Output Losses Due to Strikes: The Case of Sawmills in British Columbia

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Abstract: The effects of five major strikes in British Columbia sawmills in the period 1959 to 1974 on production, shipments and inventories of sawn lumber are analyzed using intervention analysis. The primary aim was to estimate the extent to which output losses during the time a strike is in progress are offset by greater production before and/or after the strike. The results indicate prestrike effects offset about 30 per cent of the gross loss, with no significant post-strike effect.

The literature on the economic impacts of strikes generally makes reference to the possibility that production may be higher than otherwise before and/or after a strike, partially offsetting the costs of the strike to the employer(s) involved, the workers involved, and society more broadly. For example, Mitchell [p. 39] notes:

"For reasons well known to industrial relations specialists, simple tabulations of wages not paid or sales not made during a dispute are likely to overstate the costs. Workers may work overtime before or after a strike to make up for lost production, firms may sell out of inventory, sales may be diverted to nonstruck suppliers, etc."

Despite the importance, e.g. for public policy ending strikes by ad hoc legislation, of measuring these offsets to production losses and understanding their determinants, few studies dealing with the phenomenon empirically are available in the literature. The purpose of this note is to present a simple approach to measuring these offsets to production losses, illustrated by an application to sawn lumber production in British Columbia.

This industrial sector was chosen for two reasons: (i) sufficiently long time series of consistent monthly data are available separately for production, shipments, and inventories held by producers to justify of the proposed technique, and (ii) there have been a number of long (several weeks) large scale strikes in this industry, with reason-
ably clearly identifiable starting and ending dates. Additionally, the output data are available in physical units (board feet of lumber), eliminating potential valuation problems.

The technique used is intervention analysis. A Box-Jenkins time series model is fitted to provide the counterfactual forecasts under the assumption no strike took place, and separate dummy variables are inserted for the pre strike, strike and post strike periods. Since the appropriate length of the pre strike and post strike periods is unknown, periods of 1, 2 and 3 months are investigated.

Five major strikes were considered: July 6 through September 14, 1959; September 19, 1967 through January 10, 1968; June 22 through July 17, 1972; June 15 through July 15, 1974; and July 2 through August 24, 1981; all dates inclusive. The data utilized cover the 23 years 1959 to 1981, inclusive. All dummy variables are prorated for portions of a month. For example, the strike dummy for June, 1974 has a value of 0.50. Considering a two-month pre strike period, the pre strike dummy would have values of 0.50, unity and 0.50 in April, May and June 1974, respectively.

For all three series analyzed, results were improved by transforming the data to logarithms. Stationarity was obtained by taking the first difference of the first seasonal difference. Acceptable models for the production and shipments series were obtained by estimating moving average coefficients at lags 1, 2, 4 and 12. For the inventory series, moving average terms at lags 1 and 12 were sufficient.

The estimation results are shown in Table 1. Discussion of the magnitudes implied by the coefficients of the intervention dummies will be couched in terms of percentage changes per month, calculated using the formula: 
\[ g = \exp (c - 1/2 \sqrt{V(c)}) - 1, \]
where \( g \) is the percentage change, \( c \) is the estimated coefficient from Table 1, and \( V(c) \) is the estimated variance of that coefficient.

Since no significant coefficients for the 1 or 2 month post strike intervention dummies were found, we did not investigate longer post strike periods. No significant pre strike dummies were found for the production series, but PRE2 has a substantial \( t \) value. Significant pre strike effects were found for both shipments and finished goods inventories held by producers, and significant strike effects obtain for all three series.

The negative strike effects for production and shipments are of approximately the same magnitude, approximately a 60 per cent reduction per month of strike. Inventories were run down about 6 per cent in the month or so prior to the strike, remaining that amount below normal during the strike. This is consistent with the finding that shipments increased more than production in the pre strike period. For example, using the results for PRE2, shipments increased by 12.6 per cent per month, while production increased by only 7.9 per cent. The positive coefficients for the post

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4) The information on strikes is from Canada, Department of Labour, Strikes and Lockouts in Canada, and British Columbia, Department of Labour, Annual Report and Labour Research Bulletin.

5) See Box/Janos.

6) See Box/Jenkins.

7) See Kennedy.