

# Changes in the Cost Structure and Productivity of U.S. Tertiary Education

Takashi Yamashita  
US Bureau of Economic Analysis  
[takashi.yamashita@bea.gov](mailto:takashi.yamashita@bea.gov)

This paper decomposes instruction cost at colleges and universities in the United States for 2000 to 2015 and analyzes the changes in the cost structure and productivity of the higher education sector. Specifically, I decompose spending on instruction into the following terms:

$$\text{Spending on Instruction} = \text{No. of Students} \times \text{Credit Hours} \wedge \text{No. of Students} \wedge \text{No. of Instructional Staff} \wedge \text{Credit Hours} \wedge \text{Cost of Instruction} \wedge \text{No. of Instructional Staff}$$

This decomposition is interpreted as cost of producing instruction services is decomposed into the number of students (quantity), credit hours per student (demand intensity), faculty course load (service intensity) and cost of instruction per instructional staff (input cost). Taking logs and differencing,

$$\ln(\text{Spending}) = \ln(\text{Enrollment}) + \ln(\text{Student Credit Load}) - \ln(\text{Faculty Course Load}) + \ln(\text{cost per instructional staff})$$

i.e., changes in spending are the sum of enrollment (demand) changes, changes in demand and service intensity and changes in input cost. I use the Integrated Postsecondary Education Data System (IPEDS) from 2000 to 2015 to decompose the above changes in four types of institutions: doctoral research, master's only, bachelor's only, and two-year colleges.

Preliminary results indicate that increases in aggregate spending on instruction at post-secondary educational institutions are foremost driven by the increase in demand, particularly at bachelor's only and community colleges. Cost per instructional staff increases moderately and the productivity of educational services measured by credit hours taught per instructional staff stays flat or decreases depending on the institutional type. However, in every type of institution the share of total credit hours taught by full-time faculty members has decreased throughout the sample period, the trend most pronounced at doctoral research institutions. Increased reliance seems to contribute to moderate increases in input cost. Moderate increases in input cost and flat productivity growth imply that the recent rise in college tuitions stem from sources other than instruction cost and productivity declines, namely declines in state appropriations and subsidies and increases in spending on non-instructional activities.