



# Survey Design and Statistical Sampling



Organizations and decision makers in both public and private spheres continually find themselves in need of statistical data for a variety of reasons, such as determining the outcome of a contemplated action, measuring the success or progress of an already implemented action or product, and determining the feasibility of changing or revising their plans and policies to mitigate risk and increase potential benefit.

The Economic & Statistical Consulting (ES) professionals in KPMG LLP's (KPMG) Economic & Valuation Services (EVS) practice have extensive experience developing and implementing sampling plans that may substantially reduce project costs, improve accuracy, and address complex issues of data quality, response rates, population definition, and a wide variety of other issues encountered in deriving quantitative results and conclusions from large data sets.

## The KPMG approach

A properly designed and executed statistical sampling plan can produce estimation results that are accurate, objective, and reliable for many applications. Working closely with our clients and other KPMG Audit, Tax, and Advisory professionals, our ES professionals use a collaborative approach tailored specifically to our client's needs. The results are an insightful and meaningful interpretation of the statistical data to support our client's short-and long-term goals and success.

## Methodology

Our ES professionals have extensive experience applying statistical sampling for projects requiring an analysis of large numbers of transactions. We understand the uncertainty and frustration you may be facing when trying to use statistical sampling in the practical applications that arise:

- Do you have problems with low statistical accuracy and large sample sizes? Are you using judgmental samples because you do not believe statistical sampling is feasible for your project? Are you applying sampling techniques that may be inappropriate for the type of test being conducted or may be vulnerable to dispute?
- Are the items you need to examine scattered over many sites? Are the items stored in boxes or other filing containers, many items to a box? Are some items much

more costly to review than others? Would profitability be improved by a sample design that reduces the number of sites visited, boxes pulled, or costly items reviewed while maintaining statistical accuracy?

- Are your data sources complex or questionable? Do you need to understand the impact of missing sample items on statistical results? Can you address potential incompleteness of the source data?
- What is the impact of the sampling plan on the ability to extrapolate the results of the sample? Do you want to extrapolate the sample results outside of the population that was sampled—for example, to additional years or business units? Can you respond to questions on the validity of your extrapolation?
- Do you need to survey employees? Do you have effective tools for designing and distributing the survey and for collecting and analyzing the resulting data?

## Our commitment

ES's highly experienced and credentialed statisticians and data analysts can respond to these issues and develop statistical sampling methodologies and estimates that address your needs in a robust and results-driven fashion—bringing sustainable value and allowing you to be more confident that the strategies and plans you put into place are based on clear and logical assumptions.

By anticipating barriers to implementation and resolving potential problems early, we can help you to a better understanding of the means open to you to move forward confidently with your plans.

## Representative statistical sampling projects

- **Meals and entertainment expenses studies.** Working with KPMG's Accounting Methods and Credits Services practice, ES professionals developed and implemented statistical sampling analyses to quantify expenses booked as meals and entertainment erroneously assumed to be subject to the 50-percent exclusion. Using stratified samples of meals and entertainment expenses, KPMG helped to identify substantial tax savings for many FORTUNE 500 companies.
- **Tax-basis studies.** ES professionals collaborated with colleagues in KPMG's Mergers & Acquisitions Tax practice to design and implement a two-stage stratified cluster sample of shareholders to establish the tax basis of acquired companies under Revenue Procedure 81-70.
- **Research credit studies.** ES professionals designed and implemented statistical sampling procedures in cooperation with KPMG's Federal Tax practice to determine the proportion of employee compensation and vendor invoices eligible for treatment as research and development costs to obtain favorable tax treatment for our clients.
- **Sales and use tax refunds.** EVS professionals worked with KPMG's State and Local Tax practice to design and implement sampling methods to support clients' sales and use tax refund claims. These projects required sampling from populations of several million invoices over multiyear periods.
- **Cost segregation studies.** Working with KPMG's Cost Segregation practice, ES professionals developed and implemented regression estimation methods for clients to estimate the value of personal property that is eligible to depreciate over a short life. Regression estimation can often achieve high precision with a relatively small sample.
- **Repairs cost studies.** ES professionals worked with KPMG's Federal Tax practice to design and implement statistical sampling methods to estimate the proportion of project costs qualified for the repairs cost tax deduction.
- **Section 199 studies.** With the assistance of KPMG's Federal Tax practice, ES professionals developed and implemented statistical sampling methods to estimate the proportion of project costs qualified for domestic production activities.
- **Asset existence and completeness assessment.** Working with KPMG's Federal Advisory practice, ES professionals provided multistage stratified probability samples to help estimate the existence and completeness of personal and real property inventory records of certain Federal government agencies. The population encompassed the inventory records of hundreds of agency sites across the United States that included in excess of one million inventory items. The sample design provided statistically valid estimates of both the property shown in agency records and property located in agency facilities but not reflected in agency records. ES also provided statistical sampling support to KPMG's State and Local Advisory practice efforts in the assessment of infrastructure assets in connection with GASB Statement 34 audits.
- **Healthcare Advisory support.** ES professionals collaborated with KPMG's Advisory practice in applying statistical sampling methods to review healthcare enrollee risk scores and issuer risk-adjusted payment streams and claims, in support of Medicare/Medicaid reimbursement issues and other insurance claim audits.
- **Federal Audit support.** Working with KPMG's Federal Audit practice, ES professionals provided data analysis and statistical sampling design to assist the audit teams in their testwork over numerous financial statement line items. The data analysis and statistical samples were used in the audit of key financial statement balance areas, as well as general non-process-specific sampling methodology, such as the sampling of periodic management controls. Based on the audit results of the samples, ES professionals designed the extrapolation models and techniques to produce statistical extrapolations of exception rates and amounts in various financial statement areas within narrowly defined confidence bounds.
- **Education performance analysis.** ES professionals developed, implemented, and analyzed surveys to assess technology impact and customer satisfaction for public school systems across the United States.
- **Surveys.** ES professionals designed and implemented a survey of 25,000 U.S. businesses to collect information on domestic money services activities for the U.S. Department of Treasury.
- **And more...** In addition to a multitude of other large and small applications, ES professionals worked with KPMG's Audit practice to estimate the number of overstayed H-1B visa holders and incidences of alien criminal recidivism to determine inventory levels for a large retailer as part of a large litigation engagement.

## Contact us

For more information on how ES can help you with statistical sampling, contact your local KPMG adviser or one of the following ES professionals:

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