

Mark Twain: Ratios of His Time to Ours

1 day
Math, Middle School

DESIRED RESULTS

What are the “big ideas” that drive this lesson?

- ❖ Twain’s rich, descriptive writing allows them to be used as a primary source for determining the relative costs of goods during the late nineteenth century by calculating ratios to understand the fluctuation of prices and monetary value.

What are the “essential questions” that students must answer in order to understand the “big ideas?”

- ❖ How has monetary value changed from Mark Twain’s time to our own in 2011?
- ❖ How do you create the ratio of monetary change through yielding a result?

CORE UNDERSTANDINGS

Identify what students will know and/or be able to do.

- ❖ Students will be able to develop an interdisciplinary approach to learning by finding data points from multiple subject areas.
- ❖ Students will be able to calculate ratios between the rise of monetary value.

LIST SUGGESTED ASSESSMENT(S)

- ❖ Group work: solve math problems relating to this ratio between monetary values of Mark Twain’s time and today.
- ❖ Homework assignment having students create their own word problems relating to the conversions between Mark Twain’s time and ours.

LEARNING EXPERIENCES AND “COMMON CORE” CONNECTIONS

What are the specific activities and sequence of instruction that will be used to engage students in this lesson?

1. Introduction- Students will be introduced to Roughing It chapter 26 and Connecticut Yankee chapters 32 and 33 as part of an interdisciplinary collaboration unit with a history and/or literature teacher. Students will be reviewed on the general details of these chapters and they will be drawn to the charts and details of the gold and silver references as well as the

conversions within the text. Students will be placed in groups of four with team leaders chosen ahead of time by the teacher.

2. Lesson- The teacher will draw attention to the chapter 26 in Roughing It and focus on the different yields of gold or silver within three areas such as:
 - Gold Hill- yielded 100 to 400 pounds a ton for silver
 - Humboldt – silver yielded 200 to 300 dollars for every 100 pounds
 - Typical silver yield- 20 to 24 dollars a ton
 - Convert a ton to a pound by dividing by 2000
3. Given examples on the board of word problems using this passage.
 - Give the conversion of inflation- in 1862- 1 dollar - 2011- 21 dollars
 - Claims cost 300 to 400 dollars a foot for a mine claim- give an example of a claim on the board that would represent a 50 foot mine claim.
 - List today's gold and silver prices- Gold-1,601.00 an ounce and silver- 40.12 an ounce. The teacher will work and make example word problems for conversion from gold and silver prices in 1862 to today's prices.
4. Teacher will reference chapter 33 from Connecticut Yankee and the price list of the products between the two time periods and compare and contrast the prices within the two time periods. The teacher will provide a chart of the information and have the groups answer questions from the chart.
 - Students will set up proportions to compare the prices within the books two time periods.
5. Group work and reinforcement- students will solve math problems from the text:
 - If you had 40.00 dollars of gold in 1862, what value would that have in 2011?
 - How much would a mine claim cost that was 200 feet in total?
 - If the conversion rate is 1 dollar in 1862 = 21 dollars in 2011, what is the value of gold that is valued at 100 dollars in 1862?
 - What value would 4,700 dollars in 2011 have in 1862?
6. Students will complete these problems in class as a team.
7. The teacher will have each group display a problem's answer on the board as a way to reinforce the lesson.

Suggested Common Core Connections:

[CCSS.Math.Content.7.RP.A.3](#) Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

CCSS.Math.Content.7.RP.A.2 Recognize and represent proportional relationships between quantities.

MATERIALS AND ATTACHMENTS

- ❖ Calculators
- ❖ Pencil, pen, paper
- ❖ Roughing It chapter 26
- ❖ Connecticut Yankee chapter 32 and 33

SUGGESTED LESSON EXTENSIONS TO ENHANCE STUDENT LEARNING

- ❖ As a homework assignment, have the students create their own word problems with conversions
 - ❖ Have them develop three word problems from Roughing It and three word problems from Connecticut Yankee that they will then bring in the following day and exchange with other students to complete and discuss.

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Chapter 1

The Nation Perspective in Post-Civil-War America: Economic Growth, Coinage Questions, Monetary Policy

The quest for precious metals is as old as civilization itself. Its modern phase started with the discoveries of gold and silver after the Spanish Conquest of the New World. From the middle of the sixteenth century into the early nineteenth century Spanish and later Portuguese mines pumped billions of ounces gold and silver (probably between 125,000 and 150,000 tons) into the world economies.¹ In the second half of the nineteenth century new discoveries in the western United States added hundreds of millions of ounces to the world supply of gold and silver. Foremost among those states was Nevada. Although mining began there in the 1850s and continues today, its fame rests on a brief but spectacular period from 1865-1885. In that period Nevada produced as much as \$400,000,000 in gold and silver, more than a third of all the gold and silver reported in the United States. While mining operations existed in most Nevada counties, a single county, Storey, accounted for almost 60 percent of Nevada's output.

Concentrated along a lode known as the Comstock under the shadow of Mt. Davidson, the boom spawned a new and vibrant settlement called Virginia City. In the city under the streets were the richest Comstock veins. One company, known as The Firm, through its two operating subsidiaries – Consolidated Virginia and California Mining – registered two-thirds of all the ore produced along the Comstock. Public pronouncements of untold wealth that could be exploited years and decades into the future, based in large part on The Firm's success, proved to be vastly overstated. The boom was confined to a few years, perhaps a decade at most; it was over almost as quickly as it began. Mining continues in Nevada more than a century after the Comstock boom and has left an indelible imprint on the state's economic landscape. Since the Comstock, however, mining has fallen to a lower rank in the state's economic hierarchy. Without the Comstock it is hard to envision what Nevada's mining legacy would be.

By all accounts the United States underwent a profound economic change between 1800 and 1900. An agrarian-based society was transformed into an industrial based society in the course of the century. One set of figures published by Robert

Gallman shows that between 1774 and 1909, a long stretch of 135 years, "real gross national product [GNP in 1860 dollars] increased about 175-fold, or an average rate of 3.9 percent per year." For various short-term GNP estimates between 1859 and 1885 the annual rates range from 2.9 percent to 5.6 percent. If real GNP growth rates could be calculated solely for the period coinciding with the Comstock era (ca 1859-1885) they could fall between 4 and 5 percent a year.² The decade of the 1880s witnessed

¹ Silver registrations are estimated in Richard L. Garner, "Long-Term Silver Mining Trends in Spanish America: A Comparative Analysis of Peru and Mexico," *American Historical Review*, 93:4 (1988), p. 898. The late Professor John TePaske, Duke University, prepared a new comprehensive database of colonial gold and silver production in the New World, and the tonnage may be higher than given here. There is no way to capture the volume of gold and silver that escaped royal registration. Estimates range from 10 to 50 percent. Evading the tax collector was not easy but was nonetheless practiced with some skill and success. The database is available on-line at www.historydatadesk.com.

² An overview appears in Robert Gallman, "Growth and Change in the Long Nineteenth Century" in Stanley Engerman and Robert Gallman, eds., *The Long Nineteenth Century*, vol. 2 of *The Cambridge Economic History of the United States* (Cambridge: Cambridge University Press, 2000), 2-6 and Table 1.3,

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exceptionally strong economic growth according to another measure: the “real reproducible tangible wealth per head” that rose about 4 percent over the decade.³ The growth in the economy during the second half of the nineteenth century was real and significant, but what was its connection, if any, with the West’s major mineral strikes? To be sure, in simplest terms, the surge in mining of minerals, first in California and then in Nevada, Colorado, Arizona, Montana, etc. added to the national wealth by producing metals that entered the currency stream and by doing business – buying supplies, paying wages, reinvesting profits. More gold (in U.S. dollars) was mined between 1850 and 1900 than the world-wide total mined prior to 1850 and perhaps three-fourths as much silver.⁴ In the United States alone more than a billion ounces of “fine” gold and silver worth \$2 to 3 billion was produced in the second half of the nineteenth century.⁵ Not all of this was coined, and part of it was exported. In other words the American consumer did not find his pockets jingling or wallets bulging with several billion dollars more in coins or notes. Market conditions, international exchange and government policy all influenced how a billion new ounces of gold and silver were allotted and utilized within the economy. But the fact remained that since a share of the new mineral wealth was coined or traded the effect was to replenish and expand the money stock. Indeed the money stock nearly tripled in the second half of the nineteenth century. According to Friedman and Schwartz (in their later *Monetary Statistics of the United States*) the money National Coinage and Monetary Policy stock in terms of a “consolidated total” that included both currency in the public’s hands plus commercial-bank deposits, all seasonally adjusted, was about 1.29 billion dollars in the 1860s. A decade later it had reached 1.65 billion dollars, although in 1875 it actually exceeded 1.7 billion dollars. Finally in the 1880s it doubled to 3.3 billion dollars. With respect to publicly held currency its pattern differed from that of the total money stock. In the mid-1860s it averaged about 600 million dollars and then declined to about 550 million dollars in the mid-1870s. In the early 1880s it jumped sharply to almost 900 million dollars before dropping back to slightly under 800 million dollars.⁶ Publicly held currency was directly dependent on monetary policy, and its decline in the mid 1870s was attributable to the Act of 1873 and its rise in the 1880s to the resumption laws of 1878 and 1879. Perhaps more importantly even as the western mining boom was unfolding currency was occupying an increasingly smaller niche within the total circulating medium, a trend that would continue into the twentieth century and would ultimately reduce coins to a minor role in the United States economy. But for many citizens and especially for westerners who were extracting millions of tons of gold and silver ore each year, minting coins still represented the historically-sound standard by which to bolster the national currency. especially note following table. Several Gallman publications with more extensive data analysis are listed in the note.

³ See also by Friedman and Schwartz in *Monetary History of the United States*, 93, from *Historical Statistics of the United States, Colonial Times to 1957* (Washington DC, Bureau of the Census, 1960), Series K-1 and K-4, 276,

⁴ These figures are from many different sources and do not always agree. The reason that silver did not exceed pre-1850 totals was the enormous output of Spanish-American silver between 1500 and 1800.

⁵ These are estimates based on data from Laughlin, *History of Bimetallism in the United States*, Appendix 1.

⁶ Milton Friedman and Anna Schwartz, *Monetary Statistics of the United States. Estimates, Sources, Methods* (New York: National Bureau of Economic Research and Columbia University Press, 1970), 61-

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For the average reader monetary histories can be daunting. Citizens spend dollars every day but have little understanding of or interest in how money is created or how it is valued. In nineteenth-century America the money stock consisted mainly of gold and silver coins along with some state and national bank notes. Paper currency then was less widely used and trusted than today. Since notes could be discounted at the time of a purchase or transfer, those holding them in effect paid more. Coins were preferred to notes, but also gold coins were preferred to silver. From time to time prior to the 1870s the federal government had minted silver dollars, and nearly all so-called subsidiary coins of one dollar or smaller were minted from silver. According to Milton Friedman and Anna Schwartz in *A Monetary History of the United States*, however, “the silver dollar had not been in circulation since 1836, and was an unknown coin to Americans” in the middle decades of the nineteenth century.⁷ This did not mean that silver dollars ceased to be coined; rather they ceased to circulate. They were stored in federal vaults or used in foreign transactions. The main reason for this was that the market price of silver was higher than its mint price. In other words one would do better to sell silver on the open market than to sell it to the federal mint. Not surprisingly, as silver output grew in the second half of the nineteenth century so too did pressure grow for the national government to increase the mintage of silver.

Two monetary historians – W. A. Shaw and J. Lawrence Laughlin – from the late nineteenth century collected and published figures on gold and silver coinage at the federal mint.⁸ Their series, to be discussed below, are identical with regard to the total coinage. Laughlin, however, distinguished between silver-dollar coins and subsidiary silver coins: half and quarter dollars, dimes and half dimes (today’s nickel) and other minor coins. The importance of this distinction is that while silver dollars could be legally coined (“free coinage” according to Laughlin) between 1793 and 1873, only 8 percent (\$8 million) of the silver coined was in dollars and the remainder in subsidiary coins. In addition his data revealed that no “silver dollars” were minted between 1806 and 1835 and only slightly more than 6.5 million dollars worth were minted between 1835 and 1873. The absence of silver dollars in day-to-day business apparently did not create any serious currency shortages.⁹ In light of the absence of circulating silver dollars Congress in 1873 passed with little opposition an act to “demonetize” silver dollars. That meant that the US Mint was not permitted either on private or public accounts to coin any silver dollars.¹⁰ Europe had given up on bimetallism, and now the United States joined the fold. Silver coins under one dollar could be minted as well as something called silver trading dollars to be used for transactions abroad, mainly in the Far East.¹¹ As noted

⁷ Milton Friedman and Anna Schwartz, *A Monetary History of the United States 1867-1960* (Princeton, NJ: Princeton University Press, 1963), 114. Excerpts of the various currency laws were published in J. Lawrence Laughlin, *The History Bimetallism in the United States* (New York: D. Appleton and Company, 1900), 300-311.

⁸ W. A. Shaw, *The History of Currency 1252 to 1984...* (London: Wilson & Milne, 1900), 265-266 and Laughlin, *History Bimetallism in the United States*, 338-340.

⁹ Shaw, *History of Currency*, 260. Friedman and Schwartz’ data on money stocks tend to bear out this observation by Shaw.

¹⁰ Relevant excerpts of the act appear in Laughlin, *History of Bimetallism in the United States*, 304-305.

¹¹ Friedman and Schwartz, *A Monetary History of the United States 1867-1960*, 114-115. Friedman and

Schwartz discuss the role of silver trading dollars in the US economy in footnote 37, pp. 113-114. In 3

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above, the difference between the market and coin value of silver made the silver dollar an unpopular choice.

Then came a reversal in national policy with the passage of the Bland-Allison Act in 1878. Ironically the decade of bimetallism came after the boom in Nevada and Virginia City. The accompanying charts show that up to 1878 silver coinage except for subsidiary coins was manifestly unimportant in the national currency. After 1878 with the resumption of coinage of silver through 1890 the volume of silver currency shot up more than ten-fold from a few million dollars per year to tens of million. In a few of those years silver coinage exceeded gold coinage. The “goldbugs” mounted a successful attack on the Sherman Act, which was repealed shortly after it was passed. The nation virtually abandoned bimetallism again, even though the “silverites” continued to press for the “free and unlimited coinage of silver” and a restoration of bimetallism. Over the long term despite great silver discoveries in Nevada, Colorado and other western states, discoveries that fired the imagination of Mark Twain and opened the wallets of San Francisco speculators, silver played second fiddle to gold. Silver only accounted for 685 million dollars or 28 percent of a total coinage of 2.4 billion dollars from 1793 to 1895.

FIGURE 1

COINAGE IN THE UNITED STATES MINTS, 1793-1895

Gold Silver Total

Dollars \$1,755,813,763.00. \$685,023,431.00

\$2,440,843,544.00 % 71.93 28.07 100.00

Growth Rate /Year 8.25% 5.11%

6.69% R₂ .76 .68 .85

Silver producers and their supporters complained that by the “Crime of 1873” the gold advocates had robbed the industry and the nation of a new and important source of wealth that could stimulate growth and ensure prosperity. Silver proponents under the leadership of Congressman Richard Bland from Missouri pushed through Congress the Bland-Allison Act in 1878 (and a revision in 1879). This Act restored bimetallism to the nation’s currency system. While it did not allow for the “free and unlimited” coinage of silver, as some had demanded, it did authorize and direct the Secretary of the Treasury to purchase not less than 2 million dollars worth of silver bullion and not more than 4 million dollars per month. If carried out every month at the maximum level the US Treasury would buy enough silver to mint just under 50 million silver dollars. In fact silver coinage in the decade following Bland-Allison was about 30 million dollars annually, although the Treasury may well have bought more silver than it had coined. From the bullion the US Mint was authorized to coin silver dollars of 371.25 grains pure silver (412.50 grains standard silver). These silver dollars could circulate as “legal tender, at their nominal value, for all debts and dues, public and private” unless stated otherwise in legal contracts.¹² The law did not permit owners of silver to convert their bullion directly into coin. Rather they sold their bullion to the Treasury at the market price of

California trading dollars helped to facilitate commercial transactions between the West Coast and the Far East. In regions outside California minor coins could be scarce, and currency speculators and money brokers found ways to inject trading dollars into local economies.

¹² Laughlin, *History of Bimetallism in the United States*, 307-308.

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silver. The market price of silver dropped sharply as the output of silver rose after 1873. Monetary policy changes may also have contributed to the declining market price. From 1834 through 1873 the average market price for pure silver of 371.25 grains was \$1.0236; a year later the price had declined to \$0.9898 and by 1886 to \$0.7690.¹³ That was a 25-percent decrease in a dozen years. On average during these years the mint paid about 90 cents for an ounce of silver and then returned a coin marked "one dollar" even though the silver was worth about 10 percent less than that. In many transactions the silver dollar was discounted to take into account the difference between the market and nominal values of the coin. Also because of the weight of silver dollars, the law also permitted the government to issue silver certificates that traded like silver dollars with some additional restrictions. Finally the law permitted the continued coinage of subsidiary coins (under \$1.00). An important underlying consideration is that the law fixed the weights of gold and silver coins and therefore the ratios between the two metals. Thus, resumption of coinage of silver placed the United States squarely in the camp of bimetallism. In short, producers had won a new outlet for the white metal but at some cost – they sold bullion for less than the face value of the silver dollar, and they received coins that the market deemed to be worth less than the stated value with the result that silver coins and certificates might be discounted in commercial transactions.

FIGURE 2

COINAGE IN THE UNITED STATES MINTS, 1793-1895

Notes: **Red**=Total Coinage; **Blue**=Gold Coinage; **Orange**=Silver Coinage.

¹³ Laughlin, *History of Bimetallism in the United States*, 297.

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\$120,000,000
\$140,000,000

$R^2 = 0.54$

$R^2 = 0.46$

$R^2 = 0.65$

Years

Dollars

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FIGURE 3

COINAGE IN THE UNITED STATES MINTS, 1793-1895

(SEMI-LOG)

Notes: Y-Scale is semi-log.

Mining of precious metals, in particular silver, did not stop because Congress outlawed the minting of silver dollars. Figure 2 shows the nominal yearly figures for gold, silver and total, while Figure 3 shows the annual total on a logarithmic scale. The purpose of Figure 3 is to illustrate that in relative terms coinage climbed steadily until the third quarter when it reached a plateau before moving higher again in the fourth quarter. It is noteworthy, of course, that the third quarter with such high silver production was also the quarter of static mintage output. Figure 2 illustrates quite clearly that total coinage had three sharp peaks between 1850 and 1880. The first around 1850 coincides with gold discoveries in California, the second around 1860 coincides with further discoveries of gold and silver in the western states or territories like Nevada and finally the third around 1880 coincides with the passage of Bland-Allison and in the waning period of the Comstock bonanza. With the first two peaks coinage shot up and then fell back over a two- to four-year cycle. Silver had an inauspicious role in the first two runups for the reason cited above – silver was not a highly valued coin. Those peaks were largely a function of gold production. The third peak is different in that it was reached after a decade in which coinage climbed somewhat irregularly from 20 million dollars per year to 120 million dollars before declining to about half the high. In this run-up post-1878 silver played a much larger role. If unacquainted with silver coins prior to 1880, Americans become fully acquainted with them after 1880. After Bland-Addison the U. S. Treasury purchased gold and silver to be minted into coins; prior to that it bought primarily gold. Between 1873 and 1878, however, Congress enacted almost annually laws that authorized the U. S. Treasury to purchase a quantity of silver to replace fractional coins and paper notes. That the Treasury enforced these provisions became evident in the coinage series from 1875 to 1878. The quantity of subsidiary silver coins (no silver dollars were coined) rose from 5 to 6 million dollars to 20 to 25 million

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Years

Dollars - Semi-Log

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dollars.¹⁴ That would not absorb all the silver being produced. The question arises: what happened to all the silver that was mined before 1878? The answer is that tens of millions of dollars in silver were exported, mainly to Europe but also to Asia. In other words silver bullion had value in other commercial arenas even though it could not circulate on par with gold in the United States.¹⁵ Mining, especially the mining of silver, would have ceased without an outlet for bullion. Although the transactions were complex and probably little understood by the average miner, a mechanism had evolved for the disposition of gold and silver, albeit different for each metal.

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Chapter 3

Statistical Profile of Mining Industry:

Prospectors to Investors, Profile Database, Costs versus Profits

From the beginning the Comstock served the interests of the less than scrupulous. As Smith pointed out, the presence of so many “silver-mad investors”, mainly from San Francisco and California, encouraged cheating and lying. His description of how he

believed the claiming of the Comstock took place is worth reviewing. He began with the weather. Early November winter storms dumped several feet of snow on the Comstock. Surface mining more or less came to a standstill while lode mining at shallow depths continued. Despite the snow the weather cleared enough to allow local prospectors to stake out more and more claims even without knowing what was under the snow. Californians, especially the incipient financial community of San Francisco, “were in a fever of excitement of the Washoe mines.” Many were willing to buy claims “without knowing anything about the location or the value, and the local prospectors were preparing to supply the demand.” According to Smith’s calculation more 16,000 claims were staked out. Many claims were worthless, but they were often sold, abandoned and then in the wake of further “good news”, even if fabricated, they were resurrected and sold again.¹

The opportunity for fraud did not end as the era of corporate mining replaced the prospecting free-for-all. Since a claim consisted of so many linear feet, it could be divided among one or more shares of stock per foot. Four companies - Ophir, Gould & Curry, Savage and Yellow Jacket – were incorporated between 1860 and 1863 and claimed a total of 4,600 feet along the Lode. Ophir claimed 1,400 feet and issued 16,000 shares or 12 shares per foot. The total value was more than \$5 million so that a share of stock had a nominal cost of \$300. Both Gould & Curry and Yellow Jacket claimed 1,200 feet each, and whereas Gould & Curry issue 4 shares per foot Yellow Jacket issued only one share per foot. The nominal value of the capital stock was more than \$2 million or \$500 per share for Gould & Curry and \$1 million or \$1,000 per share for Yellow Jacket. Savage with 800 feet issued 800 shares with a nominal value of \$2,000 per share.² The value of the stock was not so much based on the capacity of the mine as on what the stock might trade for in the marketplace. Since no marketplace *a priori* existed for these stocks, held initially by the incorporators, one had to be created. It was created by inviting outsiders – persons who were known to speculate in real estate and other assets as well as persons of means – to buy a portion of their shares. Creating this marketplace often entailed “fictitious trades”. Two stockholders might trade the same shares over and over again in order to move the price of the stock and to attract attention. In addition there were “sympathy trades”. As the prices of shares in one company began to move

¹ Smith, *The Comstock Lode*, 20. Smith provided no source for the figure of 16,000, although in all probability it was drawn from studies of the hundreds of lawsuits that were contested in state and federal judiciary.

² Maureen Bloomquist Jung, “The Comstock and the California Mining Economy, 1848-1900: The Stock Market and the Modern Corporation” (PhD dissertation, University of California, Santa Barbara, 1988), 70.

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upward, the holders of stocks of other companies would begin to trade their shares in hopes of impressing investors that all stock prices were on the rise. It helped that the dollar value of Comstock production, to the extent that figures existed, jumped from several hundred thousand dollars in 1859 to \$12.5 million in 1863. A 10- to 15-fold increase made it fairly easy to entice market speculators but also legitimate investors.

While the aggregate value of gold and silver mined in the first several years came to nearly \$25 million, the value of mining stocks sold in San Francisco may have been several times that amount. In short, as promising as the Comstock was, brokers and speculators in San Francisco tried to enhance their own financial positions through opportunistic purchases and sales that had little in common with actual Comstock operations.³

It is hardly surprising, though, that mining stocks were a frequent source of financial chicanery. By its very nature mining, especially underground, was a perpetual roller coaster. While past output was measurable, it seldom was a reliable indicator of future output. The Comstock was filled with surprises, even for serious-minded scientists, who year by year gained more knowledge about the character of the Comstock but could not always predict where the next bonanza would occur nor how much longer the Comstock would continue to generate bonanzas. Conversely they were reluctant to be bearers of bad news and seldom said much about the *bonanza-borrasca* cycle that was becoming evident in the early years. One of the most important of the visiting scientists was Baron Ferdinand von Richthofen, a German geographer and geologist. His report in 1865-66 identified correctly many of the geological and chemical features of the Comstock but incorrectly posited that the richest veins would be located in the upper regions with a diminution in the quality and the concentration of the ore as the depths increased. In fact since the mines had only reached depths of several hundred feet he could not have known nor did he anticipate that the richest deposits were found between 1,000 and 1,500 feet beginning in the early 1870s.⁴ The work of the scientific community was important, and their findings could actually move markets. But more often than not the slightest shift up or down in production or just the rumor of a shift had a more pronounced impact that could cause prices of stocks to skyrocket or plummet. And of course company executives like market speculators were not above planting information in order to manipulate stock prices. Even after the establishment of the San Francisco Stock Exchange in 1863 and the

³ Jung, "The Comstock and the California Mining Economy", 76, 88, 114.

⁴ The Baron's report was widely circulated and cited. It exists in a microform version under the title *The Comstock Lode: its character, and the probable mode of its continuance in depth* [1866] at the University of Nevada, Reno Library. Perhaps the Baron's most serious miscalculation was to conclude that the richest pockets of ore were located toward the top of the Lode, and the quality would diminish as the depths increased. In fact between 1,200 and 1,500 feet the richest strikes ever were made. Below 1,500 feet the quantity and quality of the ore declined to virtual barrenness even though the strikes between 1,200 and 1,500 feet caused some investigators to revise their projections in favor of greater depths would yield richer strikes.

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Illustration 2: Baron
von Richthofen

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enactment of some minimal trading rules, market manipulation in the hands of some bulls and bears achieved the level of an art form. The timely release of information whether truthful or fictional about progress or the lack thereof could serve stockholders who

wanted to unload their holdings at the highest possible price or to increase them at the lowest possible price. Newspapers like Virginia City's *Territorial Enterprise* could become unwilling conduits of false information. The extent to which the activities of the stock exchanges influenced day-to-day decisions in the Comstock operations themselves is not easy to determine with any certainty. Grant Smith organized his *History of the Comstock Lode* in such a way as to accentuate the role of the San Francisco bulls and bears in precipitating the cycles of boom and bust on the Comstock. But historically production cycles were normal phenomena in every mining economy, although heavy speculation in mining stocks may well have exaggerated the movement of the cycle. What is necessary but difficult to do is to separate the legitimate institutional functions of a stock exchange from those that were conceived for other perhaps illegal purposes.⁵ Noted earlier was the fact that the discovery of ores was the occupation of the many, but their exploitation became the occupation of the few. Lode mining, certainly as the depths increased, required not only capital but also organization and management. Mining had always seemed to attract strong personalities and flamboyant characters, and while the Comstock had its fair share, it also confronted them with the challenge of developing their business skills to complement their personal ambitions. A profile of the Comstock mining industry during the two decades, 1865-1885, clearly illustrates and demonstrates how the free-wheeling, almost egalitarian spirit of the first locators was fairly quickly supplanted by a more industrial mentality that emphasized control and production. Of the hundreds if not thousands who tried their hand at making a fortune from the wealth of the Comstock became casualties rather than victors in their endeavors. The road was rocky for all with a high percentage of financial failure at every level. But in terms of the sheer volume of ore extracted and refined, only a handful of companies qualified. The structure of the Comstock mining industry was generally oligopolistic and at times came close to being monopolistic. Even among the oligopolists profitability was elusive and bankruptcy was unavoidable. Whatever their ultimate financial fate, major producers were large companies, some of which owned or controlled dozens of mines and mills across the Comstock.

One set of public records through which we can build a profile of Comstock mining is county assessment rolls. Other documents such as company accounts and state reports can be used to supplement these records. Unfortunately they are incomplete.

Because so many of the early placer miners were from California, where mineral

⁵ Smith, *The Comstock Lode*. Chapter 7, for example, has a section with the intriguing title "Stock Devilment" (p. 62-63). Smith was not alone. Lord wrote in *Comstock Miners and Mining* (p. 318 and Smith cites on p. 62, footnote 3): "A well-managed 'stock deal' was as acceptable to most holders [of mining stocks] as an actual development of ore." Smith also cited Fred MacCrellish, editor of the *Atlas California*, who compared "the stock-jobbing business" to gambling, "the most demoralizing kind: for, unlike card playing it is pursued openly and has been regarded as respectable....It is worse than card gambling, because the players are not upon an equal footing...and it breeds an increasing crop of professional liars whose business it is to entrap honest but credulous people." Smith, p. 63, footnote 3 from *Atlas California*, 16 July 1871.

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production was not taxed, they successfully opposed any taxation (property or production) during the First Territorial Legislature in 1861. Such opposition did not obviate the need for revenue, and in subsequent legislative sessions (as a territory and a state), a tug-of-war ensued between the mining interests and the government over how to

tax the output of the mines. Finally in 1871 the Nevada Legislature agreed upon a mining tax that remained in effect for decades. I will look more closely at the actual debate over taxation of mining in a later chapter. For now I want to explain how the assessment records once the legislation was approved can be used to create a profile of the industry.⁶ The 1871 law was called a mining “net-proceeds” tax, and it was applied against the net proceeds of the mines in the same way as property taxes were applied. In fact tax rates on mining proceeds could be no more or no less than property-tax rates. The legislation spelled out how county assessors were to maintain assessment records and what they were to report to the state controller. Each quarter miners, millers and individuals who might have acquired ores were required to pay their assessment taxes. In calculating and collecting these taxes assessors were to organize their records or ledgers

in the following way: **Name of Owner(s); Description and Location of Mine; Number of Tons Extracted; Gross Yield or Value, in Dollars and Cents; Actual Cost of Extracting; Actual Cost of Transportation to Place of Reduction or Sale; Actual Cost of Reduction or Sale; Net Yield or Value, in Dollars and Cents; and Total**

Amount of Tax.⁷ Story County assessors generally maintained their records in accord with the law, although toward the end of the period for this study the entries in the ledgers became more disorganized and less useful. With these records we have access to Comstock production on a quarter-by-quarter and a company-by-company basis for more than a decade. These are rich sources for the study of the Comstock mining industry, although they are not by any means perfect. [A copy of the ledger for the 3rd Quarter, 1877, appears in a **Special Appendix** at the end of the chapter.]

There is one important caveat, however. A fire in Virginia City, the county seat, in October 1875 destroyed the courthouse and many of the county’s records including assessments and collections of mining-proceeds taxes from the passage of the legislation in early 1871 through the first half of 1875. From the third quarter of 1875 (mining-proceeds taxes for the third quarter were collected in the fourth quarter) through the fourth quarter of 1885 the documentation is complete. The surviving documents are stored currently in the Story County Assessor’s Office, and microfilm copies are available at the Nevada State Archives and Libraries and in Special Collections at the Library of the University of Nevada at Reno. Some of the missing records have been located in other archives, in particular the archives of the Controller’s Office. The State of Nevada received a portion of the taxes on mining proceeds, and quarterly each county

⁶ Romanzo Adams, *Taxation in Nevada, A History* (Carson City, NV: State Printing Office, [Publication of the Nevada Historical Society] 1918), 71.

⁷ The text of *An Act providing for the taxation of the net proceeds of mines*, approved 28 February 1871, appears in Bonnifield and Healy, comps., *Laws of Nevada*, 2:225-228. It is located in *Chapter C Of the Taxation of the Net Proceeds of Mines* Sections 3245-3252. Sections 3255-3258 consider the taxation of Borax and Soda, which are not discussed with respect to the Comstock. The Constitutional provision that governs taxes on proceeds is Section 10, Article 1. Taxation of mining proceeds was and remains controversial and will be discussed in greater detail in Chapter 17 & 18.

assessor provided the Controller with a summary (Abstract Statement) of the taxes collected and authorized a transfer of money to state treasury. Some but not all of the Story County Abstract Statements for quarters prior to the fire have survived in the Nevada State Archives, and while these were summaries of the actual accounts kept by the assessors, they can be used to fill in a part of the missing quarterly data between 1871 and 1875.⁸ Finally, the State Mineralogist, who prepared a biennial report on the status of mining for the Legislature, included data from the Abstracts submitted by the counties including Story County. Although the Mineralogist extracted only certain data from the Abstracts (which themselves were summaries of the county records), he usually included tonnage and bullion figures for all the operations that paid assessments in his biennial reports.⁹ It turns out, then, that despite the destruction of the original documents other records allow us to reconstruct a large portion of the destroyed assessment rolls for Story County. The result is that I have been able to assemble a dataset on tonnage and value of bullion for each quarter from the first quarter of 1871 through the fourth quarter of 1884 by mine or mill (that is, by owner of the bullion) except for the fourth quarter of 1872.

It is important to examine what the Act actually stipulated. To determine the assessment from which the tax was calculated county assessors “shall demand from the President, Superintendent, Treasurer, or managing agent of each corporation, association, or firm engaged in extracting ores and minerals within his county, and from any person so engaged other than as a corporation, association, or firm, a statement under oath or affirmation” with the appropriate information noted above. He could also “demand” that the company or individual “open” their ledgers to inspection, although the procedures by which such audits would be made was not specified in the law.¹⁰ It is not known how often if ever an assessor inspected a firm’s accounts. It would appear that the government depended mainly on honest affirmations rather than expensive audits. While the firm or individual surely understood the risks in lying to the government and then getting caught, the temptation to misrepresent their finances probably remained strong. Certainly among contemporary observers and later commentators there was considerable suspicion that the mining executives were ever totally honest in reporting their finances to state or county officials and even to their own stockholders. Unfortunately the task of demonstrating that these executives cooked their books to avoid paying taxes or simply to avoid revealing information is a very difficult one. Where company records exist (for example, the financial records of Consolidated Virginia and California Mining Companies are almost complete) the financial summaries extracted from these records tend to be in general agreement with what companies reported to state or county officials and more

⁸ I have examined the actual surviving ledgers for the last two quarters of 1875 and the full years of 1876 and 1877 in the Assessor’s Office located in the Courthouse of Story County, Virginia City. My principal source was microfilm copies listed under The County Records Microfilm Project, ST 67 Story County, in Special Collections, Library, University of Nevada at Reno.

⁹ Surviving Abstracts of the Story County assessment rolls and the tax collections submitted to the State have been found in the Nevada State Archives. They include 1st Quarter 1871, 1st, 3rd and 4th Quarters 1872, and 4th Quarter 1874. The Biennial Reports of the State Mineralogist of the State of Nevada for the Years 1871, 1872, 1873, 1874 and 1875 appended to the Journal of the Senate 6th Legislative Session (1873) and appended to the Journals of the Senate and the Assembly, 7th (1875) and 8th (1877) Sessions of the Legislature of the State of Nevada.

¹⁰ *An Act providing for the taxation of the net proceeds of mines*, approved 28 February 1871, in Bonnifield and Healy, *Laws of Nevada*, 2:226-227 specifically sections 3246-3248.

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importantly with what they reported to their stockholders. It is not easy, therefore, to pinpoint the discrepancies, and where discrepancies may appear to exist they do not always appear to be significant. The category, which invited the worse abuse, was reported operating costs – extraction, refining and transportation. These figures could be more easily fudged than the value (in dollars) of the output because the latter was actually determined by the mint. It should also be recognized that business practices like accounting and bookkeeping was evolving in the late nineteenth century and that companies may not have known with the precision of current contemporary auditing standards what their real costs were. Of all the figures that the assessor collected the value of the gold and silver extracted from the ore, which the owner declared in tons, were probably the most accurate. Certainly they were the easiest to trace and verify through the mint records.

The calculation of mining taxes from mining proceeds had a curious proviso. The law clearly stated that the proceeds would be arrived at by deducting the “actual cost” of extracting the ores from the mines or the “actual cost” of processing the tailings from the gross return: “the remainder shall be deemed the net proceeds, and shall be assessed and taxed as provided for in this Act”. The proviso declared “that in no case whatsoever shall the whole amount of deductions allowed” exceed the gross yield. In short, if costs matched or exceeded receipts taxes would still be collected on the bullion in accord with a schedule based on per-ton yields. Every producer with bullion to declare paid netproceeds taxes even if the costs were greater than the receipts. The aim clearly was to make sure that every producer paid some taxes. Producers had to report yields per tons in gold and silver bullion, and the higher the yields the smaller the deductions for costs against value of the bullion. For example, if the yield per ton was \$20, the producer could claim a deduction no greater than 80 percent. Thus a producer with \$1,000 worth of bullion from ores yielding \$20 per ton at a cost of \$900 to extract, reduce and transport per ton would pay taxes on \$200 worth of bullion instead of on \$100, the difference between the bullion value and the mining costs. The value of the bullion that was taxable was called the assessment, and the tax rate could not exceed the millage by which other property holders were taxed. In this example the producer could not count all his costs in the determination of the assessment. In many cases no deduction at all were allowed. To cite again the \$1,000 example, if the total costs had been only \$500 even with a yield of only \$20 per ton the bullion would be taxed at “net”, that is, no deduction. Under this procedure it was certainly possible for the company to falsify the tonnage so that the yield per ton would be lower and the deduction higher as well as to misrepresent the costs. And this may well have occurred, although where the company’s declared tonnage can be compared to the recorded tonnage few discrepancies could be found. Cooking the books on a regular and consistent basis would have been a large undertaking that few companies, it would seem, had either the time or the money to pursue. This is not to argue against producers using various deceptions to evade the tax collector (among others) but rather to argue that such deceptions were sporadic and not continual. The Act also provided that a further adjustment in determining the taxable value was allowed when ore were refined by a process known as the Freiberg method, although Freiberg was not widely used on the Comstock.

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By isolating one quarter of data from the assessment rolls we can see how the system worked. The quarter chosen was the fourth, October through December, of 1876. It was not chosen because it is typical; rather it was chosen because it had fewer declarations than in other quarters and is less cumbersome to summarize. Seven mines and four mills, mainly tailings mills, declared assessable ores. Two mines were assessed on the basis of the “net” – the balance after costs were deducted from receipts. In both cases the reported costs were between 32 and 38 percent of the receipts and therefore did not qualify the mines for deductions in their assessments. Two mines reported yields and costs that allowed them to shield 60 percent of their bullion from taxation, two mines 80 percent and one mine 90 percent. With respect to the four mills two were granted deductions and two were assessed at net. The Act provided for various penalties if owners refused to open their books or to supply the data required to determine the assessments and taxes. But these penalties do not appear to apply in the above examples. In the final analysis since cheating was hard to detect and expensive to investigate the most trenchant criticism of the net-proceeds mining taxes was that the formula described above was too generous. By some calculations mining companies paid less per \$1,000 in assessments than did other taxable properties.¹¹

What can we learn from the assessment rolls even with the less-than-perfect statistics that they generate? We can begin with the obvious. The initial sentence in the 1871 Law that “All ores, tailings, and mineral-bearing material, of whatever character, shall be assessed for purposes of taxation....”¹² Story County assessments distinguished between ores and tailings, and the first contributed 90 percent and the second 10 percent of the total bullion value. Ores referred to the extracted matter that was crushed and amalgamated to yield the precious minerals. Tailings were residues that escaped during the transportation of the crushed watery ores to the amalgamation pans. They usually ended up in slag piles or holding ponds scattered around the mines and mills. They were also dumped into the Carson River, the bed of which today is still covered with these residues. Sometimes sluices were built to capture the tailings and direct them to their final resting places. Since tailings contained small amounts of gold and silver, they could be reprocessed in mills built specifically for that task. It had always been a matter of concern and speculation as to how much gold or silver was lost in the tailings. Some believed that more minerals were lost in tailings than were actually processed at the mills. It is not an easy to confirm or deny such assertions. Enough could be recaptured, though, to lead some companies to convert or construct mills specifically for the reprocessing of tailings from their amalgamation mills. The 1871 Act also stipulated that assessment rolls should have two columns that read: “Actual cost of transportation to place of reduction or sale” and “Actual cost of reduction or sale”. As the column titles suggest ores could be sold, and when they were sold the buyers paid the net-proceeds taxes. How much ore was

¹¹ *An Act providing for the taxation of the net proceeds of mines*, approved 28 February 1871, in Bonfield and Healy, *Laws of Nevada*, 2:226-227 specifically Section 3245 along with the previously cited sections; quarterly data from assessments on microfilm in The County Records Microfilm Project, ST 67 Story County, Special Collections, Library, University of Nevada, Reno.

¹² *An Act providing for the taxation of the net proceeds of mines*, approved 28 February 1871, in Bonfield and Healy, *Laws of Nevada*, 2:226-227, Section 3245. Certain compounds like borax could yield precious minerals, and the State Controllers' Annual Reports showed that two Nevada counties – Esmeralda and Churchill – reported assessments on ores, tailings and boraxes.

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sold under the terms indicated in the 1871 law in any given year is not known and cannot be separated out from the figures as they appear in the assessment rolls. Most of the extracted ores were not sold but were processed by the producers, and those that were sold were probably tailings.¹³

Not only did the rolls distinguish between ores and tailings, but they also noted the mining districts where the mines or mills were located. From the earliest years miners organized themselves into districts in order to administer the rules (which the miners themselves generally wrote and approved) and to adjudicate disputes. Nearly all the declared ores came from mines in the districts of Virginia City and Gold Hill. A very small quantity came from a third district, Flowery, a different lode to the east of the Comstock that was being explored more intensively in the 1880s as the Comstock went into decline. The actual boundaries of the districts cannot be precisely delineated. The district boundaries for Virginia City and Gold Hill may have coincided with the municipal boundaries. With few exceptions the mines that declared ores were known to be within the municipal boundaries whereas the mills and particularly the tailings mills with ores to declare were located throughout the county and beyond in adjacent counties. When locations were given for tailings mills, they might be as general as Virginia City or Gold Hill or they might be more specific such as Six Mile Canyon or Geiger Pass. And in some quarters the locations of the mills were not noted at all. Joseph Tingley, notable contemporary scholar of Nevada mining and the Comstock in particular, writes that American Flat, south of Gold Hill, was also designated a mining district. There was an American Flat mining claim and other claims surrounding that mine, but in the extant assessment rolls no ores were ever declared from those mines or that district (if it continued to exist).¹⁴ At times Virginia City and Gold Hill were referred to as the Comstock District, but that designation was not used in the assessment rolls. The importance of identifying the district within the assessment rolls had tax implications. Tax rates as applied to assessable ores differed from district to district. Even though Gold Hill and Virginia City were adjacent to each other, they did not always share the same tax rates. From the assessor's standpoint it was necessary to know where the ore came from so that the correct rate could be levied and the revenue raised by the tax could be distributed to the appropriate district based on what the county commissioners had legislated.¹⁵

Between 1871 and 1884 production data can be assembled for 55 of the 56 quarters (only the fourth quarter 1874 is missing). In that period the number of bullion owners (mines and mills) totaled at least 71. I stress owners of bullion to be assessed because there were many more mine and mill owners who may have had operations that yielded no useful metal. The actual number may be slightly higher or lower than the number given because in compiling these statistics I have had to deal with entries in the assessment rolls that lacked consistency, especially in the recording of names. It is relatively easy to keep track of the major producers (mines or mills), but it is less easy

¹³ *An Act providing for the taxation of the net proceeds of mines*, approved 28 February 1871, in Bonfield and Healy, *Laws of Nevada*, 2:226-227, Sections 3245-46.

¹⁴ See Joseph Tingley, *Mining Districts of Nevada*, Report 47, Nevada Bureau of Mines and Geology, 2nd edition, 1998, for a discussion of the Comstock Mining District.

¹⁵ More about the tax implications in Chapters 17 & 18.

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with small, marginal producers. Where I thought that it was reasonable to assume that operations with slightly different spellings or identifying notations could be grouped under a single name, I have done so. Although the number of such groupings was small and mainly concerned modest operations, it can affect other calculations such as rankings. Of the approximately six dozen bullion owners that I have identified 56 percent were mining operations and the remaining 44 percent were milling operations. In terms of ore production and bullion yield the statistics are quite different. The mines accounted for 90 percent of the tonnage and 98 percent of the bullion. As voluminous as tailings were, they were not a significant factor in overall ore production. Against claims numbering in the hundreds along the Lode or in the region of the Lode no more than a few dozen mines produced the bulk of the ore in a decade and a half.

Total ore tonnage of all the declarations between 1871 and 1884 reached approximately five million with a bullion value of \$204 million. When ranked according to tonnage Crown Point stood at the top of the list with 804,000 tons or 16 percent, but when ranked by bullion it ranked fourth with \$26 million or nearly 13 percent of the total. Close behind Crown Point in tonnage was Consolidated Virginia with 791,000 or 16 percent. In bullion, however, Consolidated Virginia was first with nearly \$64 million or 31 percent of the total. The other major ore producers were well-known mines: Belcher was third in tonnage and bullion with 15 and 16 percent respectively, and California was fourth in tonnage with 12 percent but second in bullion with 23 percent. In fifth place but far behind the aforementioned leaders was Chollar Potosi with 5 percent of the tonnage and 3 percent of the bullion. Further scrutiny of these figures suggests significant differences in per-ton yields, perhaps the most important measure of a mine's productivity. Not surprisingly Consolidated Virginia and California occupied the top two positions with average yields of \$81 and \$80 per ton respectively. Behind them in third place was Belcher with \$44 per ton. Further down the list at sixth was Crown Point at \$32 per ton. In fourth and fifth place at \$36 per ton were Ophir and Union Consolidated. Both of these properties were on the northern end of the Comstock Lode in the vicinity of the two most productive mines, Consolidated Virginia and California. As high as their per-ton yields were Ophir and Consolidated Union were much farther down on the lists of the rankings by tonnage and bullion: Ophir had no more than 3 to 4 percent of the tonnage and bullion, and Union Consolidated had about 1 percent.

During these 15 years the average yield for all properties was slightly more than \$41 per ton. That figure was directly influenced by the extraordinarily high yields at Consolidated Virginia and California. When a median from all of the computed per-ton yields is calculated, it comes in at an extremely low \$11 per ton. Since this analysis of tonnage and bullion includes output from tailings mills, which often reported per-ton yields in the low teens and below, the median may understate the performance of the Comstock. Another approach is to make these calculations from mines alone. If all the known tailings mills are excluded, then the mean for the mines is \$45 per ton and the median is \$14 per ton. One could, of course, treat Consolidated Virginia and California as outliers, since no other properties came even remotely close to their productivity. Removing them from the calculations would drop the mean to \$26 per ton, but the median remains at \$14 per ton. Clearly without the bonanza mines of Consolidated

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Virginia, California, Belcher, Crown Point and perhaps one or two others Comstock yields would barely have justified further investment or exploration. The ultimate test was profitability. The best measure of Comstock performance would include a comparison of yields per ton versus costs per ton. Yield data were fairly reliable because they were determined at the mint. It was harder for the bullion owner to cheat, if he were so inclined, about yields than about costs. Since there is no sure-fire way to account for fraud, it is worth making quarterly comparisons of miners' reported costs. (I have excluded millers because they did not have mining costs.) Eliot Lord was openly critical of the profligacy of mine owners and their managers. He observed how extravagant and wasteful they were in the use of company capital by not paying attention to unjustified outlays that boosted their costs and reduced their profits, which should be used to rebuild their capital.¹⁶ But Eliot was complaining about poor business judgment rather than conniving and deceiving. One approach is to examine per-ton yields quarterby-quarter and compare them to quarterly costs as reported by the companies. Data on yields and costs, when assembled and plotted, cover 43 quarters between 1871 and 1884. (Figures from 1885 assessments are virtually unusable.) In these quarters 3.4 million tons were recorded in the assessment rolls with a bullion value of \$145 million at a cost of \$76 million. The calculation of a mean reveals that the ore yielded \$42 per ton in bullion at a cost of \$22 per ton. But the mean can be affected by outliers within the variables, and the coefficient of variation (standard deviation/mean) indicates that variability in yields was more than twice that of costs (61 percent to 27 percent). The median, computed for each variable over the 43 quarters, is notably different with a narrower spread: bullion yields came in at \$27 per ton and the costs at \$22 per ton. The two variables – yields and costs – correlate only moderately at about 63 percent. Expansion in output characterized the period from 1871 through 1878 and contraction for 1879 through 1884. In the first period the mean for yields and costs came in at about \$50 per ton and \$24 per ton respectively with coefficients of variation at 32 percent and 14 percent (still more than twice). For the second period, costs per ton exceeded yields by 10 cents per ton (\$18.72 to \$18.62). Coefficients of variation were closer – 45 percent for yields and 32 percent for costs – but again yields even in a contracting economy had greater variability than costs. The mean cost per ton fell by about \$5 during the second period, but the mean yield per ton dropped by \$24. The level of costs per ton across the entire 43 quarters appears to be fairly consistent, and if miner owners or their agents were manipulating the books in order to reduce tax burdens one might expect less consistency. It can be assumed that they were so clever as to cheat with consistency. It's more likely that their costs were close to real, and whatever gains accrued by manipulating costs were small and perhaps insignificant.¹⁷ That mine owners simply did not pay enough because of the way in which the assessments were structured was a far more valid criticism.

¹⁶ Throughout *Comstock Mining and Miners* Lord depicted managerial behavior that he thought was detrimental to the success of the Comstock. He was probably more critical of that behavior in the first decade than later. The owners who came to the fore in the 1870s were more sober and conscientious in terms of running their companies.

¹⁷ All the calculations were made from assessment (1875-1884) in The County Records Microfilm Project, ST 67 Story County, Special Collections, Library, University of Nevada at Reno, and in the Story County Quarterly Abstracts submitted to the State Controller for 1st Quarter 1871, 1st, 3rd, 4th, Quarters, 1872, and 4th Quarter, 1874, on file in the Nevada State Archives.

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FIGURE 1

COMPARISON OF YIELDS PER TON AND COSTS PER TON, 1871-1884

Quarters # Bullion Per Ton Cost Per Ton

1 Quarter 1871	1	\$22.81	\$16.61
1 Quarter 1872	2	\$30.12	\$22.32
3 Quarter 1872	3	\$27.23	\$23.70
4 Quarter 1872	4	\$28.86	\$21.44
1 Quarter 1874	5	\$46.31	\$30.40
3 Quarter 1875	6	\$54.93	\$23.48
4 Quarter 1875	7	\$45.25	\$28.41
1 Quarter 1876	8	\$69.03	\$23.23
2 Quarter 1876	9	\$66.22	\$26.10
3 Quarter 1876	10	\$55.97	\$28.07
4 Quarter 1876	11	\$52.02	\$25.71
1 Quarter 1877	12	\$75.48	\$24.86
2 Quarter 1877	13	\$57.24	\$23.97
3 Quarter 1877	14	\$57.79	\$23.26
4 Quarter 1877	15	\$59.40	\$23.34
1 Quarter 1878	16	\$69.01	\$25.65
2 Quarter 1878	17	\$53.70	\$22.82
3 Quarter 1878	18	\$29.44	\$20.63
4 Quarter 1878	19	\$37.65	\$19.38
1 Quarter 1879	20	\$36.34	\$22.43
2 Quarter 1879	21	\$35.74	\$23.10
3 Quarter 1879	22	\$25.03	\$21.42
4 Quarter 1879	23	\$33.17	\$26.38
1 Quarter 1880	24	\$32.96	\$29.28
2 Quarter 1880	25	\$26.55	\$22.68
3 Quarter 1880	26	\$18.82	\$14.07
4 Quarter 1880	27	\$13.18	\$21.02
1 Quarter 1881	28	\$20.73	\$36.26
2 Quarter 1881	29	\$14.97	\$24.80
3 Quarter 1881	30	\$8.35	\$11.89
4 Quarter 1881	31	\$11.76	\$14.25
1 Quarter 1882	32	\$14.26	\$17.23
2 Quarter 1882	33	\$17.76	\$16.46
3 Quarter 1882	34	\$11.79	\$15.14
4 Quarter 1882	35	\$15.39	\$15.95
1 Quarter 1883	36	\$16.18	\$17.04
2 Quarter 1883	37	\$13.76	\$12.68
3 Quarter 1883	38	\$15.04	\$16.99
4 Quarter 1883	39	\$12.68	\$16.82
1 Quarter 1884	40	\$14.19	\$14.31
2 Quarter 1884	41	\$13.95	\$14.24
3 Quarter 1884	42	\$12.07	\$12.49
4 Quarter 1884	43	\$12.21	
		\$12.29 Median	\$27.23 \$22.32

Source: Story County Net-Proceeds Assessment Rolls, see footnote 17.

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FIGURE 2

COMPARISON OF YIELDS AND COSTS PER TON 1871-1884

\$0

\$10
\$20
\$30
\$40
\$50
\$60
\$70
\$80

0 10 20 30 40 50

Quarters Sequentially

Per-Ton Yields

Per-Ton Costs

The vast majority of mine owners and operators even in good times operated in the red or very close to the edge of red. It would have taken more than figuring out a way to cheat on taxes to enhance profitability. For whatever reason – malfeasance, incompetence or misfortune – mining companies had to rely on capital (as opposed to tax) assessments to stay in business. Authorization of assessments against stockholders meant that companies at the very least had too few profits from which to underwrite further explorations, to maintain existing facilities or upgrade underground technologies. In some cases assessments were required to meet daily operating expenses. Mines not only lacked profits that could be converted to capital for investment but at the basic level revenue streams that paid for day-to-day operations. But then again companies were expected to pay dividends so that whatever profits they might earn often ended up in the stockholders' pockets. If companies were paying dividends, theoretically they had profits and surpluses that could be invested in continuing explorations and operations. It was not uncommon for companies to pay dividends while collecting assessments. This created burden than tax payments. It was the basis of much of Lord's complaint against owners and operators. He compiled a table of assessments and dividends for all stocks trading on the San Francisco Exchange as of 1880. One caveat: his data cannot be readily verified although his research was generally viewed favorably. In any event he found that the Exchange listed 103 mining stocks for Washoe Mines (mines along the Comstock Lode and beyond). Fourteen mines paid dividends totaling \$116 million. The four largest bonanza mines – Consolidated Virginia, California, Belcher and Crown Point paid out \$102 million. The balance of \$10 million was spread among the other ten mines. That group included well-established operations such as Gould & Curry, Hale & Norcross, Kentuck, Ophir, Savage and Yellow Jacket, which combined paid out \$13 million. Four smaller operations split up the remaining million dollars. Only 14 percent of the mining companies whose stocks traded generated profits from which to pay dividends. By contrast 102 of the 103 companies (California was the sole exception) approved

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assessment that totaled \$62 million. Only five of the companies – Belcher, Consolidated Virginia, Crown Point, Gould & Curry and Kentuck – had profits after deducting assessments. (California had profits as well but no assessments.) Thus, while 14 percent paid dividends, only 5 percent had profits that exceeded their assessments. If California is added to the list (profits but no assessments) 6 percent had free and clear profits. Of the \$62 million in assessment \$44 million (63 percent) was never repaid.¹⁸ Although Lord's data do not resolve the basic issue of yields versus costs, they do reinforce the idea that except for a handful of operations over a quarter of a century could be said to make any

money for their owners and investors. Other operations might have been profitable from time to time but over the long term they were not moneymaking investments. Whatever the actual spread between yields and costs quarter by quarter and company by company may be, these computations nonetheless suggest that the color red was as prominent in the Comstock's financial world as gold and silver were in its mineral world.