Using Excel and Benford’s Law to detect fraud

Learn the formulas, functions, and techniques that enable efficient Benford analysis of data sets.

By J. Carlton Collins, CPA

In 2015, Atlanta’s Six Flags White Water theme park opened a new 10-story slide called the Dive Bomber. The ride begins with a virtual free fall nearly straight down before it gradually levels out toward the bottom. Most people who look at the Dive Bomber see a thrill ride—one they may or may not want to experience. CPAs who gaze upon the Dive Bomber may see something else—an image they could possibly use to detect and prevent fraud.

What could a water slide possibly have to do with fighting fraud? The answer lies not in the nature of the slide, but in its shape. The Dive Bomber’s curve closely matches the curve Frank Benford discovered in 1938 that depicts mathematical expectations related to naturally occurring (or nonfabricated) numbers (see the sidebar, “The History of Benford’s Law”). Affixing the shape of this water slide in your mind now may help you detect fraudulent data later. Though the merits of the analogy may not be immediately obvious, this article explains Benford’s Law, how it relates to the shape of a water slide, and how to make simple Excel-based calculations that can help spot and stop fraudulent activity.

WHEN TO USE BENFORD’S LAW TO SPOT FRAUD

Briefly explained, Benford’s Law maintains that the numeral 1 will be the leading digit in a genuine data set of numbers 30.1% of the time; the numeral 2 will be the leading digit 17.6% of the time; and each subsequent numeral, 3 through 9, will be the leading digit with decreasing frequency. This expected occurrence of leading digits can be illustrated as shown in the chart “Benford’s Law.”

The resulting curve pictured in this green bar chart closely resembles a steep water slide and is sometimes referred to as the Benford curve. Today, armed with any version of Microsoft Excel, CPAs can count the leading digits contained in virtually any data set, chart the findings, and compare the results to Benford’s curve to see if that data set obeys the expectations set forth by Benford’s Law.

The Excel-based procedures described in this article for counting and charting a data set’s leading digits are the same for any size data set and can include general ledgers, trial balance reports, income statements, balance sheets, invoice listings, inventory listings, depreciation schedules, investment

Online extras

You can access the following online resources with the digital version of this article at journalofaccountancy.com/benfords-law:

- Video: “Benford’s New Law,”
- Excel: Download a file with the sample data to follow this article’s instructions.

Editor’s note

Instructions for Microsoft Excel in this article refer to the 2007 through 2016 versions, unless otherwise specified.
For this example, we will examine the populations of the world's 258 countries from 2011 through 2015 as reported by the World Bank Group's World DataBank (databank.worldbank.org), using United Nations World Population Prospects data (see the sidebar “Data Source Citation” for the full source information for the data). The first step is to extract the first digit of each population number using the LEFT function (see the screenshot “Extracting the First Digit”). As pictured in cell K2, the function formula =LEFT(F2,1) reads the population in cell F2 (32,526,562 in this example) and returns the first digit of that number (the digit 3 in this example). This simple formula is then copied across and down to extract the first digits for all populations (columns G through K in this example).

**Extracting the first digit**

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**Applying the COUNTIF function**

The function formula =COUNTIF($G$5:$K$215,M2) counts the number of first digits that match the criteria in cell M2 (the digit 3 in this example). The result of this function is 318, indicating that 318 countries have populations that begin with the first digit 3. This simple formula is then copied across and down to extract and count the first digits for all populations (columns G through K in this example).
As a larger example, I opened my Excel file containing 20 years of my personal general ledger activity (26,879 numbers) and applied the procedures described above. (This is the same general ledger data used to produce an Excel PivotTable and Treemap in the January 2017 JofA article “Data Mining Your General Ledger With Excel,” tinyurl.com/jxymqtm). I repeated the process described above and created the chart “20-Year General Ledger.”

As you can see in this example, the data set contains a frequency of numerals 1 through 9 that produces a Benford-like curve, with the exception that the numeral 9 occurs slightly more frequently.

The next step is to count the occurrence of each number 1 through 9 within the extracted digits using the =COUNTIF function (see the screenshot “Applying the COUNTIF Function”). This is achieved by numbering a range of cells 1 through 9 (as shown in cells M2 through M10), entering into cell N2 the formula =COUNTIF($G$2:$K$259,M2), and then copying that formula down to cell N10.

In this example, we see that the numeral 1 occurs 318 times; the numeral 2 occurs 174 times; the numeral 3 occurs 162 times; and so on. Charting these occurrences produces the results in the chart “World Populations by Country.”

As you can see in the chart above, even with this relatively small data set, the results do roughly (but not exactly) follow Benford’s curve. (While you should never expect the results to exactly match Benford’s curve, you should expect the curve produced by larger sets of data to match Benford’s curve more closely than in this relatively small data set example.) As a result, we can conclude that this Benford analysis tends to verify the populations as genuine numbers that have not been fabricated.

You can download an Excel workbook containing the data solutions described above at journalofaccountancy.com/benfords-law. The digital version also includes a short video demonstrating the procedures discussed in this article.

Data source citation

The total population data used in this article and the associated Excel file and video are used with permission from the World Bank’s World Databank. Total population data are based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates. Sources of data used by the World Bank include (1) United Nations Population Division, World Population Prospects; (2) census reports and other statistical publications from national statistical offices; (3) Eurostat: Demographic Statistics; (4) United Nations Statistical Division, Population and Vital Statistics Report (various years); (5) U.S. Census Bureau: International Database; and (6) Secretariat of the Pacific Community: Statistics and Demography Programme.
First things first
Frank Benford attempted to explain his law by saying that “it’s easier to own one acre than nine acres,” implying (perhaps) that when people purchase land, it is reasonable to assume that more people purchase one acre as a starting point, rather than nine acres as their starting point.

Why this works. Using a nontechnical description, Benford’s Law works whether you are counting dollars, acres, inventory, populations, or anything, because you must first count 1 before counting 2, 3, or 4; you must first count 10 before counting 20, 30, or 40; you must count 100 before counting 200, 300, or 400; and so on. Every counting job starts with lower numbers, but not all counting jobs progress to include the increasingly higher numbers. As an example, when counting to 25, 11 numbers have a leading digit of 1, seven numbers have the leading digit of 2, and only one number leads with the digit 3. Even in this simplified counting exercise, you can see Benford’s Law at work—rather than each digit having an equal chance at being the first digit, lower numerals always have a greater chance at being the leading digit compared to higher numerals.

Scientifically, Benford’s Law is based on base-10 logarithms that show the probability that the leading digit of a number will be n can be calculated as \( \log_{10}(1+1/n) \). By substituting the numbers 1 through 9 for n, you can calculate that each subsequent number 1 through 9 has a diminishing probability that it will be the leading digit.

HOW TO SPOT POSSIBLE FRAUD
To illustrate what a bar chart based on fraudulent or fabricated numbers might look like, I replaced the country population figures (from the earlier World DataBank example) with computer-generated random numbers by entering the formula =RAND()*10000 in place of each population number. The result is the chart “Computer-Generated Numbers.”

As you can see in this chart, the top of the bars do not produce anything close to a Benford curve, and this straight-line result tends to repeat even when the random numbers are recalculated multiple times (by pressing the F9 key). This suggests these data were artificially produced, which they were using a standard computerized random number generator program, whereby each numeral 1 through 9 has an equal chance of being the leading digit. If the data you analyze produce a chart with bars of approximately the same height, this suggests the underlying data may be fabricated.

Continuing our analysis of fabricated data, let’s look at what the chart might look like if someone uses his or her computer keyboard’s horizontal number keys to create fictitious data by typing randomly. In this case, it is reasonable to assume that the more dominant index and middle fingers of the person typing would press the 4, 5, 6, and 7 keys more frequently than the pinkie and ring fingers would press the 1, 2, 8, and 9 keys (as shown below).

In this case, we would expect to see a chart with a bell-shaped curve similar to the yellow bar chart “Manually Generated Numbers Using a Computer Keyboard.”

Similarly, if a person uses a computer’s number keypad to create random numbers, then the results will likely vary based on many factors. For example,
The results obtained using Benford’s Law analysis should not be considered definitive; the process of counting leading digits will never decidedly prove the absence or presence of fraud. The results obtained from this process are merely an analytical tool that, when charted, would produce a Benford-shaped curve.

Even if a person fabricates numbers mentally (using his or her brain rather than a computer), there is little reason to believe such a mental exercise would produce results that adhere closely to a Benford’s curve. It is more likely that the person producing numbers mentally would tend to repeat certain patterns, and charting the frequency of the resulting leading digits might reveal those patterns. For example, a person may subconsciously overuse the digits 1, 3, and 4 to produce false data, and underuse the digits 6 and 8. If so, such anomalies would manifest themselves by producing an erratic bar chart that bears little resemblance to Benford’s curve.

As another example, a bookkeeper writing fictitious checks may intentionally keep the check amounts below the company’s $500 or $1,000 authorization thresholds, and therefore an analysis of those check amounts might show the numbers 4 and 9 occurring more frequently as the leading digits than Benford’s Law would predict.

The history of Benford’s Law

The story of Benford’s Law begins in 1881, when astronomer Simon Newcomb noticed that the page numbers in a book of logarithm tables were worn (or smeared) more toward the front of the book and progressively less worn toward the end of the book. Where others would simply dismiss the worn page numbers, Newcomb recognized a distinct pattern related to the occurrence of lower versus higher numbers. He published an article explaining his observations and postulated that the probability of a single number n being the first digit of a number was equal to \( \log(n+1) - \log(n) \). Fifty-seven years later, in 1938, physicist Frank Benford tested Newcomb’s hypothesis against 20 sets of data and published a scholarly paper verifying the law. Despite Newcomb’s groundwork, Benford has garnered much of the credit for the discovery now commonly referred to as Benford’s Law.

The application of Benford’s Law to spot signs of accounting fraud grew out of an article published in 1972 by economist Hal Varian, who wrote that Benford’s Law might be used to detect the possibility of fraud in socioeconomic data submitted in support of various public planning decisions. Varian’s general idea was that a simple comparison of first-digit frequency distributions ought to reveal anomalous results (if any), per Benford’s Law. In 1999, a JofA article (“I’ve Got Your Number,” JofA, May 1999, tinyurl.com/hdlrjmw) written by Mark J. Nigrini introduced how forensic accountants and auditors could apply Benford’s Law to search for indicators of potential accounting and expenses fraud.
a. Consider whether specific unusual transac-
tions or events, accounting changes, business
changes, random fluctuations, or misstate-
ments may have impacted the data set.
b. Perform a test of transactions to verify the
data set. For example, select a sample of data
and physically trace the numbers to support-
ing documentation.
c. Compare the data set to prior–or
previous-year data sets. Investigate signifi-
cant differences.
d. Compare the data set to budgeted or
expected amounts, if any. Investigate signifi-
cant differences.
e. Analyze the data set using ratios or re-
lationships, and compare those results to
expected ratio results or industry averages.
As examples, financial ratios may be revealing
when dealing with financial data sets
and square-footage calculations, or per-hour
measurements or per-mileage measurements
may be revealing when dealing with statisti-
cal data sets.
f. Consider using positive, rather than negative,
confirmations to verify vendor and cus-
tomer balances.
g. If standard analytical procedures have been
applied and produced no presence of fraud,
but the data sets involved skew signifi-
cantly from Benford’s expectations, consider
expanding your analytical procedures to
include larger-than-normal sample sizes and
tightening standard-deviation calculations by
using higher levels of confidence.

h. If the data set involves inventory of any kind,
perhaps the physical inspection of a sampling
of these inventories is in order. AU-C Section
501, Audit Evidence—Specific Considerations
for Selected Items, provides guidance for
further investigating inventories.

3. **Rethink internal controls.** Consider whether
reliable controls are in place to detect or
prevent improprieties.

4. **Consider the source.** Reconsider the source
where the data were obtained. Were they
produced internally or obtained from an outside
source? If from an outside source, inquire about
the measures that source used to verify its data.

**Another tool for fighting fraud.** AU-C Section
240, Consideration of Fraud in a Financial State-
ment Audit, requires auditors to employ analytical
procedures to help detect the existence of unusual
transactions or potential fraud. To that end, CPAs
are on a constant lookout for new methods and
procedures that can help them detect and prevent
fraud. As it turns out, fabricating a set of falsified
data that conforms to Benford’s Law is a dif-
ficult proposition, and many would-be fraudsters
are likely unaware of Benford’s Law or how to
construct fraudulent data that abide by its rules.
Therefore, this Excel-based Benford’s Law analysis
will likely be a handy addition to any CPAs arsenal
of fraud detection tools.

To comment on this article or to suggest an idea for
another article, contact Jeff Drew, senior editor, at
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JofA contributing
editor.
4 strategies for efficient, effective audit documentation

Smart planning and standardized procedures can aid in compliance.

By Mark Koziel, CPA, CGMA
Documenting the nature, timing, extent, and results of your procedures may seem as if it will break your audit budget, but many practitioners have found that this isn’t the case. An AICPA study found that the most common audit issue is a lack of adequate documentation.

Strong documentation will enable you to comply with AU-C Section 230, Audit Documentation, and it also can lead to a more efficient engagement. The time spent documenting in accordance with the standard is an investment that will pay dividends later. Complying with the requirements of the Audit Documentation standard while implementing the best practices discussed here will help your firm perform high-quality work while increasing your efficiency.

**TAKE A SMART APPROACH TO PLANNING**

A sound audit plan is the foundation of an efficient and effective audit. When performing your planning procedures, take the time to really get to know clients and what is going on in their industry. Make sure the most experienced engagement team members are heavily involved in identifying audit risks and responses.

Once the audit plan has been established, map the audit in a memo, laying out the biggest risks, strategies to mitigate each risk, and references to where the work will be performed. This will give the partner a quick overview of the audit areas that matter the most while providing linkage to the working papers. Continue to update the memo as the audit progresses and new risks are identified.

Referencing the audit plan, ensure that your audit programs have been tailored to address your client’s unique risks. For firms that use standardized materials from third-party providers, actively eliminating procedures that aren’t necessary to support the audit opinion can increase efficiency while focusing the audit team’s attention on the accounts and areas that represent the greatest risk.

If your firm’s audit teams have been taking a SALY (“same as last year”) approach—or worse, if they have been performing whatever procedures appear on a third-party provider’s audit program regardless of risk considerations—they may be missing an opportunity to make significant gains in efficiency and effectiveness.

**EMBRACE STANDARDIZATION**

Although firms may have standardized audit procedures, each partner often has his or her own working paper preferences, which can create inefficiencies when staff members document their work. The solution is to require that all auditors use standardized working papers. To ensure proper documentation, use a format designed to comply with AU-C Section 230, covering the nature, extent, and timing of procedures; the results of those procedures; and any significant findings, issues, or professional judgments.

Firms should use standardized tick marks to avoid unnecessary repetition in the working papers. They should also design working papers to accomplish multiple purposes. For example, firms can use the same working paper to analyze a balance sheet account and related income statement accounts (e.g., fixed assets and depreciation expense) as well as provide necessary information for the entity’s statement of cash flows (e.g., fixed asset additions and disposals), required disclosures (e.g., depreciation schedule), and/or tax return.

Eliminating unnecessary client documentation in the file boosts efficiency as well. For example, when an auditor adds copies of client bank statements to an audit file, he or she must scan in the documents, link pertinent information to the bank reconciliation, and obtain a supervisor’s signoff. This is time-consuming, and it could lead to legal exposure. Remember: Not every audit procedure needs its own working paper. The nature, timing, extent,

**IN BRIEF**

- Inadequate documentation was the most common audit issue identified in a recent AICPA study, but following some best practices in this area can help auditors steer clear of trouble.
- Following proper planning procedures can help practitioners identify the most important audit areas and provide linkage to the working papers.
- Standardizing working papers and documenting work promptly help auditors perform more effective documentation.
- Properly performed documentation prepares practitioners for the work and challenges they will handle later, such as audits in subsequent years and review.

To comment on this article or to suggest an idea for another article, contact Ken Tysiac, a JofA editorial director, at Kenneth.Tysiac@aicpa-cima.com or 919-402-2112.
Completing the review process and issuing the audit report on a timely basis also limits the auditor's responsibility for subsequent events procedures. When audit work is done on March 31, but the report is not issued until September, the auditor must consider events that have taken place in the meantime. That could require meeting with the client and performing various procedures to ensure that nothing has occurred that should be included in the financial statement disclosures. Timely completion of the report prevents these additional steps.

BE PREPARED FOR WHAT'S AHEAD

Good documentation also improves efficiency in subsequent-year audits. By documenting appropriately, the auditor is providing next year's audit team with a record of matters of continuing significance, helping them avoid duplication of effort, and giving them a solid foundation on which to build. They can walk in with a better understanding of what's ahead and the information that is needed, and they don't have to start from scratch.

Auditors will also be in better shape when it comes to internal inspections, peer reviews, and regulatory inspections. With more thorough documentation, less time should be spent addressing questions and concerns during reviews or inspections. By developing a cohesive set of working papers, the auditor is less likely to be required to redo work already performed in the field, make follow-up requests to clients, or, in a worst-case situation, recall an audit report.

DOCUMENT NOW, SAVE TIME LATER

Instead of documenting while performing the audit procedures, auditors in the field sometimes decide to catch up with documentation later. However, there is a good reason that the standard calls for completing this step promptly. Documentation is more likely to be accurate if it is performed sooner rather than later. This approach also prevents the preparer from having to remember vast amounts of information or to repeat tasks after the procedure is performed.

In addition, meeting the requirements of AU-C Section 230 by documenting in a timely manner allows supervisors and partners to spend less time dealing with unnecessary questions and misunderstandings. It improves the chances that working papers can be reviewed in the field and that a draft report and management letter can be ready before leaving the client's office. It's much easier to identify problems and address questions to client staff when you're working down the hall from them than after you've left the field and you're trying to tie up loose ends.

Requiring the use of standardized working papers can eliminate inefficiencies when staff members document their work.

and results of some procedures can be documented by adding a few sentences to the audit program.

AICPA RESOURCES

Articles


“Audit Documentation: Tips for Getting It Right,” JofA, June 2017, tinyurl.com/yaezhven


“Professional Liability Spotlight: Professional Liability Risk

Resolutions for 2017,” JofA, Jan. 2017, tinyurl.com/j8gb6s8

“Maintaining Independence With Nonattest Services,” JofA, Nov. 2016, tinyurl.com/hthhn8qp

CPE self-study

Audit Workpapers: Documenting and Reviewing Field Work (#733228, text; #GT-AUDW, group pricing)

Audit Workpapers: Documenting Field Work (#163223, online access; #GT-CL4DFW, group pricing)

Audit Workpapers: Reviewing Field Work Documentation (#163233, online access; #GT-CL4FWD, group pricing)

New Staff: Core Concepts—Workpapers and Workpaper Documentation (#161060, online access; #GT-JEH, group pricing)

Working Paper Documentation—Tax Staff Essentials (#157603, online access; #GT-TSE.WPD, group pricing)

For more information or to make a purchase, go to aicpastore.com or call the Institute at 888-777-7077.

Online resources

Employee Benefit Plan Audit Quality Center, aicpa.org/ebpaqc

Governmental Audit Quality Center, aicpa.org/gaqc

Peer Review Audit Documentation Resources webpage (includes free toolkit), aicpa.org/documentation

Journal of Accountancy  November 2017
What to do with math error notice letters from the IRS

The best advice if you or a client receives one is not to ignore it.

By Russell Zhaochu Li, Ph.D.; Clement Chen, CPA, Ph.D.; and Keith Jones, CPA, Ph.D.

In 2015, the IRS received more than 146 million individual tax returns and audited 1.2 million of them, a mere 0.8% (IRS 2016). At the same time, the IRS found more than 2.17 million math errors from individual tax returns and sent more than 1.67 million math error notice letters (some returns have more than one error). What are these math errors, and how should taxpayers and tax practitioners respond to them?

MATH ERROR PROGRAM
The IRS uses several programs to check the accuracy of a tax return, and one of these programs is the math error program (Sec. 6213(b)). In
this program, the IRS uses computers to screen all tax returns when processing them. When the IRS identifies math or clerical errors (collectively referred to as math errors) in a return, it will recalculate taxes, assess any interest and penalties, and send the taxpayer a letter detailing the math error. It is worth noting that the math error program uses computers to (1) screen all tax returns, and (2) send out notice letters without much human assistance. Different from the IRS audit process, the math error program, especially with the advancement of computer technology, is highly automated and has become an important tool for tax enforcement.

Congress first authorized the math error program in 1926, allowing the IRS to recalculate taxes due to obvious arithmetic errors on tax returns. Since then, Congress has expanded the program to include clerical errors and other math errors in addition to obvious arithmetic errors. The expansion came at the IRS’s request, since a regular audit notice was much costlier to the IRS than a math error notice. It is worth noting that detecting math errors is within the capability of computers. If an issue requires subjective judgment, such as underreporting income, the IRS will likely issue an audit notice instead of a math error notice. The sidebar “What Is a Math Error?” lists all the types of math errors with examples. As shown, a “math error” extends beyond making a mistake in adding or subtracting numbers.

DOES A MATH ERROR MEAN A TAXPAYER OWES MORE TAXES?
The good news is that a math error notice does not necessarily mean a bigger tax bill. The bad news is that additional tax liability can be high if a notice is unfavorable. A favorable adjustment occurs when a math error notice increases a taxpayer’s refund or decreases his or her balance due. An unfavorable adjustment occurs when a math error notice decreases a taxpayer’s refund or increases his or her balance due.

In 2010, the IRS issued more than 6.4 million favorable notices and more than 3 million unfavorable ones (Treasury Inspector General for Tax Administration (TIGTA) Rep’t No. 2011-40-059). Overall, only 31% of math error notices required taxpayers to pay more taxes. As shown in the chart “Total Number of Math Error Notices, Total Dollar Value, and Average Dollar Value by Error Type in 2010,” the Treasury lost nearly $6.2 billion of tax revenue from favorable math error notices but received an additional $9.5 billion of tax revenue from unfavorable notices. The chart also shows the average dollar value of favorable and unfavorable math error notices. On average, the Treasury lost $963 when issuing a favorable notice but received an additional $3,180 when issuing an unfavorable notice.

A TAXPAYER’S LEGAL RIGHTS ON RECEIVING A MATH ERROR NOTICE
A math error notice differs significantly from a regular audit notice in terms of legal rights. When the IRS issues an audit notice, it first sends a report letter to the taxpayer and includes items that need to be adjusted in terms of tax liability. The taxpayer has 30 days to either accept the adjustment or request an appeal. If the taxpayer does not respond to the initial letter, or if the appeal does not go through, the IRS will send a statutory notice of deficiency to the taxpayer, who has 90 days to respond to the notice.

To protect taxpayer rights, the government requires the IRS to inform the taxpayer of the right for petition or dispute. The government also prohibits the IRS from assessing and collecting

About the authors
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Areas prone to math errors

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<td>Education credit</td>
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<td>Excess Social Security</td>
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<td>First-time homebuyer credit</td>
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<td>Other credits</td>
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<td>Internal Revenue Manual (IRM) §21.5.4, General Math Error Procedures.</td>
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</tbody>
</table>

To comment on this article or to suggest an idea for another article, contact Sally P. Schreiber, senior editor, at Sally.Schreiber@aicpa-cima.com or 919-402-4828.
If a taxpayer files an abatement, he or she needs to follow up and contact the IRS to see if the abatement has been processed. Although IRS employees are well-trained, it is impossible for them to know the intricacies of every math error. Therefore, it may be up to taxpayers or tax advisers to direct IRS employees to the relevant Code sections or portions of the IRM. The taxpayer should file the request using certified or registered mail instead of over the phone, for recordkeeping purposes.

If the taxpayer agrees with an unfavorable notice, he or she accepts a smaller refund or pays additional taxes. This includes cases when taxpayers do not respond to the notice. If the taxpayer disagrees with the notice, he or she must provide additional documents or information to the IRS to overturn it. Once the IRS receives that information, it will treat the response as either a substantiated response or an unsubstantiated response.

If the IRS agrees with the taxpayer based on the additional information, it treats the response as a substantiated response and reverses the math error adjustment. The taxpayer, therefore, does not have to pay additional taxes. If the IRS deems the additional supporting documents sent by the taxpayer inadequate, it will treat the response as an unsubstantiated response. In this case, the IRS generally reverses the math error adjustments and places an examination freeze on the taxpayer’s account, resulting in the tax return’s being referred to the Examination function for further review.

According to a 2011 report by TIGTA, 97% of taxpayer responses are substantiated responses (TIGTA Rept No. 2011-40-059). As long as a taxpayer or the tax adviser can provide adequate documents to support his or her disagreement with the initial math error notice, it is almost certain that the math error notice can be reversed. For example, if a taxpayer does not include the correct TIN in the original return, the IRS may reduce any tax credit that depends on this TIN. The taxpayer can provide the correct TIN in the appeal and then have the unfavorable notice reversed.

**What is a math error?**

Under Sec. 6213(g)(2), math errors include:

- An error due to addition, subtraction, multiplication, or division.
- An incorrect use or selection of information from tax tables and schedules.

**Example:** A taxpayer who files as a head of household uses the married-filing-jointly table to calculate taxes.

- A transcription error in the same form or from another form.

**Example:** A taxpayer enters a salary amount that is inconsistent with that on his or her Form W-2, **Wage and Tax Statement**.

- An omission of required supporting forms.

**Example:** A taxpayer does not include Form 8863, **Education Credits** (American Opportunity and Lifetime Learning Credits), when claiming the American opportunity tax credit.

- Claiming credits or deductions that exceed statutory limits.

**Example:** The tuition and fees deduction a taxpayer claimed exceeds the limit allowed based on his or her modified adjusted gross income.

- Missing or incorrect taxpayer identification number (TIN) used for personal and dependency exemptions, child and dependent care credit, earned income tax credit (EITC), child tax credit, and education credits.

**Example:** A taxpayer claims his son as a dependent but does not include his son’s TIN or includes an incorrect one, making the claim invalid.

- Claiming an EITC based on self-employment income without paying self-employment tax.

- An EITC claim by a taxpayer who does not have a qualifying child and does not meet the age requirements (taxpayers must be between 25 and 64 to claim the EITC).

- Claiming a credit that is incorrect because of an age limit.

**Example:** A taxpayer claims the child tax credit for a dependent who is over 16.

**ADVICE FOR PRACTITIONERS**

Math errors extend well beyond arithmetic and include several types of errors, and a number of errors occur quite frequently. Fortunately for taxpayers, most can be cleared up without further damage beyond the inconvenience. Still, the inconvenience is not insignificant and is often avoidable with either a practitioner’s assistance or just by using off-the-shelf tax preparation software, which cuts down on math errors.

As shown previously, the average amounts of favorable and unfavorable notices are strikingly different, however. And, as psychologists Daniel Kahneman and Amos Tversky note, “[L]osses loom larger than gains” (“Prospect Theory: An Analysis of How People Think About Risk and Uncertainty”. PSYCHOLOGY TODAY, Jan. 2007).
of Decision Under Risk," by Daniel Kahneman and Amos Tversky, 42–1 *Econometrica* 263 (1979)). That is, a loss will generally be felt with more intensity than a gain of similar size.

Given the stress for taxpayers, tax advisers should therefore do their best to help clients avoid unpleasant surprises. First, tax advisers should inform clients that math error notices are not audits and that the IRS screens all tax returns for these errors. Second, tax advisers should respond promptly to a notice. When a taxpayer receives a notice, he or she may assume it is the tax adviser who made the mistake. However, the error could be from incorrect information the taxpayer provided, such as an incorrect TIN. Some math error notices are due to missing, incomplete, or incorrect information from taxpayers. When the relevant information is provided, most math error notices can be reversed.

The tax adviser should therefore carefully understand the math error notice and double-check TINs on the return where the error was noted. When requesting an abatement for a client, a tax adviser should provide all the necessary supporting documents and direct the IRS to the relevant sections of the IRM. Finally, not only should tax advisers understand what constitutes a math error, but they should also be aware of areas prone to math errors, such as exemptions and the earned income tax credit, so as to prevent their clients from making those errors in the first place. ■

### AICPA RESOURCES

**Article**


**The Tax Adviser and Tax Section**

*The Tax Adviser* is available at a reduced subscription price to members of the Tax Section, which provides tools, technologies, and peer interaction to CPAs with tax practices. More than 23,000 CPAs are Tax Section members. The Section keeps members up to date on tax legislative and regulatory developments.

Visit the Tax Center at aicpa.org/interestareas/tax.html. The current issue of *The Tax Adviser* and many other resources are available at thetaxadviser.com.
A. Excel's CONVERT function can be used to convert a multitude of units of measurements. For example, to convert 37.3 °C in cell B3 below, I've entered the formula =CONVERT(B3,"C","F") in cell B9 to derive 99.1 °F. The syntax of this function requires you to reference the number to be converted, the unit of measure you are converting from, and then the unit of measure you are converting to. This formula can then be copied down and over (from cell B9 to cells B9:G12 in this example) to convert all Celsius temperatures (shown in rows 3 through 6 in this example) to the Fahrenheit scale.

In addition to converting temperatures, the CONVERT function can be used to convert more than 100 units of measure in the areas of weight and mass, distance, time, pressure, force, energy, power, magnetism, temperature, volume, area, information, and speed. The key to using this tool is knowing the codes supported by the CONVERT function. As examples, presented at the top of the next page are approximately half of the codes supported by the CONVERT function. You can view a full list of the CONVERT function's codes at tinyurl.com/ya63y3uz.

As additional examples, you could use the formulas =CONVERT(1, "lbm", "kg") to convert 1 pound to 0.4535924 kilograms; =CONVERT(2.5, "mi", "ft") to convert 2.5 miles to 13,200 feet; or =CONVERT(1600, "barrel", "gal") to convert 1,600 barrels of oil to 67,200 gallons of oil. This wide array of options makes the CONVERT function a valuable tool for CPAs.
ONLINE SECURITY

The password-recovery questions you should be answering

Q. What security questions should we ask of our employees to confirm the identity of those employees digitally changing their login passwords?

A. In 2008, a 20-year-old college student hacked the Yahoo! email account for then vice presidential candidate Sarah Palin because he was able to figure out the answers to her password security questions by using Google searches to find her ZIP code, birthdate, and where she met her husband. Today, with so much of our personal information available on social media, many common security questions are not as secure as they once were. Some of the more common security questions with answers that might sometimes be found on one’s social media pages include the following:
1. What is your mother’s maiden name?
2. What is the name of your first pet?
3. What was your first car?
4. What elementary school did you attend?
5. What is the name of the town where you were born?

I think we’ve reached a point in which organizations and individuals need their security questions to produce more formidable hurdles for would-be hackers. The challenge for organizations is to not make the security questions so difficult that users are unable to remember their answers later. To be useful, a better security question should:
1. Be fairly easy to remember, even years later.
2. Contain thousands of possible answers, so it’s not easily guessed.
3. Not be a topic frequently found on social media.
4. Have an answer that never changes (e.g., your favorite color or dream car might change over time).
Given the above suggested criteria, you might try to come up with more challenging security questions that have answers not typically revealed on social media, such as the following:
1. When you were young, what did you want to be when you grew up?
2. Who was your childhood hero?
3. Where was your best family vacation as a kid?
Still, the problem with all security questions, no matter how difficult they are, is they are intended to be simpler to use than passwords because the question itself is supposed to trigger your memory.

To combat the more simplistic nature of security questions administrators often ask, end users might consider protecting themselves further by providing random answers that cannot be researched or guessed. In effect, I am suggesting that your answers be more random so they act more like a password. For example, instead of providing your mother’s actual maiden name, you might provide the made-up name Aphrodite1234!, which resembles a password more so than a name. While this approach may defeat the purpose of simpler security questions, it probably would result in greater security.

9 PivotTable enhancements in Excel 2016

**Q. What new PivotTable features, if any, have been added to Excel 2016?**

**A.** Microsoft has made several improvements to Excel 2016’s PivotTables. Among them are:

1. **Automatic relationship detection:** In Excel 2013, pivoting two or more sets of data was a more difficult operation because you had to use Excel's Relationship tool to define the connecting field names between the separate database tables — a process often referred to as joining the databases. However, Excel 2016 makes this process a little easier with an Auto-Detect button that can compare multiple database tables to identify common field names, and then establish the join(s) automatically.

   **Note 1:** For the Auto-Detect tool to work, each database table must first be converted to an Excel Table, using Excel’s Insert, Table, Create Table menu option.

   **Note 2:** The Auto-Detect joining process works only when common field names are used across the various database tables; if the field names do not match exactly (they don’t have to have the same case to match exactly), the
join needs to be created manually. For example, the two database tables shown in the middle of the previous page each contain a column of invoice numbers, but because the column headings (field names) are different in each table (Invoice_Number versus Invoice#), the new Auto-Detect feature will not create the join.

Because the field names are not identical in this example, you would need to use Excel's Create Relationship tool (available from the PivotTable menu) to join the separate database tables together, as pictured in the example at the bottom of the previous page.

2. Creating, editing, and deleting custom measures: Excel 2016 allows you to create and edit custom measures directly from the PivotTable fields list. To do this, you need to make sure you have at least three tables added to the Excel Data Model (with the proper relationships defined, as needed), and then right-click a table in the PivotTable Fields list and select the Add Measure option, as pictured below.

This action will launch the Measure dialog box where new measure formulas can be created using the DAX formula programming language. (DAX is an abbreviation for Data Analysis Expressions, which is the native formula and query language included in Microsoft PivotTables, PowerPivot, Power BI Desktop, and SQL Server Analysis Services (SSAS) Tabular models. DAX provides new functions designed to work with relational data, such as the CUBE function.) The detailed explanation of the DAX formulas is beyond the scope of this column, but a simple example of a DAX formula, which calculates a sales-to-cost ratio by product category, might appear as shown above.

(The Measure feature was originally included in Excel 2010 but was removed from Excel 2013. Now this feature has returned.)

3. Automatic date and time grouping: Excel 2016 automatically groups your date- and time-related fields (year, quarter, month) in your PivotTable. Once the fields are grouped together, you can drag the group to your PivotTable in one action to distribute your data across the different levels of time with drilldown capabilities. (In earlier editions of Excel, PivotTables data were plotted by individual dates, and users had to specify date group settings manually using the Group tool.)

4. PivotChart drilldown buttons: Excel 2016 allows you to zoom in and out of your PivotCharts across groupings of time and other hierarchical structures within your data.
About the author

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5. **Search your PivotTable:** A new Search field (pictured at the bottom right of the previous page) in the PivotTable Fields box helps you search and find specific fields across your entire data set. (This feature was included in Excel 2010, was removed from Excel 2013, and is now back.)

6. **Smart rename:** Excel 2016 enables you to rename tables and columns in your workbook’s data model. With each edit or change, Excel 2016 now automatically updates any related tables and calculations across your workbook, including all worksheets.

7. **Defer Layout Update:** Similar to setting Excel’s Workbook Calculation option to Manual (by selecting File, Options, Formula) to prevent your workbook from recalculating after each edit, a new PivotTable feature called Defer Layout Update (see the screenshot below) allows you to delay updating your PivotTable calculations while you make multiple changes to your Pivot data. Once you have completed the edits, your changes can be updated throughout the workbook by pressing the Update button, unchecking the Defer Layout Update option, or closing the PivotTable or PowerPivot window.

8. **Multi-Select slicer:** Excel 2016 allows you to select multiple items in an Excel slicer on a touch device, as pictured below. (Previously only one item in a slicer could be selected at a time using touch input.)

9. **Get & Transform:** Excel 2016 provides a new Get & Transform tool (pictured below), which is an improvement over Excel’s previous Get Data tool. This tool helps you connect to data sources, and gather and import the resulting data.

As part of the data import process, the Navigator tool (pictured near the top of the next page) helps you clean your data before completing the data import process. For example, this tool can help you remove columns, change data types, or merge tables.

Once you’ve created your query, you can save it and, if desired, edit it using the Query Editor
For people who are concerned about facial-recognition technology mapping their likeness, I’m wondering if tagging random pictures of other people on social media as yourself might thwart or hinder those facial-recognition efforts.

CARLTON’S PONDERING

A thought on facial recognition

For people who are concerned about facial-recognition technology mapping their likeness, I’m wondering if tagging random pictures of other people on social media as yourself might thwart or hinder those facial-recognition efforts.
HUMAN RESOURCES

Giving employees skin in the game

Educating employees in a fun way about profitability paid dividends for one CFO and her company.

By Brandy Amidon, CPA
employees, I’ve struggled with how to engage and hold our team accountable for the company’s financial health. We tried using a giant thermometer to track yearly goals. We used money from the board game Monopoly to help everyone understand where and how we spend it. We tried other gimmicks I hoped would spark interest in the long term, but they weren’t effective. And now I know why.

You can’t encourage your team to be involved in finances if you don’t give them power and buy-in when it comes to money. The thought of giving financial control to anyone other than the finance team and senior leadership sounds scary, but here’s how and why it works.

We were inspired after discovering the work of Jack Stack, who formed a successful employee-owned company in the early 1980s and wrote about that transformation in *The Great Game of Business*. Stack’s team-rallying concepts also caught our eye in *Conscious Company* magazine. An article there detailed how Zingerman’s Deli took the concept of open-book management and turned the deli into an entrepreneurial empire (see “How Zingerman’s Deli Became a $40 Million Business,” *Conscious Company*, Oct. 4, 2015, tinyurl.com/ybnz6pbp).

By sharing financial information with employees, and making a game out of the numbers, organizations can empower individuals. Zingerman’s Deli eventually became employee-owned — workers care enough to use every bit of mayo from the jar because they see how that adds to the bottom line. And that’s what we wanted at Brains on Fire: employees who see the correlation and contribution of everything they do at work.

Using open-book management, everyone gets to play and make decisions that affect whether you win or lose. No one person is in charge of making sure the company is profitable for years to come, and people continue to get paid. It’s a team sport. Hence, it’s a game.

**ADAPTING THE GAME FOR BRAINS ON FIRE**

*The Great Game of Business* method focuses mostly on manufacturing companies. Here’s how we adapted it to the service industry. We are confident that other organizations, or segments of larger companies, could adapt the same simple core concepts for their team.

**Step 1**

Focus on two main goals for the year. Shareholders, owners, and the CFO should agree on the two biggest drivers of success and profitability, and

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**About the author**

Brandy Amidon (brandy@brainsonfire.com) is CFO of Brains on Fire, a marketing and creative agency based in Greenville, S.C. She has worked at Brains on Fire for 12 years.

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**Beginning of the game**

From the beginning of my tenure as CFO of Brains on Fire, a marketing and creative agency with 25

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Many finance leaders are challenged by how to convey financial information to nonfinancial employees in interesting and meaningful ways. Because of this, employees can have varying degrees of interest and concern regarding their employer’s profitability.

To help employees better understand how their everyday work affects the bottom line, bring them off the sidelines. That’s what our company did — we let them be part of the game. This article discusses how we went beyond ratios and spreadsheets to create a better team, one in which all our players understood how their skills translated to the company’s success.
then share that information with the rest of the company. To effectively communicate financial goals to the rest of the company, you’ve got to keep things simple and focused. Provide too much information and you can lose companywide focus.

Reaching specific profitability targets and signing a specific number of retainer clients have been our two goals each year. Both goals are important in our industry for sustainability and growth. For other companies, goals could focus on sales growth or product launches within a set timeline.

**Step 2**
Host a financial boot camp. Teach your team how to read financial statements. Keep it simple. Everyone needs to understand how you make money and how you spend money. To play the game, you must attend financial boot camp. The CFO provides a recommended budget for the year and a detailed history of past transactions to the team at the financial boot camp. For example, employees at Brains on Fire wanted to know how much we spent annually on travel or certain software. You review the budget together. The entire team signs off on the budget for the year with a vote by email.

**Step 3**
Establish a shared responsibility regarding expenses and revenue, sometimes referred to as “spend” and “make.”

**Spend:** All transactions over $500 not agreed upon in the budget meeting voted on during boot camp require a group majority vote with a quorum (60%) present. Any unknowns for the year must be voted upon. Any employee making requests for a budget expenditure not agreed upon in the initial budget review will submit a request to the CFO and then make a formal request for “unknown” at the weekly team meeting. For example, your company may vote on a continuing education budget for the year, but you don’t know how that breaks down until employees make requests to attend classes or conferences throughout the year. Employees would need to put a request before the team for a vote if the training costs more than $500.

**Make:** The new business team meets once a week. All new business clients and proposals are discussed here. All employees are welcome at the new business meeting to listen or add input on pricing, deliverables, timing, and staffing.

**Step 4**
Positively reward successful behavior. Bonuses are staggered as you start to reach two main goals for the year. For example, if one of the goals is reaching $5 million in revenue for the year, you can stagger then share that information with the rest of the company. To effectively communicate financial goals to the rest of the company, you’ve got to keep things simple and focused. Provide too much information and you can lose companywide focus.

Finance leaders sometimes struggle with passing on financial information in interesting ways. Employees, therefore, can exhibit a lack of interest regarding their organization’s profitability.

Engaging employees in a game can help improve financial acumen and profitability. In this case study, the company adapted practices established by a manufacturing company and written about in the book *The Great Game of Business*.

The four steps for creating a game for employees are setting goals, having a financial boot camp, sharing responsibility for expenses and revenue, and rewarding successful behavior.

A critical part of the game’s success is giving up control of spending decisions. But by doing so, employees feel empowered to contribute ideas and find ways themselves to play the game better and make the company more profitable.
bonuses for quarterly or six-month intervals and have a final bonus for completing the goal by year end. If the team doesn’t meet the agreed-upon goals, bonuses aren’t awarded. No exceptions.

**SCORECARD**
In 2016, our first year playing “The Brains on Fire Game,” our internal adaptation of *The Great Game of Business*, we had the most profitable year in company history. Seeing our team fully engage in a concept that gives members control and transparency has been amazing. Employees now keep work in-house instead of using a contractor because they know the choice affects profitability. Employees ask what they need to do to make sure we regularly meet goals. Team members ask questions and provide solutions to problems we hadn’t explored before.

The weight of new business has shifted from a few to many. Our shareholders now have a greater sense of stability knowing that everyone is concerned about the company’s financial health. As the CFO, I share the information, projections, and professional recommendations with my team, but we ultimately make those decisions together. We expect the positive results to continue, and our team to benefit, as we grow and hone the game.

For example, we added stretch goals and “mini games” throughout the year, as suggested by employees, with bonuses attached. We also learned the most powerful bonuses aren’t always monetary. For example, employees have shown enthusiasm for reaching a goal that awards them Friday afternoons off in December.

**GIVING AWAY CONTROL**
The simplest way to encourage and get your employees to care about being profitable is also the most difficult, because it means giving up control. Most CFOs and shareholders feel the full weight of creating a sustainable company that provides steady employment for their team, who then provide for their families.

We strive to hire the best and brightest we can afford. So why would we not trust, educate, and build up a team of employees who understand how we make and spend money as if they own the company?

In “The Game” model, we share the burdens and successes of running a business with our very smart and talented team of employees. We, along with many other companies over the years, have seen the benefits of opening up the financial workings of the company for our entire team to engage.

**Articles**
“Rethinking Retention,” JofA, May 2017, tinyurl.com/y72kc85h
“Innovation Showcase: CPA Employers on the Cutting Edge,” JofA, May 2017, tinyurl.com/y7ecm35o
“Opening the Books, Growing the Business,” CGMA Magazine,

**Publication**
The Engaged Employee: 10 Initiatives for Successful Firms (PPM1402P, paperback; PPM1402E, ebook)

**CPE self-study**
Employee Motivation and Engagement: Driving Results Without Driving Your Team Crazy (BLL1162100, online access; GT-BLIEME, group pricing)

For more information or to make a purchase, go to aicpastore.com or call the Institute at 888-777-7077.

**Podcast**
For more on how Brains on Fire implemented its game, listen to the JofA podcast “How to Keep Employees in the Game,” tinyurl.com/yat5nzb
TAX

IRS pursuing self-employment taxes from LLC members

The Service has been challenging LLC members on their treatment of LLC income as not subject to self-employment taxes.

By Troy Lewis, CPA, CGMA, and Ron Worsham, Ph.D.
Ambiguity in the tax law often provides opportunities for taxpayers. For nearly three decades, how earnings of a limited liability company (LLC) are reported for self-employment tax purposes has been unsettled. (LLC in this article also refers to limited liability partnerships (LLPs) and professional limited liability companies (PLLLCs).) This uncertainty has created a divergence in practice that has gone relatively unchecked until recently when the IRS started using legal action to clarify the application of self-employment tax laws to LLCs.

Sec. 1402(a)(13) provides that a guaranteed payment, under Sec. 707(c), to an LLC member for services rendered is subject to self-employment tax. A significant number of taxpayers have claimed that none of the residual profits after deducting guaranteed payments, or so-called distributive earnings, are subject to self-employment tax even if those earnings were allocated to a managing or otherwise actively working member. To be fair, some taxpayers have taken a more conservative view by applying proposed regulations and limited case law to subject some or all of their distributive share to self-employment income tax. However, taxpayers use both methods today with little consistency.

Lack of judicial precedent and authoritative guidance from the IRS has resulted in taxpayers’ aggressively pursuing their own self-interested interpretation of the rules, which has contributed to an increase in the projected tax gap related to underreported self-employment income (including underreporting from LLC members on distributive shares), estimated to be about $65 billion in the years 2008–2010, according to an IRS study (tinyurl.com/y7ahe5bv).

This degree of underreporting of self-employment taxes has led the IRS to aggressively pursue both taxes and penalties on underreported self-employment income for some LLC members. Emboldened by its recent successes, the IRS appears committed to resolving the ambiguity in this area by creating a body of well-settled administrative and judicial law.

On March 13, 2018, the IRS designated as a compliance campaign issue the underreporting of self-employment income by partners rendering services to a partnership (see “IRS Announces Rollout of Five Large Business and International Compliance Campaigns,” available at tinyurl.com/y7p3ed5k). This designation will result in the IRS devoting an increased allocation of time and resources in auditing this issue with the ultimate goal of increasing compliance with the law in light of several recent court decisions discussed in this article. Because of this most recent round of successful IRS efforts in the courts, along with the Service’s recent compliance campaign designation, taxpayers and their advisers should immediately reevaluate their reporting of self-employment income for members who are either actively involved or are member-managers in an LLC.

**HISTORY OF SELF-EMPLOYMENT TAX AND LIMITED LIABILITY**

Sec. 1402(a)(13), enacted in 1977, permits distributive earnings allocated to a limited partner to be excluded for self-employment tax calculation purposes. Limited partners (limited in both their ability to manage the partnership and liability for the partnership’s debts) can exclude their distributive share for self-employment tax purposes. General partners (fully active in managing the partnership and unlimited in liability) are subject to self-employment tax on their distributive shares of income. However, with the development of LLCs, federal tax law now clashes with state entity statutes. An LLC member can enjoy limited liability and yet still participate actively in the LLC’s management. This situation was never contemplated when Congress created the self-employment tax limited partner exception, because at that time active participation by a partner would always mean unlimited liability.

Since 1977, when Wyoming became the first state to enact a statute authorizing limited liability companies, LLCs have been faced with determining whether a member in an LLC could qualify as a “limited partner” under the Sec. 1402(a)(13) exception and thereby exclude his or her distributive share of income from self-employment tax even though the member might manage the LLC and still enjoy limited liability for the LLC’s debts.

In 1997, in an effort to resolve the issue, the Treasury Department issued Prop. Regs. Sec. 1.1402(a)-2, which provided that an LLC member’s distributive share would not be subject to self-employment tax unless the member had:

- Personal liability for the LLC’s debts;
- Authority to contract for the LLC; or
- Participated in the LLC’s business for more than 500 hours per year.

In addition, “service partners” in a service partnership were automatically excluded from claiming limited partner status; all their distributive share of income would be subject to self-employment taxes. Immediately after the proposed regulations were issued, politicians and pundits alike claimed that the regulations were an attempt by Treasury...
to legislate without Congress’s approval. Congress subsequently passed a one-year moratorium prohibiting Treasury from finalizing the regulations (Section 935 of the Taxpayer Relief Act of 1997, P.L. 105-34). Treasury has yet to finalize the regulations some 20 years later. This failure to issue final self-employment tax regulations has provided some taxpayers with support for a reporting position to claim that distributive income allocated to an LLC member, even a service partner, is excludable for self-employment tax purposes. The IRS has historically disagreed with this position and has recently begun to litigate perceived abusive fact patterns in the courts to counteract this otherwise unchecked reporting position.

**RECENT CASE LAW FILLS THE VOID**

In a series of recent court cases, the IRS has, for the most part, successfully challenged LLC members who have attempted to exploit the ambiguity created from the IRS’s failed effort to issue final self-employment tax regulations. In attempting to discern who should be treated as “limited partners” for self-employment tax purposes, the courts have examined the legislative intent underlying the Sec. 1402(a)(13) exception and found that members or owners who provide services to a business, who have management authority, or who possess other characteristics inconsistent with those of traditional limited partners should be subject to self-employment tax. In this regard, these decisions seem to have come full circle in that they are judicially reviving two of the three original factors included in the 1997 proposed regulations used to determine the status of LLC members for self-employment tax purposes: management control and participation.

The first case involved a group of tax attorneys who had organized their firm as an LLP (*Renkemeyer, Campbell, and Weaver, LLP*, 136 T.C. 137 (2011)). The attorneys’ interests in the LLP had been split into “general managing partnership units” and “investing partnership units,” and the partners had treated income allocable to the investing partnership units as limited partnership investment income not subject to self-employment tax. The Tax Court rejected this approach on two grounds. First, the court noted in passing that all the partners had management authority under state law governing LLPs. Second, and more importantly, the court emphasized that none of the partnership’s income should be excluded from self-employment tax because all of the partners were active participants in the partnership’s business. In its decision, the Tax Court stated: “The legislative history of section 1402(a)(13) does not support a holding that Congress contemplated excluding partners who performed services for a partnership in their capacity as partners (i.e., acting in the manner of self-employed persons), from liability for self-employment taxes.” After *Renkemeyer*, taxpayers were put on notice that LLC members providing services to an LLC would be at risk of having their distributive shares treated as self-employment income.

Following on the heels of *Renkemeyer*, a 2012 district court case examined the extent to which a husband and wife who were the sole members of an LLC and received W-2 wage income from the LLC should be able to exclude their distributive shares of the LLC’s income from self-employment income. In attempting to discern who should be treated as “limited partners” for self-employment tax purposes, the courts have examined the legislative intent underlying the Sec. 1402(a)(13) exception and found that members or owners who provide services to a business, who have management authority, or who possess other characteristics inconsistent with those of traditional limited partners should be subject to self-employment tax. In this regard, these decisions seem to have come full circle in that they are judicially reviving two of the three original factors included in the 1997 proposed regulations used to determine the status of LLC members for self-employment tax purposes: management control and participation.

**IN BRIEF**

- Uncertainty in the treatment of the earnings of limited liability companies (LLCs) by LLC members for self-employment tax purposes has led to inconsistent tax reporting.
- Proposed regulations issued 20 years ago (Prop. Regs. Sec. 1.1402(a)-2), which provided criteria for determining when an LLC member’s distributive share would not be subject to self-employment tax, have never been issued in final form.
- The IRS has won a number of recent cases in which it has asserted that members who control the management of the entity and/or provide services for the business should be subject to self-employment taxes.
- The IRS has also issued Chief Counsel Advice memorandums taking this position.
- Taxpayers and practitioners should note the IRS’s stepped-up enforcement in this area before filing returns that exclude this income from self-employment taxes where the member is an active participant in the business.

To comment on this article or to suggest an idea for another article, contact Sally P. Schreiber, a JofA senior editor, at Sally.Schreiber@aicpa-cima.com or 919-402-4828.
income since they had paid themselves a salary as compensation for the services they provided to the LLC. Citing Rev. Rul. 69-184, the court first noted that “a partner who participates in the partnership business is a ‘self-employed individual’” and cannot simultaneously be treated as an employee.

The most relevant and novel part of the court’s ruling, however, suggested that management control alone would be sufficient to taint an LLC member’s income. Explaining its position, the court stated that the taxpayers did not “resemble limited partners, which are those who lack management powers … whether the Plaintiffs were active or passive in the production of the LLC’s earnings, those earnings were self-employment income” (emphasis added).

In 2017, the Tax Court revisited this issue when it heard a case involving a law practice organized as a Mississippi member-managed PLLC (Castigliola, T.C. Memo. 2017-62). The members received guaranteed payments approximating a fair salary for their services, which they treated as self-employment income. However, they did not pay self-employment taxes on their residual distributive shares from the PLLC. The Tax Court found that the members should not be treated as limited partners for self-employment tax purposes because the members shared control of the PLLC under state law, and limited partners lose limited liability protection under Mississippi state law if they participate in the control of the business. Further, the court ruled that the members should be treated as general partners for self-employment tax purposes and pay self-employment taxes on their distributive shares.

Because of its focus on management control only, Castigliola has caused a significant amount of consternation in the tax practice community and has been heavily criticized for its emphasis on form over substance. It could have far-reaching consequences, because the decision could be applied to treat distributive-share income allocated to LLC member-managers as self-employment income solely because LLC members have management authority.

WHAT THE FUTURE HOLDS
With this string of recent cases decided in its favor, the IRS now has more tools to attack strategies for reducing LLC members’ self-employment tax liability, and it is likely to become more aggressive in attacking what it perceives as abusive strategies in this area going forward. Indeed, recent Chief Counsel memorandums (see ILM 201436049 and ILM 201640014) suggest that the IRS is willing to use management control or participation, or both factors in combination, to stop LLC members who attempt to avoid self-employment tax on their distributive shares.

LLC members wanting to avoid self-employment tax may want to consider a few options. First, they may want to avoid member-manager status perhaps by carving managerial rights out into a separate interest or by avoiding member-managed structures entirely. Second, LLC members providing services should consider opportunities for segregating their involvement into separate interests or separate entities (see Hardy, T.C. Memo. 2017-16). Interestingly, in doing these things, LLC members would essentially be complying with the proposed regulations issued in 1997. Finally, members may want to instead consider forming an S corporation to better manage self-employment taxes in situations where the S corporation eligibility requirements are satisfied and state law permits the business to be organized in corporate form.

FUTURE GUIDANCE
Even with this recent court decisions discussed in this article, significant uncertainty remains in this area of the law. For example, the law remains unclear as to when an LLC member’s income is deemed to come from services or from capital, and whether an LLC member’s service-based income is sufficient to taint his or her income that is a result of capital investment. This could occur when an LLC member provides some level of services, but where his or her income from capital is significant relative to his or her income from services. To address this and other uncertainties in this area, the IRS placed this issue on its 2016–2017 Treasury Priority Guidance Plan (tinyurl.com/hfggod6).
GOING FORWARD
The IRS has signaled that it intends to litigate reported exclusions of self-employment taxes on distributive earnings to LLC members who are in a position of management control or who provide significant services to an LLC. This increased enforcement effort, combined with the IRS’s successes in Renkemeyer and Castigliola, makes it imperative for taxpayers and their advisers to reevaluate their reporting positions for self-employment income in LLCs where members are managing the enterprise, are providing meaningful services, or otherwise have authority to legally bind the LLC. Failure to do so could lead to tax assessments as well as underpayment penalties for those LLC members.

AICPA RESOURCES

Articles
“Using LLCs to Minimize Taxes,” Tax Insider, July 17, 2014, tinyurl.com/y7ufjkxk

CPE self-study
Tax Fundamentals of LLCs and Partnerships — Tax Staff Essentials (#157674, online access, #GT-Y5E.TFLP, group pricing)
For more information or to make a purchase, go to aicpastore.com or call the Institute at 888-777-7077.

The Tax Adviser and Tax Section
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Mechanics of the new Sec. 199A deduction for qualified business income

Here’s a step-by-step guide to calculating the new deduction for passthrough businesses and determining who qualifies for the break.

By William A. Bailey, CPA, J.D., LL.M.

Overview

The initial step in calculating the Sec. 199A deduction begins with determining QBI. QBI is determined separately for each of the taxpayer’s qualified businesses. For any tax year, QBI is the net amount of items of income, gain, deduction, and loss with respect to any qualified business of the taxpayer. Qualified items of income, gain, deduction, and loss include such items that are effectively connected with the conduct of a U.S. trade or business and are included in determining the business’s taxable income for the tax year.

Certain investment items are excepted from QBI, including short-term and long-term capital gains and losses, dividends, and interest income not properly allocable to a trade or business. QBI also does not include reasonable compensation payments to a taxpayer for services rendered to a qualified business, guaranteed payments to a partner for services rendered to a business, and, to the extent provided in regulations, a Sec. 707(a) payment to a partner for services rendered to the business (Sec. 199A(c)).

Another critical definition is for the “combined QBI amount” (Sec. 199A(b)). The combined QBI amount serves as a placeholder: It is the amount of the Sec. 199A deduction before taking into account a final overall limitation. Under this overall limitation, a taxpayer’s QBI deduction is limited to 20% of the taxpayer’s taxable income in excess of any net capital gain. The combined QBI amount is the sum of the...
Example 1
H and W file a joint return on which they report taxable income of $310,000, of which $10,000 is net capital gain and $280,000 is ordinary net income from H’s interest in an S corporation. H and W’s combined QBI is $56,000 (20% × QBI of $280,000). Combined QBI is $56,000 before applying the overall limitation of $60,000 (20% × [310,000 taxable income – 10,000 net capital gain]). H and W’s Sec. 199A deduction is $56,000.

TAXPAYERS ABOVE THE HIGHER TAXABLE INCOME THRESHOLD
If the taxpayer has taxable income above the higher threshold amount, two issues arise in the calculation of the Sec. 199A deduction. First, a business of the taxpayer will not be treated as a qualified business, and the income of the business of the taxpayer will not be included in QBI, if the business meets the definition of a specified service trade or business (see below). Thus, the Sec. 199A deduction will be denied in full for the business. Second, if a business is a qualified business (i.e., it is not a specified service trade or business), the deductible QBI amount for the business is subject to a W-2 wage and capital limitation.

EXCEPTION FOR A SPECIFIED SERVICE TRADE OR BUSINESS
As described above, taxpayers with taxable income of more than $415,000 (the “higher threshold”) are denied the Sec. 199A deduction for the income deductible QBI amounts for each of the taxpayer’s qualified businesses. The deductible QBI amount of a qualified business is generally 20% of its QBI, but the deductible QBI amount may be limited (1) by a wage and capital limitation and/or (2) when the business is a specified service trade or business.

The calculation of a taxpayer’s Sec. 199A deduction depends on whether the taxpayer’s taxable income is (1) below a lower taxable income threshold ($157,500, or $315,000 if filing a joint return), (2) above a higher taxable income threshold ($207,500, or $415,000 if filing a joint return), or (3) between the lower and higher taxable income thresholds. (When computing taxable income for this purpose, the Sec. 199A deduction is ignored.)

TAXPAYERS BELOW THE LOWER TAXABLE INCOME THRESHOLD
If a taxpayer has income below the lower threshold, calculating the Sec. 199A deduction is straightforward. The taxpayer first (1) calculates the deductible QBI amount for each qualified business and (2) combines the deductible QBI amounts to determine the combined QBI amount. If the taxpayer has only one qualified business, the combined QBI amount is the deductible QBI amount for that business. The taxpayer then applies the overall taxable income limitation to the combined QBI. Thus, the taxpayer’s Sec. 199A deduction is equal to the lesser of (1) the combined QBI amount or (2) the overall limitation (20% × taxpayer’s taxable income in excess of any net capital gain).

IN BRIEF
- Beginning in 2018, Sec. 199A allows a deduction of up to 20% of qualified business income (QBI) for passthrough entities, including partnerships, LLCs, S corporations, trusts, and estates. It also applies to sole proprietorships.
- The amount of the otherwise QBI of a business that is a specified service trade or business that is included in calculating the Sec. 199A deduction is phased out for taxpayers with taxable incomes over a threshold amount.
- Specified service trades or businesses are defined as health, law, accounting, actuarial science, performing arts, consulting, athletics, financial services, and brokerage services. The definition explicitly excludes engineering or architecture from the list.
- Under the wage and capital limitation, the amount of QBI of a qualified business taken into account in calculating the deduction is equal to the lesser of 20% of the taxpayer’s QBI, or the greater of (1) 50% of the taxpayer’s allocable share of W-2 wages, or (2) 25% of W-2 wages plus 2.5% of the taxpayer’s allocable share of the business’s unadjusted basis in all qualified property.
- The wage and capital limitation does not apply to taxpayers with taxable incomes equal to or below a threshold level and is phased in for taxpayers with taxable income above the threshold.
- This article provides examples to illustrate how the Sec. 199A deduction will apply to taxpayers with differing income levels and types of businesses.

To comment on this article or to suggest an idea for another article, contact Sally P. Schreiber, a JofA senior editor, at Sally.Schreiber@aicpa-cima.com or 919-402-4828.
from any business that is a specified service trade or business. A specified service trade or business is defined in Sec. 199A(d)(2) as “any trade or business — (A) which is described in section 1202(c)(3)(A) (applied without regard to the words ‘engineering, architecture,’) … or which involves the performance of services that consist of investing and investment management, trading, or dealing in securities (as defined in section 475(c)(2)), partnership interests, or commodities (as defined in section 475(e)(2)).” Sec. 1202(c)(3)(A) describes:

any trade or business involving the performance of services in the fields of health, law, engineering, architecture, accounting, actuarial science, performing arts, consulting, athletics, financial services, brokerage services, or any trade or business where the principal asset of such trade or business is the reputation or skill of 1 or more of its employees [or owners].

Thus, service trades or businesses (e.g., engineering, architecture, manufacturing, etc.) that are not specified service trades or businesses are eligible for the deduction regardless of the taxpayer’s taxable income, but businesses providing specified services (e.g., law, accounting, consulting, investment management, etc.) — of taxpayers who have taxable income above the higher taxable income threshold limit — are barred from the deduction.

Example 2
H and W file a joint return on which they report taxable income of $450,000, of which $300,000 is ordinary income from W’s interest in an S corporation. W’s S corporation is a specified service trade or business because it performs consulting services. H and W cannot take a Sec. 199A deduction based on the income from the S corporation.

W-2 WAGE AND CAPITAL LIMITATION ON QBI
If a taxpayer has taxable income above the higher taxable income threshold and owns a business that is not a specified service trade or business, the QBI deductible amount for the business is subject to a limitation based on W-2 wages and/or capital (capital here is measured as the unadjusted basis of certain business assets) (Sec. 199A(b)(2)(B)). The deductible QBI amount for the business is equal to the lesser of (1) 20% of the business’s QBI, or (2) the greater of: (a) 50% of the W-2 wages for the business, or (b) 25% of the W-2 wages plus 2.5% of the business’s unadjusted basis in all qualified property. Thus, two alternative limitations under Sec. 199A(b)(2) may limit the deductible QBI amount for each business that is included in a taxpayer’s combined QBI amount: (1) a pure 50% wage test, or (2) a combined 25% wage and capital test.

W-2 wages are total wages subject to wage withholding, elective deferrals, and deferred compensation paid during the tax year that are attributable to QBI (Sec. 199A(b)(4)). However, amounts not properly included in a return filed with the Social Security Administration on or before the 60th day after the due date (including extensions) for that return are not included (Sec. 199A(b)(4)(C)).

A partner’s allocable share of W-2 wages is required to be determined in the same manner as the partner’s share of wage expenses.

The basis of qualifying property is calculated as the unadjusted basis immediately after acquisition of that property. Qualifying property means (1) tangible, (2) depreciable property (3) held by, and available for use in, the business at the close of the tax year, (4) used in the production of QBI at any time during the year, and (5) for which the “depreciable period” has not ended before the close of the tax year (Sec. 199A(b)(6)).

The depreciable period starts on the date the property is first placed in service and ends on the later of (1) 10 years after the beginning date, or (2) the last day of the last full year of the applicable recovery period under Sec. 168 (ignoring Sec. 168(g)). This rule allows “qualified property” to include property that has exhausted its modified accelerated cost recovery system (MACRS) depreciation period if it is still in its first 10 years of service. The statute directs Treasury to provide anti-abuse rules to prevent the manipulation of the depreciable period of qualified property through related-party transactions, and for determining the unadjusted basis immediately after the acquisition of qualified property in like-kind exchanges and involuntary conversions.
subject to a ratable phase-in of the wage and capital limitation (thereby avoiding the full burden of the wage and capital limitation). For taxpayers owning a specified service trade or business who are between these thresholds, the deduction limitation is also phased in — allowing taxpayers with a specified service trade or business at this taxable income range to be able to qualify for at least part of the Sec. 199A deduction.

**Example 3**

H and W file a joint return on which they report taxable income of $450,000, of which $300,000 is ordinary income from W's interest in an S corporation that is not a specified service trade or business. W's allocable share of the business's W-2 wages is $80,000, and her share of the business's unadjusted basis in its qualified property is $600,000.

H and W's wage and capital limitation is the greater of (1) 50% of W-2 wages, $40,000, or (2) the sum of 25% of W-2 wages, $20,000, plus 2.5% of the unadjusted basis of the qualified property immediately after its acquisition: $600,000 × 0.025 = $15,000, for a sum of $35,000. The amount of the wage and capital limitation is therefore $40,000.

H and W's combined QBI is the lesser of 20% of QBI, $60,000, or the wage and capital limitation of $40,000, or $40,000. Combined QBI is $40,000 before applying the overall limitation of $90,000 (20% of $450,000). H and W's Sec. 199A deduction is $40,000.

**TAXPAYERS BETWEEN THE LOWER AND HIGHER THRESHOLDS**

Taxpayers with taxable income between the lower and higher thresholds (i.e., between $315,000 and $415,000 for married taxpayers filing jointly; between $157,500 and $207,500 for others) are subject to a ratable phase-in of the wage and capital limitation (thereby avoiding the full burden of the wage and capital limitation). For taxpayers owning a specified service trade or business who are between these thresholds, the deduction limitation is also phased in — allowing taxpayers with a specified service trade or business at this taxable income range to be able to qualify for at least part of the Sec. 199A deduction.

**Wage and capital limitation phased in**

Taxpayers between the taxable income thresholds and who are not in a specified service trade or business are subject to only a partial wage and capital limitation. The deductible QBI amount for a business of a taxpayer with taxable income between the thresholds is 20% of QBI, less an amount equal to a “reduction ratio” multiplied by an “excess amount.”

The “reduction ratio” is calculated as the amount of taxable income in excess of the lower threshold amount of $315,000 for married filing jointly ($157,500 for other taxpayers), divided by $100,000 for joint filers ($50,000 for other taxpayers) (Sec. 199A(b)(3)(B)(ii)). The more taxable income, the higher the reduction ratio, and the more the wage and capital limitations apply until they are fully phased in at $415,000 (or $207,500).
The “excess amount” (determined under Sec. 199A(b)(3)(A)(ii)) is the amount of the difference between (1) the deductible QBI amount of the qualified business with no wage and capital limitation (i.e., 20% of QBI); and (2) the deductible QBI amount of the qualified business with a fully phased-in wage and capital limitation (see W-2 wage and capital limitation on QBI, above). The reduction ratio is applied to this hypothetical amount to determine the reduction of the wage and capital limitation.

Example 4
H and W file a joint return on which they report taxable income of $330,000, of which $300,000 is ordinary income from H’s interest in an S corporation. The S corporation is not a specified service trade or business. H’s allocable share of the business’s W-2 wages is $80,000, and his share of the business’s unadjusted basis in its qualified property is $600,000. Because H and W’s taxable income is between the lower and higher thresholds, only a partial wage and capital limitation applies.

The reduction ratio is calculated as $330,000 less $315,000 = $15,000 of excess taxable income above the lower threshold, divided by $100,000 = 15%.

Next, the excess amount is calculated. The deductible QBI amount of the business with no wage and capital limitation applied is 20% of QBI of $300,000 = $60,000. The deductible QBI amount for the business with a full wage and capital limitation is the greater of (1) 50% of W-2 wages, or $40,000, or (2) the sum of 25% of W-2 wages ($20,000) plus 2.5% of the unadjusted basis of the qualified property immediately after its acquisition: $600,000 × 0.025 = $15,000, for a sum of $35,000. The deductible QBI amount with a full wage and capital limitation is therefore $40,000. The difference between $60,000 and $40,000, or $20,000, is the excess amount.

The 15% reduction ratio multiplied by the excess amount of $20,000 is $3,000. The deductible QBI amount for the business is therefore 20% of QBI, $60,000, less $3,000, or $57,000. Because H and W have only one qualified business, their combined QBI amount is also $57,000 before applying the overall limitation of $66,000 (20% of $330,000). H and W’s Sec. 199A deduction is $57,000.

Applying the limitation on a specified service trade or business
To calculate the specified service trade or business limitation for taxpayers with QBI from a specified service trade or business and taxable income between the higher and lower thresholds, the taxpayer first calculates an “applicable percentage.” The applicable percentage is 100% less the ratio of taxable income in excess of the lower threshold amount of $315,000 ($157,500 if not a joint filer), all divided by $100,000 ($50,000 if not a joint filer) (the applicable percentage is calculated inversely to the reduction ratio). The taxpayer multiplies the applicable percentage by (1) QBI, (2) W-2 wages, and (3) unadjusted basis of all qualified property to arrive at the includible amount of these items. These amounts are then used in calculating the deductible QBI amount for the business, as described above in “Wage and Capital Limitation Phased In.”

Example 5
H and W file a joint return on which they report taxable income of $330,000, of which $300,000 is ordinary income from H’s interest in an S corporation that is a specified service trade or business. H’s allocable share of the business’s W-2 wages is $80,000, and his share of the business’s unadjusted basis in its qualified property is $600,000. Because H and W’s taxable income is between the lower and higher thresholds, and they have a business that is a specified service trade or business, H and W must calculate their specified service trade or business limitation phase-in.

The applicable percentage is 100% less the ratio of ($330,000 – $315,000) ÷ $100,000 = 1 – 0.15 = 0.85, or 85%. Multiplying their QBI, W-2 wages, and unadjusted basis of qualified property by 85%, H and W have $255,000 of includible QBI, $68,000 of includible W-2 wages, and $510,000 of includible unadjusted basis of qualified property after the limitation on a specified service trade or business.

H and W must then apply the wage and capital limitation using these includible amounts. The reduction ratio is $15,000 ($330,000 less $315,000) of excess taxable income above the lower threshold, divided by $100,000, or 15%.

Next, the excess amount is calculated. H and W’s deductible QBI amount, calculated as if no wage and capital limitation applied, is 20% of includible QBI ($255,000), or $51,000. Their deductible QBI amount calculated as if the full wage and capital limitation applied is (1) 50% of includible W-2 wages ($68,000), or $34,000, or (2) the sum of 25% of includible W-2 wages ($17,000) plus 2.5% of the includible unadjusted basis of the qualified property immediately after its acquisition: $510,000 × 0.025 = $12,750, for a sum of

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OTHER FACTORS TO CONSIDER

The Sec. 199A deduction is a below-the-line deduction, meaning that it will not have an impact on various adjusted-gross-income thresholds. The deduction is available to both itemizers and non-itemizers. Additionally, the taxable income thresholds (e.g., $315,000 and $415,000) are indexed for inflation (Sec. 199A(e)(2)(B)).

The Sec. 199A deduction cannot be taken in loss years. If QBI is less than zero in a year, the amount will be treated as a loss from a qualified business in the next year (Sec. 199A(c)(2)).

The deduction is allowed only for federal income tax purposes (i.e., not for payroll taxes). Sec. 199A will expire in 2026 absent congressional action to extend it (Sec. 199A(i)).

Much of the Sec. 199A deduction’s complexity comes from congressional concerns of potential abuse. Undoubtedly, more administrative guidance will be issued to further define and clarify the law’s parameters (e.g., cloudy areas such as “reputation and skill” and definitions of specified service trades or businesses). Until then, CPAs reading this article have a general idea of how the rules’ mechanics will apply to most taxpayers, and CPAs can be of great service in explaining how these rules affect individual taxpayers and offer opportunities for tax planning.

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Overall limitation applied after combined QBI is calculated

After the deductible QBI amount is calculated for each of a taxpayer’s qualified businesses under the various taxpayer scenarios above, the deductible QBI amounts are combined to determine the taxpayer’s combined business amount. Therefore, if the taxpayer has only one qualified business, the combined QBI amount is the same as the deductible QBI amount for that business. After determining the taxpayer’s combined QBI amount, the overall limitation is applied. Under the overall limitation, the Sec. 199A deduction is the lesser of the combined QBI or 20% of the taxpayer’s taxable income in excess of net capital gain.

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$29,750. Therefore, the hypothetical full wage and capital limitation is $34,000. The excess amount is the difference between these two amounts, $51,000 – $34,000 = $17,000.

The deductible QBI amount after the wage and capital limitation is the deductible QBI amount calculated as if no wage or capital limitation applied ($51,000) less the reduction ratio of 0.15 × the excess amount of $17,000 ($2,550), or $48,450. Because the taxpayers have only one qualified business, the combined QBI amount is also $48,450 before applying the overall limitation of $66,000 (20% of $330,000). H and W’s Sec. 199A deduction is $48,450.