C I N T R A F O R

Working Paper

75

Changing Export Trends and the Health of the Pacific Northwest Forest Sector

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Rose Braden
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December 1999
(Revised March 2000)

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EXECUTIVE SUMMARY

The Pacific Northwest (PNW) forest sector is strategically linked to Pacific Rim markets, as it has been at a competitive disadvantage with the US South and interior Canada in delivering wood products to the population dense eastern and southern US markets. Deep-water port access to Asia however, has provided the PNW with a comparative advantage in serving what was until recently, the region with the world's highest sustained growth. The Asian financial crisis, which began in 1997, substantially reduced US exports to Asia, and has compounded the negative impacts of the harvest restrictions intended to protect the habitat of endangered species, which began in 1990. Both the Asian financial crisis and the harvest constraints are forcing long-term structural changes. Understanding these changes is important to maintaining the economic and biological health of the forest sector.

The Impact of the Asian Financial Crisis

US forest product exports to Japan, the largest export market, declined from $4.8 billion in 1996 to $2.8 billion in 1998 (-42%). And exports to South Korea, the third largest market for US wood products, declined from $963 million to $538 million (-52%). The only Asian market to avoid the crisis was China. US exports to China increased from $474 million in 1996 to $538 million in 1998 (+13%). While the Asian recession has forced substantial structural change in the PNW, such as permanent closure of many businesses, firms who survive are expected to increase their sales as the Asian economy rebounds.

The Impact of Harvest Restrictions

Since timber harvest restrictions were first implemented in 1990 to protect endangered species, harvest volumes have declined 30% in Washington, and over 40% in Oregon, from what were thought to be sustainable harvest levels. Lower harvest volumes resulted in substantial losses to logging and lumber processors and raised the cost of wood for secondary processors, reducing their competitiveness. Prior to the Asian crisis, the higher prices resulting from the reduced harvests mitigated some of the economic losses to timber producers, but they also motivated investments and increasing production rates by suppliers of wood from around the world. With the Asian crisis ending the period of tight markets, the second round of long-term structural adjustments to restore cost competitiveness at reduced harvest levels is now beginning.

The effects of these two issues on business income, exports, employment and forest health in the PNW are ongoing topics of analysis. The summary below is based on the report: *Changing Export Trends and the Health of the Pacific Northwest Forest Sector,* (CINTRAFOR WP75) which examines the data on changing export trends, supply and demand shifts and competitiveness, as policies are being implemented to promote the protection of endangered species.

Secondary Wood Products

Secondary wood product exports (doors, windows, joinery, moldings, furniture, cabinets, prefabricated components and prefabricated housing) increased to $320 million by 1996, a gain of over 100% in four years, largely driven by the Japanese government beginning to deregulate their home construction market. These gains were small in comparison to $3 billion in primary product exports, but they provide evidence of growing export opportunities. As shown in figure 1, while secondary product exports continued to increase as the PNW began to supply Japan's housing market, by 1997-1998 exports declined substantially. As the anticipated economic recovery in Japan and Asia stimulates consumer demand and deregulation continues to open these markets, however, market penetration should increase from current levels of about 1% of their market to levels more comparable with primary products (10-20%), which could sustain a strong recovery over many years.

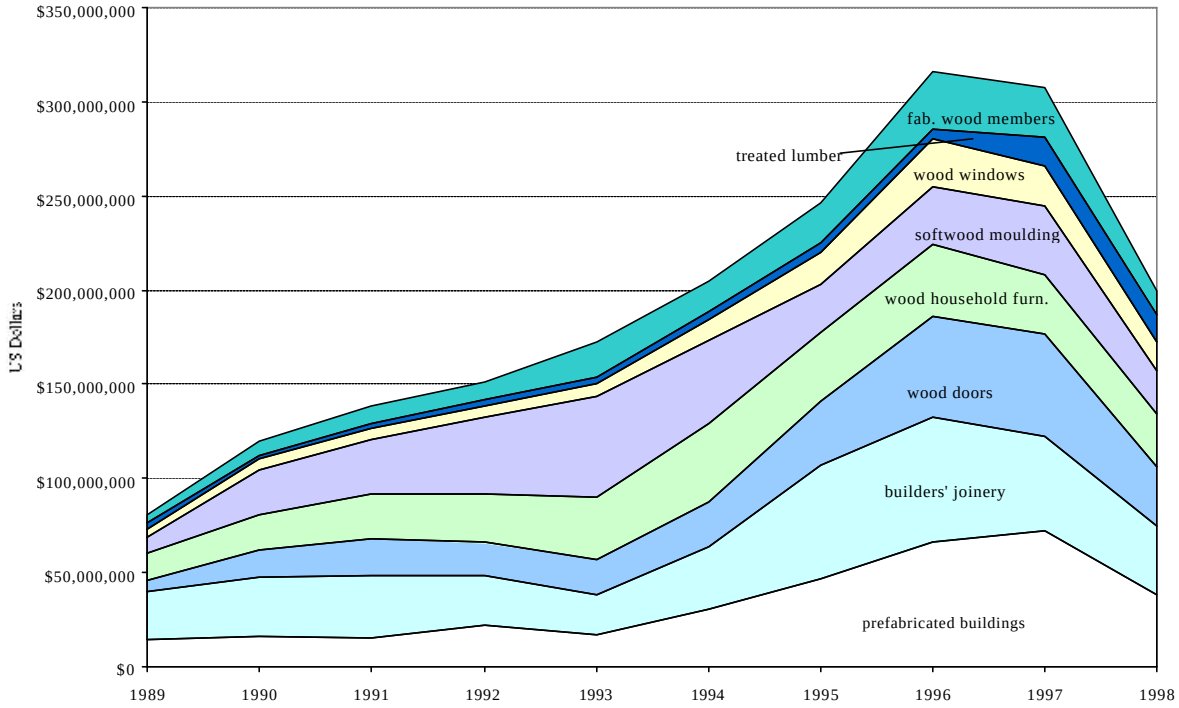

Figure 1. Secondary exports from the Pacific Northwest to all destinations, 1989-1998 (US Department of Commerce 1999).

While secondary exports to Japan have increased overall, the PNW's share of the Japanese market declined 23% as Canadian producers' share increased. Higher regional wood costs, fluctuating exchange rates, and higher levels of support to the forest sector provided by the Canadian government and forest products industry have helped Canadian producers catch up to the PNW and become a formidable competitor.

Revenue from secondary manufacturing in Washington State (inflation adjusted) has grown at nearly 3% per year, with a substantial portion of that growth due to increasing exports. While revenue growth has been constant, it has also been constrained by the harvest reductions and the higher cost of wood. Revenue from secondary manufacturing appears to have fallen below potential by as much as 15%. Even so, the sector has not been nearly as severely constrained as

the primary processing sector. While exports could potentially increase by several billion dollars with only modest penetration of the Asian markets, declining competitiveness with Canada and other supplier regions may substantially reduce the PNW's growth potential.

There has also been a positive long-term trend in secondary processing productivity as the sector has improved productivity by almost 3% per year. This has resulted in much smaller increases in employment compared to production. Growth has also largely been located in communities close to metropolitan corridors and has not been of much help in offsetting the primary job losses in rural communities. Secondary wood product manufacturers generally have lower capital intensity than other wood or paper processors and their efficiency improvements reflect increased capital investments.

Primary Wood Products

Primary product export volumes also declined significantly as a consequence of harvest constraints. Prices for raw materials and finished goods increased as available volume decreased, which offset some of the losses in revenue for a few years. High timber prices allowed companies to harvest higher cost timber stands, requiring more workers, which reduced employment losses in rural timber dependent areas. These offsets may be short lived however, as timber prices declined substantially in 1997-98 with the Asian crisis, forcing another round of structural changes.

Lumber production did not decline nearly as much in Washington State as in Oregon, because substantial volumes of log exports were diverted from Washington ports to local mills, which almost offset the decline in local harvest. While the decline in log and lumber export revenues has been substantial (almost $2 billion), very strong demand from the US housing market has helped maintain high domestic lumber prices. Nevertheless, lumber margins in the 1990s have generally been below the cash flow levels needed to sustain capacity, resulting in more mill shutdowns and lowering the base of installed capacity. Logging and processing costs have increased by almost 20% relative to the US south. This cost disparity provides a direct measure of declining competitiveness and the need for additional restructuring.

Much of the decline in log exports is linked to worldwide restructuring followed higher log prices during the early 1990s. Export premiums once paid for hemlock logs may never be restored as the market has shifted to other suppliers such as Russia, Europe, New Zealand and Chile. Even spruce and fir export prices may not be fully restored by economic recovery in Asia, as the emphasis on pre-cut construction has shifted to more stable wood, such as dried lumber and engineered products.

The countervailing duty and quota agreement between the US and Canada has also affected US competitiveness in international markets. The agreement limits the amount of lumber Canada can export to the US duty free. While this quota provides protection for US lumber manufacturers, it forces Canadian producers to sell excess supply at lower prices to offshore markets, taking away the transportation and quality advantage the PNW once held. As Canada's domestic lumber prices have dropped, Canadian producers exported more lumber and secondary products to the Pacific Rim. The quota limitation on Canadian lumber to the US accelerated the shift from US log exports to lumber exports from Canada and Europe as Japanese buyers saw

high US log and lumber prices relative to other suppliers. When US markets ultimately weaken, PNW log and lumber producers will feel the full effects of this loss in competitiveness in the Asian markets they once dominated. The US market share of logs and lumber in Japan has declined from 56% in 1989 to 31% in 1998, a 25% decline, as Europe gained share by 11%, Canada by 7%, and other suppliers by 7%.

Pulp and Paper

Unlike the solid wood sector; there is no demonstrated improvement in employee wages per dollar of sales for the pulp and paper producers. Rising wage costs, especially following harvest constraints, suggest facilities are operating at lower efficiency levels since supply has declined. Since pulp and paper mill capital costs have more than doubled over the last two decades (as mills invested in technologies to reduce effluent), there has been an increase in capital costs, wages, and wood costs, which has reduced profitability and competitiveness. Greater use of recollected waste fiber has not offset rising costs. Washington State's pulp and paper facilities have become high cost producers in the global market, resulting in several closures and strategic shifts to other regions with lower cost fiber resources, such as South America.

Business Income and Employment

Overall, business income in the forest sector did not decline as much as harvest rates, since prices partially offset the negative impacts of the early harvest declines. Changes over a five-year period before the harvest declines (1986-1991) and after (1992-1997) show that Washington's timber harvest volume declined 31%, but logging employment declined only 22%. Both logging and processing costs have increased relative to the US South, compromising Washington's ability to compete. If production efficiency improved, Washington State could lose another 2,000 rural logging jobs.

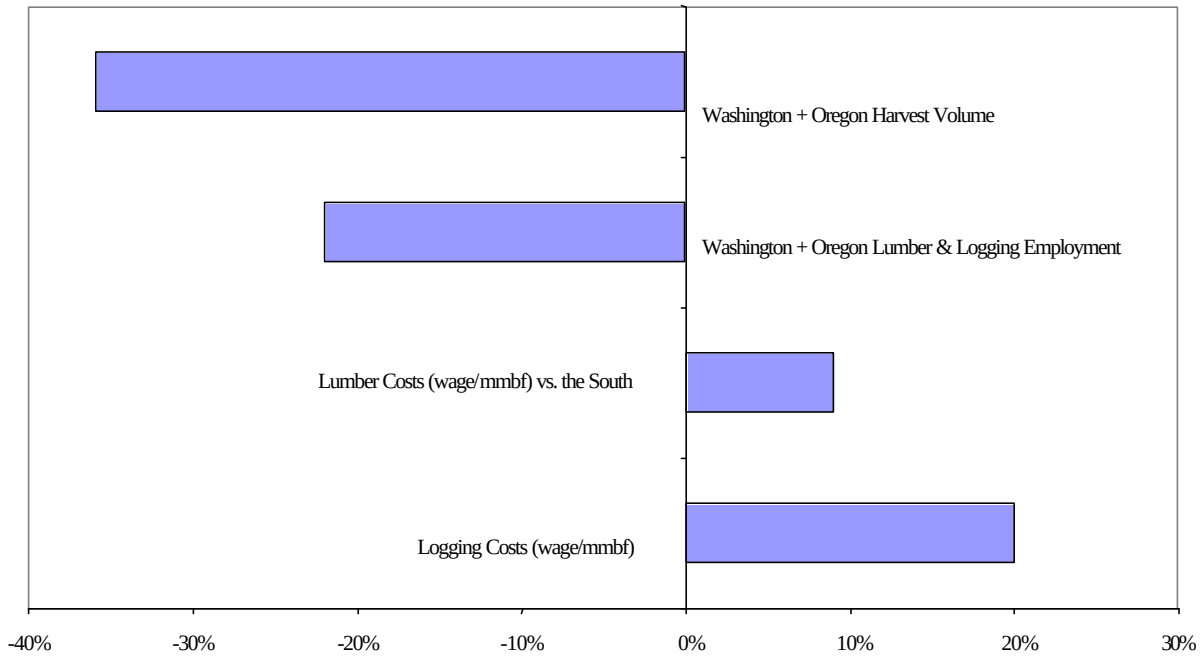

Figure 2. PNW change from 1986-1991 in harvest, employment, and costs (CINTRAFOR 1999).

Approximately 12,600 primary processing jobs in Washington and Oregon, and an equal number of indirect rural jobs, have been lost since 1992. Unemployment rates are still 6% higher in timber-dependent communities than in urban communities. New timber harvest restrictions to protect salmon populations, combined with industry restructuring to make PNW production costs competitive with other regions will compound already high employment losses and regional disparity. The 66% increase in disparity between urban and timber rural county incomes experienced by 1997 will almost certainly worsen before adjustments to timber harvest reductions have been absorbed.

While the PNW has experienced losses in revenue, employment, and market share, the region still maintains a fundamental long-term comparative advantage in growing timber and accessing international markets. The increase in income from both secondary manufacturing, improvement in product yields, and higher valued exports, which collectively characterized the growth in the sector before the harvest constraints, should be restored once this lagging adjustment process to changing markets and policies is complete. Unfortunately, the evidence suggests that the structural adjustments to meet new regulations and restore competitiveness are not yet complete.

Increased Old-Forest Habitat for Endangered Species

While recent federal and state regulations have reversed the trend of declining old forest habitat, since the regulations rely on reserves to restore critical habitat, the projected habitat improvements are both slow and costly. Simulations for the westside of Washington show late seral structures of importance to endangered species increasing from 11% of the acres to 18% by the 5^{th} decade and 33% by the 10^{th} decade. Reserves age slowly without the benefit of periodic fires and other disturbances that in pre-European times contributed to the creation of diverse forest structures. Reserve stands that are now too dense for good habitat will remain in this condition for many decades. Simulations of active management strategies to restore habitat on at least some acres show more a more rapid restoration of old forest habitat conditions, obtained at a lower cost. More rapid deployment of new technologies in rural areas affecting timber production, forest protection, and habitat restoration will be critical to future environmental progress as well as the impact on rural communities. To provide better insights on how to increase the rate of environmental progress or reduce the negative economic consequences that have resulted from recent policies, Washington State could benefit from a more systematic effort to assess environmental progress and economic sustainability.

Other Perspectives

While taxes remain a concern to forest landowners, changes in regulatory impacts in the last decade have had much greater impacts than taxes. Concerns over accelerated land conversions and sales by small non-industrial forest owners have increased. Harvest rates for non-industrial private forest owners doubled in the 1990s, reaching unsustainable rates. While the several-year period of high prices prior to the Asian crisis provided an opportunity to liquidate mature timber, it also offset the landowner's losses resulting from environmental regulations. With the expectation of lower timber prices and higher regulatory costs, the motivation for small landowners to manage the land for timber rather than sell to larger owners or to real estate developers will diminish.

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INTRODUCTION

The health of the PNW forest sector has been strategically linked to export markets and the establishment of stable supplier relationships with foreign purchasers:

The Pacific Northwest (PNW) forest sector (Washington and Oregon) has long been at a competitive disadvantage with the US South and Interior Canada in delivering wood products to the population dense eastern and southern US markets. While other regions may have a competitive supply advantage for delivery to the US population centers, deep water port access to Pacific Rim markets gives PNW and coastal BC producers a competitive advantage in serving what, until recently, have been the highest growth markets in the world. The rising demand in the Pacific Rim has contributed to higher prices and margins in the region, and therefore has a disproportionately greater impact on profitability than the 30% share of total sales going into exports. The impact of exports can range from as high as 70% of revenue for some private timber companies, to only indirect impacts for secondary processors that only serve local markets. Understanding changing developments in Pacific Rim markets and the competitiveness of PNW suppliers provides a basis for understanding the health and viability of the PNW forest sector.

Section I provides a brief explanation of the two external shocks that have had the most severe impact on the forest sector over the last decade, namely (1) the Asian economic crisis and (2) the efforts to save endangered species, which resulted in substantial harvest reductions. Data and accompanying analysis show that these shocks have not affected all product categories in the same way. Section II is devoted to secondary manufactured wood products. This sector, with the highest valued products, holds the greatest promise for long-term growth and market penetration based on recent progress in deregulating overseas construction markets. Secondary manufactured wood products have been affected less by harvest constraints and thus provide a somewhat clearer perspective of changing export opportunities. Section III covers primary wood products including unprocessed materials, which have been severely constrained by harvest reductions during the 1990s due to endangered species conservation efforts. Many of the policy issues that are related to changing export trends and changing competitiveness are analyzed in this section, including the impacts of market cyclicality, the comparison of exports to domestic production, adjustments to supply constraints, and log export bans.

Section IV provides a brief summary of the pulp and paper sector. Section V provides a summary of business income for the total forest sector. Section VI provides employment trends for the forest sector, shifting the focus to the impact on the community rather than processors and forest landowners. Section VII assesses the environmental progress resulting from regulations and their cost effectiveness.

Changing export trends are analyzed for every product category for which reliable data is available. The hottest products and international markets are identified by rank. An analysis of changing market shares provides evidence of changing competitiveness among supply regions both within the US and with other global suppliers. When available, measures of costs and productivity are included to better assess the causes of changing competitiveness. The impacts of exports on business income are examined in each forest product sector. Much of the analysis

is focused exclusively on Washington State, as it has been the leading exporter among all US states for most forest products. To the degree that the factors driving change are fairly well known, we have drawn some conclusions about how future trends might be expected to compare to the past.

Section VIII provides a brief discussion of other perspectives, particularly taxation and land conversions along with a brief summary of major findings. In the Executive Summary, changing trends are analyzed from the perspective of the overall health of the forest sector and its many interrelated industries. While the Asian economic crisis has clearly had a dominant and negative impact on the PNW forest sector over the last two years, the restructuring taking place in the long-term should result in the further opening of international markets and greater export opportunities.

I. EXTERNAL SHOCKS: THE ASIAN CRISIS AND HARVEST REDUCTIONS TO PROTECT ENDANGERED SPECIES

Asian countries enjoyed a stable growth trend until 1997 when the Asian financial crisis substantially reduced US exports to Asia. US forest product exports to Japan, the largest export market, declined from $4.8 billion in 1996 to $2.8 billion in 1998, a 42% decline. Exports to South Korea, the third largest Asian market for US wood products, declined from $963 million to $538 million, a 52% decline. The only Asian market that avoided the crisis was China. US exports to China increased from $474 million in 1996 to $538 million in 1998, a 13% increase (US Department of Commerce 1999).

Because Japan is the largest US export market, and the housing sector is the dominant end-market for US exports, Japanese housing starts provide the single best economic indicator of demand for imported products. Figure I.1 shows Japanese housing starts compared to US housing starts. The number of housing starts in Japan had been consistently higher than the number of starts in the US for several years prior to the Asian crisis, but that number declined to record low levels during 1997-98. A modest recovery in Japanese housing is expected in the last half of 1999 and in 2000, the result of direct stimulus programs. While problems in Japan's banking sector and losses in consumer confidence are regarded as significant obstacles to their rate of recovery, more general recovery and restoration of export markets can be expected over the long-term. Korea is already experiencing rapid economic recovery. While the external shock caused by the Asian crisis can be described as monumental, it will provide the setting for a very strong recovery for exporters who are able to survive the downturn and who remain positioned to take advantage of the opportunity.

Harvest reductions to protect endangered species. The second major shock to the forest sector resulted in harvest declines of 30% in Washington and over 40% in Oregon from what had previously been thought to be sustainable harvest rates (Bare et al 1994, Adams et al 1992), Lippke et al 1991). Efforts to protect endangered species began having a substantial effect on timber sales in 1990. Declines in harvest volumes for Washington and Oregon are shown in Figure I.2. Reduced harvest volumes have caused a substantial loss in the production of primary products such as lumber and pulp, and have raised the cost of wood for secondary processors. The major difference between the impacts of the Asian crisis and the impacts of harvest constraints is that analysts expect the Asian crisis to be temporary. While the impacts of the Asian recession have forced substantial structural change, such as the permanent closure of many businesses, recovery is expected to benefit firms that have weathered the storm. Conversely, harvest constraints are not temporary - they are forcing long-term structural adjustments. The questions of whether and how much longer these adjustments will continue and what can be done to minimize the negative consequences remain important issues.

Figure I.1. US and Japan annualized housing starts, 1989-1998 (Japan Wood Information Center 1999).

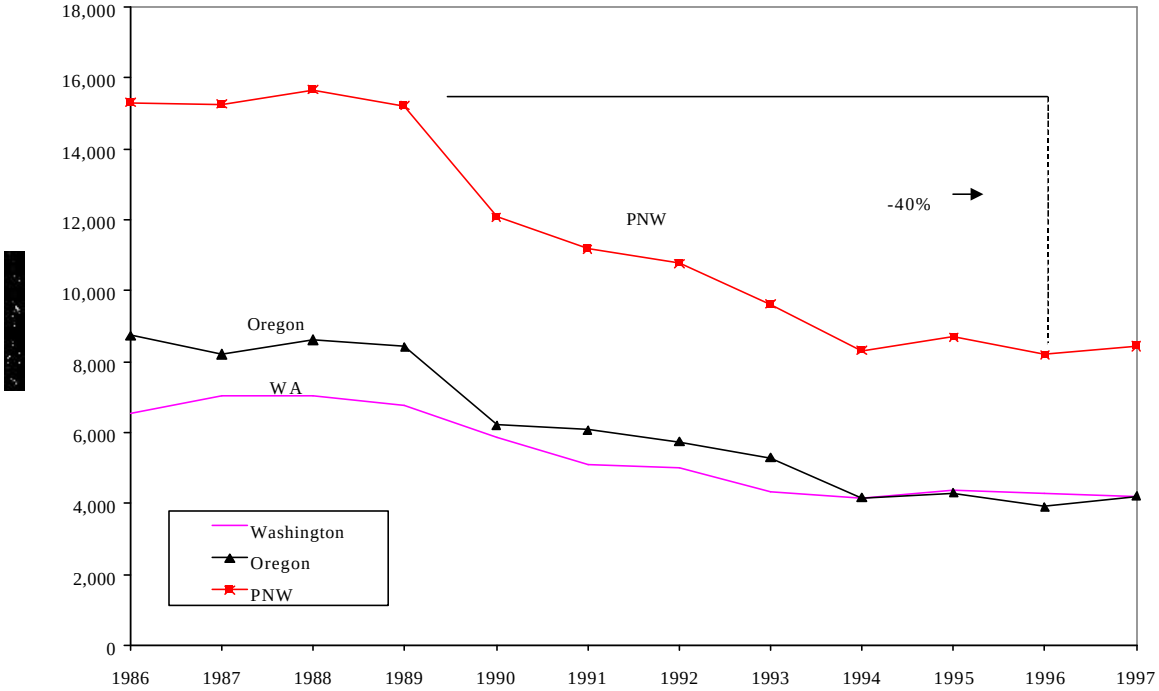

Figure I.2. Harvest levels in the PNW (Washington and Oregon), 1986-1997 (WDNR and ODF 1998).

II. SECONDARY MANUFACTURED PRODUCTS AND EXPORTS

Fundamental changes are being driven by the deregulation of the Japanese housing market and the Asian economic crisis.

Industry analysts have been expecting that exports to overseas markets, especially exports to Japan, would follow the normal progression from exporting raw materials, to exporting primary products, and eventually to more highly processed product exports. The logic behind this progression is based on several factors: (1) increased demand in Pacific Rim markets has exceeded domestic wood supply, necessitating the growing need for imports; (2) uses of wood and historical species preferences in foreign market differ from those in the US, therefore foreign buyers first have to be satisfied with the quality of the imported wood; and (3) since foreign markets are much more dependent upon stable supplier service relations than US markets, successful US raw material exports would help develop the foundation for a stable supplier relationship. This would lead to the export of primary, and eventually secondary products.

Consistent with that logic, starting in the early 1960s log exports to Japan flourished. Much later, demand for wood products in Korea, Hong Kong, and China increased as well. During the 1980s, there was a substantial increase in exports of primary processed products to Japan. While it has taken a long time, the demand for secondary manufactured products in Japan has increased in the last seven years. The increase in secondary manufactured exports to Japan is a result of major changes in the Japanese government's policies toward its construction sector. The Japanese government now appears committed to deregulating Japan's housing markets, in order to lower the cost and to raise the quality of housing. This requires open access to imports. There are early signs of similar market developments in Korea and China.

While the Asian economic crisis has sharply curtailed many markets, it may have positive long-term impacts on future foreign investment and trade. In Korea, President Kim Dae Jung and his cabinet launched one of the most aggressive economic restructuring campaigns in Asia. Many of the Korean government's reforms are supplementary to reforms required by the International Monetary Fund (IMF). In an effort to stimulate the domestic economy the Ministry of Finance and Economy instituted several economic reform policies to relax real estate and foreign investment laws to attract foreign capital. The Korean government has also enacted policies to reform business practices in domestic corporations and banks. Economic reform measures are causing the economy to recover at a faster rate than projected (Braden 1999). Recovery is also progressing in other Asian markets.

II.A. Secondary Manufactured Exports from the PNW (Washington and Oregon)

Figure II.1. Secondary manufactured wood exports (including pass-through exports from other regions) to all countries from 1989 to 1998, provides the available history for the current definitions on harmonized export codes, as given by the US Department of Commerce. Unadjusted for inflation, export revenues increased from $109 million in 1989 to almost $392 million in 1996, a 260% increase in the seven years before the Asian economic crisis. While exports of secondary products are but a small share (10%) of the sector’s output, which largely serves local urban markets, such high export growth still contributed to a doubling of the sector's

growth rate. Since the economic crisis, revenue from secondary processed wood product exports has declined $140 million, or 36%. Most of the growth and losses in secondary exports have occurred in Asian markets, yet overall, exports remain 130% above 1989 revenues. Several of the top ten export product categories show different patterns of growth and sensitivity to the economic decline in Asia, therefore, each will be examined. Many different products have contributed to the substantial growth of secondary manufactured products in export markets. While the data include products that are imported from other US regions and pass through PNW ports as exports, analysis of other data shows that for the top ten selected product categories, the dominant share originates in the PNW.

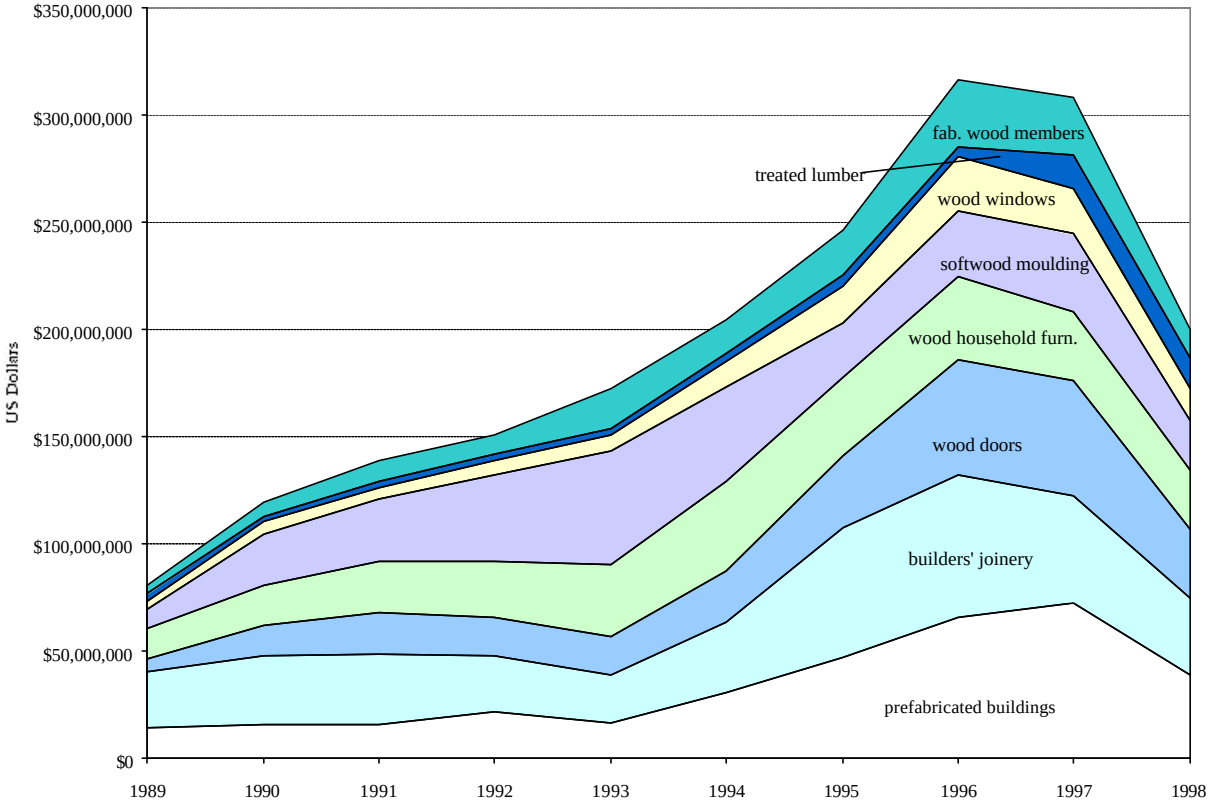

Figure II.1. Leading secondary processed wood exports from the Pacific Northwest to all countries, 1989-1998 (US Department of Commerce 1999).

Figure II.2. Secondary manufactured exports by custom district, shows that most products are exported from the Seattle customs district. Ports located along both the Washington and Oregon sides of the Columbia River are included in the Columbia-Snake River customs district. The share of exports coming from the Columbia-Snake District has increased significantly after 1993, rising from 11% in 1993 to 22% in 1996. However, the Seattle customs district continues to dominate the amount of exports leaving the region. Since some of the Columbia River custom district ports are in Washington State, Washington has an even more dominant share of secondary exports than Oregon, in contrast to the comparison of the Seattle to Columbia-Snake River customs district.

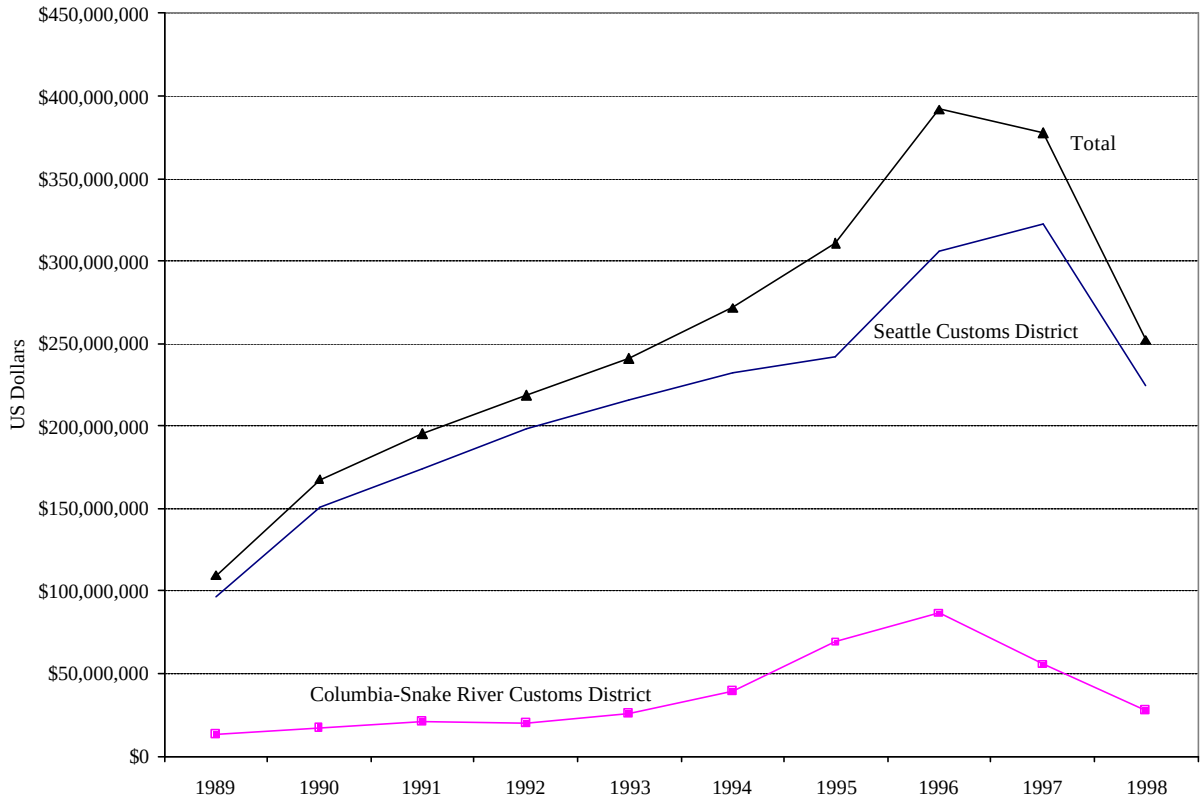

Figure II.2. Secondary exports from the Pacific Northwest to all destinations by custom district (US Department of Commerce 1999).

II.B. Secondary Manufactured Exports to Japan

Figure II.3. Secondary wood product exports to Japan, shows a much more rapid increase from 1992 to 1996 than exports to all countries. Unadjusted for inflation, the Japanese market increased from $55 to over $238 million, a more than three-fold increase in seven years. The slowdown in the Japanese economy contributed to declining export levels in 1992 and 1993, but there was no significant economic recovery to explain the high growth from 1993 to 1996. Deregulation of the Japanese housing market provides the logical explanation for this substantial growth. Since PNW penetration of these markets is almost inconsequential, typically 1% or less of Japan's consumption, the opportunity for growth in the Japanese housing market is expected to continue for many years, assuming deregulation continues. Theisen and Dirks (1996) provide an in-depth descriptive of the characteristics of the Japanese market.

The $183 million increase in exports to Japan explains much of the $283 million increase in exports to all countries. Similarly, the decline in exports from 1996 to 1998 of $124 million explains much of the $140 million decline in exports to all countries.

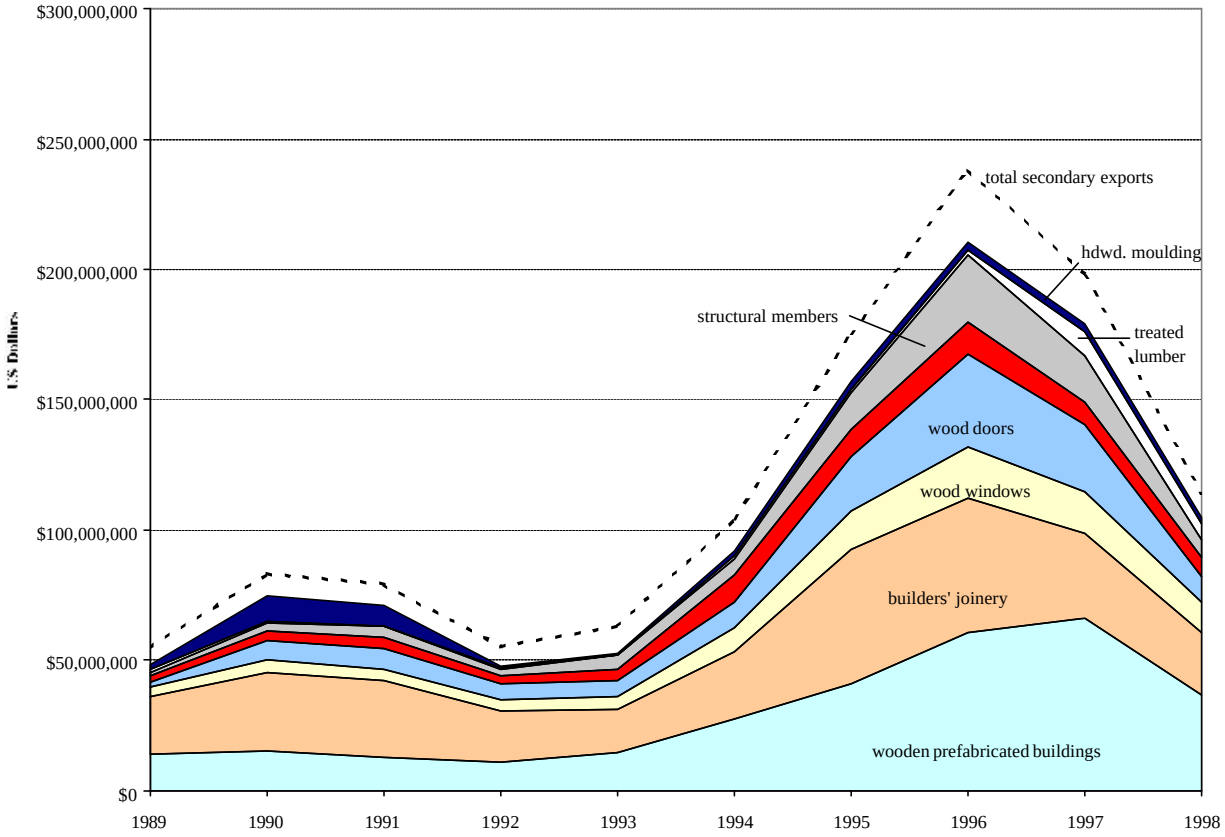

Figure II.3. Leading secondary processed wood exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Table II.1. Top ten secondary processed wood exports from the Pacific Northwest to Japan, illustrates that the PNW supplies a large share of US secondary wood exports. The PNW share of US exports in most secondary product categories lies in the 60-90% range. The table shows PNW shares in 1992 before the impact of deregulation in Japan, in 1996 before the Asian economic crisis, and in 1998. Prefabricated wooden buildings show the greatest gain in export revenue of all secondary processed goods, with an almost $50 million increase between 1992 and 1996. While the dominant share of US prefabricated wooden home exports to Japan comes from the PNW (86%), the increase in the PNW's share of US exports was only 10%, suggesting exports from other regions have been growing almost as rapidly. The top seven categories showed growth of over $9 million each.

Table II.1. Top ten secondary processed wood exports from the Pacific Northwest to Japan

US $ Millions	PNW Exports 1992	PNW Exports 1996	PNW Exports 1998	US Exports 1992	US Exports 1996	US Exports 1998	PNW Share of US Exports 1992	PNW Share of US Exports 1996	PNW Share of US Exports 1998
Wooden prefabricated buildings	$11.1	$60.9	$36.7	$14.6	$70.8	$40.7	76%	86%	90%
other builders joinery	$19.4	$51.1	$24.0	$24.4	$62.6	$40.7	79%	82%	59%
wood windows and frames	$4.5	$19.8	$11.4	$5.7	$21.7	$16.9	79%	91%	67%
wood doors, frames, etc	$6.0	$36.0	$9.8	$9.0	$47.1	$16.3	67%	76%	60%
wood household furniture	$3.3	$11.8	$7.8	$34.5	$56.7	$36.9	10%	21%	21%
Structural wood members	$2.4	$25.7	$6.7	$3.5	$38.3	$7.9	71%	67%	85%
treated lumber	$0.2	$1.8	$6.0	$0.3	$2.3	$6.5	81%	80%	92%
Hardwood moulding	$0.6	$3.6	$2.4	$1.1	$5.0	$3.0	49%	71%	81%
wood kitchen cabinets	$1.0	$9.9	$1.9	$1.5	$13.4	$3.4	67%	74%	57%
Hardwood flooring	$1.0	$5.5	$1.5	$3.6	$7.5	$3.9	26%	73%	38%
Softwood flooring	$0.7	$3.5	$1.4	$2.5	$5.5	$2.2	28%	64%	61%
Secondary Total	**$55.2**	**$238.2**	**$113.9**	**$127.5**	**$387.7**	**$218.9**	**43%**	**61%**	**52%**

Source: US Department of Commerce 1999

Revenue from builders' joinery increased $32 million, but incurred a slight loss in US share as other regions increased their exports even more. The PNW share of builder's joinery increased from 1992-1996, demonstrating leadership in opening the growing Japanese market, but suffered a severe decline in share by 1998. The lower share in1998 than in1992 demonstrates that the new suppliers from within the US who followed the market up were in fact very competitive in the downturn. This is evidence that although the new suppliers entered the market late they remained competitive.

Wooden doors and frames also experienced a large increase of $30 million from 1992 to 1996. Beginning with only $1.5 million in 1989, wooden doors registered the highest percentage increase in export revenue and one of the highest gains in share of US exports. Fabricated structural wood members showed a $23 million increase, but experienced a decrease in US share, suggesting substantial competition from other US regions. However the increased PNW share in 1998 provides evidence that the PNW remained very competitive in this market. Wooden windows and frames showed an increase of roughly half that of doors, but a higher share of the US market. Revenues from wooden household furniture exports increased almost $9 million.

PNW producers also increased their share of US exports of wooden furniture, yet the PNW share still maintains only one-fifth of the US exported wooden furniture market. Revenue from wooden kitchen cabinets increased $9 million, and PNW share of the US market increased 7%, with most of the growth occurring during 1995-1996. Hardwood flooring and moulding ranked in the top ten of exports, even though revenue earned from these two product categories was significantly less than the other export categories. One can speculate that these include more pass-through exports from the Eastern US, given the rather small volume of hardwoods produced in the PNW. Two fairly large product categories did not make the top ten list in exports to Japan: softwood moulding and wood or wood frame seats. Japan has not become a large importer of softwood moulding; the majority of softwood moulding produced in the PNW is exported to Canada.

PNW revenue losses from secondary processed product exports to Asian markets as a consequence of the economic crisis are shared broadly across the product categories with a $124 million, or 52% loss in exports to Japan from 1996 to 1998. Revenue losses for prefabricated buildings, wooden windows, and wooden household furniture were less than the secondary product sector total. Revenue losses for builders' joinery were about average, but losses for doors, structural members, kitchen cabinets, and hardwood flooring ranged from 70% to 80%, substantially greater than the sector average. Survey findings suggest that products that required exporters to integrate more closely with the Japanese distribution system, such as a sales office in Japan, or exporters who established joint ventures for distribution, fare better during the downturn than those that did not. Windows, which require more service support than other products declined less than the average of all products.

Export trends for each product category follow in the order of their export growth:

Figure II.4. PNW prefabricated wooden building exports to Japan, shows almost no increase until 1994, after which, they surged. Between 1993 and 1996, prefabricated building exports increased $54 million, or more than 300%. PNW producers supply the dominant share of US exports, and the PNW share seems to be reasonably comparable to other regions.

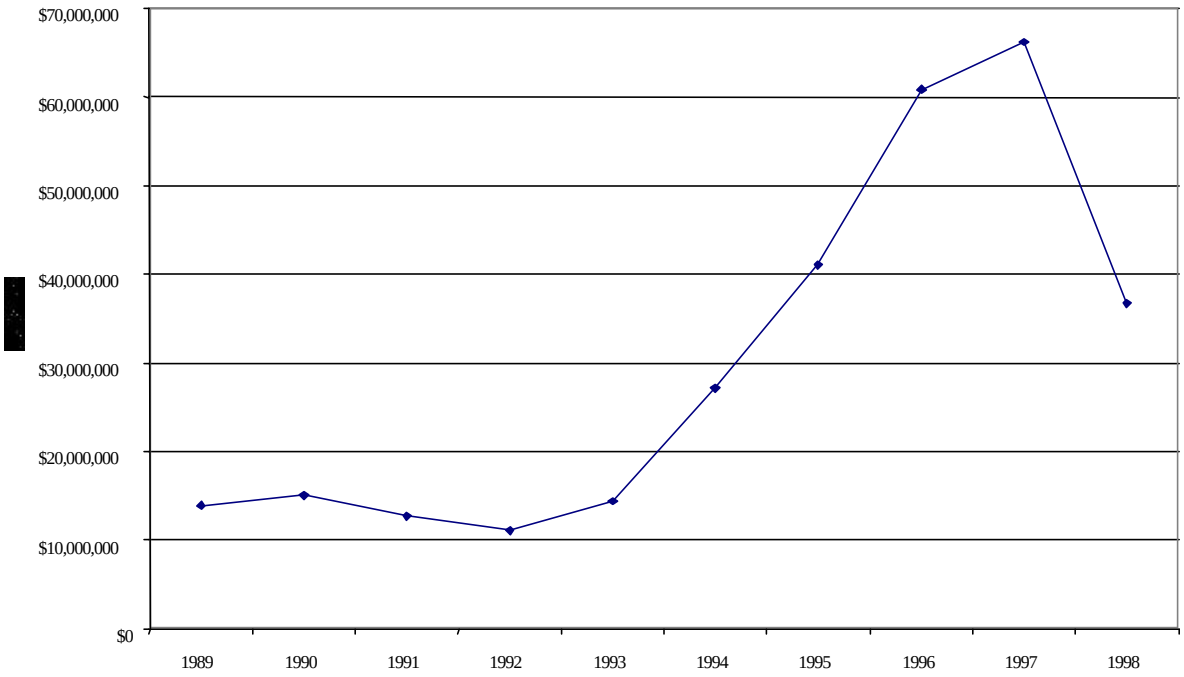

Figure II.4. Prefabricated wooden building exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

No single product more clearly typifies the opportunity for increased exports than prefabricated buildings, which offer an opportunity to lower housing costs in Japan as construction barriers are eased. Prefabricated building exports also enhance the opportunity for exporting cabinets and other interior fixtures.

The decline in prefabricated building exports after the Asian economic crisis was somewhat delayed compared to other sectors. Prefabricated building exports continued to increase through 1997, but declined 45% from the high, reached in 1997. Prefabricated building export revenues, however, remain three times the level of revenues in the early 1990s.

Figure II.5. PNW builders' joinery exports to Japan, shows some decline as the Japanese economy weakened, but they experienced a $34 million, or 200% increase from 1993 to 1996. While the PNW supplied the dominant share of US exports to Japan, other US regions gained substantial share on the PNW in 1996. Builders' joinery exports were immediately impacted with the onset of the Asian economic crisis, and by 1998, incurred a 53% decline from 1996 sales.

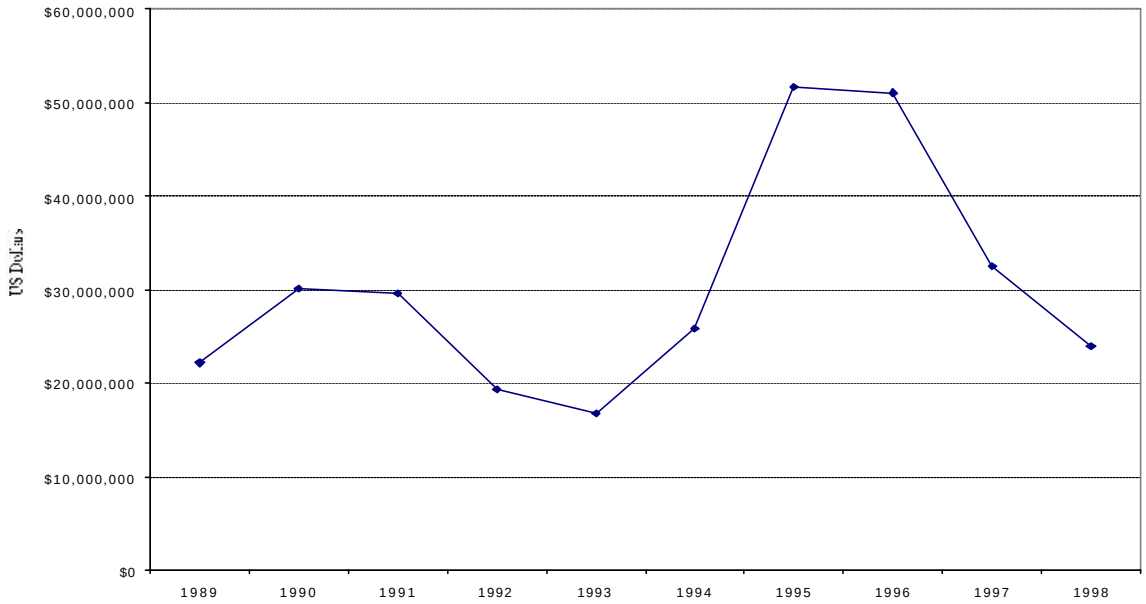

Figure II.5. Builders' joinery exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure II.6. PNW wood door and frame exports to Japan, shows some decline as the Japanese economy weakened in the early 1990s, yet the sector demonstrated a $30 million or 400% increase from 1993 to 1996. The PNW supplied the dominant share of US exports to Japan since 1989, and the share appears to be fairly stable over the last 7 years. Wooden door and frame exports declined more than most products since the Asian crisis with a 73% decline from the 1996 peak. Even so, revenues are well above 1992-1993 levels.

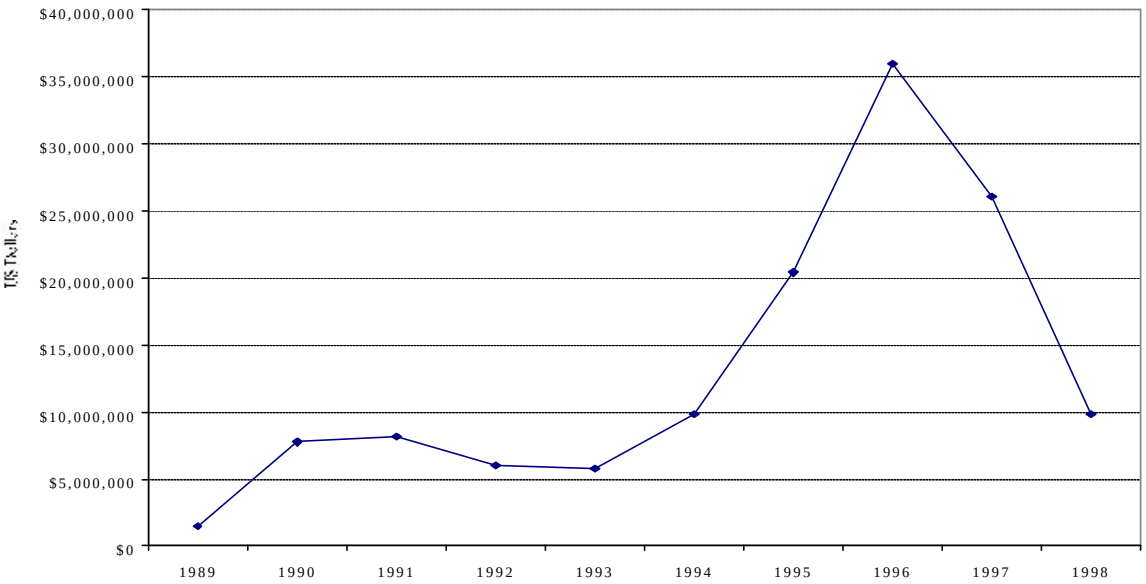

Figure II.6. Wooden door and frame exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure II.7. PNW fabricated structural wood member exports to Japan, shows significant increases starting a year sooner than many other categories. Use of laminated beam lumber in Japan has been increasing steadily since 1993, and US exports increased over 500% in just four years. The $22 million increase in PNW exports from 1992 to 1996 has helped the region maintain a fairly stable share of US exports during high growth years even though the PNW share of US exports was close to 100% in 1992. While not the largest market in terms of revenue growth, it had been one of the hottest product sectors with one of the highest growth rates. However, exports have declined 74% since the Asian economic crisis, one of the larger declines among all secondary product. Japan expanded domestic capacity in this sector just prior to the recession, contributing to the sharp decline in imports.

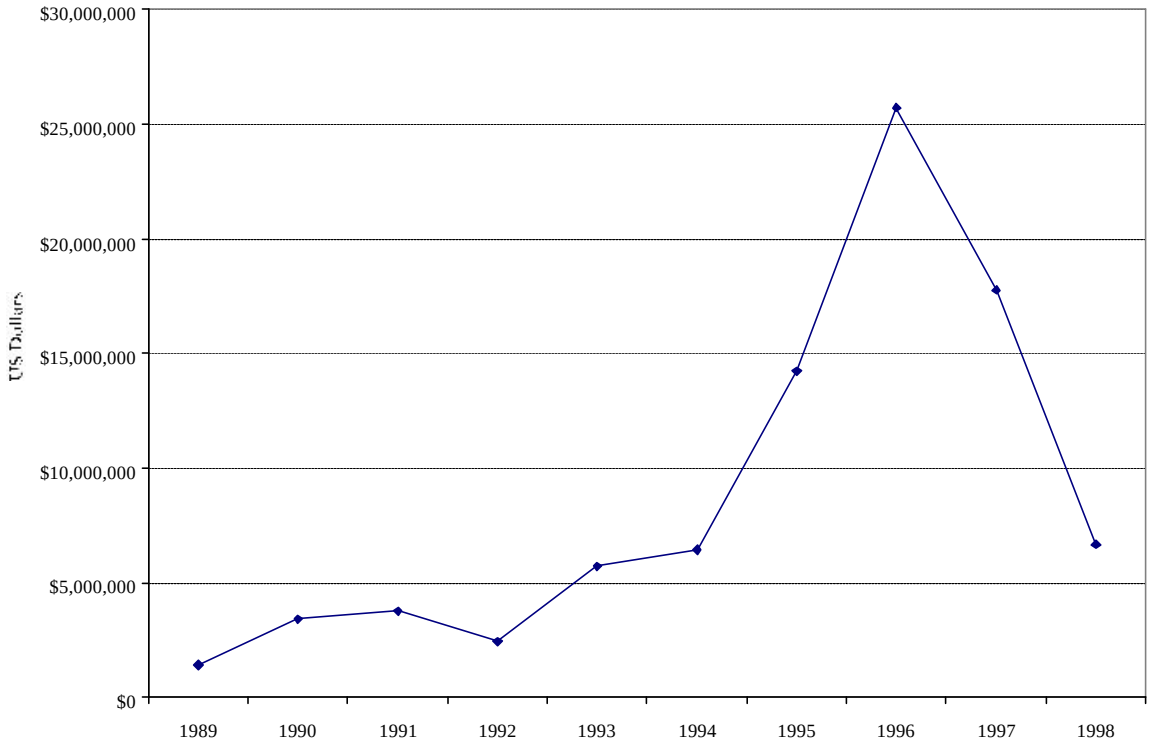

Figure II.7. Fabricated structural wood member exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure II.8. PNW wood window and frame export to Japan, shows that they were not one of the largest growth markets, yet revenues still increased almost $15 million or 288% from 1993 to 1996. Wooden windows require more intensive service than most other products, resulting in closer relationships with buyers. This may have worked to the sector's benefit during the economic downturn, as window exports declined 43%, one of the smaller declines among secondary product.

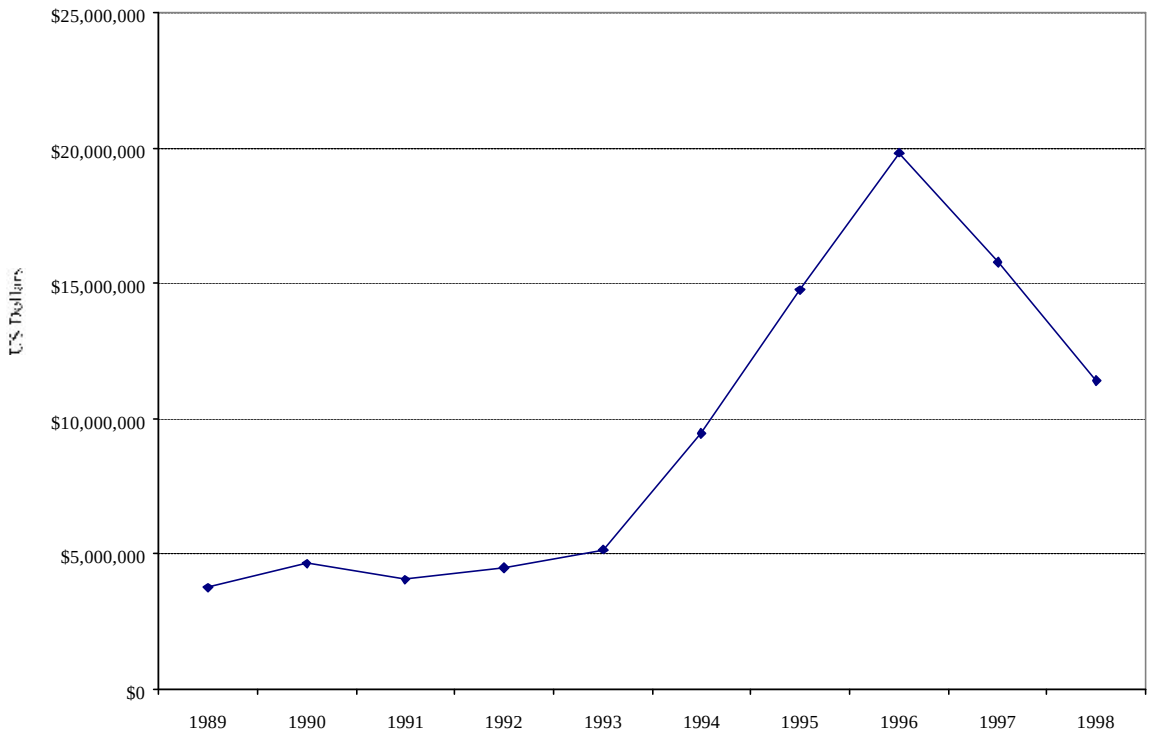

Figure II.8. Wood window and frame exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure II.9. PNW wood household furniture exports, shows moderate growth over the last three years, yet not nearly as much as most other secondary processed product categories. PNW exports to Japan increased from $4 to $12 million between 1993 and 1996, comprising a much greater portion of the $57 million in US wooden furniture exports to Japan. It appears furniture exports have received some benefit from deregulation of the Japanese housing market. For example, some prefabricated wooden homes come equipped with furniture and internal fixtures. Since PNW furniture manufacturers had previously sold furniture mainly to markets in the western US markets, the increase in exports shows promise for more market penetration. The 44% decline in wooden furniture exports during the Asian crisis, which was one of the smallest declines among all secondary wood product exports, may also be considered testimony to the potential for furniture exports to Japan.

Figure II.10. Hardwood flooring exports, shows growth, although revenues from hardwood flooring provide a fairly small contribution to total revenue. Hardwood flooring exports increased from only $1.5 million in 1993 to $5.5 million in 1996. Much of the hardwood flooring was produced in other regions of the US and passed through PNW ports en route to Asia. The Asian downturn eliminated all the growth in the hardwood flooring category, and resulted in a 73% decline from the peak, reached in 1996. In contrast, many other product categories remained about 100% above 1990-1992 levels.

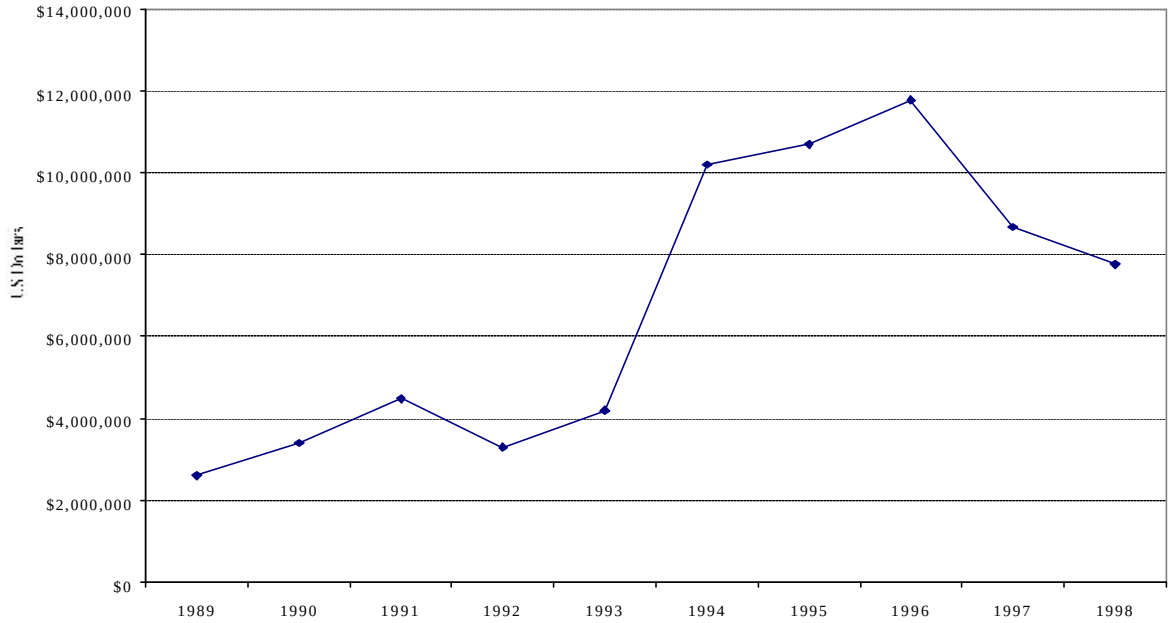

Figure II.9. Wooden household furniture exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

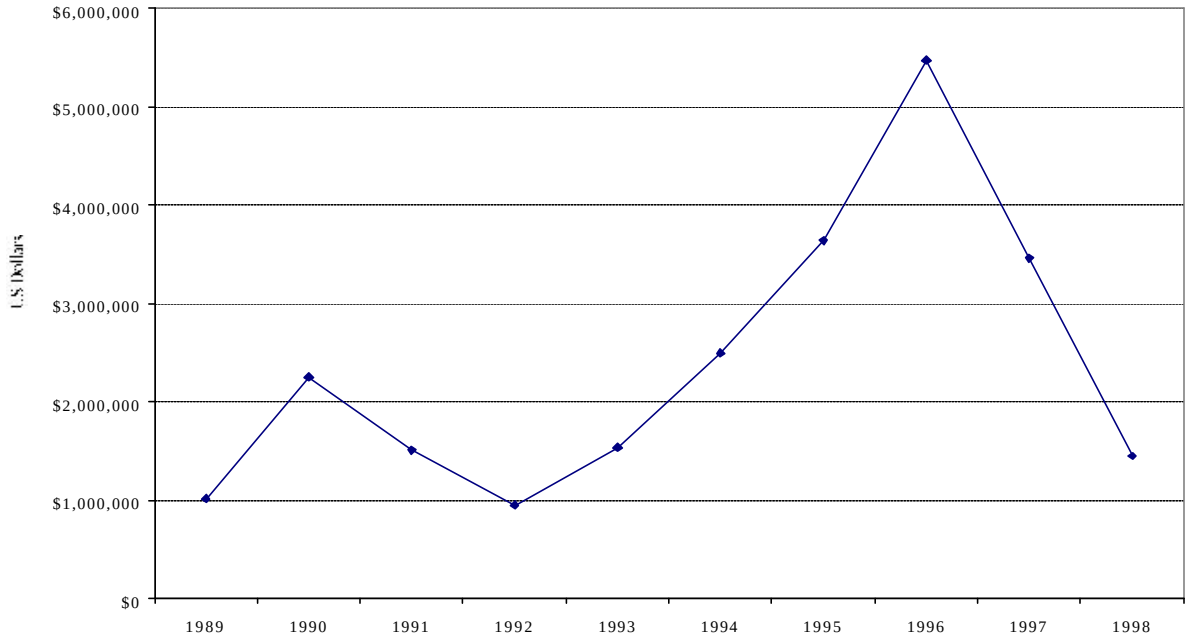

Figure II.10. Hardwood flooring exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure II.11: Hardwood moulding exports were volatile even before the Asian crisis. Large export volumes of hardwood moulding were shipped in 1990 and 1991, but record low volumes were shipped in 1992 and 1993. Exports appeared to increase from 1993-1996, yet after the Asian downturn they were not significantly above 1990 levels.

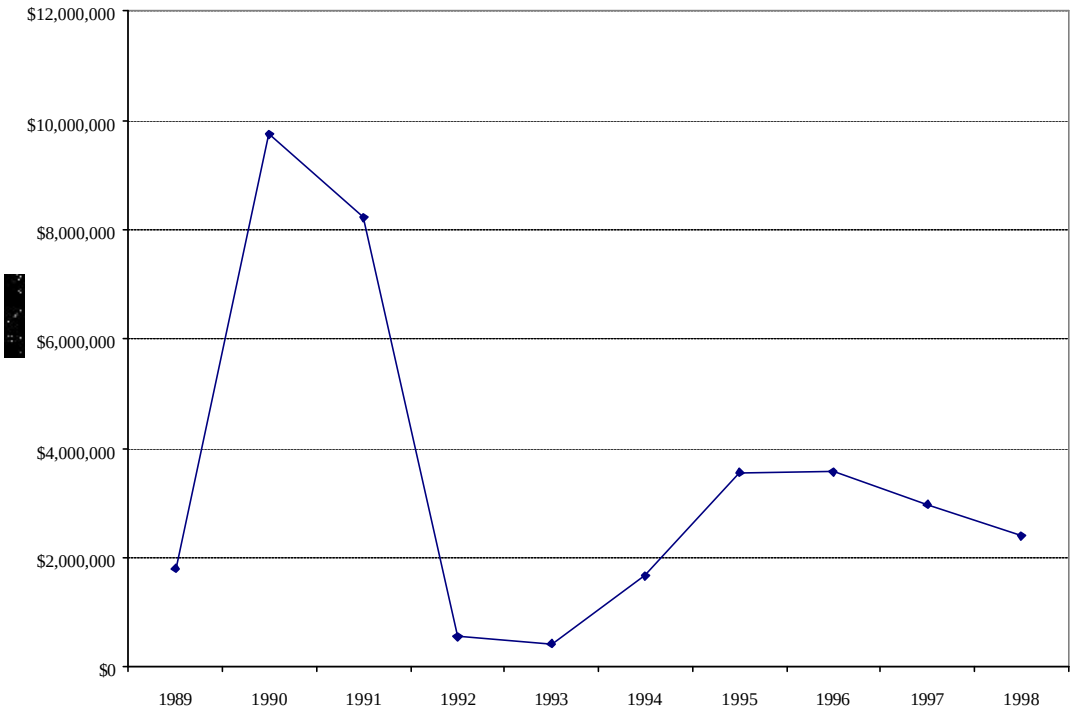

Figure II.11. Hardwood moulding exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure II.12. Wood kitchen cabinet exports from the PNW to Japan, shows an increase in revenue somewhat later than other categories. Most of the revenue gains occurring during 1996. While there were some revenue gains in 1994 and 1995 compared to 1993, exports increased from $1.7 to $9.9 million between 1995 and 1996, a 480% increase in one year. In 1996, the PNW share of the US market increased some with this large increase as well. Kitchen cabinet exports, however, were also impacted by the Asian economic crisis. Export revenue declined 81% from 1996 to 1998.

Figure II.13. PNW softwood moulding exports to Japan, shows revenues increased in 1994 and 1995 but declined in 1996. Since then, the market has remained small, totaling only $1.3 million in 1998. Canada is now the leading consumer of PNW produced moulding, yet is also the leading competitor. The moulding market is expected to become more competitive in years to come. As Canada continues to increase its secondary manufacturing capacity, Canadian manufacturers will undoubtedly become a source of tougher overseas market competition for US moulding. At the same time, substantial growth in radiata pine production in Chile and New Zealand will also present competition for softwood moulding since pine is generally the preferred material for moulding. Applications that compete with radiata pine will face the toughest competition in the next few years. Some of this competition may have already begun as exports fell to only $1.3 million in 1998, which is equivalent to zero growth since 1992, and a decline from 1991.

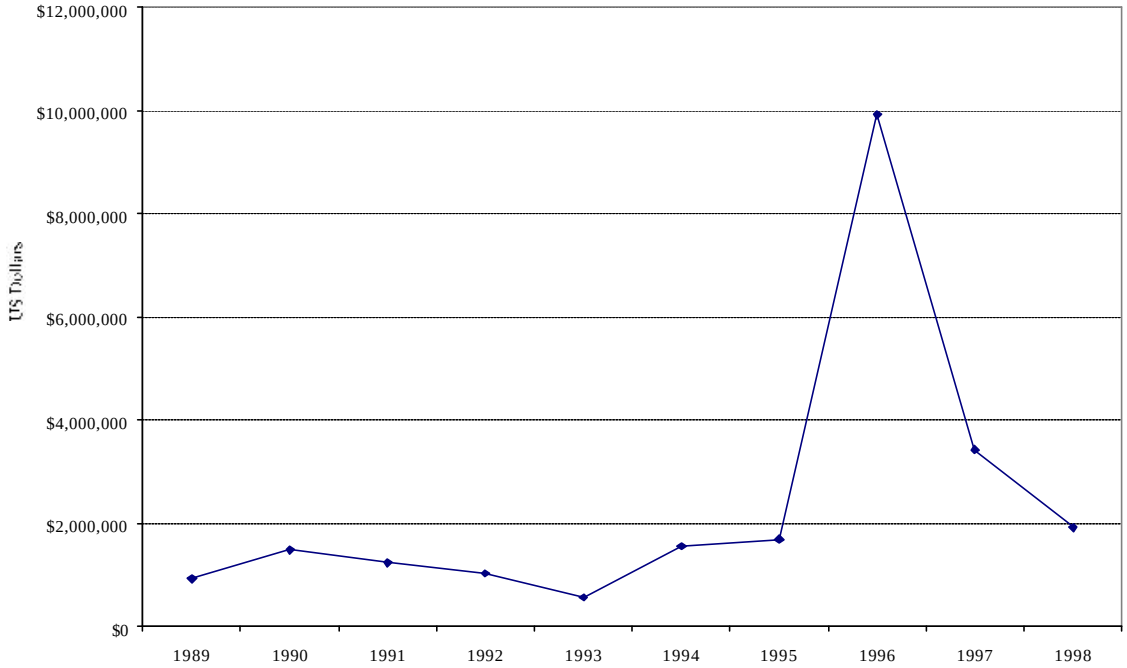

Figure II.12. Wooden kitchen cabinet exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

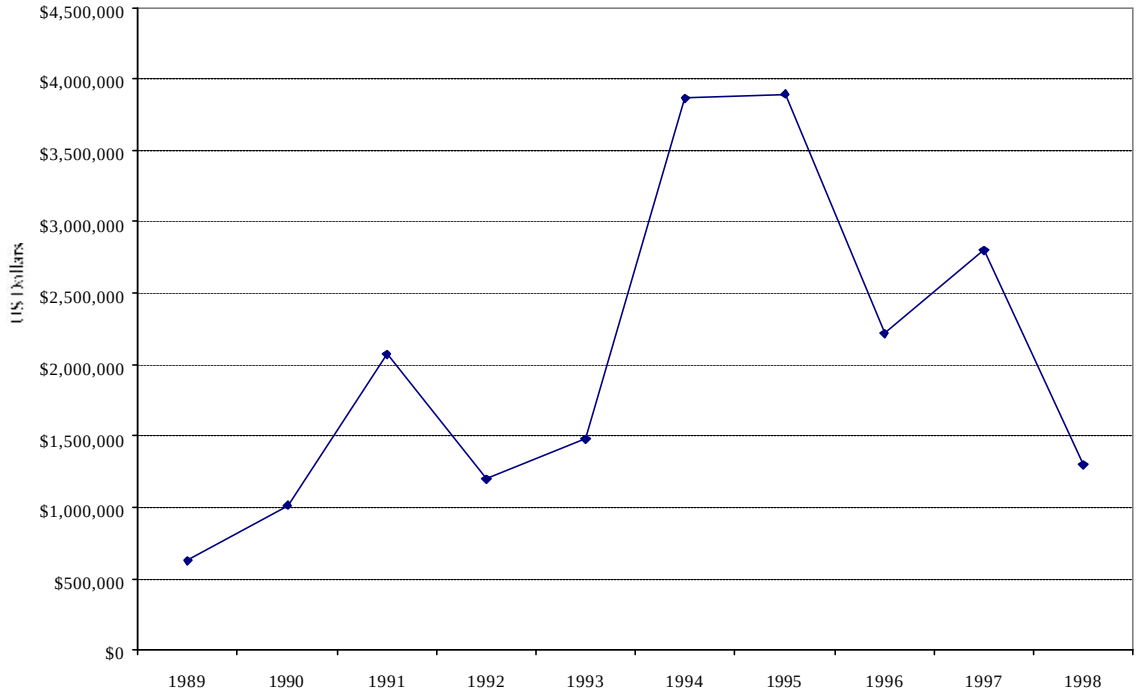

Figure II.13. Softwood moulding exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

II.C. Secondary Manufactured Exports to Canada and Korea, the second and third country destinations.

Figure II.14. PNW secondary processed product exports to Canada, shows revenues increased substantially from 1990 to 1993, yet growth across sectors is inconsistent. Overall, export revenue in 1998 was 20% lower than 1993. The leading sectors contributing to export growth and thus, the most substantially impacted by the subsequent decline, were softwood mouldings, wood or wood frame seats, and wooden furniture. Given the relative non-competitiveness of Canadian secondary product producers who were shielded by protective tariffs prior to the North American Free Trade Agreement (NAFTA), US exporters appear to have increased exports to Canada under NAFTA. However, Canadian producers, with support from the Canadian government, have made a major effort over the last five years to improve their competitiveness in secondary manufacturing. As evident by the changing trends, Canadian producers have made significant gains in improving their competitiveness in the international market. Open trade with Canada is unlikely to offer long-term opportunities for US exporters, with the exception of small niche markets and specific locations where the economy of scale for Canadian producers is too small to become competitive with potentially larger producers in the US. Instead, more two-way trade across the boarder is likely. However, Canada is making substantial gains in secondary manufacturing capacity, thus reducing the opportunity for US manufacturers to export mouldings to Canada.

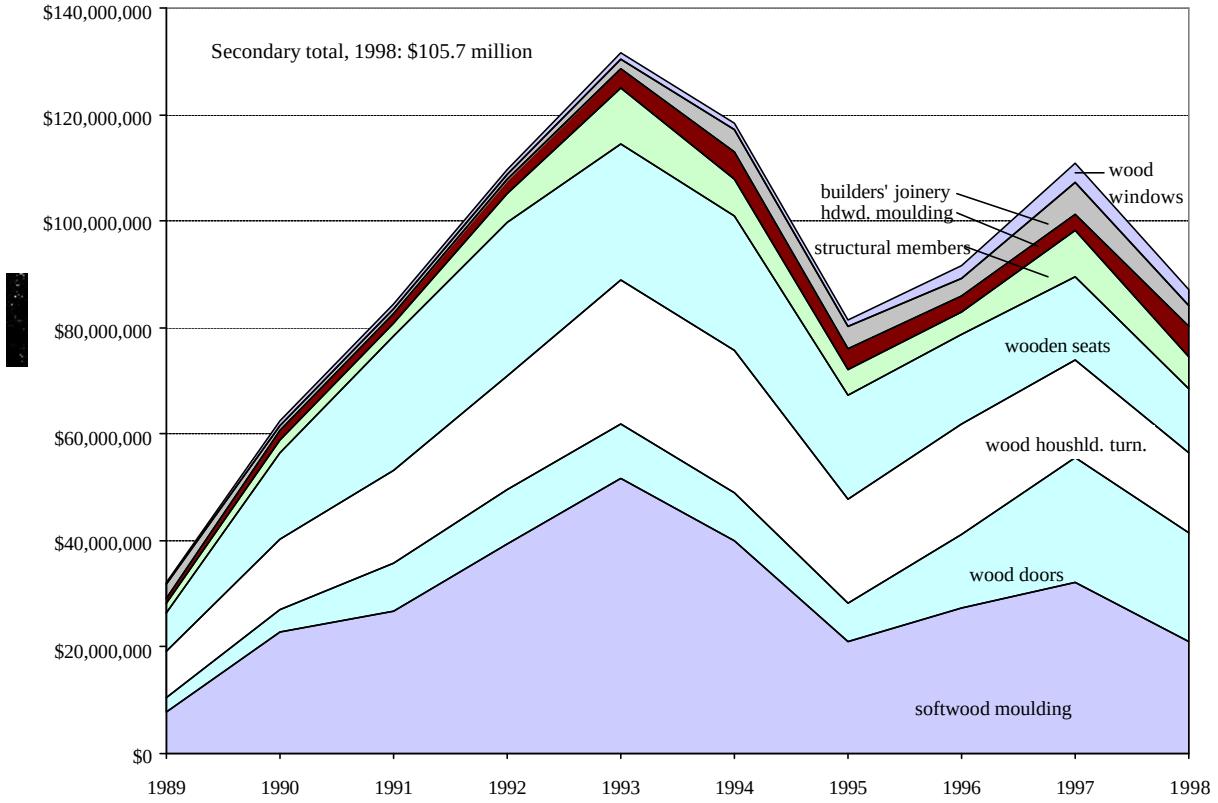

Figure II.14. Leading secondary manufactured exports from the Pacific Northwest to Canada (US Department of Commerce 1999).

Figure II.15. PNW secondary processed product exports to Korea, shows substantial growth until 1996. The Korean market for imported secondary wood products from the U.S. was less than $2 million in 1990 and reached almost $14 million by 1996, a 600% increase but still a miniscule share of their domestic market. Prefabricated wooden buildings, joinery, and wooden doors all showed strong growth. While Korean markets have not been subject to the same degree of protectionism as Japanese markets, few dwellings are wooden. It will be an uphill effort to gain acceptance in Korea's building codes for wooden housing and to promote 2x4-style wood homes among builders and consumers. Recent growth of secondary manufactured exports suggests there is such a potential even though the base is small (Braden 1999). The Asian crisis hit Korea hard and imports declined substantially by 1998. Secondary manufactured exports from the US in 1998 were down 60% from the 1996 peak. The sharp recession reduced demand for imported products. The rapid recovery that Korea experienced in 1999 should translate to a recovery in these markets.

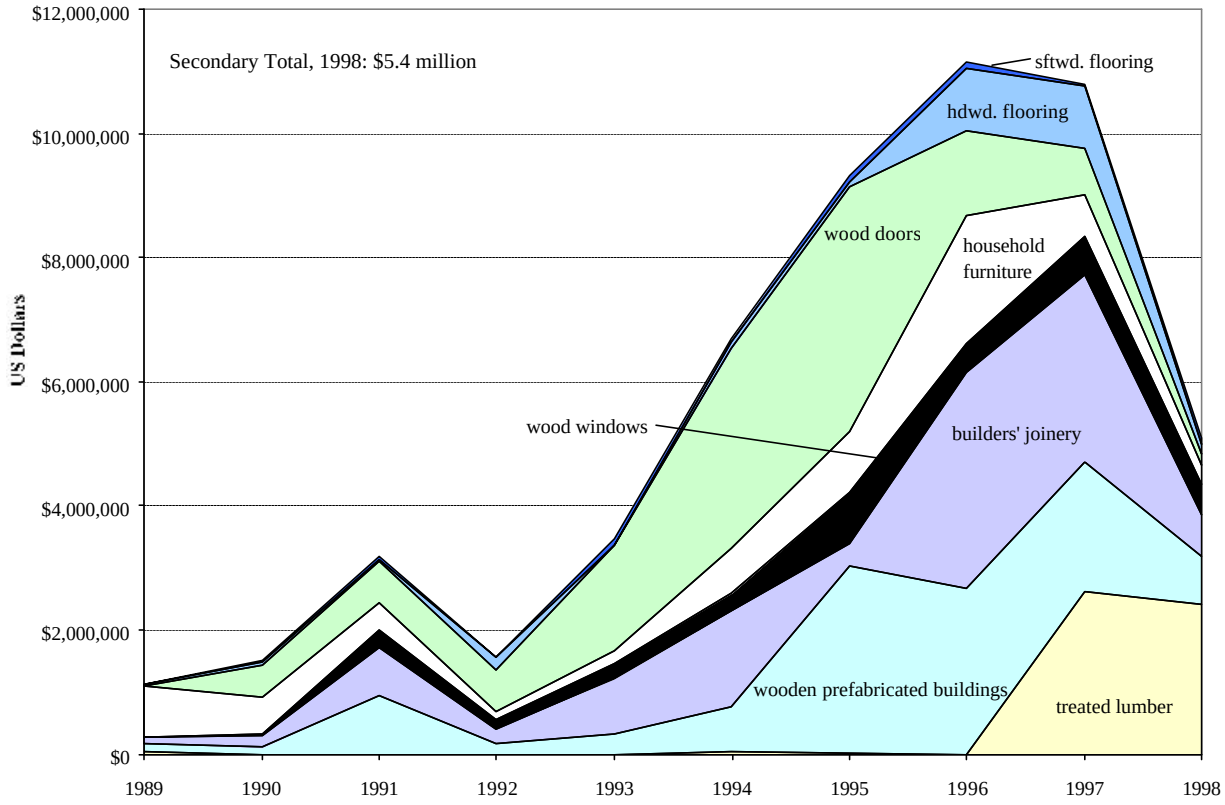

Figure II.15. Leading secondary manufactured exports from the Pacific Northwest to Korea, (US Department of Commerce 1999).

II.D. Secondary Manufactured Export Market Shares

Table II.2. Top ten PNW secondary processed wood product exports to all markets, including PNW market share, shows an almost consistent picture of the PNW leading the US in export growth in secondary wood products until 1998. While it was appropriate to look at the changes in exports to Japan first, since that is where the dominant change has occurred, the table provides a snapshot of the top ten exports to all countries. Categories for which the PNW share of the US is highest (although substantially lower than for the exports only to Japan) generally show the higher share increases. As the Japanese market has opened, the PNW is most attractively situated both in distance and supplier/purchaser relationships to take advantage of new opportunities. Categories for which the PNW share is low, like wooden furniture, wood frame seats, and the miscellaneous product category show no significant share gain for the PNW.

PNW growth in exports between 1992-1996 for the top ten categories was 354% to Japan, 183% to countries other than Japan, and 259% overall. The PNW share to all markets declined in 1998 largely because of the decline in demand in Asian markets. PNW vs. Canadian shares in the Japanese market provide a somewhat different picture of the changing competitiveness.

Table II.2. Top ten PNW secondary processed wood product exports to all markets.

US $ Millions	PNW Exports 1992	PNW Exports 1996	PNW Exports 1998	US Exports 1992	US Exports 1996	US Exports 1998	PNW Share of US Exports 1992	PNW Share of US Exports 1996	PNW Share of US Exports 1998
Secondary Products									
Wooden prefab buildings	$21.8	$65.7	$38.4	$59.8	$93.0	$53.2	36%	71%	74%
Structural members & joinery	$35.7	$79.8	$49.3	$84.0	$225.3	$213.0	42%	35%	27%
Doors	$17.8	$53.9	$31.9	$132.1	$102.2	$90.0	13%	53%	46%
Windows	$6.1	$25.5	$15.4	$33.5	$45.1	$47.0	18%	57%	43%
Home & office furniture	$32.6	$43.4	$31.5	$538.5	$615.2	$671.4	6%	7%	5%
Kitchen cabinets	$4.0	$3.4	$2.1	$26.6	$32.1	$20.4	15%	11%	10%
Hard & softwood moulding	$44.1	$37.5	$31.1	$117.9	$113.3	$115.9	37%	33%	33%
Secondary Total	**$4,247**	**$4,859**	**$2,872**	**$17,759**	**$22,028**	**$20,235**	**24%**	**22%**	**18%**

Source: US Department of Commerce 1999.

Table II.3. shows the penetration of the PNW, US, and Canada in several building product sectors for which common data is available. For prefabricated homes, builder's joinery, and structural members and doors, the data show that Canada was almost a non-participant in the Japanese market in 1992 with only $8 million in exports compared to $39 million for the PNW and $52 million for the total US. In effect, the PNW led the US in opening the Japanese market. Shortly after 1992, Canada sent teams to the US to investigate how US producers succeeded in the secondary wood product market in Japan. The Canadian government also launched training programs in wood processing technology and increased product promotion in Asia. In 1998, Canadian share of the Japanese import market was nearly equal to the PNW. Canada had a 41% share of North American exports to Japan compared to 42% for the PNW. The PNW suffered a 23% share loss as Canada increased its share by 28%. While the US, and the PNW in particular, have faired quite well in secondary manufacturing exports, Canada has done even better.

Table II.3. PNW and US share loss to Canada in Japan's secondary building product market.

$ Millions	1992	1998	Percent Change 1992-1998
Canada Exports	$8	$76	141%/yr
PNW Exports	$39	$76	17%/yr
US Exports	$52	$106	17%/yr
Market Shares			**Share Shift 1992-1998**
Canada Share of Total	13%	41%	28%
PNW Share of Total	65%	42%	-23%
US Share of Total	87%	57%	-30%

**Secondary = prefabricated homes, builders' joinery, structural members, and doors.*
Source: US Department of Commerce and Statistics Canada 1999.

Changes in competitiveness were likely a response to some combination of: (1) the declining Canadian currency; (2) Canadian government supported promotion and training efforts; (3) somewhat higher cost wood resources in the US, which has been exacerbated by the countervailing duty/quota agreement on Canadian lumber; and (4) the strong US housing market. It would be very difficult to determine the relative impact of these changes. The compound impact of all of these factors may have reached threshold levels where the impact becomes larger than the sum of the individual contributions. For the US to regain or at least avoid further losses in market share, something needs to be done to reduce these negative impacts or improve competitiveness in some other way.

The first and last factors noted above are macroeconomic in nature and outside of the forest sector's influence. The second factor, government supported promotional and training efforts, could be increased in the US to neutralize the Canadian impact. The third factor, the higher cost US wood, has resulted from both the harvest constraints to protect endangered species, and the two-tier lumber price structure created by the import quota on Canadian lumber. As Canadian lumber imports to the US approach the quota established to avoid paying a countervailing duty, Canadian domestic wood prices fall and US prices rise. While some US lumber mills receive price protection under this agreement, US processors of secondary manufactured goods see the cost of their purchased wood rise substantially relative to what Canadian manufactures pay, resulting in lost competitiveness to Canadian manufacturers.

II.E. Secondary Manufactured Export Contributions to Business Income

Firms who produce products for both urban markets in the PNW and for export reduce their risk of exposure to the volatility that could occur if they relied on just one market.

Figure II.16. Secondary contributions to business income (adjusted for inflation and stated in 1998 dollars), shows an upward trend for Washington State. When export revenue based on the Seattle Customs district is included, the trend is much higher than revenue from domestic sales alone. The growth trend for these combined exports is approximately 3% per year.

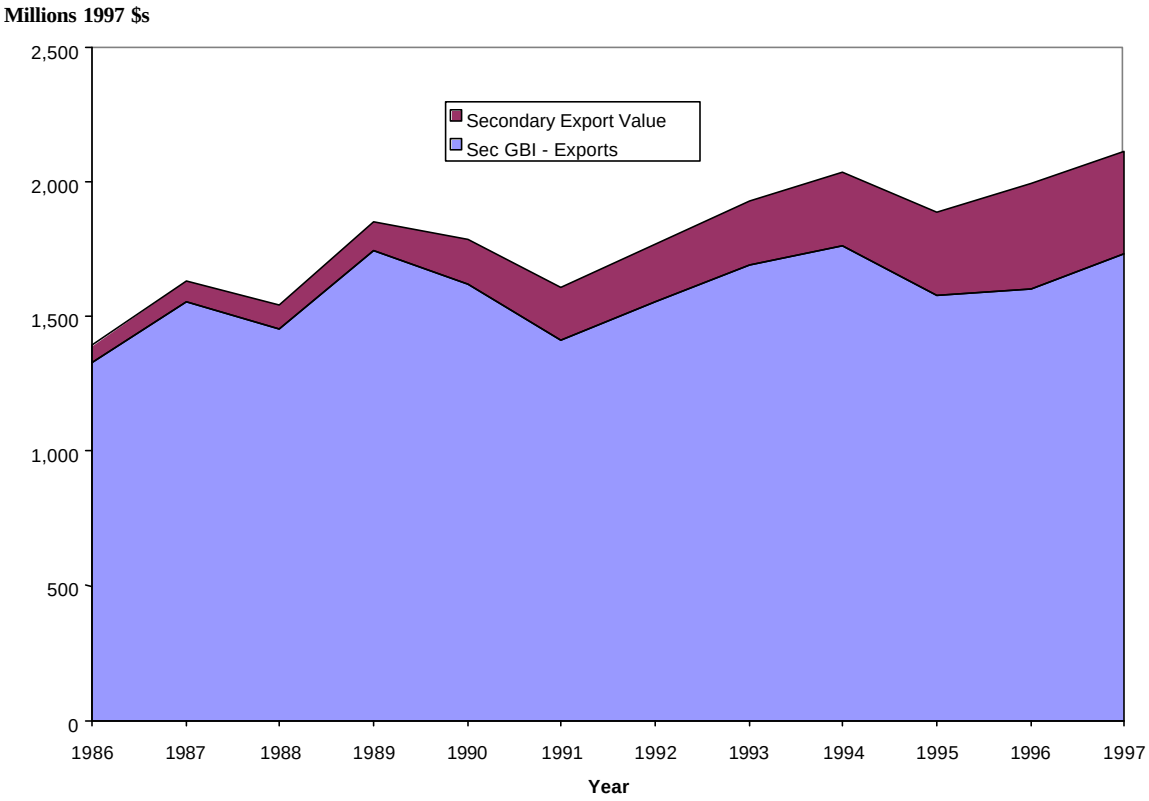

Figure II.16. Business income for secondary manufactured wood products in Washington State.

There are several additional comparisons that can be made to characterize the competitiveness of the sector. One is to compare the sector's business income growth with the growth in the local economy to see if there has been any change in the sector's share of total business income.

Figure II.17. Secondary manufactured share of total business income for Washington State shows the share of secondary manufactured business income to Washington State's total business income both with and without increased exports. We should expect to see the increase in export revenue elevate the trend after about 1993. But, also at this time, the raw material cost increased substantially, and this could have a negative impact. Looking at the sector's share before or after 1991, without export revenue appears to show a 15% decrease in share of the domestic market. This decrease could well be the impact of reduced availability of high grade

USFS wood and higher wood costs[1]. That is, without deregulation in the Japanese market and increased exports, growth in secondary manufacturing for the U.S. market could have been as much as 15% higher if stable resource supplies had been stable.

Table II.4. Secondary GBI Excluding Exports/Total State Income

Pre 1991 Average	Post 1991 Average	% Change
1.44%	1.23%	-14.5%

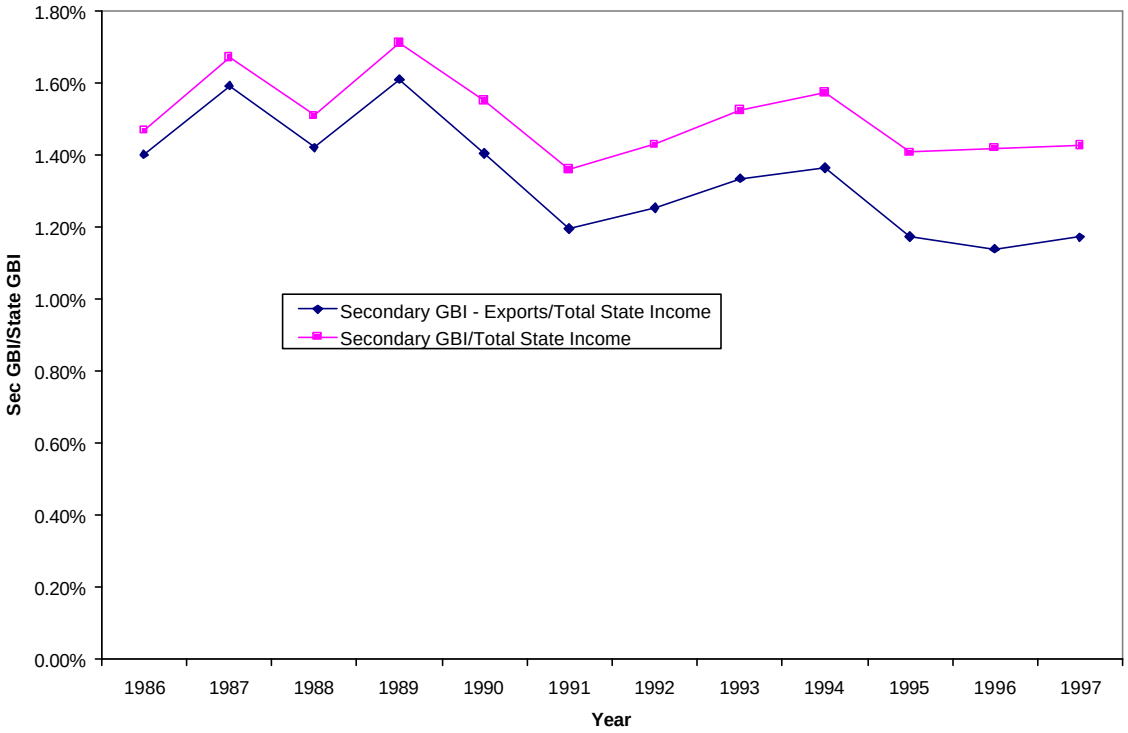

Figure II.17. Secondary manufactured share of total business income for Washington State.

Another important aspect of competitiveness is whether the productivity of the sector is increasing. One measure of productivity is the business income produced per employee over time.

[1] While the negative impact starts in 1991, which appears to be too soon for the impact of wood availability constraints, the year 1991 was also a business cycle low point in US domestic housing activity.

Figure II.18. illustrates remarkable improvement in business income per employee. This 3% per year trend rate of improvement in real output per employee (plotted here as employment per unit of output, i.e. a labor cost) represents a very respectable increase in productivity, or decline in labor. Secondary wood product manufacturers generally have a lower capital intensity than other wood or paper processors, however they demonstrate a steady improvement in efficiency gains, probably reflecting increasing capital investments.

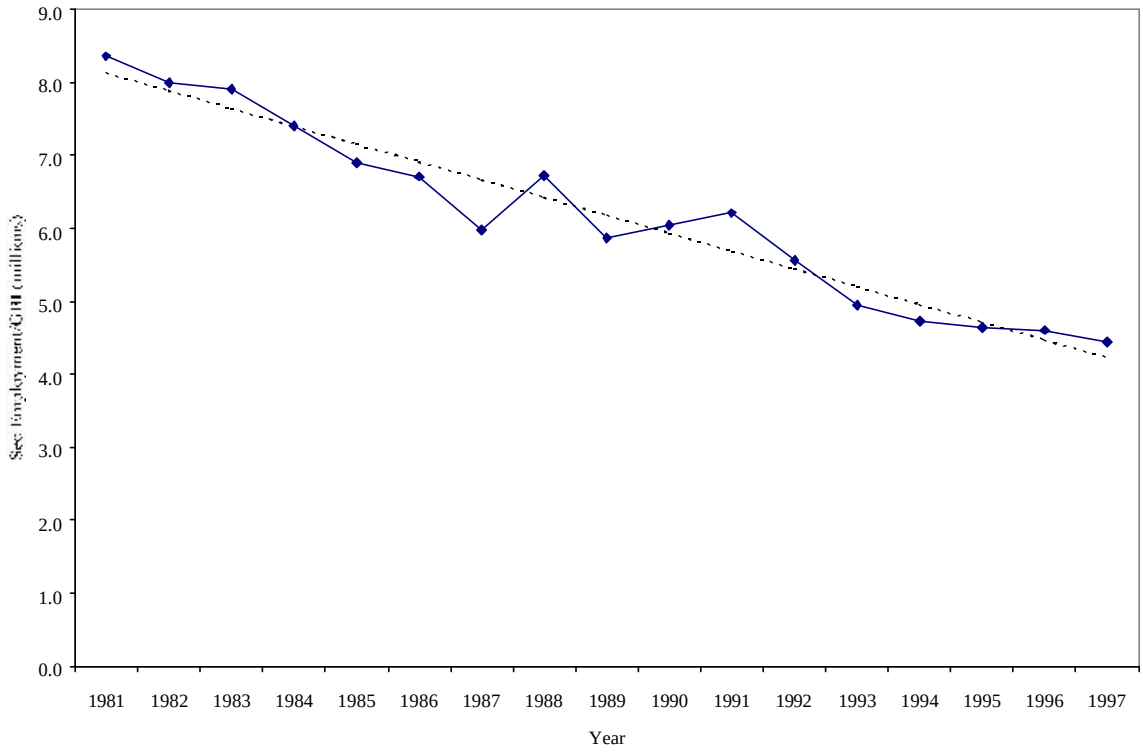

Figure II.18. Secondary Employment per Secondary Revenue.

Secondary manufacturing in wood products has suffered a temporary decline with the Asian crisis. Secondary producers have not been devastated by harvest reductions, yet they appear to have suffered some loss in competitiveness as raw materials have become increasingly scarce. The higher prices for wood in the US compared to Canada as a consequence of the countervailing duty and quota arrangement may also be contributing to a decline in competitiveness in the secondary manufacturing sector. The sector has steadily increased output per employee, which has slowed growth in the number of employees in secondary processing.

III. PRIMARY SOLID WOOD PRODUCTS AND EXPORTS

Primary Processing Supply Constraints

While secondary processed exports underwent a major boom when the Japanese government began deregulating the Japanese housing market, primary product exports fell as new US environmental regulations were enacted. Harvest levels peaked in about 1989, and have been constrained since. Production levels and thus, exports, were first impacted by declining sales of federal timber to conserve northern spotted owl habitat, then by state forest practice regulations developed after the spotted owl and marbled murrelet were added to the endangered species list. More recently, passage of a habitat conservation plan on state lands and new requirements to protect salmon in riparian areas will reduce allowable harvest levels further.

Figure III.1. Harvest levels in the five Western states (Washington, Oregon, Northern California, Montana and Idaho) shows harvest volume has dropped from 23 billion board feet to 13 billion board feet, substantially more than during the worst prior business cycle. This should be viewed largely as a permanent policy shift, if not a barometer for an ever increasing set of environmental constraints on harvest. The PNW (Washington and Oregon) is the US's primary region for timber production and exports, accounting for 67% of the five-state harvest volume and 75% of the 10 billion board foot harvest decline. PNW harvest volume is just over half what it was in 1989, prior to spotted owl related regulations and other environmental conservation efforts were adopted.

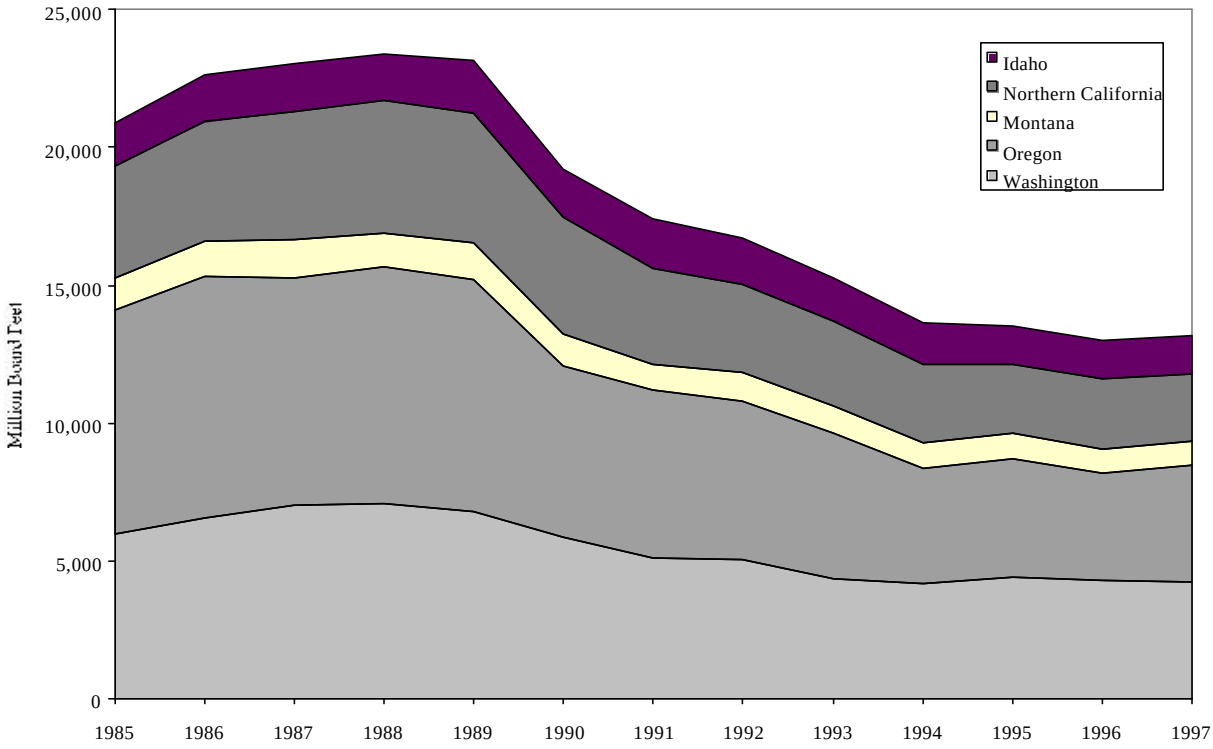

Figure III.1. Harvest levels in the five western states (Washington, Oregon, Northern California, Montana and Idaho), 1985-1997 (Warren 1999)

Since the series of regulations were adopted, the price of standing timber has increased substantially in the short term, which has stimulated demand for wood from lower cost international suppliers, as well as non-wood substitutes. As the world slowly responds to such a large supply change, the region's timber prices should be expected to decline from recent peaks. Prices have declined over the last several years, despite strong US housing demand. The size of this supply adjustment is much larger than the volume of annual harvest losses, as the markets are attempting to replace the inventory needed to sustain market driven harvest levels. Using typical northwest forest productivity (growth per acre), the loss in inventory associated with a 10 billion board foot harvest decline is a 15 million acre loss of harvest from mostly mature timber, valued at $150 billion or more. World markets are restructuring to replace the productive capacity of this inventory, and it will take many years for a complete adjustment.

Figure III.2. PNW and Southern pine stumpage (standing timber) prices (adjusted for inflation to 1998 dollars), shows rising prices from the supply changes in the 1990s, compared to a period of high demand in the 1970s - a time of sustained high household formations and US housing starts, and substantial increases in international demand for timber products.

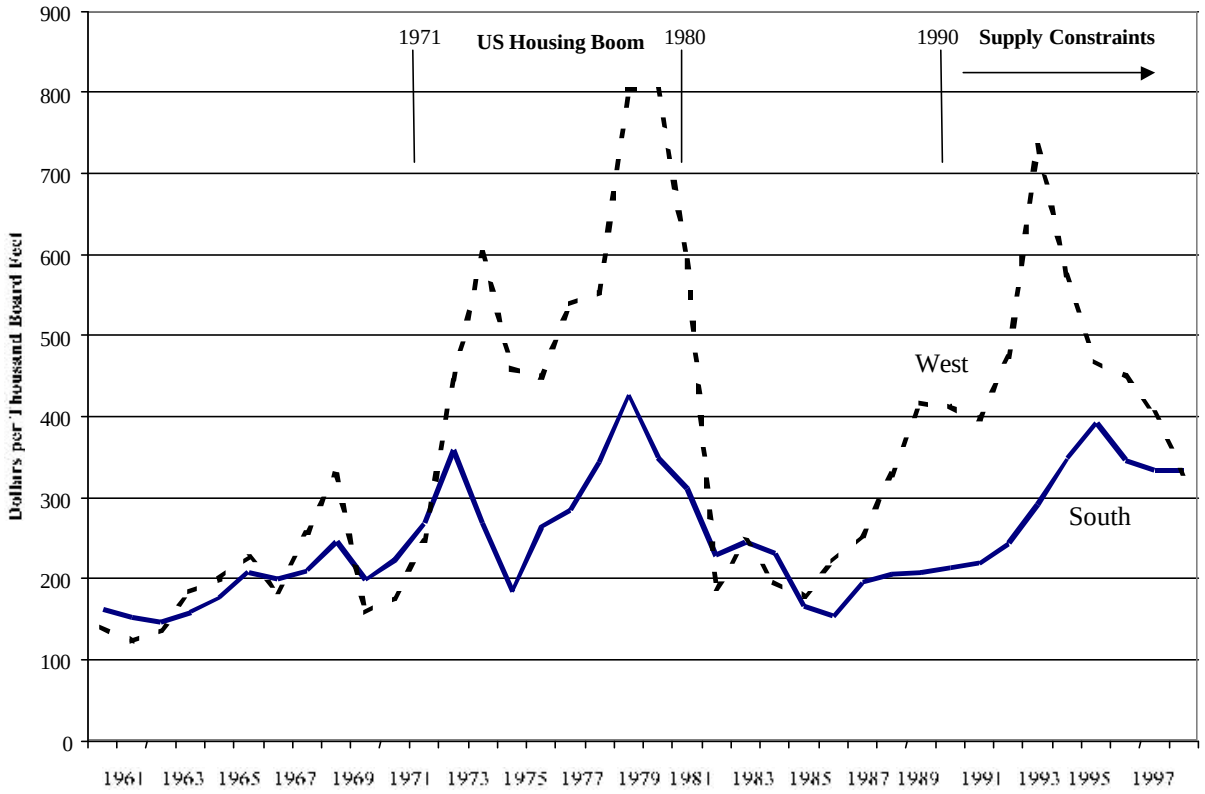

Figure III.2. PNW versus US Southern pine stumpage prices, 1961-1997 (CINTRAFOR & Timber mart-South 1989-1998).

Since supply reductions have occurred largely in the Northwest, timber prices first increased in that region. While prices rose to comparable levels in the 1970s, when World War II baby

boomers formed households, the price increase in the 1990s is being driven by supply constraints.

When timber prices increased initially, many PNW mills were forced to close. As the US South and other producers have increased production, Southern timber prices have slowly risen as prices for timber in the West have fallen. After markets restructure to offset the supply reductions in the PNW, the new equilibrium price may be below the current price in the South. Much of the world is slower to respond than the US South, but once producing, may be competitive at a lower cost. Even temporary timber price hikes in the West have forestalled the region's full adjustment to lower harvest levels, since the higher prices made it possible to log high cost and marginally productive forestland. Other uses of the higher timber revenues partially offset the lost economic activity from reduced harvest and processing. The full structural adjustment and resulting market share shifts may take several more years.

III.A. Primary Wood Product Exports from the PNW (Washington and Oregon)

Figure III.3. PNW primary solid wood export revenue declined 12% from 1989 to 1996, or 30%, adjusted for inflation. This decline was still less than the harvest reductions because product price increased above general inflation, and offset some of the decline in volume. Logs, lumber and chips make up the dominant share of revenue. Export revenues declined substantially in 1997 and 1998, a consequence of the Asian crisis.

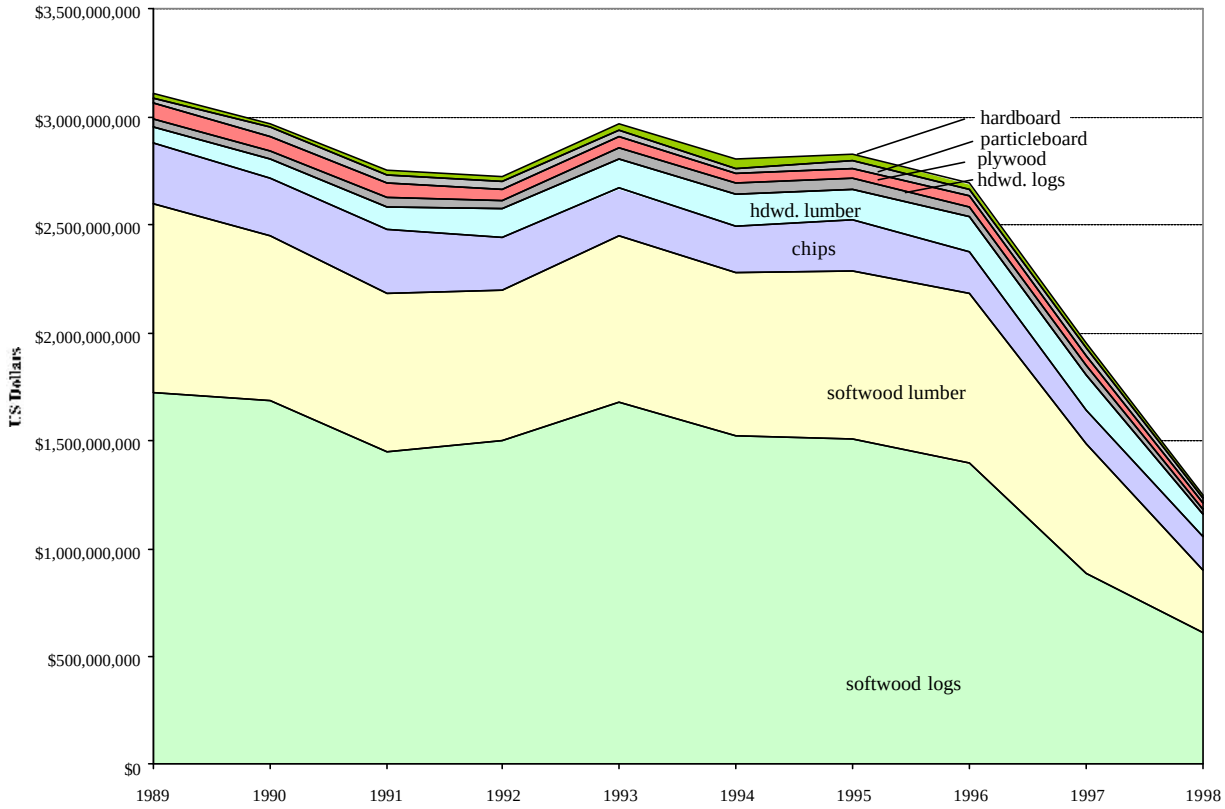

Figure III.3. Leading primary wood product exports from the Pacific Northwest to all destinations, 1989-1998 (US Department of Commerce 1999).

Figure III.4. Primary wood exports by custom district, shows that the Columbia-Snake River customs district usually makes up about 40% of total PNW exports. Since many of the Columbia-Snake River ports are located along the Columbia River in Washington, the dominant share of primary exports originates in Washington State.

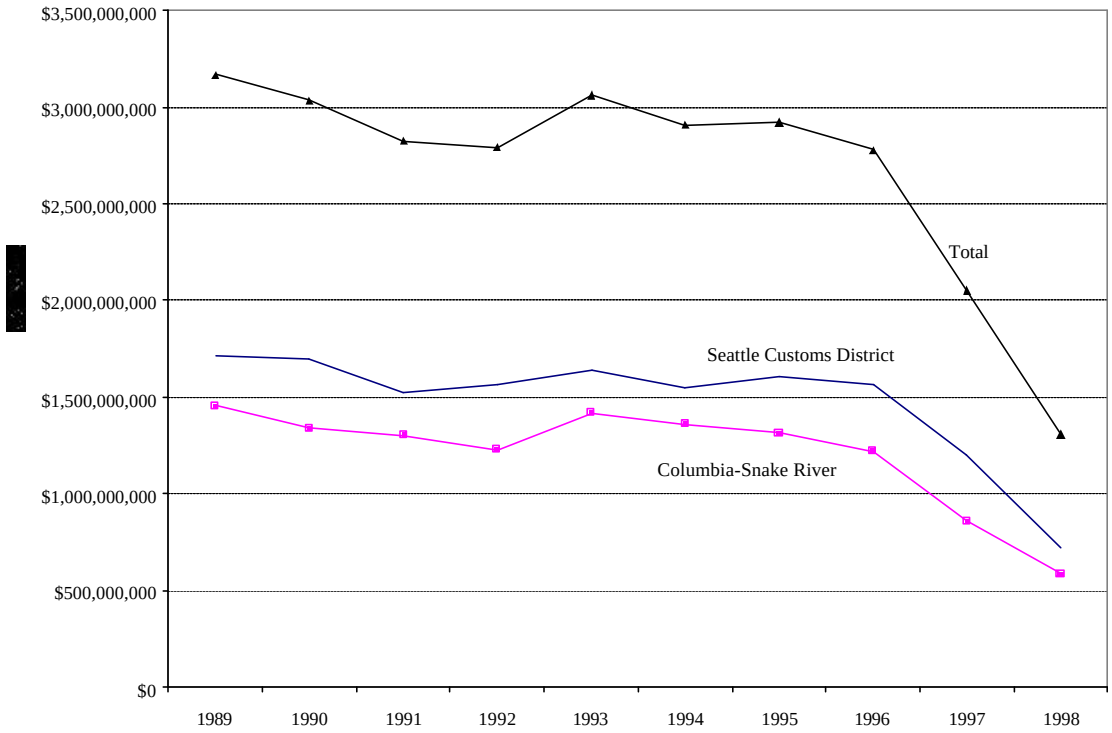

Figure III.4. Pacific Northwest primary solidwood exports by custom district, 1989-1998 (US Department of Commerce 1999).

Figure III.5. US solid wood product revenues to leading export destinations, shows that Japan has been the dominant export market. It also shows that, in spite of harvest constraints, solid wood product export revenues experienced no significant decline until the Asian crisis. Exports from all other countries total approximately $2 billion. Exports to South Korea were also impacted by the Asian crisis, however, the Korean market is more price sensitive. Exports to Korea began to decline several years before the Asian recession. Exports to other non-Asian countries remained relatively stable.

Changes in competitiveness are evident when examining how Japanese buyers have changed the way they source wood. Softwood logs from the PNW pioneered entry into the Japanese market and remain the single largest product category even though many other products have been introduced.

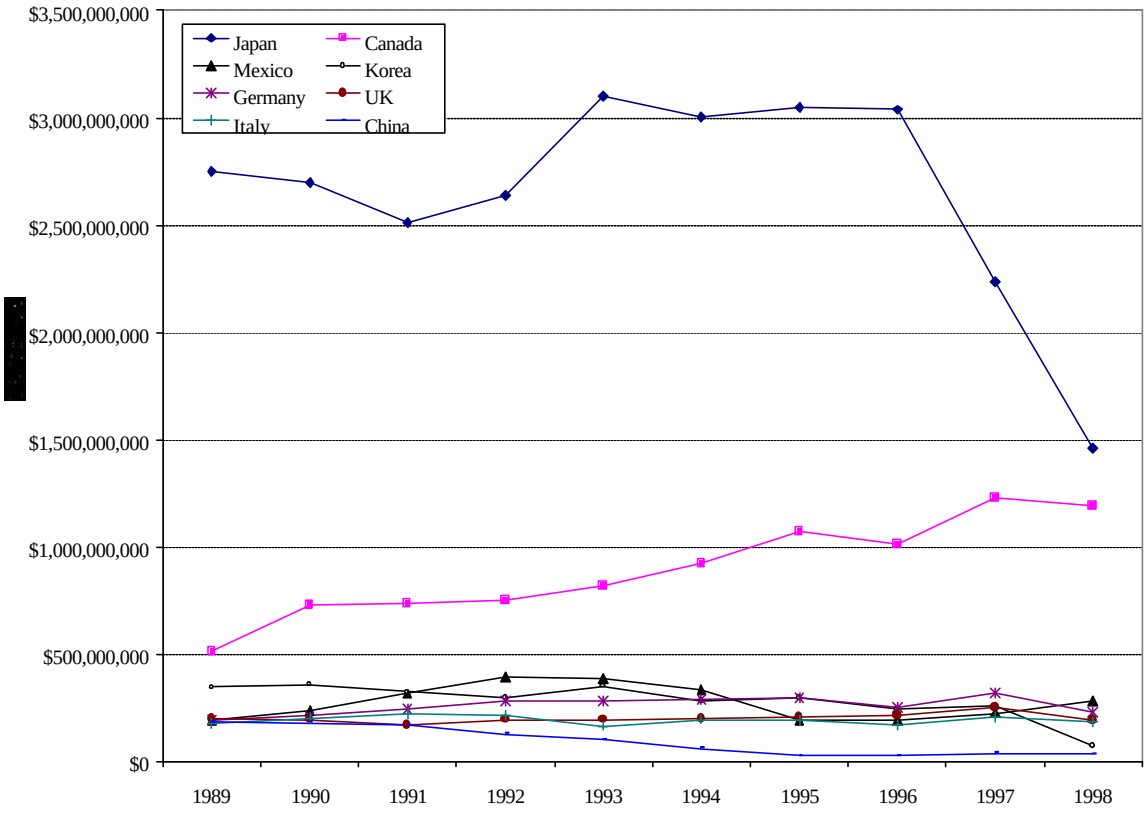

Figure III.5. US solid wood product revenues to leading export destinations (US Department of Commerce 1999).

III.B. Primary Wood Exports to Japan

Figure III.6. Japanese softwood log imports by supplier, shows the dominant position US logs had in Japan prior to 1990. Japan's import of US logs was growing after years of slow economic growth in the early 1980s. Imports of US logs peaked in 1989 and began to fall thereafter, a consequence of the harvest constraints in the US and resulting log price hikes. Canada has a virtual ban on log exports, only exporting surplus volume that cannot be processed domestically. As demand in international markets increased, Canada's log exports declined to very low volumes. Russia was the main unrestricted supplier and began to substitute for declining US exports. New volume available from radiata pine countries (New Zealand and Chile) also replaced some of the volume lost by US suppliers. While the US share of logs imported by Japan was twice as high as Russia's share in the early 1990s, Russian suppliers increased their share to equal the US share in 1997, when the Asian crisis curtailed demand and eliminated the shortage of wood in Japan. The US share of Japanese softwood log imports has declined from 63% in 1989 to 42% by 1998, largely a consequence of PNW harvest constraints.

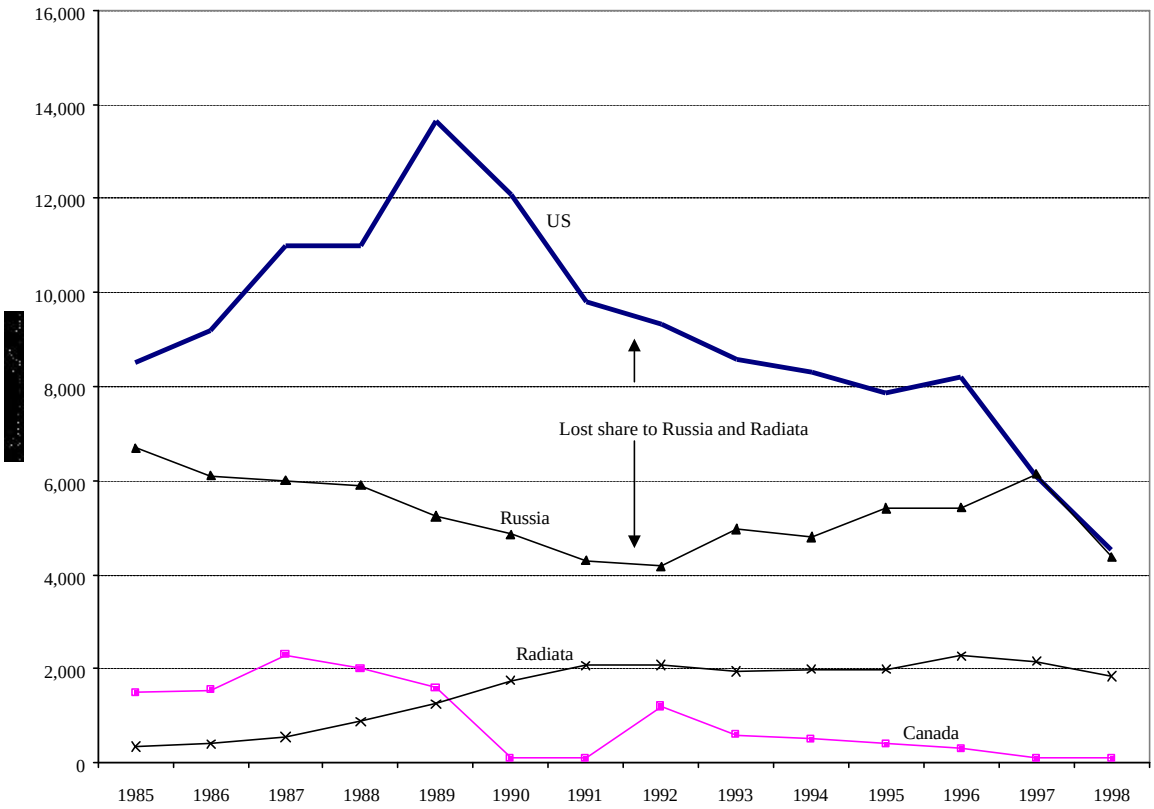

Figure III.6. Japanese softwood log imports by source (Japan Wood Information Center 1985-1999).

Figure III.7. Domestic and export log prices, shows that rising US log export prices starting in 1991 were the signal for the Japanese to look for alternative international log sources. Export log prices doubled in a short period of time after harvest reductions in the PNW, and remained high until demand collapsed as the 1997 Asian crisis began. Even with higher prices, it was not possible for Japan to replace their lost log import volume, and they turned to product imports as the only practical alternative.

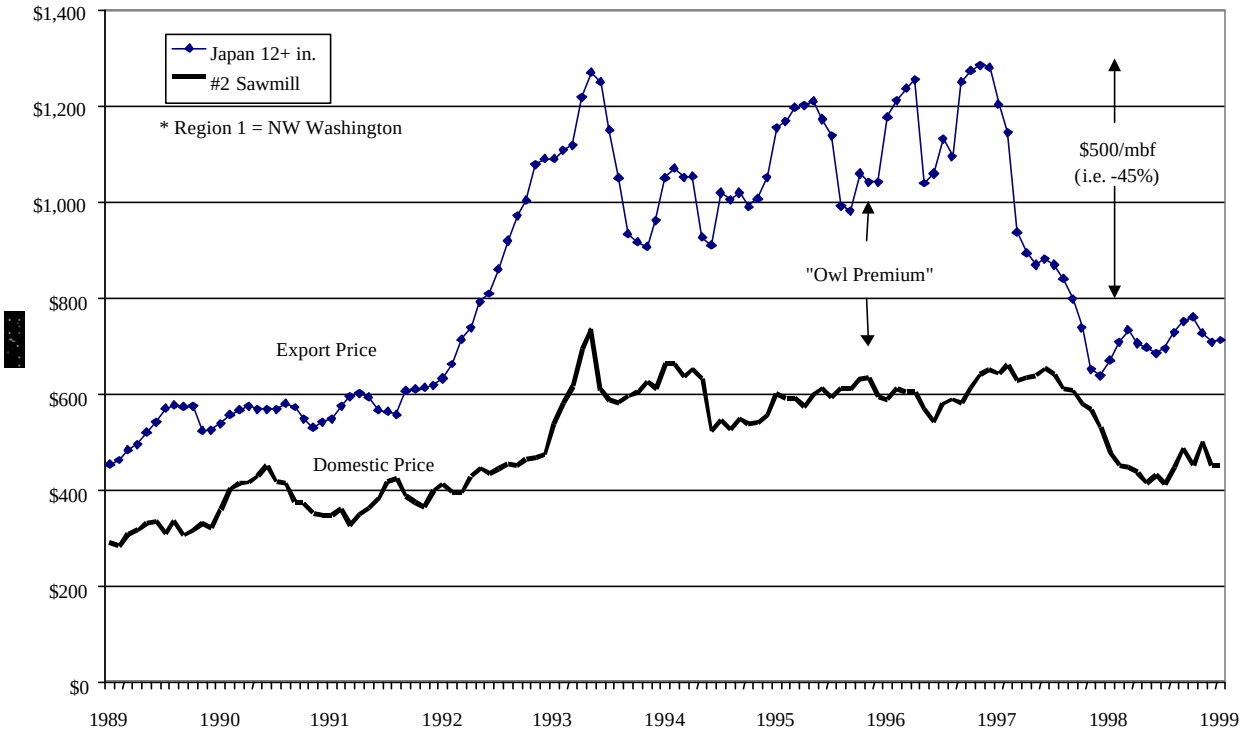

Figure III.7. Domestic versus export softwood log prices, 1989-1999 (Log Lines 1989-1999).

Figure III.8. PNW export log volumes to Japan and revenues, shows that in spite of declining export volume, revenues increased as prices increased until the Asian crisis started. Most log exports from the US to Japan originate in the PNW, with the dominant share originating in Washington. The fact that revenues remained high largely offset the negative impact of volume losses to private timber owners until 1997. In Washington, export volumes and harvest levels declined simultaneously, which sustained the flow of logs to local mills for processing. However, since there has been a greater decline in harvest volume and a lower volume of log exports in Oregon, there was a substantial reduction in local processing in Oregon.

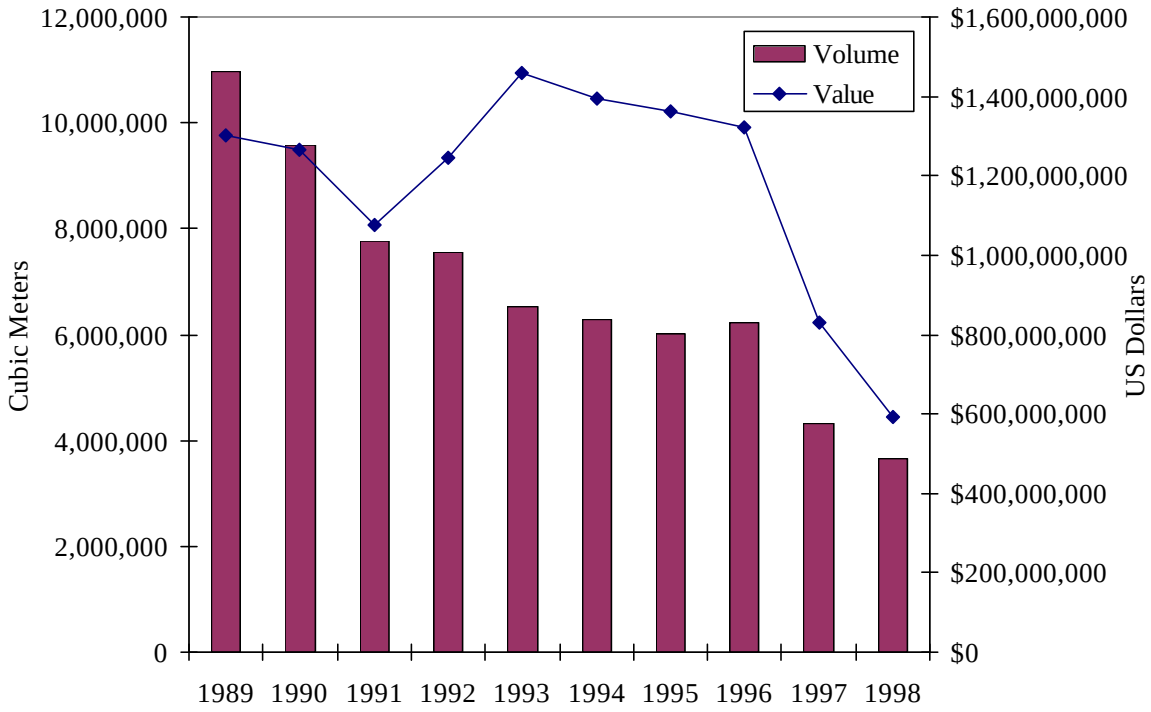

Figure III.8. Revenue and volume softwood log exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure III.9. Japanese lumber imports from the US were increasing prior to 1989. While the Canadian ban on log exports provided Canadian log producers with a competitive advantage in serving lumber markets, the US share of lumber exports to Japan remained very close to Canada's share until after 1989. When harvest volumes declined in the PNW, Canada's lumber exports continued to increase as US exports began to drop. While there was some increase in radiata lumber imports, European suppliers had the single largest increase in market share. European suppliers started with zero market share in 1992, yet quickly surpassed US lumber exports in 1997 and 1998. While harvest reductions are the root cause of these market share changes, structural changes in Asia and the countervailing duty and quota agreement with Canada also contribute. Canadian lumber imports have reached their quota during the last several years, so the price of Canadian lumber is less than the price of US lumber. When the Japanese saw prices for US logs and lumber increase, they began to import more lumber from Europe and Canadian. Even the trend in Japan toward pre-cut homes has shifted demand from green hemlock and fir to dried European whitewoods, older and more stable Canadian lumber, or engineered products.

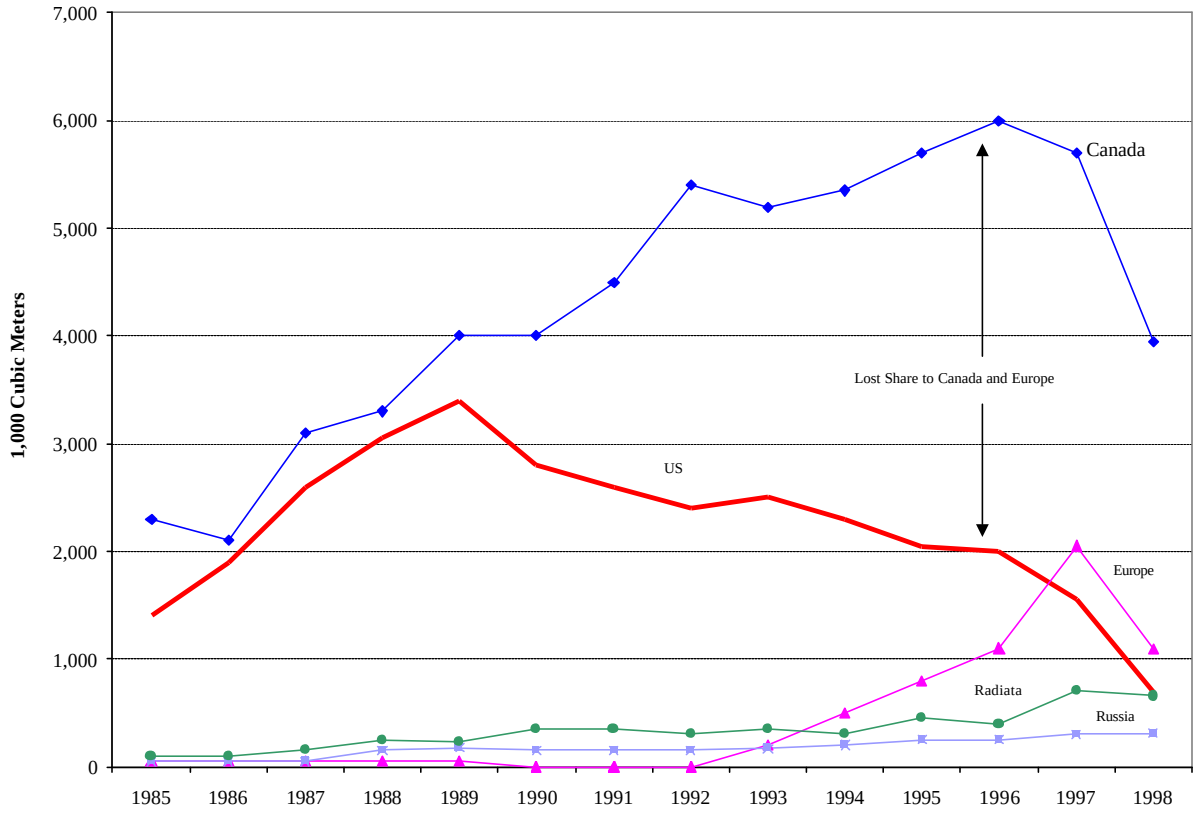

Figure III.9. Japanese lumber imports by source, 1985-1998 (Japan Wood Information Center 1985-1999).

By combining the exported softwood log volume and the log equivalent volume needed to produce the export lumber for the Japanese market, we can estimate total US softwood primary product market share loss. The US market share in logs and lumber declined from 56% in 1989 to 31%, a 25% shift in share (or a 45% decline in the US share) (Table III.1).

Table III.1. Canadian suppliers increased their share of the Japanese imported log market from 25% to 32%. European supplier share increased from zero to an 11%, or almost half of the US share loss. Radiata suppliers had a 5% increase in share and Russian suppliers gained 2%. In effect, US environmental policy resulted in substantial US market share losses in international markets. These changes in competitiveness were not the result of protection activities by foreign nations. In fact, as noted in the discussion about secondary manufactured exports, Japan deregulated its construction markets, leading to increased imports of secondary products from the US. Without the impact of the changing US environmental policy, Japan would have been expected to increase their imports of primary products as well as secondary products.

Table III.1. Softwood log volume equivalent market shares in Japan (1,000 m^3, log equivalent).

Supplier	1989 Exports	1996 Exports	1998 Exports	Volume Change 1989-'98	1989 Share	1998 Share	Share Shift 1989-'98
US	20,500	12,000	9,000	-11,500	56%	31%	-25%
Canada	9,000	12,500	11,000	2,000	25%	32%	7%
Russia	5,500	6,500	7,000	1,500	15%	17%	2%
Europe	0	4,200	4,000	4,000	0%	11%	11%
Radiata Countries	1,700	4,100	3,800	2,100	5%	10%	5%

Source: Japan Wood Information Center 1999.

Figure III.10. Softwood lumber exports volume and revenues to Japan, shows that higher prices helped offset declines in lumber export volume. Export revenues increased until the Asian crisis in 1997-1998, yet the 1998 decline in revenue was steep, resulting in revenues 72% below 1996.

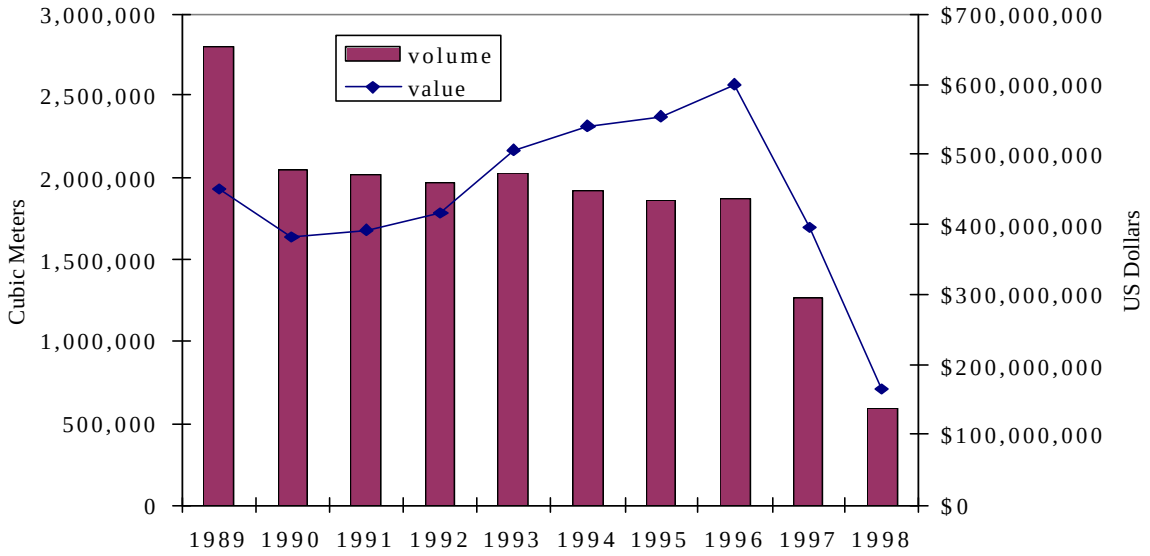

Figure III.10. Revenue and volume from softwood lumber exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

Figure III.11. Chip export volumes to Japan and revenues have been the third largest source of primary product export revenue. Chip exports were also constrained by declining harvest, yet price increases did not fully offset declining export volume. Revenues began to decline in 1992. Chip volumes and revenue did not decline as steeply in the Asian crisis as lumber, since the pulp and paper consumption and demand for chips did not decline as much as the demand for housing.

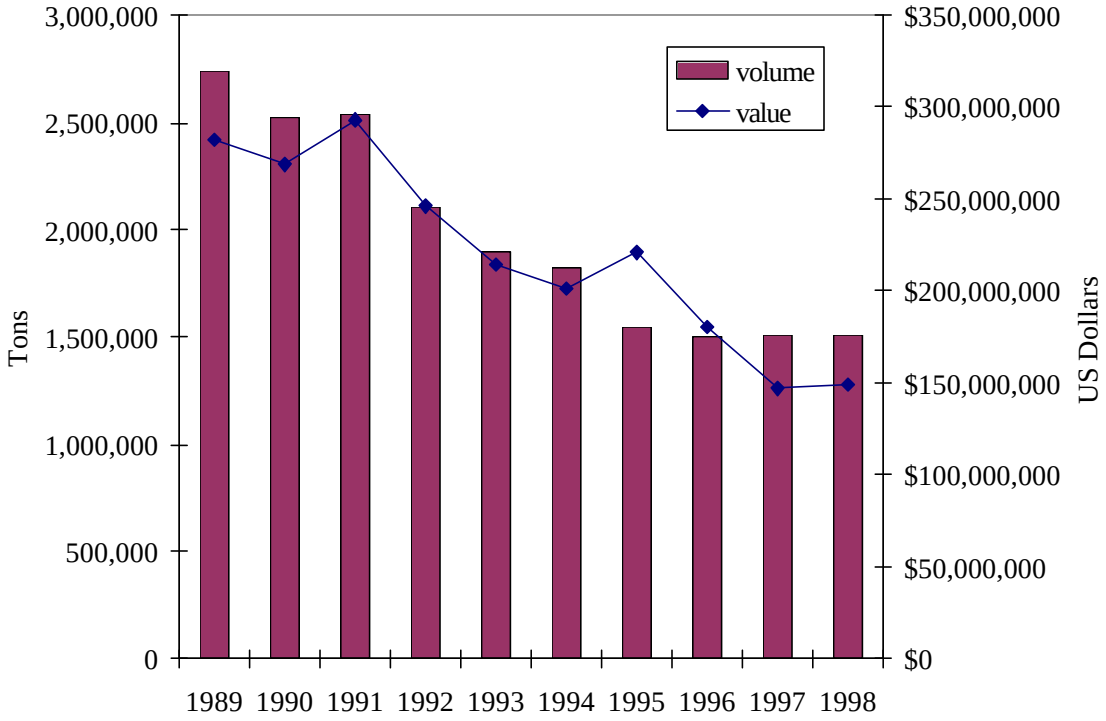

Figure III.11. Revenue and volume from chip exports to Japan, 1989-1998 (US Department of Commerce 1999).

Figure III.12. Markets for panels, particleboard and other products have not effectively penetrated the Japanese market due to tariffs, performance standards, and size incompatibilities, such as the traditional use of three-by-six panels in Japan instead of four-by-eight panels used in the US. The increased use of two-by-four construction technology in Japan does increase the potential market for US panels, but to the degree that these panels are a part of pre-assembled units, they appear in export statistics as pre-fabricated components.

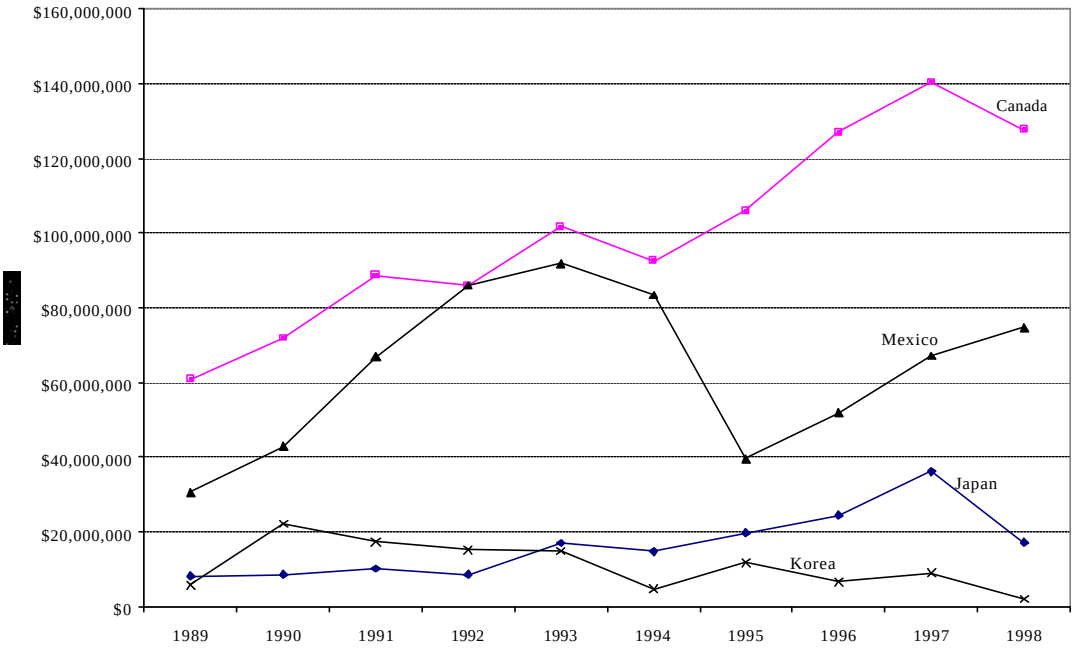

Figure III.12. Leading export destinations for panels from the U.S., 1989-1998 (US Department of Commerce 1999).

Figure III.13. Revenues from all primary wood product exports to Japan show that Japan peaked at near $2.3 billion from 1993 to1995, but fell to only $980 million in 1998, a 57% decline from the earlier period.

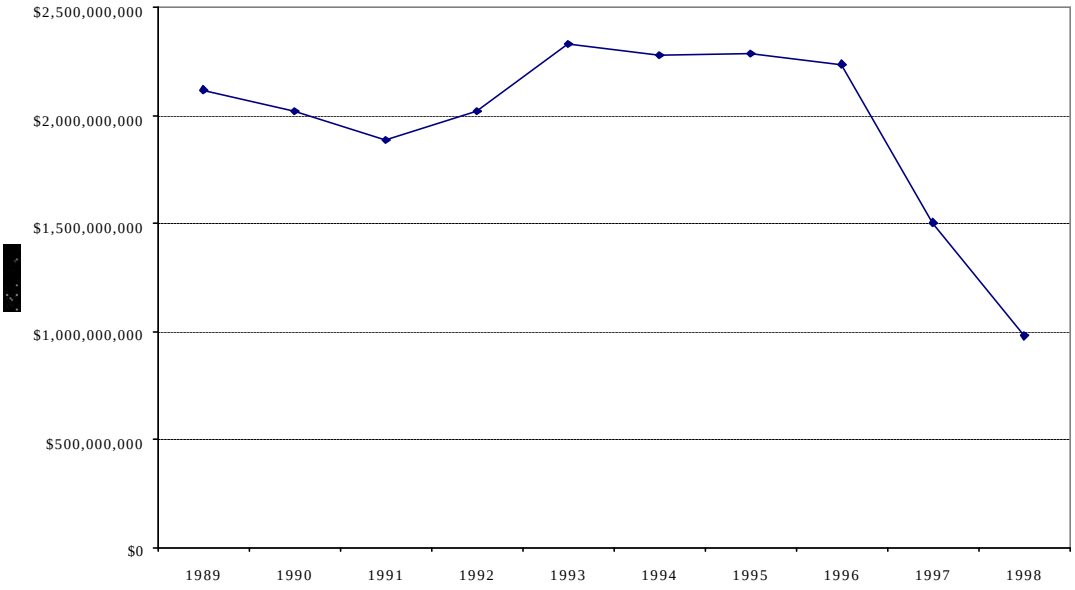

Figure III.13. Revenues from all primary wood product exports from the Pacific Northwest to Japan, 1989-1998 (US Department of Commerce 1999).

III.C. Primary Wood Exports from the PNW to Canada and Korea

Canada and Korea are the second and third largest export destinations for PNW primary wood exports.

Figure III.14. Primary product exports to Canada showed moderate growth even though imports from Canada to the US are much greater. The Free Trade Agreement with Canada enables cross border trade of products wherever such flows are cost effective for producers and consumers. Continued growth should only be expected for those products that can establish a degree of specialization or regional delivery advantage. Lumber quota arrangements establish a cap on the flow of lumber to the US, which became particularly binding in 1998. This in turn resulted in surplus products at lower prices in Canada, which may have contributed to the significant decline in wood exports to Canada in 1998.

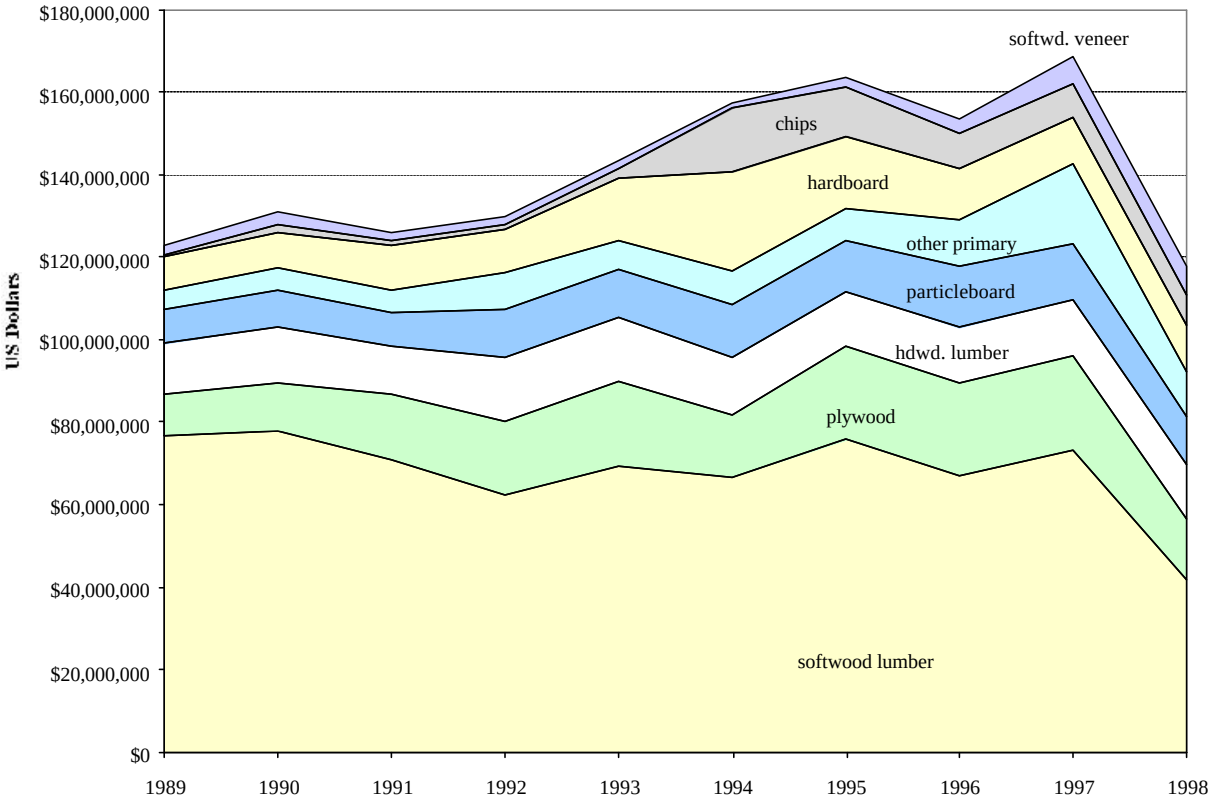

Figure III.14. Leading primary product exports from the Pacific Northwest to Canada (US Department of Commerce 1999).

Figure III.15. Primary product exports to Korea, shows the dramatic decline in log revenues after 1989. The Korean economy was strong until 1997. The decline in US log revenues occured when lower priced radiata pine logs displaced US logs. Exports declined further in 1998 as Korea's economy stalled. Economic recovery is not likely to restore the US log market in Korea, as it has been permanently lost to other suppliers, particularly radiata pine from New Zealand. Radiata pine has largely pushed hemlock logs out of international markets, forcing hemlock log prices down. Even though log markets in Korea are no longer favorable to the US, there are opportunities for other primary products and home building materials (Braden 1999, Braden and Tichy 1999).

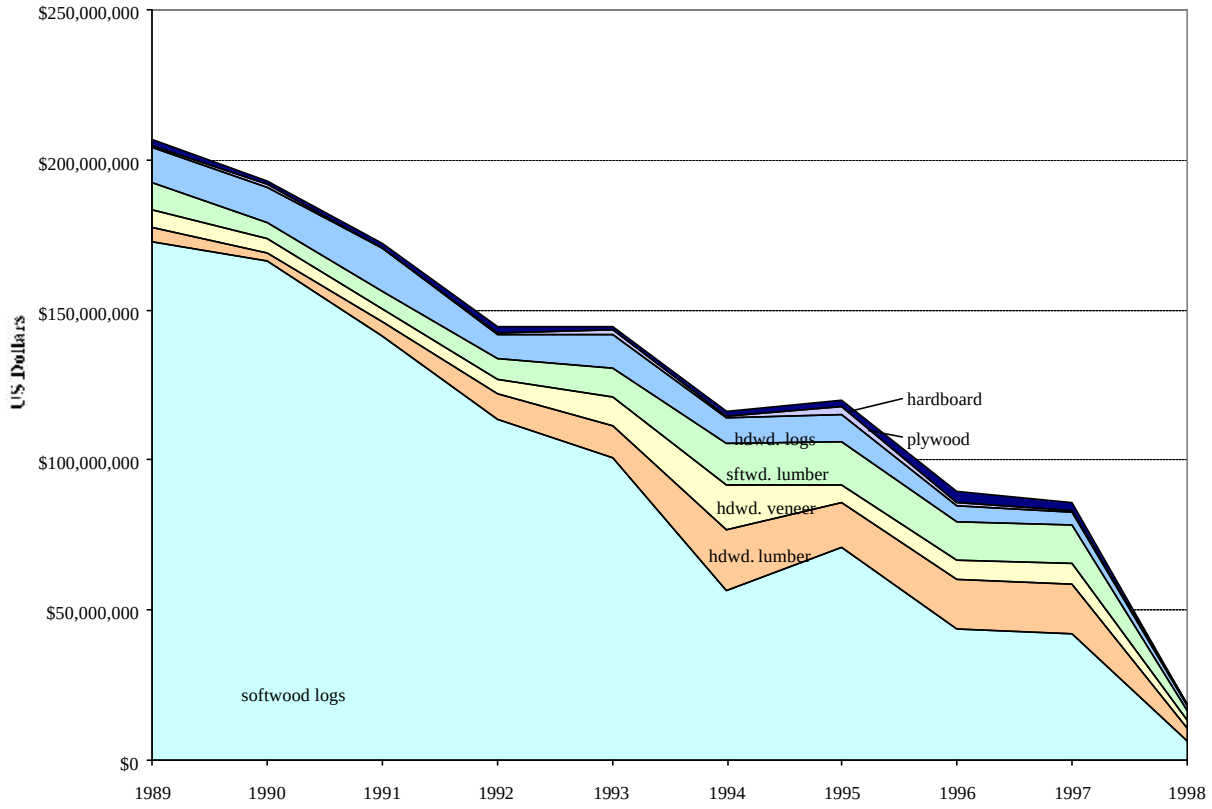

Figure III.15. Leading primary processed wood product exports to Korea, 1989-1998 (US Department of Commerce 1999).

III.D. Primary Product Export Market Shares

Table III.2. Primary wood product exports from US to all markets, shows the PNW leading the US in export shares for logs and lumber. Unlike secondary products, the PNW share of US exports has declined substantially since 1992. Overall, PNW share of total US primary product exports has declined from 44% in 1992 to only 27% in 1998. US hardwood lumber exports have benefited from the supply constraints, and have increased in share, largely to the advantage of eastern suppliers. Hardwood lumber is one of the few primary products where export revenue is increasing. PNW shares of hardwoods include some pass through of eastern hardwood products as well as western hardwoods. Changes in environmental policies have had a substantial impact on the export shares among US supply regions as well as among nations. The PNW decline in revenue share from 44% to 27% is a 39% change in the PNW's share.

Table III.2. Primary wood product exports from the US to all destinations.

US $ Millions	PNW Exports 1992	PNW Exports 1996	PNW Exports 1998	US Exports 1992	US Exports 1996	US Exports 1998	PNW Share of US Exports 1992	PNW Share of US Exports 1996	PNW Share of US Exports 1998
Primary Products									
Softwood logs	$1,499	$1,321	$614	$1,916	$1,870	$904	78%	71%	68%
Softwood lumber	$697	$600	$287	$1,348	$1,173	$677	52%	51%	42%
Chips	$248	$180	$156	$474	$560	$482	52%	32%	32%
Hardwood lumber	$130	$64	$100	$975	$1,220	$1,222	13%	5%	8%
Hardwood logs	$36	$45	$26	$238	$249	$313	15%	18%	8%
Plywood	$51	$46	$24	$238	$351	$252	22%	13%	10%
Particleboard	$43	$33	$24	$238	$85	$119	18%	39%	20%
Hardboard	$20	$24	$15	$238	$133	$81	9%	18%	18%
Primary Total Exports	**$2,793**	**$2,780**	**$1,308**	**$6,302**	**$6,308**	**$4,799**	**44%**	**44%**	**27%**

Source: US Department of Commerce 1999.

Figure III.16. Pacific Northwest and US south softwood lumber exports to all destinations, shows the dramatic change in export share between the PNW and US South. Softwood lumber exports from the PNW began to decline when harvest restrictions were applied, while exports from the US south remained stable even though the domestic demand was strong. With the onset of the Asian crisis, the volume of PNW lumber exports fell below the volume from the US south.

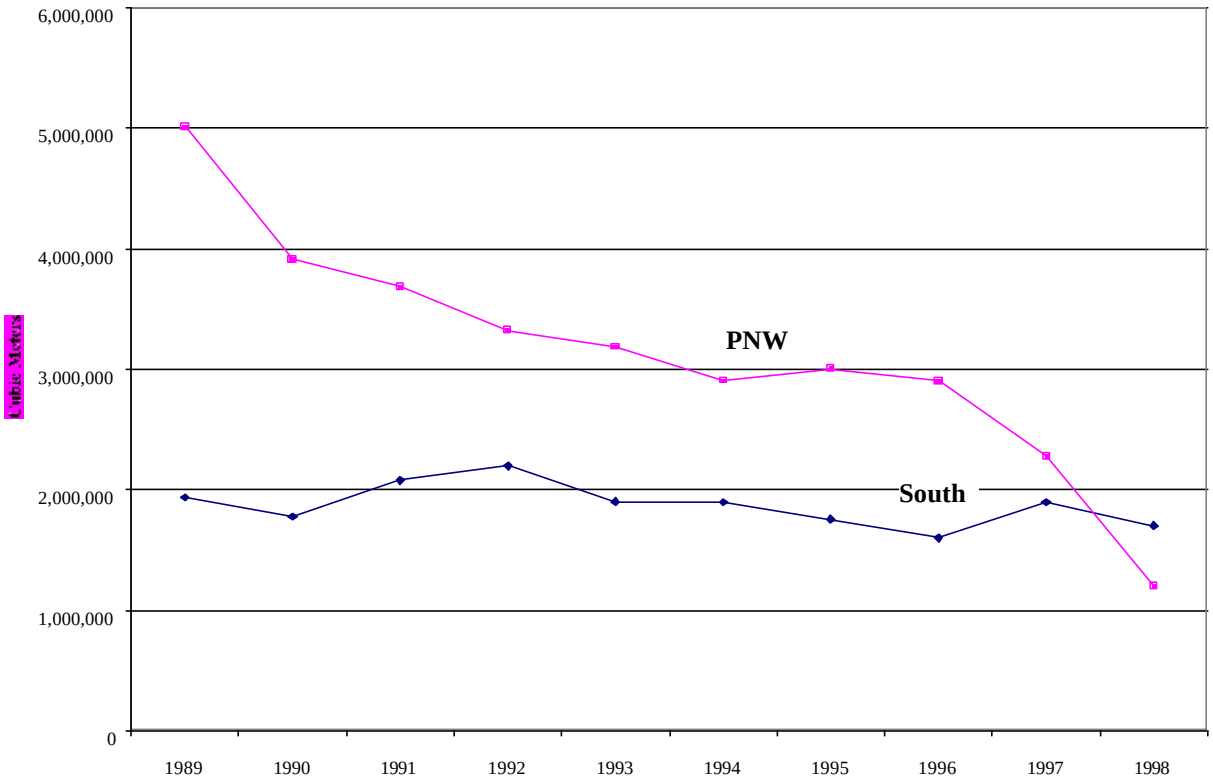

Figure III.16. Pacific Northwest and US south softwood lumber exports to all destinations, 1989-1998 (US Department of Commerce 1999).

The relative loss in PNW exports compared to the US south raises yet another aspect of the Canadian-US countervailing duty agreement. Southern exports are generally not in direct competition with Canadian lumber. Southern exports have not declined, even when domestic demand has increased. Southern mills receive a greater benefit from the Canadian lumber agreement than PNW mills. The agreement produces lower lumber prices in Canada than the US. PNW producers are in direct competition with Canadian producers and become less competitive in the offshore export markets, given the lower lumber price structure in Canada. These offshore markets are the only markets that PNW producers had a true comparative advantage over all other suppliers except coastal Canada. Therefore, PNW lumber producers are forced into eastern US markets. Whatever protection PNW lumber producers receive from the Canadian agreement may be offset by their reduced ability to compete in offshore Pacific Rim markets. Instead of increasing the competitiveness of PNW lumber producers, the Canadian-US lumber agreement has made them less competitive with Canadians in offshore Pacific Rim markets, the only markets in which they held a significant comparative advantage.

III.E. Primary Wood Contributions to Business Income

Contributions to Business Income

Business income from primary processing includes the income from domestic lumber; exports of log, lumber and chips; and other panel products. Business income information is state-derived and the examples will be for Washington, the state most impacted by exports.

Figure III.17. Business income from lumber production and exports has increased in trend from the lows experienced with the post-US housing boom of the 1970s and the international recession of the early 1980s. This increase has been supported more by product prices than volume, although lumber production in Washington did not decline significantly with the harvest constraints because export log volumes were diverted back to domestic markets.

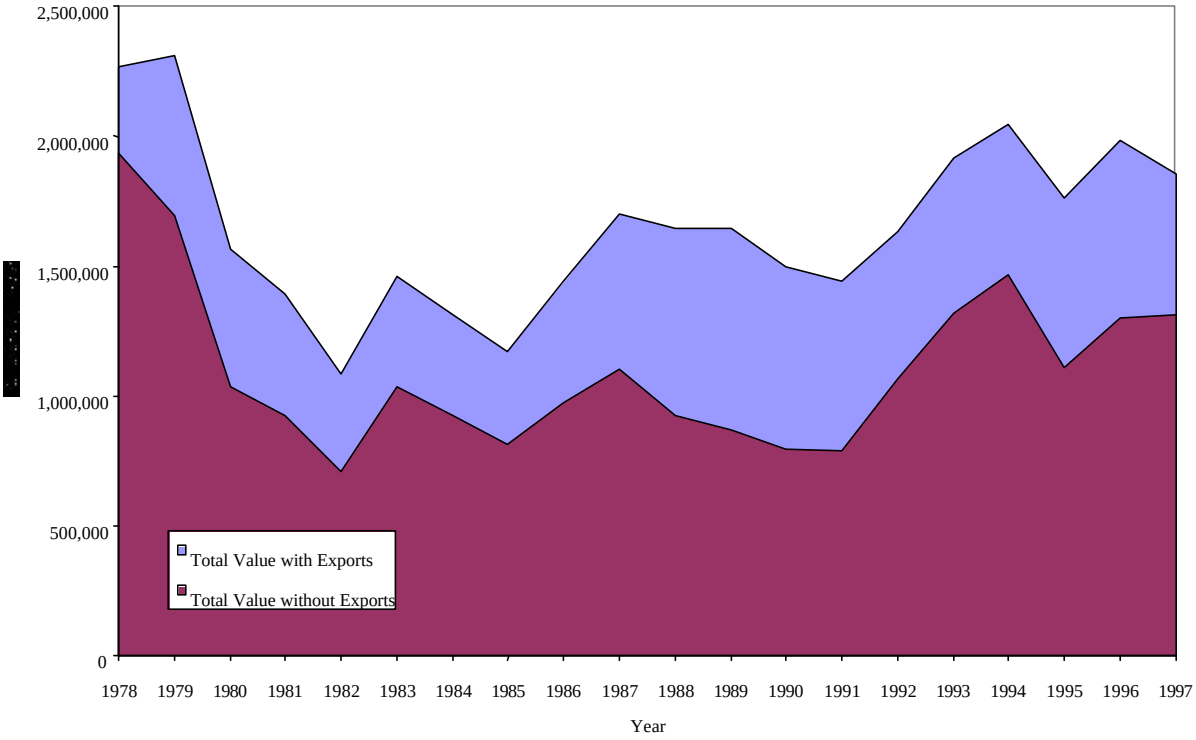

Figure III.17. Business income for lumber in Washington State.

Figure III.18. Business income from log and chip exports from Washington State barely declined until the collapse in prices during 1997. Prior to 1997, price increases essentially offset the volume declines.

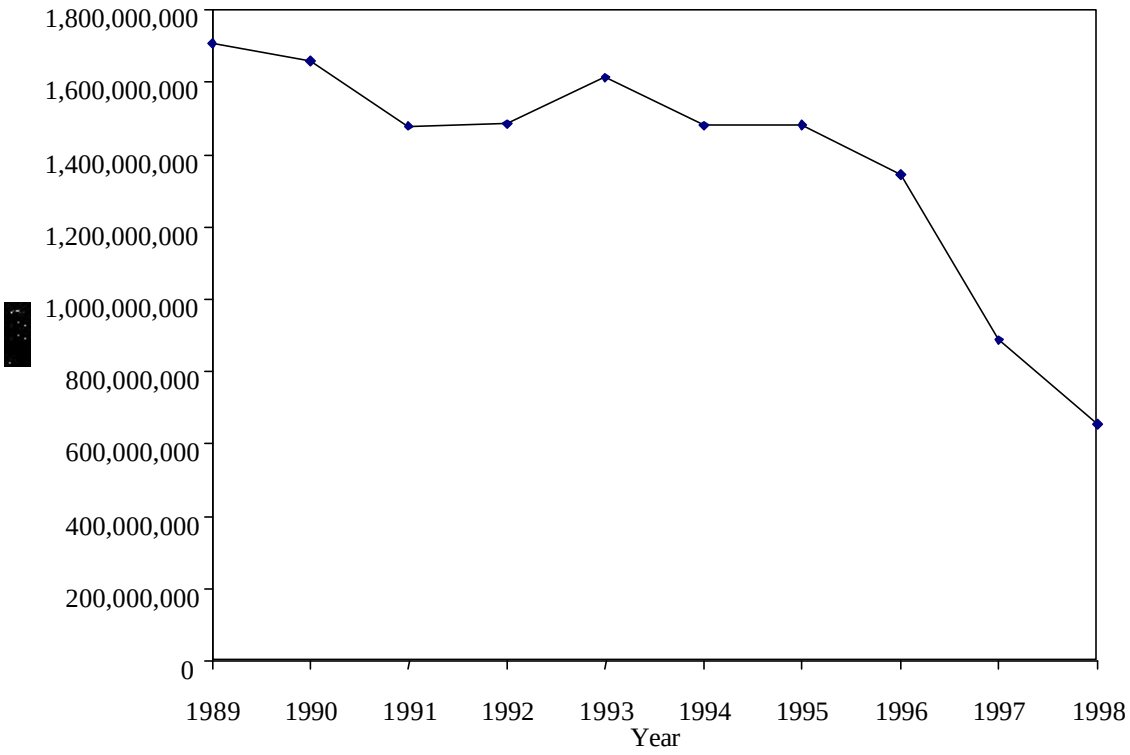

Figure III.18. Business income from log and chip exports from Washington State.

III.F. Primary Wood Processing and Harvest Efficiency

Measures of the changing efficiency of wood processing and logging include processing and logging wages/unit volume for western states, and comparisons to primary competitors in the US South.

Figure III.19. Washington State logging wages/mmbf, shows a substantial decline in unit costs in the early 1980s, but an increase in unit costs after 1992. The logical explanation for the substantial decline in the early 1980s is the very weak market conditions that followed the booming 1970s, resulting in a substantial shake out in the industry. Many logging operations were outsourced and placed on piece count pricing, resulting in substantial reductions in unit costs. Union agreements were also renegotiated during this period. The positive trend reversed after 1992, when lower harvest volumes and high prices affected both the economy of scale for logging operations limited the cost intensive logging practices that were made possible by higher product prices. While the downturn gives the appearance of a loss in competitiveness in the late 1990s, considering prices declined in 1998, costs may soon be forced down to trend levels. The trend in reduced unit costs of 1.8% per year may or may not reflect a long-term structural improvement trend, given the large structural changes that have occurred.

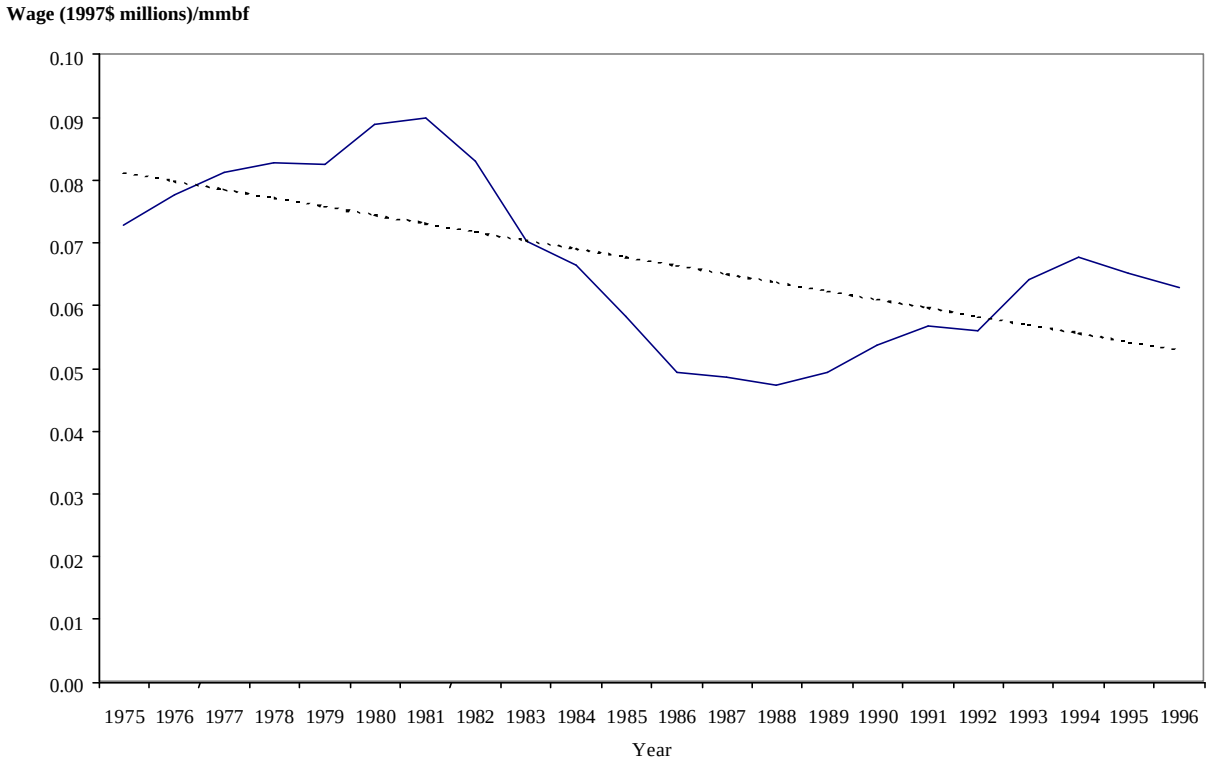

Figure III.19. Washington State logging cost.

Figure III.20: Washington State lumber processing cost (wages/mmbf), also shows a declining trend and improvement after 1980, but does not show the same cost increase generated by high stumpage prices after 1992. The long-term trend shows a cost decline of about 3% per year, a healthy rate of productivity improvement. Fierce competition between mills with a shortage of timber supply has forced many firms operating within marginal financial conditions out of business, thereby most likely improving the productivity more than would otherwise be expected over the last ten years. The improving trend in productivity may slow down.

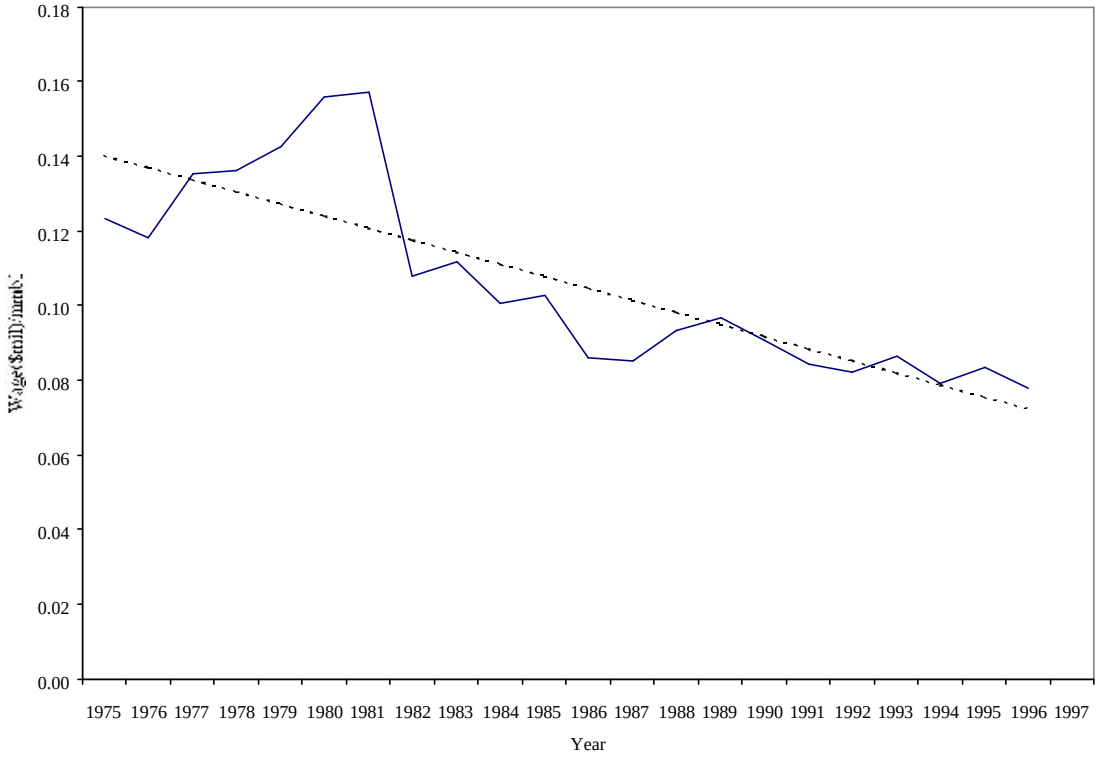

Figure III.20. Washington State lumber production efficiency.

Figure III.21. Washington lumber efficiency vs. US South provides a direct comparison of Washington wages/mbf efficiency relative to the US south. While the positive trend in Washington mill productivity looked impressive, a direct comparison with the South (ratio of Washington vs. South) does not look as favorable. Since 1990, the unit wage cost in Washington has actually increased by 20% relative to the South. The expansion of new capacity in the South appears to have increased productivity even more than shutting down old capacity in the west. Comparisons between costs in Washington and Oregon did not show any significant difference in the trend, suggesting similar competitive pressures have largely impacted producers in both states.

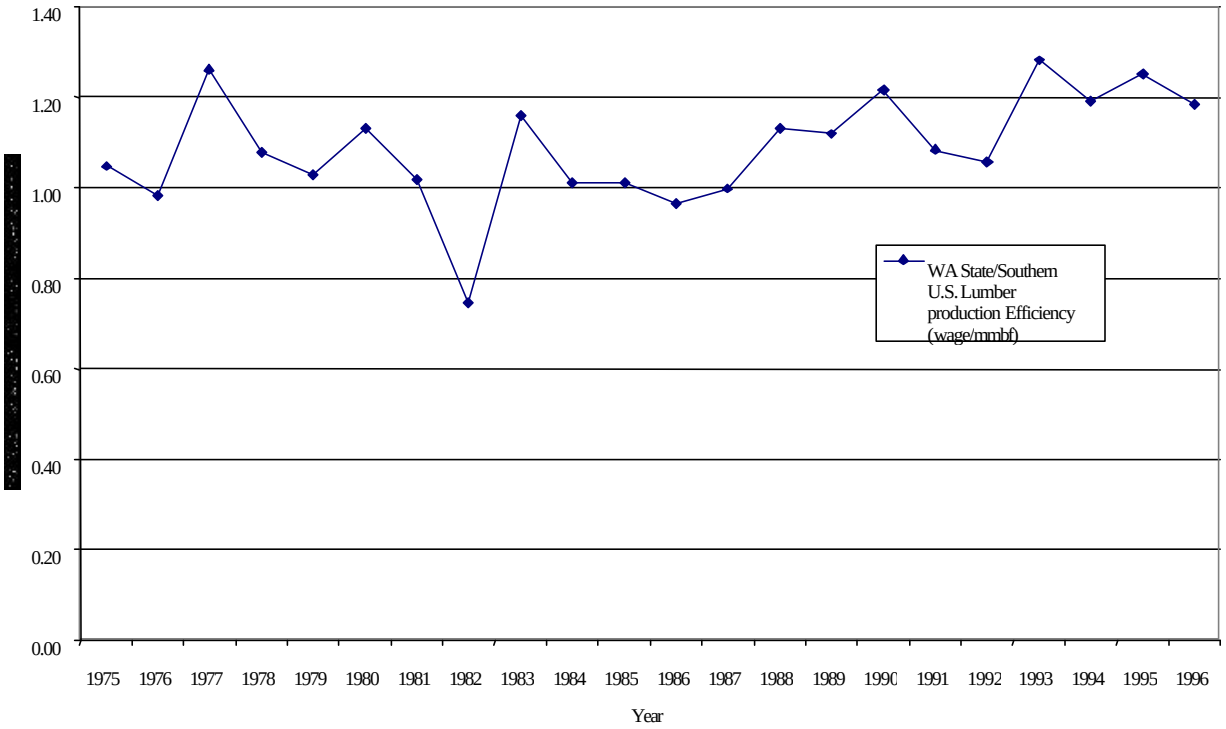

Figure III.21. Washington lumber efficiency vs. South: ratio.

Figure III.22. Washington lumber plus logging wage costs, was derived by weighting the lumber efficiency ratio of the PNW vs. the US South by the current wage cost and adding it to the logging cost adjusted for removal of the trend. The increase in logging and processing costs in Washington compared to the increase in the US south shows that total costs have increased more than 20%, an increase that is eroding the region's competitiveness.

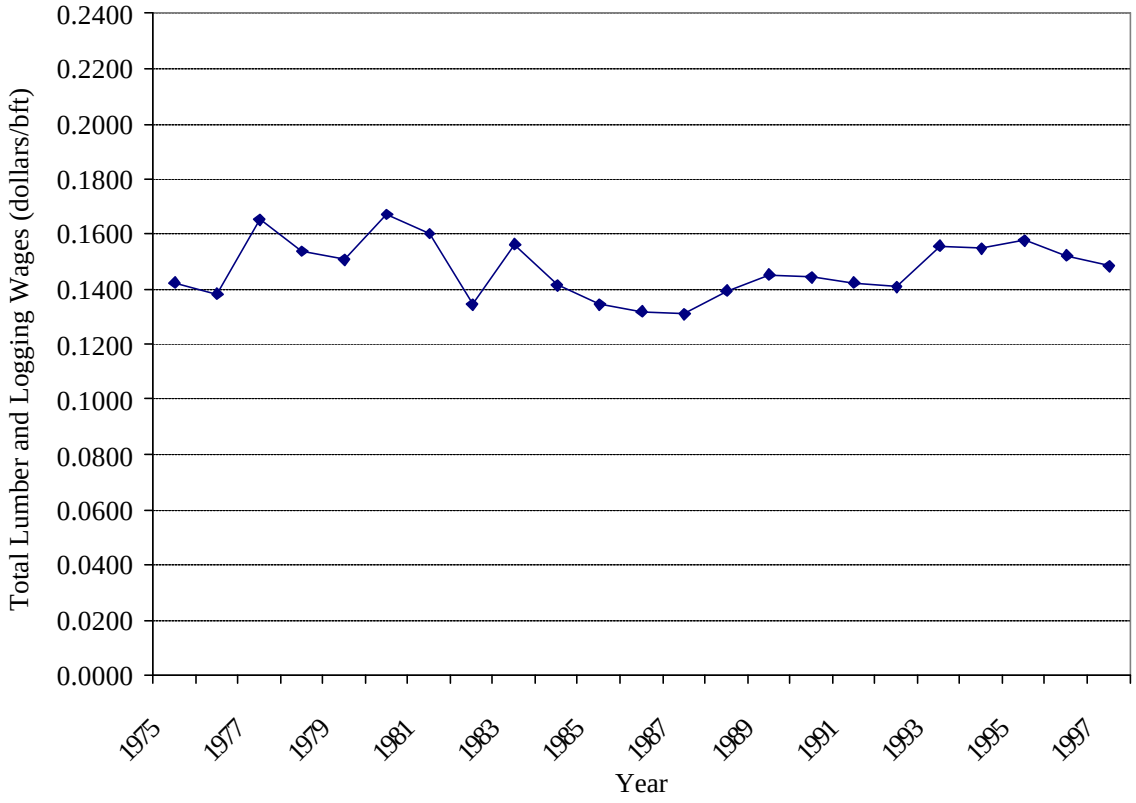

Figure III.22. Washington State lumber plus logging wages per unit of production.

Figure III.23. Lumber margins, integrates all of the previously cost and efficiency factors into a composite measure of performance for regional producers. The derived lumber margins are based on an estimate of the average price for lumber products, plus the value of residuals, and less estimates for the cost of wood, wages and other operating costs. It is a gross before tax margin.

The $50 margin average the last several decades suggests that such a margin has been necessary to cover other overhead costs, including taxes, and provide sufficient return to maintain the industry at a stable production level. The much higher margin prior to 1980 signaled that a period of high demand in excess of supply was ahead, which motivated processors to expand capacity. The negative margins after 1990 provide the comparable signal for contraction, except for the period when lumber prices spiked up in 1993.

The chart summarizes what we know about the profitability of the PNW domestic lumber industry. Profits were high when demand was high (prior to 1980), which promoted expansion. The 1980s became a no-growth, or breakeven, operation. When wood costs increased in the

1990s, margins were negative except for periods when product prices were very high. Many mills were forced to shut down.

The sector may return to a stable breakeven point if the decline in timber prices stabilizes and enough mills have shut down to not bid up the price of timber. Since the regulations affecting timber supply are still changing and a full Asian recovery may be several years in the future, more stable conditions are not likely in the near term.

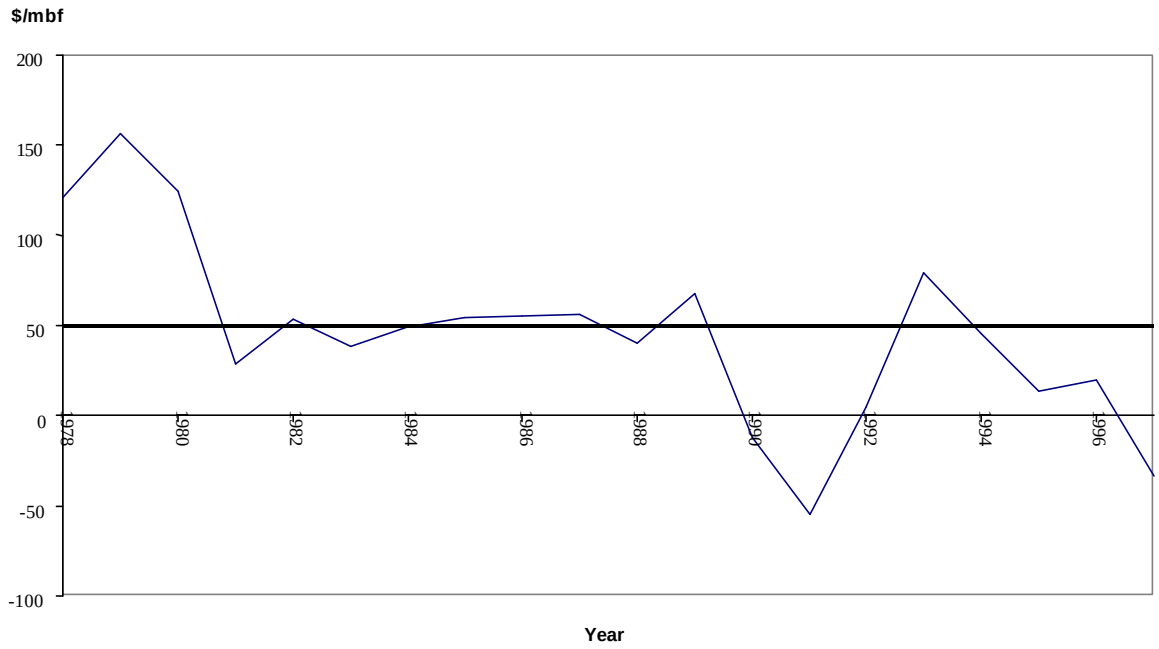

Figure III.23. Washington unit lumber margins: price plus residuals, less operating costs.

III.G. Changing Export vs. Domestic Mix

Business Cycles: US lumber consumption vs. all manufacturing

In order to characterize the interaction between the economy and wood markets and the interaction between several sectors of the wood markets such as export vs. domestic uses, it is important to be able to separate business cycle issues from trend growth in demand and production.

Figure III.24. US lumber consumption in comparison to total US manufacturing. The business cycle peaks and troughs are noted. Four important characteristics are (1) business cycles appear to have become longer over the last three decades growing from 4-5 years to as long as nine years or more, (2) the growth trend for lumber consumption is lower than total manufacturing, (3) the lumber sector has generally been more cyclic than total manufacturing, and (4) the lumber sector has generally led other product sectors in terms of extreme highs and lows.

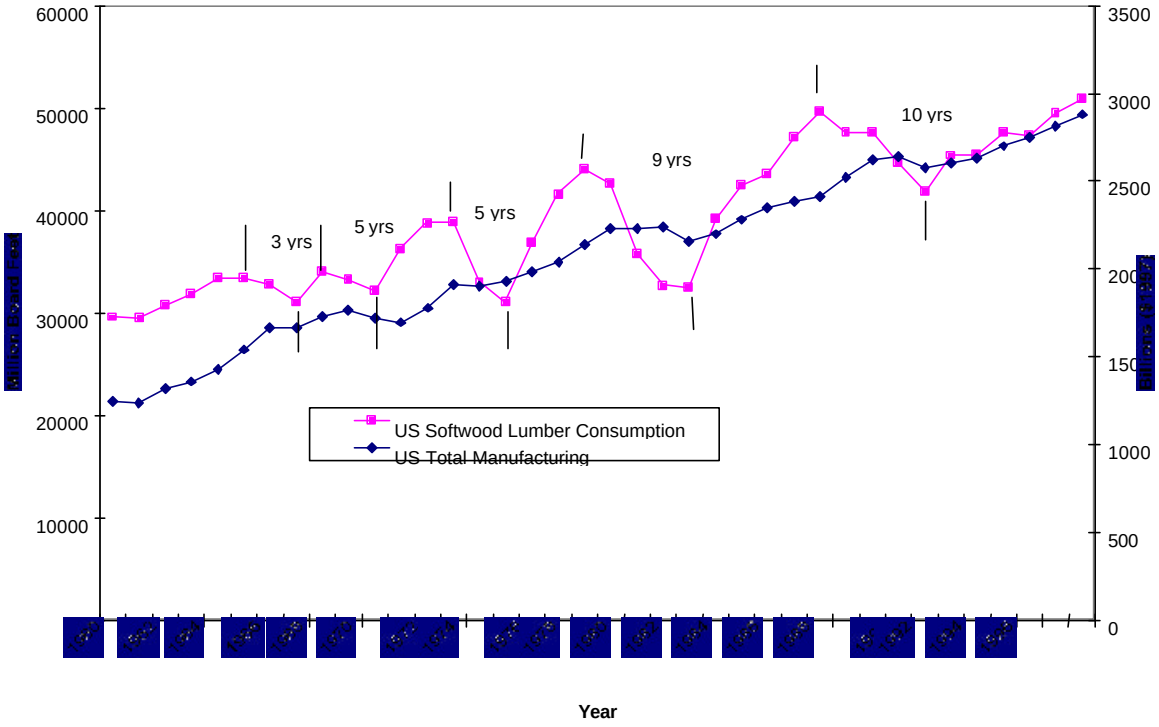

Figure III.24. US lumber consumption in comparison to total US manufacturing.

Figure III.25. Growth rates for US lumber consumption and total manufacturing, provides the same information using growth rates. The lumber growth trend has been only 1.4% compared to 2.6% for total manufacturing. In the last decade, however, the lumber growth trend has been even lower as the 1991-1944 recovery appeared to be less robust than prior cycles by almost 10%. Lumber primarily serves housing markets, which grow more slowly than manufactured goods in total. In addition, the lumber cycle's typical one-year lead was not evident in the most recent business cycle, although it was apparent from the 1982 recovery and 1987 decline, and almost all previous cycles.

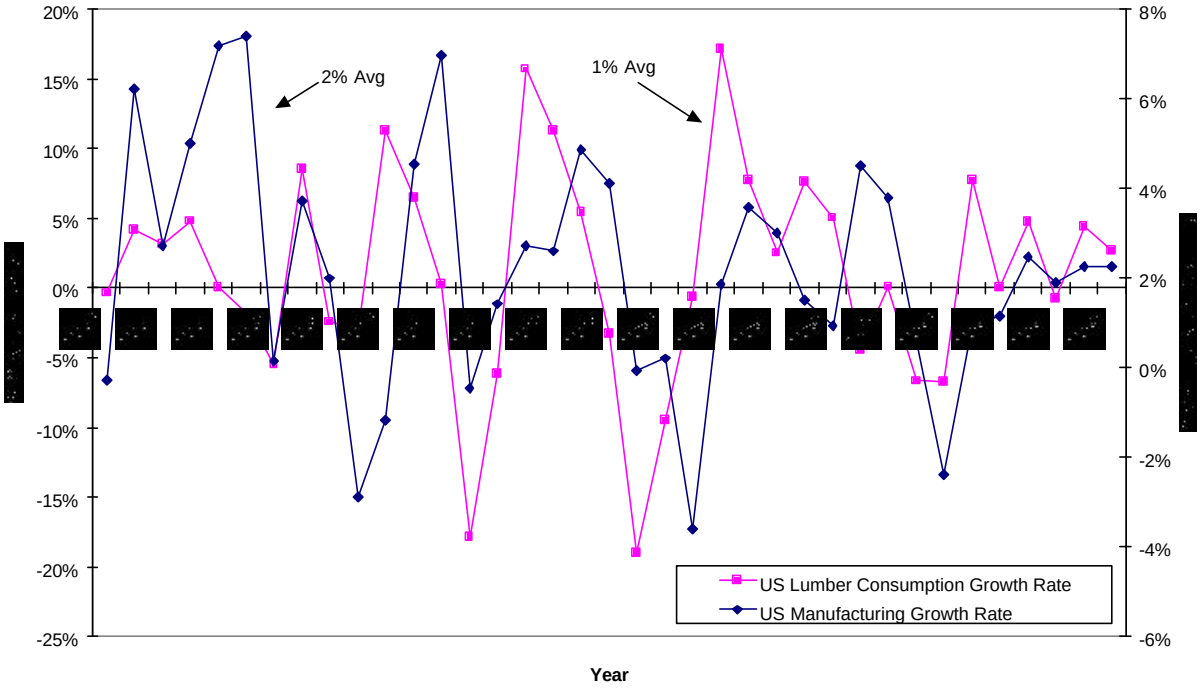

Figure III.25. Growth rates for US lumber consumption and total manufacturing

Another distinguishing feature of the current business cycle is that the trough was not as deep. In general, we can expect lumber consumption to be about four times more cyclic than manufacturing (the ratios of peak to trough changes as shown by the different sensitivity scales in the figure) with a growth trend between 1-2%. The growth trend will be somewhat higher than the population growth, reflecting housing expenditures from increasing discretionary income, but below the all manufacturing or total economy growth rate.

PNW Business Cycles: Lumber production and log exports

For the PNW, the role of international markets and US exports is as important as the US housing market and US lumber consumption. The role of log exports in particular has been politically controversial, as some believe all raw materials should be domestically processed. The US is a major importer of many raw materials, which it processes, thus generating revenue from other

countries' raw materials. Any policy that would ban exports could invite retaliation by others, which would impose large costs on the US. The US exports less in wood products, largely from the coastal region, than it imports from the Canadian interior. In effect, the US PNW competes more effectively with Canadian suppliers in international markets than it does in US domestic markets.

Figure III.26. PNW lumber production and log export cycles across the last four business cycles. While there has been some correlation between US and international business cycles in the recoveries of 1970, 1975, and 1982, recovery of log exports has generally lagged that of lumber. While not totally countercyclic, upturns in regional lumber production were much stronger than log export recoveries. There was no period when log exports lead in a recovery, corresponding to declines in domestic production, which could have been an indication of severe competition or substitution between the markets. The 1990 recovery is substantially different. Instead of sharing in the US lumber recovery, PNW lumber production declined by about 800 million bd ft. in comparison to its typical 1.7 billion bd ft recovery. Log exports declined even more, effectively diverting as much as 1.5 to 2 billion bd ft to the domestic processing market. Without the log export decline, domestic lumber processing would have been constrained much more severely.

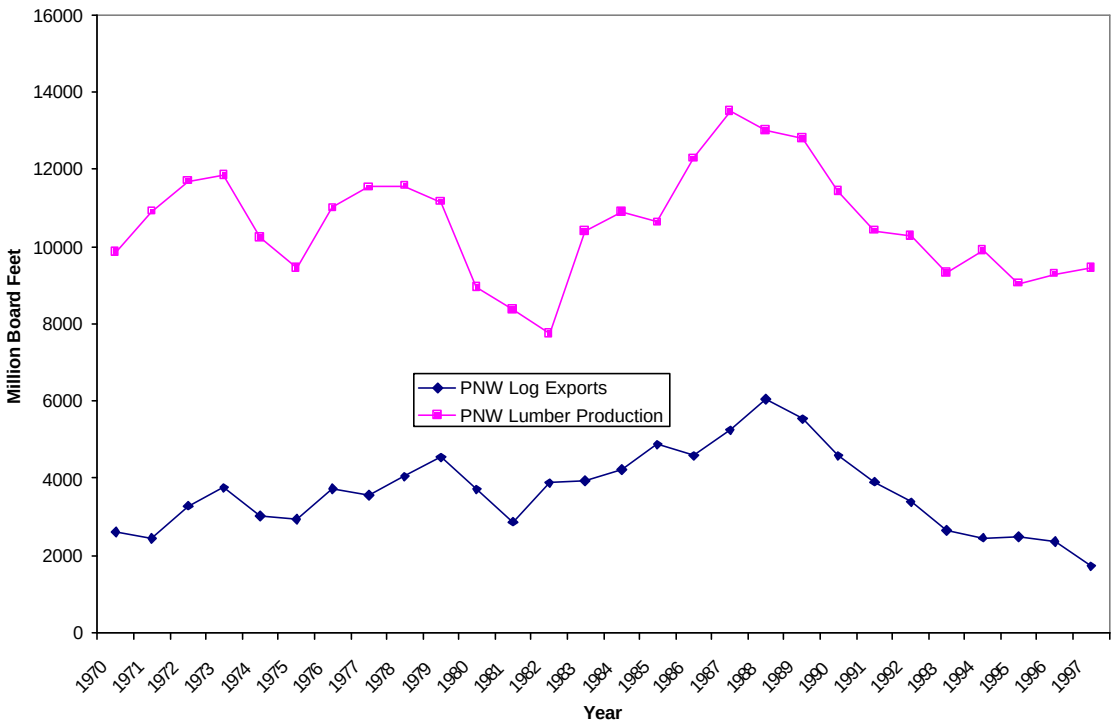

Figure III.26. PNW lumber production and log export cycles across the last four business cycles (Log exports adjusted by the overrun factor to an equivalent lumber volume).

Since most log exports originate from Washington State, any competition between log exports and lumber production should be most evident in Washington State.

Figure III.27. Washington State lumber production across the last four business cycles. In the last business cycle recovery started after 1991, lumber production did not recover, yet it did not follow harvest declines, although log exports did.

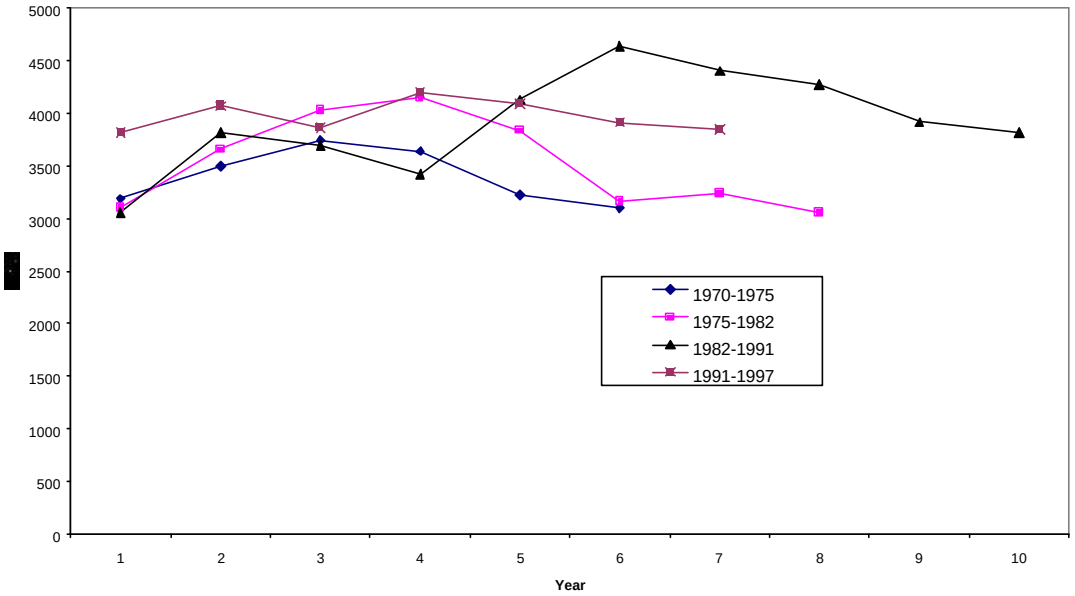

Figure III.27. Washington State Lumber production across the last four business cycles (measured from the trough as year 1).

Figure III.28. PNW lumber production over the last four business cycles, shows much more clearly the difference of the last business cycle with declining production from already recessing levels.

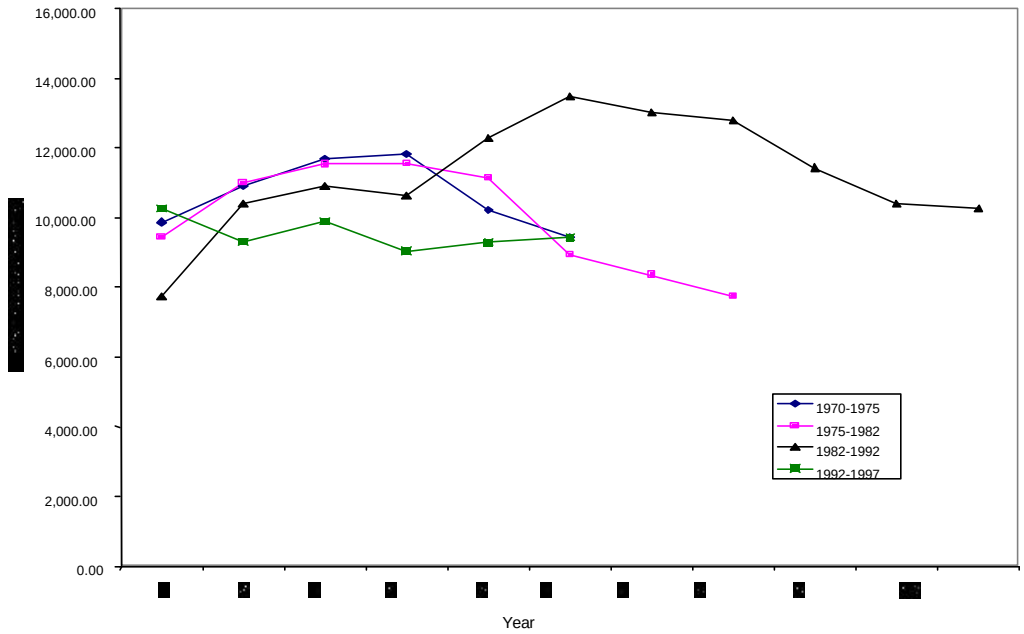

Figure III.28. PNW lumber production over the last four business cycles.

Figures III.29&30 compare the business cycle recoveries for Washington and PNW log exports for each of the last four business cycles. Since most of the exports are from Washington, there is not much difference between the cycles. The obvious difference with the lumber cycle is that log exports declined much more than lumber during the most recent cycle. This prevented lumber production from declining much below prior recession levels in the PNW and resulted in almost no decline in Washington. It provides convincing evidence that strong lumber demand bid volume away from log exports. When demand for exports are much greater, the reverse may also be true. In effect, the existence of the two markets has provided more stability.

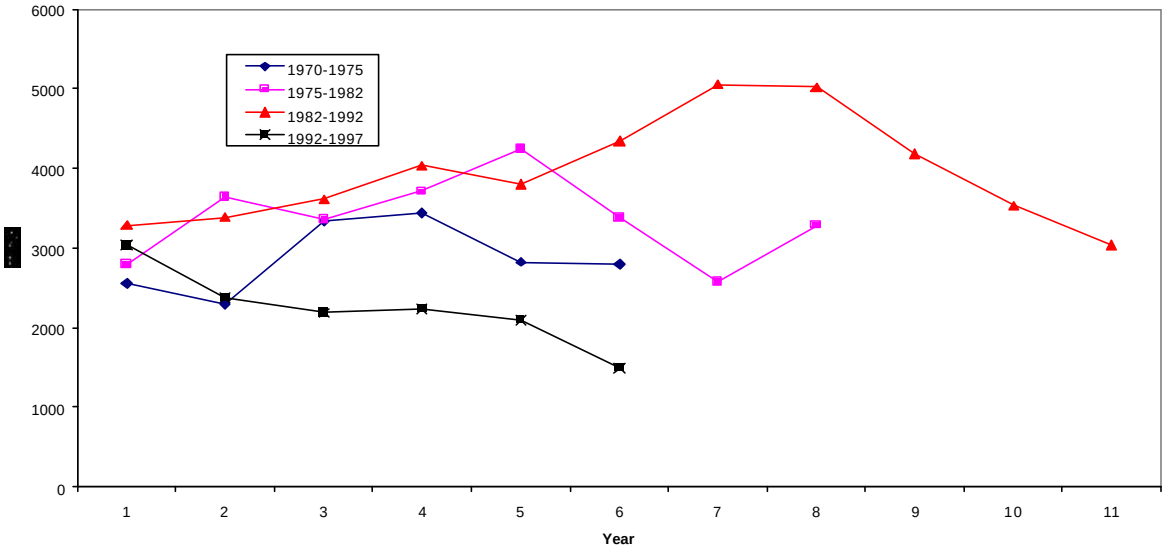

Figure III.29. Washington State log exports across the last four business cycles (lumber equivalent.).

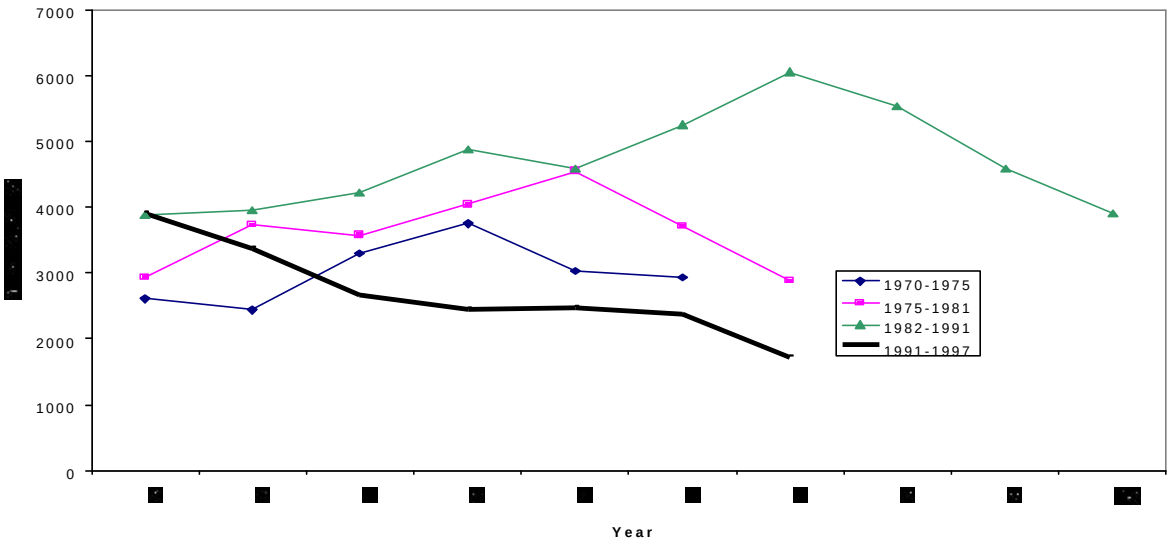

Figure III.30. PNW log exports across the last four business cycles (lumber equivalent.)

Additional evidence on this effect is provided in Section V on employment. Washington lumber employment declined 6% after the harvest declines, while Oregon lumber employment declined 32%. The ratio of Washington's employment loss to harvest decline was only .26, compared to .8 for Oregon. A ratio of 1.0 corresponds to lumber employment losses equal to harvest losses. Washington's ratio is low because Washington log exports were diverted to processing, which reduced the employment loss to much less than the harvest loss.

If Oregon log purchasers had not bid away roughly one-half of the Washington State timber sales, the Oregon ratio would have been even closer to 1.0 as Oregon's log exports have been small in comparison to Washington.

While the harvest cutbacks have diverted more resources to serving domestic markets, this does not necessarily imply that this will remain the best long-term strategy for the PNW. Once the other international suppliers have had time to respond, the comparative disadvantages previously experienced by the west in serving the US markets will return. PNW producers are likely to shift back to export markets, yet unless a comparative advantage in processing is developed, such as the prefabricated building market in Japan, the premiums timber sellers once enjoyed in international markets are unlikely to return or be replaced by equally profitable product exports. Hemlock log exports in particular, have most likely been permanently replaced by other suppliers.

Changing export price premiums:

Several factors heavily influence how products are distributed to international and domestic users and how the products contribute to business income. Export restrictions constrain log exports from British Columbia, from US federal lands, and, since 1990, from state lands, which affects Washington and to a lesser degree, Oregon. The near total ban on log exports from British Columbia prevents British Columbian producers from competing in international log markets and forces them to give up their comparative advantage to US private, Russian, New Zealand and Chilean log exporters. The resulting Canadian log prices are lower than international market prices, which gives Canada a comparative advantage in the primary products market. Therefore, prices in the international log market are higher than they would be without export constraints.

A second factor affecting export markets involves the absence of international processing and construction standards. The Japanese post and beam construction method requires products that are largely incompatible with US processing. The Japanese distribution system relies heavily on custom cut order files of many different dimensions and sizes, which cannot be effectively mass-produced in North America. Many Japanese mills can afford to pay premiums for logs to serve their local needs. The premium may potentially be as high as custom cut US lumber, with much less labor and much higher profits. While the result of Canadian log export constraint is more revenue for US firms, which can be invested in activities such as programs to create jobs, there are also fewer mill-processing jobs left in export dependent regions. Understanding the characteristics of these premiums and their impacts helps to identify the workings of international markets.

Table IV.1 shows the log price for domestic grade fir and hemlock log sorts for #2 logs in comparison to Japanese export sorts (which are dominated by #2 logs). Prices are shown for four different market conditions: (1) 1986, which is representative of a normal US market but weak international market; (2) 1989, a period when both markets were strong; (3) 1994, after owl constraints reduced US timber supplies; and (3) 1996, which is representative of approximately five years of international adjustments to US supply constraints.

Table IV.1. Export log premiums vs. market tightness.

Log prices $/mbf	Jan '86 **Weak mkt.**	Jan '89 **Strong int'l mkt.**	Jan '94 **Post-owl**	Jan '96 **Int'l adjustments**
Domestic fir #2	270	375	750	700
Domestic hem #2	177	295	470	475
Japan sort fir	370	663	1075	1150
Japan sort hem	340	675	875	667
Fir export premium	100	288	325	450
Hem export premium	163	380	405	192
60/40 mix premium	125	325	357	347
Export quality difference	-50	-50	-50	-50
Quality & mix adj. premium	75*	275	307	297

* consistent with other study estimates

The table shows that the price for export grade sorts have a premium of about $100/mbf for fir and $163 for hemlock over domestic grades even in weak markets. While much of this premium may reflect differences in higher quality standards for export log sorts than for domestic sorts, the increased price for hemlock is clearly an international premium, since hemlock logs have been in much less demand in the US. Other studies have shown that the Japanese preference for whitewoods results in a lower discount for hemlock in international markets relative to US markets (hedonic price analysis of DNR sales by Lippke H, 1993). More importantly, as international markets tightened by 1989, the export premiums increased by $190 to 220/mbf, which cannot be attributed to a quality change. Export premiums are very sensitive to relative market conditions; they were quite low following the international recession in the early 1980s, but increased substantially with strength in the international market.

These premiums increased a little further after the US supply reductions, $25-35/mbf, but this increase in premium was very small compared to the $375 (100%) increase in domestic fir log prices. The percentage increase in both domestic and export hemlock log prices after a few years of market adjustment was much less than for fir logs, since hemlock is much more vulnerable to substitution from the increasing supply of New Zealand and Chilean radiata pine. As the table shows, the current export premium for hemlock logs declined to the weak market condition of a decade ago, even as the fir export premium climbed to new highs. As noted earlier, log export volumes decreased substantially even in the face of these high premiums being paid by the Japanese, yet the volume declines have been largely in hemlock and lower grade sorts to Korea and China. The increased volumes of radiata pine coming from New Zealand and Chile, southern pine from the US South, and eastern pine from Russia have more or less permanently

reduced the price for US hemlock. Hemlock had been largely purchased by international users who have since substituted other suppliers.

Impact of the state log export ban:

The ban placed on the export of state logs by an act of Congress was intended to relieve the shortage of wood for mills by offsetting some of the loss in federal harvest by diverting state logs from export to local processing. Since the supply of logs to the export market was reduced by this ban, export price premiums for the remaining suppliers increased further. Nevertheless, the total diversion of log exports to domestic processors was much larger than the reduction in state log exports. Tight US markets and high domestic prices caused most of the diversion of log exports from private log suppliers even though they were not constrained by the ban.

Since federal supply reductions were greater in Oregon than in Washington, an unexpected consequence has been that almost half of the Washington State log sales have been purchased by Oregon processors, instead of local Washington processors. This is almost the same share that had been exported. Like any log ban, the price paid by mills for the timber is lower than it would have been without the ban, resulting in some transfer of income from Washington State Trusts to Oregon mills. The surviving Oregon mills did pay more for the timber than Washington mills would have paid, so the timber revenue to Washington's trust beneficiaries declined less than it would have by more in-state processing. The unexpected consequence is that the federal ban on state log exports caused much of the loss in income to Washington's trust beneficiaries to be gained by Oregon mills, not Washington mills. To the degree that mitigation in mill employment was the objective of the ban, it should be remembered that most of the diversion in log exports was the market response to higher domestic log prices from the declining federal harvest and not the result of the state ban. However, Congress's ban on state log exports did add to the diversion of log exports, but with most of the mitigation benefit going to Oregon's mills and the mitigation costs born by Washington trust beneficiaries.

Timber revenue dependence on log exports:

A rough estimate of the impact of these export markets on state timber revenues can be derived by characterizing the export and domestic log shares with these premiums under internationally strong and weak market conditions.

Table IV.2. Export and domestic conversion returns to timber.

	Weak market (like '84-'86)			Strong market (like '89-'94)		
	Export	*Domestic*	*Composite*	*Export*	*Domestic*	*Composite*
Private sector			70/30 mix			70/30 mix
Logs ($/mbf)	375	205		975	575	
Timber ($/mbf)	200	90	167	800	450	695
Export premium (same quality) ($/mbf)	75	0	53	350	0	245
Statewide pre-harvest constraints			45/55 mix			45/55 mix
Harvest (bill. bdd ft.)		6.8				6.8
Timber revenue ($million)	612	337	949	2720	1530	4250
Export premium ($/mbf)	230			1190		
Statewide post-constraints			33/67 mix			33/67 mix
Harvest (bill. bdd ft.)			4.2			4.2
Timber revenue ($million)	277	253	530	1109	1266	2375
Export premium ($million)	104			485		

Table IV.2 presents estimates for state timber revenue as generated from export logs and domestic sales. The mix of exports and domestic processing was roughly 45/55 before the period of harvest constraints and 33/67 more recently (yet still declining) as a consequence of harvest levels falling from 6.8 billion bd ft to 4.2 billion bd ft. The pre-supply constraint harvest levels supported timber revenue of $949 million in weak markets and $4.3 billion in strong markets. The revenue share from export premiums was as low as $230 million in weak markets and as high as $1.2 billion in strong markets.

After the supply constraints, revenues fell to as low as $530 million with weak markets, but remain close to $2.4 billion in tight markets. The export premium would be as low as $104 million in weaker markets, but has probably remained closer to the $485 million estimate in strong markets.

In weak market conditions, the export premium of $75/mbf, a profit to the timber owner, is roughly comparable to the processing wage bill if the logs were processed. In other words, if processing was required, the policy cost of each processing job is equivalent to the export premium, which is lost by the timberland owners/beneficiaries (assuming the lumber price decline from their increased production volume was insignificant). In strong markets, the export premium of $350/mbf is more than 4 times the processing wage bill. The federal timber harvest reductions with a tight domestic and international market maintained high export price premiums for the four years preceding the Asian downturn and for several years prior to the harvest reductions. While the domestic US market remained strong through the Asian downturn, with weak international markets export premiums declined to weak market conditions.

Other studies have modeled the export markets under various constraint policies (Perez-Garcia, et al. 1994, Perez-Garcia, et al. 1997), concluding that while mill processors and their employees gain under a log export ban, the losses in port jobs and other jobs supported by the export

premiums are larger. In the case of a state ban, export premiums will be recycled into the local economy, therefore, the local economy experiences a net loss in income and jobs.

Since the Asian crisis and the decline in log prices, the markets have continued to divert most private logs to domestic processors without export constraints, as the export premium for even high quality logs has remained very low.

IV. Pulp & Paper Sector

Pulp and paper products are high value-added products that utilize most of the lowest valued logs and mill residuals. Nevertheless, their contribution to business income is substantial. Washington State has more processing facilities than it has fiber supply, and has traditionally imported a substantial share of the chip furnish from Oregon, Idaho and British Columbia.

Figure IV.1. Washington State pulp and paper gross business income had been reasonably stable at $4.3 billion until harvest constraints affected chip supplies. Gross business income for the six years after the harvest constraints declined 23% from the six years prior, in spite of efforts to offset the declining chip supply with increased use of secondary fiber and paper fillers. The chip supplies within the state also benefited by the diversion of log exports to domestic processing of lumber, which resulted in a much smaller reduction in the residuals chip supply than in the harvest volume.

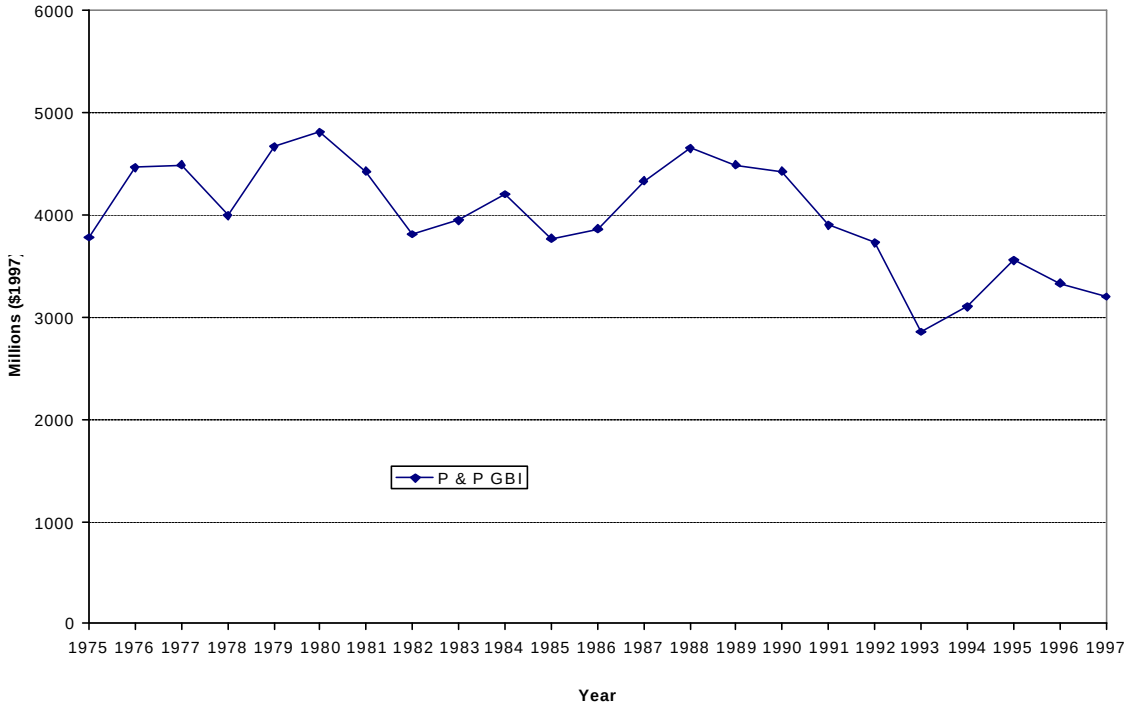

Figure IV.1. Washington State pulp and paper gross business income.

Figure IV.2. Washington State pulp & paper wages per unit of sales, provides an efficiency measure for the sector. Unlike the solid wood sector, however, there is no demonstrated improvement in wage costs per dollar of sales. The rising wage cost trend, especially after the harvest constraints, would seem to suggest facilities are operating at lower efficiency when the chip supply has been low. Capital costs more than doubled over the last two decades as companies have adopted technologies to clean up pollution and begun closed mill operations to reduce effluent levels. There has been both a capital cost and wage cost squeeze which has affected the pulp and paper sector's bottom line. The increased use of secondary fiber has not been able to offset these increased costs. The state's pulp and paper facilities have become high cost producers on the global market, resulting in several closures and strategic shifts to other regions with lower cost fiber resources, such as South America.

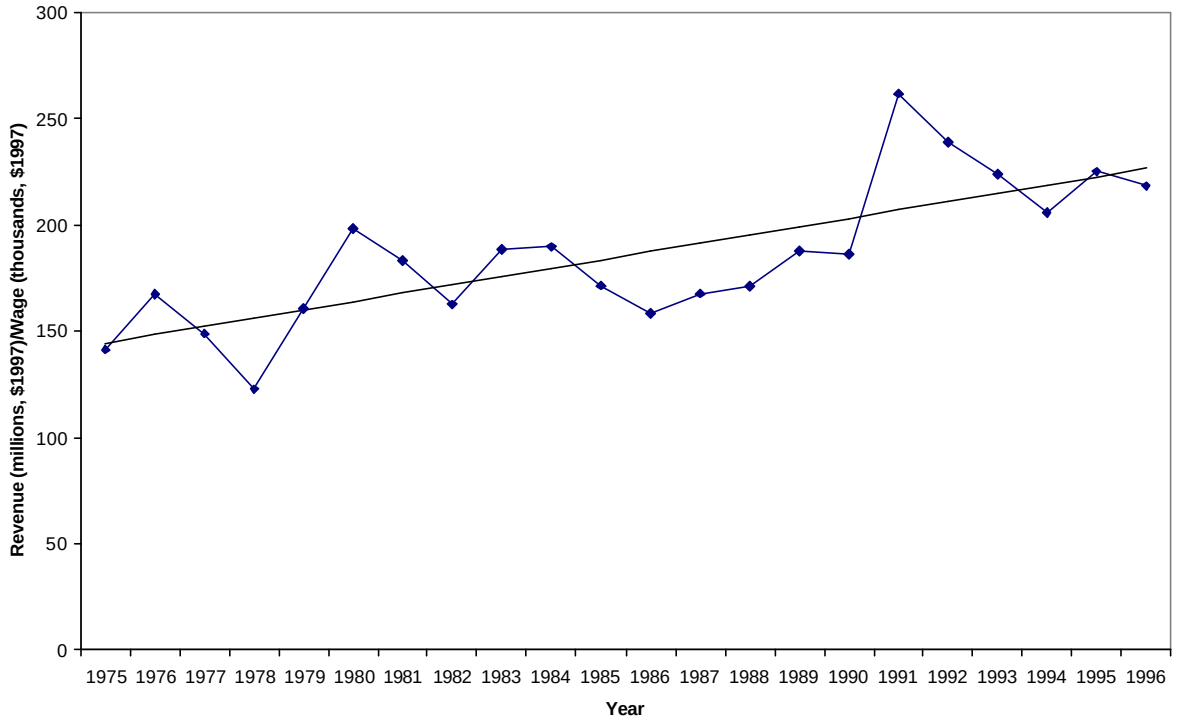

Figure IV.2. Washington State pulp & paper wages per unit of sales.

V. Total Forest Sector Business Income

Figure V.1. Washington State total forest sector business income, shows the summation of gross business income (GBI) across all sectors. It must be recognized that since each sector is characterized with a gross business income, there will be some double counting of income in this summation. The wood cost portion of secondary manufacturing may also appear as income to primary processing. Since timber sales are not considered end products, timber income is not double counted as a part of product income.

The business income growth trend of about 3% per year was shown in an earlier study to be caused by factors other than price changes (Robertson and Lippke 1996). Increased export markets with high values, increased secondary manufacturing, and improvements in product yield collectively explained most of the historical growth in business income, not increasing harvest volumes or product prices. Since 1990, the harvest declines ended the trend increase in business income, but a substantial decline in income was avoided by the period of high product prices. A rough approximation for what business income might have been without the decline in harvest volumes is projected by scaling up the business income by the reduction in harvest. The end point of this estimate includes the impact of price reductions to more normal levels with the Asian recession, and therefore provides an estimate of what the trend might have been without the harvest declines. The 3% historical trend increase in business income lines up with this adjusted income series, suggesting that, other than the harvest constraints, the basic factors contributing to a growth in business income per unit of volume have continued.

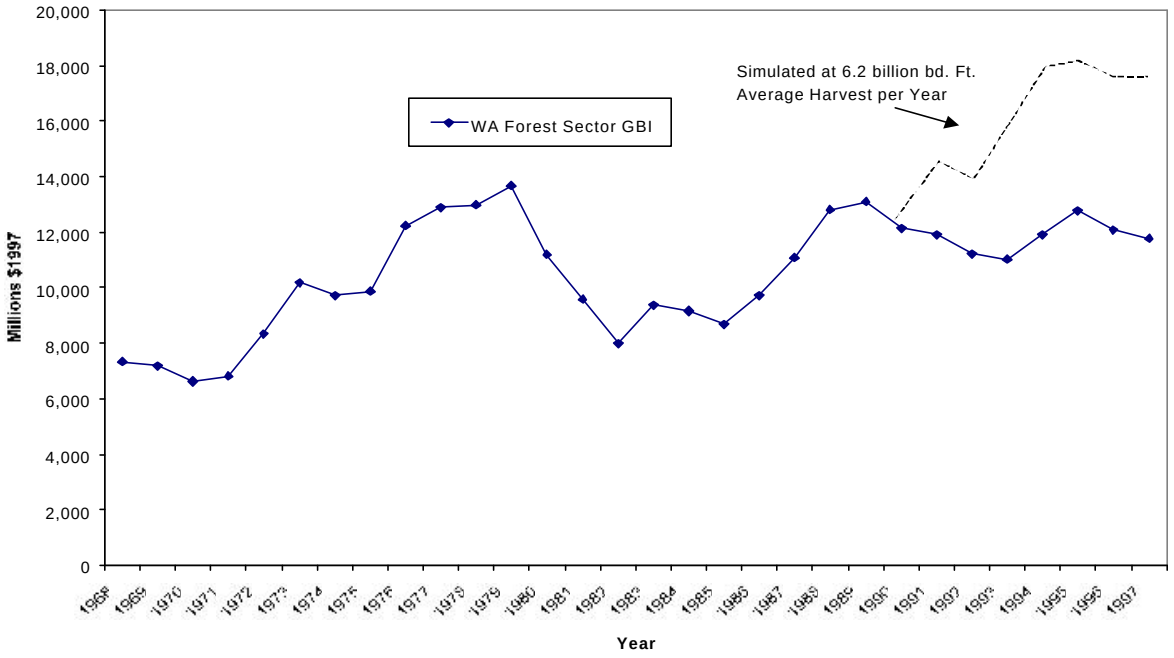

Figure V.1. Forest Sector Gross Business Income for Washington State.

Figure V.2. Washington State forest sector GBI per unit of harvest increased significantly after 1991, producing incomes of over $2000 per board foot of harvest. Almost all of this increase in income per unit of harvest occurred after the harvest reductions, which supported higher prices for a number of years.

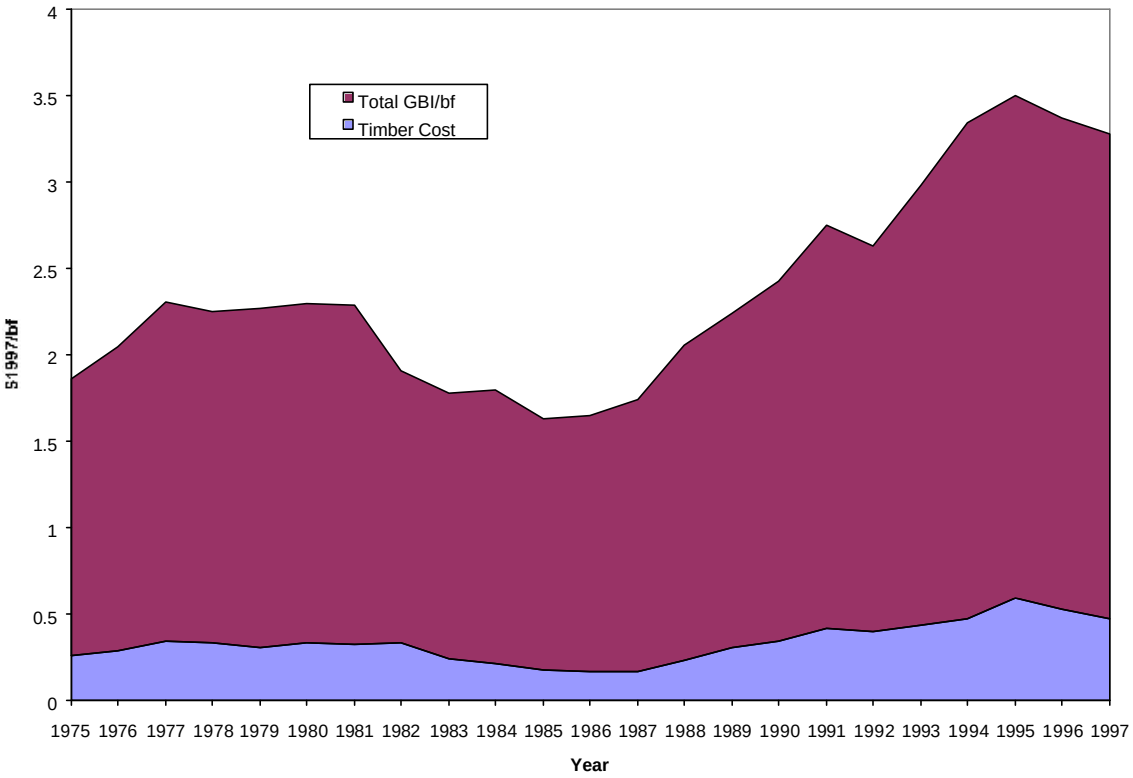

Figure V.2. Washington State forest sector gross business income per unit of harvest

Also shown in figure V.2 is an estimate of the timber cost share of the total business income. As noted in the figure, the timber income represents the raw wood cost for production and explains some of the contribution to the rising income per unit of harvest. Since timber prices declined substantially in 1998 and 1999, forest landowners will no longer benefit from inflated revenues sufficient to offset the reduced harvests and regulatory cost increases. For smaller owners with disproportionately higher costs, the regulatory losses will have a substantially larger percentage impact on their rate of return, leading to a higher motivation for land conversions or outright sale of their timber and land.

If and when the forest sector attains a more stable harvest level, business income growth should be restored with increasing high valued export opportunities and secondary manufacturing. There may also be increases in product yields, produced by the growing use of engineered products and advanced mill processing technologies. However, this growth will be benchmarked from a lower base of income corresponding to the reduced harvest level.

VI. Employment and Rural Income

Sustained employment has been and remains a serious problem in timber rural communities. While revenue and profits are the variables of greatest interest to companies, rural employment and income are of greater interest to local communities. With a stable level of harvest and processing, we should expect some gains in productivity, leading to some decline in employment, but a more stable income stream. It is only through increased value produced per unit of harvest or acre utilized that stable or rising employment can be experienced.

Forest Sector Employment

Figure VI.1, Washington forest sector employment trends, shows some sectors declind while others increased. The employment trends show logging employment in Washington State declined at almost 4% per year and lumber declined 1-2% per year. Secondary manufacturing employment increased 1-2% per year and pulp and paper increased approximately 1/4% per year. The decline in logging jobs during the mid 1980s is probably exaggerated since much of the logging and hauling operations were outsourced from industry ownership to independent proprietor contract work. This was a make or buy decision change rather than a technologically induced productivity change. These employment reductions offset the lack of productivity gains during the prior decade.

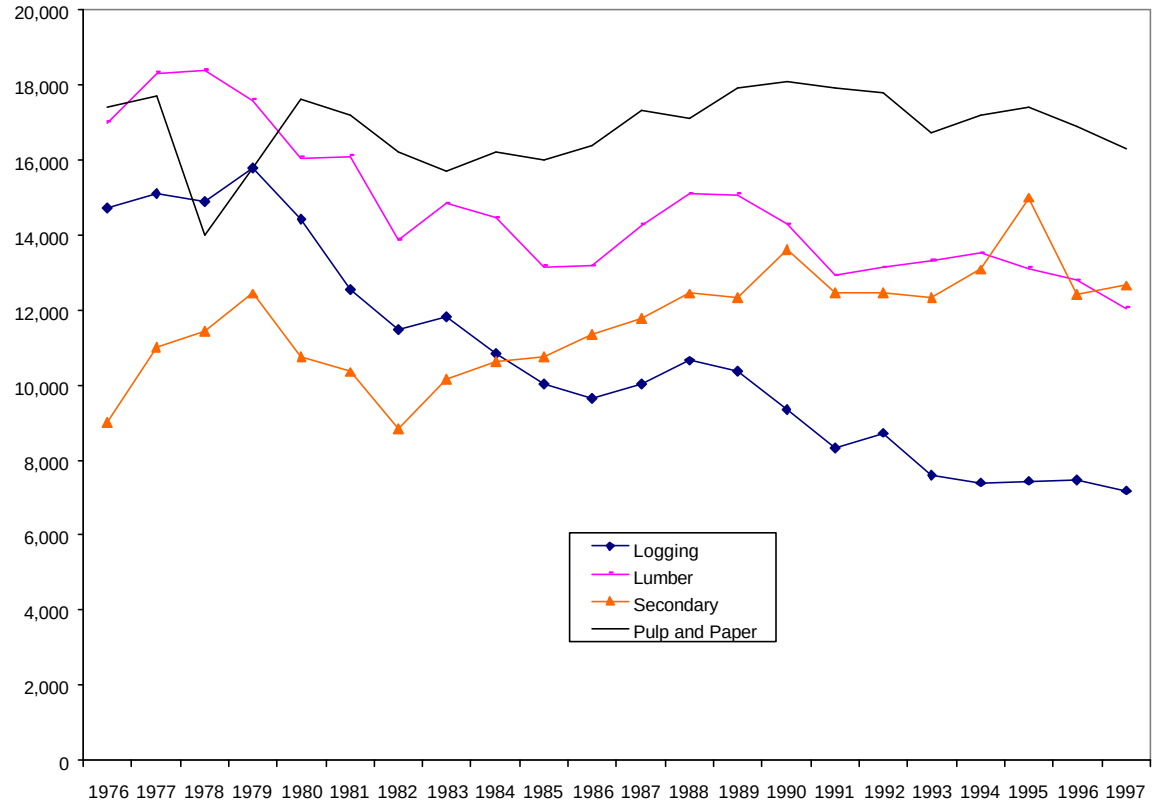

Figure VI.1. Washington State forest sector employment trends

A more succinct analysis of the driving force behind the employment changes can be obtained by examining the employment change for a five-year period before the harvest declines (1986-1991) and after (1992-1997). In Washington, harvest volume declined 31%, but logging employment declined only 22%. One inference is that logging costs have increased and become less competitive than other regions. This may be the case if the difference is not explained by higher log prices making it possible to absorb higher logging costs. If the prior level of efficiency is restored, Washington State could lose another 2000 jobs in rural logging activity.

Lumber production only declined about 6%, while lumber employment declined 8%. If productivity continued to increase at the prior rate of 2-3% per year, in 1992-1997 we might have expected employment to have declined almost 18%, including the production decline. The 10% difference does suggest a loss in efficiency and higher costs, but not nearly as severe as the efficiency losses in the logging industry.

Secondary manufacturing employment increased 5%, however the booming economy and strong demand in 1992-1997 would suggest potential demand could have increased as much as 26%. It appears that secondary manufacturing has been constrained by as much as 15%. from higher priced wood

The 7% decline in Washington solid wood direct employment remains much lower than the 31% harvest volume reduction. Oregon's 20% decline in direct employment is also much less than the 40% decline in harvest volume. This is little consolation to timber dependent communities such as Clallam, Grays Harbor, Skamania, Pacific and Lewis counties that have experienced 8.5 to 10.5% unemployment rates over the last 3 years. Substantially higher than the metropolitan counties of King (3.7%) and Snohomish (3.9%).

While unemployment rates in timber-dependent rural communities have improved (below 10%), they are persistently higher (about 6%) than the rate in metropolitan communities. Gains in secondary manufacturing employment are concentrated near the metropolitan communities and container ports, reflecting a shift to suburban jobs rather than rural.

Table VI.1. Washington State Forest Industry Employment and Production.

	1986 – 1991 Average/year	**1992 – 1997 Average/year**	**Percent Change**
Log Harvest (mmbf Scribner)	6,397	4,398	-31.24
Log Employment	9,727	7,625	-21.61
Lumber Production (mmbf Lumber Tally)	4,430	4,176	-5.74
Lumber Employment	14,131	12,980	-8.15
Secondary Manufacturing Employment	12,325	12,986	5.36
Washington Real Economic Income (1997$ Billions)	106.1	133.8	26.06

Table VI.2. Oregon State Forest Industry Employment and Production.

	1986 – 1991 Average/year	1992 – 1997 Average/year	Percent Change
Log Harvest (mmbf Scribner)	7,715	4,608	-40.27
Log Employment	11,954	9,241	-22.70
Lumber Production (mmbf Lumber Tally)	8,035	5,544	-31.00
Lumber Employment	20,827	14,130	-32.16
Secondary Manufacturing Employment	12,287	12,978	5.32
Oregon Real Economic Income (1997$ Billions)	64.5	83.6	22.8

The primary processing sector job losses in Oregon (9,510) were substantially higher than the job losses in Washington (3,253), a consequence of more drastic harvest reductions and less diversion of log exports. Prior economic impact studies show that the 12,763 primary jobs lost were most likely accompanied by an equal number of indirect jobs lost in the rural areas, (Conway 1994, Lippke and Conway 1994). Direct and indirect job losses account for over 25,000 jobs no longer supported in the rural communities by forest sector activity. There were also jobs in port communities lost with the decline in export activity. Some small portion of the secondary manufacturing gains were centered in rural communities, however the gains would have been much larger in the absence of the harvest constraints. Since most of these lost opportunities were likely related to the reduced supply of quality wood from the federal lands, they were probably disproportionately located in rural areas. Although there were some job gains in special forest products and tourism, it is very unlikely that a significant number of these were dependent upon the reduced harvest levels. Hence they are not induced offsets, but rather a part of any baseline employment projection scenario.

Timber Rural Income

Forest sector activities are not the only economic activity in rural areas, however they are substantial enough that income in timber rural counties will be impacted.

Rural timber dependent communities have at times benefited from strong export markets, and earnings have almost equaled timber earnings in urban areas. Regulatory constraints, however, have had substantial economic impacts on rural communities. Analysis of urban vs. rural income trends confirm that there is increasing disparity between timber rural and urban incomes, which can be expected to worsen when the impacts of the Asian economic crisis and anticipated passage of new regulations to protect salmon populations are fully realized (Moore and Lippke 1999).

Over the last two decades, the US economy has had steady growth overall, with relatively minor contractions. Washington State's economy has also grown steadily, and average per capita income has generally been above the national average. However, not all sectors of the economy have fared as well. In a national study, *Development Report Card for the United States*, Washington State ranks 48th in a measure of urban to rural income disparity(Clones and Rist, 1997). This suggests that Washington's rural economies are declining compared to its urban economy, which may be a result of shifts in both economies. Between 1979-1997, per capita income in timber-dependent counties declined 29% compared to the national average, from 93% to 67%. During the same period, income in King County, the Washington's urban center,

increased 17% , from 134% to 158%. This trend is expected to become even more unfavorable during the next few years, as weak international market conditions and regulatory constraints on harvesting continue to affect rural timber-dependent counties, and while service and technology industries in urban counties grow.

To examine urban/rural income disparity, counties were chosen by economic base in order to compare per capita income. Chelan, Clallam, Cowlitz, Grays Harbor, Lewis, Pacific, Pend Oreille, Skagit, Skamania, and Stevens counties were selected as rural counties where income is largely dependent on timber revenues and not heavily impacted by an urban community. King County was selected as the urban county.

Figure VI.2. Timber dependent and urban community income disparity, shows a substantial increase in the disparity between timber rural and urban incomes. Five points in time were analyzed that best indicate years where timber dependent communities were significantly impacted by changes in the economy or by new policies. 1979 provides a measure of timber dependent counties near the end of a decade of high timber demand. 1983 shows the impact on the wood sector during an international recession and industry shake-out. 1987 records a period of recovery before regulations to conserve habitat for endangered species significantly reduced harvest. Data for 1993 show when timber prices reaching a record high when timber harvests were substantially reduced by harvest restrictions on federal and state lands. Data for 1997 show a continued decline in rural income, but does not show the full effects of either the Asian economic crisis or the new riparian zone regulations.

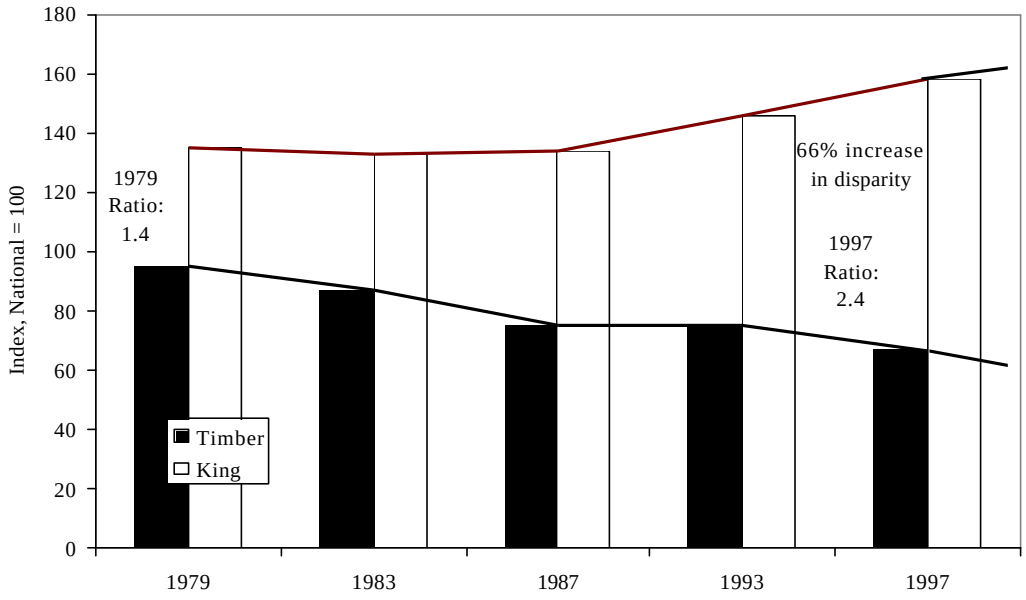

Figure VI.2. Timber dependent and urban community (King county) income disparity, 1979-1997 (Bureau of Economic Analysis and CINTRAFOR 1999).

When data is available, 1998 will be analyzed to reflect the impact of the Asian crisis on both devalued export volumes and on prices. The impact of new riparian regulations will just begin to have an impact in the year 2000 and may cause some price offset if markets are stronger.

Table VI.3. Changes in Income by county category 1979-1997.

Timber Dependent Counties	-29%
King County	17%
King County. vs. Timber Counties	66%

In 1979, per capita income for timber-dependent rural communities was only 5% lower than the national average. Over the next 18 years, however, timber-dependent counties experienced a 29% decline in per capita income relative to national averages. During the same period, per capita income in King County increased 17%. The disparity of Washington's urban area income to the State's timber-dependent rural communities increased 66%. Per capita income in non-timber dependent rural counties also declined, but with a more market dependent cyclic pattern than timber-dependent communities.

Disparity between timber-dependent rural and urban incomes can be expected to widen for several reasons. First, the US housing boom came to a close by 1981, ending the extra strength it added to timber-related economic activity. Second, despite strong export wood markets and a temporary moderating effect of high prices as a consequence of reduced federal timber sales, increasing regulatory constraints have depressed timber-dependent community economies in recent years. Finally, the high-income and labor-intensive service and technology industry has grown rapidly in urban areas. The technology growth boom has not had a comparable impact on rural communities.

The timber industry will likely be further depressed in 1998-2000 due to depresessed demand in Asian markets, which eliminated the high prices that resulted from harvest constraints. Demand for primary and secondary processed wood products in Asia has declined dramatically since the last quarter of 1997, which has directly impacted Washington's rural communities. Total exports of forest products from Washington to all countries are down approximately $2 billion from 1996 to 1998 and this will impact rural incomes.

Lower levels of harvest volumes can also be expected as salmon protection plans are adopted. While some of the urban technology gain may spill over to rural areas through recreation and tourism, poor international markets and domestic environmental regulations will continue to be a challenge for timber dependent communities in Washington and Oregon. Urban communities are benefiting both from the increased forest reserves around them and the technology boom. Timber rural communities are paying the price for regulatory actions and are not experiencing gains from the technology boom.

VII: Habitat Restoration and the Cost Effectiveness of Regulatory Change

The previous sections demonstrated the impact of regulatory changes on economic performance. This section is a brief summary of the benefits of the harvest constraints enacted to protect endangered species. It will characterize the trade-off between increased environmental protection and the economic impacts on forest landowners, and timber dependent communities.

New timber harvest regulations generally follow a management strategy that depends largely on reserving certain land types and habitat from active management, which was the strategy first adopted on federal lands. Active management alternatives to improve environmental and habitat conditions have received some attention by researchers as a method that may be more effective at protecting habitat at a lower cost than reserve-only strategies. Such strategies have not been incorporated within a regulatory structure, except as active management used for conservation and restoration within an approved habitat conservation plan.

Simulation of forest management alternatives for riparian protection: We lack good biological measures of ecosystem change at the state level. Even if we had such data covering the last several years, real progress must be measured over the longer term. Simulations of harvest rates and other management treatments can provide estimates of stand structure conditions and hence biological change over time. Assessments of critical habitats, biodiversity, harvest levels and economic impacts demonstrate the environmental and economic tradeoffs between alternatives, such as the difference between a pre-regulation baseline projection and post regulation projections. Two sets of simulations are summarized for the westside of Washington: one set to characterize the impact of proposed regulations and the other focused on other management alternatives for riparian and upland areas (Lippke, et al 1999).

For riparian management zones, current practices (before the Washington State Forest and Fish Agreement) are first simulated as a baseline (Case 1) for private lands. The consequences of these regulations resulted in essentially no-management buffers of 85 ft. along fish bearing class 1-3 streams with the buffers covering about 2-3% of the forestland. Possible alternatives to increase salmon habitat include enlarging riparian management zones (RMZs) and covering both fish bearing and non-fish bearing streams with either no-management (Case 2) or active biodiversity management within the RMZ (Case 3) to essentially restore riparian functions that existed in pre-European settlement times. The RMZ widths for Cases 2 and 3 shown in Table VII.1 are 150 ft. on class 1-3 (larger fish bearing) streams, 100 ft on class 4 (perennial streams) and 50 ft. on class 5 (generally intermittent and non-fish bearing) streams.

The Forest and Fish Agreement (Legislative Act 1999) reduces the economic cost of no-management across a wider RMZ by doing a better job of prioritizing the acres that are most important for protective habitat. As a consequence, while the inner zone portion of the RMZ along fish bearing streams and their headwaters are largely retained under no-management, other less sensitive streams are less protected. The agreement allows partial removals in an extended outer portion of the RMZ along fishbearing streams and non-fishbearing headwater streams well above the fish bearing streams. While this may take on some of the character of active management to restore habitat such as in Case 3, most of the RMZ remains without management, although it requires less reserve land than Case 2.

Using the old forest (late seral) stand structure as an aggregate proxy for environmental affects important to endangered species and valued by society, Case 2 shows a 5% increase in the late seral structure within the defined RMZ by the 5th decade and a 46% increase by the 10th decade. In effect, there is a slow improvement in habitat restoration. Case 3 demonstrates considerably faster improvement in late seral structures but requires active management of stand conditions much closer to the stream bank, a more direct approach to restoration which is not a part of the Forest and Fish agreement.

Table VII.1. Economic and environmental impacts from riparian management alternatives on private lands in Western Washington (5,712,000 private acres, assuming no owl and murrelet protection).

(Land Base)	***Case 1*** **Current Base**	***Case 2*** **No-mgt. RMZ**	***Case 3*** **Bio-mgt. RMZ**
Acres Impacted	2.5%	14%	14%
		Change from the Base (Case 1)	
(Mill Impacts)			
Harvest: 1-20 years average (mmbf)	3,640	-23%	-17%
Long-term sustained	4,077	-15%	+9%
(Community Impacts)			
Rural Jobs: 1-20 years	72,000	-23%	-15%
Long-term sustained	76,500	-10%	+27%
(Landowner Impacts)			
NPV @ 5% $ billions	28.8	-20%	-11%
(Government Impacts)			
State & Local Tax Receipts: 1-20 years ($ millions)	821	-23%	-15%
(Societal Environmental Impacts)			
Late Seral Habitat in RMZ (%)		Percent of Riparian Land Base	
Current	1%	1%	1%
By 5th decade	1%	6%	53%
By 10th decade	11%	57%	67%

The economic tradeoffs for the environmental restoration characterized by Case 2 includes harvest losses over the first 20 years from no-management within the RMZ (Case 2 compared to Case 1), of 23% -- 16,500 timber rural job losses and 840 million board ft. per year. The number of jobs in the long-term increases because more intensive management in the early years increases the available harvest and jobs over time.

Harvest losses are reduced under active management using biodiversity thinnings within the RMZ (Case 3 vs. Case 1), hence the first 20-year job losses are cut to 10,800. In the long-term, jobs increase rather than decrease as a consequence of labor intensive thinning to enhance biodiversity. Thinning also produces larger trees with higher quality wood supporting increased value-added processing.

The NPV loss to private owners for Case 2 is $5.6 billion or 20% (slightly less than the harvest loss), but is reduced to $3.2 billion or 11% under Case 3. Tax receipts are proportional to the economic activity, with losses of $185 million per year under Case 2 and $117 million under Case 3.

The environmental improvements in Case 2 are very modest until the10th decade, whereas more active management to replicate old forest functionality under Case 3 achieves similar levels by the 5th decade. The 5% increase in riparian acres with late seral structures by the 5th decade under Case 2 costs $1,100 million for each additional 1.0% of late seral riparian acres and under Case 3, $61 million. Using this ratio as a measure of economic efficiency, active management to increase old forest functionality within the RMZ results in an eighteen-fold improvement.

The simulation does not include increased costs associated with road, bridge and culvert improvements or increased costs of logging associated with the fragmentation of logable areas into much smaller sites. Also, since the simulation only estimates the average affect across owners, there will also be a substantial disproportionality. Some small owners will feel no impact and some will feel almost 100% loss of their economic potential if their lands fall almost entirely in the affected RMZ.

Simulation of forest management alternatives across all forestlands: Similar cases were developed for all owner groups and upland as well as riparian acres. Case 4 provides a low harvest constraint base case for comparison across all owners and acres, with the same RMZ protection as Case 1. Case 4 is comparable to regulations prior to efforts to protect the spotted owl. Case 5 provides a characterization of proposed regulations based on a reserve strategy. It includes the impact of minimum regulations to protect the owl and murrelet; the proposed no-management RMZ along streams for state and private owners (as was shown in Case 2 for private lands); and the Northwest Forest Plan on federal lands. Compared to Case 4 it represents the cumulative affects of regulatory changes to save the owl, murrelet, and salmon. Since Case 2 overstates the amount of reserves that will be required in the Forest and Fish Agreement, it may overstate the economic impacts somewhat. Case 6 simulates active biodiversity management by the state and private owners in the uplands and is like Case 3 in the riparian zones and hence characterizes a more active management approach to biological restoration.

The Case 5 representation of proposed regulations increases late seral habitat from 11% to 18% by the 5th decade and to 33% by the 10th decade whereas the pre-regulation baseline reduces the acres in the late seral category from 11% to 3% by the 5th decade recovering to 11% by the 10th decade. Case 6 provides for both more rapid and more complete restoration rising to 22% by the 5th decade and 60% by the 10th decade.

Table VII.2. Economic and environmental impacts from riparian and upland management alternatives in Western Washington (9,429,000 acres across all owners).

	Case 4 **Commodity Base**	***Case 5*** **Proposed Regs w/ FEMA**	***Case 6*** **Bio-mgt on non-fed. owners**
		Change from Base (Case 4)	
Harvest: 1-20 yr. av. (mmbf)	5,831	-31%	-20%
Long-term sustained	6,478	-24%	-10%
(Community Impacts)			
Rural jobs: 1-20 years	134,000	-40%	-29%
Long-term sustained	127,000	-22%	+11%
(Landowner Impacts)			
NPV @ 5% $ billions	48.4	-42%	-23%
Private	27.7	-27%	-11%
State	11.1	-22%	0%
Federal	9.6	-82%	-82%
(Government Impacts)			
Tax Receipts: 1-20 years ($ millions)	1,485	-38%	-26%
(Societal Environmental Impacts)			
Late Seral Habitat (%)		Percent of Total Acres in Late Seral	
Current	11	11	11
By 5th decade	3	18	22
By 10th decade	11	33	60

For proposed regulations, (Case 5 compared to Case 4), jobs for the first 20 years are down 40% but only 22% in the long-term. These losses include the affects of proposed riparian no-management RMZs that were estimated in Case 2 and hence are cumulative effects of prior uplands protection and proposed riparian protection. NPV losses are heavily weighted to federal lands as a consequence of the Northwest Forest Plan. The 22% impact on state lands includes protection of habitat within circles around owl sites as well the no-management RMZ. On private lands the impacts are larger because unlike state lands, they do not have a surplus of mature acres to harvest as an offset to the exclusion of mature acres for habitat protection.

The economic losses under the active biodiversity management alternative (Case 6) are significantly lower than Case 5 while the late seral habitat measures are better. As a result, both upland and riparian environmental measures are achieved at lower cost. Over the long-term, the impact on jobs is positive rather than negative, because the higher quality wood from that portion of the acres being managed to produce larger trees and habitat supports additional processing and jobs, as does more intensive forest management. These economic benefits are however primarily in the long-term. The tax receipts in the first 20 years are down 26% or $386 million; compared to 38%, and $558 million for the proposed regulations (Case 5).

The economic efficiency for an additional 1.0% of the acres in late seral structures by the 10th decade improves from a $927 million cost under Case 5 to $227 million under Case 6, a four fold improvement.

Economic sensitivity to increasing levels of habitat protection: A sensitivity analysis performed by simulating an increase in the amount of habitat show that the cost to provide

additional late seral acres in 100 years is about $80 per additional acre, or $8 million for a 1% increase in late seral structures. However it is not possible to increase habitat substantially in less than 50 years and the cost increases as the target year is reduced below 100 years.

While the simulations inherently fail to account for many details, they do provide a plausible characterization of the difference between regulatory and management alternatives. They show biological progress from the change in regulations, albeit at a very slow rate and a high cost.

Comparisons between the simulations and the analysis of trend data suggest that the simulated harvest declines are not as great as was actually experienced prior to 1999, partially because the federal and state harvest levels fell below their simulated trend capability during the transition period of implementing the FEMAT recommendations and planning for the DNRHCP. The job losses appear to be less than the simulations because the simulations did not include the transitional impact of high prices and reduced productivity for an extended period of time, or the impact of diverting log exports to domestic mill processing. Both the trend analysis and simulations omit the impact of reduced profits on reduced job creation, and the change in port activities, hence neither provides a comprehensive accounting of all job impacts.

VIII. SUMMARY and OTHER PERSPECTIVES

Other Perspectives

Surveys of forest landowners show taxes to be a most important determinant of their management decisions. Recent surveys have shown that changing regulations have become even more important than taxation (Lippke and Bare 1998). We have not provided an in-depth analysis of taxation since the dominant impact of recent changes have been regulatory cost increases which have similar impacts to taxes.

The impact of inheritance taxes often contributes to untimely liquidation of the timber inventory, land fragmentation, and land conversions by small owners. Each of these results in counterproductive impacts on the environment. The changing regulatory climate has exacerbated both affects.

Timber taxes are also a potential form of double taxation since they tax inventory in addition to the value of real estate, which already should include the value of the income producing capability of the land. Timber tax rates in excess of real estate tax rates tied to the income producing capacity of the land encourages both conversions and investments in other regions.

Washington appears to have the highest timber tax of all states given the reduction in timber taxes implemented in Oregon. In 1993, Oregon reduced their timber tax rate to a rate comparable to the difference between the statutory real estate rate and an assessed market value for the real estate. In 1999, Oregon passed legislation to phase in a complete elimination of the timber taxes in favor of assessed valuations for real estate comparable to other real estate assets. In effect, unlike Washington, Oregon will no longer be taxing standing timber as well as taxing the income producing value of the real estate.

While the several year period of high prices created an environment that made liquidating timber lands attractive, a period of low prices and high regulatory costs may provide even higher motivation for small non-industrial forestland owners to sell. Small owners' rates of return are generally lower than that of large owners because of inadequate economies of scale. This factor, compounded with regulatory costs results in a larger percentage reduction on the margin and rate of return for small owners.

Summary

- Timber harvests have temporarily stabilized at just over 4 billion board ft. per year in Washington and Oregon, 30% and 40% below prior sustainable projections. Regulations to protect salmon habitat will reduce harvests further and will lengthen the restructuring period.
- Incomplete restructuring adjustments in addition to further harvest reductions include:
  - Logging costs, lumber processing costs, and pulp and paper costs remain above trend and above that in competitive regions;
  - Secondary manufactured product market shares are declining (evidence of an input cost problem);
  - Lumber margins remain well below trend;
  - Timber and product prices are still above trend, which offset some of the volume losses while temporarily shielding some of the higher cost operations; and
  - Employment remains above levels that would restore a more competitive position.
- Business income will likely decline further as these structural adjustments are completed.
- Domestic lumber prices have remained high, providing a safety net for declining income while offsetting some of the export losses.
  - The PNW competitive disadvantage in US markets will ultimately restore the PNW's dependency on export markets as US housing demand is satisfied if not overbuilt from the high level of starts during recent years.
- Harvest restraints have contributed to market share losses that will not be restored.
  - PNW softwood log and lumber share is down 45% in Japan.
  - PNW share of all US wood exports is also down 39%.
- Continued deregulation of construction markets in Asia offers the potential for substantial increases in the export of secondary manufactured products and engineered wood and panel products, but Japan has:
  - Shifted log consumption to domestic and other offshore producers
  - Shut down many mills dependent on log imports.
  - Radiata supply increases have lowered the demand for western hemlock.
  - European whitewood suppliers have established a higher quality image.
- With economic recovery in Asia and a more stable harvest supply, business income growth should be restored, albeit starting from a lower base and requiring some additional restructuring along the way.
- Rural forest sector employment will likely decline further and the disparity in timber rural vs. urban counties grow larger.
- The projected decline in old-forest habitat has been reversed but at a very high economic cost.
- Adaptive management alternatives offer the potential to restore habitat at a lower cost while contributing to increased rural economic activity. However, there is no ongoing state level environmental and economic assessment analysis to benchmark progress and assess the attractiveness of alternatives.

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APPENDIX A

US and PNW Trade Data