CONSUMER BOYCOTTS AND FARM LABOR WELFARE:
A MULTI-LEVEL MARKET ANALYSIS

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Selected Paper prepared for presentation at the American Agricultural Economics Association
Annual Meeting, Long Beach, California, July 23-26, 2006

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Introduction

We examine the recent boycott activity against Taco Bell initiated by the Coalition of Immokalee Workers (CIW) in Florida. The purpose of the boycott was to increase wages for harvest workers. Taco Bell eventually reached an agreement with the CIW to pay workers an additional penny per pound for tomatoes being sold to Taco Bell. Since that agreement, the CIW is now negotiating with other fast-food buyers of tomatoes with the intent of establishing additional agreements with increased wages.

Boycotts were conducted against California wine grapes and table grapes in the 1960s. By targeting sensitive branded products, labor contracts were concluded with a number of wineries. Wyeth’s analysis of the table grape boycott by contrast suggested there was little effect on overall consumption. Buyers used the boycott to extract a lower price from the growers, leading some larger growers to sign labor contracts, although they were not long-lived. Carter, et al. conclude that the 1979 strike against California lettuce growers resulted in increased rather than reduced profits for the industry given the characteristics of the product and labor markets.

A unique characteristic of the Taco Bell agreement is that it is between the retail firm (Taco Bell) and harvest labor. The final product is readily identifiable by the consumer, while the tomatoes going into the final product are not be readily identifiable. Consequently, a boycott is likely to be much more successful. Although growers are the employers of the labor, the bargaining was between the buyer of their product and the labor group.

The questions addressed in this paper are related to the economics of the recent boycott strategies and the possible impacts of the agreements on labor and the industry. Gardner’s
approach to analyzing multi-level markets is used to address the linkage between Taco Bell, growers, and labor. Since the labor market becomes segmented into labor in the agreement and labor outside the agreement, we utilize Welch’s technique for dealing with segmented markets.

**Methodology**

Gardner’s multi-level market model is commonly used to measure effects resulting either from an exogenous shock to one level of the industry, or from shocks due to policy changes. Analogous to a public policy instrument, the wage supplement introduced an exogenous shock to the system. Consumer boycotts affect consumers’ preference toward the products sold by the targeting firm, the effect on sales and profits of the targeted firm will depend on the information content consumers receive and their value toward it.\(^1\) A decision of agreement between the boycott organizers and the targeted firm is assumed to be based on rational behavior, in which both agents are optimizing. The distortions caused by a boycott and an agreement to terminate a boycott are analyzed using Gardner’s multi-level market model assuming both measures are exogenous shocks to the system.

**Model**

The first assumption of the model is that the industries at the retail and farm levels are competitive and optimizing agents. Also, both levels of production are characterized by only two inputs and one output. At the retail level the output is represented by \((y (tacos))\) and the two inputs are the farm product in question \((X (tomatoes))\) and an aggregate of the rest of the inputs \((c)\). At the grower level, the output is the retailer input in question \((X (tomatoes))\), and the two inputs are labor \((L)\) and the remaining inputs aggregated together as \((b)\). The final assumption is that the representation of technology or the production function of both industries is such that

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\(^1\) For more on the information role in consumer boycotts see, Robert Innes (2006).
there exists a unique least-cost technology to produce, implying linear homogeneity. The retail and farm level agents are assumed to maximize their respective profit functions:

\[(1.0) \text{Max. } \pi_R = P_y Y - P_x X - P_c c + \lambda_R [Y - f(X,c)]\]

\[(2.0) \text{Max. } \pi_F = P_x X - P_L L - P_b b + \lambda_F [X - \varphi(L,b)]\]

In the retail level maximization problem (1.0), \(P_c, P_x,\) and \(P_y,\) are the prices of the inputs \(c\) and \(X,\) and the output \(Y.\) In the farm level maximization problem (2.0), \(P_L, P_b,\) and \(P_X\) are the prices of inputs \(L\) and \(b,\) and output \(X\) (used as an input at the retail level). The parameters \(\lambda_i\) are the Lagrange multipliers for the constraints associated with well-behaved production functions at both levels, \(f(X,c)\) and \(\varphi(L,b).\)

The boycott against Taco Bell is represented by the introduction of \(P_y B\) in the profit maximization equation as in (1a):

\[(1.a) \text{Max. } \pi_R = P_y Y - P_y B - P_x X - P_c c + \lambda_R [Y - f(X,c)]\]

The \(B\) in the 1.a profit maximization problem represents the final product boycott quantities. The first order conditions are totally differentiated and converted to percentage changes to determine the effect of the exogenous variable, \(B,\) on the endogenous variables in the system. The following is the system of equations derived from the profit maximizing first order conditions (FOC).

\[
\begin{align*}
(1.1) & \quad y = f(x,c) & (2.1) & \quad X = \varphi(L,b) \\
(1.2) & \quad P_x = f_x P_y & (2.2) & \quad P_L = \varphi_L P_x \\
(1.3) & \quad P_c = f_c P_y & (2.3) & \quad P_b = \varphi_b P_x \\
(1.4) & \quad c = g(P_c) & (2.4) & \quad L = h(P_L) \\
(1.5) & \quad y = D(P_y) - B & (2.5) & \quad b = i(P_b)
\end{align*}
\]
Equations 1.1 to 1.5 correspond to the retail level profit maximization FOC and equations 2.1 to 2.5 correspond to the grower level. These ten equations are totally differentiated and converted to percentage changes. The resulting percentage change equations represent percentage change \((E\bullet)\) in the quantities and prices of the \(j^\text{th}\) output and \(i^\text{th}\) inputs for both levels \((Y, X, c, L, b, P_y, P_x, P_c, P_L,\) and \(P_b\)), and are the endogenous variables of the system. Dividing these equations by the percentage change in the exogenous boycott quantity and defining \(EB=dB/Y\), we obtain the following ten simultaneous equations:

\[
\begin{align*}
1.6 & \quad \frac{E_y}{EB} = K_x \frac{E_x}{EB} + K_c \frac{E_c}{EB} \\
1.7 & \quad \frac{EP_x}{EB} = -K_c \frac{E_x}{EB} + \frac{K_c E_c}{EB} + \frac{EP_y}{EB} \\
1.8 & \quad \frac{EP_c}{EB} = \frac{K_c \sigma_y}{EB} - \frac{K_c E_c}{EB} + \frac{EP_y}{EB} \\
1.9 & \quad \frac{E_c}{EB} = e_c \frac{EP_c}{EB} \\
1.10 & \quad \frac{E_y}{EB} = \eta \frac{EP_y}{EB} - \frac{EB}{EB}
\end{align*}
\]

\[
\begin{align*}
2.6 & \quad \frac{E_x}{EB} = K_L \frac{EL}{EB} + K_b \frac{Eb}{EB} \\
2.7 & \quad \frac{EP_L}{EB} = -\frac{K_h EL}{EB} + \frac{K_h Eb}{EB} + \frac{EP_x}{EB} \\
2.8 & \quad \frac{EP_b}{EB} = K_l \frac{EL}{EB} - \frac{K_h Eb}{EB} + \frac{EP_x}{EB} \\
2.9 & \quad \frac{EL}{EB} = e_L \frac{EP_L}{EB} \\
2.10 & \quad \frac{Eb}{EB} = e_b \frac{EP_b}{EB}
\end{align*}
\]

The agreement reached between Taco Bell, the growers, and CIW was for Taco Bell to pay an extra penny per pound of tomatoes with the intent that it would go to the workers. The retail profit maximization problem in this case becomes:

\[
(1.\text{b}) \quad \text{Max. } \pi_R = P_x Y - P_x X - sX - P_c c + \lambda_R [Y - f(X,c)]
\]

The \(s\) in \(1.b\) represents the per unit supplement paid by the retailer to the growers. The modification of the maximization problem implies a modification in the set of simultaneous equations to be solved. The FOC of this new problem modifies equations \((1.2)\) and \((1.5)\) to become \(P_x = f_x P_y - s\) and \(Y = D(P_y)\), respectively. Again, totally differentiating the system and
converting to percentage changes in the endogenous variables with respect to a percentage change in $s$, where $E_s = ds/P_x$, results in the following system of equations:

\[
\begin{align*}
(1.6) \quad \frac{E_y}{E_s} &= K_x \frac{E_x}{E_s} + K_c \frac{E_c}{E_s}
\end{align*}
\]

\[
\begin{align*}
(1.7) \quad \frac{EP_x}{E_s} &= -\frac{K_c}{\sigma_y} \frac{E_x}{E_s} + \frac{K_c}{\sigma_y} \frac{E_c}{E_s} + \frac{EP_y}{E_s} - \frac{E_s}{E_s}
\end{align*}
\]

\[
\begin{align*}
(1.8) \quad \frac{EP_c}{E_s} &= \frac{K_x}{\sigma_y} \frac{E_x}{E_s} - \frac{K_x}{\sigma_y} \frac{E_c}{E_s} + \frac{EP_y}{E_s}
\end{align*}
\]

\[
\begin{align*}
(1.9) \quad \frac{E_c}{E_s} &= e_c \frac{EP_c}{E_s}
\end{align*}
\]

\[
\begin{align*}
(1.10) \quad \frac{E_y}{E_s} &= \eta \frac{EP_y}{E_s}
\end{align*}
\]

\[
\begin{align*}
(2.6) \quad \frac{E_x}{E_s} &= K_L \frac{E_L}{E_s} + K_b \frac{E_b}{E_s}
\end{align*}
\]

\[
\begin{align*}
(2.7) \quad \frac{EP_L}{E_s} &= -\frac{K_b}{\sigma_x} \frac{E_L}{E_s} + \frac{K_b}{\sigma_x} \frac{E_b}{E_s} + \frac{EP_x}{E_s}
\end{align*}
\]

\[
\begin{align*}
(2.8) \quad \frac{EP_L}{E_s} &= -\frac{K_b}{\sigma_x} \frac{E_L}{E_s} + \frac{K_b}{\sigma_x} \frac{E_b}{E_s} + \frac{EP_x}{E_s}
\end{align*}
\]

\[
\begin{align*}
(2.9) \quad \frac{EL}{E_s} &= e_L \frac{EP_L}{E_s}
\end{align*}
\]

\[
\begin{align*}
(2.10) \quad \frac{EB}{E_s} &= e_b \frac{EP_b}{E_s}
\end{align*}
\]

Note that the system of equations to be solved requires knowledge of factor shares, factor supply elasticities, final product demand elasticity, and elasticities of substitution (Allen elasticities). The letter $e$ in equations 1.9, 2.9, and 2.10 represents supply elasticities of the $i^{th}$ inputs $c, L,$ and $b$, respectively. The $K_i$s (in 1.6 to 1.8 and 2.6 to 2.8) are the relative factor shares of the inputs at each level. The sum of the relative input shares within a level must equal one, $K_x + K_c = 1$ and $K_L + K_b = 1$. The $\sigma_j$ in equations 1.7, 1.8, 2.7, and 2.8 represent the elasticity of substitution between the inputs, while producing $Y$ or $X$. Finally, $\eta$ in equation 1.10 is the product demand elasticity for the retail level output. The long run equilibrium solutions are obtained given alternative assumptions about the various underlying parameters and shares in the system given knowledge of the industries. Alternative specifications regarding the parameter values are examined.

**Parameter values**

The values of the parameters in the system are assumed based on knowledge of the industry. For instance, the demand elasticity for the retail level product is assumed to be fairly
elastic, as well as the supply elasticities of the factors of production. The Allen elasticities of substitution are assumed to be equal to one. Table 1, shows the assumed values of the parameters.

Table 1 – Parameter Values

<table>
<thead>
<tr>
<th>Elasticities</th>
<th>Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td>$e_c$ = 5</td>
<td>$k_c$ = 0.950</td>
</tr>
<tr>
<td>$e_L$ = 5</td>
<td>$k_L$ = 0.330</td>
</tr>
<tr>
<td>$e_b$ = 5</td>
<td>$k_b$ = 0.667</td>
</tr>
<tr>
<td>$\sigma_x$ = 1</td>
<td>$k_x$ = 0.050</td>
</tr>
<tr>
<td>$\sigma_y$ = 1</td>
<td></td>
</tr>
<tr>
<td>$\eta$ = -5</td>
<td></td>
</tr>
</tbody>
</table>

The share of tomatoes to the total cost is assumed rather small, .05. ²

Model Results

The two systems of ten equations were solved numerically³. The percentage change in each of the endogenous variables with respect to a percentage change in the boycotted quantities or supplement amount resulted from Gauss are given in the Table 2.

---

² According to Taco Bell’s web page, the main inputs for taco production are lettuce, flour and corn shells, meat, cheese, and beans. Taco Bell buys 10 million pounds of tomatoes from Florida in a year compared to 555 million pounds of other main food factors. Considering the corresponding average prices reported in USDA - NASS, and other inputs used in the taco production by Taco Bell the share of Florida tomato input is assumed to be rather small, perhaps optimistic here.

³ The solutions are readily calculated from $X=A^{-1}(b)$, where $A$ is the nxn parameter values matrix, $X$ is a column vector of percentage changes for the endogenous variables, and $b$ is the column vector of n-1 zeros and a 1 corresponding to the exogenous shock in question, using matrix software such as Gauss.
Table 2 – Boycott and Supplement Model Results

<table>
<thead>
<tr>
<th>Effect</th>
<th>Exogenous Shock</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boycott</td>
<td>Supplement</td>
<td></td>
</tr>
<tr>
<td>Ey/E*</td>
<td>-0.50</td>
<td>-0.13</td>
<td></td>
</tr>
<tr>
<td>EP_y/E*</td>
<td>-0.10</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Ec/E*</td>
<td>-0.50</td>
<td>-0.08</td>
<td></td>
</tr>
<tr>
<td>EP_c/E*</td>
<td>-0.10</td>
<td>-0.02</td>
<td></td>
</tr>
<tr>
<td>EX/E*</td>
<td>-0.50</td>
<td>-0.92</td>
<td></td>
</tr>
<tr>
<td>EP_X/E*</td>
<td>-0.10</td>
<td>-0.18</td>
<td></td>
</tr>
<tr>
<td>EL/E*</td>
<td>-0.50</td>
<td>-0.92</td>
<td></td>
</tr>
<tr>
<td>EP_l/E*</td>
<td>-0.10</td>
<td>-0.18</td>
<td></td>
</tr>
<tr>
<td>Eb/E*</td>
<td>-0.50</td>
<td>-0.92</td>
<td></td>
</tr>
<tr>
<td>EP_y/E*</td>
<td>-0.10</td>
<td>-0.18</td>
<td></td>
</tr>
</tbody>
</table>

Note that all of the effects on the endogenous variables are negative except for the effect on the price of the retail output \( y \) in the presence of the supplement. The absolute values of the elasticities at the retail level are larger in the presence of a boycott than the supplement. The reverse is true at the grower level: the absolute values of the elasticities are greater in the presence of the supplement than with a boycott.

There are shifts in the demand curves for the retail level final product as well as for the tomatoes at the grower level (Figure A1). First, the boycott shifts downward the demand at both levels, from \( D_1 \) to \( D_2 \). Then the supplement agreement shifts the demand curves upward at the
retail level, but downward at the grower level. The upward shift in the demand for tomatoes at
the retail level resulting from the supplement agreement is not enough to bring the demand curve
back to its original position. Because of the boycott and the supplement agreement, the quantity
of tomatoes demanded by Taco Bell is reduced, from \( X_e \) to \( X_a \) in figure A1. This reduction is
larger than the reduction in the quantity of tacos demanded after the agreement, shifting from \( Y_e \)
to \( Y_b \). In addition, there is a decrease in the supply price of tomatoes from \( P_e \) to \( P^* \).

The intent of the Taco Bell agreement is that the extra penny per pound of tomatoes is
paid to workers harvesting Taco Bell tomatoes as a wage increase. The price paid by Taco Bell
to its Florida tomato suppliers is represented by \( P_s \) in the lower part of figure A1. Since Taco
Bell pays the supplement, its unit cost of tomatoes rises. Consequently, a percentage increase in
the supplement reduces the quantity of tomatoes demanded by Taco Bell, and reduces the supply
price to growers.

*Sensitivity Analysis*

It is noteworthy that the model results for quantities and price of tomatoes facing a
supplement were the same as for quantities and price of labor. That is due to the assumed values
of the parameters, particularly the supply elasticities. The original values for the supply
elasticities of the two inputs at the grower level and the input other than tomatoes at the retail
level are equal. Therefore, a change in one of these supply elasticity values should bring about
new and different results for the two pairs of endogenous variables of interest. A reasonable
change in one of these parameters is on that associated with the non-labor input at the grower
level, \( e_b \). The input other than labor at the grower level might be assumed less elastic because it
includes, among other things, land, which tends to be an inelastic factor of production. A less
elastic value for \( e_b \) “ceteris paribus” might be 2. Table 3 shows the model results for a
supplement percent change on the endogenous variables using the original parameter values and the new value for $e_b$ “ceteris paribus”.

Table 3 – Supplement Model Result Comparison from Supply Elasticity Changes

<table>
<thead>
<tr>
<th>Endogenous Variables</th>
<th>Results for $e_b$ Values</th>
<th>5</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$EP_y/Es$</td>
<td></td>
<td>0.025</td>
<td>0.021</td>
</tr>
<tr>
<td>$Ey/Es$</td>
<td></td>
<td>-0.125</td>
<td>-0.107</td>
</tr>
<tr>
<td>$EP_x/Es$</td>
<td></td>
<td>-0.183</td>
<td>-0.302</td>
</tr>
<tr>
<td>$EX/Es$</td>
<td></td>
<td>-0.917</td>
<td>-0.783</td>
</tr>
<tr>
<td>$EP_c/Es$</td>
<td></td>
<td>-0.017</td>
<td>-0.014</td>
</tr>
<tr>
<td>$Ec/Es$</td>
<td></td>
<td>-0.083</td>
<td>-0.071</td>
</tr>
<tr>
<td>$EP_L/Es$</td>
<td></td>
<td>-0.183</td>
<td>-0.181</td>
</tr>
<tr>
<td>$EL/Es$</td>
<td></td>
<td>-0.917</td>
<td>-0.905</td>
</tr>
<tr>
<td>$EP_b/Es$</td>
<td></td>
<td>-0.183</td>
<td>-0.362</td>
</tr>
<tr>
<td>$Eb/Es$</td>
<td></td>
<td>-0.917</td>
<td>-0.724</td>
</tr>
</tbody>
</table>

A change in the parameter $e_b$ resulted in different effects for prices and quantities of tomatoes and labor, as expected. With the new parameter value, a percentage change in the supplement will reduce the price and quantity of tomatoes by .30 and .78 percent, respectively. In the case of labor, a percentage change in the supplement will reduce wage rate and employment by .18 and .90 percent, respectively.

Perfectly elastic labor supply

Although arguments about labor availability are contentious, the relatively small component that tomato harvesting is of the total labor market in the presence of a continuing supply of foreign workers suggests that a relevant case to consider is a perfectly elastic labor supply. In this case $P_L$ is taken as given, and the labor supply equation in (2.4) drops out of the system, leaving the model with nine equations instead of ten. The results for this limiting case are shown and compared with the original model results in Table 4.
Table 4 – Limiting Case Model Results vs. Original Values

<table>
<thead>
<tr>
<th></th>
<th>$e_L=5$</th>
<th>$e_L=\infty$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Ey/Es$</td>
<td>-0.13</td>
<td>-0.13</td>
</tr>
<tr>
<td>$EP_y/Es$</td>
<td>-0.18</td>
<td>-0.12</td>
</tr>
<tr>
<td>$EP_p/Es$</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td>$Ec/Es$</td>
<td>-0.08</td>
<td>-0.09</td>
</tr>
<tr>
<td>$EP_r/Es$</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>$Ex/Es$</td>
<td>-0.92</td>
<td>-0.98</td>
</tr>
<tr>
<td>$EP/Es$</td>
<td>-0.18</td>
<td>n/a</td>
</tr>
<tr>
<td>$EP_p/Es$</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>$El/Es$</td>
<td>-0.92</td>
<td>-1.11</td>
</tr>
<tr>
<td>$Eb/Es$</td>
<td>-0.92</td>
<td>-0.30</td>
</tr>
</tbody>
</table>

The result of a perfectly elastic supply of labor at the grower level is a larger decrease in employment and equilibrium quantity of tomatoes for Taco Bell, but a smaller decrease in the supply price of tomatoes. The primary effect at the retail level is a higher cost of tomatoes (since the supply price falls less), and, of course, the larger reduction in equilibrium quantity of tomatoes purchased.

Changes in Demand Elasticities

Changes in the demand elasticity for the final product at the retail level, “ceteris paribus”, are not greatly different than the original ones. As shown in table 5, all effects except retail price are accentuated as product demand becomes more elastic, and are diminished as it becomes less elastic. As expected, the less elastic is product demand, the greater the effect on retail price, and vice versa.

Table 5 – Result Comparison from Demand Elasticity Changes

<table>
<thead>
<tr>
<th>Endogenous Variables</th>
<th>Results for η Values</th>
<th>Change in Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2.50</td>
<td>-5.00</td>
</tr>
<tr>
<td>$Ey/Es$</td>
<td>-0.083</td>
<td>-0.125</td>
</tr>
<tr>
<td>$EP_y/Es$</td>
<td>-0.175</td>
<td>-0.183</td>
</tr>
<tr>
<td>$EP_p/Es$</td>
<td>-0.008</td>
<td>-0.017</td>
</tr>
<tr>
<td>$Ec/Es$</td>
<td>-0.042</td>
<td>-0.083</td>
</tr>
<tr>
<td>$EP_r/Es$</td>
<td>0.033</td>
<td>0.025</td>
</tr>
<tr>
<td>$EX/Es$</td>
<td>-0.875</td>
<td>-0.917</td>
</tr>
<tr>
<td>$EP_t/Es$</td>
<td>-0.175</td>
<td>-0.183</td>
</tr>
<tr>
<td>$EP_j/Es$</td>
<td>-0.175</td>
<td>-0.183</td>
</tr>
<tr>
<td>$EL/Es$</td>
<td>-0.875</td>
<td>-0.917</td>
</tr>
<tr>
<td>$Eb/Es$</td>
<td>-0.875</td>
<td>-0.917</td>
</tr>
</tbody>
</table>
No Restrictions on the Use of the Supplement

Suppose now that the agreement does not restrict the disposition of the wage supplement by Taco Bell to the growers. As before, the pre-agreement quantities that Florida tomato growers supplied are represented by $X_e$ in Figure A4. The original price per pound of tomatoes is represented by $P_e$. The supplement paid by Taco Bell can be seen as an increase in the equilibrium price of tomatoes from $P_e$ to $P_s$. The difference is that in the absence of restrictions on the distribution of the supplement, supply price and demand price for tomatoes are now the same at $P_S$. At the higher price the new equilibrium quantity of tomatoes is $X_a$, the same as in the presence of restrictions on the supplement distribution.

A measure of the loss to Taco Bell from paying the supplement is represented by the areas $(a)$ and $(b)$ to the left of the demand curve between the two price lines. Note that the vertical distance $P_S-P^*$ represents the penny per pound supplement paid by Taco Bell. Area $(a)$ represents the increased cost of tomatoes to Taco Bell due to the supplement paid for Florida tomatoes purchased by Taco Bell. Area $(b)$ represents the loss to Taco Bell of buyers’ surplus due to the reduced quantities purchased. Area $(a)+(d)$ is the total supplement paid at the new quantity, but only area $a$ is a gain since area $(d)$ was part of producer surplus prior to the agreement. Growers also lose area $(c)$ from the reduced quantity. The growers’ gain is $(a)-(c)$. This is the rent resulting from the right to sell tomatoes at the higher price. Whether or not the grower gains or loses depends on whether or not $(a)$ is greater than equal to or less than area $(c)$. Under the assumed profit maximizing scenario, growers would only distribute all or part of the
area \((a) + (b)\) to workers as an act of good will. Since the agreement established a mechanism to transfer the supplement directly to farm workers, the above is only included for comparison.

**Restrictions on the use of supplement**

The Taco Bell agreement establishes a procedure to safeguard the extra income transfer to workers, including a list with specific names of the workers that will receive an extra wage payment.\(^4\) This agreement includes specific provisions on the use of the additional cent per pound of tomatoes, such that only tomato workers who pick tomatoes supplied to Taco Bell receive the wage increase. The effect is to segment the labor market into labor working under the agreement and labor working outside the agreement. The effects will differ for the two groups.

Just, Hueth, and Schmitz (2004) suggest a model describing market effects from unionization outcomes by separating the labor market into unionized and non-unionized segments. Although collective bargaining agreements apply only to the unionized employers, the agreements are typically expected to alter the wage and employment equilibrium for non-unionized employers. Their analysis assumed a perfectly inelastic labor supply, an untenable assumption for the labor market under consideration.

A related model by Welch (1976) analyzes employment and wage effects on a non-covered segment due to a wage stipulation covering a specific labor segment. He assumed a positively sloped supply curve, and is a reasonable approach for analyzing supply adjustments in the labor market from segmented provisions and long-run wage effects. The complication raised

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\(^4\) These stipulations on the use of the extra income convey additional costs to Taco Bell in addition to the supplement. Also, from the “Supplier Code of Conduct” established by Taco Bell, it seems that Florida growers will have some transaction costs to be able to continue being tomato suppliers to Taco Bell (Taco Bell web page). According to one of the most informative publications in regard to the Taco Bell agreement and other recent activities engaged by the CIW, (St. Petersburg Times Online Business, March 5, 2006), workers are receiving $10 more per week, thanks to the Taco Bell agreement with Florida tomato growers.
by an elastic labor supply curve is that of displacement from the labor market; with a perfectly inelastic labor supply curve, there is no labor displacement.

Following Welch, the labor market is assumed to be a competitive market and the supply curve is assumed to have some elasticity. Because of the segmentation due to the agreement, there is a derived demand for Florida tomato labor that picks tomatoes purchased by Taco Bell, and another for Florida labor picking tomatoes for other buyers. Labor picking tomatoes purchased by Taco Bell will be referred to as labor under the agreement and the rest of the labor will be referred to as non-agreement labor. These demands are graphically represented in Figure A5 by $D_a$ and $D_n$, respectively. The sum of the labor demands is the total or aggregate demand for labor on Florida tomato farms, $D_t$. Prior to the agreement, equilibrium wage, $w_e$, and employment, $L_{te}$, are established by the supply and total demand curves, $S$ and $D_t$. Given equilibrium wage rate, $W_e$, agreement employers would have employed $L_{ae}$ units, and non-agreement employers would have employed $L_{ne}$ units. The new wage rate received by the workers covered by the agreement (inclusive of the supplement) is represented by $W_a$.

As suggested by the earlier numerical results,, the wage increase paid by the buyer, Taco Bell, reduces labor demand for agreement labor to $L_a$. In other words, due to the increased wage rate under the agreement, less labor is assigned to pick Taco Bell tomatoes than prior to the agreement. This reduction increases the supply of labor to harvest tomatoes for other buyers by non-agreement labor, i.e., there will be an excess supply of labor in the non-agreement segment at the original equilibrium wage, $w_e$.

The excess supply is illustrated in the figure A6; it is the distance between the $L_a$ and $L_1$ (equal to the displacement from the agreement market). The supply shift to $S_1$ is such that if all the workers find a job in this market their wage rate would be $w_1$, lower than the equilibrium
wage rate prior to the agreement. Given this wage, some workers may choose to work in other labor markets, or drop out of the labor force. As non-agreement workers leave the Florida tomato labor market to join other markets and as others drop out of the labor force, wages are pushed up until the market reaches a new equilibrium at \( w_2 \), but still below the competitive equilibrium wage, \( w_e \). That is where the residual supply for Florida tomato non-agreement labor, \( S^*_n \) intersects the demand for non-agreement labor, \( D_n \).

Referring to figure A7, labor in the agreement market gains area \((a)\), but loses area \((c)\). Therefore, their net gain is \((a) - (c)\). Industry in the agreement market loses area \((a)\) (transferred to labor) and area \((b)\) from reduced production under the agreement.

Combining the two market segments in a single diagram in figure A8 it is clear that the labor surplus gain equals the industry’s loss from the agreement and vice versa. Labor surplus gain from the agreement is the area \((a)\). Area \((a)\) is the net redistribution from the industry to labor under the agreement. The industry gains in the non-agreement labor market are the difference between the equilibrium wage rate \( w_e \) and the new wage rate for non-agreement workers \( w_2 \). Correspondingly, this is a loss to labor in the non-agreement sector.

**Conclusions**

The problem addressed in this paper is an important social issue regarding wages and working conditions of seasonal farm workers, and is an important concern of labor-intensive specialty crop producers. The Taco Bell agreement represents a different approach for negotiating with labor. A unique aspect of the agreement is the arrangement between the buyer of the farm product and the farm workers.

The analytical structure provides an interesting way of bringing the structure of the product and factor markets, and the production technologies directly to bear on the implications
for factor, grower, and final product market participants. In particular, it provides an analytical means of addressing changes in distribution resulting from labor agreements under alternative market conditions as addressed in the paper. The approach uses standard economic analysis in a novel way to address an interesting labor issue across different levels of the marketplace.

Whether or not farm workers are better off with the agreement depends largely upon whether or not they are employed by a grower supplying Taco Bell. If they are outside the agreement, they are likely to be worse off, either with lower wages than prior to the agreement, or potentially displaced due to the likely lower level of employment. The agreement results largely in a redistribution from Taco Bell and growers to agreement workers. However, to the extent there is a wage reduction in non-agreement employment, there is potential redistribution from non-agreement workers to non-agreement growers.

The extent of the agreement is currently rather small. If similar agreements are made between other retail level buyers of farm products and labor, the major component of redistribution will be from industry to farm workers in the form of higher wages.
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Figure A1 – Market Level Boycott and Supplement Effects

Final Product Market:

Figure – A2 Labor Market under Limiting Case
Figure A3 – Final Product Market for Different Demand Elasticities

Figure A4 – Economic Gains from Agreement Without Restrictions on use of Supplement
Figure A5 – Agreement Distortion to the Florida Labor Market

Figure A6 – Adjustments in the Uncovered Labor Market

Figure A7 - Economic and Welfare Analysis
Figure A8 – Agreement Welfare Analysis on Florida Tomato Labor Market

Agreement Workers’ surplus gain = Industry’s surplus loss

Industry’s surplus gain = Non-Agreement Workers’ loss