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Measuring the Efficiency product output: An Application to Food Industry in Canada

Vahid Omidvar

Agricultural Economics Department, University of Nebraska-Lincoln
03A FYH, University of Nebraska-Lincoln (UNL), Agricultural Econ.
Lincoln, NE 68583-0922 USA

604-468-2039

omidvarvahid@gmail.com

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Objective:

- Obtain a reliable and up-to-date measure of performance
- Investigate the efficiency and the productivity of food processing
- Use two different Methodology
 - Input Distance Function
 - Translog production Function

Method

The input distance function is:

$$(1) \ln D_{It} = \alpha_0 + \alpha_i \ln y_i + \frac{1}{2} \alpha_{ii} \ln y_i \ln y_i + \sum_k \beta_k \ln X_{mi} + \frac{1}{2} \sum_m \sum_k \beta_{ki} \ln X_{ki} \ln X_{mi} + \sum_m \sum_k \delta_m \ln X_{mi} \ln y_i + \lambda_t t + \frac{1}{2} \lambda_{tt} t^2 + \sum_k \lambda_k \ln X_{ki} t + \sum_m \lambda_m \ln y_i t + v_{it} - u_{it}$$

Production Function without time trend:

$$(2) \ln Y_{it} = \alpha_0 + \sum_k \alpha_k \ln X_{mi} + \frac{1}{2} \sum_m \sum_k \beta_{ki} \ln X_{ki} \ln X_{mi} + \delta_t t + \frac{1}{2} \delta_{tt} t^2 + \sum_k \lambda_k \ln X_{ki} t + v_{it} - u_{it}$$

Data and Variable:

Statistic Canada's website

Provinces in this study are: Quebec, Ontario, Alberta and British Columbia

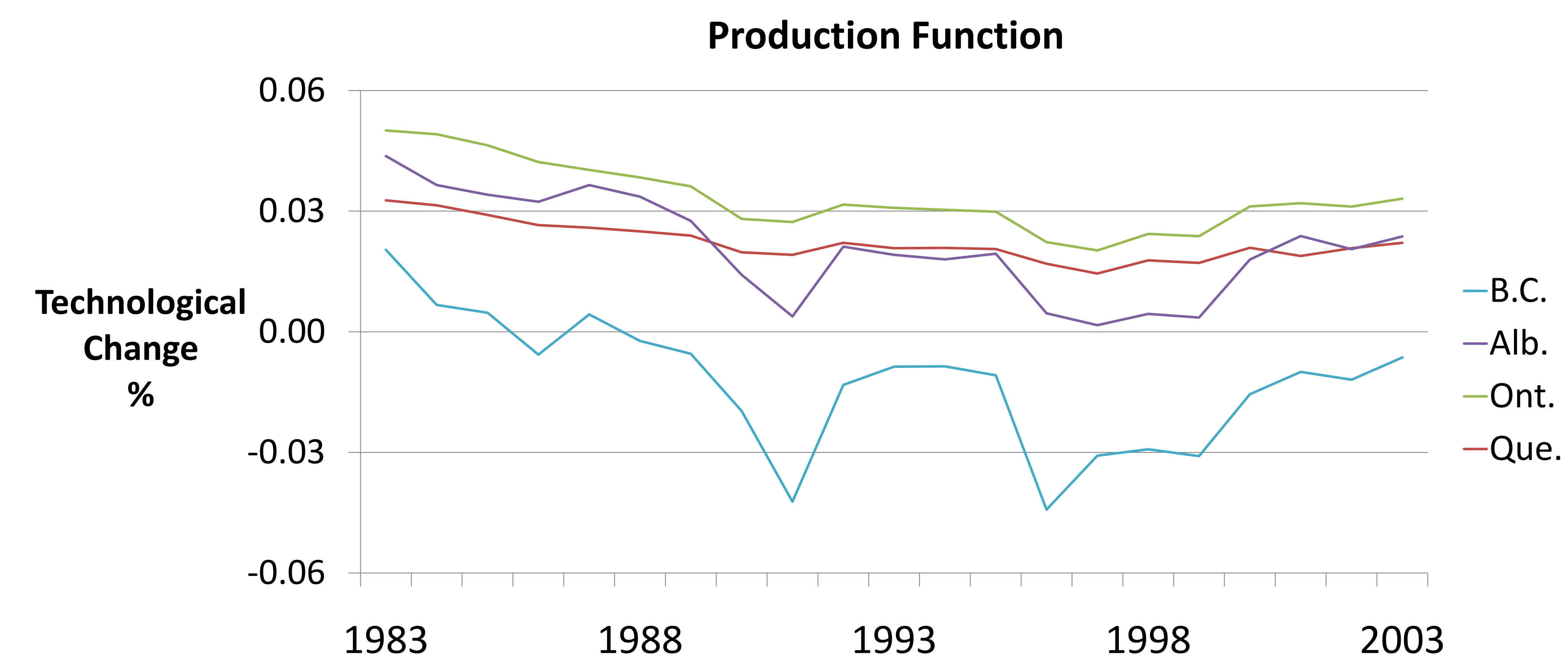
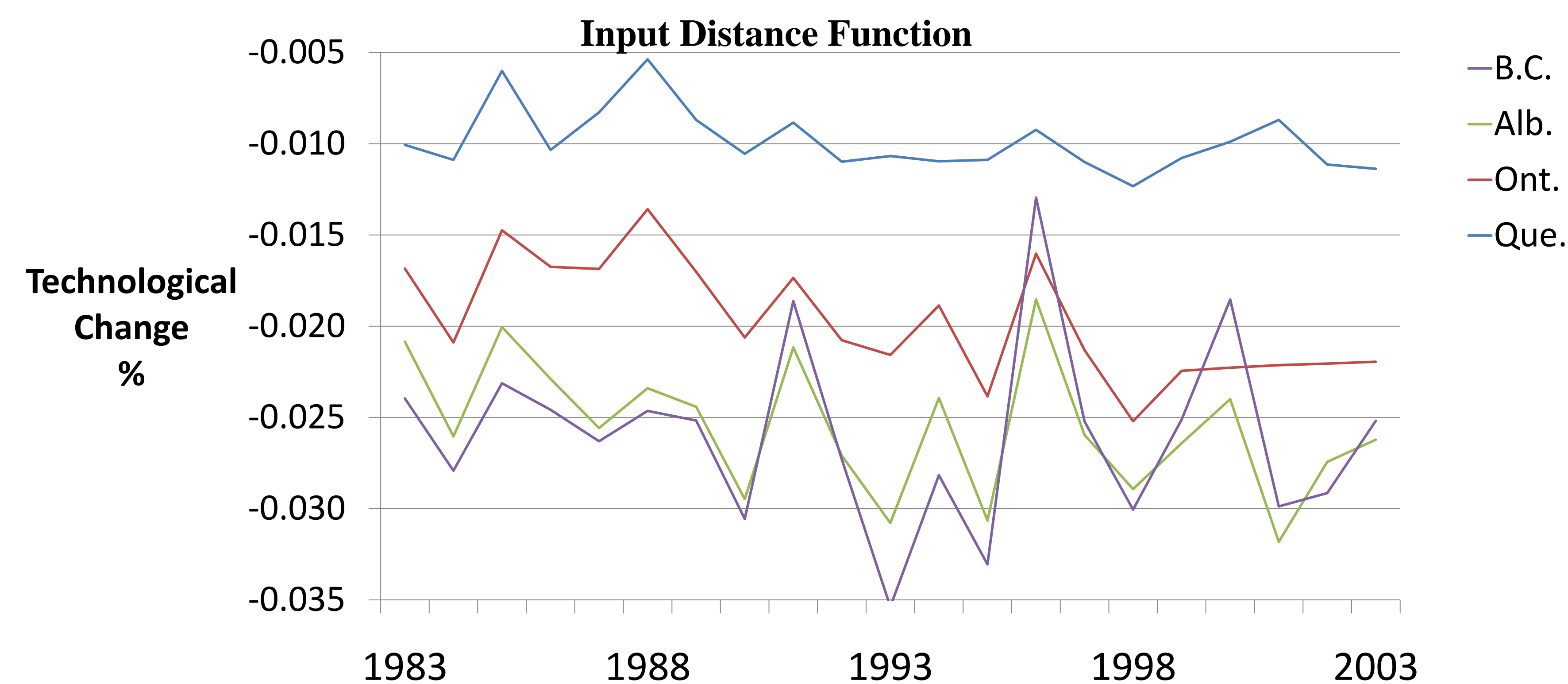
The data are from 1983-2003.

X variables

- Production Workers
- Investment
 - Building and Engineering
 - Equipment and machinery
- Input
 - Energy
 - Materials

Y variable
Output

Result



Results

Change in Productivity (U_{it}) 1983-2003

Year	Que.		Ont.		Alb.		B.C.	
	Input	Prod	Input	Prod	Input	Prod	Input	Prod
Mean	0.024	0.0872	0.147	0.0856	0.234	0.0901	0.291	0.0873

Malmquist index 1983-2003

Mean	Que.		Ont.		Alb.		B.C.	
	Input	Prod	Input	Prod	Input	Prod	Input	Prod
	1.336	0.891	1.375	0.873	1.462	0.865	1.462	0.874

Conclusion

- All provinces are :
 - Almost efficient using production Function method
 - Not efficient using input distance function
- Malmquist indexes are
 - Production Function method denotes regress or deterioration in performance
 - Input Distance Function indicates improvements in the relevant performance
- Technological Changes
 - Same trends
 - Decreasing under both functions