Are We Transitioning from an Era of Oak to an Era of Maple?

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Abstract -- Oaks and maples encompass numerous species that are processed into hardwood lumber and sold under four broad categories: red oak, white oak, hard maple, and soft maple. Historically, the most valuable lumber produced from these species has been used in the production of furniture, millwork, cabinetry, and flooring, as well as exported. However, over the last 40 years, relative prices of these species have fluctuated as demand (driven by fashion considerations) and relative availability have changed. In the mid-1960s, maples were important appearance species and along with black cherry dominated the furniture markets. From 1973 to 1990, the price of oaks increased as white oak was in high demand in export markets and red oak was used heavily in the production of furniture and kitchen cabinets for domestic markets. During the same period, the price of hard and soft maple declined. During the 1990s, the use of maple species for kitchen cabinet and furniture production increased while the use of white oak declined and red oak use remained steady. Maple used in appearance applications has continued to increase. By January 2005, prices of mid-and higher quality hard and soft maple lumber surged past those for red and white oak lumber. We examine the historical use of these economically important species and link the changing price of these species groups to fashion trends and relative availability.

Key words – Hardwood lumber, price, oak, maple
Introduction

Oaks and maples encompass numerous species that are processed into hardwood lumber and sold under four broad categories: red oak, white oak, hard maple, and soft maple. These species have different visual characteristics and changing consumer preferences have contributed to divergent trends in lumber prices over the last 40 years. During the 1960s, maples were the higher priced species group and preferred in furniture manufacturing. During the 1970s and 1980s, the preference for oaks increased along with oak prices. Since the mid-1990s, deflated prices for higher grade maple lumber have increased steadily, while the prices of higher grade oak lumber have trended downward. Have we ended an era in which the oaks were highly valued and begun an era in which maples will again be a high-priced species? We address this question by examining species preferences, physical availability, and prices for mid-grade (No. 1 Common or 1C), high-grade (Firsts and Seconds or FAS), and lower grade (No. 2 Common or 2A) oak and maple lumber from 1965 to 2005.

Species Preference

Preferences for hardwood species are influenced by function and fashion considerations. Functional preferences usually are dictated by specific wood properties or by tradition. For instance, many white oak species are used in the production of whiskey barrels or other tight cooperage products because the pores of most white oak species are plugged with tyloses. Hard maple has traditionally been used for basketball floors and was used heavily in the production of bowling alleys until the advent of substitute products.

Preferences resulting from functional considerations are an important part of overall species demand, but changes in species preference as dictated by fashion probably are the greatest source of price variability in hardwood lumber. Two indicators of fashion and wood preference are species shown for bedroom and dining room suites at the High Point Furniture Market (Table 1), and species displayed in cabinets exhibited at the International Builder Show and Kitchen & Bath Industry Show. The wood furniture and kitchen cabinet industries are the largest users of 1C lumber but also use FAS and 2C lumber. Percentages of showing do not translate directly into wood demanded by these industries, but they do provide a barometer of species fashion.

Percentages of furniture suites featuring major hardwood species shown between 1966 and 2005 are listed in Table 1. In 1966, less than 6% of the furniture suites shown were oak compared to 20% maple and 15% cherry. We mention cherry because maple lumber can be combined with cherry veneer and marketed as cherry furniture. As oaks became more popular, the popularity of maple decreased; by 1986 only 2.5% of the suites shown featured maple. In 1990, the number of oak suites shown peaked at 30% while the number of maple and cherry suites shown also increased (Frye 1996). Since 1990, the oaks have declined in popularity as the percentage of suites featuring maple or cherry have increased. However, even with the resurgence of maple in recent years, the percentage of suites featuring maple have yet to approach the levels of the late 1960s as alternative species such as red alder, birch, and rubberwood have been introduced.
Table 1 – Percentage of dining room suites that featured major hardwood species at the High Point (NC) Furniture Market, 1966 to 2005.a

<table>
<thead>
<tr>
<th>Year</th>
<th>Oak</th>
<th>Maple</th>
<th>Cherry</th>
<th>Walnut</th>
<th>Pecan</th>
<th>Mahogany</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>5.5</td>
<td>20.0</td>
<td>15.0</td>
<td>21.0</td>
<td>NA</td>
<td>6.0</td>
</tr>
<tr>
<td>1970</td>
<td>14.0</td>
<td>12.0</td>
<td>10.0</td>
<td>15.5</td>
<td>14.0</td>
<td>2.5</td>
</tr>
<tr>
<td>1974</td>
<td>11.5</td>
<td>9.0</td>
<td>3.5</td>
<td>8.0</td>
<td>8.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1978</td>
<td>19.0</td>
<td>8.0</td>
<td>6.0</td>
<td>4.5</td>
<td>12.0</td>
<td>3.0</td>
</tr>
<tr>
<td>1982</td>
<td>25.5</td>
<td>6.0</td>
<td>10.5</td>
<td>2.5</td>
<td>7.5</td>
<td>4.5</td>
</tr>
<tr>
<td>1986</td>
<td>21.0</td>
<td>2.5</td>
<td>12.0</td>
<td>2.5</td>
<td>5.0</td>
<td>6.0</td>
</tr>
<tr>
<td>1990</td>
<td>30.0</td>
<td>4.5</td>
<td>15.0</td>
<td>2.0</td>
<td>4.0</td>
<td>7.5</td>
</tr>
<tr>
<td>1994</td>
<td>27.5</td>
<td>7.0</td>
<td>16.5</td>
<td>1.0</td>
<td>1.0</td>
<td>7.0</td>
</tr>
<tr>
<td>1998</td>
<td>20.0</td>
<td>6.2</td>
<td>21.0</td>
<td>1.0</td>
<td>1.0</td>
<td>7.0</td>
</tr>
<tr>
<td>2002</td>
<td>17.0</td>
<td>9.0</td>
<td>20.0</td>
<td>2.0</td>
<td>0.5</td>
<td>6.0</td>
</tr>
<tr>
<td>2005</td>
<td>15.0</td>
<td>9.0</td>
<td>15.0</td>
<td>2.0</td>
<td>1.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

a Percentages do not add to 100 because other species were featured e.g., pine, ash, rubberwood, alder, yellow-poplar, birch, beech, primavera, and other domestic and imported species for which historical data are incomplete.

b Source: Frye 1996.
d Source: Appalachian Hardwood Manufacturers Inc., 2002, High Point, NC.
e Source: Appalachian Hardwood Manufacturers Inc., 2005, High Point, NC.

The wood furniture industry was once the single most important market for hardwood lumber. However, because of the growth in the kitchen cabinet industry and the decline in domestic furniture production due to increased imports from China and other sources, overall demand for lumber by these industries was nearly equal in 2004 (Hardwood Mark. Rep. 2005).2 In 1989, more than 55% of kitchen cabinets on display at the International Builder Show and Kitchen & Bath Industry Show were oak while less than 5% were maple (Hardwood Mark. Rep. 2005). By 1995, this ratio changed to 40% oak and 30% maple. As a fashion species in this industry oak continued to decline such that by 2004, it accounted for less than 10% of the showing compared to more than 40% for maple.

A major user of FAS lumber is millwork and a major use of hardwood millwork is commercial construction e.g. restaurants, shopping malls, retail stores, common areas of hotels, and lobbies and executive suites of office buildings. There are no published indicators of species use in commercial construction, but the oaks apparently were fashionable in the 1970s and 1980s while maple and other closed-grained species become more fashionable in the 1990s and beyond.

2 Data do not differentiate between red and white oak or hard and soft maple because statistics were not collected consistently for individual species groups.
Solid strip flooring is one appearance application for oak that has grown considerably since the mid-1980s. Since 1989, production of oak flooring has increased by 300% (Emanuel and Rhodes 2002, 2005). Although red oak is preferred over white oak for flooring, that this industry consumes considerable amounts of 2C lumber in both red and white oak.

The last major market for appearance hardwood lumber is exports which has incased more than tenfold since the early 1970s. During the 1970s and 1980s the United Sates exported large quantities of FAS white oak to Europe and Japan. Mid- and lower-grade exports of red oak began to increase in the mid-1980s with the development of the Taiwanese furniture industry. It is interesting that red oak declined from 25% to 10% of the total hardwood lumber volume exported to Asia from 1994 to 2004, according to United States bureau of the Census. This is likely a function of the decreasing popularity of red oak in the United States, the final destination for much of the furniture manufactured in Asia. Oaks still account for 40% of overall United States hardwood lumber exports but maples now comprise 19%.

Availability Issues

Although the influence of species preference on demand affects interspecies hardwood lumber prices, the inventory levels of a species can influence timber prices and affect lumber price through supply. Whereas oaks are distributed widely and accounted for 39% of the eastern sawtimber inventory, maples make up only 13% of the eastern sawtimber resource and are more abundant in the northern United States. Inventories of white oak increased at a fairly constant rate over the last 50 years; maple inventories increased at a much lower rate from 1963 to 1977 but have increased at a much higher rate since 1977 (Fig. 1). From 1985 to 2003, the maple market share of hardwood lumber production has increased from nearly 9% to more than 13%, while the market share of oak has fluctuated between 48% and 50% (U.S. Dep. Commer. Bur. Census 1986, 2004).

Figure 1. Relative growth of United States maple and oak sawtimber inventories, 1963 to 1997. (Source: Smith et al. 2001; indexed with 1963 = 100)
Changes in Deflated Price

Deflated average yearly prices for grades FAS, 1C, and 2C red oak, white oak, hard maple, and soft maple are presented in Figures 2-5, respectively. By focusing on FAS prices for these species groups, we can discern two periods of different price movements that are related to the changes in species preferences discussed above. Between the mid-1960s and the mid-1980s, the prices for FAS red and white oak increased as the prices for FAS hard and soft maple decreased. After the mid-1980s oak, prices remained relatively flat while maple prices escalated.

To examine these differences in price trends, we estimated annual rates of change for the different lumber grades and species groups. We decided to separate the data set into two groups of similar size: 1965 to 1985 and 1986 to 2005. Although the prices for 2005 do not reflect the entire year, there was a considerable decline in oak prices and a considerable increase in maple prices during the first 3 months. The separation point of 1985 was chosen because 1965 and 1985 represent similar production peaks in the hardwood production cycle.

Annual change in deflated hardwood lumber prices for the grades and species examined were calculated by estimating the natural logarithm of price as a function of time and allowing both the intercept and slope to shift between the two periods. The specific equation estimated was:

\[
\text{Ln}(P_{ij}) = B_{0ij} + B_{1ij} + B_{Fij}(T_F) + B_{Sij}(T_S)
\]

where

\[
\text{Ln}(P_{ij}) = \text{Natural logarithm of price for species } i \text{ of grade } j
\]

\[
B_{0ij} = \text{Intercept for species } i \text{ of grade } j
\]

\[
B_{1ij} = \text{Intercept shifter for species } i \text{ of grade } j \text{ during second period (1986-2005)}
\]

\[
B_{Fij} = \text{Slope for species } i \text{ of grade } j \text{ during first period (1965-1985)}
\]

\[
T_F = \text{Sequential time variable for first period (1 to 21 for 1965-1985, 0 otherwise)}
\]

\[
B_{Sij} = \text{Slope for species } i \text{ of grade } j \text{ during second period}
\]

\[
T_S = \text{Sequential time variable for second period (1 to 20 for 1986-2005, 0 otherwise)}
\]

Annual change in real price for the two periods (\(AC_F\) and \(AC_S\)) was calculated using the procedure described in deSteiguer et al. (1989):

\[
AC_{F\text{ or } S} = (\text{antilog of corresponding slope coefficients (}B_{Fij}\text{ or }B_{Sij})\text{)}^{-1}
\]

Estimates for \(AC_F\) and \(AC_S\) for each grade and species, the goodness of fit (\(R^2\)) for each equation, and the t value associated with the respective \(B_{Fij}\) and \(B_{Sij}\) coefficients are presented in Table 2. The \(R^2\) associated with the individual price trend equations generally was high except for the price of FAS and 1C white oak and 2C soft maple. The \(R^2\) associated with the price of FAS white oak was diminished by the large increase in both exports and price in the early 1980s due to a precipitous drop in the value of the United States dollar. The deflated price of 1C white oak has been nearly constant over the entire period, resulting in a low \(R^2\). The deflated price of 2C soft maple has been
highly variable since 1985. As a result the $R^2$ is low even though the $B_{Fij}$ and $B_{Sij}$ coefficients were statistically significant.

Table 2 -- Goodness of fit ($R^2$), calculated percentage annual rate changes (%AC), and Student “t” statistics of associated regression coefficients of time (t value) for inflation adjusted prices of lumber grades FAS, No. 1 Common, and No. 2 Common Appalachian red oak, white oak, hard maple, and soft maple lumber from 1965 to 1985 and 1985 to 2004.

<table>
<thead>
<tr>
<th>Species group Grade</th>
<th>$R^2$</th>
<th>1965 to 1985</th>
<th>1986 to 2005</th>
<th>1986 to 2005</th>
<th>1986 to 2005</th>
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<tr>
<td></td>
<td>$AC_F$</td>
<td>t value $^c$</td>
<td>$AC_S$</td>
<td>t value $^c$</td>
<td>$AC_S$</td>
</tr>
<tr>
<td>Red oak</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAS</td>
<td>.71</td>
<td>1.12</td>
<td>3.60 $^d$</td>
<td>-0.03</td>
<td>0.10</td>
</tr>
<tr>
<td>No. 1 Common</td>
<td>.60</td>
<td>1.02</td>
<td>2.42 $^e$</td>
<td>0.70</td>
<td>1.56</td>
</tr>
<tr>
<td>No. 2 Common</td>
<td>.76</td>
<td>-1.12</td>
<td>2.16 $^e$</td>
<td>3.55</td>
<td>6.23 $^d$</td>
</tr>
<tr>
<td>White oak</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAS</td>
<td>.33</td>
<td>1.34</td>
<td>3.16 $^d$</td>
<td>-0.92</td>
<td>2.05 $^{c,f}$</td>
</tr>
<tr>
<td>No. 1 Common</td>
<td>.09</td>
<td>0.46</td>
<td>0.99</td>
<td>0.32</td>
<td>0.65</td>
</tr>
<tr>
<td>No. 2 Common</td>
<td>.46</td>
<td>-0.45</td>
<td>0.87</td>
<td>2.11</td>
<td>3.72 $^d$</td>
</tr>
<tr>
<td>Hard maple</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAS</td>
<td>.88</td>
<td>-2.90</td>
<td>8.11 $^d$</td>
<td>4.76</td>
<td>11.89 $^d$</td>
</tr>
<tr>
<td>No. 1 Common</td>
<td>.88</td>
<td>-2.46</td>
<td>7.05 $^d$</td>
<td>5.23</td>
<td>13.43 $^d$</td>
</tr>
<tr>
<td>No. 2 Common</td>
<td>.70</td>
<td>0.37</td>
<td>0.77</td>
<td>3.54</td>
<td>6.78 $^d$</td>
</tr>
<tr>
<td>Soft maple</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAS</td>
<td>.91</td>
<td>-3.32</td>
<td>11.22 $^d$</td>
<td>4.82</td>
<td>14.54 $^d$</td>
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<tr>
<td>No. 1 Common</td>
<td>.75</td>
<td>-2.84</td>
<td>8.31 $^d$</td>
<td>2.40</td>
<td>6.36 $^d$</td>
</tr>
<tr>
<td>No. 2 Common</td>
<td>.31</td>
<td>-1.42</td>
<td>2.95 $^{d,f}$</td>
<td>1.16</td>
<td>2.21 $^e$</td>
</tr>
</tbody>
</table>

$^a$ $R^2$ value is for the equation from 1965 to 2005.

$^b$ AC denotes annual rate of change (percent) for first ($AC_F$) and second ($AC_S$) periods.

$^c$ t value is for the coefficient from which annual rate of change was developed

$^d$ Significant at .01 level.

$^e$ Significant at .05 level.

$^f$ Preliminary analysis indicates coefficients not statistically significant following adjustment for autocorrelation.

Since a cyclical time series was being examined, the presence of autocorrelation was possible. Durbin-Watson statistics developed for each price equation indicated serial correlation in all models except for 1C red oak. Preliminary attempts to adjust for serial correlation produced ambiguous results depending on the length of the autoregressive lag structure. Coefficients representing the second-period price of FAS white oak and first-period price of 2C soft maple were not statistically significant after adjustment.
The price of FAS and 1C red oak increased in real terms between 1965 and 1985 while the price of low-grade red oak lumber decreased during this period (Figure 2). These trends indicate activity in two separate markets. FAS and 1C red oak were being used in the production of millwork and furniture, while the major market for 2C red oak i.e., flooring, was in decline. From 1986 to 2004, there was no significant growth or decline in the prices of FAS or 1C red oak but a relatively large increase in the price of 2C red oak. Again, this reflects the stable or declining preference for red oak in furniture, millwork, and kitchen cabinets, and the large increase in demand for flooring. There has been no formal analysis of the decline in oak preference. The industry consensus is that today’s consumers tend to dislike the grain pattern associated with oak, specifically color variations associated with red oak.3 This rejection of red oak as an appearance species may be surprising to some but red oaks always have been considered less desirable than white oak (Wray 1952).

Figure 2 – Yearly prices of deflated FAS, 1C, and 2C Appalachian red oak lumber form 1965 to 1985 and 1986 to 2005. (Source: Hardwood Market Report, Memphis, TN; deflated by U.S. Department of Labor producer price index)

The increase in FAS white oak prices between 1965 and 1985 is strongly related to the export of this lumber to northern Europe and Japan (Figure 3). The decline in FAS prices after 1985 is a reflection of reduced export demand. Although white oak is used in furniture production, the preference for red oak might account for the lack of significant change in the price of 1C white oak. The price of 2C white oak showed no significant change between 1965 and 1985, though white oak also is used in the production of flooring. However, the lower growth rate of 2C white oak versus red oak since 1985 reflects a preference for red oak for flooring.

3 Based on conversations in first quarter 2005 with Mark Barford, Executive Vice President, Appalachian Hardwood Manufacturers Inc, High Point, N.C.
The prices in Figure 3 reflect white oak prices in the United States market. European and Japanese consumers have continually paid higher prices for FAS and 1C white oak but require separations for color, ring count, heartwood content, length, and width. One can argue that white oak with more desirable growth attributes (color, ring count, ring consistency) has been continually pulled from the domestic market by international buyers. These attributes do not influence grade but they do affect price.

**Figure 3 – Yearly prices of deflated FAS, 1C, and 2C Appalachian white oak lumber form 1965 to 1985 and 1986 to 2005. (Source: Hardwood Market Report, Memphis, TN; deflated by U.S. Department of Labor producer price index)**

Between 1965 and 1985 prices, for FAS and 1C hard maple declined by 2.9 and 2.5% per year, respectively (Figure 4). Since 1985, prices of all grades of hard maple have increased. The use of 2C hard maple in basketball floors and bowling alleys might account for the stable price of this grade from 1965 to 1985. Since 1985, 2C maple also has been used by manufacturers of kitchen cabinets.

Although the price increases for hard maple since 1985 are spectacular, the true extent of this growth is muted because Figure 4 does not reflect the development of a separate market for “white” hard maple during the mid-1990s. Historically premiums have been paid for white hard maple but white maple now is quoted separately due to increased demand. White maple is sapwood that has not been discolored by improper handling of logs or lumber. In March 2005, prices for FAS, 1C, and 2C white hard maple were 32%, 19%, and 44% higher, respectively, than those for color unselect hard maple.

The decline and rise of soft maple prices during the two periods were similar to the movement of hard maple prices (Figure 5). However, since 2C soft maple had no specialty market like basketball courts or residential flooring, it showed the greatest decline in 2C lumber from 1965 to 1985. This lack of a specialty market might have accounted for the low rate of growth for 2C soft maple since 1986.

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4 Based on conversations in first quarter 2005 with Edward Ramsey, Taylor Ramsey Lumber Co., Lynchburg, VA.
Examination of the estimated rate of annual change (Table 2) revealed considerably greater change in the prices of FAS and 1C hard and soft maple than in prices for red and white oak for the two periods. The large declines in maple prices between 1965 and 1985 correspond to large declines in the preference for these species (Table 1). The large increase in price since 1985 may have been influenced by the lower sawtimber inventories of these species that caused supply to be more inelastic.

**Conclusion**
The accession of oak (especially red oak) as the dominant appearance species during the 1970s and 1980s was a major shift in the hardwood market. A search of records prior to 1970 found no reference to red oak as a high-value species; if anything, red oak was held in low regard (Wray 1952). By contrast, maples have been used by furniture manufacturers from colonial times but the growth in maple inventory apparently was insufficient to satisfy demands without additional price increases during the late 1960s. The shift from maple to oak may have been related more to perceived availability of oak by furniture manufacturers than to changes in preferences by the final consumer. Still, once consumers accepted oak, the value of these species increased even though inventories were abundant.

The shift from oak to maple that began in the late 1980s also could have been triggered by the relative low price of maple versus oak. This caused furniture and kitchen cabinet producers to show maple to potential customers. Now that consumers have accepted maple, there again seems to be a negative connotation associated with oak. In a 2005 editorial published in the Weekly Hardwood Review, the term “anything but oak” seemed to reflect the sentiments of many furniture, cabinet, and millwork consumers. However, consumers may not be able to afford a preference for maple in the long run.

Although long-term growth trends suggest an increasing supply of maples relative to oaks, the supply of maple will be much smaller than that of oak sawtimber for the foreseeable future. Also, the white maple that commands the highest prices in the market is in shorter supply than color unselect maple. As a result maple prices are expected to continue to increase to a point where consumers must include price in the purchasing equation. This could expand opportunities for maple substitute species, both domestic and foreign. It is interesting that the popularity of maple in the marketplace apparently is not associated with consumers' ability to identify maple wood (Bowe and Bumgardner 2004). Development of new finishes for oak that are more acceptable to today’s consumer could help oak regain greater acceptance. Should this occur, one can expect greater separations for visual characteristics such as grain and color to placate the aesthetic concerns of consumers.

**Literature Cited**


