

CAN MEASUREMENT ERROR EXPLAIN SLOW PRODUCTIVITY GROWTH IN CONSTRUCTION?

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Of all major industries, construction is the only one to have registered negative average labor productivity growth from 1987 (when the official statistics begin) to 2019. By contrast, aggregate productivity growth (specifically, for the entire nonfarm business sector) averaged 2 percent per year over the same period. This research examines the extent to which measurement error might explain why productivity growth in the construction sector has appeared so low.

Why Suspect Measurement Error?

Labor productivity is defined as the quantity of goods or services produced per unit of labor input. In the official measurement of construction sector output, nominal output for 22 different subsectors is divided by a subsector-specific price index that is designed to convert nominal output into real quantities. These deflators must accurately measure the price of producing each type of structure in each subsector. Otherwise, increases in nominal output could be incorrectly attributed to price increases rather than increases in the real quantity of structures produced, leading to a downward bias in output growth and therefore productivity growth.

There are good reasons to suspect that mismeasurement of the construction-sector deflators could be important. Structure quality has improved in a variety of ways that are difficult to measure, which would result in an upward bias in the structure price deflator, and therefore a downward bias in real output. For example, homes have become more energy efficient and often have higher-quality interior finishes, and these aspects of quality are not included in the deflator for new residential structures. Another possible source of measurement error is that the deflator for some nonresidential sectors is partly based on a price index for residential structures, which would result in bias if true productivity growth has been different for residential and nonresidential sectors.

Quantifying Measurement Error

We assess the contribution of changes in structure quality to measurement error using three different approaches: examining measures of structure quality that are not included in the official structure price deflators, creating an alternate structure price index based on detailed construction cost data that allow us to hold many additional features of a structure fixed, and applying an econometric technique developed to quantify the magnitude of omitted variable bias. The largest estimate from these three approaches suggests that the bias to productivity growth in the construction sector from 1987 to 2019 was no more than 0.5 percentage point per year.

We examine other potential sources of measurement error in the structure deflators and conclude that the bias imparted to construction productivity growth is also small. In total, we estimate that

* Any opinions and conclusions expressed herein are those of the authors and do not indicate concurrence with other members of the research staff of the Federal Reserve or the Board of Governors.

measurement error in the structure deflators has biased productivity growth downward by no more than 0.7 percentage point per year. Moreover, we suspect that measurement error in labor input cannot explain why construction productivity growth has been low because the largest source of measurement error is likely growth in the use of undocumented workers, and this unmeasured source of labor would cause productivity growth to be overestimated.

In sum, our estimates suggests that true productivity growth was around 0.2pp per year from 1987 to 2019, rather than falling by 0.5pp per year as published. While this difference is not inconsequential, we still conclude that construction productivity growth was quite low over this period, and still much lower than all of the other major industry categories.

Contributions to Bias in Aggregate Construction Sector Productivity Growth 1987-2019

	Percentage Points Annual Rate
Unobserved structure quality	0.50
SF price index not appropriate for nonresidential sectors	0.12
Other	0.08
Total bias	0.70
Published productivity growth	-0.50
Productivity growth adjusted for total bias	0.20

Implications

- Construction productivity growth was truly quite low from 1987 to 2019.
- Possible reasons for slow productivity growth that should be examined in further research:
 - An expansion of housing supply regulations could have increased delays throughout the construction process.
 - More construction could be taking place in areas that are already dense with existing structures, making construction more complicated than in the past and reducing the opportunities for builders to take advantage of returns to scale.
 - Construction is still quite labor intensive and may not have benefited from as many labor-saving innovations as many other industries.