



# **Logging Cost Indices**

## **The Effect of Increasing the Sample Size**

Second Quarterly Report to the  
Wood Supply Research Institute

by

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## Preface

The fundamental objective of the Wood Supply Research Institute (WSRI) is to enhance pro-competitive awareness of factors affecting the efficiency, stability, and economic viability of the industrial wood supply system. Thus, the members of WSRI believe that the industry needs some continuous, long-term, credible, index of trends related to the cost of producing wood and the financial health of the system.

The long term cost and productivity study at Mississippi State University originated within the Industrial Forestry Operations Research Coop at Virginia Tech in 1990. The study has been supported by the Forestry and Wildlife Research Center at MSU since 1999. The objectives of this study have been to monitor the effects of changes in the wood supply system on logging business performance, to monitor the effects of externalities such as weather, tax law, fuel prices, labor legislation on business structures, and gather information and insights that could lead to the development of better understanding of, and management tools for, the wood supply system.

This research project, funded in part by WSRI, is designed to expand the current work being done at Mississippi State University and to enhance the dissemination of this index to a broader audience.

This is the second in a series of reports discussing the indices study. The first dealt with basic issues of developing a set of indices that would have utility for harvesting contractors, procurement and management foresters using a base population of 25 contractors for whom seven years of data (1995-2001) were available. Efforts are currently underway to expand the population to 100 or more firms.

A preliminary study was conducted for this report using data from 13 additional firms for which data were available for the period 1999-2001. The goal of the analysis was to examine the effects of firm size diversity on the indices and to guide recruitment efforts by assessing the effect expansion will have on the volatility of the total and component cost indices.

This report will discuss possible complications associated with expanding the population, and describe the efforts being made to make the sample as representative of both the wood supply system and the population of full time contractors as possible.

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# Potential Effects of Expansion of the Sample Population

## 1.1 Introduction

The very nature of the logging makes generalization about any aspect of the physical, technical, economic, or sociological environment of the industry difficult. Logging firms were created, in response to opportunities and/or incentives offered by the local wood supply system, to fill a niche in the market of the time. The businesses have evolved with the industry and resource development. Logging businesses are almost without exception privately owned – individual or family – as opposed to public (openly traded) stock companies which has limited the resources available for growth and adaptation. The diversity of business structures, resources, capabilities, objectives and methods arising from this evolutionary process precludes the use of a single measure to represent all.

The firms included in the sample reflect this diversity. The newest firm started up in 1993, but there are several second, third and even fourth generation firms. Production for 2001 ranged from 2,600 tons to 290,000 tons, business structures ranged from small, simple sole proprietorships to firms comprised of several corporations. Market niches included harvesting grade hardwood timber, whole tree chipping, cut-to-length systems, standard and specialty thinning systems as well as tree length southern pine sawtimber, chip-n-saw and pulpwood operations.

The first WSRI report<sup>1</sup> discussed and demonstrated the development of logging cost indices using data from a sample population of 25 contractors who had supplied continuous, consistent cost and production data for the years 1995 through 2001. This report discusses the effects of adding 13 additional firms for which data were available for the years 1999-2001. This purpose of this analysis is to get a sense of the conditions under which, and how long it will take for, the indices to stabilize as the number of participating firms is expanded. The geographic distribution of firms in the base and expanded population are shown in Table 1.

Table 1. Geographic distribution of study participants

State	Base (1995-2001)	Expanded (1999-2001)
Alabama	4	7
Georgia	4	4
Louisiana	1	1
Michigan	1	4
Mississippi	5	8
New York	1	1
North Carolina	1	2
South Carolina	3	5
Virginia	5	6
Total	25	38

The larger sample permits partitioning the data set into a variety of sub-units for analysis, but the partitioning that appeared to offer greatest insight for constructing indices was size, measured as annual production per firm. As in the first report, the firms were ranked on this basis from smallest to largest and the population split into approximate thirds, thirteen firms in the largest and smallest groups, twelve in the middle group. Table 2 demonstrates the effect that the additional 13 firms had on production measures. (The base population used in Report 1 is identified as 1999b, 2000b and 2001b, the expanded population as 1999e, 2000e, and 2001e.)

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<sup>1</sup> Stuart, W.B., L.A. Grace, B.D. Jackson, R. Stutzman. 2003. Logging Cost Indices. First Quarterly Report to the Wood Supply Research Institute. 23 pp. Available at [http://www.cfr.msstate.edu/forestry/Q1\\_IndicesWSRI\\_R1.pdf](http://www.cfr.msstate.edu/forestry/Q1_IndicesWSRI_R1.pdf)

Table 2. Percentage distribution of total annual production across firm sizes.

Size Group	1995	1996	1997	1998	1999b	1999e	2000b	2000e	2001b	2001e
Small	14.25%	15.17%	13.99%	13.29%	12.91%	<b>13.62%</b>	11.97%	<b>11.69%</b>	10.69%	<b>11.08%</b>
Medium	31.87%	33.42%	31.86%	32.42%	31.13%	<b>26.96%</b>	29.90%	<b>25.39%</b>	27.80%	<b>23.65%</b>
Large	53.88%	51.41%	54.16%	54.29%	55.96%	<b>59.43%</b>	58.13%	<b>62.92%</b>	61.51%	<b>65.26%</b>
Total Production	2,020,141	1,940,421	2,133,774	2,069,130	2,053,665	<b>2,990,842</b>	2,200,724	<b>3,104,980</b>	2,152,563	<b>3,031,574</b>
Expansion Increment						<b>937,176</b>		<b>904,256</b>		<b>879,011</b>
Expansion Gain						<b>45.63%</b>		<b>41.09%</b>		<b>40.84%</b>

The 52% increase in firms from 25 to 38 resulted in a 46% increase in total production for 1999. The good faith attempt made to add firms across the full range of production was reasonably successful; there was a 4% production shift from the middle to top third groups in 1999.

## 1.2 Effect on Production Indices

Production shifted from the first and middle thirds to the larger third of the population within both samples, but the trend accelerated from 1998 on; the top third's share increased only 2% between 1995 and 1998 and by 7% between 1998 and 2001 in the base population, so the gain of 6% between 1999 and 2001 for the expanded population only reflects the industry trend.

The break points between the groups and year to year changes are shown in Figure 1, with blue designating the small firms, gold the medium firms, and green the larger firms. The white bars indicate regions with no representation. Note that two bars have been provided for 1999, 2000, and 2001. The lower bar is for the base data set of 25 firms, the upper for the expanded data set of 38 firms.

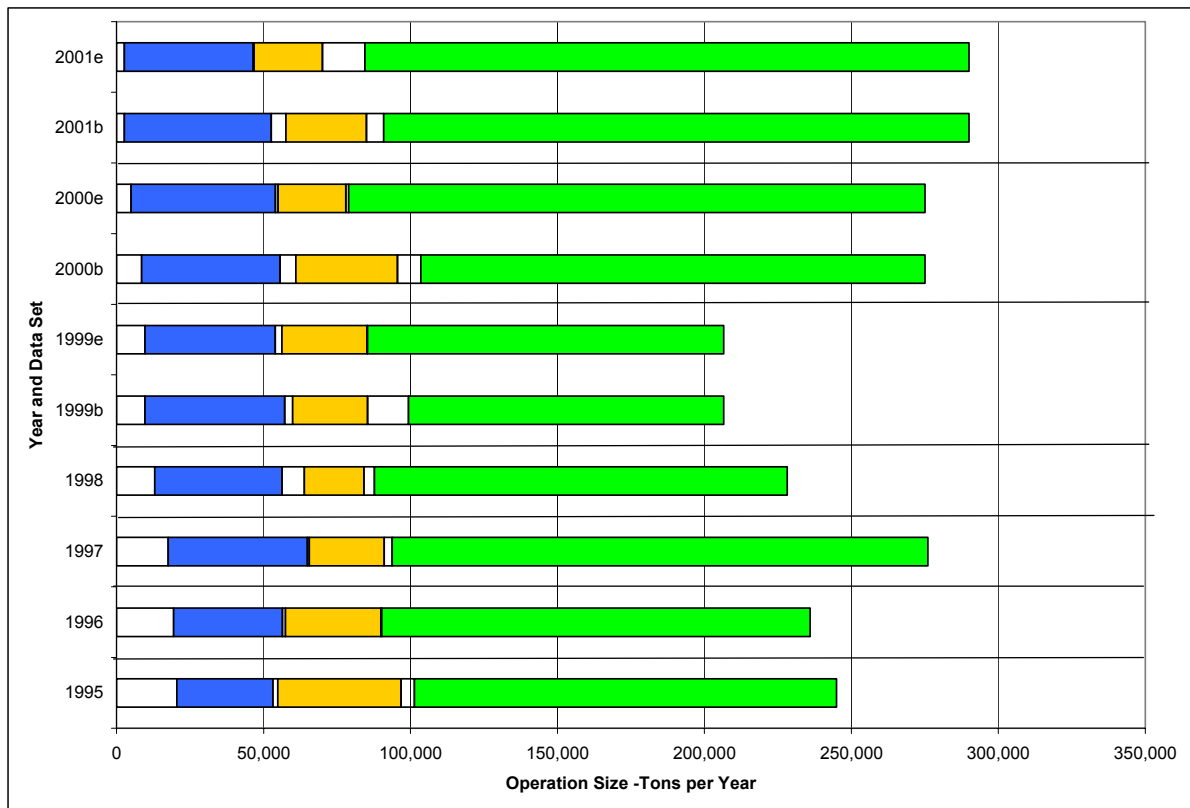


Figure 1. Production ranges by firm size – base and expanded populations

The spread increased for smaller firms as the minimum production decreased from 20,475 tons in 1995 to 2,649 tons in 2001 (the smallest firm in 2001 was a part of the 1995 base data set). The range of the mid-sized firms both narrowed and moved lower, while the range of the larger firms widened by extending both the upper and lower bounds. In other words, the larger firms got larger, the small and medium sized firms decreased in both individual firm production and overall contribution.

### ***1.3 Effect on Cost Indices***

#### **1.3.1 Weighting**

Care must be taken in computing any average or index so that the sample used is representative of the population being considered. The sampling process should not weight the average or index to the advantage or disadvantage of any segment within that population. The overall average cost per ton indices, for example are computed by dividing the total cost for the entire population by the total production, weighting it heavily to the larger firms.

It is unlikely that firms, the largest with an output 100 times that of the smallest, would have parallel cost structures and react to business stimuli in the same manner. The larger firm group accounted for 65% of the production of the expanded sample for 2001. A recent look at Mississippi's wood supply system found that operations of this size accounted for only about 10% of the population of firms. Sixty-five percent of the firms attending the logger education workshops had four or fewer employees, 25% had between five and nine employees and 10% had 10 or more. The Mississippi figures may be a more accurate reflection of the structure of the wood supply system.

#### **1.3.2 Cost Indices**

Cost indices were developed for total cost per ton and for cost per ton of the four largest cost components (equipment, labor, consumable supplies, and contract services) in total and by operation size. The 1995 base population's cost per ton values were used, for reasons of consistency and clarity, as the base values for indices for the expanded population throughout the following discussions.

The indices for the base population and the expanded populations are shown on the same graph, the base population denoted by the solid line in the following charts, the expanded population by the dashed. The indices axes were fixed for a range from 80 to 180 except for the small and medium categories for contracted services where the indices ranged between two and three hundred.

Ideally the indices for the expanded population should be similar in value and movement as those of the base population. The greater the difference in magnitude, rate, and direction of movement the greater the probability it will take longer and more effort to develop representative values.

##### **1.3.2.1 Average Total Cost Per Ton Indices**

Average cost per ton of producing and delivering a ton of wood is the variable of utmost interest to all in the wood supply system because of the effect on stumpage prices, contract rates, and delivered wood costs.

Expanding the population raised the index by three points for 1999, the spread increased to eight points for 2001. The expanded population did not show the "dip" in the index for 2000 (Figure 2).

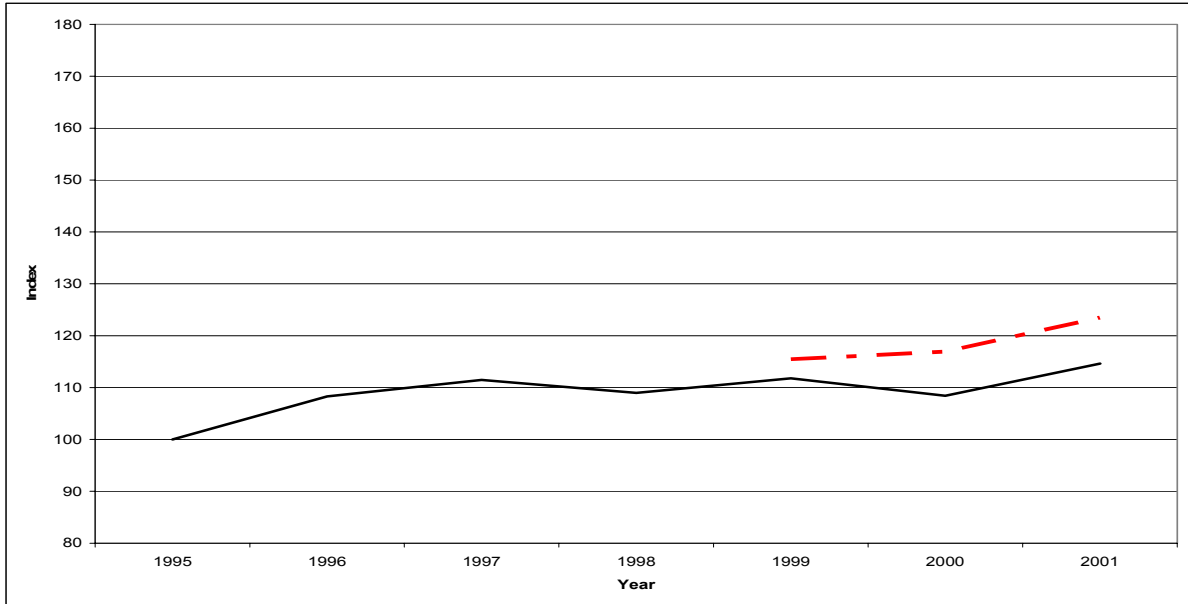


Figure 2. Average cost per ton indices for all firms

Further investigation shows that expanding the population affected the average costs per ton differently for firms of different size. Costs for smaller firms in the expanded population rose more rapidly than for those in the base population. The expanded index started 12 points higher in 1999 and ended 50 points higher (Figure 3). The reasons for this are not fully obvious. They may be related to the reduced production level for this group (Table 1), the transition of several firms from commodity to grade production, as well as industry and firm level cost restructuring. (Analyses of causality are different from, and more demanding of data, than developing indices. Causality issues will be addressed more completely in the graduate theses accompanying this research.)

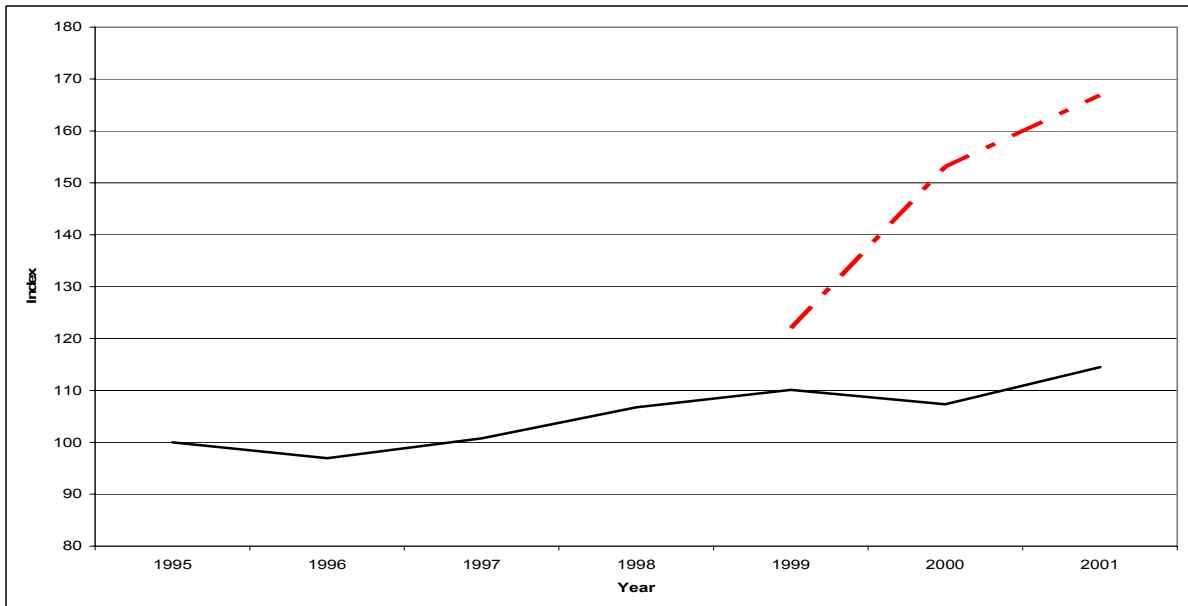


Figure 3. Average cost per ton indices for the small firms

The indices for the mid-sized contractors followed a markedly different pattern, starting out five points higher and remaining essentially flat, ending four points lower than that for the base population (Figure 4). Again, it is not possible to attribute causality, but the cost indices may be related to the production share of this group being smaller in the expanded population in 1999 and continued to decrease through 2001. There were a variety of forces at work in the wood supply system during this three year period, including a major rise in fuel prices in 2000, a surplus of logging capacity and shrinkage of markets and general concern over the future of the industry. Cost control became a major concern.

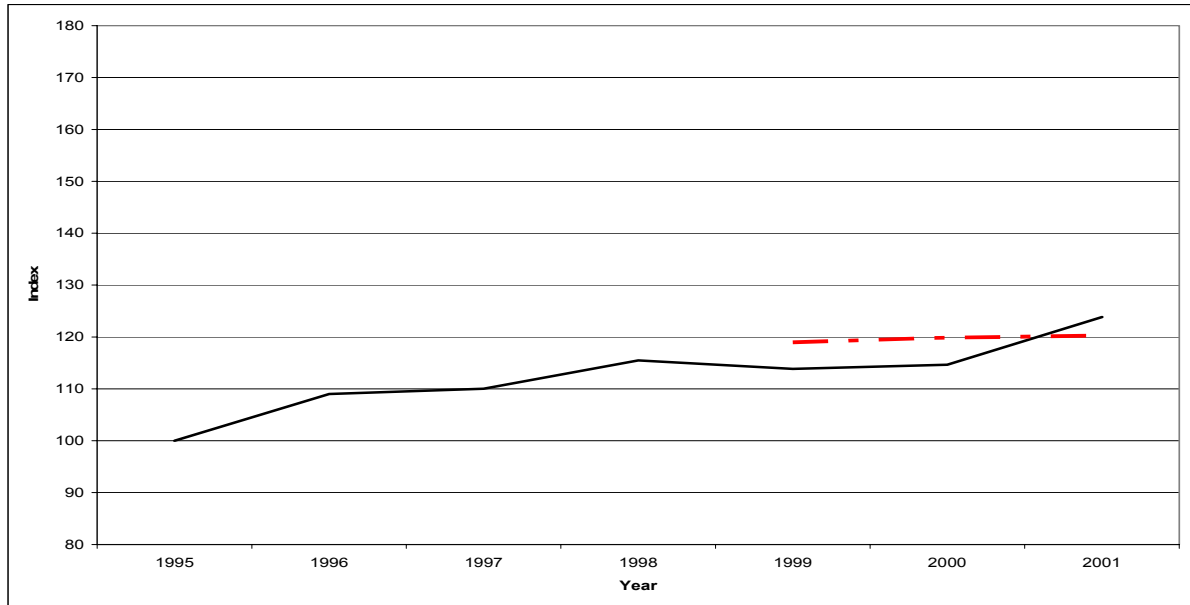


Figure 4. Average cost per ton indices for the medium firms

There was more consistency in the indices for the larger contractors. That for the expanded population started at the same level, fell less in 2000 and rose more rapidly ending five points higher (Figure 5).

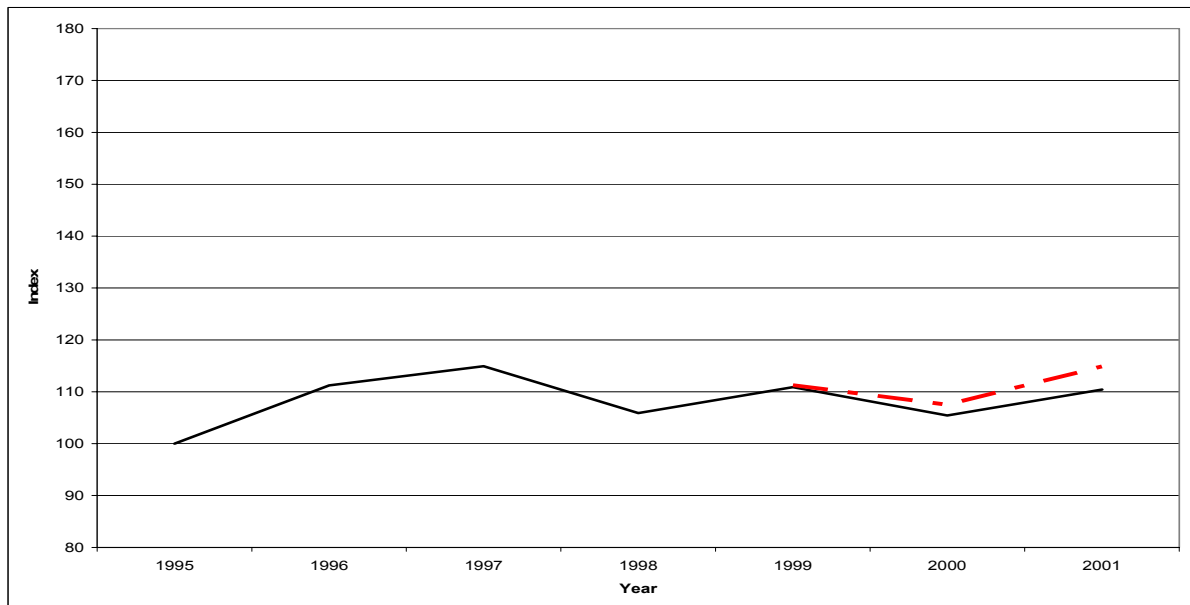


Figure 5. Average cost per ton indices for the large firms



A casual look at the cost per ton index for the entire population would lead one to believe that the index is robust and increasing the sample size would cause minimal distortion. However, the assessment by size classes indicates that the assumptions must be approached guardedly. The cost per ton indices for operations of different sizes demonstrates that groups of firms reacted differently to the events of 1999 through 2001. Firms in the smaller and mid-sized groups in the expanded population reacted differently than those in the base group. There was some shift in the study population with the addition of more contractors from the Gulf South and Lake States (Table 2). The effects of curtailments, closures and restructuring were felt differently across the regions. The move toward cut-to length systems in the Lakes States is one such factor.

### 1.3.2.2 Component Cost Indices

Component cost indices for equipment, labor, consumable supplies and contract services were developed in the same manner as those for total cost per ton. The index was developed first for the entire base and expanded populations, and then for the population split into size categories (Figure 6). Component indices are affected by substitution (contract trucking can be substituted for equipment replacement, a pull-through delimeter will displace labor) and business restructuring. Assessing the major cost components in isolation can aid in understanding the forces underlying aberrant behavior of the larger index.

#### 1.3.2.2.1 Component Cost Indices

**Equipment cost per ton, Figure 6a:** The equipment cost per ton indices for the expanded population roughly paralleled the base population but the magnitude of the year to year changes differed.

**Labor cost per ton index, Figure 6b:** The labor cost per ton index rose steadily over the period, the expanded index smoothing out the 2000 downturn in the base index bringing the trend more in line with the Bureau of Labor Statistics index for the wages of blue collar workers (shown as a dotted line).

**Consumable Supplies cost per ton index, Figure 6c:** The consumable supplies index for the expanded population mirrored, but was higher than the base population, starting eight points higher and ending 13 points higher. Fuel costs account for a share of this, the jump in prices is evident in the 2000 figures, but other supplies rose as well.

**Contracted Services cost per ton index, Figure 6d:** Contracted services are one tool that firms may use to accommodate short term changes in the other major costs. Therefore these short term cost substitutions cause other indices to display less predictable behaviors, simply because different firms may choose to use contract services in different ways. The contracted cost per ton index for the total populations rose steadily over the period; the index for the expanded population was more volatile than that of the base, falling in 2000 and rising again in 2001, ending six points higher.

#### 1.3.2.2.2 Component Cost Indices by Firm Size

The indices for the small firms, producing less than 50,000 tons per year (Figures 7a-7d), exhibited the greatest volatility, often moving in directions counter to that of the other two groups. The indices for operations of this size are much more vulnerable modest changes by only one or two firms. As mentioned earlier, the firms are also more subject, because of their size, to changes in any aspect of the business climate. They are least likely to be protected as key or critical suppliers.

Those for the expanded population of mid-sized firms (Figures 8a -8d) moved in unison with the pattern defined by the base population, but were larger for all categories except equipment costs per ton.

The indices for the expanded population of larger contractors (Figures 9a-9d) also matched the pattern and location of the base population, although the year to year changes were somewhat different.

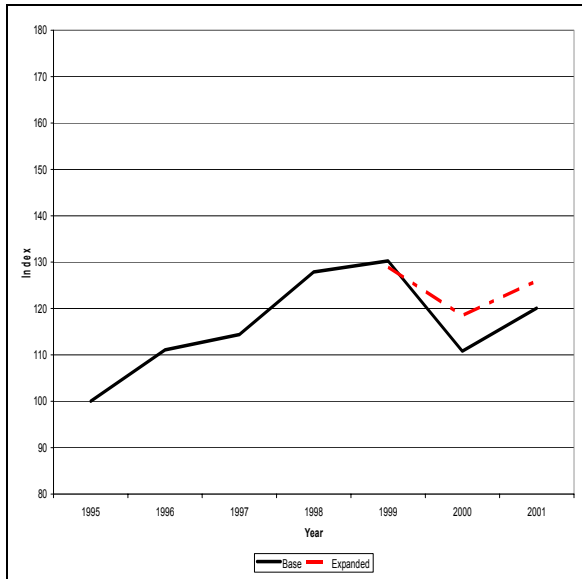


Figure 6a. Equipment cost per ton index

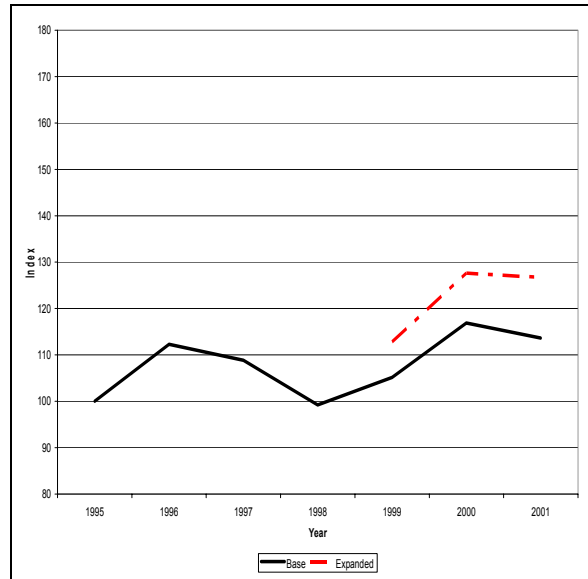


Figure 6c. Consumable supplies cost per ton index

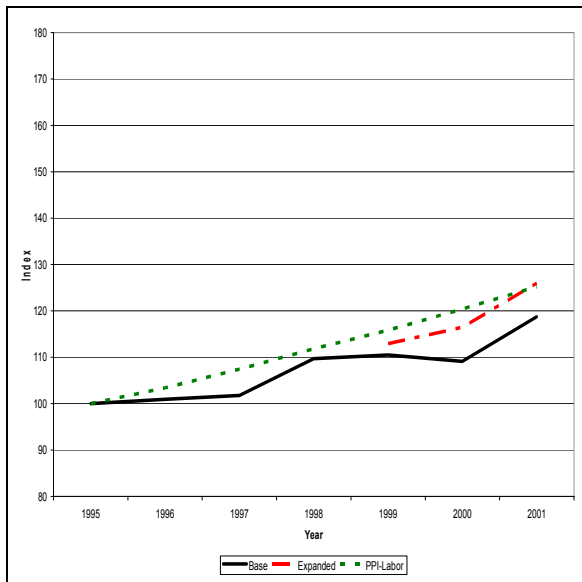


Figure 6b. Labor cost per ton index

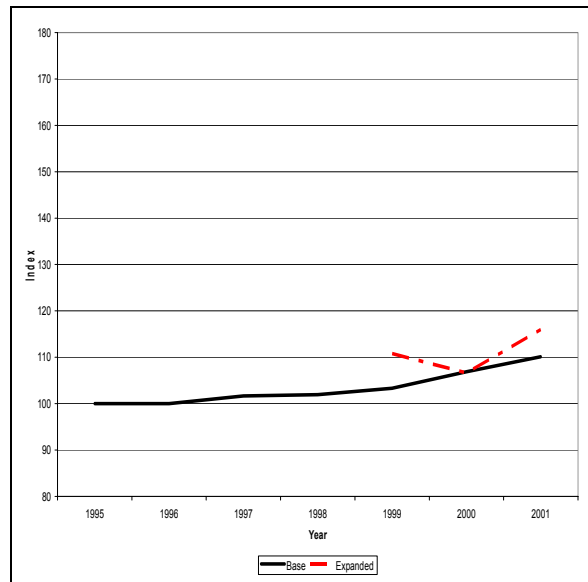


Figure 6d. Contracted services cost per ton index

Figure 6. Component cost indices for all firms

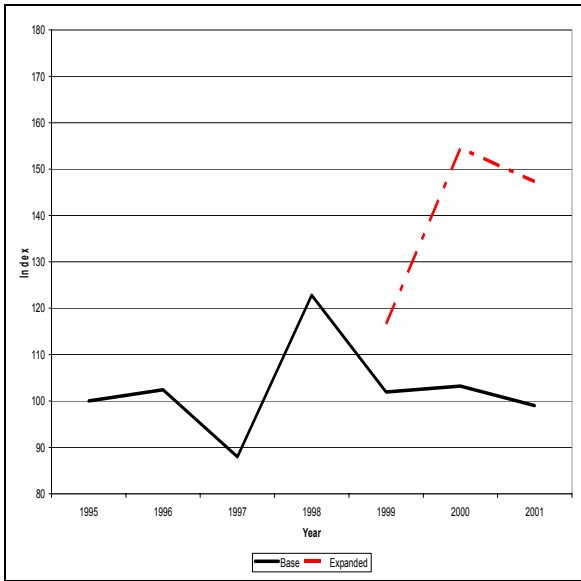


Figure 7a. Equipment cost per ton index

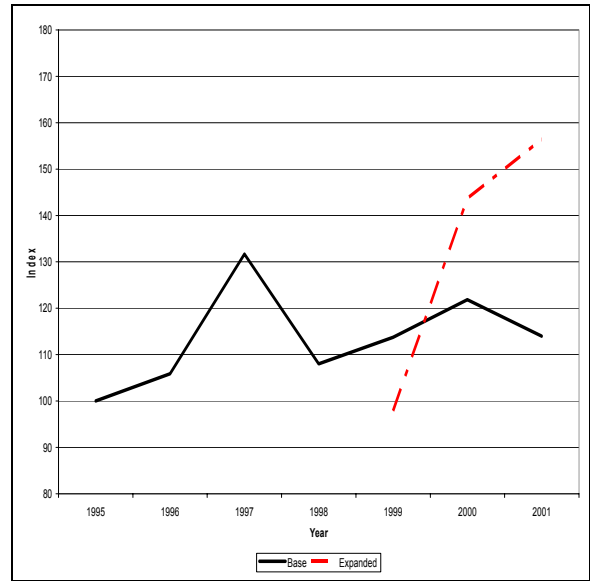


Figure 7c. Consumable supplies cost per ton index

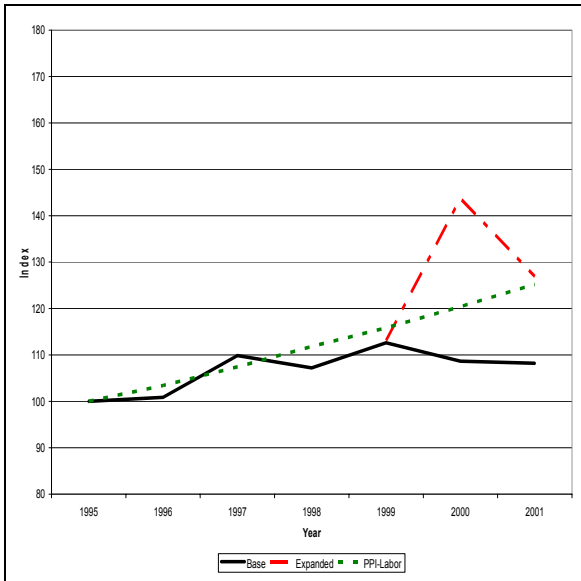


Figure 7b. Labor cost per ton index

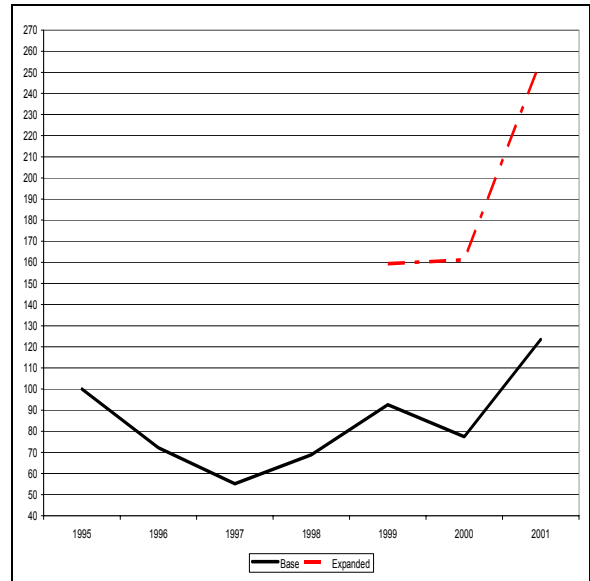


Figure 7d. Contracted services cost per ton index.

Figure 7. Component cost indices for small firms

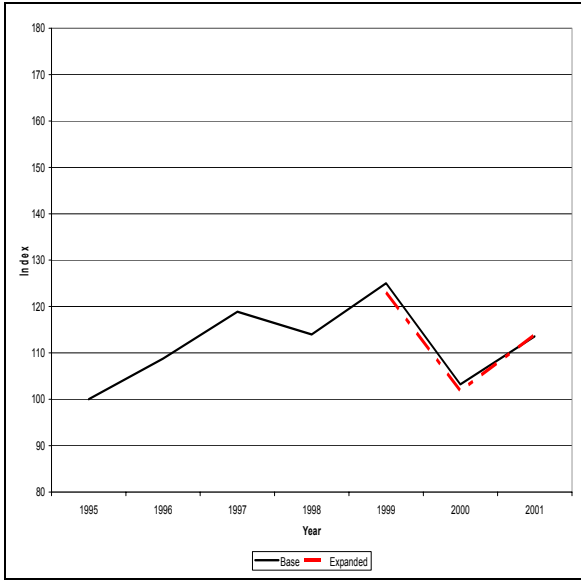


Figure 8a. Equipment cost per ton index

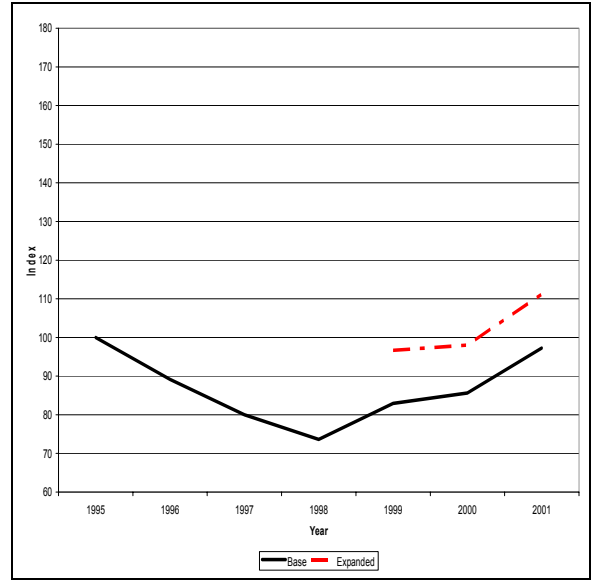


Figure 8c. Consumable supplies cost per ton index

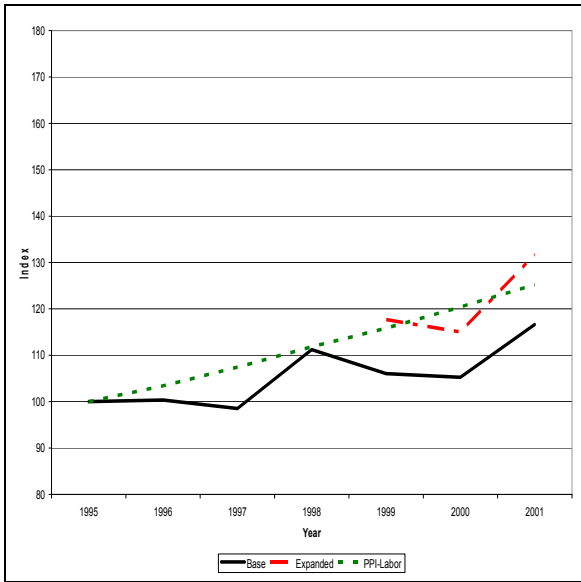


Figure 8b. Labor cost per ton index

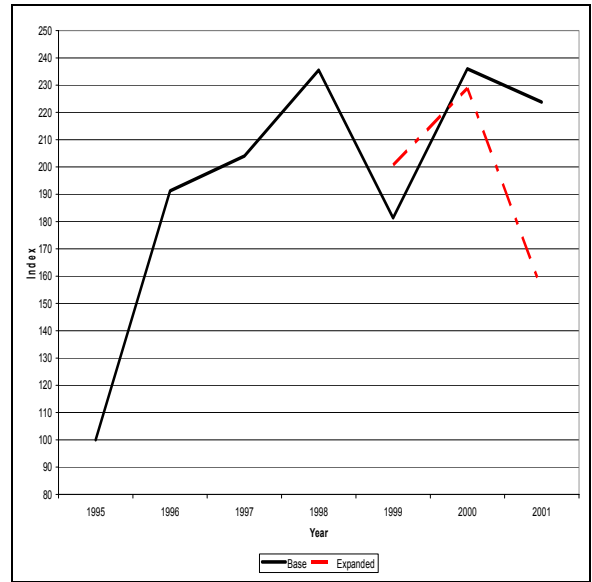


Figure 8d. Contracted services cost per ton index

Figure 8. Component cost indices for medium firms

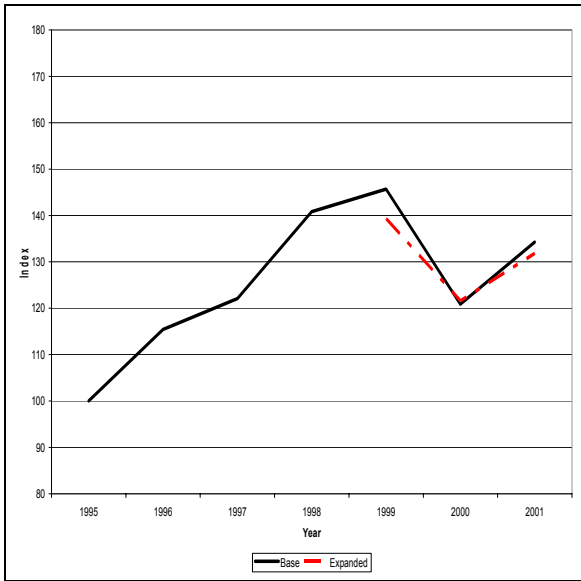


Figure 9a. Equipment cost per ton index

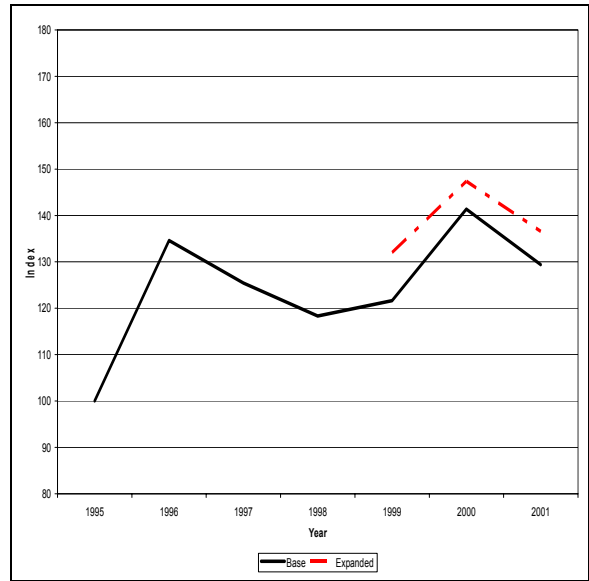


Figure 9c. Consumable supplies cost per ton index

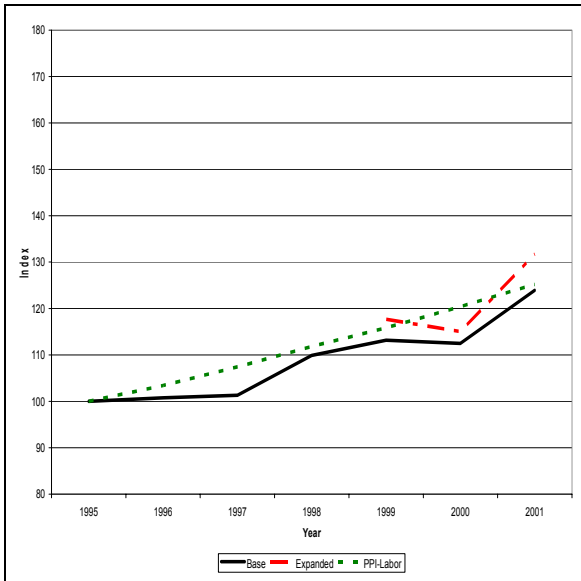


Figure 9b. Labor cost per ton index

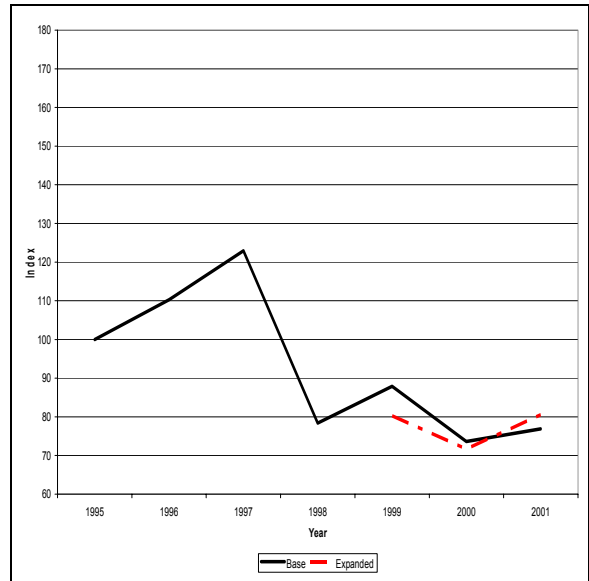


Figure 9d. Contracted services cost per ton index

Figure 9. Component cost indices for the large firms

### 1.3.2.3 Cost Allocation

Trends in cost restructuring are as important as trends in the costs themselves. Short term survival strategies used to compensate for events such as the rises in fuel costs in 2000 and 2003 have to be employed to survive, often at the expense of long term business development. Strategies such as reducing the investment in equipment by relying on contracted services can have long term implications for both the firm and industry.

The percentage contribution of each of the six major cost components (equipment, labor, consumables, administrative overhead, insurance, and contracted services) to total costs was computed for both the base and expanded population and for each size category within the populations to assess differences in cost allocation (Figure 10). More detailed definitions for the cost components can be found in Appendix Table A11. The double entries in years 1999-2001 are separated by dotted lines and base and expanded populations are indicated by suffixes b (base) and e (expanded) in the following charts.

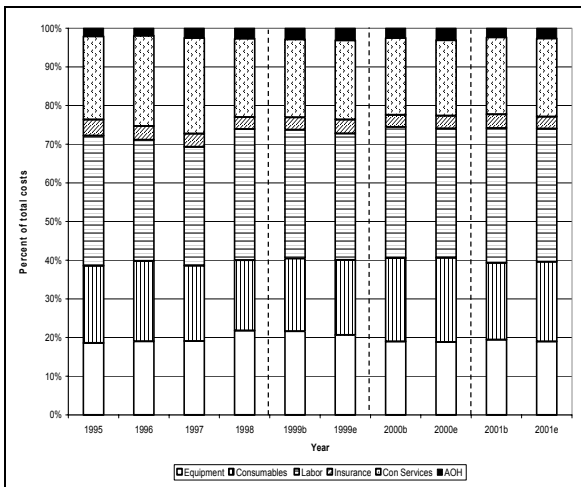


Figure 10a. Cost allocation for the total population

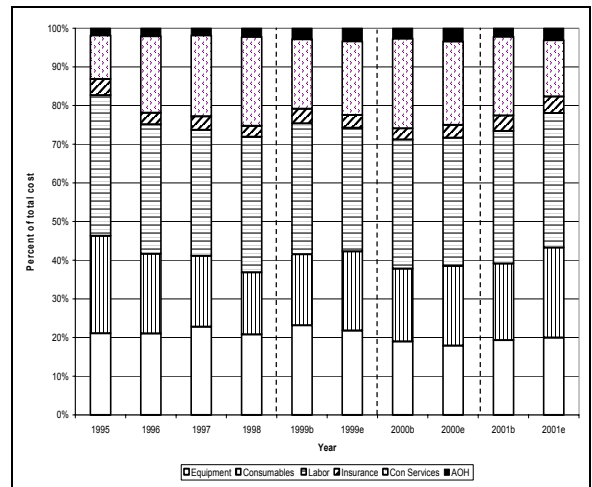


Figure 10c. Cost allocation medium firms

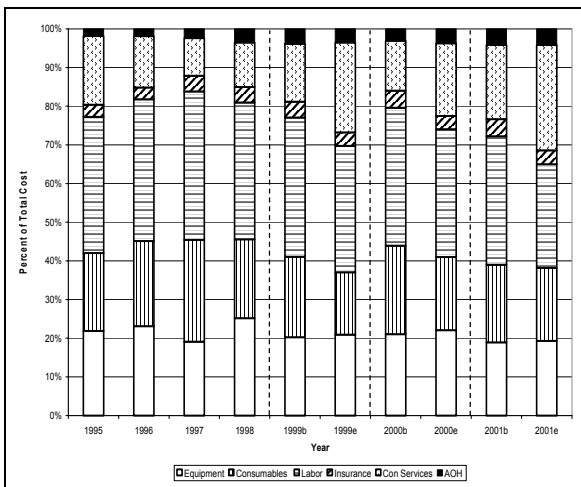


Figure 10b. Cost allocation for the small firms

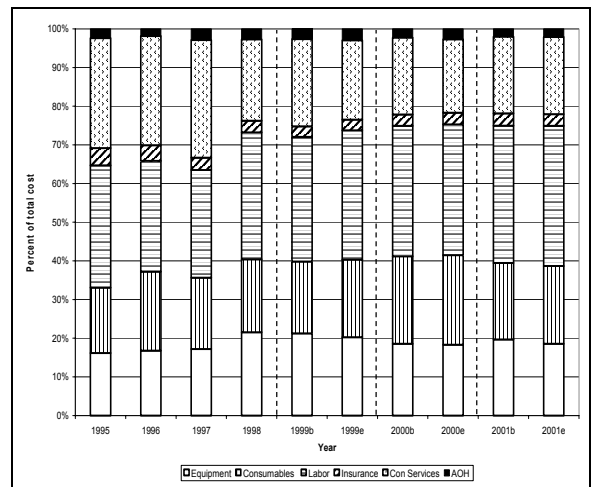


Figure 10d. Cost allocation large firms

Figure 10. Cost allocation for the entire sample and by firm size

The cost allocations by year for the total population were quite similar (Figure 10a) except that the expanded population used slightly less labor and compensated by relying more on contracted services than the base population. Cost allocations for the smaller contractors were more variable over time and between populations for the same year (Figure 10b). Patterns of trade-offs were more difficult to discern, likely because of the individualistic nature of the firms and the turmoil of the period. The base and expanded populations of the mid-size firms tended to track fairly well for 1999 and 2000 (Figure 10c). The allocations to consumable supplies and labor increased for the expanded population and the contracted services share fell in 2001. Cost allocations for the larger firms were more consistent over time and between populations (Figure 10d). Labor's share rose, and other costs were adjusted to compensate. Equipment expenditures were slightly less for the expanded population.

## ***1.4 Discussion***

Expansion of the survey population may cause some instability in the index in the early stages. Partitioning the causes of instability into those inherent to the populations being sampled and those due to current disturbances in the regional wood supply system is difficult in the early stages of sampling. Pre-determining the appropriate sample size for sampling is nearly impossible for a population as complex as logging contractors.

The problem is further complicated by the fact that little is known of the universe of wood suppliers. Recent reviews of statistics concerning the logging industry find that most are in error and nearly all underestimate the number of participants.

The goal in the early stage of the project will be to recruit as many businesses as possible, attempting to get an appropriate mix of business and operation types and sizes, geographic distribution and procurement relationships. Only full time businesses are being recruited, those for whom cutting and delivering roundwood is a full time occupation and the major business undertaking.

An attempt is being made to build "nests" of contractors similar in equipment spread, size, harvesting/procurement niche, and geographic location to deal with exogenous factors affecting cost and productivity. Again, attributing causality is not a necessary component of index development, but the ability to identify, in a general context, the forces affecting the index will be critical to gaining the most benefit, for the suppliers and consuming mills, from the index effort. This is an overarching reason for linking the index and graduate level research efforts.

A special emphasis will be placed on recruiting more small firms, those producing less than 55-60,000 tons per year. Data from these firms are the most variable, probably because these firms are more diverse in management, market niches, and procurement relationships. They play an important role in the wood supply system, and may play an even greater role in the future given the disaggregation of forest ownerships and the potential demands for smaller harvesting units in the future.

Indices are useful and valuable if they adequately reflect the direction and extent of change. Indications are that the indices being developed will gain utility and value as tools early in the development, but like everything else, must be subjected to a program of continuous improvement over time. Work will continue to develop linkages between the logging cost index and other indices developed by government agencies, research organizations, trade publications and other sources. A forthcoming report demonstrates the linkage of the logging cost index with stumpage prices and delivered roundwood values maintained by RISI.

## Appendix

The following tables provide the source data used to develop the figures contained in the body of the report. They are numbered and structured to mimic the figures as closely as possible.

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Table A1. Production ranges by firm size – base and expanded populations (Figure 1)

<i>Year</i>	<i>Operation Size--Tons per year</i>					
	<i>Lower Third</i>		<i>Middle Third</i>		<i>Upper Third</i>	
	<i>Min</i>	<i>Max</i>	<i>Min</i>	<i>Max</i>	<i>Min</i>	<i>Max</i>
2001e	2,649	43,825	44,151	67,025	81,525	272,525
2001b	2,649	49,984	54,955	77,381	83,243	276,518
2000e	4,916	49,132	50,042	72,153	73,169	268,159
2000b	8,496	47,100	52,523	81,650	89,587	253,143
1999e	9,644	44,325	46,630	73,370	73,389	194,624
1999b	9,644	47,526	50,281	72,940	86,936	180,197
1998	12,975	43,303	50,896	63,551	67,154	203,996
1997	17,533	47,393	48,020	72,879	75,611	255,163
1996	19,450	36,953	38,064	69,346	69,678	215,077
1995	20,475	32,697	34,358	74,638	79,216	218,236

Table A2. Average total cost per ton indices (Figures 2-5)

	<i>Sample</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
All Contractors (Fig. 2)	Base	100	108	111	109	112	108	115
	Expanded					115	117	123
Small Firms (Fig. 3)	Base	100	97	101	107	110	107	115
	Expanded					122	153	167
Medium Firms (Fig. 4)	Base	100	109	110	115	114	115	124
	Expanded					119	120	120
Large Firms (Fig. 5)	Base	100	111	115	106	111	105	110
	Expanded					111	107	115

Table A3. Component cost indices for all firms (Figure 6)

<i>Component Cost</i>	<i>Sample</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
Equipment (Fig. 6a)	Base	100	111	114	128	130	111	120
	Expanded					129	119	126
Labor (Fig. 6b)	Base	100	101	102	110	110	109	119
	PPI	100	103	107	112	116	120	125
	Expanded					113	116	126
Consumable supplies (Fig. 6c)	Base	100	112	109	99	105	117	114
	Expanded					113	128	127
Contracted services (Fig. 6d)	Base	100	118	129	103	105	101	106
	Expanded					111	107	116

Table A4. Component cost indices for the small firms (Figure 7)

<i>Component Cost</i>	<i>Sample</i>	1995	1996	1997	1998	1999	2000	2001
Equipment (Fig. 7a)	Base	100	102	88	123	102	103	99
	Expanded					117	154	147
Labor (Fig. 7b)	Base	100	101	110	107	113	109	108
	PPI	100	103	107	112	116	120	125
Consumable supplies (Fig. 7c)	Base	100	106	132	108	114	122	114
	Expanded					98	144	156
Contracted services (Fig. 7d)	Base	100	72	55	69	93	77	123
	Expanded					159	161	256

Table A5. Component cost indices for the medium firms (Figure 8)

<i>Component Cost</i>	<i>Sample</i>	1995	1996	1997	1998	1999	2000	2001
Equipment (Fig. 8a)	Base	100	109	119	114	125	103	114
	Expanded					123	102	114
Labor (Fig. 8b)	Base	100	100	99	111	106	105	117
	PPI	100	103	107	112	116	120	125
Consumable supplies (Fig 8c)	Base	100	89	80	74	83	86	97
	Expanded					97	98	111
Contracted services (Fig. 8d)	Base	100	191	204	235	181	236	224
	Expanded					201	229	155

Table A6. Component cost indices for the large firms (Figure 9)

<i>Component Cost</i>	<i>Year</i>	1995	1996	1997	1998	1999	2000	2001
Equipment (Fig. 9a)	Base	100	115	122	141	146	121	134
	Expanded					139	122	132
Labor (Fig. 9b)	Base	100	101	101	110	113	112	124
	PPI	100	103	107	112	116	120	125
Consumable supplies (Fig. 9c)	Base	100	135	125	118	122	141	129
	Expanded					132	147	137
Contracted services (Fig. 9d)	Base	100	110	123	78	88	74	77
	Expanded					80	72	81

Table A7. Cost allocation—all firms (Figure 10a)

<i>Component Cost</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999b</i>	<i>1999e</i>	<i>2000b</i>	<i>2000e</i>	<i>2001b</i>	<i>2001e</i>
Equipment	19%	19%	19%	22%	22%	21%	19%	19%	20%	19%
Consumable supplies	20%	21%	20%	18%	19%	20%	22%	22%	20%	21%
Labor	34%	31%	31%	34%	33%	33%	34%	34%	35%	34%
Insurance	4%	4%	3%	3%	3%	4%	3%	3%	4%	3%
Cont. services	21%	23%	25%	20%	20%	21%	20%	20%	20%	20%
AOH	2%	2%	3%	3%	3%	3%	3%	3%	2%	3%

Table A8. Cost allocation—small firms (Figure 10b)

<i>Component Cost</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999b</i>	<i>1999e</i>	<i>2000b</i>	<i>2000e</i>	<i>2001b</i>	<i>2001e</i>
Equipment	22%	23%	19%	25%	20%	21%	21%	22%	19%	19%
Consumable supplies	20%	22%	26%	20%	21%	16%	23%	19%	20%	19%
Labor	35%	37%	38%	35%	36%	33%	36%	33%	33%	27%
Insurance	3%	3%	4%	4%	4%	3%	4%	3%	4%	4%
Cont. services	18%	13%	10%	11%	15%	23%	13%	19%	19%	27%
AOH	2%	2%	2%	4%	4%	4%	3%	4%	4%	4%

Table A9. Cost allocation—medium firms (Figure 10c)

<i>Component Cost</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999b</i>	<i>1999e</i>	<i>2000b</i>	<i>2000e</i>	<i>2001b</i>	<i>2001e</i>
Equipment	21%	21%	23%	21%	23%	22%	19%	18%	19%	20%
Consumable Supplies	25%	21%	18%	16%	18%	20%	19%	21%	20%	23%
Labor	36%	33%	33%	35%	34%	32%	33%	33%	34%	35%
Insurance	4%	3%	3%	3%	4%	3%	3%	3%	4%	4%
Cont. Services	11%	20%	21%	23%	18%	19%	23%	22%	20%	15%
AOH	2%	2%	2%	2%	3%	3%	3%	3%	2%	3%

Table A10. Cost allocation—large firms (Figure 10d)

<i>Component Cost</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999b</i>	<i>1999e</i>	<i>2000b</i>	<i>2000e</i>	<i>2001b</i>	<i>2001e</i>
Equipment	16%	17%	17%	22%	21%	20%	19%	18%	20%	19%
Consumable supplies	17%	20%	18%	19%	19%	20%	23%	23%	20%	20%
Labor	32%	29%	28%	33%	32%	33%	34%	34%	35%	36%
Insurance	4%	4%	3%	3%	3%	3%	3%	3%	3%	3%
Cont. services	28%	28%	30%	21%	23%	21%	20%	19%	20%	20%
AOH	2%	2%	3%	3%	3%	3%	2%	3%	2%	2%

Table A11. Component cost definitions.

1. <u>Equipment</u>	
A. Note payments (principal and interest)	
B. Depreciation	
C. Taxes (highway use, property tax)	
2. <u>Labor</u>	
A. Payroll (wages and salaries)	
B. Payroll taxes (FUTA, FICA, and Medicare)	
C. Worker's Compensation Insurance (WCI)	
D. Fringe benefits (vacation, uniforms, retirement, etc.)	
3. <u>Consumables</u>	
A. Tires	F. Non-depreciable tools
B. Fuel	G. Gravel
C. Oil and Lubricants	H. Mats
D. Parts and maintenance	I. Wrecker service
E. Truck and equipment washing	
4. <u>Administrative overhead</u>	
A. Secretary wages	F. Legal and professional fees
B. Bookkeeping or accounting fees	G. Travel expenses
C. Office expenses	H. Phone and CB radio expenses
D. Licenses	I. Medical expenses
E. Fines	J. Miscellaneous dues and contributions
5. <u>Insurance</u>	
A. General liability	
B. Equipment (Fire/Theft/Vandalism)	
C. Umbrella policy	
6. <u>Contracted services</u>	
A. Contract trucking	
B. Cut & Skid, moving expenses	
C. Road building, BMPs, excavating, etc.	
D. Contract labor	