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## Productivity and Ownership Changes in the Supermarket Industry

2009 Agricultural \& Applied Economics Association Summer Meeting Selected Paper
Wonho Chung (chun0058@umn.edu) and Clarissa Yeap Department of Applied Economics, University of Minnesota, St. Paul, Minnesota 55108

## Introduction

The increasing degree of competition satisfying variou acquisition ( $\mathrm{M} \& A$ ) activities in the supermarket industry in more recent years. From an economic point of view, whether tore-level ownership changes by M\&A are desirable depend (represented by store-level productivity).
Compared to various studies of this relationship in the manufacturing sector, however, little research has been done to understand the relationship in the service sector, including the upermarket industry. Many studies on the manufacturing ctor showed that plants with lower productivity are mot productivity improvement after that change (McGuckin and guyen, 1995). This study addresses the relationship between
U.S. Supermarket industry

- 35,000 supermarket stores.
onal chains and

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Group size 1 1 store 
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Annual sales volume of S 650 billion (5\% of GDP).
Gross margin $28.6 \%$, Net income before tax $1.8 \%$.

## Theoretical Motivation

Job Matching Model (Jovanovic, 1979)
Low level of productivity due to poor match induces a hig
probability of job separation.
Eaction of his job tenure.
fur mis job tenre distribution) is higher, given that the first match was low.

## Main Hypotheses

are more likely to be cquired or closed than those with higher productivity
-Stores that changed ownership experience productivity mprovement after that change compared to other unchanged

## Data

2002 and 2007 store-level data from the Supermarket Panel conducted by the Food Industry Center at the U of Minnesot -The Supermarket Panel is an annual survey of supermarkets
since 2000 where store managers provide information on store characteristics, operations, and performance.


Performance Measurement
Labor Productivity (LP) $=Q_{i} / L$
Multi-factor Productivity $(\mathbf{M F P})=A_{i}=\mathrm{O} /\left(\mathrm{L}^{\beta_{1}} \times \mathrm{K}^{\beta_{2}}\right)$
where $\mathbf{Q}_{\mathbf{i}}$ : weekly sales for store $i$
$\mathbf{K}_{\mathbf{i}}$ : store selling area for store
$\mathbf{A}_{i}$ : Hicks-neutral measure of technical change
-Technical Efficiency (TE)
$\begin{aligned} \mathrm{IQ}_{2} & =\beta_{0}+\beta_{1} \ln L_{i}+\beta_{2} \ln K_{i}+\mathrm{v}_{\mathrm{i}}-\mathrm{u}_{i} \quad \text { or } \\ \mathrm{Q}_{\mathrm{i}} & =\exp \left(\beta_{0}+\beta_{1} \ln L_{i}+\beta_{2} \ln \mathrm{~K}_{\mathrm{i}}+\mathrm{v}_{\mathrm{i}}-u_{i}\right)\end{aligned}$
$\mathrm{TE}_{\mathrm{i}}=\frac{\exp \left(\beta_{0}+\beta_{1} \ln L_{i}+\beta_{2} \ln K_{i}+v_{i}-u_{i}\right)}{\exp \left(\beta_{0}+\beta_{1} \ln L_{i}+\beta_{2} \ln K_{i}+v_{j}\right)}=\exp \left(-u_{i}\right)$
where $v_{i}$ : random error with $E\left(v_{i}\right)=0, E\left(v_{i}^{2}\right)=\sigma_{v}^{2}$, and
$E\left(v_{i} \mathrm{y}_{\mathrm{j}}\right)=0$ for all $i \neq$.
$\mathbf{u}_{\mathbf{i}}$ : non-negative random variable associated with technical inefficiency with $E\left(v_{i}^{2}{ }^{2}\right)=\sigma_{v}^{2}$ and
$E\left(v_{y_{v}}\right)=0$ for all $i \neq j$.

Empirical Model

- Multinomial Probit/Logit Regression (To test the first
hypothesis)

where $\mathrm{OC0207}$, dummy variable with 1 if the store $i$ changed ownership, 2 if the store closed, and 0 if the
tore has been unchanged during 2002-07 store has been unchanged during 2002-07
LPO2 $2_{1}$ : labor productivity of the store $i$ in 2002
THour02 $2_{i}$ : total labor hours of the store $i$ in 2002
GSize $22_{i}$ : ownership group size of the store $i$ in 2002
Age02 $2_{\text {i }}$ : years since the current owner acquired
Format02: : dummy variable with 1 if the store $i$ 's
format is warehouse, super warehouse, or supercenter
format is wat
and 0 if not

located in SMSA and 0 if no
$\varepsilon_{i}$ : normally distributed error term
th Rate of Productivity (To test the second hypothesis)
$\left\{\left(\mathrm{LPO} 7_{\mathrm{i}}-\mathrm{LPO} 2_{\mathrm{i}} / 0.5\left(\mathrm{LP} 07_{\mathrm{i}}+\mathrm{LPO} 2_{i}\right)\right\}=\mathrm{b}_{\mathrm{o}}+\mathrm{b}_{\mathrm{i}} \mathrm{OCO207} \mathrm{i}_{\mathrm{i}}+\right.$

where SDist Ch0207, : dummy variable with 1 if the store changed from wholesaler supplied to self-distributed -1 if changed from self-distributed to wholesaler supplied, and 0 if no change between 2002 and 2007 Remodelo207i : dummy variable with 1 if the store

Estimation Results

| OC2207 | All Stores |  | Stores with Larger |  | Stores with SmallerSelling Area |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1 | 2 | 1 | 2 | 1 | 2 |
| LP02 | -3.083 | -13.766" | -2.611 | -13.373 | -4.076 | $-16.041^{-}$ |
| тHour02 | -3.319** | -9.332* | -2.369 | -1.433 | -6.368 | 30.26 |
| GSize02 | 7.242" | 10.500 | $7.21{ }^{\circ}$ | 9.532** | 6.349 | 443. |
| Age02 | -2.212" | -0.288 | -5.054" | -3.001 | -1.989 | 0.172 |
| Format02 | -1.295 | $1.926{ }^{\text {". }}$ | -1.235 | $1.602^{\prime \prime}$ |  |  |
| SMSA02 | 2.560 | -2.114 | -6.596 | -9.613 | 9.925" | - |
| Interept | -0.841 | $0.993{ }^{\circ}$ | -0.102 | -0.203 | -0.982 | 2.56 |
| "Significant at $10 \%$ level, "Significant at $5 \%$ level, "'Significant at $1 \%$ level |  |  |  |  |  |  |
| Table 4. Multinomial Logit Regression Results (base: $\mathbf{O C 0 2 0 7}=\mathbf{0}$ ) |  |  |  |  |  |  |
| OC2207 | Group Siz |  |  | Stores in Smaller Group Size |  |  |
|  |  |  | 2 |  |  | 2 |
| LP02 | 2.8 |  | 2.433 | -9.945 |  | -19.306** |
| THour02 | -4.73 |  | ${ }^{-3.715^{*}}$ | -1.302 |  | -27.026"* |
| GSize02 | ${ }^{6.5}$ |  | ${ }^{8.246 *}$ | 7.93 |  | . 070 |
| Age2 | 0.3 |  | -1.349 | -2.990 ${ }^{\circ}$ |  | -0.031 |
| Format02 | -393 |  | $1.470^{-1}$ | 34.261 |  | 7.626 |
| SMSA02 | -0.3 |  | ${ }^{-1.0888}$ | 6.873 |  | 2.333 |
| Intercept | -1.0 |  | 0.582 | -0.734 |  | 2.582"* |


|  | LP |
| :---: | :---: | :---: | :---: |
| Growth Rate |  | | MFP |
| :---: |
| Growth Rate |$\quad$| TE |
| :---: |
| Growth Rate |

Summary and Future Research

- Stores with lower nreductvity are not more likely to be acquired but more likely to be closed.
- Stores with lower initial productivity that changed to self distribution system experienced productivity growth, but ownership change itself did not improve productivity.
- Wider time span with more store observations for the panel
data will be helpful to generate statistically significant results. -Supply chain-level or company-level efficiency will be considered as a potential factor for ownership changes for

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