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Worse than Baumol's disease: The implications of labor productivity, contracting out, and unionization on transit operation costs

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ABSTRACT

Unit costs measured as bus operating costs per vehicle mile have increased considerably above the inflation rate in recent decades in most transit agencies in the United States. This paper examines the impact of (lack of) productivity growth, union bargaining power, and contracting out on cost escalation. We draw from a 17-year (1997–2014) and a 415-bus transit agency panel with 5780 observations by type of operation (directly operated by the agency or contracted out). We have three main findings: first, the unit cost increase in the transit sector is far worse than what economic theory predicts for industries with low productivity growth. Second, contracting out tends to reduce unit costs, and the results suggest that the costs savings from private operations can be only partly explained by lower wages in the private sector. Interestingly, we find that the cost savings from contracting out are larger when the transit agency also directly operates part of the total transit service. However, while overall unit costs are lower in contracted services, cost growth in large private bus operators is no different than cost growth in large public transit operators. Third, unique transit labor laws that lead to union bargaining power are a likely driver of the unit cost growth above inflation. Overall, these factors reflect inherent characteristics of the bus transit sector, such as the nature of low productivity growth and union legislative power related to the need for public subsidy. They drive increases in both transit fares and public subsidy at rates higher than inflation, and play an important role in the deterioration of transit agencies' financial sustainability.

1. Introduction

The cost of bus transit operations has risen rapidly across the United States (U.S.). As a result, most transit agencies struggle to balance budgets, leading to increasing concern about financial sustainability and capacity to provide more frequent and reliable service to meet increasing demand. In spite of higher ridership and fares, operating deficits grow because of cost increase greater than inflation, so the transit agencies struggle to find additional government support, which motivates an analysis of the drivers of transit cost escalation.

In particular, we examine three characteristics and potential drivers of unit cost: (i) Baumol's cost disease, which describes the implications of the inherent nature of low productivity growth; (ii) labor unions, which often hold substantial bargaining power for transit workers relative to management and significant influence on legislative bodies; and (iii) public operations of bus transit service which are not often near the feasible production frontier, which leads to consider contracting out to private providers as a potential alternative to achieve moderation of cost growth and facilitate service expansion.

The U.S. transit sector has seen costs soar over recent decades. The total operating expenditure measured in constant dollars in bus and rail transit service in the country increased from $25 to $38 billion between 1997 and 2014, a 49% increase. Over this period, service levels measured as vehicle revenue miles increased by only 16% (data from the National Transit Database [NTD] and Bureau of Economic Analysis [BEA]). In the same period, the total cost of transit increased from 0.21% to 0.24% of the gross domestic product (GDP). While government expenditure in transit is not nearly as high as in other areas such as education or health care, transportation has always struggled to find political support for its funding needs in the past. This need for political support for increasing subsidies makes transit particularly sensitive to union legislative influence.

Bus operating costs have also rapidly increased with a per vehicle revenue mile (VRM) and per passenger mile traveled (PMT) basis, since neither service supply nor ridership have increased nearly at the same pace as costs. In nominal terms, aggregate cost per VRM for all U.S. transit agencies has increased at a compounded annual rate of 3.5% from 1997 through 2014, compared to an annual inflation rate of 2.3% over

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the same period. Total costs per PMT have also increased above inflation, at a rate of 3.2%.

The increasing costs of transit operations have been partly funded with higher fare revenue, as a result of fare hikes and growing ridership, while the remaining funding needs have been met with growing government subsidies. Average fare revenue per PMT has increased at an annual rate of 2.1% for bus service from 1997 through 2014, roughly on par with the inflation rate. However, the increase in fare revenue has not been nearly enough to cover total cost growth, and in order to balance budgets, governments have provided additional operating budget support, as the average subsidy per PMT grew at annual rates of roughly 4.0%. Overall, 65% of the escalation of operating expenditures between 1997 and 2014 was covered with additional government subsidy, and 35% was covered with additional fare revenue. While transit finance in the U.S. has deteriorated, Buehler and Pucher (2011), for example, show success in the German public transit sector, which has been able to reduce unit costs, increase productivity and cut subsidies through organizational restructuring and contracting out most new service.

Understanding the factors that contribute to the escalation of transit operating costs and, as a result, to the growing needs for government support is important to inform public transportation policies. First, Baumol's cost disease offers a partial explanation from a productivity growth perspective for the cost problems of the transit sector. The theory predicts that industries with low productivity growth due to limited technology adoption and high labor intensity, such as transit, have an inherent disadvantage with respect to the rest of the economy and, as a result, higher cost growth rates. Second, institutional factors in the U.S. transit industry can also explain the large unit cost increase during recent decades, such as potential inefficiencies associated with public sector service delivery and unique transit labor protection laws and regulations, both of which can result in higher wages and less efficient organization of production.

Apart from estimating the implications of these factors on the level of costs, we also seek to assess whether they also have an impact on cost growth. Can contracting out reduce unit cost escalation by encouraging more efficient practices and new technologies? Can modification of labor laws and regulation reduce transit cost growth rate?

This paper first presents a brief review of Baumol's cost disease and its application to transit, as well as the implications of contracting out and union political power on cost and efficiency. We then present the data and the econometric model used to assess the drivers of transit unit cost escalation. The following sections show the regression results, a discussion of the findings, and final remarks.

2. Literature review

As our first focus of analysis, Baumol's cost disease is a theory that observes that some industries are characterized as being technologically progressive, while other stagnant industries have low productivity growth over time. The latter industries usually have a small role for technology and are labor intensive. The original framework by Baumol and Bowen (1965) focused on the performing arts, showing that the unit cost of that industry must continually rise faster than the rate of inflation due to inherently low productivity growth.

In short, the theory claims that as wages increase in jobs with growing labor productivity, wages in jobs with stagnant productivity must also increase at the same pace, in order to continue to attract workers. As a result, wage growth rates are expected to equalize across industries, despite uneven growth rates in productivity. In the long term, unit costs in stagnant industries rise faster than productivity and, therefore, faster than costs in progressive industries. Baumol et al. (1985) and Baumol (1996) revisited the original paper, confirming not only the impact on performing arts, but also on other 'stagnant industries', such as healthcare and education.

Nordhaus (2008) finds compelling evidence that, over long periods of time, technologically stagnant industries have increasing unit costs and declining outputs with respect to the rest of the economy, while their wage growth is similar to progressive industries. The author relies on aggregate industry level data to analyze the impact of Baumol's cost disease, with findings that strongly support the hypothesis of a cost disease caused by low productivity growth.

Hartwig (2008), Colombier (2012), and Bates and Santerre (2013) proposed a novel method to assess Baumol's cost disease by estimating an econometric model with the differential between average wage growth and productivity growth –the so-called Baumol variable– as an independent variable and unit cost growth as a dependent variable. The authors applied this specification to healthcare data, concluding that the healthcare sector suffers from Baumol's cost disease. As Baumol's cost disease predicts, the higher differential between wage growth and productivity growth, the higher the unit cost increase, as in the following equation:

$$\Delta \ln(UnitCosts) = \lambda[\Delta\ln(Wages) - \Delta\ln(Productivity)] \quad (1)$$

A positive value for λ provides evidence of Baumol's cost disease. The explanatory variable in the right hand side of the model is called the Baumol variable. If λ is positive and the Baumol variable is also positive, this implies that the excess growth in wages over productivity drives the increase in unit costs.

A few authors have argued that Baumol's cost disease also affects the transit sector, such as Zureiqat (2007), Evangelinos et al. (2012), Gordon (2015), and Morales Sarriera and Salvucci (2016). The former explains that transit has limited potential for technological innovation, limited import substitutability (since operating labor must be hired locally), and is largely subsidized by the government, concluding that the implications of the disease also apply to transit. Gordon (2015) entertains the possibility that contracting out is a partial solution for Baumol's cost disease by bringing down the costs of providing service and permitting quicker response to opportunities for service expansion. Evangelinos et al (Gordon, 2015). relies on a quantitative approach, calculating an efficient frontier using empirical data for transit agencies in Germany and in the U.S., and observing total factor productivity growth. The authors provide evidence of low productivity growth in the transit sector, especially in bus operations.

Morales Sarriera and Salvucci (2016) performed an empirical analysis which found that labor productivity growth over the last two decades has been sluggish in the U.S. transit industry, close to zero for bus transit and lower than 1% per year for rail transit. Moreover, they found that the average compensation in the U.S. transit industry has been growing not only above the inflation rate, but also above the average compensation rate in the metropolitan areas in which they operate, outpacing the predicted rate of growth from a Baumol type analysis. The authors conclude that on top of the implications of Baumol's cost disease, other compounding factors must also affect cost escalation, such as institutional, political, or managerial factors.

With respect to these institutional factors, the potential to reduce costs and improve efficiency by contracting out has been the subject of a variety of papers. The findings are not uniform and, in general terms, indicate that the success of private delivery of transit must be determined on a case by case basis. McCullough et al. (1998) find that bus service operated under contract are often, but not always, less costly than directly operated service. The authors use a sample of U.S. transit agencies between 1989 and 1993, concluding that contracting should not be assumed as the appropriate strategy for every situation. More recently, Leland and Smirnova (2009) find that "neither the type of government nor whether an agency contracts out has much impact on the efficiency and performance of urban bus services", using a factor analysis of multiple criteria to determine eight efficiency and performance factors for U.S. transit agencies, however none of the factors analyzed are directly related to unit costs. Using a similar sample, Iseki (2010) performs a regression analysis and finds lower operating costs for partial and full-contracting agencies, which translates into savings of about 8% with