

# Labor Productivity: Where Do We Go From Here?

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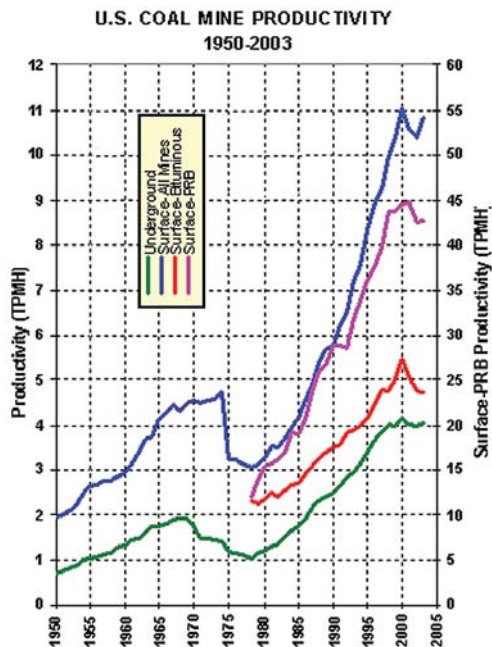


Figure 1

Coal mine labor productivity, as measured in tons per manhour, is extremely important as it is one of the most important determinants of variable production costs. As coal prices are historically driven by production costs, productivity is a strong indicator of price as well. It is not coincidental that the long period of increasing productivity coincided with a long period of declining real coal prices.

Until recently, a common belief was that coal mine productivity would continue to improve. This is understandable given the growth rates experienced during the 1980s and 1990s (See Figure 1). This view, however, lacked an understanding of the key factors behind the productivity growth. In 2000, average mine productivity peaked. Are productivity improvements over or is this just a pause before productivity improvements resume?

The search for an answer requires an understanding of the major drivers behind productivity growth. Coal mine labor productivity is driven by several factors including equipment technology, mining methods, reserve quality, management/labor, regulation, financial condition of the industry, and the market.

Mining equipment has become larger, more powerful, and more reliable over time. Larger equipment requires fewer workers to perform the same task. For example, a 360-ton truck can haul about three times the material per truck driver as a 100-ton truck could haul. Equipment reliability has substantially decreased downtime.

Mining methods have also improved along with equipment technology improvements. With stronger shields and face conveyors, longwall widths have increased from 400 to 600 feet to 1000 feet plus, increasing the production rate per shift while reducing the ratio of (higher cost) continuous miner to (lower cost) longwall coal. The advent of remote controlled equipment has allowed continuous miner units to take longer cuts and has reduced downtime on the equipment. Larger surface mine equipment allowed mountain-top removal to become highly productive. Improvements in highwall miner technology allowed the efficient mining of reserves that were too deep to mine with surface equipment.

Reserve quality, such as strip ratio, coal height, and seam depth, are important factors in productivity. In general, reserve quality declines over time as the better

reserves are mined first. Central Appalachia was, however, a major exception to this rule in the 1980s and 1990s. The steel companies had acquired massive amounts of coal reserves they intended to consume for their own requirements. With the collapse of the steel industry in the early 1980s, the steel companies began to divest these reserves to the coal industry.

These reserves consisted of large blocks of coal which allowed for the development of both surface and underground mining complexes utilizing the most advanced forms of mining including longwalls and mountain-top removal and provided substantial improvements in productivity. Examples include Arch Coal's Mingo Logan complex on reserves it acquired from U.S. Steel, Massey Energy's Marfork complex developed on reserves it acquired from Bethlehem, and Peabody Energy's Big Mountain complex on reserves it acquired from Armco.

These reserves have been heavily mined and many have depleted or are nearing depletion. There are not large blocks of undeveloped reserves comparable to what the steel companies held available to replace this coal.

Management/labor has been an important part of the increase in productivity. The three largest factors in management/labor improvement have been: the trend from union to non-union workers, the improvement in union work rules, and more efficient work schedules.

Government regulations also affect productivity. It took a number of years for the industry to adjust to the Mine Health and Safety Act of 1969 and the Surface Mine Control and Reclamation Act of 1975 which imposed a number of requirements on underground and surface mines, respectively. The recent change in the permit requirements for mountain-top removal mines has contributed to a decline in mountain-top production, which has contributed to the decline in Central Appalachia surface mine productivity.

The financial health of the coal producers is necessary to realize maximum performance. Over the past 20 years, the ownership of coal companies has been transitioning from large conglomerates to independent coal companies, both private and public. This

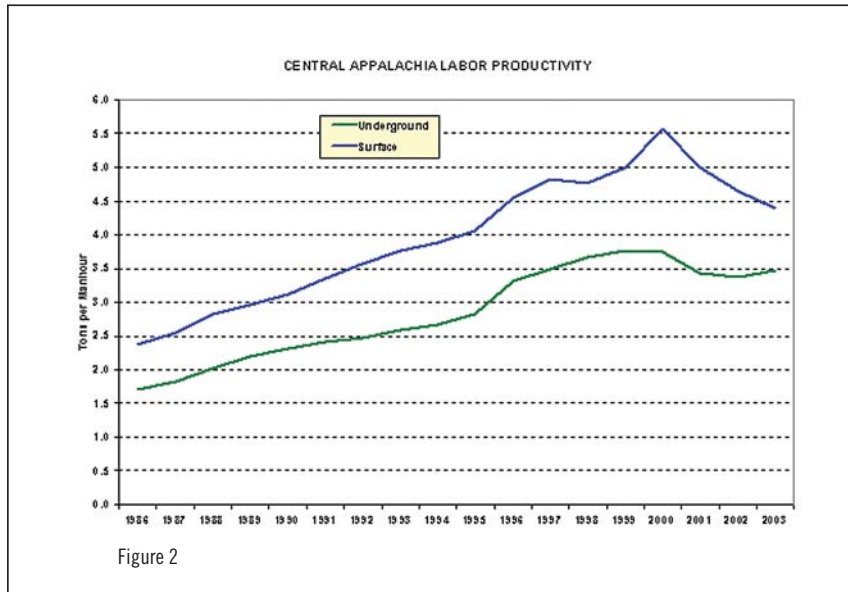


Figure 2

ownership change has generally reduced access to capital during periods of low prices and has made coal companies more cautious about investing additional capital.

The last major factor affecting productivity is the market. Higher prices allow less productive mines to operate while lower prices tend to force the less productive mines out of the market, causing productivity to rise. Because mines do not open and close on a short-term price movement, the impact of short-term price swings on productivity tends to be lagged in both directions.

Long-term productivity trends are the key to forecasting future prices. The tendency in every industry is to project the future based upon the past. Many industry participants continue to project productivity improvements, albeit at slower rates. While

this may be the case for some supply regions, productivity improvements in many supply regions are not a given.

Two regions of particular interest are Central Appalachia and the Gillette area of the Powder River Basin because they are the largest coal supply regions and the most interesting with respect to productivity.

Over time depletion will cause productivity in Central Appalachia to decline although the exact pace of the decline is somewhat difficult to predict as it is not simply a function of depletion but the overall supply/demand balance for this coal.

Typically, some rationalization of production occurs as demand declines with the highest cost mines, a.k.a. the mine with the lowest productivities, being closed first thereby allowing for the average decline to be moderated.

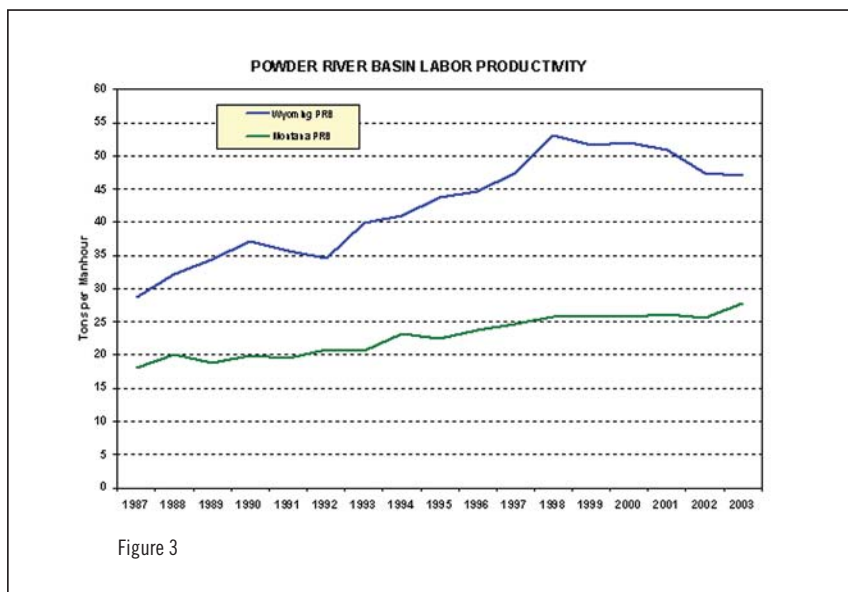


Figure 3

Because of the recent strength in demand for coals from Central Appalachia, the productivity decline is expected to be steeper as less rationalization occurs, existing mines are worked harder, and new, less economic areas are opened up. However, once the supply/demand balance is restored, productivity should then level off (or even increase) for a period followed ultimately with future declines.

The Gillette area of the Powder River Basin, unlike Central Appalachia, has extensive remaining reserves. Productivity in this area of the Powder River Basin peaked in 1998 after realizing significant improvements. In contrast, productivity of the Montana Powder River Basin mines has continued to improve (See Figure 3). Increasing ratios, the key to productivity in surface mining, are on the increase in the Gillette area. Also, haulage distances to the tipple are increasing over time as the active production areas move further away. Improvements in technology may or may not offset these dual challenges of higher ratios and increased haulage.

Declining productivity is not the only upward pressure on prices in the Powder River Basin. Producers are expected to require higher prices to justify the higher bonus payments associated with leasing federal coal.

Despite declining productivities in Central Appalachia and the Powder River Basin, national averages are likely to grow. The national average productivity numbers mask the regional changes because of the growth of the high productivity Powder River Basin mine. Ultimately, it is not national average productivities that determine coal prices.

Flat to declining productivities in the two largest coal supply regions do not bode well for consumers with respect to prices or producers with respect to costs. The dynamic in the market place that resulted from increasing productivities over much of the last two decades is also expected to change. Timing of procurements will become extremely important and sellers, rather than buyers, may be more interested in market price and/or cost-related reopeners.

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