

December 2, 2009

See For Yourself

The Importance of Checking Claims

Nullius in verba.

*Motto of the Royal Society*¹

Don't Overpay for Wine

In doing research for my latest book, *Think Twice*, I was delighted to bump into an equation that predicted the value of wines from Bordeaux without relying on anyone from the swirl, sip, and swish crowd. The formula is in *Supercrunchers*, a book by Ian Ayres, which celebrates the use of statistics to solve common economic problems. As someone ignorant about wines and sympathetic to the analytical approach, I found it to be a pearl. Here is the equation, as Ayres presents it:²

Wine quality = 12.14540 + 0.00117 winter rainfall + 0.0614 average growing season temperature – 0.00386 harvest rainfall

I included the equation in my chapter about the limitations of experts, and kept going. But then I got curious about the origins of the analysis and decided to learn more about where the equation came from. And so began a little journey.

As Ayres explains, the equation was created by an economist and wine enthusiast named Orley Ashenfelter, a professor at Princeton University. Ashenfelter had become skeptical of the claims of professed wine experts, and recognized that the value of a particular vintage had a lot to do with temperature and rainfall during the grape-growing season. Armed with copious records of temperature and rainfall from the Bordeaux region of France, Ashenfelter created a regression equation that considered the key variables and predicted the average vintage value.³ Wine experts were not amused, with the New York Times reporting that the cognoscenti considered the analysis “ludicrous and absurd.”⁴

Actually, what seems ludicrous and absurd is the ability of purported wine experts to judge the quality of wines. In a pair of recent papers, Robert Hodgson, a retired professor and vintner, showed that individual wine judges vary substantially in their ratings of the same wine at different times and that the probability of a wine winning a Gold medal at a competition is well described by a random process. In other words, the opinions of wine experts are not very reliable.⁵ But is the equation Ayres portrays any better?

In this case, the answer is a resounding no. In fact, Ayres got the equation wrong—by a lot—because he didn't actually look at Ashenfelter's work.⁶ This brings us to the moral of the story. It is really important to check the primary source for any important assertion you see or hear. Mistakes, mischaracterizations, and misleading comments float around everywhere in the business and investment worlds.

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It is not hard to see how Ayres made the error. He found an article about Ashenfelter in the *Princeton Packet* that included the equation.⁷ He simply copied it. In so doing, three errors were perpetuated (see Exhibit 1). The first is that he showed the constant as a positive instead of a negative (the constant is -12.145, not 12.145). This error could be the result of how the text wrapped around in the article. It appears Ayres mistook the minus sign for a dash at the end of the line, and so read the constant as a positive rather than a negative. So Ayres's equation would have you pay way too much for wine!

Exhibit 1: How Errors Happen...

Bestseller	Wine quality = 12.145 + 0.00117 winter rainfall + 0.0614 average																																				
Press Reference	Ashenfelter, finding a good bottle of wine is as easy as - 12.145 + 0.00117*winter rainfall + 0.0614*average																																				
Original	<p style="text-align: center;">Parameter Estimates</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Variable</th> <th>DF</th> <th>Parameter Estimate</th> <th>Standard Error</th> <th>T for H0: Parameter=0</th> <th>Prob > T </th> </tr> </thead> <tbody> <tr> <td>INTERCEP</td> <td>1</td> <td>-12.145398</td> <td>1.68808445</td> <td>-7.195</td> <td>0.0001</td> </tr> <tr> <td>WRAIN</td> <td>1</td> <td>0.001167</td> <td>0.00048203</td> <td>2.421</td> <td>0.0242</td> </tr> <tr> <td>DEGREES</td> <td>1</td> <td>0.616397</td> <td>0.09517460</td> <td>6.476</td> <td>0.0001</td> </tr> <tr> <td>HRAIN</td> <td>1</td> <td>-0.003860</td> <td>0.00080753</td> <td>-4.781</td> <td>0.0001</td> </tr> <tr> <td>TIME_SV</td> <td>1</td> <td>0.023847</td> <td>0.00716666</td> <td>3.327</td> <td>0.0031</td> </tr> </tbody> </table>	Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T	INTERCEP	1	-12.145398	1.68808445	-7.195	0.0001	WRAIN	1	0.001167	0.00048203	2.421	0.0242	DEGREES	1	0.616397	0.09517460	6.476	0.0001	HRAIN	1	-0.003860	0.00080753	-4.781	0.0001	TIME_SV	1	0.023847	0.00716666	3.327	0.0031
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Source: Ian Ayres, *Supercrunchers: Why Thinking-by-Numbers is the New Way to Be Smart* (New York: Bantam Books, 2007), 2; Abhi Raghunathan, "First Crush the Grapes, Then Crunch the Numbers," *Princeton Packet Online*, April 4, 1999; Orley Ashenfelter, David Ashmore, and Robert Lalonde, "Bordeaux Wine Vintage Quality and the Weather," www.liquidasset.com; LMCM analysis.

Second, the author of the article erroneously moved a decimal point in the temperature variable. As a result, the importance of temperature was understated by a factor of 10 in the ultimate value. Not good, especially given that temperature is very important in determining the quality of a vintage. Finally, the author either miscopied or failed to round properly the temperature variable, further distorting that parameter.

The problem with mistakes like this, of course, is that they propagate unchecked. For example, here's what a search on Google revealed:

	<u>Ayres equation</u>	<u>Correct equation</u>
Number of results	103	Zilch

In this case, the error is not likely to have any meaningful consequences. Since the equation actually describes the logarithm of the average vintage price relative to the 1961 vintage, it's unlikely anyone has used it to find bargains at their local wine store. But there are cases where errors can shape behavior.

Why I Can Beat Up Popeye

Proud of unearthing the mistake about the wine equation, I shared the story with Mark Newman, a professor of physics at the University of Michigan, while at a conference at the Santa Fe Institute. Mark has done important work on citation networks—for example, how academic papers refer to one another.⁸ In a talk on the subject, Mark discussed research suggesting that the authors of papers read the articles they cite a depressingly low fraction of the time.⁹ Researchers

drew this conclusion after an analysis of misprints in scientific citations—not unlike the mistake Ayres made.

After hearing about the wine equation, Newman said, “ah, that’s the spinach mistake.” Knowing only that spinach is good for me and unaware of any vegetable transgressions, I asked him to elaborate on his response.

The story is that in 1870, a German chemist named Erich von Wolf collected the nutritional value of green vegetables, including spinach.¹⁰ In transposing the figures from his notebook to the final table, von Wolf apparently misplaced a decimal point, hence overstating spinach’s iron content by a factor of ten.¹¹ (Roughly 35 mg per 100 g serving versus 3.5 mg.) Once in print, the perception of spinach’s nutritional value took on a life of its own.

Spinach got another boost in the 1930s when Paramount Productions decided that Popeye, the bizarre one-eyed cartoon character, would gain his incredible strength from downing a can of spinach. Popeye’s famous line, “I’m strong to the ‘Finich,” ‘Cause I eats me spinach,” led Americans to increase their consumption of spinach by one third.¹²

Alas, in 1937 scientists rechecked the figures and realized that spinach, while healthy, is no more healthy than other green vegetables. Yet generations of Americans have perpetuated spinach’s special nutritional status. Sara Lippincott, who spent almost two decades as a fact checker at *The New Yorker*, said that once an error gets into print it “will live on and on . . . deceiving researcher after researcher down through the ages, all of whom will make new errors on the strength of the original errors, and so on into an exponential explosion of errata.”¹³ If the nutritional error were not enough, the spinach mistake encouraged parents to impose the stuff on generations of kids.

While the proliferation of information—stoked strongly by the Internet—has made error propagation big business, the techniques for finding the source of errors is improving, too. For example, three scientists took algorithms, developed originally to infer phylogenetic trees based on the genomes of organisms, and applied them to the evolution of chain letters.¹⁴ The analysis revealed the source of errors (or mutations), and by following the errors the researchers could reconstruct how the letters evolved. For example, the name of a man discussed in one letter varied from “Walch” to “Wales” to “Walsh” to “Welsch” and finally to “Welsh.” But most of us don’t have algorithms at our disposal. We have to figure out what’s right and what’s wrong using more conventional methods.

Nullius in Verba

The motto for the Royal Society, an academy of science founded in 1660, is “nullius in verba,” which means “take no one’s word for it.”¹⁵ In business and markets, certain ideas or beliefs seem to perpetuate without a solid foundation in the facts. The Royal Society’s motto has served it well for 350 years and remains excellent advice today. As Dan Brown writes in his latest thriller, *The Lost Symbol*, “wide acceptance of an idea is not proof of its validity.”

One example of a persistent belief in markets is that a high price/earnings (P/E) multiple portends low subsequent market returns (and vice versa).¹⁶ For instance, one investment firm’s recent commentary was dour on the market’s prospects as the result of a P/E that they deemed to be too high. The firm says, “On this basis we come up with a smoothed trendline [sic] reported earnings number of \$60, resulting in a P/E ratio of 18.2, still well over the historic norm of 15. The conclusion: anyway we look at it, the market is overvalued.”¹⁷

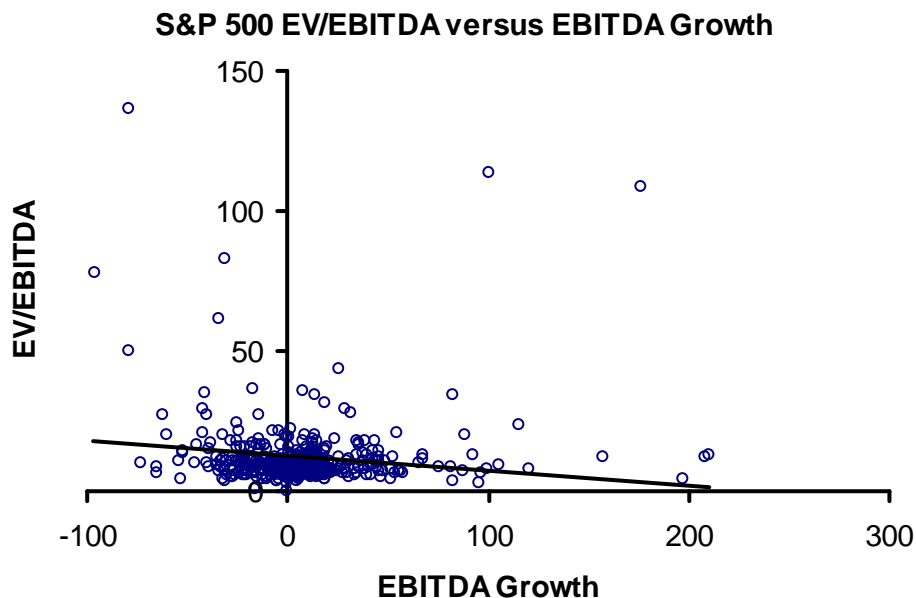
Meir Statman, a professor of finance at Santa Clara University, and Ken Fisher, chairman of Fisher Investments, ran the numbers comparing the P/E ratio at the beginning of the year with one- and two-year subsequent returns. As they report, “there is no statistically significant relationship between P/E ratios at the beginning of the year and returns during the following year

or during the following two years.”¹⁸ While the relationship between P/E and returns for the next year appears sensible, the last century of data don’t back it up.¹⁹

Another belief that persists is of the importance of corporate growth. One of the scores of business books promising the keys to achieving growth opens with the apparently unobjectionable statement that “today’s best business leaders obsess about growth.”²⁰ Companies frequently set goals for sales and earnings growth, believing that higher growth rates lead to higher valuations.

This is another view that the data do not substantiate. As Exhibit 2 shows, there is no discernible relationship between growth in earnings before taxes, depreciation, and amortization (EBITDA), a common measure of cash flow, and valuation as measured by enterprise value/EBITDA. The reason is simple: It is not growth that creates value (and a higher valuation) but rather value-creating growth. A company must earn above the cost of capital on its incremental investments to create shareholder value. Growth simply amplifies, making a good business more valuable and a bad business less valuable. And growth has no effect on a business earning its cost of capital.²¹

Exhibit 2: EBITDA Growth Does Not Correlate Well with Valuation



Source: Bloomberg and LMCM analysis; EV/EBITDA is the current enterprise value divided by trailing 12 months EBITDA, as of the most recent quarter; EBITDA growth is the year-over-year change in EBITDA, as of the most recent quarter.

A final example comes from outside the world of investing or business—football play calling. Through their play-calling and discourse, football coaches have molded a conventional wisdom about what to do in certain game situations. Punting is considered a safe call, especially when a team finds itself on its side of the field, as is “putting points on the board”—i.e., kicking a field goal versus going for it when deep in the opposing team’s zone. The conventional wisdom is reinforced frequently by the announcers on television as well as sports writers.

A deeper analysis of crucial play calls shows that coaches are often far too conservative. For instance, they punt too readily versus going for it on fourth down, especially when they are on their own half of the field.²² Chuck Bower, an astrophysicist, and Frank Frigo, a world backgammon champion, created a computer program called Zeus to assess N.F.L. play calling. Their analysis shows that during the 2008 season, only 4 of the N.F.L.’s 32 teams made calls in critical situations that concurred with Zeus over half of the time, and that 9 teams made calls

consistent with the program less than one-quarter of the time. These blunders are consequential: Zeus estimates that 25 percent of N.F.L. teams lost one game or more as the result of poor play calling in the 2007 season, denting their post-season aspirations in the relatively short 16-game season.²³

Conclusion

We are all exposed to large amounts of information and have too much to sort through carefully. But our minds generally filter information without much effort, and the typical default is to accept what we believe to be true (often the conventional wisdom) and ignore pretty much everything else.²⁴ Problems arise, however, when we accept ideas without verifying the veracity of the claim. As we have seen, some of our beliefs are built on errors and others are built on unsubstantiated claims. As a result, it is important to periodically revisit and challenge your beliefs no matter the source of the (mis)information. While this is intellectually taxing, it can also be the source of an important edge.

Endnotes

¹ See <http://royalsociety.org/page.asp?id=6186>.

² Ian Ayres, *Supercrunchers: Why Thinking-by-Numbers is the New Way to Be Smart* (New York: Bantam Books, 2007), 2.

³ Orley Ashenfelter, "Predicting the Quality and Prices of Bordeaux Wines," *Working Paper No. 4, American Association of Wine Economists*, April 2007.

⁴ Peter Passell, "Wine Equation Puts Some Noses Out of Joint," *The New York Times*, March 4, 1990.

⁵ Robert T. Hodgson, "An Examination of Judge Reliability at a major U.S. Wine Competition," *Journal of Wine Economics*, Vol. 3, No. 2, Fall 2008, 105-113; Robert T. Hodgson, "An Analysis of the Concordance Among 13 U.S. Wine Competitions," *Journal of Wine Economics*, Vol. 4, No. 1, Spring 2009, 1-9. See also Leonard Mlodinow, "A Hint of Hype, A Taste of Illusion," *The Wall Street Journal*, November 14, 2009.

⁶ That Ayres did not look up original sources has been noted before. For example, David Leonhardt, a journalist at the *New York Times*, notes that Ayres relied, "on accounts from newspapers and magazines," and that "his reproduction of these sources can be quite troubling." See David Leonhardt, "Let's Go to the Stats," *The New York Times*, September 16, 2007.

⁷ Actually, I couldn't find the article that Ayres refers to in his notes. But the equation seems to come from another article: Abhi Raghunathan, "First Crush the Grapes, Then Crunch the Numbers," *Princeton Packet Online*, April 4, 1999.

⁸ E. A. Leicht, Gavin Clarkson, Kerby Shedden, and M.E.J. Newman, "Large-scale Structure of Time Evolving Citation Networks," *ArXiv.org*, June 6, 2007.

⁹ M.V. Simkin and V.P. Roychowdhury, "Read Before You Cite!" *ArXiv.org*, December 3, 2002.

¹⁰ Actually, there are two stories about the miscalculation of spinach's nutritional value. The one cited most is about von Wolf in 1870. However, I was unable to find any original sources to back it up. Another one comes from the research of Gustav Von Bunge, who in the 1890s showed that dried spinach has iron content of 33-39 mg per 100g serving, higher than beef or egg yolks. See G. Bunge, *Textbook of Physiological and Pathological Chemistry*, 2nd ed. (Philadelphia, PA: P. Blakiston's Son & Co., 1902), 376.

¹¹ Gregory McNamee, *Moveable Feasts: The History, Science, and Lore of Food* (Westport, CT: Praeger Publishers, 2007), 162-167.

¹² For the lyrics to "I'm Popeye the Sailor Man," written by Sammy Lerner, see Fred M. Grandinetti, *Popeye: An Illustrated Cultural History*, 2nd Ed. (Jefferson, North Carolina: McFarland & Company, 2004), 45. For spinach consumption, see TJ Hamblin, "Fake!," *British Medical Journal*, Vol. 283, December 19-26, 1981, 1671-1674.

¹³ John McPhee, "Checkpoints," *The New Yorker*, Vol. 85, No. 1, February 9 & 16, 2009, 56-.

¹⁴ Charles H. Bennett, Ming Li, and Bin Ma, "Chain Letters and Evolutionary Histories," *Scientific American*, June 2003, 76-81.

¹⁵ The phrase is said to come from Horace, "Nullius addictus judicare in verba magistri." Translated into English it means, "Not compelled to swear to any master's words."

¹⁶ John Y. Campbell and Robert J. Shiller, "Valuation Ratios and The Long-Run Stock Market Outlook," *The Journal of Portfolio Management*, Winter 1998, 11-16.

¹⁷ Comstock Partners, "Stock Market Significantly Overvalued," *Commentary*, October 22, 2009.

¹⁸ Kenneth L. Fisher and Meir Statman, "Cognitive Biases in Market Forecasts," *The Journal of Portfolio Management*, Fall 2000, 1-10.

¹⁹ Ken Fisher, *The Only Three Questions That Count: Investing By Knowing What Others Don't* (Hoboken, NJ: John Wiley & Sons, 2007).

²⁰ Graeme K. Deans and Fritz Kroeger, *Stretch! How Great Companies Grow in Good Times and Bad* (Hoboken, NJ: John Wiley & Sons, 2004), xv.

²¹ Alfred Rappaport and Michael J. Mauboussin, *Expectations Investing: Reading Stock Prices for Better Returns* (Boston: Harvard Business School Press, 2001), 15-16.

²² David Romer, "Do Firms Maximize? Evidence from Professional Football," *The Journal of Political Economy*, Vol. 114, No. 2, April 2006, 340-365.

²³ Chuck Bower and Frank Frigo, "What Was Coach Thinking?" *The New York Times*, February 1, 2009. Also, Zeus, "Ranking NFL Coaches by Play-Calling Abilities, *Golf Magazine*, February 11, 2008.

²⁴ Michael J. Mauboussin, *Think Twice: Harnessing the Power of Counterintuition* (Boston: Harvard Business Press, 2009) 27-29.

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