
- Confirm the accuracy of calculations and make computations
- Sample statistically
- Test for gaps or duplicates in a sequence.

# Examples analysing data with GAS?

- ✓ Identify all inventory items relating to products no longer sold.
- ✓ Select all inventory items with no recorded location.
- ✓ Summarise inventory items by location to facilitate physical observation.
- ✓ Review account receivable balances for amounts over credit limits or older than a specified period.
- ✓ Summarise accounts receivable by age for comparison to the client's schedules.
- ✓ Review inventory quantities and unit costs for negative or unusually large amounts.
- ✓ Isolate all inventory items that have not moved since a specified date.
- ✓ Review assets for negative net book values.
- ✓ Summarise inventory by age to assess the reasonableness of obsolescence provisions.

# Structured GAS approach to analytical procedures – 4 Phases

## Phase one in performing analytical procedures – expectations

- Determine appropriate base data and an appropriate level of disaggregation.
- Use regression analysis techniques to develop from the base data a plausible relationship (a regression model) between the amounts to be tested (the test variable such as accounts receivable balance) and one or more independent sets of data (predicting variables such as revenue, volume of shipments, collection history, selling square footage, number of customers, etc.) that are expected to relate to the test variable.
- Based on this relationship, use GAS software to calculate the expectations (regression estimates) for the test variable based on the current-period values of the predicting variables.

Illustration 8.5 The Four-Phase Analytical Review Process Using Gas

# Structured GAS approach

## Phase two in performing analytical procedures – identification

- Use GAS's statistical techniques to assist in identifying significant differences for investigation (i.e. differences exceeding the materiality thresholds) based on the regression model, audit judgements as to monetary precision (MP), required audit assurance (R factor), and the direction of the test.

## Phase three in performing analytical procedures – investigation

- Investigate and corroborate explanations for significant differences between the expectations and the recorded amounts.

## Phase four in performing analytical procedures – evaluation

- Evaluate findings and determine the level of assurance, if any, to be drawn from the analytical procedures.

Illustration 8.5 The Four-Phase Analytical Review Process Using Gas (Continued)

# Data mining techniques

- Data mining can be used in all types of databases or other information repositories. Data to be mined can be numerical data, textual data or even graphics and audio.
- Used most extensively in **customer relationship management (CRM)** and fraud detection, data mining is for both verification and discovery objectives.
- Data mining is used in a top-down approach to verify auditors' expectations or explain events or conditions observed.

# Data mining analytical procedures

- GAS has been criticised because it cannot complete any data analysis by itself. Data mining, on the other hand, analyses data automatically.
- Data mining methods include data description, dependency analysis, classification and prediction, cluster analysis, outlier analysis and evolution analysis.
- The most frequently used algorithms are decision trees, apriori algorithms and neural networks.

# Data description, dependency analysis and classification

- The objective of data description is to provide an overall description of data, either in itself or in each class or concept.
  - Main approaches in obtaining data description – data characterisation and data discrimination.
- The purpose of dependency analysis is to search for the most significant relationship across large number of variables or attributes.
- Classification is the process of finding models, also known as classifiers, or functions that map records into one of several discrete prescribed classes.

# Cluster analysis, outlier analysis and evolution analysis

- The objective of cluster analysis is to separate data with similar characteristics from the dissimilar ones.
- Outliers are data items that are distinctly dissimilar to others and can be viewed as noises or errors.
- Objective of evolution analysis is to determine the most significant changes in data sets over time.

## **Data mining most frequently uses three algorithms**

- A decision tree is a predictive model that classifies data with a hierarchical structure.
- The apriori algorithm attempts to discover frequent item sets using rules to find associations between the presence or absence of items.
- A neural network is a computer model based on the architecture of the brain.

# Follow-up in case of unexpected deviations

- When analytical procedures identify significant fluctuations or relationships that are inconsistent with other relevant information or that deviate from predicted amounts, the auditor should investigate and obtain adequate explanations and corroborative evidence.
- There are primarily two reasons for a significant fluctuation or inconsistency
  - a genuine business reason that was not obvious during planning procedures;
  - a misstatement.

# Thank you for your attention

## Any Questions?