

# PROJECTING RECOVERED PAPER SUPPLY IN THE UNITED STATES

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**ABSTRACT.** The use of recovered paper has an influence on the amount of timber harvested as well as the feasibility of expanded recycling programs. During the 1990's markets and prices for recovered materials have fluctuated widely. There are a number of factors driving these market changes including economic conditions domestically and internationally. The objective of this study was to develop recovered paper supply functions for the five principal grades of recovered paper by focusing on the effects of the spot and contract markets in establishing domestic prices for recovered paper. Two supply functions were estimated for each grade in each of three U.S. supply regions - North, South, and West. For these three United States supply regions, recovered paper supply consists of two elements namely, "long-term contract" and "spot market" supply which are estimated with two separate equations. The results of these estimations were incorporated into the North American Pulp and Paper Model (NAPAP).

**KEY WORDS.** Recovered Paper, spot, contract, hypothesis, supply.

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## INTRODUCTION

Since the mid-1980s, there has been a significant and continuous increase in paper recycling rates in the United States. The increase in paper recycling is largely a response by the paper industry to increased supplies of paper being recovered for recycling, and the response has entailed billions of dollars of investment in new recycling facilities at paper and paperboard mills. In tonnage, more paper and paperboard is now recycled in the U.S. economy than all other recycled materials combined (metals, glass, etc). The historical increase in paper recycling contributed to a slower growth in pulpwood harvest during that 1990s. Modeling trends in U.S. paper recycling and pulpwood markets requires estimates of supply functions for recovered paper. For our purposes, the North American Pulp and Paper Model (NAPAP Model) is used to simulate long run capital investment behavior (Zhang et al. 1996). The purpose of this paper is to explain the development and use of recovered paper supply equations in the NAPAP model.

## BACKGROUND AND THEORETICAL DEVELOPMENT

During the mid-1990s recovered paper prices became highly volatile, increasing significantly following the prolonged period of depressed prices in the "market glut" of the early 1990s, and then abruptly falling to low levels again after peaking in 1995. Our earlier studies had documented and explained that the market glut of the early 1990s was a result of substantial increases in domestic recovery of paper for recycling, and that the market glut would be superceded by a period of higher prices for recovered paper commodities as demand and utilization increased and recovery limits were approached (Ince 1994).

The hypothesis we developed was that supply consisted of two elements, long-term contractual supply and short-term spot market supply. According to this hypothesis, the regional supply of each recovered paper commodity can be divided into two elements, one element governed by

long-term contracts with future supplies negotiated at “forward” prices and the other element governed by short term agreements for immediate delivery at “spot” prices. We found that this theory was also corroborated somewhat by anecdotal information from industry contacts who reported to us that transactions for recovered paper supply were in fact generally negotiated under either long term contracts or on a spot market basis.

#### METHODS

Supply curves for ONP, OCC, Mixed Office paper, High Grade Deinking, and Pulp Substitutes were constructed for the U.S. North, South and West by adding together two separate equations in each case, one for long-term or contract supply and one for short term or spot market supply.

The long term contract supply equation was estimated for each recovered grade in each region as a linear combination of the amounts of domestic consumption for those selected “parent” grades of paper from which the category of recovered paper is derived. For each region the percentage of a given “parent” paper grade’s consumption that is recycled into each recycled grade is projected using a modified Perl curve (Martino, 1983).

#### RESULTS

Using our hypothesis that the market for recovered paper consists of long term contract supply and short term spot market supply we constructed equations and used them in the NAPAP model to make 50 year projections of supply amounts and prices for 5 recovered paper grades in three U.S. regions.

To a limited degree our equations explain the rise and fall of recovered paper prices in the mid 1990’s. The equations perform better in tracking the price rise in the late 1990’s. The fact that our equations do not track the high price spike in 1995 may indicate amounts in the spot market may be smaller than the export amount.

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**P R O C E E D I N G S**  
**SOCIETY OF AMERICAN FORESTERS**  
**2000 NATIONAL CONVENTION**

Washington, DC • November 16-20, 2000