Border Region Commercial Electricity Demand

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Border region electric utilities face unique circumstances in attempting to assess overall business and load demand conditions. These result from the many business cycle conditions facing these entities as a consequence of operating near international political boundaries. Can international economic fluctuations be systematically incorporated into electricity demand models? Along the U.S.-Mexico border, this problem is further complicated by economic interactions between an advanced economy and a developing country where data constraints exist at the regional level of disaggregation. Transfer function autoregressive moving average analysis is utilized to examine whether commercial electricity sales in El Paso, Texas respond to the national and metropolitan business cycles affecting economic performance in Ciudad Juárez, Chihuahua. Together, these cities form one of the largest international metropolitan areas in the world. This provides a logical starting point when considering the questions raised in this paper. (JEL R15)

Introduction

As long noted by area business managers, public administrators, and academic researchers, the international border regions between Texas and Mexico follow very different business cycles than do either of the national macroeconomies with which El Paso and Ciudad Juárez are associated. Additionally, border economic conditions on both sides of the Rio Grande are impacted by what happens in the respective regional economies on the opposite side of the river. The effects are pervasive and can cause especially noticeable impacts on commercial retail activities. Although business and policy analysts have long been aware of the complicated factors that cause this international metropolis to follow unique expansion paths, it is difficult to model such an economy. This paper will address this impact within the context of commercial electricity demand in El Paso.

Over time, two basic modeling approaches have proven useful in the analysis of international, national, regional, and metropolitan business cycles. They include large-scale systems of equations, econometric models, and small-scale time series statistical models. For commercial electricity demand, these approaches represent relatively...
uncharted domains because very few modeling efforts have ever been conducted for cross-border regions involving an advanced economy and a developing economy. Consequently, this paper represents an exploratory effort to develop monthly commercial electric energy demand models incorporating variables that reflect overall business conditions in Ciudad Juárez. This is of interest because border region public utilities are faced with the unique problem of having electric companies that operate in service areas located near international boundaries.

This paper is prepared as follows. The next section provides a short review of relevant literature. The third section contains a brief discussion of the general methodologies to be employed, and the fourth section summarizes the empirical analysis. Conclusions and suggestions for future research comprise the final segment.

Related Literature

El Paso Electric is a public utility corporation engaged in the generation, transmission, and distribution of electricity for a 10,000 square-mile service area covering southern New Mexico and western Texas. Wholesale customers are served in California, Mexico, New Mexico, and Texas. More than half of its 270,000 residential, commercial, and industrial retail customers are located in El Paso, Texas, a metropolitan area of nearly 700,000 residents and located directly on the international border between Mexico and the U.S. (for additional details, see El Paso Electric Co., [1997]).

Because so much of its retail electricity is distributed in an international, metropolitan market, El Paso Electric faces a unique set of factors that set it apart from other public utilities in the U.S. Namely, border area electric power demand is affected by regional business cycle fluctuations on both sides of the Rio Grande. This problem is especially apparent concerning commercial electricity sales in El Paso since a large percentage of retail sales activity in this important Texas city accrue to citizens from across the border. Therefore, two basic questions arise. Do business and economic fluctuations in northern Mexico affect commercial electricity sales in El Paso? If so, are these impacts systematic enough to be captured within the standard, modeling framework already utilized to forecast budget-year load demands by El Paso Electric?

The system of equations approach to modeling, forecasting, and policy analysis for regional and national economies can be traced back to 1936 [Dhane and Barten, 1989]. Its overall design flexibility has made it an invaluable tool for corporate planning and public policy analysis. In the U.S., these methods have been extensively applied to both regional and metropolitan economies during the past quarter century using quarterly and annual data [Bolton, 1985]. This is especially true in Texas where the comptroller of public accounts maintains an extensive modeling system for the state, its 27 metropolitan areas, and its 254 individual counties [Plaut et al., 1996]. El Paso Electric also utilizes this approach as part of its service area modeling research efforts [Jordan, 1996]. This methodology has built an impressive track record with respect to the study of economies in Latin America [Fullerton, 1992]. Some sector-specific models have even been