

## MODELING GEOGRAPHIC FERROUS SCRAP MARKETS: REGIONAL PRICES AND INTERREGIONAL TRANSACTIONS IN THE UNITED STATES\*

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**ABSTRACT.** The *U.S. Regional Ferrous Scrap Model* analyzes spatial variations in prices for two grades of ferrous scrap using a logistic model of choice under differentiated products. The model uses a computer-generated equilibrium framework to solve for prices that support the observed spatial distribution of supply and demand quantities. This paper presents the model's formal structure and its solution algorithm. The model specification is highly disaggregated with 1,212 supply and 240 demand regions. Characteristics of the equilibrium solution are described for prices and interregional flows. Sensitivity of equilibrium values to changes in model parameters is reported.

### 1. INTRODUCTION

When Joseph Schumpeter coined the phrase “Creative Destruction” he used U.S. Steel as an example of a company on the cutting edge of competition (Schumpeter, 1950, p. 83). At that time, U.S. Steel was revitalizing the market from within by beating old-line manufacturers. U.S. Steel remains a competitive firm in a competitive market, but now U.S. Steel is one of a number of firms being challenged by new competitors. Intra-industry competition in the steel industry today is a clash of two technologies, one based on the reduction of iron ore and its transformation into steel and the other based on the direct melting of ferrous scrap. U.S. Steel is still one of the leading ore-based producers; the domestic challengers depend on ferrous scrap.

The geography of ferrous scrap markets, as defined by interregional scrap flows and the spatial distribution of prices, is central to the geography of competition in steel markets. The economic model presented here characterizes regional markets for ferrous scrap in great detail: its equilibrium is defined by a set of prices that balances interregional flows of ferrous scrap among 1,212 supply regions and 240 demand regions, which encompass the continental United States. The model

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