RESEARCH REPORT

Housing Markets in BC Resource Communities: Case Studies from the 1980s to the 1990s

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Housing Markets In BC Resource Communities: Case Studies From the 1980s to the 1990s

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Executive Summary

This report examines how the cycles of the resource sector impacts the housing markets in six resource-dependent communities in BC. The selected communities and their primary resource base are:

- Port Alberni – Forest products
- Prince George – Forest products.
- Prince Rupert – Forest products and fishing.
- Fort St. John – Oil and gas.
- Trail-Rossland – Mining.
- Kelowna – Diversified.

Kelowna was included in the study, even though it is not resource dependent, because we wanted to see if there were differences between Kelowna and the resource-dependent communities.

The stages of the study included:

- A literature search on housing models at the regional level.
- A historical review of the communities' economies and the housing market.
- The estimation of multiple-regression models for the housing market variables, single-family house (SFD) prices, single-family house sales, single-family housing starts and total housing starts using EViews.
- Testing of the regression models for structural consistency over subsets of the sample period.
- The estimation of ARIMA models for the housing markets.
- A comparison of the modeling and forecasting capabilities of the regression models and the ARIMA models.
- Base case simulations for the community housing market variables out to 2004.

The purpose of the study is to provide CMHC with a methodology that would permit simulations of significant discrete outlooks for various resource sectors on the housing markets of known resource-dependent communities. The methodology could become another tool used for strategic planning and risk analysis.

The conclusions of the study are:

- There is virtually nothing in the literature that investigates the relationships of housing markets to economic or resource cycles at the micro regional level like in this study.
- The housing markets of resource-dependent communities are significantly impacted by resource cycles.
- Typically, resource production variables were more important than resource prices in impacting housing markets.
- The housing cycles tended to be much longer and more severe than the resource cycles, possibly due to major stock adjustments required in the housing markets as a consequence of dramatic structural changes forced on BC's resource industries.

- The regression models' coefficients, with few exceptions, were stable as determined by various stability tests.

- The regression models capture most of the dramatic adjustments in the housing markets since the late 1970s.

- In general, the quality of the model results are positively correlated with the size of the communities.

- The best model results were for house prices, followed by single-family starts, single-family home sales, and then total starts.

- The regression models are superior to the ARIMA models in replicating history, tracking major turning points, and in forecasting accuracy.

- The methodology is widely applicable to other resource-dependent communities.

The study results provide a valuable tool for assessing the degree of risk facing housing markets in resource-dependent communities.

Prince George

Prince George, located in almost the geographical centre of the province, has an estimated population of 80,800. It is the 2nd largest of the communities selected for study, after Kelowna. About 1/3 of all income is dependent on the forest sector.

Prince George felt the shocks of the forest industry restructuring in the 1980s and 1990s,with significant implications for the housing market. Starts fell from over 4% of the BC total in the late 1970s to just 0.3% in 1986, and have recovered only to about 1% of total BC starts. This is well below Prince George's share of BC households, which has averaged about 2%. Home sales and average prices fell sharply in the early 1980s, but have recovered. Sales volumes are still below previous peaks but home prices have reached new highs.

The equation for single-family house prices (SFD) had the best fit with an R-square of 0.96. Lumber production in the northern interior, lagged two periods, was highly significant, but lumber prices were not. Other RHS variables were prices of homes and mortgage rates. The elasticity of SFD prices to lumber production was 0.105.

The R-square for SFD sales was just 0.60. Both lumber production and prices are in the equation, although lumber prices were not as important as originally anticipated.

The SFD starts equation had an R-square of 0.78 and managed to capture the sharp cycle swings quite well. Lumber production was significant, but only at the 11% level, whereas lumber prices were not. The elasticity of lumber production was 0.30, indicating a fairly pronounced impact.

The equation for total starts had the identical specification as the equation for SFD starts. The coefficients were similar, as one would expect.

Overall, the model for Prince George was the best of all the resource communities.

Fort St. John

Fort St. John, located in the northeast corner of the province, is one of the smaller communities selected for study. The population in 1999, according to BC Stats was estimated at 16,448, slightly smaller than Prince Rupert and Port Alberni.

From its agricultural roots the economic base has expanded to include forest resources and oil & gas extraction. Today, it is the energy sector that dominates the local economy, although there is still potential for the forest industry. The nickname for Fort St. John is "The Energetic City".

Realtors consider the fortunes of the oil and gas industry to be the single most important driver of the housing market. Fluctuations in the housing market in Fort St. John were the most extreme of the communities studied. During the 1970s the economy was booming, but as soon as the National Energy Program (NEP) was introduced the oil and gas industry and the housing market all but collapsed. Housing starts plunged from about 550 in 1979 to close to zero in 1983. From 1983 to 1993 there were a total of only 153 starts.

The oil and gas sector recovered strongly since the late 1980s, but housing starts have remained well below previous peak levels. House prices plunged along with housing starts but turned around with the oil and gas industry, pushing to new record levels by 1994. Housing sales have been variable around a mean of close to 400 p.a., with the steepest decline in 1978 to 1982, followed by a sharp temporary surge in 1983 to 1986. Since 1986 sales have been closer to trend.

When adjusted for average household incomes, housing is very inexpensive. In 1996 the average home was just 1.82 times average household income. The next lowest ratio was 2.33 times for Rossland. Fort St. John has consistently had affordable housing. Despite low ownership costs, Fort St. John has a low home ownership ratio. This likely reflects the migrant nature of the population.
The resource variable that had the best explanatory power was the number of wells authorized. In the context of the model, natural gas prices were insignificant.

The model for Fort St. John was best in estimating SFD prices. The R-square was 0.95. The wells authorized elasticity, however, was only 0.058. In the SFD sales equation, sales were much more responsive to the resource variable, with an elasticity of 0.18.

The SFD starts equation, had an R-square of 0.68, and, as expected, was responsive to the resource variable. The elasticity of wells authorized was 0.31. It was slightly higher in the total starts equation at 0.34, even though the equation was not as good a fit as the SFD starts equation.

The Fort St. John model captures the importance of the resource base, despite the huge stock adjustment process that took place in the housing market.

Port Alberni

Port Alberni, located on the west coast of Vancouver Island, had a 1999 population estimated at 19,334. Like Prince George, Port Alberni is also a forest dependent community. Its dependence on the industry, however, is slightly larger than Prince George. The income dependency ratio is 36% vs 33%.

Port Alberni suffered proportionally greater housing market swings than Prince George, mostly because its resource dependence is greater, but also because the forest industry in Port Alberni was much harder hit by the shocks and structural changes in the industry.

The resource variable, found to be the best for the housing models in Port Alberni, was newsprint and pulp shipments, although it was insignificant in 2 of 4 equations.

The inability of the resource data to capture the impact on the housing market, as well as expected, may be, in part, due to the fact that the explanatory data was provincial, and therefore not entirely representative of the regional economy.

The equation for SFD prices was reasonable with an R-square of 0.82. The shipments elasticity was 0.137, but not significant at the 10% level. Nor were pulp and newsprint prices significant. The R-square for SFD sales was 0.79, the highest of the communities. However, as with the price equation the resource variables were not significant.

The resource variables were significant in the housing start equations, with large elasticities of 0.799 for SFD starts and 1.295 for total starts.

It might be that sales and prices of SFD in Port Alberni were affected by competing housing markets in other communities that were within commuting distance. This, in addition to potential data problems, may be why the resource variables were not significant. The willingness of developers to build new houses seems much more dependent on the resource data. The estimation results for Port Alberni, in general, may also suffer because the sample period omits the 1980-81 collapse in the industry.

Prince Rupert

Prince Rupert is a community of about 17,000 people on the north coast of BC. The city is 65 km from the Alaska Panhandle and 90 km east of the Queen Charlottes. It is 1,520 km north of Vancouver by highway and 728 km west of Prince George.

The economy is quite diversified, with transportation, government services, resources, tourism and trade all being important. But the key sector is the forest industry. Skeena Cellulose is the city's largest single employer. Like other resource-dependent communities, population growth has been highly variable, depending on the employment opportunities provided by the major industries.

While income growth in Prince Rupert has been less volatile than in other resource dependent communities, the sad news is that the trend has been consistently towards less than average growth, even during periods of relative prosperity.

The model results for Prince Rupert were relatively poor, with low R-squares and spotty significance for the resource variables.

The equation for SFD prices had an R-square of just 0.71, with pulp shipments significant. The elasticity of pulp shipments was 0.15, which is above the 0.137 for Port Alberni and 0.105% for Prince George.

The SFD sales equation was the worst of all communities with an R-square of 0.30, less than half the average R-square for the other communities. However, pulp prices were significant, even if pulp shipments were not. The elasticity for pulp prices was 0.255%.

The equations for starts were also poor with R-squares at 0.40. The resource variables were insignificant, but kept in the equations because they had the correct sign and realtors considered them to be very important.

The model results for Prince Rupert were the worst of all communities. This may reflect data problems and a relatively short sample period starting in 1987, which omitted most of the forest industry cycle in the 1980s. The fact that the community is relatively diversified may also be a consideration.

Trail-Rossland

Trail and Rossland, ten minutes apart by car, are the two largest of five closely connected communities in the West Kootenay region, with 1999 estimated populations of 7,626 and 3,859, respectively. Together they represent 70% of the greater Trail population.

Trail being the larger community is the business centre and home of the Cominco smelter. Rossland is higher in the mountains and has developed the tourism sector. Rossland has grown as a suburb of Trail, with employment very dependent on Cominco. The mining industry is the dominant industry in the region.

Trail and Rossland are quite different in terns of demographics, income profiles and housing costs.

There was insufficient housing starts data available for Trail and Rossland to estimate models. Equations were estimated only for SFD prices and sales. A single series for sales and prices was created for the region, because of their proximity, by summation and a weighted average, respectively.

The resource variables tested extensively in Trail-Rossland equations were lead and zinc production and prices, because of the importance of the Cominco smelter to the local economy.

The SFD prices equation had an R-square of 0.77. Zinc production had the correct sign but was not significant.

Interestingly, the equation for SFD sales was among the best of the communities. The R-square was 0.77, just below that of Port Alberni. Here zinc production is a significant variable, with an elasticity of 0.17. Unlike other sales equations, lagged house prices was insignificant.

Given the comments of realtors in Trail and Rossland about the importance of the mining industry in determining the changes in the housing markets, we are reasonably pleased with the two equations that were estimated.

Kelowna

Kelowna is not a resource-based community. It has a well-diversified economy, with exposure to the primary and manufacturing sectors that are just slightly below the provincial average.

Kelowna is located in the southern interior of BC and is part of the Central Okanagan Regional District. The city is about 470 km east of Vancouver and 606 km west of Calgary and a one-hour drive north of the US border.

Kelowna is the largest of the communities analyzed in this report, being slightly larger than Prince George. The population estimate for 1999 by BC Stats is 97,385. This is 2.4% of the BC population. Kelowna has had the strongest population growth rate of the communities. Growth from 1976 to 1999 was 2.8% a year slightly ahead of the BC growth rate. The pattern of growth by 5-year periods shows no declines, unlike five of the resource-dependent communities, that had declines in 1981-86.

Prior to estimating any equations, the expectation was that resource variables might not be significant explanatory variables because the region has grown due to in-migration and expansion of the tourism industry, the wine industry and general manufacturing. Nevertheless, Kelowna would get a positive spillover impact from a generally robust economy, which is generally led by the resource industries. This seems to be the case in correlating the population and migration flows in Kelowna with the province's resource cycles.

Kelowna benefits from a generally strong economy but does not suffer proportionately when the resource industry recessions impair the overall BC growth performance.

Kelowna is characterized by strong population and employment growth, and above average household income growth. Household growth has also been well above average contributing to a vibrant housing market. Nevertheless, housing did have sharp cycles with steep declines in the 1981-82 period and more recently in the past eight years. These have corresponded to resource cycles.

A unique aspect of Kelowna is that housing starts, even in severe down cycles, have been above Kelowna's share of total households. On average, starts have been about double Kelowna's share of total BC households since 1976.

Model estimation results were much as expected. Lumber production (central interior) and lumber prices, as well as mining variables, were tested. The best results were using the forest-related variables

The equation for SFD prices had an R-square of 0.91. Lumber production had the correct sign but was insignificant. The elasticity was 0.108, well within the range estimated for the other communities. In the SFD sales equation lumber production again had the correct sign but was insignificant. Lagged SFD prices and population growth were strongly significant, reflecting strong inertia in the Kelowna housing market.

Lumber production is a significant and correctly signed variable in the two housing starts equations. Elasticity estimates were about 1.00. The R-squares for the housing starts equations were by far the best of all communities, exceeding 0.80.

In summary, the estimated models for the communities corroborate the initial hypothesis that resource cycles do have a significant impact on the housing markets. For the most part, the equations do an excellent job of capturing significant turning points.

Where the models do not adequately capture the impact of the resource cycles, one factor is data limitations. In addition, it might be that individuals in resource-dependent communities may have developed longer-term outlooks, recognizing the cyclical nature of the resource sectors.

Very few times did we get nonsensical results. Typically, resource variables that were not significant at least had coefficients that were correctly signed and of a reasonable order of magnitude. More regionally specific data and longer sample periods would likely improve the estimation results. This study has provided the foundation for further enquiry, which can be extended to other communities and improved by attempts to get better and longer data series.

Despite some minor shortcomings, the estimated models can be used effectively for scenario simulations of discrete resource industry outlooks. Chapter IV reviews the simulations for each of the communities. The models are a new valuable tool for CMHC to use in risk analysis.

Sommaire

Dans le présent rapport, nous examinerons comment les cycles du secteur des ressources naturelles se répercutent sur les marchés de l'habitation de six collectivités britanno-colombiennes dont l'industrie est axée sur les ressources. Les collectivités retenues et leurs ressources primaires sont les suivantes :

- Port Alberni – produits forestiers
- Prince George – produits forestiers
- Prince Rupert – produits forestiers et pêcherie
- Fort St. John – pétrole et gaz naturel
- Trail-Rossland – exploitation minière
- Kelowna – économie diversifiée

Kelowna a été retenue pour l'étude même s'il ne s'agit pas d'une collectivité axée sur les ressources, car nous voulions observer les différences entre elle et les collectivités axées sur les ressources.

Les étapes de l'étude sont les suivantes :

- Recherche bibliographique sur les modèles de logement à l'échelon régional.
- Examen historique de l'économie et du marché de l'habitation des collectivités.
- Estimation des modèles de régression multiple appliqués aux variables des marchés de l'habitation, des prix des maisons individuelles, des ventes de maisons individuelles, des mises en chantier de maisons individuelles et des mises en chantier totales à l'aide de EViews.
- Mise à l'essai des modèles de régression afin de vérifier la cohérence structurelle des sous-ensembles de données pour la période d'échantillonnage.
- Estimation des modèles ARMMI pour les marchés de l'habitation.
- Comparaison des capacités de modélisation et de prévision des modèles de régression et des modèles ARMMI.
- Simulations du scénario de référence pour les variables des marchés de l'habitation des collectivités jusqu'en 2004.

L'étude visait à fournir à la SCHL une méthode qui lui permettrait de prévoir, à l'aide de simulations, les répercussions significatives de divers secteurs de ressources naturelles sur les marchés de l'habitation de collectivités axées sur les ressources. Cette méthode deviendrait un autre outil pouvant servir à la planification stratégique et à l'analyse des risques.

Les conclusions tirées de l'étude sont les suivantes :

- Les relations entre les marchés de l'habitation et les cycles de l'économie ou des ressources naturelles à l'échelon régional ne sont traitées dans presque aucun ouvrage de référence, mise à part la présente étude.
- Les marchés de l'habitation des collectivités industrielles sont très touchés par les cycles des ressources naturelles.
- Généralement, les variables sur la production de ressources importent davantage que le prix des ressources quant

aux répercussions sur les marchés de l'habitation.

- Les cycles de l'habitation ont tendance à être plus longs et plus marqués que ceux des ressources, peut-être en raison des importantes corrections de stock dont ont besoin les marchés de l'habitation à la suite des changements structurels radicaux imposés aux industries de ressources de la Colombie-Britannique.

- Les coefficients des modèles de régression, à quelques exceptions près, étaient stables selon divers tests de stabilité.

- Les modèles de régression font ressortir les corrections radicales des marchés de l'habitation depuis la fin des années 1970.

- La qualité des résultats tirés des modèles correspond bien à la taille des collectivités.

- Les meilleurs résultats tirés des modèles concernent le prix des maisons, suivi des mises en chantier de maisons individuelles, des ventes de maisons individuelles et des mises en chantier totales.

- Les modèles de régression sont de beaucoup supérieurs aux modèles ARMMI pour ce qui est de reconstituer l'histoire, de retracer les principaux points tournants et de permettre des prévisions exactes.

- Cette méthode est aisément applicable à d'autres collectivités axées sur les ressources.

Les résultats de l'étude constituent un précieux outil d'évaluation du niveau de risque auquel sont confrontés les marchés de l'habitation dans les collectivités axées sur les ressources.

Prince George

Prince George, situé presque au centre de la province, compte 80 800 habitants. Parmi les collectivités retenues pour l'étude, c'est la deuxième collectivité en importance, après Kelowna. Environ le tiers des revenus sont tirés du secteur forestier.

Prince George a ressenti le choc de la réorganisation de l'industrie forestière dans les années 1980 et 1990, ce qui a eu d'importantes répercussions sur son marché de l'habitation. Les mises en chantier y sont passées de plus de 4 % de l'ensemble de l'activité en C.-B. à la fin des années 1970 à un maigre 0,3 % en 1986, et elles n'ont remonté qu'à 1 % depuis. Ce chiffre est bien en deçà du pourcentage de ménages habitant Prince George, soit 2 % des ménages britanno-colombiens. Les prix moyens et les ventes des maisons ont chuté au début des années 1980, mais ils ont récupéré depuis. Les volumes des ventes sont encore inférieurs aux plafonds déjà atteints, mais les prix des maisons ont atteint de nouveaux sommets.

L'équation du prix des maisons individuelles avait la meilleure corrélation avec un coefficient de détermination multiple de 0,96. Faible durant deux périodes, la production de bois d'oeuvre dans le district de l'Intérieur-Nord a été importante, mais le prix du bois d'oeuvre n'était pas élevé. Les autres variables très significatives du point de vue des ressources étaient les prix des maisons et les taux hypothécaires. L'élasticité des prix des maisons individuelles par rapport à la production de bois d'oeuvre était de 0,105.

Le coefficient de détermination multiple pour les ventes de maisons individuelles était d'à peine 0,60. Le prix et la production du bois d'oeuvre étaient dans l'équation, quoique le prix du bois d'oeuvre n'ait pas vraiment eu d'importance.

L'équation des mises en chantier de maisons individuelles avait un coefficient de détermination multiple de 0,78 et a réussi à bien profiter des revirements rapides de cycle. La production de bois d'oeuvre a été importante, mais seulement au niveau de 11 %, alors que le prix du bois d'oeuvre était peu élevé. L'élasticité de la production de bois d'oeuvre se situait à 0,30, ce qui témoigne d'un impact assez marqué.

L'équation de l'ensemble des mises en chantier ressemblait étrangement à celle des mises en chantier de maisons individuelles. On ne s'étonnera donc pas que les coefficients se ressemblent beaucoup.

En général, le modèle pour Prince George a été le meilleur de toutes les collectivités axées sur les ressources à l'étude.

Fort St. John

Fort St. John, situé dans le nord-est de la province, est l'une des plus petites collectivités à l'étude. Selon BC Stats, il comptait 16 448 habitants en 1999, soit légèrement moins que Prince Rupert et Port Alberni.

Partant d'une base agricole, l'économie de Fort St. John s'est diversifiée pour inclure les ressources forestières et l'extraction de pétrole et de gaz naturel. De nos jours, c'est le secteur de l'énergie qui domine l'économie locale, bien que l'industrie forestière présente encore un bon potentiel. Fort St. John est surnommé la « ville de l'énergie ».

Les courtiers en immeubles estiment que les fortunes réalisées grâce à l'industrie du pétrole et du gaz naturel sont le principal moteur du marché de l'habitation. Le marché de l'habitation à Fort St. John a enregistré les plus grands écarts parmi les collectivités à l'étude. Au cours des années 1970, l'économie était florissante, mais dès qu'on a lancé le Programme énergétique national, l'industrie du pétrole et du gaz naturel et le marché de l'habitation se sont effondrés. Les mises en chantier ont chuté, passant d'environ 550 en 1979 à presque zéro en 1983. De 1983 à 1993, on n'a enregistré que 153 mises en chantier.

À la fin des années 1980, le secteur du pétrole et du gaz naturel s'est redressé de belle façon, mais les mises en chantier sont demeurées bien en deçà des sommets déjà atteints. Le prix des maisons a plongé en même temps que les mises en chantier, mais il a suivi la remontée de l'industrie du pétrole et du gaz naturel, atteignant de nouveaux records en 1994. Les ventes de maisons ont fluctué aux environs d'une moyenne de près de 400 par année, la plus forte baisse, de 1978 à 1982, ayant été suivie d'une forte hausse temporaire de 1983 à 1986. Depuis 1986, les ventes se sont rapprochées des tendances générales.

Compte tenu des revenus moyens des ménages, les maisons y sont très bon marché. En 1996, une maison moyenne ne représentait que 1,82 fois le revenu moyen des ménages. Le second ratio le plus faible, soit 2,33, a été observé à Rossland. Fort St. John a toujours eu des logements abordables. Malgré le faible prix des maisons, Fort St. John accuse un faible taux de propriété. Cela est peut-être attribuable au caractère transitoire de sa population.

La variable ressources la plus évocatrice a été le nombre de puits autorisés. Le prix du gaz naturel n'a pas eu d'importance.

Le modèle pour Fort St. John est celui qui a le mieux permis d'évaluer les prix des maisons individuelles. Le coefficient de détermination multiple s'établissait à 0,95. L'élasticité des puits autorisés n'était que de 0,058. Dans l'équation des ventes de maisons individuelles, la variable sur les ressources était beaucoup plus importante, son élasticité s'établissant à 0,18.

L'équation des mises en chantier de maisons individuelles, quoique n'ayant un coefficient de détermination multiple de seulement 0,68, était celle dont la relation avec la variable sur les ressources était la plus forte. L'élasticité des puits autorisés était de 0,31. Elle était légèrement supérieure (0,34) dans l'équation de l'ensemble des mises en chantier, bien que cette équation ne soit pas aussi valable que l'équation des mises en chantier de maisons individuelles.

Le modèle de Fort St. John fait ressortir l'importance de la base de ressources, malgré l'énorme correction du stock ayant eu lieu dans le marché de l'habitation.

Port Alberni

Port Alberni, situé sur la côte ouest de l'île de Vancouver, comptait 19 334 habitants en 1999. À l'instar de Prince George, Port Alberni est une collectivité dont l'industrie est axée sur l'exploitation forestière, et ce dans une proportion un peu plus élevée que Prince George. Le rapport de dépendance des revenus est de 36 %, comparativement à 33 %.

Le marché de l'habitation à Port Alberni a subi de plus durs revirements que celui de Prince George, principalement en raison de sa plus grande dépendance envers l'industrie forestière, mais aussi parce que cette industrie à Port Alberni a été plus durement touchée par les changements structurels de ce secteur.

La meilleure variable ressources pour Port Alberni a été les expéditions de papier journal et de pâte, quoique cette variable ait été sans importance dans deux des quatre équations.

L'incapacité des données sur les ressources de bien prévoir les répercussions des ressources naturelles sur le marché de l'habitation est peut-être attribuable au fait qu'il s'agit de données provinciales, qui ne sont donc pas tout à fait représentatives de l'économie régionale.

L'équation des prix des maisons individuelles était bonne, le coefficient de détermination multiple s'étant établi à 0,82. L'élasticité des expéditions se situait à 0,137, mais elle n'était pas significative au niveau de 10 %. Le prix du papier journal et des pâtes n'était pas non plus significatif. Le coefficient de détermination multiple des ventes de maisons individuelles s'établissait à 0,79, soit le plus élevé des collectivités à l'étude. Toutefois, comme l'équation du prix, les variables sur les ressources n'étaient pas significatives.

Les variables sur les ressources étaient significatives dans les équations sur les mises en chantier, de grandes élasticités étant observées pour les mises en chantier de maisons individuelles (0,799) et pour l'ensemble des mises en chantier (1,295).

Cette situation est peut-être attribuable au fait que les ventes et les prix de maisons individuelles à Port Alberni sont touchés par la concurrence des marchés de l'habitation dans les collectivités situées dans un rayon dont le trajet quotidien en voiture est raisonnable. Cette situation, sans compter les problèmes de données possibles, expliquerait pourquoi les variables ressources ne sont pas significatives. La volonté des promoteurs de construire des maisons neuves semble dépendre plutôt des données sur les ressources. En général, les résultats de l'estimation pour Port Alberni sont peut-être décevants parce que la période d'échantillonnage ne tient pas compte de l'effondrement de l'industrie en 1980 et 1981.

Prince Rupert

Prince Rupert, situé sur la côte nord de la Colombie-Britannique, compte environ 17 000 habitants. Cette ville se trouve à 65 km de l'Enclave de l'Alaska et à 90 km à l'est des îles de la Reine-Charlotte. En voiture, elle est à 1 520 km au nord de Vancouver et à 728 km à l'ouest de Prince George.

L'économie de cette ville est assez diversifiée, les transports, les services gouvernementaux, les ressources, le tourisme et le commerce y occupant une place importante. Cependant, son secteur clé est celui de l'industrie forestière. Skeena Cellulose embauche la majeure partie des travailleurs de cette ville.

Comme d'autres collectivités axées sur les ressources, la croissance démographique de Prince Rupert fluctue beaucoup, selon les perspectives d'emploi offertes par les principales industries.

Si la croissance des revenus à Prince Rupert a été moins volatile que dans d'autres collectivités axées sur les ressources, elle tend toujours à être inférieure à la croissance moyenne, même durant les périodes de prospérité.

Les résultats des modèles pour Prince Rupert sont assez décevants, les coefficients de détermination multiple étant faibles et les variables ressources étant rarement significatives.

L'équation des prix des maisons individuelles produisait un coefficient de détermination multiple d'à peine 0,71, les expéditions de pâte étant significatives. L'élasticité des expéditions de pâte s'établissait à 0,15, ce qui est supérieur à celle de Port Alberni (0,137) mais au-dessous de celle de Prince George (0,105).

L'équation des ventes de maisons individuelles était la pire de toutes les collectivités à l'étude, le coefficient de détermination multiple se situant à 0,30, soit moins de la moitié de la moyenne des coefficients des autres collectivités. Néanmoins, les prix de la pâte étaient significatifs, même si les expéditions de pâte ne l'étaient pas. L'élasticité des prix de la pâte s'établissait à 0,255.

Les équations pour les mises en chantier étaient aussi décevantes, leurs coefficients de détermination multiple se situant à 0,40. Les variables sur les ressources n'étaient pas significatives, mais elles ont été retenues dans les équations car elles portaient le bon signe et les courtiers en immeubles les jugeaient très importantes.

Les résultats des modèles pour Prince Rupert ont été les pires de toutes les collectivités à l'étude. Cette situation est peut-être attribuable aux

problèmes de données et à la période d'échantillonnage assez courte débutant en 1987, laquelle ne comprend pas la majeure partie du cycle de l'industrie forestière dans les années 1980.

Trail-Rossland

Trail et Rossland, à dix minutes l'une de l'autre en voiture, sont les deux plus grandes villes parmi les cinq collectivités presque adjacentes dans la région de West Kootenay, et leur population respective était évaluée à 7 626 et 3 859 habitants en 1999. Ensemble, elles constituent 70 % de la population de la région de Trail.

Trail étant la plus grande collectivité des deux, elle est le centre des affaires et la ville où est implantée la fonderie Cominco. Rossland est plus élevée dans les montagnes et a développé son secteur touristique. Rossland s'est développée en tant que banlieue de Trail, et sa population active compte beaucoup sur Cominco. L'exploitation minière est l'industrie dominante dans cette région.

Trail et Rossland sont très différentes du point de vue démographique, des profils des revenus et des coûts du logement.

Les données sur les mises en chantier pour Trail et Rossland étaient insuffisantes pour évaluer les modèles. On a évalué les équations des ventes et des prix des maisons individuelles. En raison de la proximité de ces deux villes, on a créé une seule série pour les prix et les ventes dans cette région, par simple addition ou selon une moyenne pondérée.

Les variables ressources que nous avons examinées à fond dans les équations Trail-Rossland étaient la production et les prix du plomb et du zinc, en raison de l'importance que revêt la fonderie Cominco pour l'économie locale.

L'équation des prix des maisons individuelles avait un coefficient de détermination multiple de 0,77. La production de zinc portait le bon signe, mais elle n'était pas significative.

Fait intéressant, l'équation des ventes de maisons individuelles était parmi les meilleures des collectivités à l'étude. Son coefficient de détermination multiple s'établissait à 0,77, à peine en dessous de celui de Port Alberni. La production de zinc est une variable significative, avec une élasticité de 0,17. Contrairement aux autres équations de ventes de maisons, les faibles prix des maisons n'étaient pas significatifs.

Compte tenu des commentaires des courtiers en immeubles de Trail et Rossland sur l'importance que revêt l'industrie minière pour déterminer les changements dans les marchés de l'habitation, nous sommes assez satisfaits des résultats limités. L'équation des ventes a été la meilleure, sans doute parce que la création de la série de données était plus fiable en tant que série de données agrégées. Toutefois, le peu de données sur les mises à chantier nous laisse perplexes quant à la façon de quantifier les répercussions des cycles des ressources sur les mises en chantier.

Kelowna

Kelowna n'est pas une ville axée sur les ressources. Elle est dotée d'une économie bien diversifiée avec des secteurs primaire et manufacturier affichant un rendement à peine inférieur à la moyenne provinciale.

Kelowna est située dans l'intérieur sud de la Colombie-Britannique et fait partie du Central Okanagan Regional District. Cette ville se trouve à environ 470 km à l'est de Vancouver, à 606 km à l'ouest de Calgary et à une heure de route au nord de la frontière américaine.

Kelowna est la plus grande collectivité analysée dans ce rapport, sa population étant légèrement supérieure à celle de Prince George. BC Stats a estimé le nombre de ses habitants à 97 385 en 1999, ce qui représente 2,4 % de la population de la Colombie-Britannique. Kelowna affiche le plus fort taux de croissance démographique des collectivités à l'étude. Cette croissance annuelle se situait à 2,8 % de 1976 à 1999, soit un peu plus que le taux de croissance en Colombie-Britannique. La tendance de la croissance par périodes quinquennales n'indique aucune baisse, contrairement à cinq des collectivités à l'étude ayant connu une baisse de 1981 à 1986.

Avant d'évaluer les équations, nous pensions que les variables ressources ne

seraient pas de bons indicateurs puisque la région s'est développée à la suite de la migration d'entrée et de l'expansion de l'industrie touristique, de l'industrie vinicole et du secteur manufacturier général. Néanmoins, Kelowna a bénéficié de répercussions en chaîne positives grâce à sa robuste économie, qui est généralement alimentée par des industries de ressources. C'est ce que semble confirmer la corrélation de la population et des mouvements migratoires avec les cycles provinciaux des ressources. Kelowna jouit d'une économie généralement florissante, mais sa croissance ne souffre pas autant que celle de la Colombie-Britannique des récessions de l'industrie des ressources.

Kelowna se caractérise par un forte croissance démographique et de l'emploi et une croissance du revenu des ménages supérieure à la moyenne. La croissance des ménages s'est également située bien au-dessus de la moyenne, d'où un marché de l'habitation vigoureux. Néanmoins, le logement a éprouvé des cycles tourmentés par de fortes chutes en 1981-1982 et au cours des huit dernières années. Ces chutes correspondent aux cycles des ressources.

Kelowna se distingue par l'excellent rendement de ses mises en chantier compte tenu du pourcentage de ménages de Kelowna par rapport à l'ensemble des ménages de la province, même durant des cycles de ralentissement marqué. En moyenne, les mises en chantier à Kelowna représentent environ le double de la part des ménages de Kelowna par rapport à l'ensemble des ménages de la Colombie-Britannique, depuis 1976.

Les résultats de l'évaluation des modèles étaient presque à l'image de nos prévisions. Nous avons vérifié les variables sur les prix et la production de bois d'oeuvre (centre intérieur) et sur les ressources minières. La meilleure corrélation touchait les variables sur l'industrie forestière.

L'équation des prix des maisons individuelles avait un coefficient de détermination multiple de 0,91. La production de bois d'oeuvre portait le bon signe mais n'était pas significative. L'élasticité s'établissait à 0,108, soit carrément dans l'éventail d'élasticités des autres collectivités à l'étude. Dans l'équation sur les ventes de maisons individuelles, la production de bois d'oeuvre portait aussi le bon signe mais n'était pas significative. Ces deux équations étaient beaucoup déterminées par le manque de vigueur de la croissance démographique et des prix des maisons individuelles, ce que reflète la forte inertie du marché de l'habitation à Kelowna.

La production de bois d'oeuvre est une variable significative et portant le bon signe dans les deux équations sur les mises en chantier de maisons. L'élasticité a été estimée à environ 1,00. Le coefficient de détermination multiple pour les équations sur les maisons était de loin le meilleur de toutes les collectivités à l'étude, dépassant 0,80.

En résumé, les modèles estimés pour les collectivités corroborent l'hypothèse initiale selon laquelle les cycles des ressources naturelles ont d'importantes répercussions sur les marchés de l'habitation. La plupart du temps, les équations permettent de faire ressortir les points tournants.

Lorsque les modèles n'ont pas fait ressortir les répercussions des cycles des ressources, cela était le plus souvent attribuable aux limitations des données. Nous n'avons que très rarement obtenu des résultats absurdes. Généralement, les variables sur les ressources qui n'étaient pas significatives comportaient au moins deux coefficients portant le bon signe et ayant une relation d'ordre décimal raisonnable. L'obtention de meilleures données et de périodes d'échantillonnage plus longues risquent vraiment d'améliorer les résultats de l'estimation. Cette étude a démarré sur une avenue prometteuse d'enquête, qui pourrait être étendue à d'autres

collectivités et améliorée en tentant d'obtenir des séries de données meilleures et plus longues.

Malgré quelques lacunes mineures, les modèles estimés peuvent être utilisés de manière efficace pour simuler des scénarios sur les perspectives des industries de certaines ressources. Dans le chapitre IV, nous examinons les simulations pour chaque collectivité à l'étude. Les modèles constituent un nouvel outil précieux dont peut se servir la SCHL dans l'analyse des risques.

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Chapter I

The Objectives of the Research Project

Terms of Reference

Canada Mortgage and Housing Corporation (CMHC) commissioned G. A. Pedersson & Associates to conduct a study of how the cycles of the resource sector impacts the housing markets in six resource-dependent communities in BC.

The key objectives of the study were:

- Undertake a detailed historical study of the resource communities.
- Identify the leads and lags in the local economies in relation to the new and resale housing markets.
- Estimate an econometric model in EViews, which can be used to simulate the impacts of different future resource scenarios on the housing markets of the selected communities.

The major requirements of the working simulation model are that it:

- Emphasizes resource variables as the explanatory variables.
- Incorporates data that is easily accessible reasonable costs.
- Be easily re-estimated and updated.
- Be capable of picking major turning points in housing cycles.
- Be stable over time such that new data and re-estimations will not materially alter the model.
- Employ methodology that can be used to build similar models for other resource communities.

Communities Selected For Study

Six communities were selected for study. One was diversified in its economy; the others were significantly dependent on one or more resource industries. To ease the selection process, we used the resource dependence calculations for local areas provided in a series of studies by the BC government. The most recent was British Columbia Local Area Economic Dependencies and Impact Ratios - 1996, published in May 1999.

The communities selected were chosen for their specific resource dependence as well as geographical dispersion throughout the province. The communities selected, and their primary resource industry are as follows.

- Port Alberni – Forest products
- Prince George – Forest products.
- Prince Rupert – Forest products and fishing.
- Fort St. John – Oil and gas.
- Trail-Rossland – Mining.
- Kelowna – Diversified.

The resource communities are similar in that they all are heavily dependent on a resource sector as the major engine of economic growth. Yet they are all quite different in many respects. The population range, based on BC Stats 1999 estimates, is from 11,485 in Trail-Rossland to 80,845 in Prince George.

Geographically, they represent the great breadth of the province. The communities are in the shaded regional districts, as shown in Figure 1 below. Two communities are on the coast, one is in the northeast, one is in the central Okanagan and two are in the Kootenay-Boundary region close to the US border.

Figure 1

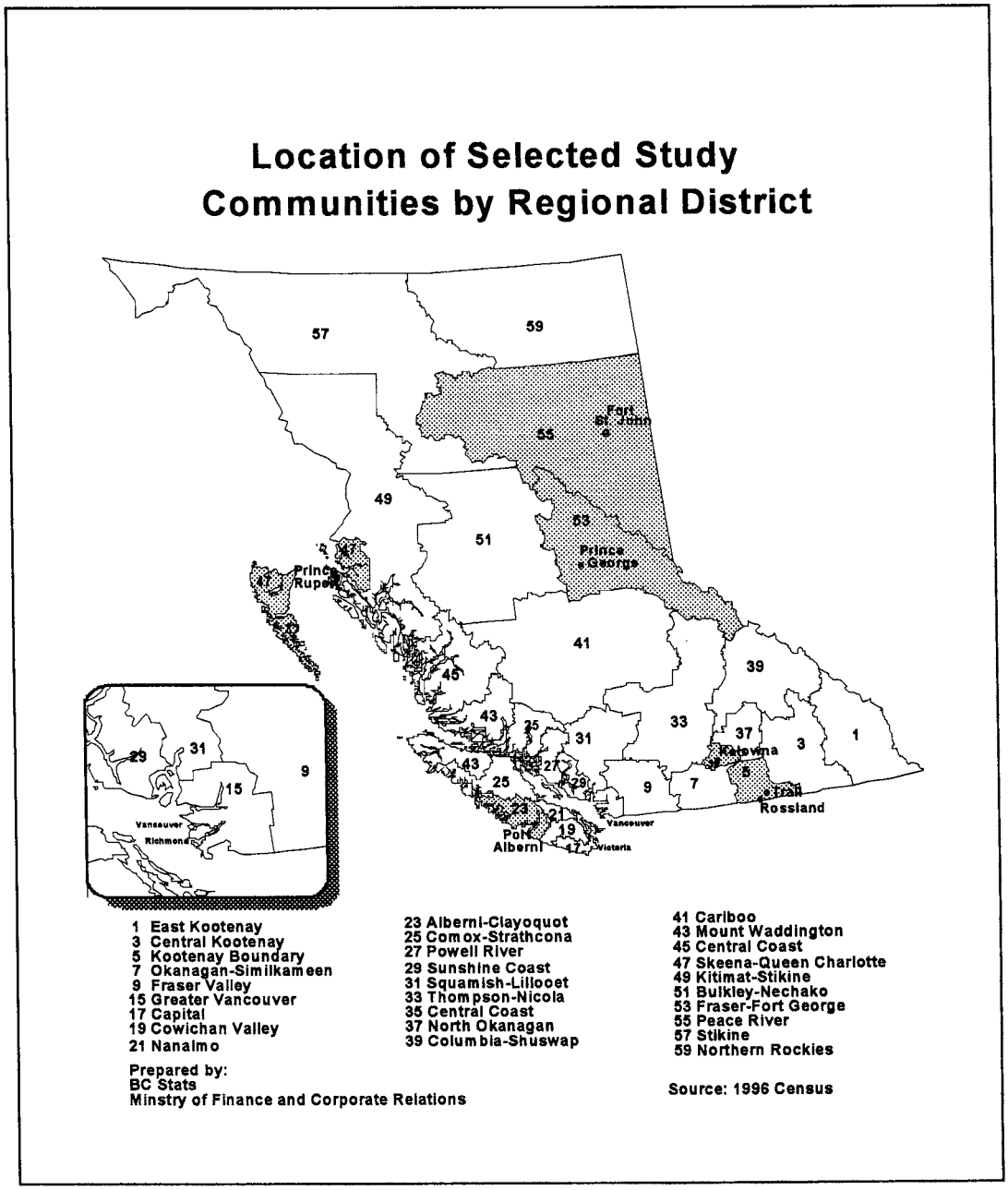
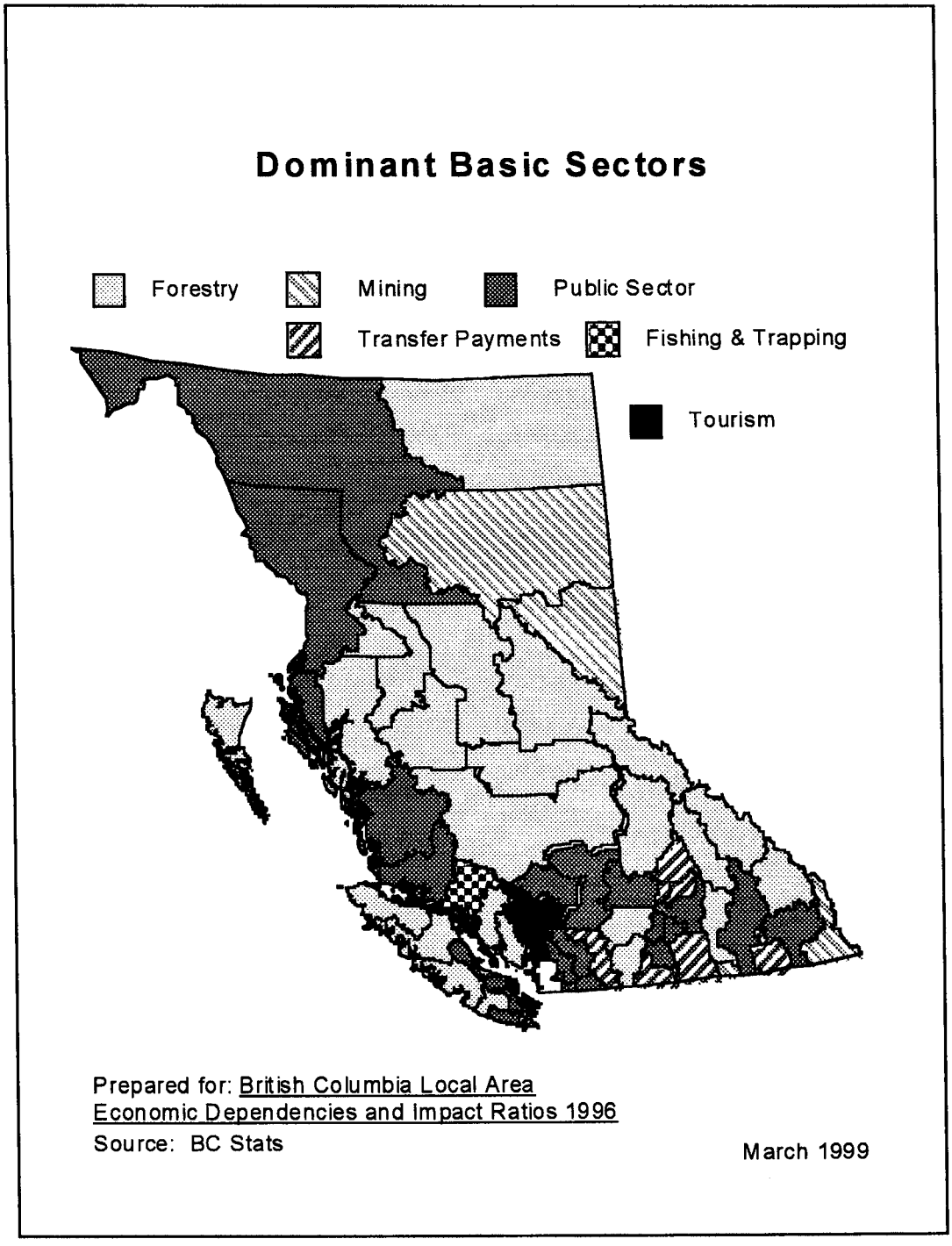


Figure 2



Resources have been the primary driving sectors of the BC economy since the very beginning. Given the relative endowment of resources, communities throughout the province have grown and prospered by developing industries around their particular resource base.

Consequently, communities and whole regions are dependent on quite different resource bases. This is underscored in Figure 2, which shows the basic economic dependence of the various regions in the province on specific resources. Because the economic dependence, as calculated by the government, is based on income, the economic base is not always a natural resource. For example, in some regions it is transfer payments (pensions, welfare, employment insurance, etc), either from government and/or the private sector.

In some regions, the employment and income of the government sector dominates and is the primary economic base. Tourism is another industry that forms the economic base of some communities.

In this study we focus on the resource industries, which are the economic base of the communities selected for analysis in this report. They are the forest, mining, oil & gas, and fishing industries, although fishing is no longer as significant as in the past.

All have had significant cycles in production and prices that were greater than for the overall economy. Given the significance of the resource sectors in the communities, these cyclical trends have important feedback impacts, both positive and negative, on the economic health of the communities.

Chapter II

The Major Resource Industries of BC

The Forest Industry

The forest industry, BC's number one resource industry, comprises the primary logging and harvesting and the related timber conversion facilities. In 1998 the primary timber conversion facilities in BC were:

- 246 lumber mills
- 33 post mills
- 36 pulp and paper mills
- 58 shake and shingle mills
- 39 panelboard mills.

Table 1

Historical Growth Rates of the BC Timber Harvest By Region (Avg. Annual % Chg)

	Coast	Interior	Total
1950-60	1.9	9.7	4.5
1960-70	3.8	6.3	4.9
1970-80	0.6	5.4	3.2
1980-90	-2.0	1.9	0.5
1990-99	-0.3	-0.1	-0.2

Source: BC Stats

BC's forest industry expanded rapidly from 1950 to 1970, slowed in the 1970's and then started a process of rationalization in the 1980's as evident in Table 1, which shows the decade growth trends in timber harvests, the raw resource for the industry.

The Coast industry is older than the Interior industry. Consequently, the Coast industry matured first and growth since 1950 has been considerably slower than the Interior industry. Concomitantly, the Interior share of the total BC harvest has risen from 25% in 1950 to 70% in 1998. However, both regions' harvest levels peaked in the late 1980's and since have been in decline, even though there was a slight recovery in 1999.

The consensus view is that the BC timber harvest levels are likely to continue declining on a trend basis in the medium term. This creates a particular challenge for communities that are dependent on the forest industry.

- Communities dependent on the forest resource potentially face not only the prospect of a declining trend in production, but also significant cycles on that trend.

- The communities have become accustomed to sharp cycles. But until recently, history provided the comfort that recoveries from downturns led to new peaks in production. Knowing this made it easier to cope with the temporary negative impacts of down cycles. But it is a different matter when the recoveries from down cycles may not reach previous peak levels. The psychological and economic impacts on the communities could be significant.

The negative impacts of future forest industry down cycles on the communities may not be totally offset in recoveries. The overall economic health of the communities would then depend on the ability of other economic sectors

to compensate for weakness in the forest resource sector. This is no small task when one considers the large employment and income multipliers associated with that resource sector.

Markets for BC Forest Products

The BC forest industry is highly dependent on the export markets to sell its output. Forest products are the single largest export from BC. In 1998 the value of exports were $8.6 billion for wood products and $4.9 billion for pulp and paper products. This represented 52% of all exports from the province.

According to 1997 data reported by the Council of Forest Industries, the destination of BC wood products by value were:

- US (54.4%)
- Japan (21.0%)
- Canada (18.2%)
- European Union (3.8%)
- Other (2.6%)

The destination of pulp and paper products (excluding newsprint) by volume were:

- Asia (38.9%)
- Europe (26.7%)
- US (22.2%)
- Canada (7.9%)
- Other offshore (4.5%)

The US is the most important market for newsprint, accounting for almost 50% of exports, followed by Japan at 14% and other Asia at just under 20%. Historically, the US has been the most important market for all the forest products followed by Japan, other Asia and Europe.

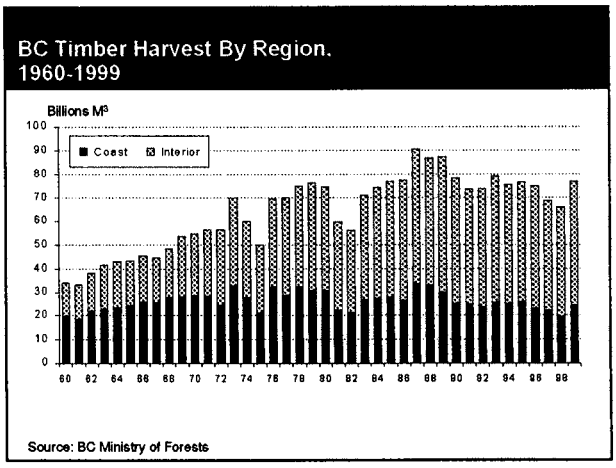
The Timber Harvest

Figure 3 underscores the sharp cycles of harvest levels, even during the periods of strong long-term trend increases in harvests.

- In the global recession following the OPEC shock in 1973, the Coast and Interior harvests fell by a respective 35% and 23%.
- The severe recession in 1981-82 caused the Coast harvest to decline 30% while the Interior harvest fell 21%.
- The early 1990's North American recession resulted in more modest harvest declines of 17% on the Coast and 15% in the Interior.

Figure 3 also shows that the harvest levels peaked in the late 1980's and are now on a declining trend. There was a slight recovery in 1999 as companies were required to meet their 5-year annual allowable cut commitments under terms of the tenures. Failure to meet those AAC commitments could result in the loss of the tenures. There was also an increase in the harvest on private lands to take advantage of improving forest product prices.

Figure 3



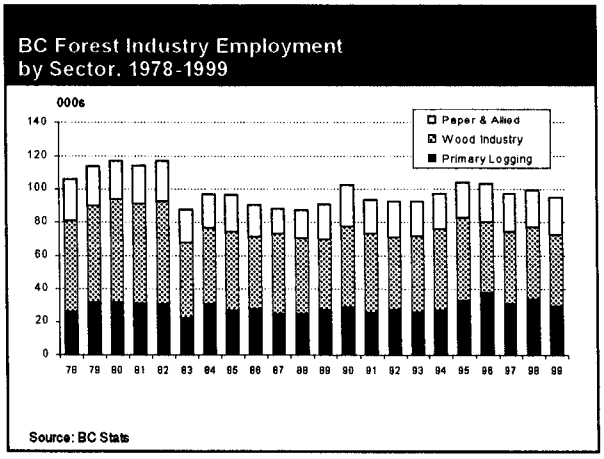
The future trend in timber harvests will play a pivotal role in determining the health of the forest sector. A rising trend would provide the potential for growth in output, employment and income. This would benefit the communities that are dependent on the forest industry.

Conversely, a continued trend decline in harvests would reduce the fibre supply to conversion facilities with negative implications for output, employment and income. Depending on the severity of the decline, this could have very negative consequences for forest-based communities unless other sectors could make up for the losses.

Forest Industry Employment

Figure 4 shows the trend in three measures of forest industry employment: primary logging, and the manufacturing related activities in the wood industries and paper & allied industries.

Figure 4



There are two observations that stand out:

- There have been sharp cycles in employment during recessions.
- The long-term trend in employment is down, although is appears relatively stable from 1982.

BC total forest industry employment (primary logging, wood products, and paper & allied manufacturing) peaked at 116,800 in 1979. Employment fell by 25.5% to a low in 1987 and then recovered to a lower peak of 102,500 in 1989, the peak of the last commodity boom. The next downturn had a low of 92,500 in 1991, a drop, of 9.8%. In the ensuing recovery, employment reached 103,900 in 1994, marginally exceeding the 1987 peak. Since then the trend has been down again, with the 1998 figure at 94,700.

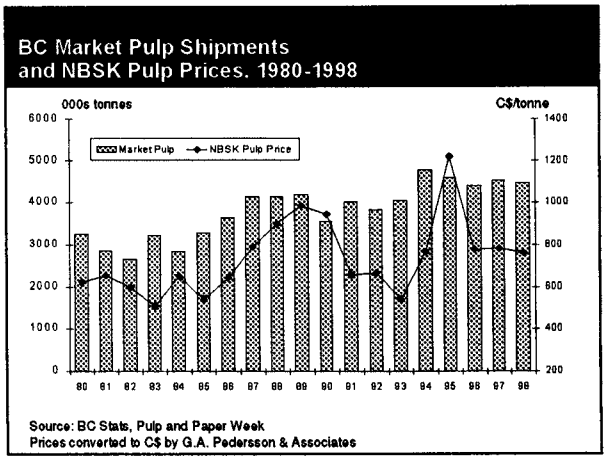
The trend in primary logging and forestry has essentially been the same. One difference is that increased investment in silviculture activities in the mid-1990's caused a short-term spike in primary employment in 1995. However, since 1995 primary logging employment has also been on a sharp decline.

Since the 1970's the forest industry employment cycles have become less severe, but there have been no new employment peaks higher than those set in the 1970's. The downtrend in employment is likely to continue.

Market Pulp

Figure 5 shows the trend in BC market pulp shipments and the $C price of market pulp since 1980.

Figure 5



BC produces a high quality northern softwood bleached kraft pulp (NSBK) that is highly valued in papermaking. But technology has permitted papermakers to reduce their use of NBSK and substitute lower quality pulps made from hardwood and fast-growing shorter fibre softwood like Radiata pine grown in New Zealand, Chile and Brazil. This is a growing competitive threat to the industry. These regions typically have much lower production costs than BC.

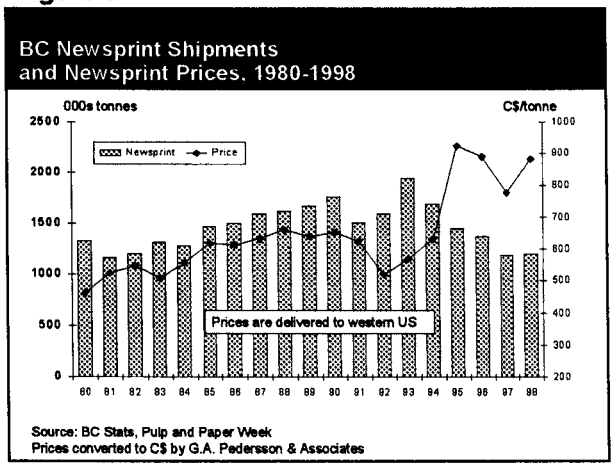
- Market pulp shipments have trended higher since 1980, peaking in 1994. Since then shipments have edged down, falling by 6.3% by 1998.

- Pulp demand is sensitive to economic cycles, as evident from the chart showing shipments declining in recessions and then subsequently recovering.

- The amplitude of the pulp shipment cycles has been much less than for timber harvests, with shipments falling about 18% in 1981-82 and 15% in 1990.

- Pulp prices have been extremely volatile. In Canadian dollar terms, pulp prices fell 22% in 1982-83, rose 94% in 1983-89, plunged 45% in 1990-93, soared 125% in 1994-95, only to decline again by almost 38% in 1996-98.

Figure 6



Newsprint

Figure 6 shows the trend in shipments and prices for newsprint, the other major commodity in the pulp & paper sector. It has a cyclical pattern as well, but less pronounced than for market pulp.

- From 1980 to 1997 newsprint prices delivered to the US (transaction prices) in Canadian dollars have moved in waves of –7.4%, +30.1%, -21%, +78% and –16%. Prices recovered in 1998 by 13.6%.

- Newsprint shipments fell in recessions, just as with pulp. Shipments fell 13% in 1981 and 14% in 1991.

- Since 1993 newsprint has been in a sharp decline. This reflects primarily a shift in the industry away from production of standard newsprint to higher value specialty grades. From 1993 to 1998 newsprint shipments fell by almost 39%, while other paper and board shipments, which includes these other papers, rose by 31%.

Pulp & Paper Prices

Figure 7

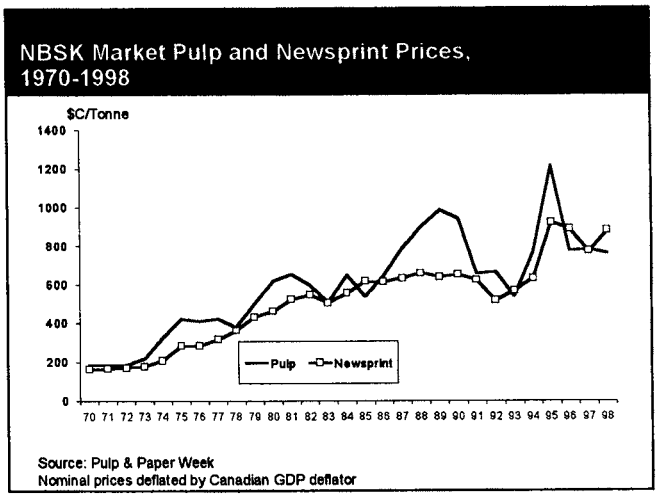


Figure 7 shows the sharp cycles in nominal pulp and newsprint prices since 1970.

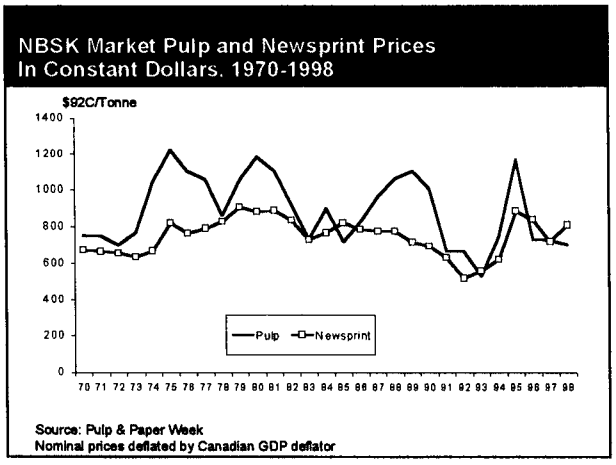
The variability in pulp and newsprint prices is much greater than the variability in shipments.

- Pulp prices are more volatile than newsprint prices.

- Pulp and newsprint nominal prices reached new record levels in 1995 and then fell sharply.

The story is somewhat different when looking at real prices, (nominal prices adjusted for inflation). The real prices of market pulp and newsprint are shown in Figure 8.

Figure 8



- With the exception of the spike in 1995, real pulp prices have been on a declining trend since the early 1970s, with successively lower peaks and valleys.

- Real newsprint prices have had a similar trend to pulp prices.

The much greater variability in both real and nominal pulp and paper prices, relative to shipments, is due to the large capital costs of production. Mills are kept running even at losses, when prices are low, because there is still a positive cash contribution by the mill, or because they are part of an integrated operation and cannot be shut down. The continued excess supply depresses prices more than would be the case if production could be curtailed more readily to meet declines in demand. Conversely, prices rocket up during shortages because there is no way to expand capacity in the short-term.

The swing in prices, along with the cycles in shipments, has a major impact on the profitability of the industry. Volumes and prices moving in the same direction compound changes in revenues.

The pressure on the pulp and paper industry, created by the downtrend in real prices, while costs have risen, has forced the industry to rationalize and reduce its labour force. Moreover, it has forced more incremental investment abroad, where returns are more attractive. These developments have negative impacts on the dependent communities.

A continuation of the declining trend in real prices is a major competitive threat to the pulp & paper industry because real production costs cannot be cut commensurately. If real product prices continued to decline on a trend basis, ultimately this would erode profitability to the point of starving the facilities of needed capital improvements and thereby creating permanent shut downs of some facilities.

Solid Wood Products

While the variability in timber harvest levels is not reflected in the production of pulp and paper, it is captured in the production of lumber and other wood products. Lumber, however, is by far the most important product. Figure 9 shows the trend in BC lumber production from 1970.

Figure 9

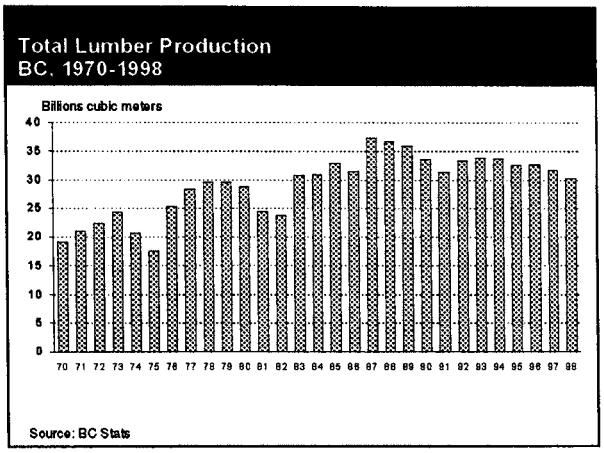


Figure 9 underscores how the production of lumber has varied with the recessions of the 1970's, 1980's and 1990's, falling sharply and then recovering. Production peaked in 1987 and has since been on a downtrend, just as with the total timber harvest. The amplitude of each cycle in lumber production has become smaller.

The trend in harvest levels is mirrored in the production of lumber.

BC essentially has two separate lumber industries, with different markets, and different economics of production, the Coast and the Interior. The pattern of lumber production by region differs significantly, as shown in Figure 10 and Figure 11. Lumber production data is available on a regional basis only from 1978.

Figure 10 shows the trend in Coast production and a representative lumber price, that of Hem-Fir 2X4's in Canadian dollars.

- Coast lumber production plunged 37.5% from 1978 to 1982, recovering to a new cyclical peak in 1987, which was below 1978 levels. Production then fell sharply through 1998, punctuated by a modest rise in 1992-94 following the 1990-91 recession. Production in 1998 was down 55.7% from the 1987 peak.

- Coast lumber prices exhibit the same cycles as the economy, falling in recessions and rising in recoveries. The historical pattern, however, broke after the 1991 recession as prices soared to record levels.

- Coast lumber production could not respond positively to rising lumber prices because of 1) a timber limitation as forest lands were removed for parks, 2) the Canada-US Softwood lumber agreement limited access to the US market when 3) the key Asian markets for Coast lumber were depressed due to the Asian crisis and 4) the higher costs imposed by stumpage increases and The Forest Practices Code.

Figure 11 shows the trend of Interior lumber production and a representative lumber price, SPF 2X4s in Canadian dollars.

Figure 10

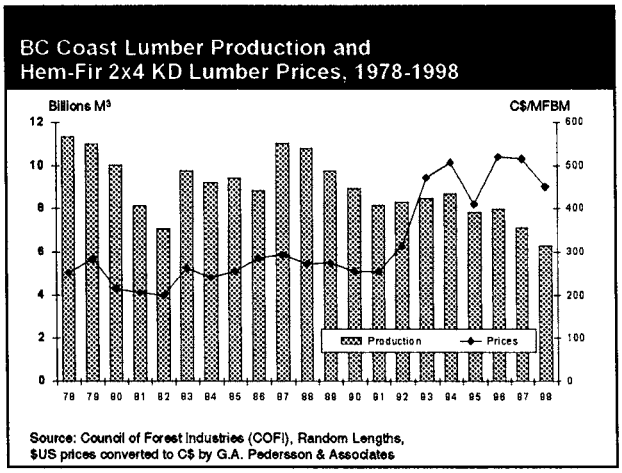
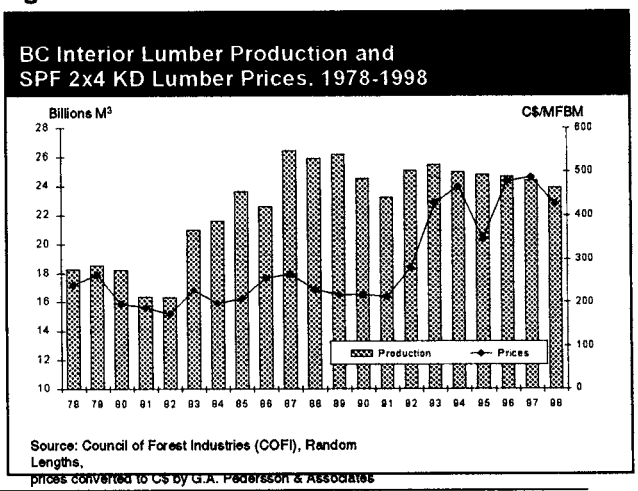


Figure 11

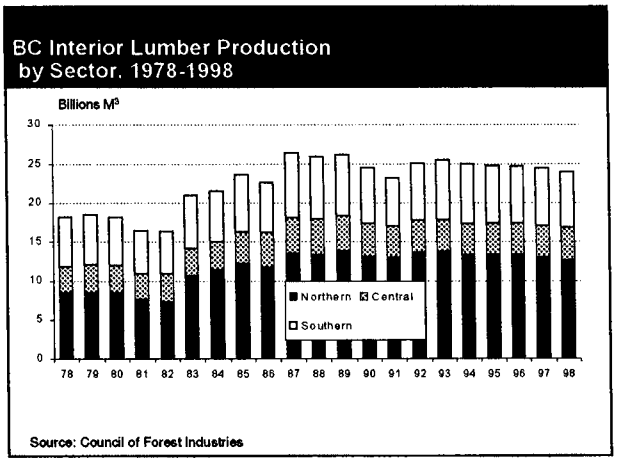


- Interior lumber production responds to the economic cycle the same way as the Coast, although the swings are more muted.

Interior lumber production has also been on a downtrend since the 1987 peak, although the decline is much more gradual than for the Coast.

Figure 12 shows the production trends for the three sub-regions of the Interior.

Figure 12



- All regions tend to have similar cycles. Apart from the cyclical pattern, however, the longer-term trend has been for the Northern region to increase production most, increasing its trend share of output from under 47% in 1998 to over 53% in 1998.

- Both the Central and Southern Interior regions have had their share of Interior production decline, falling to about 17% and 29% respectively, in 1998.

The Interior lumber industry has not suffered to the same extent as the Coast since production peaked in 1987. By 1998 the Interior production was down just 9.7% from the peak compared to almost 56% for the Coast. Even though the Interior lumber industry also suffers from timber constraints and higher costs due to provincial charges and the Forest Practices Code, the Interior industry has several advantages that have mitigated the negative impacts to a degree.

- The industry is more cost competitive both in logging and conversion costs.

- The US market, which has remained strong in the past few years, is the primary market for Interior production, while the Asian market, the Coast's major market, has been very weak.

- In the Interior less timber has been lost to parks and other environmental concerns than on the Coast.

- The Interior has a much larger quota than the Coast under the Canada-US softwood lumber agreement.

But like the Coast, the Interior lumber production has not been able to respond positively to the surge in lumber prices in the past few years. The reasons are the binding quotas of the softwood lumber agreement as well as high production costs for some producers.

Figure 13

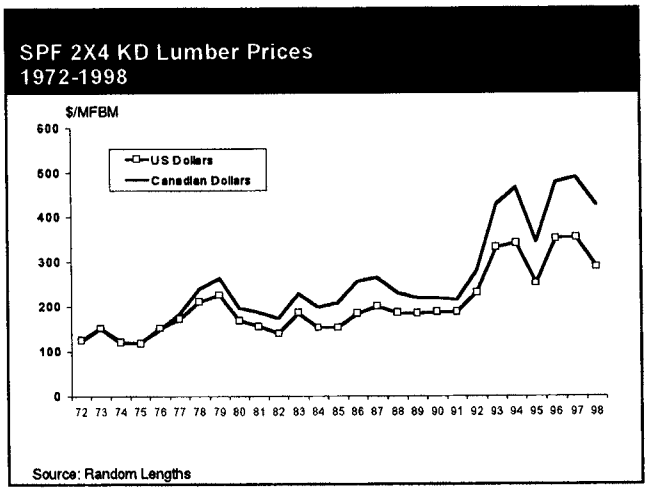


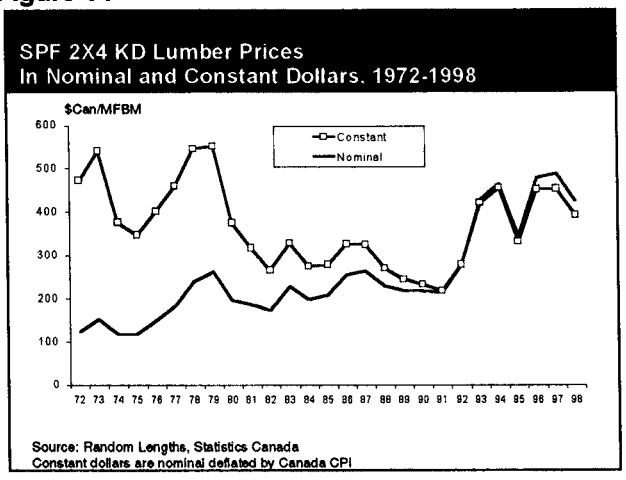
Figure 13 illustrates how important the decline in Canadian dollar has been in slowing down the deterioration in the competitive position of the lumber industry. The cash flows to the lumber industry, other things equal, would have been severely curtailed had the Canadian dollar remained at parity with the US dollar. In 1998 alone, the incremental cash flow to producers due to the weak Canadian dollar amounted to $138.80/MFBM or almost 50%.

Looking at the trend in nominal prices only, however, gives a misleading picture of the potential returns to lumber production. As is the case in the pulp and newsprint sectors, real prices for lumber have been on a declining trend since the late 1970s.

Figure 14 shows the trend in real $C prices of SPF 2X4's, the bellwether lumber price for BC.

- Real prices peaked in 1979. They fell almost continuously to a low in 1991, almost 61% below the record peak.
- There was a modest recovery through 1995-97 but then real prices eroded again, and in 1998 at $392.56, the real price was 29% below the 1979 peak.

Figure 14



Had the Canadian dollar in 1998 been the same as in 1979, the real $C price of SPF 2x4s in 1998 would have been just $310, more then 21% below the actual 1998 real price, or 44% below the 1979 peak. Clearly, without the Canadian dollar weakness, the BC lumber industry would be in much worse shape than today. Even if a stronger currency in the past had forced companies to invest more in capital equipment and technology to improve efficiency, it is unlikely that it would have closed the gap. But even if that happened, the implications would have been even lower levels of employment than occurred, because labour is the main area where costs could have been cut.

Looking at the longer-term trends in the forest industry, it appears that there are two primary domestic competitive threats: 1) a declining availability of the raw resource and 2) a declining trend of real commodity prices. Two external threats are trade barriers (either government mandated or consumer boycotts) and the growth of lower cost competition from abroad and from other Canadian producers.

To the extent non-market factors such as provincial government economic and resource policies, trade polices, uncertainty about aboriginal land claims and potential environmentalist led boycotts either mitigate or exacerbate the market forces, the difficulties facing the forest industry in the medium-term could be alleviated or compounded. Whatever the outcome, the implications for the forest-based communities in BC will be very significant.

The Mining Industry

BC's mining industry started in the mid-1880s with coal mining on Vancouver Island and placer gold mining in the Cariboo. Mining has been an important economic driver of the province, second only to the forest industry. The industry has built up world class expertise in exploration, development, operations and research.

The BC mining industry is comprised of several sectors, each with specific markets and unique characteristics. The industry is composed of the metal mining, coal mining, industrial minerals, construction aggregates, and the oil & gas sectors as well as the related primary metals manufacturing. In the report we discuss mining in its three major components, metals, coal and oil & gas industry separately.

Metal Mining

The metal industry has been in decline for about a decade. When major fluctuations in mining industry employment and production are added to the longer-term trend, it is clear that there is a major challenge for communities dependent on mining.

At the end of 1998, BC had 22 operating mines of which 8 were coal mines. Between 1984 and 1998 there has been a reduction in operating mines from 31 to 22. There have been 27 mines opened or re-opened and 38 mines closed or temporarily shut down, for the net loss of 11 operating mines.

Markets for BC Mining Production

The BC mining industry is highly dependent on global economic conditions. While it sells about 25% of its output to other parts of Canada, the major market is Asia with a 61% share. Japan is the dominant single market taking 47% of BC ores and concentrates.

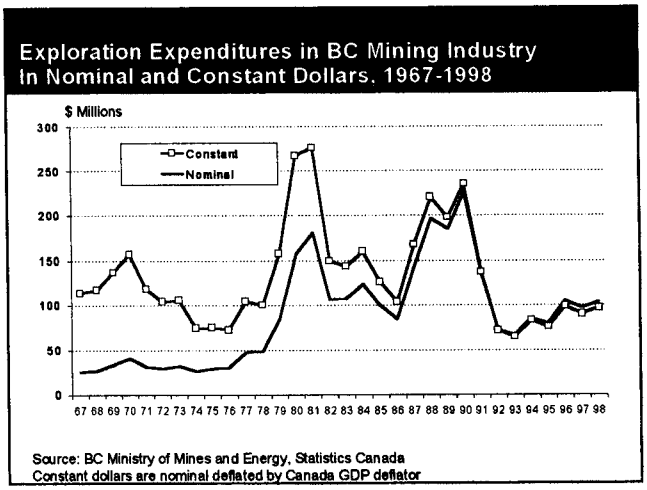
Being dependent on just a few foreign markets means the fortunes of the BC mining industry are determined to a large degree by the economic performance of those countries.

Mining is a global commodity industry where the balance of global supply and demand sets industry prices. This makes it imperative to be a low cost supplier. Failure to have competitive production costs will mean lower sales and margins to the firms in the industry.

Mining Exploration Expenditures

The basis for a growing mining industry, and a good barometer of the economics facing the mining industry, is the amount of money spent on exploration. Figure 15 shows the exploration spending in BC since 1967, in both constant and nominal dollars. Expenditures have been extremely volatile with recent expenditures near record lows.

Figure 15



- Nominal dollar exploration spending rose strongly in the late 1970s, spurred by rising inflation and commodity prices, peaking in 1980.

- The onset of the 1981 recession and the anti-inflation stance adopted by the G-7

central banks negatively affected the medium-term prospects for commodity prices at that time, and exploration fell sharply through the mid 1980's as it did in many other parts of the world.

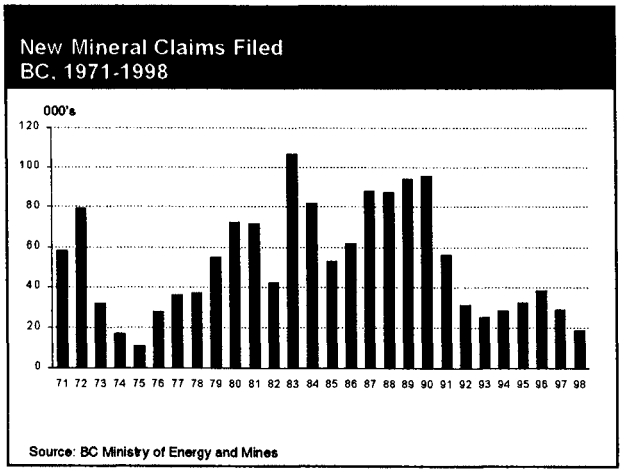
- A renewed commodity price boom in the late 1980's spurred another surge in exploration spending, which peaked in 1990.

- Since 1990 the level of exploration spending has eroded sharply, in large part due to provincial policies but also because of global conditions.

- In constant dollars, the level of exploration spending in the past few years has been only marginally above the levels of the mid-1970s, and off about 70% from their 1979-80 peak levels.

New claims units filed each year, shown in Figure 16, is another leading indicator of the mining industry. It doe not suggest a robust future.

Figure 16



The 18,600 new mineral claims units in 1998 was the lowest since 1975 and compares poorly to the peak of 106,683 set in 1983. Even in 1990, there were over 95,000 new claims units.

The climate for investing in the BC mining industry has been very poor relative to the alternatives elsewhere in the world. The high costs of labour, the lengthy delays of the consultative approach to land-use decisions, high taxes, tough environmental standards, confiscation of mining properties for parks, and the uncertainty of the aboriginal land claims have all damaged the investment climate in BC.

The decline in the number of operating mines in the past 15 years, the poor record of mining exploration spending in the past few years and the continued decline in claims units filed indicates that the mining industry is in a period of decline, with significant momentum.

Given the long lags between exploration identifying a potentially economic ore body and the opening of a mine (usually about 7 years) the lack of exploration spending in the recent past puts the BC mining industry and the communities that depend on mining at risk. As current mines deplete their ore bodies or are forced to shut because of poor economics, mining has many more negative risks than positive risks in the medium-term.

Employment

Figure 17

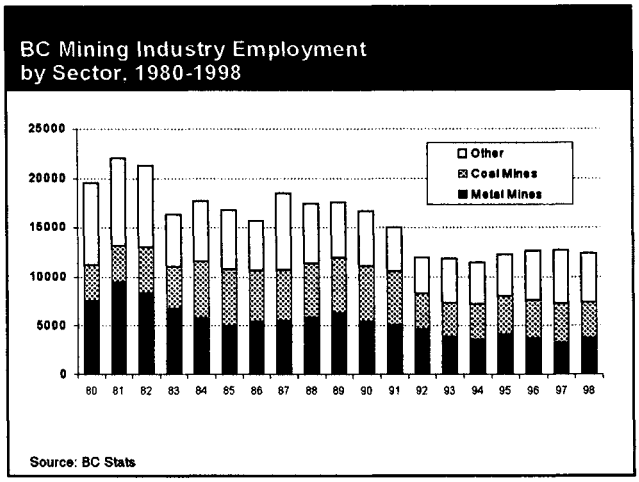


Figure 17 shows the trend of employment in the mining industry since 1980. Employment has

trended down with steep cyclical drops during recessions. In addition to the factors outlined above, mining employment has declined due to:

- The loss of operating mines.
- The need to replace labour with capital to increase productivity and lower production costs.
- The greater capital intensity of the newer mines.
- Reduced expectations about commodity prices given the anti-inflation policies of the G-7 nations.
- Loss of market share to lower cost competitors, mostly in emerging markets.

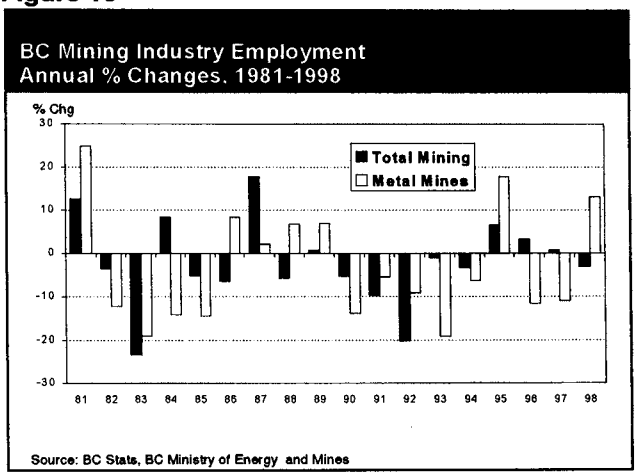
Employment has also been highly variable on the downtrend, as mines have altered production in response to the economic cycles. The annual changes in mining industry employment are shown in Figure 18. Since 1979 employment has declined in 11 of 19 years, with 1987 being the only year of significant gains since 1980.

- Total mining employment declined by 36.8% from 1980 to 1998, with metal mines declining 51.2%. Coal mining employment rose a modest 1.8%. Other mining employment fell 40.4%.

The decline in mining employment occurred in long waves. For example, in metal mining:

- The 1st wave of decline in 1982-85 was 47.6%.
- The mini commodity boom of 1986-89 had an increase of 26.9%.
- The 2nd wave of decline in 1989-95 was 44.9%.
- In the last four years there were two declines and two advances for a net gain of 4.8%.

Figure 18

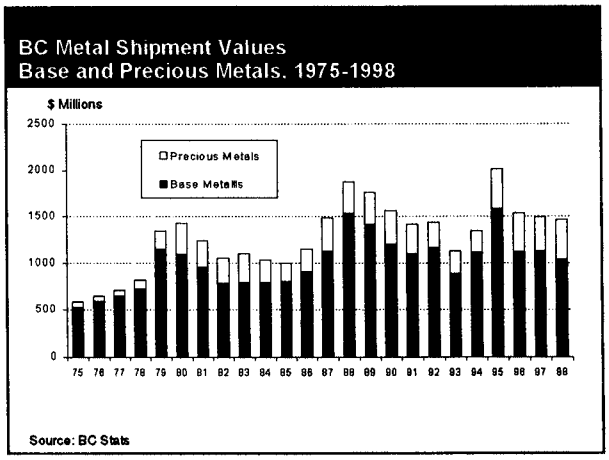


The waves of employment declines and increases closely follows the cycles in the value of shipments, as shown below. The huge drop in mining employment since 1980 has had a big impact on the mining dependent communities such as Trail.

Metal Shipment Values

Figure 19 shows the trend in the value of metal shipments, segregated by the two major categories, base metals and precious metals.

Figure 19



Like employment, the value of shipments has been highly variable. The value of 1998 shipments was $1.5 billion. The range since 1975 has been between $587 million and $2.0 billion. The key metals produced in BC, with the respective shares of the 1998 value of total metal production, are:

- copper (46.5%)
- gold (20.8%)
- zinc (15.8%)
- silver (8.1%)
- molybdenum (5.6%)
- lead (1.7%)

Base metal production is clearly dominant, accounting for about 70% of total sales. But that is changing. Precious metals have taken on increasing importance. Precious metal shipments have increased from 8.4% of shipment values in 1976 to 28.9% in 1998. Gold has become the dominant precious metal, accounting for 20.8% of sales, up from less than 4% in 1976.

Mining industry shipments are also very cyclical, falling in recessions and recovering with a lag in the recoveries. Since 1975 the annual change in the value of total metal shipments have ranged from –24% to +65%.

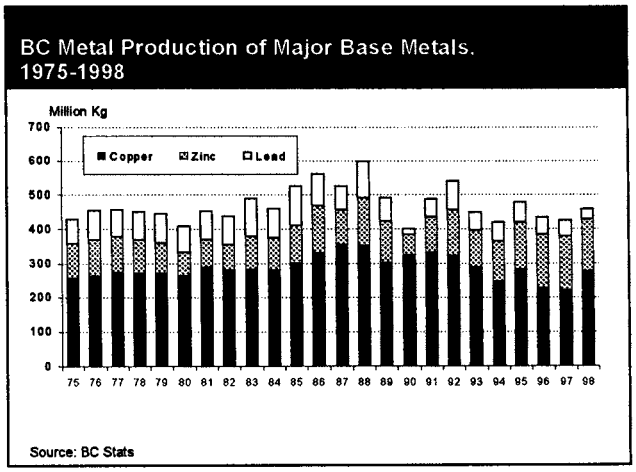
Since 1980 most of the annual sales changes have been negative (11 of 19 years as has been the case with employment). The value of metal sales in 1998 was only slightly above that of 1980, and down 27% from the 1995 peak.

Metal Production Volumes

The fluctuation in shipment values is due to both price and volumes. Figure 20 shows the volumes of base metals shipped since 1980 while Figure 21 shows precious metal production.

Production of copper was essentially on a rising trend through the 1980s but has been declining since 1991, notwithstanding the modest increase in 1998. The 1998 production was still 16.4% below the 1991 peak.

Figure 20

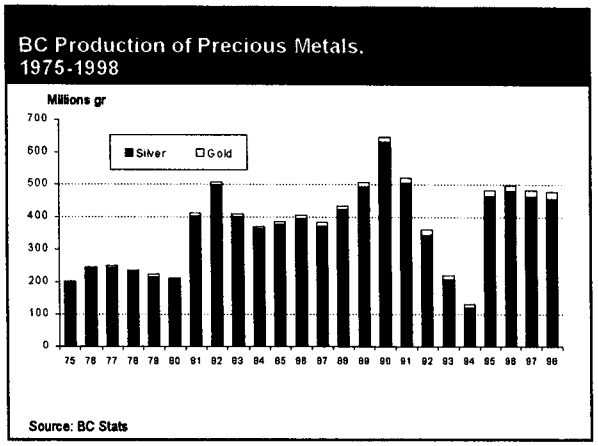


- Zinc production has been on a rising trend while lead has been declining.
- The volume of base metal production in 1998 was 460 million kg, down 25% from the 1988 peak of 611 million kg.

Precious metal production has also been highly variable, as shown in Figure 21. Silver has had a dramatic decline in the early 1990s, recovering to more stable levels in the past few years.

- Gold production is a very tiny proportion of total metal production, but its value is second only to copper in all metal shipments because of price.
- Precious metal production, despite a strong surge from the low in 1994, was still 26% below the 1990 peak in 1998.

Figure 21



The production volume of metals is extremely volatile on an annual basis, owing to a variety of factors. From 1975 to 1998 the annual change in base metals production has ranged from –18% to +20%, while for precious metals it has been –40% to +260%.

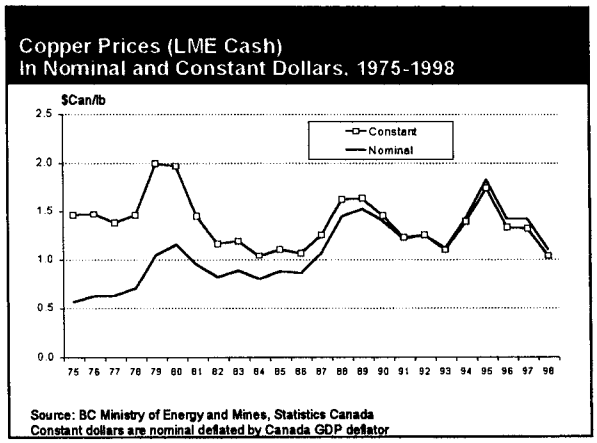
Judging from the trend in the volume of production, it may indicate that BC has passed the peak of production in base metals. Given the relative lack of investment in exploration, it seems unlikely that metal production has much upside potential. On the contrary, the risks seem mostly on the negative side.

Metal Prices

The three most important metal prices for BC are copper, zinc and gold. Prices for these metals have been quite volatile from year to year. But more importantly, from the perspective of the economic viability of the mining industry in BC, the long-term trend in constant dollar prices has been negative as shown in the figures below. As in the forest industry, this puts pressure on the firms to lower costs, which are primarily labour costs.

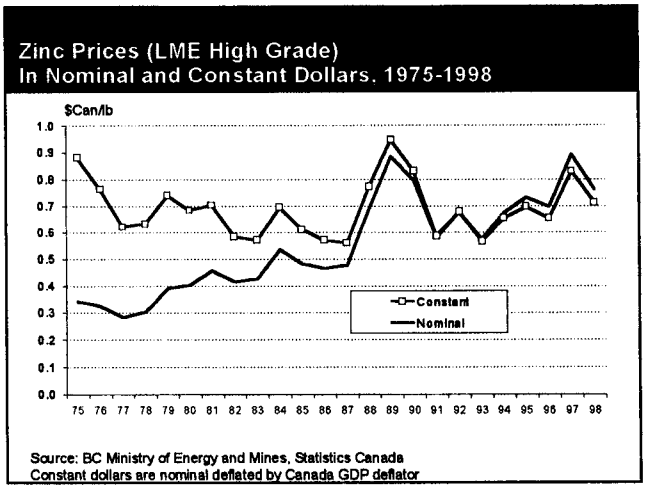
- The constant dollar price of copper has set declining peaks since 1979. This trend was temporarily interrupted in 1995. But prices quickly collapsed and in 1998 the constant dollar price was 48% below the 1979 peak and 41% below the 1995 peak. These are the lowest prices recorded since 1975. Prices have improved in 1999, but the longer-term trend remains down in real terms.

Figure 22



The constant dollar price of zinc, shown in Figure 23, has not been as weak as copper. While still below the 1989 peak, it has been on an erratic up-trend for the past 5 years.

Figure 23

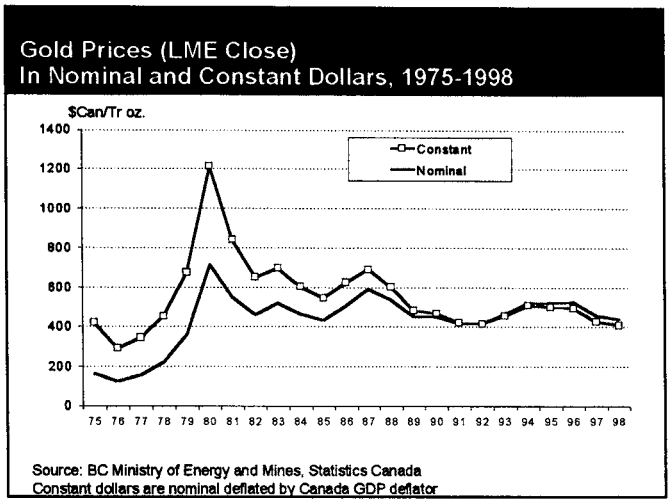


Gold prices, shown in Figure 24, have also been on a downtrend.

- Both the nominal and constant dollar prices of gold have been declining, with the

constant dollar price in 1998 the lowest since 1977, and off 66% from the 1980 peak.

Figure 24



The biggest threat to the BC mining industry is declining commodity prices, whether in real or nominal terms. If they continue to decline, it increases the risk of shutting down more existing mines, because production costs cannot be cut fast enough to compensate for price declines. At the very least, declining metal prices will force companies to reduce their employment levels to cut costs. This will have a negative impact on mining dependent communities.

The charts above show prices in Canadian dollars. As was the case for the forest industry, the Canadian dollar's decline against the US dollar has helped mitigate the negative impact of the decline in prices. A stronger Canadian dollar, other things equal will also seriously damage the competitive position of the BC metal mining industry just as it would the forest industry.

Coal Mining

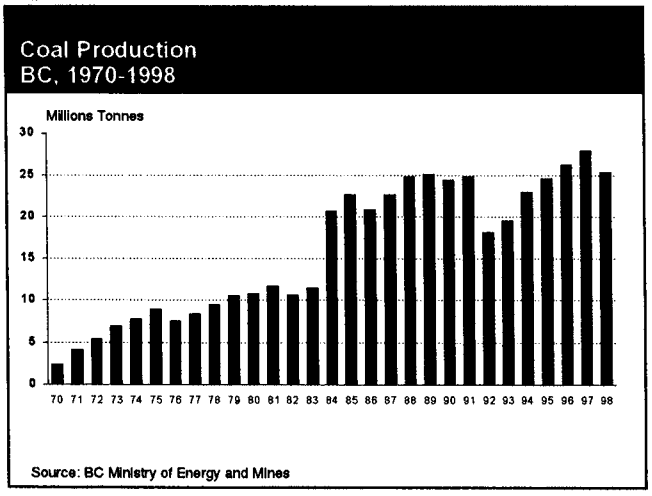
Coal mining is not an integral industry to any of the communities we analyzed, but we discuss it here because it is a major part of the mining industry. Moreover, the industry is a significant indirect influence in the northern part of BC and hence can be a factor in the future development of Fort St. John and Price George.

Coal mining has a long history in BC, dating back to 1836. The predominant coal product, representing about 93% of total coal production, is high value metallurgical coal used in the making of steel. The balance is thermal coal (steam coal) used as a fuel to generate electricity.

In 1998 there were 8 operating coal mines in BC. The coal mining sector did not grow rapidly until the 1973 OPEC oil shock changed the economics of the coal industry.

Figure 25 shows the trend of coal production since 1970.

Figure 25



With the opening of new mines, coal production almost doubled to 20.7 million tonnes in 1984 from 11.4 million in 1983.

- Coal production has continued to expand, punctuated by the downturn in the global economy in the early 1990's, peaking in 1997.

Coal production weakened in 1998 and into 1999 as our main export markets (Asia) were hit by a deep recession.

Coal Markets

Most of BC coal is exported, with some going east to the steel foundries in Ontario and utilities in Ontario. But even more than the metal mining industry, the coal industry is highly dependent on just a few markets. Consequently, sales and prices are very dependent on the health of those markets and the general global supply of coal from competitors.

The major export markets for BC metallurgical coal in 1998 were:

- Japan (48.0%)
- Korea (14.2%)
- Italy (4.2%
- UK (3.9%)
- Germany (3.4%)
- Taiwan (2.9%)

The major markets for thermal coal in 1998 were:

- Korea (38.7%)
- Japan (25.0%)
- Canada (14.8%)
- Chile (12.5%)
- US (5.6%)

The dependence on Japan and Korea had a significant negative impact on the coal industry as these two economies had very deep recessions as part of the Asian crisis. Sales continue to be weak and prices for the reference year started April 1 1999 were down 15% to 18% from 1998. Prices have weakened further in the current fiscal year.

BC, while a major coal producer in Canada, is a marginal supplier globally, competing with producers that have lower costs of production and are closer to the markets. Australia, the largest exporter of metallurgical coal, exporting 70 million tonnes (1996) compared to 26 million tones for Canada (1996), has a significant transportation cost and production cost advantage over BC.

In thermal coal (or steam coal) BC faces strong competition from a number of Asian and emerging market suppliers. According to 1996 export data the major suppliers of thermal coal, in million tonnes, were:

- Australia (63)
- South Africa (57)
- Indonesia (34)
- Columbia (21)
- Russia (10)

By contrast Canada exported just 7 million tonnes, of which BC had only a small portion.

Coal Prices

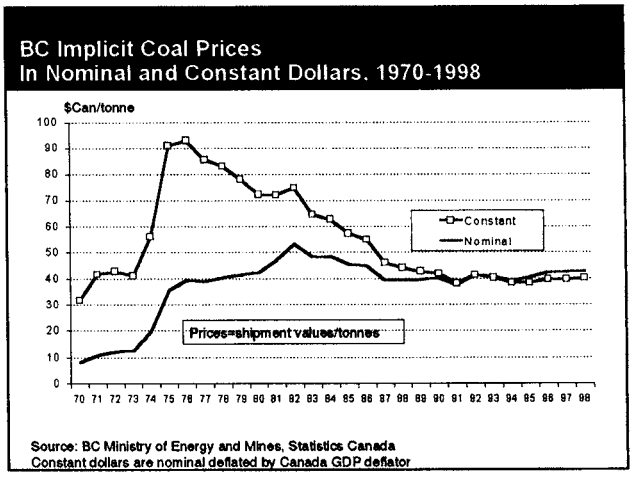
Global coal prices are determined at annual conferences between the major coal buyers, typically Japan and Korea, and major coal suppliers, lead by Australia. Prices are set for a fiscal year of April 1 to March 31. Most coal is sold under annual contracts at the reference price, but increasingly coal has been traded on spot prices.

BC northeast coal was developed because of long-term price and tonnage contracts with the Japanese that provided above-market prices. Those contracts have since been renegotiated down in both price and volumes, necessitating production cutbacks and employment reductions at the mines.

The coal industry faces the same squeeze of declining real prices that threatens the forest and metal mining industries.

Figure 26 shows the trend of coal prices since 1970. Coal prices rose sharply with energy prices in the early 1970s, in both nominal and constant dollar terms. This spurred the development of the coal industry. The continued rise in nominal prices through the early 1980s, despite the decline in constant dollar prices, continued to spur the development of the global and BC coal industries.

Figure 26



A growing global excess capacity of coal and improvements in technology that reduce unit requirements of coal in both steel and power generation has caused constant dollar prices of coal to decline almost continuously since peaking in 1976 at $93.02/tonne in 1992 prices.

They have been relatively stable in the last few years before falling again in 1999.

- Constant dollar prices peaked in 1976.
- Constant dollar prices have been relatively stable from 1991 to 1989
- The 1998 constant dollar price of $40.22 is up just marginally from the recent lows of $38.21 in 1991, but down 56.8% from the 1976 peak.
- With the 15% and 18% negotiated price declines in thermal and metallurgical coal for the current reference year, constant dollar coal prices are probably below $34, the lowest since 1970.

There is increasing competition in global coal trade from Australia and emerging markets that have been developing their coal reserves, These countries have some significant competitive advantages compared to BC. For example:

- Exchange rates
- Government subsidies
- Lower production costs
- Lower transportation costs.
- Lower environmental standards.

There have already been sharp cuts in contractual commitments for BC coal in 1999 and prices have dropped. The eroding competitive position of the BC coal industry has forced the premature closure of the Quintette coal mine. Further losses of contractual tonnage and constant dollar coal price erosion threatens the viability of the rest of the BC coal industry.

The Oil & Gas Industry

The BC oil & gas industry is the one sector in the mining industry that is a growth industry. Growth has been most significant from the mid-1980's. The initial burst of activity in the late 1970s, in response to rising energy prices, was cut short with the introduction of the federal National Energy Program (NEP). Since the NEP was scrapped and the demand for US natural gas has grown strongly and consistently, there has been a significant development of the gas reserves.

Figure 27

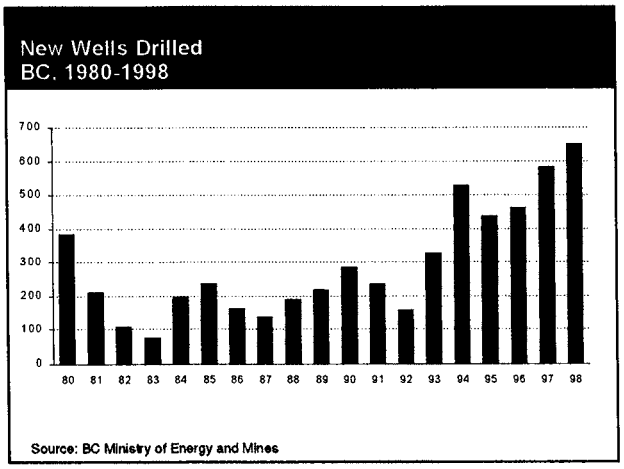
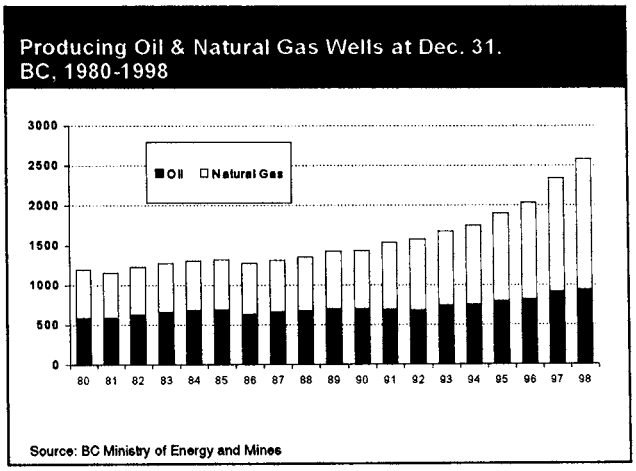


Figure 27 illustrates the dramatic fall in exploration in the early 1980's in response to the NEP. Wells drilled plunged from 385 in 1980 to 76 in 1983. Drilling improved erratically later in the decade but didn't really take off until the early 1990s. There was a record 650 wells drilled in 1998.

Even though the number of wells drilled has varied from year to year, there has been a constant growth in the number of producing wells. Natural gas production has grown rapidly since the late 1980s as shown in Figure 28.

Production grew modestly from 9 billion M^3 in 1980 to 19.9 billion M^3 in 1988, but soared to 25.3 billion M^3 by 1998.

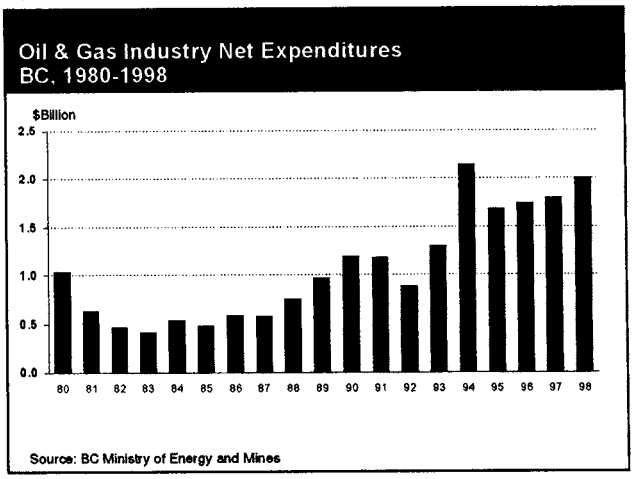
Figure 28



The spin-off effects from drilling and infrastructure construction heavily influence the economy. There are large employment and income multipliers in the construction and energy services sectors, even though the industry is highly capital intensive.

It is the ebb and flow of the total expenditures in the industry that creates the boom-bust cycle. As in drilling activity, the sharp cycles in industry expenditures are evident in Figure 29.

Figure 29



Expenditures plunged 60% from 1980 to 1983 and did not start to recover meaningfully again until late in the decade. There was a cyclical downturn in the aftermath of the 1990-91 North

American recession and the drop in oil prices after the Gulf War in 1990. Since then expenditures have grown sharply.

The price of natural gas has risen relative to oil. This, coupled with growing export demand and pipeline construction, should be positive for the continued development of the oil & gas sector in the years ahead.

The oil & gas sector is the only major resource industry in BC that still has good growth potential in the medium-term.

Chapter III

Community Socio-Economic Profiles

In this section we look in more detail at each of the selected communities, reviewing their development and progress. We examine changes in the resource based industrial structure, the changes in employment and income, and other economic variables. We will also look at the changes in demographics, households and their changing characteristics. Lastly, we examine the trend in housing starts, housing sales, and housing prices. Throughout, we will consider the changes in the housing sector in the context of the changes that occurred to the resource base of the communities.

One of the best sources of data that can be used to track the development of the communities and compare them to BC and the GVRD comes from the Census. Appendix C provides comparative tables on many demographic, housing and economic variables taken from the census data. The benefit of using Census data is that the census years closely correspond to the major resource cycles. For example:

- The period 1976 to 1981 encompasses the last inflationary commodity cycle of the 1970s and the beginning of the strong anti-inflation stance taken by the G-7 monetary authorities.

- The 1981 to 1986 period marks the deep global recession and the first round of global resource industry restructuring that resulted from dramatically lowered inflation expectations and a glut of excess resource capacity. It also was the time of BC provincial economic austerity policies implemented to cope with significantly lowered tax and royalty revenue expectations from the resource base.

- The 1986 to 1991 period marked the last, albeit mild, commodity price boom and the end of the last global economic expansion.

- The 1991 to 1996 period encompasses the period of low global and domestic inflation, weak commodity prices, the economic underperformance of BC relative to Canada, the fallout of the Asian economic crisis, the period of less than supportive economic policies of the BC NDP government, the expansion of resource competition from emerging nations and the former Soviet bloc nations, a shift in BC resource industry capital investment abroad, and the second major restructuring phase of the BC resource-based industries.

For the sake of brevity we will not cite each relevant table from Appendix C when using Census data to describe the historical development of the communities. The reader is encouraged to review the tables.

Prince George

Prince George, often referred to as BC's northern capital, has an estimated population of 80,800. It is the 2nd largest of the communities selected for study, after Kelowna. Prince George is part of the Fraser-Fort George Regional District. The city is approximately 800 km north of Vancouver by highway and almost in the geographic center of the province.

Prince George is a regional centre for the province, and as such has a large service sector. However, the economy has been based on the forest industry. The income dependency ratio of Prince George on the forest sector is 33%. That is, 1/3 of all income earned in Prince George is dependent on the forest sector. Because of its location and role as a regional centre, the public sector (government, education, health, etc.) is also important and a growing sector. It accounts for about 24% of income earned

Growth was rapid in the 1960s and 1970s as the forest industry expanded. Today, however, there are about 14 sawmills, two single pulp mills and a twinned pulp mill, one of the largest in the world.

The Prince George economy has felt the shocks of the forest industry restructuring in the 1980s and 1990s. This has had implications for the housing market. The partial offset has been the growth of the services sector, particularly the government sector.

Along with the shocks, the Prince George housing market has seriously underperformed the BC market from the late 1970s through the 1990s. The share of new housing starts are still well below the Prince George share of BC households. But a reduction in the excess supply of housing, coupled with better income growth since 1991 has helped home prices recover.

Demographics

Population Growth

Since 1976 the population has grown at an annual rate of about 1.1%, which is nearly half of the provincial rate of 2.1% and less than half of the GVRD's 2.7% rate. This alone would reduce the growth in potential housing demand relative to the province and the GVRD. But population growth has been much more variable than this comparison implies. For example, population grew more rapidly than in the GVRD and the province during commodity booms but was much weaker during periods of resource industry restructuring and difficulties. Specifically:

- Population grew 2.4% a year in 1976-81 while GVRD and BC population growth was just 1.5% and 2.2%.
- During the 1st phase of the forest and mining industry restructuring in 1981-86, annual population growth was zero compared to 1.0% BC.
- With the improved commodity markets in the 1986-91 period population growth rose to 0.6% a year, nevertheless, it was still well below the 2.6% for BC and 4.0% for the GVRD.
- Population growth improved further to 1.5% a year in the 1991-96 period.

It appears that with the break in inflation and commodity market expectations around 1981, there was a significant lowering of the trend rate of population growth. Following the 1st wave of resource industry restructuring, when marginal adjustments became less severe and the economy increased its diversification, population growth slowly and persistently picked up, but has remained well below pre-1981 rates.

Population Age 65 & Over

Prince George has a very small share of population that is 65 & over, compared to the other communities and the province.

- The 1996 share was the lowest of all communities, along with Fort St. John, at 5.6% of the total population.
- The 1996 share was 12.0% for BC and 23.2% for Trail, which has the largest share.

While Prince George's share of 65 & over was the smallest, it was among the fastest growing of the communities. In the 1976-96 period this cohort grew at a 4.5% annual rate, exceeded only by Fort St. John at 5.5%. The BC cohort grew at a 4% rate.

The rapid growth of the older population may be the consequence of a lack of job opportunities that cause out-migration for the younger people. Those near retirement age, or older, may have been in a financial position where they could afford to choose to remain in Prince George, despite eroding job opportunities.

Migration

Migration has always played a major role in the population growth of Prince George and hence the housing market. It has consistently been much more important than for the province in total or the GVRD.

- The share of the population aged 5 & over that lived outside of Prince George (migrants) at the time of the previous Census was 53% in 1976 compared to 35% for BC and 30.9% for the GVRD.
- The ratio of migrants in the population has dropped markedly since 1976, easing from 53% in 1976 to 48.3% in 1981, and then plunging to 38.5% in 1986. It has remained close to that level through 1996.

Given that inter-provincial and international migrants have accounted for roughly 20% of migrants, Prince George relies on intra-provincial migration. The drop in the migrants' share of population implies net out-migration from Prince George. That is not surprising since the unemployment rate in Prince George soared from 8.3% in 1981 to 16.7% in 1986. The unemployment rate has remained roughly 25% above the BC average in 1986, 1991 and 1996. The surge in the unemployment rate was primarily due to the downsizing of the resource-based industries and the consequent multiplier effect on other sectors.

The Industrial Structure

Prince George is heavily dependent on the forest industry, both in the primary and the manufacturing sector.

- In 1996 6.7% of employment was in the primary sector, with 5.4% in logging and forestry. The peak share was in 1981 when it was 7.8%.
- Manufacturing, which is mostly forest resource-based accounted for 13.5% of employment. This is above the BC average of 10.4%, which is much more broadly based across the manufacturing spectrum.

The trend has been for primary sector employment to decline from its 1986 peak, but in 1996 its share of employment was still above the 1981 level of 5.0%. The fact that its share is above the 1981 level would seem to be inconsistent with the restructuring hypothesis. But, the brunt of the adjustment, given the limitations on productivity growth in logging and the increased emphasis on silvicultural activities, is not captured in primary activities.

A better measure of the impact forest resource sector restructuring is in the employment in the manufacturing sector. This sector provides the

opportunity to replace labour with capital to increase productivity and lower costs. Moreover, uneconomic conversion facilities would be shut down.

In 1981 the manufacturing share of employment was 17.2%. The drop to 13.5% by 1996 is a strong indication of the impact of restructuring in the forest industry. This decline is more significant.

While Prince George is heavily dependent on a resource base compared to the whole province, it is less dependent than other communities selected for analysis in this study.

The magnitude of restructuring is also less than for some other communities. Taking the sum of primary and manufacturing employment shares as a proxy, the Prince George resource employment share has fallen from a peak of 23.1% in 1986 to 21.6%. By contrast the resource share of employment has dropped from 46.7% to 24.7% in Trail, a much larger drop, absolutely and relatively.

While Prince George is resource dependent, it is developing a diversified economy. It is much more diversified than all the other communities selected, except Fort St. John and Kelowna, the latter being the least dependent on resources.

Labour Force Developments

The data on employment and unemployment show that there was a dramatic shift in labour markets when the resource sector prospects changed in 1981. The initial wave of resource industry restructuring was in the conversion facilities. Later it spread to the primary sector. The inter-census employment growth suggests that the negative economic impact of continued resource industry restructuring became less severe as time passed, or was being muted by the increasing diversification of the economy.

- During the resource boom days of the 1976-81 period, employment grew by 6% a year. Male employment grew by 5.0%

- In 1981-86 total employment growth was minus 1.7% a year, with most of that borne by males (-2.5% vs –0.5% for females). Virtually all of the decline was due to the 9.5% annual rate of decline in construction employment.

- Interestingly, primary sector employment grew strongly by 9.2% a year in 1981-86. This strength is somewhat overstated because 1981 was a recession trough. Nevertheless, primary resource industry employment did rise because forest industry output rose: interior lumber production rose 38% in this period. Primary sector employment essentially stagnated from 1986 to 1996 as the timber harvest increased lumber production from 22.59 to 24.66 billion M^3.

- Manufacturing sector employment, which is concentrated in forest industry production experienced a steep 2.6% annual decline in 1981-86. This occurred despite a cumulative 38% increase in lumber production and a 27% increase in pulp shipments. The need to lower costs resulted in lower employment in the industry.

- From 1986 to 1996 manufacturing employment grew by an average of 0.5% a year, reflecting higher forest product output. Again productivity gains through modernization of mills reduced the needed employment per unit of output.

The initial declines in resource manufacturing employment and that related to construction in the 1981-86 period were the most unsettling in Prince George. With the emphasis on reducing labour requirements, the resource base was no longer a generator of jobs, but nor did it result

in large-scale losses. The relatively neutral employment impact of the resource sector in Prince George from 1986 to 1996 kept the employment growth subdued at 2.2% a year compared to about 3.2% for BC.

The restructuring of the resource sector and the generally weak employment growth from 1986 resulted in a significant growth in self-employment, with annual gains of 10.6% in 1986-91 and 8.8% in 1991-96. Self-employment in 1996 accounted for 10% of total employment, up from 4% in 1981. This was in line with the BC trend.

Between 1976 and 1981 Prince George was in a boom period. The unemployment rate dropped sharply from 10.5% to 8.3%. The rate for males fell more than for females, which is consistent with the surge in employment in the resource and construction industries, which are primarily male-oriented.

But the early 1980s proved to be extremely difficult. Males took the brunt of the job losses. Unemployment soared to 16.7% by 1986. The spread with the BC unemployment rate doubled to 3.6 percentage points

- Male unemployment more than doubled from 7.0% in 1981 to 16.5% in 1986.
- Female unemployment rose from 10.2% to 17.0%.

Except for Fort St. John, Prince George had the highest 1986 unemployment rate of all the communities analyzed in this report.

With modest employment growth since 1986, the unemployment rate has declined, and the spread with the BC rate is narrowing. But at 2.1 percentage points, the gap is still above its average in the booming 1970s. In 1996 the unemployment rate was still a very high 11.7%.

The relative magnitude of unemployment rates between the sexes has changed dramatically since the first wave of resource industry restructuring in the early 1980s. In 1976 and 1981 male unemployment rates were 2.0% and 3.2% points below female unemployment rates. By 1986 that gap had dropped to just 0.5% points as males took the employment losses.

Since 1986 the growth in employment has been much faster in the service sector than in the resource and construction sectors, owing to the diversification of the economy and continued restructuring in resource industries. Consequently, employment prospects for females improved relatively faster. The result has been a drop in female unemployment rates below those for males in 1991 and 1996; with the gap trending higher from 1.2% to 2.4% points.

One would expect that the labour market developments in the early 1980s would have had a significant negative impact on the housing markets. Primary family breadwinners took the brunt of job losses and the community's confidence in the future of the resource base was shaken.

Household Incomes

Prince George has had above average household income since the 1981 census. (income data in the Census refers to the prior year). It was 10% above the BC average in 1980 and, despite the soaring unemployment in the early 1980s, was still 8.6% above the BC average in 1985. It has continued to erode to 4.9% in 1990. But with better employment growth in the early 1990's Prince George's average household income in 1995 at $55,828 was 10.2% above the BC average.

The resource base employment in Prince George has typically paid above average incomes. It would appear that the incrementally faster non-

resource based employment growth also pays relatively well.

One would expect that, other things equal, slow but steady improvements in employment and incomes from the mid-1980s would have been positive for the housing markets.

From 1980 to 1995 household income growth in Prince George was faster than the BC average, even though it grew more slowly in the 1980-1990 period. Faster relative growth in income in the 1990-95 period (2.6% vs 1.6% a year) may be foreshadowing a brighter future for Prince George, barring another major downsizing of the resource sector.

Household income in Prince George is much more dependent on employment income than the average BC household. In 1995 employment income accounted for 83.8% of household income compared to 75.5% for the BC average. It was the highest ratio for all communities analyzed, except for Fort St. John.

The trend has been for employment income to decline as a share of total household income. It was 87.0% in 1985. Government transfers and other income are increasing their shares to reflect the employment and unemployment trends and the aging of the population.

Households

Prince George had about 26,775 private households in 1996. The growth in households since 1976 has averaged 2.1% a year, which is below the BC rate of 2.8% and the GVRD rate of 3.0%. Since household growth is the primary determinant of housing demand, one would expect that given the low rate of growth since 1976 the housing market in Prince George would have performed more poorly than the BC or GVRD housing markets.

- The share of BC housing starts should be declining.
- Upward pressure on home prices should be weaker.
- Home sales should be relatively weak.

The 5-year pattern of household growth between census years was much more extreme than the longer-term average, as was population growth.

- In 1976-81 growth was 4.5% a year.
- Household growth stagnated in 1981-86, rising a mere 0.7% a year.
- Household growth improved gradually to 1.3% and 2.1% a year in 1986-91 and 1991-96, respectively.

Prince George has above average size households and families. It had the lowest percentage of single-family households at 19.2% in 1996, compared to 25.3% for BC and 37.2% in Trail. Moreover, families' share of households, at 76.2% in 1996, was the largest of the communities selected and well above the BC average of 70.8% and GVRD average of 69.0%.

The large share of families in households, the large size of families, and the relatively few single-person households may be the result of relative economic hardship. For example, poor employment prospects at the entry level may reduce the number of children moving out of the home or force them to move elsewhere to either find work or attend school. Single-person households may also be more mobile, leaving the city for better opportunities. The above-average number of children at home per family is consistent with this hypothesis. In 1996 there were 1.3 children at home compared to 1.1 for BC.

Prince George has a high homeownership rate. In 1996 it was 68.7% of households compared to 65.2% for BC and 59.4% for the GVRD. The corollary is a low share of renters in households at 31.4%. This is consistent with the low number of single-family households. There was relatively little demand for rental accommodation.

The Housing Sector

Housing Costs

Owning a house in Prince George is less costly than for the average BC homeowner. The 1996 census put the average dwelling cost at $135,957.This is below the average prices in Prince Rupert and Kelowna, and 43% below the BC average, which is heavily weighted by the GVRD.

The growth in house prices since 1981 was slightly less than for BC and the GVRD. The 1981-96 appreciation was 3.5% a year, compared to 4.3% for BC and 4.1% for the GVRD. The similarity of price appreciation was prevalent even in resource cycles.

- Average prices declined by 4.6% a year in 1981-86, which compared to –5.0% a year for BC and –5.7% a year for the GVRD.

- Average prices rose in 1986-91 by 5.8% a year, which is probably close to the average for the province when the GVRD is excluded. The price appreciation in the GVRD during this period was 13.8% a year, biased up by the flood of Asian immigrants moving to the lower mainland when the hand over of Hong Kong was negotiated.

- Home prices have appreciated faster than the provincial average in 1991-96, rising by 10% a year, compared to 6.4% for BC and 5.1% for the GVRD.

The rapid price appreciation in homes in the 1990's seems at odds with the continuation of resource industry restructuring, below average household formation and above average unemployment rates.

However, Prince George household incomes were growing faster than the BC average. The stronger price performance may also be the result of economic diversification, as the service sector has grown (the University of Northern BC, UNBC, opened in 1994) and a return of consumer confidence as people recognized that most of the resource restructuring was over.

Moreover, it may be that Prince George house prices were recovering from relatively depressed levels, while BC and GVRD prices were correcting from excessive price appreciation in the prior 5 years.

Even with the price appreciation from 1991 to 1996, the average Prince George house cost just 2.44 times household incomes compared to 4.73 times for BC and 5.89 times for the GVRD. Relative to incomes, Prince George has the lowest priced housing in the communities analyzed, except for Rossland and Fort St. John.

At the peak of the boom in 1981 Prince George houses cost 2.81 times household incomes. That ratio dropped to 1.7 times in 1986 and 1991. Even with the price appreciation since 1991, it would appear there is room for further price appreciation when one considers the BC and GVRD ratios and the previous Prince George peak ratio.

Given the relatively low price of housing, fewer Prince George homeowners, relative to the BC average, suffer financial hardship.

In 1996 only 12.1% of homeowners spent more than 30% of household income on major monthly payments (mortgage, taxes, utilities) compared to 19.1% for BC and 23.2% in the

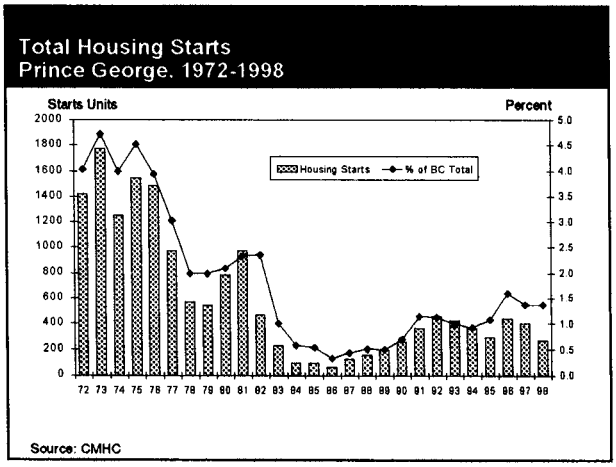
GVRD. This is up sharply from 6.9% in 1991 but only slightly above the 1986 ratio of 11.4%. Nevertheless, compared to the BC average, and particularly the GVRD, housing is relatively affordable in Prince George.

Housing Starts

Prince George's share of total BC starts has ranged from a high of over 4% in the early 1970s to a negligible 0.3% in 1986 and recovered only partially to just over 1% of total BC starts in the past four years. Put another way, Prince George's share of total BC housing starts is now about ¼ of what it was in the early 1970s and about half the share of the late 1970s, before the major change in commodity prices and price expectations that are still with us today.

Figure 30 below underscores how the Prince George housing market has seriously underperformed the BC housing market in the 1980s and 1990s

Figure 30



- In the early 1970s, the robust commodity-based economy was growing strongly. Housing activity was brisk and starts averaged just over 4% of all BC starts in 1972-76. This was about twice the share of households in BC. Clearly this level of housing starts reflected a combination of speculative building and legitimate expectations of continued strong growth in future housing demand.

- Despite a strong BC economy and rising commodity prices in the late 1970s starts were weak and the Prince George share fell by almost half to average just 2.3% of BC starts in 1977-79. This was still above the Prince George share of total BC households. The drop in starts probably was a correction from excessive building in prior years.

- Housing starts rose in 1980-81 at faster rate than in BC. The Prince George share of starts also rose. Again it looks like inflationary expectations and continued commodity-boom conditions led builders to over-commit resources to new housing.

- Starts fell sharply in the 1981 recession, halving from 971 to 466. But this was less rapidly than in all of the province and the Prince George share continued to rise to 2.35% in 1982.

- Housing starts, with a lag, then plunged in the years following and reached a low of 66 in 1986, for a share of just 0.3% of BC starts. The plunge in starts was essentially a correction from the excessive building of prior years, as well as reduced expectations of future household demand.

- With a recovering BC economy and stronger forest product prices and demand, the housing sector started a slow recovery in the late 1980s. But starts remained below the share of BC households.

- Starts fell again in 1993-95, as did the share of BC starts.

- The Prince George housing market has slowly been climbing back from its lows of the mid-1980s, but starts are still relatively

weak, and just about 1/4 of the share prior to the OPEC shock of 1973.

Prince George had a sustained period of excessive house building in the 1970's and early 1980s. This created a growing excess inventory of homes, which was a significant imbalance.

The negative impact on future economic growth and commodity price expectations, caused by the committed anti-inflation policies of the central banks, punishingly high interest rates, a global restructuring and downsizing of resource industries, and restrictive BC government fiscal policies in the mid-1980s, meant that it would take some time to work off the excess inventory of housing. Consequently, there has been a prolonged period where new home construction has been below Prince George's share of BC households. This has arguably reduced the excess inventory of homes and brought the housing market closer to balance.

Housing Sales

Prince George housing sales and average home prices, as shown in Figure 31, confirm the story told by housing starts.

Sales and prices have been impacted significantly by the interest rate, economic and commodity cycles.

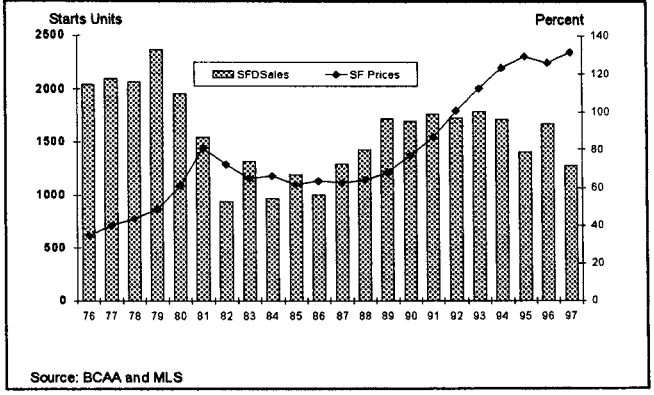
- Sales of single-family homes plunged in the early 1980s, dropping more than 60% from the 1979 peak of 2,372 to the low of 940 in 1982.

- Sales bounced back in 1983, but were essentially at low ebb through 1986, averaging just over 1,120 a year.

- A slow recovery in sales occurred in the late 1980s as the economy and commodity prices recovered, continuing through the early 1990s, despite a recession in the forest industry, peaking at 1,792 sales in 1993.

Figure 31

Total Single-Family Dwelling Sales and Average Prices
Prince George, 1976-1998



Source: BCAA and MLS

- Home sales have continued on a weakening trend through 1997, ending 1997 at levels only slightly above the mid-1980s lows.

- Home prices dropped sharply in the downturn in the early 1980s but lagged sales by a couple of years. Prices troughed in 1985, down 23.7% from the 1981 peak.

- Prices treaded water for a couple of years and then started to rise in 1988. Since then, prices have essentially been on an uptrend, despite falling sales in 1994-97. Average prices in 1997 were $131,407, up 123% from the 1985 low.

While it appears starts and sales remain quite cyclical and sensitive to the economic and forest product cycle, prices appear to have broken the linkage to the economic base of Prince George in the 1990s. The relatively strong rise in prices from the lows through 1997, despite a modest weakening in the forest sector, is consistent with somewhat stronger population and household growth and the very low level of housing starts. Housing demand has exceeded supply. As the excess inventory of homes has been absorbed, and incomes have risen, prices have risen. Favourable financing costs have also been beneficial to rising home prices.

Port Alberni

Port Alberni, like Prince George is also a forest dependent community. Its dependence on the industry is slightly larger than Prince George. The income dependency ratio is 36% vs 33%.

The next most significant sector is the public sector, where the ratio is 21%. The aging population and high incomes has had a growing impact on generating income. Transfer payments and other non-employment income represented 25% of total income.

Port Alberni is located on the west coast of Vancouver Island. Macmillan Bloedel was the major employer, but has spun off some of its Port Alberni operations in its restructuring efforts. It sold its paper assets to Pacifica Paper Limited Partnership in 1998.

The forest products manufactured in Port Alberni are lumber, pulp, newsprint, uncoated groundwood printing papers, lightweight-coated papers (LWC) and shakes and shingles. MacMillan Bloedel had a large plywood operation but it was shut down in the 1980s.

Port Alberni is highly dependent on the Asian markets. Japan is a key market for lumber. The Asian crisis has hit Port Alberni very hard in the last few years.

Demographics

Population

The 1999 estimated population of Port Alberni is 19,334. BC Stats estimates population declined by 0.8% and 0.7% in 1999 and 1998, respectively. This reflects the difficulties in the forest products sector in the last couple of years, caused by the Asian crisis.

Port Alberni had the 2nd lowest population growth since 1976 of the communities selected, with an annual 0.3% decline. Even during the booming 1970s population growth was barely positive.

- In 1976-81 growth was just 0.3% a year, compared to 2.4% in Prince George and 1.9% in Prince Rupert, the other two forest dependent communities.
- Population fell at a 1.7% annual rate in 1981-86, which was again worse than for either Prince George or Prince Rupert.
- Since 1986 population has declined marginally.

Population Age 65 & Over

Port Alberni has a slightly above average proportion of age 65 & over. This was 12.6% in 1996 compared to 12.0% for BC. The share is more than twice that of Prince George, Prince Rupert and Fort St. John.

The growth in this age cohort is slowing sharply, implying that those past retirement age are likely leaving for other communities.

The growth rate of those aged 65 & over has dropped steadily from 4.7% a year in 1976-81 to 1.9% in 1991-96. This trend is despite the efforts of Port Alberni to market itself as a retirement location as a way to diversify the economy. Since 1986 the age 65 & over cohort has grown 2.3% annually, less than the BC average and well below the 4.3% rate of Kelowna which is marketed as a retirement community as well.

Migration

The difficulty of Port Alberni to attract in-migration is reflected in the share of migrants in the population. It is the lowest of all the communities selected at 13.9%, and well below the BC average of 29.2.

- In 1976 19.8% of the population age 5 & over were migrants. It fell to a low of 10.3% in 1986, as the dramatic downsizing

of the forest operations and employment losses caused out-migration.

- The share of migrants rose to 16.4% in 1991 as the forest industry fared better. But the continued restructuring caused further out-migration and the share dropped to 13.9% by 1996.

The forest industry is dominant on Vancouver Island. Many communities are dependent on the industry. The labour force in the industry appears to be mobile and distances between communities are not great. It appears that intra-provincial migration is the most important source of migrants for Port Alberni. In 1976 they accounted for 62% of migrants, while in 1996 their share had risen to 75.5%.

The narrow economic base of the community limits it attractiveness for immigrants, who represent about 1% of the population. Inter-provincial migrants were just 2.4% of the population in 1996. Port Alberni is not conveniently located like Fort St. John or interior communities that might attract Alberta migrants.

Industrial Structure

The importance of the forest products industry to Port Alberni is underscored by the share of employment in that sector.

- In 1981 13.4% of employment was in the primary sector, almost entirely logging and forestry related. That was nearly twice the BC share.

- In 1981, 34.1% of employment was in manufacturing, again almost entirely forest related. This compared to 14.8% for BC, where the manufacturing sector is more diversified.

- The shares of employment in both primary and manufacturing have dropped, with the total declining from 47.5% in 1981 to 26.6% in 1996.

The magnitude of the decline in the employment share of the forest dependent sector has been dramatic, underscoring the huge adjustment the industry has made in light of competitive conditions and government policies.

Most of the adjustment was in the manufacturing shares, which fell from 34.1% in 1981 too 19.9% in 1996. The 1st wave of restructuring reduced the share to 27.8% by 1986. A marginal dip to 24.5% continued to 1991. The drop between 1991 and 1996 shows how much more the coast industry has had to restructure compared to the interior communities.

During the 1981 to 1996 period plywood operations were permanently shut down, a kraft pulp mill was closed and major re-tooling of mills resulted in many jobs being eliminated. Producers were forced to become more productive.

Labour Force Developments

Port Alberni was the hardest hit of the communities selected for study, in terms of employment losses in the resource base of the community.

- From 1981 to 1996 primary sector employment declined at a 2.9% annual rate, with declines in each 5-year inter-census period. By contrast for BC the annual change was +0.6%.

- Manufacturing employment has declined at a 4.6% annual rate since 1981, the worst record of all communities, and in stark contrast to the –0.2% for BC.

Since males dominate the forest sector labour force, it comes as no surprise that male employment losses were significant.

- From 1981 to 1986 male employment fell at an annual rate of 5.4%, compared to –1.0% for BC. Only Trail-Rossland, which are dependent on Cominco, fared worse.
- The recovery in commodity prices in 1986-91 saw male employment rise by just 0.9% a year, well below the BC average of 3.2%.
- Declines at a 2.1% annual rate resumed in 1991 to 1996.

Female employment was equally hard hit in the 1981-86 wave of restructuring, declining at the same 5.4% annual rate as male employment. Female employment grew rapidly in the 1986-91 period but slowed in the 1991-96 period.

Since 1981 total employment in Port Alberni has fallen at a 0.1% annual rate. In stark contrast, BC gained 2.9% a year. Employment growth has been even weaker in the 1991-96 period, averaging a drop of 1% a year.

In other communities hit by resource sector restructuring, self-employment was a partial answer. This was the case in Port Alberni as well, but not to the same degree. A reason for a below average incidence of self-employment may be that the unemployed preferred to migrate to find better opportunities..

In 1996 self-employment represented 8.7% of total employment, the lowest of all communities and just over half the BC share.

The poor employment prospects and Port Alberni's proximity to other communities and the lower mainland resulted in out-migration. The small size of the community limited its ability to grow in the service sector. Hence the restructuring of the forest sector has had a significant dampening impact on the community.

Household Characteristics

Household Incomes

In 1995 average household incomes in Port Alberni were $42,742, which is only 84.4% of the BC average. Even more surprising, this is 23.4% below household incomes in Prince George.

In 1980 the average household income in Port Alberni was $26, 487 only 8% below that of Prince George, and about 96% of the BC average.

Household income growth from 1980 to 1985 was significantly below that of Prince George, reflecting the more severe employment impact of the restructuring. Income growth was roughly the same in the 1985-90 period, but started to lag seriously again in 1990-95. During this period, incomes stagnated while they grew at a 2.6% annual rate in Prince George and 2.2% province-wide.

Forest industry incomes in Port Alberni must have been constrained more than in Prince George. Not only were there more high paying jobs lost, but also wages must have grown more slowly in Port Alberni, or because the forest worker in Port Alberni had to make greater concessions to preserve jobs. The forest industry on the coast has not been as cost-competitive as the industry in the interior. This is clearly reflected in the trend in negotiated wages and the degree of employment loss due to capital improvements and shutdowns.

Another factor in explaining the much lower average incomes in Port Alberni, and the deterioration since 1980, has been the composition of income. In 1980, employment income was 78% of total income, compared to 76.5% for BC and 87% in Prince George.

Port Alberni relies much more on lower income sources, particularly government transfers that are mostly pension and unemployment insurance benefits. Recall that in 1981 the age 65 & over cohort's share of total Port Alberni population was 7.8% compared to 3.1% in Prince George. By 1996 the respective shares were 12.6% in Port Alberni and 5.6% in Prince George.

Port Alberni has consistently had a higher unemployment rate than Prince George. For Port Alberni the unemployment rate was above the Prince George rate by 1.3% in 1981, 0.5% in 1986, 1.2% in 1991 and 2.2% in 1996. This was not always the case. In 1976 Port Alberni's unemployment rate was 8.5%, less than the BC and Prince George rates. This supports the view that the resource sector adjustment in Port Alberni has been more severe and ongoing than in Prince George.

Port Alberni also has a much higher share of other income (e.g. investment income and private pensions) than does Prince George.

Number of Households

Port Alberni had about 7,400 households in 1996. The growth in households since 1976 has been the 3rd weakest of the communities, at 0.9% a year. Only Trail and Rossland had weaker growth. The BC average was 2.8% a year. The weak household growth is consistent with the poor population growth.

The pattern of household growth strongly followed the forest industry cycle.

- Between 1976 and 1981 households expanded at a 2.1% annual rate, but then dropped at a 0.2% rate in the 1981-86 period.
- A commodity recovery in 1986-91 saw households expand at a 0.9% rate, but continued restructuring and consequent weak population growth after 1991 saw the growth rate slip to 0.8%.

In view of the weak household growth and weak income growth one would expect the Port Alberni housing market to have performed significantly worse than the BC housing market and even other forest dependent communities such as Prince George.

Household size in Port Alberni was above the BC average in 1976 at 3.1 persons, but it has fallen below the average by 1996 at 2.5. The decline is likely due to out-migration of labour force age people due to difficult employment opportunities.

Household size is also small because Port Alberni has the lowest family size after Kelowna, at 3.0 persons. The large number of people in the age 65 & over cohort, like in Kelowna, is a factor in the sharp drop in family size. Port Alberni also has just 1.1 children per family, down from 1.6 in 1976.

Port Alberni has the 2nd highest proportion of 1-person households in the communities under study, at 27.1%. Since it increased from 17.5% in 1976, much like the ratio for Kelowna, it probably reflects a growth in single elderly households.

Housing Costs

The average single family house in Port Alberni cost $131,826 in 1996, which is slightly below that of Prince George. Prices have moved dramatically with the resource cycle.

The price of houses fell at a 6% annual rate from 1981 to 1986, faster than in any other resource dependent community. This is consistent with the magnitude of employment losses and rise in the unemployment rate.

- Prices recovered at a 5.9% rate in 1986-91, which was in line with other forest

dependent communities, but well below the BC performance.

- House prices accelerated at a 12.6% rate in 1991-96, about twice the BC average, and about in line with Prince George.

The rapid rise in house prices from 1991 to 1996 occurred despite essentially stagnant household incomes. This may reflect a relative scarcity of houses due to low building levels and a return of confidence to the remaining workers in the forest industry as well as success in diversifying the economy.

The ratio of house prices to household incomes in 1996 was 3.08 for Port Alberni. That is the highest of any community, except Kelowna, but it is well below the GVRD and BC ratios.

The 1996 ratio is up sharply from 1.71 in 1991 and above the 1981 ratio of 2.81. Port Alberni and Rossland are the only two communities we looked at that had price/income ratios in 1996 higher than their 1981 peak.

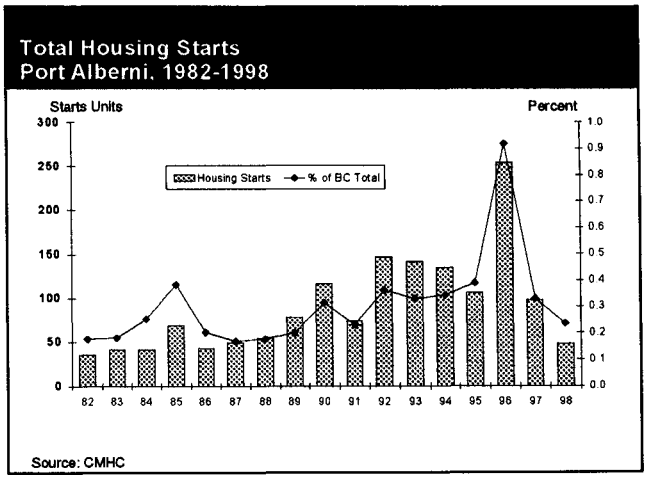
On a comparative basis it looks like house prices were getting ahead of incomes in Port Alberni. This is confirmed by the hardship ratio. The number of homeowners in Port Alberni that had major monthly payments exceed 30% of household income was 13.8% in 1996, up from 4.3% in 1991. That is the sharpest increase of any community in the study. The share of hardship cases, however, is only slightly above that for Prince George and Prince Rupert, while still being below that of Rossland and Kelowna.

Housing in Port Alberni is still affordable on a comparative basis, but the scope for further price gains is limited given the performance of household income growth and the sharp rise in the proportion of households that need more than 30% of income for major monthly payments.

Housing Starts

Housing starts data, which is available only from 1982, is shown in Figure 32 below. It is clear that Port Alberni has dramatically underperformed the BC total, particularly when considered in light of the community's share of households.

Figure 32



- In 1982-88 starts were at very low levels, averaging less than 50 a year, with 1985 the only relatively strong year in that period. The average share of BC starts was 0.22%.

- Starts improved in 1989 and 1990, but the recovery was cut short by the 1991 recession when they fell by 28%.

- Starts were relatively strong in 1992-96, as the share of BC starts rose from 0.23% in 1991 to average 0.35%.

- There was a very strong surge in 1996 as 256 homes were started, amounting to over 0.9% of BC starts.

- Starts then fell very sharply in 1997 and 1998 with the 47 starts in 1998 the lowest level since 1986.

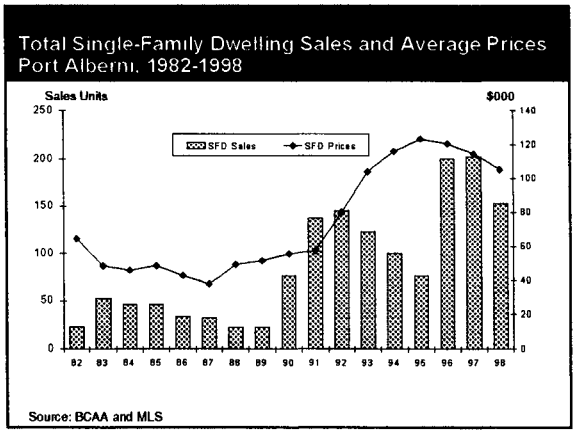
Except for 1996, the number of housing starts in Port Alberni have been about half what they

might have been based on the share of provincial households. From 1982 to 1998 starts averaged just 0.3% of BC starts, while Port Alberni had about 0.6% of all households.

Housing starts in Port Alberni have been more volatile than the BC average, having ranged between 0.2% and 0.9% of BC total starts. Until very recently the trend had been for starts and the share of BC starts to rise gradually. The Asian crisis, with its disproportionate impact on Port Alberni, and the Coast industry in general, caused a weakening in 1997 and 1998.

Home sales and prices are shown in Figure 33.

Figure 33



Home sales were depressed throughout the 1980s, trending down through 1989. The 1982-89 average was 35 sales a year.

- Sales then rebounded sharply in 1990-92, despite the forest products recession. This probably was a correction from the exceedingly low sales levels of the past eight years.

- Sales fell again in 1993-95.

- Sales were quite strong on average in 1996-98, even though there was a drop in 1998, which was likely a lagged response to the impact of the Asian crisis.

It appears that housing sales have recovered to a new higher level, relative to the 1980s. We have no data to compare recent levels with activity prior to 1981.

- The average price of single-family homes sold through the MLS fell from $64,790 in 1982 to $37,740 in 1986, a drop of 42%.

- House prices bottomed out in 1987 and started to rise two years before sales started to move up.

- House prices increased by 52% from 1987 to 1991 and another 115% from 1991 to 1995. The weakness in home sales in 1992-94 did not cause any price weakness.

- Home prices peaked in 1995 and have declined for three years through 1998, for a cumulative drop of almost 15%.

The rapid home price appreciation from 1987 likely reflects the relative scarcity of desirable houses, given the very low levels of new home construction in the 1980s. But as we pointed out above, the census data on home prices relative to incomes suggested prices had moved too fast. The decline in home prices in the past three years is indirect evidence of this, although the Asian crisis and further restructuring probably had a negative impact as well.

Port Alberni's housing market, like Prince George's, has been severely impacted by the restructuring in the forest industry. The housing cycles lasted much longer than the forest industry cycles. House prices, starts and sales were depressed for extended periods because of dramatically changed expectations and the need for a significant stock adjustment from the inflationary 1970s.

Fort St. John

Fort St. John is located in the northeast corner of the province in the Peace River Regional District. The community was originally a stopping off place for those travelling to the gold fields of the Northwest Territories. However, its early settlement was due to the farmers. From its agricultural roots the economic base has expanded to include forest resources and oil & gas extraction. Today, it is the energy sector that dominates the local economy, although there is still potential for the forest industry to expand. The nickname for Fort St. John is "The Energetic City".

Demographics

Population Growth

Fort St. John is one of the smaller communities selected for study. The population in 1999, according to BC Stats is estimated at 16,448, slightly smaller than Prince Rupert and Port Alberni. Trail and Rossland were the only communities selected that were smaller.

Population growth has been quite variable between census years. Population growth has tended to be rapid when the oil & gas industry was expanding and extremely weak when the energy patch had low levels of activity.

- During the energy shortage and inflationary 1970s, population growth exploded. In 1976-81 population grew at a 9.2% annual rate, but quickly turned negative in the 1980s as the National Energy Program (NEP) brought the exploration for oil & gas to a halt. The economy stagnated and people left the region.

- The immediate shock of the NEP caused an outflow of people as the population fell at an annual rate of 0.8% in 1981-86.

- The ending of the NEP brought back job opportunities and net in-migration. In 1986-91 population grew at a 1.2% annual rate. That persisted in 1991-96.

- Since 1996, the record drilling activity and construction of natural gas pipelines has caused population to expand at a 3.1% annual rate.

Age 65 & Over

Fort St. John has a relatively young population. Only 5.6% of the population was 65 & over in 1996 compared to 12.0% for BC.

The group 65 & over, however, is growing rapidly. It expanded at a 4.3% annual rate in 1986-96, the same as Kelowna, and just slightly below the pace of Prince George.
This age cohort for BC grew at a 2.5% annual rate in the 1986-96 period.

Migration

Population growth in Fort St. John is highly dependent on net migration. This is evident from the sharply changing shares of migrants in the population.

- In 1976 and 1981, migrants represented 53% and 48.3% of the population. High shares during periods of strong population growth.

- By 1986 the ratio had dropped to 38.5%, indicating an exodus of people from the city.

- It has dropped slightly further to 37.9% in 1996.

The major source of migrants is intra-provincial. The proximity to Alberta, however, is a factor that keeps the inter-provincial share well above the BC average and the highest of

the communities studied in this report, except for Kelowna.

In 1976 the inter-provincial share was about 17% compared to less than 9% for BC. In 1996 the share was just over 12%. International migrants represent about 1% of the population.

Industrial Structure

Fort St. John has the lowest share of manufacturing employment of all communities studied and the greatest dependence on the primary sector. The oil & gas exploration sector is the key component of the economy. The multiplier impact of the oil & gas sector is large, as the drilling activity requires transportation services and materials, while construction activity is heavily dependent on new pipelines. There is little conversion of energy resources in the region. They are piped to other centres both in Canada and the US.

- In 1996 manufacturing accounted for only 4.6% of employment, compared to 10.4% for BC. Even Kelowna, the next lowest in dependence on manufacturing had a share of 10.1%.

- The primary sector share of employment in 1996 was 12.1%, more than double the BC average of 5.7%. Most of the primary employment (9.5%) was in oil & gas extraction.

- Construction employment, which is strongly dependent on pipelines, was 10.5% vs 7.3% for BC.

- Transportation and communications (there is a significant transportation component to drilling and production) came in at 10.2% vs 7.3% for BC.

There is little doubt that the oil & gas sector is the engine of the Fort St. John economy, although primary agriculture and forestry are also a factor.

Labour Force Developments

The growth of employment is highly correlated with the cycles in the energy industry. Moreover, the cycles have been extreme compared to the BC average as well as other resource-dependent communities. This may be as much due to the small labour force as to the severity of the cycles in the energy sector.

- Employment soared at a 13.3% annual rate from 1976 to 1981. This is by far the fastest growth recorded in the communities studied. Kelowna came a distant second at 5.8%, while for BC it was 4.9%.

- The 1981 to 1986 period saw a reversal to a 4% annual decline. Some communities fared worse, but the BC average fell only at a 0.2% annual rate.

- Employment growth recovered rapidly, expanding at a 4.8% annual rate between 1986 and 1991, but slowed to a more moderate pace of 1.5% in the 1991 to 1996 period.

In the 1976 to 1991 period, male and female employment growth moved in similar directions and by similar magnitudes. But that changed in the 1991 to 1996 period when female employment growth was 2.6% a year compared to 1.5% for males. This change is similar to that experienced in other resource-based communities, as the growth of the service sector accelerates relative to the goods sector.

Growth in self-employment has been below the BC average.

The energy industry is capital intensive, not labour intensive. The number of jobs created per million dollars of investment are few, but well paying. Productivity has been increasing, reducing the employment generation of investment. The employment impact from strength in the energy sector is mostly through the multiplier impact on other more labour intensive industries.

- When total employment was declining at a 4% annual rate in 1981 to 1986, primary sector employment rose at a 2.4% annual rate. This may have reflected gains in agriculture and forestry that offset the small losses in the energy sector. While the NEP caused drilling to plunge from 212 wells in 1981 to 76 in 1983, there was a recovery to 237 by 1985. Drilling tailed off again to 161 in 1986, but the seasonal nature of drilling may have resulted in high levels of activity just prior to the Census being taken.

- The steep decline in overall employment in 1981-86, despite a rise in primary sector employment, reflected the net loss of population and the drop in construction activity. Construction employment fell by almost half, while there were steep losses in transportation, trade, and the real estate industry.

- Modest increases in well drilling in 1986 to 1991 resulted in just a modest 0.2% annual gain in employment. Total employment surged at a 4.8% annual rate, attesting to the positive impact of population growth and the multiplier impact of the energy sector. There were gains in all major sectors except manufacturing and FIRE.

- Even though well drilling accelerated strongly in the 1991-96 period, primary sector employment actually fell at a 0.7% annual rate, which is below the BC growth rate of 0.6% for primary employment.

The low employment generation in the primary sector reflects growing productivity gains and capital intensity of oil & gas exploration, but also productivity gains through capital expenditures in the other two primary sectors, agriculture and forestry.

Unemployment rates were below the BC average in 1976, but exceeded the BC average in all subsequent census years. The devastating impact of the downturn in the energy sector is underscored by the rise in the unemployment rate to 18.1% in 1986, the highest of the communities we analyzed. The BC rate was 12.9%.

The sharp rise in the unemployment rate for Fort St. John is typical of resource-dependent communities. However, it was most sever in Fort St. John.

There has been a structural shift in the unemployment rates between males and females.

- In the census years 1976 through 1991 female unemployment rates were higher than male unemployment rates. That changed by 1996 as the relatively strong growth in the services sector, where most females opportunities lie, caused female employment to grow at a 2.6% rate in 1991-96 compared to 0.7% for males.

Housing Market Characteristics

Household Incomes

The jobs generated in Fort St. John are high paying jobs. That may reflect the very high share of male employment and the nature of the resource, transportation and construction employment, which tends to be high paying.

- The average household income in 1995 was the highest among the communities analyzed, at $56,480. This was 11.5% above the BC average. In the boom years of the late 1970s the premium was even greater. In 1980, Fort St. John incomes were 20% above the BC average.

- The importance of the employment mix in Fort St. John in explaining the above-average incomes is evident in 1985 data. The steep employment losses since 1981, borne primarily by males, caused incomes to be essentially stagnant and fall 2% below the BC average. A swing of 20% is huge for a five-year period.

- Income growth accelerated in 1985-90, but not as fast as for BC, and average household income fell further behind the BC average.

- The buoyant economy in the 1st half of the 1990s caused average household incomes to advance at a 4.7% annual rate, the fastest of all communities, and well above the BC average of 1.6%. This has re-established Fort St. John as an above-average income community. In 1995 average household income had risen to $56,480, which is 11.5% above the BC average.

Fort St. John has consistently had the highest proportion of employment income to total income, averaging 87.3%. Moreover, the ratio has been fairly stable, whereas for BC and other larger resource-dependent communities, the ratio has been declining. Rossland and Kelowna are two communities where the employment share of income has been rising.

The relative stability and small share of government transfers and other income in Fort St. John total income is consistent with the small population age 65 & over, and the fact that the unemployed tended to leave the community.

The recent surge in population growth, continued expansion of the oil & gas sector, and the construction of pipelines are favourable signs in the medium-term for continued above-average growth in household incomes.

Households

Fort St. John had about 5,500 households in 1996, or 0.39% of the BC total. Since 1976 the number of households has grown at a 3.8% annual rate, compared to 2.8% for BC. Fort St. John had the fastest household growth of all the communities analyzed. But this growth has not been steady. The growth cycle in households has mirrored the growth cycle in population.

- There was a 12% annual increase in 1976-81. When population declined in 1981-86 there was still a modest 0.7% annual increase in households. Growth reached a 1.8% rate in 1986-91 and eased off to 1.2% in 1991-96.

Thus, breaking the twenty year growth trend into decades, we see that in the 1976-86 period, the rate was 6.2%, about double Kelowna's rate, which was the 2nd fastest, and more than twice the BC rate of 2.8%. In the 1986-96 period, Fort St. John households grew at a modest 1.5% annual rate. This was well below the 2.7% rate for BC and the surge of 4.2% in Kelowna. Fort St. John did better than Trail-Rossland and the coastal forest dependent communities, but not as well as Prince George.

In light of the rapid population growth since 1996, household growth was probably strong as well.

- Household size is above average at 2.7 persons in 1996. Family size is also above average at 3.2 persons. There are 1.3

children at home compared to 1.1 for the province. The drop in the number of children, however, has been greater than for any community. In 1976 there were 1.8 children.

- The proportion of single-person households is 22.5%, below average, but above that of Prince George and Prince Rupert. The ratio has increased from 13% in 1976.

- As has been the case elsewhere, families are a decreasing proportion of households. In 1976 they had an 81.8% share. By 1996 that had fallen to 70.1%. This was a much steeper drop than for BC.

Fort St. John has a relatively low homeownership rate, and it has been declining.

- In 1996 60.1% of households were homeowners. Renters represented 40% of households. Only the GVRD and Prince Rupert had lower homeownership ratios.

The decline in homeownership in Fort St. John was the steepest of the communities and in sharp contrast to a relatively stable ratio for BC and increases for three communities. This change and the high proportion of renters are consistent with a very mobile labour force and a young population.

Housing Costs

Financially, owning a home is easier in Fort St. John than in any of the communities we studied.

- In 1996 the average house cost $102,620 compared to $239,745 for BC. Only Trail had a lower house price.

- When adjusted for average household incomes, housing is still very inexpensive. In 1996 the average home was just 1.82 times average household income. The next lowest ratio was 2.33 times for Rossland. Fort St. John has consistently had affordable housing.

Consistent with the inexpensive housing, Fort St. John has the least strapped homeowners. Only 7% of homeowners needed more than 30% of income for major monthly payments in 1996. Moreover, the ratio has been dropping from 1991 and 1986. Fort St. John is the only community we analyzed that had a decline in the hardship ratio. In all other communities the ratio has increased.

House prices have moved sharply with the resource cycle. Prices fell at a 4.9% annual rate in 1981-86, and then rebounded at a 5.3% rate in 1986-91. There has been an acceleration in 1991-96 to 7.5% a year. This is less than experienced in the forest-dependent communities.

The relatively slow rise in home prices since 1986 is somewhat at odds with the surge in activity in the energy sector and brighter future prospects. The high proportion of migrants in the labour force likely mitigates upward pressure on home prices.

The data through 1996 would indicate that if the population of Fort St. John were optimistic about the future on a longer-term basis, then there is significant potential for house price appreciation.

Housing Starts

The resource cycle has created the most extreme housing cycle in Fort St. John. Housing starts were severely depressed for more than a decade, between 1981 and 1994. Housing starts have only been recovering for five years.

During the heady pre-NEP period in the 1970's, Fort St. John had housing starts that were well above its share of BC households. In the five

census years from 1976 to 1996 Fort St. John's share of BC households has ranged from 0.32% to 0.46%.

Figure 34

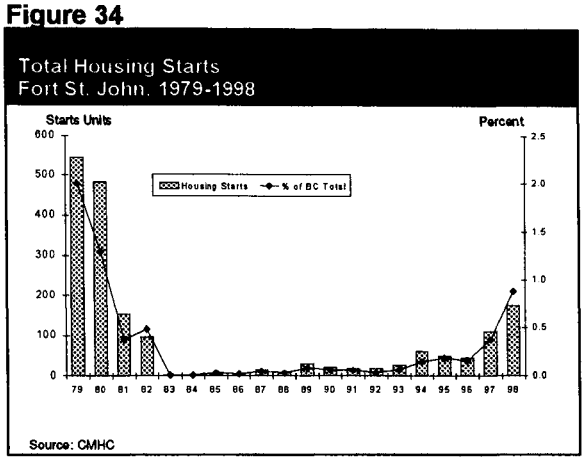


Figure 34 shows the starts history since 1979.

- Starts were very strong in the 1979-80 period, running at 544 and 483, respectively. This represented 2% and 1.3% of BC starts, or more than four times the share of households. Strong growth expectations and the 12% annual increase in household formation in 1976-81 meant starts had to be well ahead of current household shares.

- But the combination of the NEP and almost 20% interest rates devastated the housing market and future expectations. Housing starts plummeted to virtually zero (two starts) by 1983. In the 16 years following, 598 houses were started, only slightly more than in 1979 alone.

- From 1983 to 1993 there were a total of just 153 starts.

- It wasn't until 1997 and 1998 that housing starts were above the share of BC households.

The virtual elimination of the home building industry after 1980 was necessary in order for the excess inventory of homes created in the boom years to be absorbed. This was a protracted process because of the very slow growth in new households.

Thus, housing starts stayed depressed right through the early 1990s, even as the energy sector started to grow strongly from the mid-1980s.

The sharp improvement in starts in the past few years, given the context of a strong growth in population and households indicates that the excesses of the housing market have been largely removed. One could reasonably infer that the market is close to equilibrium.

Housing Sales and Prices

Figure 35 below shows the trend in single-family home sales and average prices from 1976. The 1970s show strong sales and price increases.

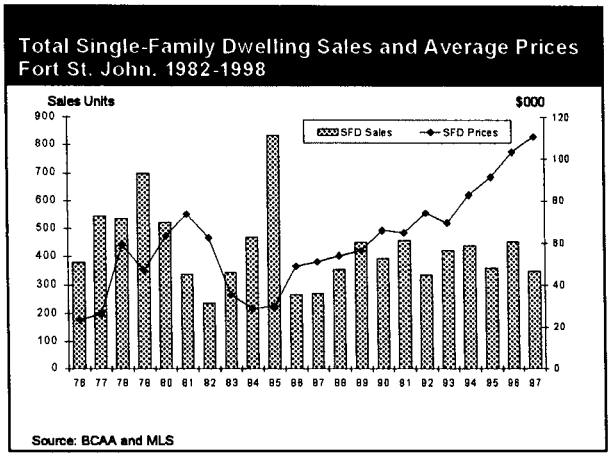
- Home sales rose from 381 in 1976 to 697 in 1979. Sales edged down in 1980 but were still at a high level. House prices rose by 174% from 1976 to 1981. Prices continued rising for a year, even after sales had dropped off sharply.

- Sales continued to be very weak in the 1980-81 recession and throughout 1982. Sales then bounced back in subsequent years. The 1985 spike in sales is unexplainable. Discussions with realtors indicate that this level of activity did not take place. Our best guess is that there was a data entry error in 1985 that skews the annual totals.

- House prices continued to fall right into 1985. Discussions with realtors portray a difficult period with net out-migration.

Many people just dumped their houses on the market and left. Foreclosures were very high.

Figure 35



- Consistent with other economic data, home sales improved in the last half of the 1980s and prices continued to rise. Sales peaked in 1991 at 458, still well below the levels of the late 1970s.

- Home sales have been stable to down since 1991, yet home prices have staged a very strong increase. Prices have increased by 60% since 1993.

The consistent strong rise in home prices, while sales activity remained below historical averages, is further indication that the housing market is close to equilibrium. The strong increase in starts in 1997 and 1998 is a predictable response to a market that has few excesses and strongly rising prices. The risks to spec building in this environment are low as rising prices compensate for carrying costs while homes are on the market.

Given that the housing market is roughly in equilibrium, one would expect that continued sales activity and stable or rising house prices should create a climate for stronger starts.

The future impact of changes in the outlook for the energy sector should be felt fairly quickly on either the upside or the downside, but we should not expect to see a repeat of the 1980s when prices plunged and building dried up for prolonged periods. There are no material excesses to be unwound today. All things equal, the upside risks seem greater than the downside risks today, particularly in light of the momentum in the energy sector.

Prince Rupert

Prince Rupert is a community of about 17,000 people on the north coast of BC. It is part of the Skeena-Queen Charlotte Regional District. Prince Rupert is situated on Kaien Island, near the mouth of the Skeena River. The city is 65 km from the Alaska Panhandle and 90 km east of the Queen Charlottes. It is 1,520 km north of Vancouver by highway and 728 km west of Prince George.

The city has the 3rd deepest natural ice-free harbour in the world. Transportation is a major industry in the city, with the port handling coal, grain, pulp, lumber and various other products. The port infrastructure includes the bulk facility at Ridley Island, built in 1980, and a general cargo port at Fairview Terminal.

Prince Rupert's origin as a port was because of its strategic location. Before the Panama Canal, Prince Rupert was the closest North American port to Asia. The Grand Truck Pacific Railway (GTP) developed the city initially and then turned the land over to the citizens in 1906. It was incorporated in 1910. The port was used by the US in the Second World War because of its strategic location.

Fishing was one of the earliest industries. At one point the world's largest fish cannery was in Prince Rupert. But since 1949, when the pulp mill was built, forestry has become increasingly important. Fishing has waned as a key driver.

The economy is quite diversified, with transportation, government services, resources, tourism and trade all being important. But the key sector is the forest industry. Skeena Cellulose is the city's largest single employer.

Demographics

Population Growth

BC Stats estimates Prince Rupert's population in 1999 at 16,448. Population growth since 1976 has been slow at 0.6% a year. This is well below the 2.1% for BC. However, it is better than the growth experienced by Trail-Rossland and Port Alberni.

Like other resource-dependent communities, population growth has been highly variable, depending on the employment opportunities provided by the major industries.

- In 1976-81, population growth was 1.9% a year.
- In 1981-86, when the forest industry underwent its 1st wave of restructuring, population fell at a 0.4% annual rate.
- Population expanded at a 3.5% rate in 1986-91 as the forest industry improved and Ridley Island started to ship northeast coal.
- The difficulties facing Skeena Cellulose were a significant factor in a weaker economy and just a 0.6% annual increase in population in 1991-96.

Since 1996 population growth has declined slightly.

Population Age 65 & Over

Like Fort St. John and Prince George, Prince Rupert has a relatively small proportion of its population aged 65 & over. At 5.7% in 1996 the share was less than half the BC share. The growth in this cohort has also been quite slow, growing at 2% a year in 1986-96 compared to 2.5% for BC.

Migration

Migration has not played the pivotal role like in other resource communities. Perhaps that is because of the isolated location. The importance of migrants has been declining, reflecting the relatively poor employment prospects.

- Migrants, as a share of the population over age 5, has ranged from 29.8% in 1976 to

20.5% in 1996. These are below the BC average.

- Interestingly, Prince Rupert has a relatively high proportion of international migrants, at 2.6% in 1996. That is exceeded only by the GVRD and BC. All other communities analyzed had much lower ratios, usually around 1%.

Industrial Structure

Prince Rupert's economy is quite diversified, but is still dependent on the two primary sectors that provide downstream manufacturing activities – the forest industry and to a lesser extent, fishing.

According to the 1996 Census, the primary sector labour force is 7.6% of the total. This compares to 5.6% for BC. Fishing & trapping accounts for 5% of the 7.4%, with logging just 1.8%. Since the data refers to the city, the small logging labour force share is an understatement of the importance of the forest industry. People who are employed in logging may well live outside of the city, yet the conversion of the logs is within the city where those employed in the manufacturing are likely to live.

Manufacturing, which is heavily fishing and forestry related, accounts for 20% of the labour force. This is twice the BC share.

The importance of the transportation sector is reflected in the 10% share of the labour force compared to 7.3% for BC. With Prince Rupert being a service centre for the north and the coast, there is a large government sector at 7.7% of the labour force compared to 5.7% for BC.

The importance of the primary sector has increased since 1976. The primary sector share of the labour force has gone from 6.5% in 1981 to 7.1% in 1986. It fell to 5.9% in 1991 but has since recovered to a new high of 7.6%.

The primary sector's restructuring is captured mostly in the conversion facilities, not harvesting, as was the case in Port Alberni and Prince George.

- Manufacturing employment dropped from 28.2% of total employment in 1981 to 22.5% in 1986, as the 1st wave of restructuring hit the forest industry. There was also consolidation going on in the fishing industry.

- The manufacturing share of employment increased slightly to 24.8% by 1991, as the industry enjoyed a mini-boom in the late 1980s.

- The difficulties of the second wave of restructuring after the 1990-91 recession caused the manufacturing employment share to drop again to 21.8%.

With the ongoing restructuring of the primary sector, particularly the forest products sector, the Prince Rupert economy has become less dependent on the resource sector. The employment share has dropped from 34.7% in 1981 to 28.5% in 1996. This is still a large share however, particularly since the resource sector has large multiplier impacts. Nevertheless, the Prince Rupert economy should be less susceptible to swings in future resource cycles.

Labour Force Developments

An analysis of the employment and unemployment trends shows that the totals are very much affected by the trends in the resource sectors. However, Prince Rupert was not hit as hard in cyclical downturns as Port Alberni and the Trail-Rossland area, which had higher dependencies on the resource sector.

- Prince Rupert's employment growth in 1981 to 1996 averaged 1.6% a year. That

was below the BC average and was only better than Trail-Rossland and Port Alberni.

- The 1976-81 period saw a 4.8% annual increase in employment. In 1981-86 the decline was 2% a year. This was more than the BC decline but considerably better than the declines of Trail-Rossland and Port Alberni.

- Since 1986 the gap between the Prince Rupert and BC employment growth rates has widened as employment opportunities have been weak. In 1976-81 the growth gap was –0.15%. In 1981-86 it was –1.8%, in 1986-91 it was –1.94%, while in 1991-96 it expanded to –3.56%.

Poor employment prospects stimulated self-employment. Prince Rupert in 1996 had 11.4% of total employment in self-employment. This is a higher ratio than four communities we analyzed. Moreover, employment growth was the only source of net employment growth in the 1986-96 period.

The corollary of the poor employment record has been the worst unemployment record of all communities analyzed. Unlike the BC average and most communities, the Prince Rupert unemployment rate, in total and for both males and females, rose to new heights between 1991 and 1996 instead of falling. In 1996 the unemployment rate was 16.3% compared to 9.6% for BC and the 6.0% in Rossland.

The high unemployment rates are influenced by the above average participation rates in Prince Rupert. The higher participation rates may reflect the younger average age of the community, the relative unattractiveness of migrating due to the isolated location and sheer financial necessity.

The negative impacts of the resource sector restructuring have taken a heavy toll on Prince Rupert. The scheduled restarting of the B mill at Skeena Cellulose should be a positive boost to the economy. But outside of that there seems to be little momentum, and there is always the question of the ability of Skeena to withstand another severe downturn in forest product prices.

Housing Market Characteristics

Household Incomes

Prince Rupert, as with other forest dependent communities, has enjoyed above average household incomes. In 1995 it was $54,760, 8.1% above the BC average. But that premium has been gradually reduced over time.

- In 1980, Prince Rupert's average household income was 18.4% above the BC average, the largest premium of any community except Fort St. John. In Prince George the premium was just 9.8% and in Port Alberni it was a mere 1.2%.

- The premium has eroded continuously, while in other resource communities the household incomes have been more volatile moving from premium to discounts and then back to premiums again.

While income growth in Prince Rupert has been less volatile than in other resource dependent communities, the sad news is that the trend is consistently towards less than average growth, even during periods of relative prosperity.

Prince Rupert is highly dependent on employment to generate household income. In 1995 employment income represented 83.6% of total income. Only Prince George and Fort St. John had higher ratios. Interestingly, Prince Rupert has below average reliance on government transfers as a source of income. Given the very high unemployment rate this must imply a low level of pension income

Other income, which is largely investment income, represents just 4.9% of income, the 2nd lowest share of all communities studied.

Given the relatively small retirement age population and a small share of other income, the future growth of household income is highly dependent on employment growth and wage increases. Given the competitive pressures to lower labour costs and substitute capital for labour, the future suggests continued below average household income growth for Prince Rupert.

Households.

Prince Rupert had about 5,900 households in 1996, representing about 0.4% of all BC households. This is a significant decline in relative terms from 1976 when Prince Rupert had 0.5% of all households. The relative drop is due to below average growth in households.

Household growth has not been negative in any inter-census period since 1976, unlike some other communities like Trail-Rossland and Port Alberni. But growth has consistently been below the BC average. More importantly the growth in households in the 1991-96 period is the weakest 5-year rate since 1976 at just 0.3% a year.

Prince Rupert has the largest average household size, tied with Prince George, at 2.8 persons. Average family size is slightly above average and about the same as four communities we looked at.

Distinguishing characteristics of Prince Rupert are that it:

- Has the lowest share of 2-person households,
- The 2nd lowest share of 1-person households.
- The largest share of more than 2-person households.
- The lowest homeownership ratio at 59.3% in 1996, which is well below the peak of 81.4% in Rossland and the BC average of 65.2%.

The low proportion of 1 and 2-person households is consistent with the very small proportion of the population aged 65 & over.

The low ownership ratio and large average households means a significant proportion of the population has rising homeownership costs as renters. This may be a partial explanation for the very high participation rate of the labour force. Perhaps many families cannot afford to move and unemployed household heads are compelled to search for work in Prince Rupert, despite poor job prospects at times.

Housing Costs

Prince Rupert does not have the lowest homeownership costs, buy they are below average. The difficult terrain in Prince Rupert makes building expensive.

The 1996 average house price in Prince Rupert was $146,218. This was more expensive than five other communities we analyzed.

The growth in house prices has been roughly in the middle of the different communities we analyzed. The 1981-86 average price appreciation was 3.5% a year, compared to the low of 2.5% for Fort St. John and the high of 5.1% for Rossland.

House price cycles were less severe than for the other communities.

- In 1981-86 house prices dropped at a mere 1.9% annual rate compared to the BC

average of –5.0% and the –6.2% in Kelowna.

- The 4.6% annual gain in house prices in 1986-91 was much more subdued than the average of 12.2% for BC.

- Prices accelerated further at a 7.8% annual rate in 1991-96, which was slightly above the BC average of 6.4%.

The cost of housing relative to household incomes in Prince Rupert is below average at 2.67 times in 1996, yet still higher than 4 of the 7 communities analyzed. Only Port Alberni and Kelowna had more expensive housing.

The proportion of homeowners facing financial hardships, where major monthly payments exceed 30% of income, was just 11.6% in 1996. That is the 3rd lowest of the communities and well below the 18% in Kelowna and 19.1% in BC. The doubling of the ratio since 1991 is consistent with the provincial trend and that of other resource-dependent communities except Fort St. John where the ratio has dipped slightly.

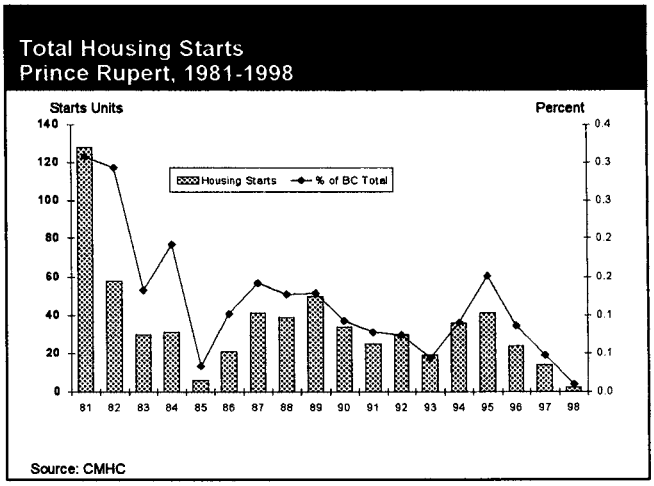
On an absolute basis, average monthly payments of homeowners in 1996 were $779, above the BC average and only slightly below the Prince George average.

While housing, on a relative basis may be inexpensive in Prince Rupert, it is not cheap. House price increases in 1991-96 have exceeded household income growth, and more homeowners than ever in the past 15 years are under financial stress. A continuation of house price increases in the context of a poor trend in employment and household income growth would push many more homeowners into financial hardship. This may become a limiting factor on future house price increases and new starts.

Housing Starts.

The performance of Prince Rupert housing starts since 1981 is shown in Figure 36 below. Data prior to 1981 was unavailable. Housing starts have been extremely volatile and consistently below the levels implied by Prince Rupert's share of BC households. The rumours of bankruptcy for Skeena Cellulose in 1996 caused the market to literally disappear by 1998.

Figure 36



BC housing starts peaked in 1981. That also happens to the best year for housing starts in Prince Rupert. But the number of starts represented only 0.31% of total BC starts. That is well below the 0.53% share of total BC households. It may have been that starts were above the 1981 level in prior years, as they were for Fort St. John and Kelowna, particularly since household growth was a very rapid 3.5%a year in 1976-81.

- Prince Rupert starts fell much more rapidly than BC starts in the early 1980s. The share of BC starts plunged to a low of 0.03% in 1985 when only six houses were started. The precipitous drop in starts is consistent with then sharply negative business sentiment in the forest industry at that time and the stagnation in household formation in 1981-86. There was essentially no net

increase in demand for housing during this period.

- Starts recovered in the mini commodity boom of the 1986-90 period, but starts were still very weak relative to the share of households.

- The collapse in pulp prices from 1989 to 1993 and the drop in pulp shipments in the early 1990s hurt the economic base of Prince Rupert and starts fell again, from the interim peak of 50 starts in 1989 to 19 starts in 1993. The share of BC starts slid to a mere 0.04%, roughly 1/10th Prince Rupert's share of BC households.

- The recovery in pulp shipments and record prices in 1994-95 resulted in another upturn in starts, although it remained modest.

- But renewed weakness in pulp shipments and prices in 1996-97, coupled with the bankruptcy of Skeena Cellulose severely damaged the economic base of Prince Rupert and confidence in the future. Hundreds of workers lost their jobs when the B mill was closed in 1997.

- Uncertainty about the future of the company contributed to consumer angst, and housing starts fell to only 2 in 1998.

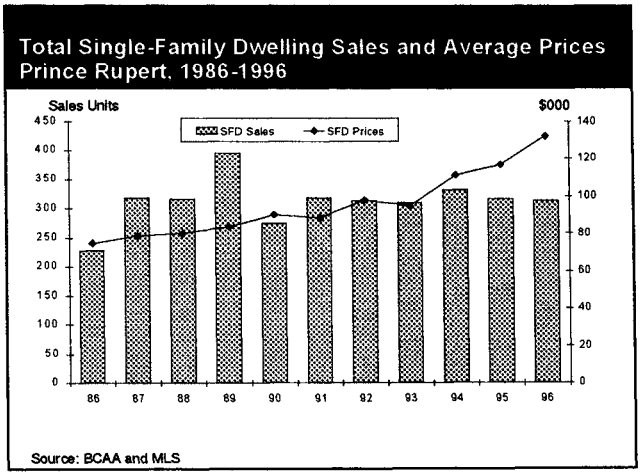
Normally, the low level of starts in the past few years might mean that the excess inventories of unsold homes would be declining. But that does not seem to be the case as negative population growth in the last few years has probably meant stable to declining numbers of households.

The data available since 1981 certainly shows Prince Rupert housing starts to be highly sensitive to the cycles in the forest industry.

Housing Sales and Prices

Data on single-family home sales and prices for Prince Rupert is limited. Data is available only from 1986 to 1996, with only partial data for 1998.

Figure 37



But even this abbreviated data set shows patterns that are consistent with housing starts.

- Sales rose in the latter part of the 1980s, peaking in 1989, just as housing starts did.

- Sales subsequently fell sharply in 1990. Despite modest gains in the 1991-93 period, sales remained on average 20% below the 1989 peak.

- Home sales remained relatively steady in the 1991-96 period, ranging from 310 to 332 per year.

- Home prices remained on an uptrend throughout the period. The greatest gains in prices were in 1994-96 when pulp markets strengthened.

- Data for the 1st three quarters of 1997 indicate the market has weakened. Home sales fell from 226 in 1996 to 138 in 1997, with the 3rd quarter sales being the lowest quarterly sales since data was available in

1986. Prices were up 1.7%. The increase in house prices may reflect the combination of two factors. There may be a shortage of desirable homes because of 1) the steady sales pace of previous years and 2) the very low numbers of new housing starts in the past ten years that limited new supply.

In Prince Rupert the housing market is very sensitive to the resource cycle. Starts are the most sensitive. Sales are less sensitive, yet still track the cycles. Home prices also track the cycles, but in the 1990's prices have had an upward bias even with weak sales. This may reflect a reduction in the excess supply of desirable homes due to very low new building levels. This is similar to the situation found in Prince George and Port Alberni.

Trail-Rossland

Trail and Rossland are the two largest of five closely connected communities in the West Kootenay region. The other three are the villages of Warfield, Montrose and Fruitvale.

Trail and Rossland are small cities with 1999 estimated populations of 7,626 and 3,859, respectively. Together they represent 70% of the greater Trail population. They are situated in the southern part of the province in the Kootenay Boundary Regional District. Trail and Rossland are about 640 km east of Vancouver close to the US border.

Trail and Rossland were first developed at the turn of the century when gold and copper were discovered. Mining continues to be the economic driver of the region, although its importance has been diminished. The two cities, despite having a common heritage, and being only 10 minutes apart by car (8 km), have developed into quite distinct communities.

Trail, being the larger community, is the business centre and home of the Cominco smelter. Rossland is higher in the mountains and has developed the tourism sector. Rossland has grown as a suburb of Trail. Lifestyle is the attractiveness of Rossland as a place to live. It is high in the mountains and gets lots of sunshine.

The sharp differences between the two communities are evident in a large number of indicators, which we explore below.

Demographics

Population Growth

Both Rossland and Trail have had population growth rates in the 1976-96 period that were significantly below average. In fact, Trail's population has been on a consistent decline since 1976 with an annual growth rate of –1.3%. The rate of decline accelerated in 1996-99 to –1.5% a year. Rossland's population has been essentially stagnant from 1976 to 1999. It declined in the 1996-99 period at a 0.8% annual rate.

The most significant population losses in Trail and Rossland were in the 1981-86 period. Trail's fell at a 3.6% rate while Rossland's fell at a 2.6% rate. The decline is associated with the restructuring of the mining industry. In particular, Cominco had significant cutbacks in employment.

The ongoing difficulties in the mining industry and productivity increasing investments meant lackluster job growth. Trail's population continued to drop in 1986-96, albeit at a slower pace. Part of the outflow from Trail was migration to Rossland, which had a modest 0.9% annual increase in population in 1986-96.

Rossland has a much younger population than Trail. In 1996, the 0-14 age cohort represented 23.8% of the total Rossland population compared to the BC average of 19.7% and Trail's 15.9%. The middle cohort of 45-64 was 19.8% in Rossland, slightly less than the 22.9% in Trail. This data is consistent with Rossland being a bedroom community for Trail where families have tended to settle.

Population Age 65 & Over

Trail has a much older age profile than Rossland. The age 65 & over cohort in 1996 was 23.2% of the population. This is the largest proportion of the communities we analyzed, and more than double the 10.1% share in Rossland. Moreover, the 65 & over cohort in Trail is growing rapidly, at 1.8% p.a. in 1986-96.

The differences in the structure of the populations of these two communities have had major implications for the housing market.

Migration

The trend in the share of migrants in the population underscores the importance of

migration to Rossland, and the likelihood that many of those come from Trail.

The share of migrants in Rossland, for the population 5 & over, has cycled with the fortunes of the resource sector, being high at 27.3% in 1981 (the peak in the commodity/inflation boom), declining to 18.3% in 1986, and then rising consistently to a new high of 27.7% by 1996.

- Rossland still has a below average share of migrants, relative to BC. This likely reflects the slow pace of employment growth in the region.

- Rossland has a relatively high share of both inter-provincial and international migrants.

Trail, suffering a declining population trend, has seen its share of migrants in the population trend down as well.

- The shares were above 20% in 1976 and 1981, but the cutbacks in mining employment in the 1981-86 period saw this drop to 11.9% by 1986. There has been a slight increase to 18.3% by 1996.

Trail, despite having a large European population, has not been a preferred destination for international migrants since at least 1976.

- The international migrants share is the lowest of all communities at 0.5% in 1996, down from 2.7% in 1981. In contrast, Rossland's share in 1996 was 2.1%.

Industrial Structure

The region is dependent on mining. BC Stats estimated that 28% of total income comes from the mining industry, followed by 23% from the public sector and 18% from transfer payments. The forest sector accounts for just 6% of income.

The current distribution of employment by industry is quite different between Rossland and Trail, despite their common history. The changes in the employment share underscore just how dramatic the resource (mining) sector restructuring has been on these communities.

- In 1981 Trail had 17.9% of employment in the primary sector more than twice the BC average. By 1986 it had dropped to 4.8%, then rose to 9.2% by 1991 and plunged to 2.8% in 1996. In this region, when Cominco shuts down or cuts back, the impact is huge.

- Trail's manufacturing employment was 28.8% of total employment in 1981 but fell to 21.3% by 1991 and was still at 21.9% in 1996.

Rossland's trend in primary employment was different from Trail's, while in manufacturing it was similar.

- Rossland's primary sector employment share was 2.4% in 1981 and rose to a peak of 11.5% in 1991 and has since been cut to 5.8% by 1996.

- Rossland's manufacturing share of employment was 35.9% in 1981, the highest of all communities, but fell to less than half that at 17.6% in 1991. It has since increased to 18.8% in 1996.

The manufacturing sector in Trail-Rossland was primarily Cominco. Clearly the mining industry has had a huge impact on the region. Consider what the proportion of total income in 1981 that would have been attributed to mining when in 1996 the much smaller employment shares represented almost 30% of income. The share may have been as high as 50% or more.

Today the mining sector is still very important, but its impact has been cut by the industry

restructuring while the economy also diversified. Nevertheless, manufacturing still has about twice the share of employment as BC, and it is concentrated in mining.

Cycles in the mining industry will continue to drive the Trail-Rossland economy but with a lesser impact than in the past.

Labour Force Developments

Rossland has had the more vibrant economy of the two communities. With the Cominco operations located in Trail, it took the brunt of the restructuring impact. With fewer lifestyle attributes than Rossland and a shrinking population, there were less employment opportunities in Trail. Consequently, Trail has had the worst employment record of the communities we looked at.

Employment growth for Trail in 1976-96 was –1.5% a year, compared to 0.3% for Rossland and 2.9% for BC. The 5-year intervals between census years really show the impact of the Cominco restructuring in the early 1980s.

- During the 1976-81 period, employment growth was strong in Rossland at 4.8% a year, while somewhat slower, but still positive, at 1.8% in Trail.

- In 1981-86 employment plunged at a 7.8% annual rate in Trail, the worst record of the communities we reviewed, while Rossland came in 3rd at -4.9%. Port Alberni was the 2nd biggest loser with employment declining at 5.4% a year.

- The 1981-86 employment declines were concentrated in the male population, -9.9% a year in Trail and -6.7% a year in Rossland. Even the male employment declines in Port Alberni were less severe than this.

- Primary and manufacturing sector employment accounted for most of Trail's employment declines in 1981-86, with respective -28.1% and -8.3% annual growth rates.

- Rossland had a significantly different experience. Primary sector employment grew at a 25.5% annual rate in 1981-86. Manufacturing employment, however, fell at an 11.7% annual rate.

The steep employment declines in 1981-86 occurred despite a total 23% increase in the provincial output of copper, lead and zinc. The employment losses were due to restructuring to reduce labour costs.

- In the improved commodity environment of the 1986-91 period, employment grew very modestly at 1.8% a year in Trail and 1.3% a year in Rossland. During this period copper, lead and zinc production initially dipped in 1987 and rose in 1988 but then fell a cumulative 32% in 1989-90. The modest rise in 1991 still left BC production down 13% from 1986. Despite the erratic production, average prices were sharply higher. But the most important factor is production. The lower output, coupled with productivity improvements, limited the employment generation of the region.

- The 1991-96 period saw employment decline again, falling at a 2.5% annual rate in Trail. Male employment led the way again, declining at a 3.6% annual rate.

Until 1991 Rossland's employment trends were roughly similar to Trail's. But this changed dramatically in 1991-96. As Trail's employment fell, Rossland's surged at an annual rate of 5.6%. This reflects the emergence of Rossland as a suburb with service sector employment growing along with the population and expansion of the recreation sector.

Both Trail and Rossland experienced significant growth in self-employment. Many people losing jobs in the mining industry were forced to create their own jobs. Many actually ended up still working in the industry but are classified under different industries.

- Self-employment in 1996 accounted for 10.2% of employment in Trail, and 16.3% in Rossland. The Trail rate is the 2nd lowest of the communities and compares to a BC average of 15.0%. Rossland's rate is the highest of all the communities analyzed. This is consistent with the greater growth in the service sector in Rossland, where many self-employed jobs are created.

- Growth in self-employment in the 1986-96 period was about 11% a year in Trail and 14.6% in Rossland.

The impact of declining employment in Trail during the 1976-96 period would normally result in sharply higher unemployment rates. But that was not the case. While unemployment did rise, it did not rise as much as in other communities. The reason is that participation rates fell sharply in Trail, falling from a peak of 59.7% in 1981 to 51.2% in 1996. Male participation rates plunged from 75.2% to 59.8%. Female participation rates were slightly variable around the 44.5% level. Males responded to declining employment by leaving the labour force or the area.

Because lower participation rates ameliorated the rise in unemployment, the 1996 unemployment rate was just 12.0%, above the rates for Port Alberni and Prince Rupert. The Male unemployment rate in 1996 was 11.5%, lower than in four other communities. Only Kelowna and Rossland had lower male unemployment rates.

Rossland's surge in employment pushed the unemployment rate down to a mere 6.0% by 1996, by far the lowest rate in the communities and in sharp contrast to the high of 16.3% in Prince Rupert. The drop in Rossland's unemployment rate occurred, despite a surge in participation rates from 55.1% in 1976 to 70.5% in 1996.

The marked difference in participation rates between Rossland and Trail is likely due to the age composition differences as well as the relative employment opportunities. It may also reflect a migration of the high participation rate cohort from Trail to Rossland.

Housing Market Characteristics

Household Incomes

Rossland and Trail are markedly different in income profiles in terms of both income levels and growth rates.

- In 1995 Rossland's average household income was $54,649, almost 8% above the BC average and almost 41% higher than Trail's $38,846.

- In 1980 Rossland's average household income was $26,171, about 5% less than the BC average and only 4.8% above Trail's income of $24,950.

- Household income growth in 1980-95 has averaged 5.0% a year for Rossland, the highest of all communities, while for Trail it was 3.0%, the lowest of all communities.

The stark differences are likely due to the following factors.

- Migration of prime income earning families from Trail to elsewhere including Rossland.

- Trail's retirement age population has grown very rapidly, while in Rossland it has fallen between 1986 and 1999. Consequently, Trails retirement age population in 1996 was more than twice that of Rossland, as a

share of total population. Retirees earn less than the average wage earner.

- The Cominco downsizing affected Trail to a much greater extent, forcing people to accept lower income jobs, migrate or take retirement.

- Trail has a much higher proportion of 1-person households than Rossland. In 1996 it was 37.2% compared to 26.8% for Rossland. This means Rossland households have a higher proportion of two income earners.

The data on income by source for 1996 shows that Rossland gets about 80% of income from employment compared to 65% for Trail. The much older population in Trail is reflected in Trail's reliance on government transfers, which at 20.5% of income, was the largest of the communities we analyzed, and about double Rossland's share. Other income, private pension and investment income was also very important for Trail at 14.5% compared to 9.7% for Rossland.

The differences in household incomes, coupled with the demographic factors and employment opportunities between Trail and Rossland hold major implications for the housing markets.

Households

Although Trail is the larger of the two communities, Rossland has had the fastest growth in households. This has meant a much more vibrant housing market in Rossland.

- In 1976 Rossland had 1,225 households compared to 3,620 in Trail. By 1996 Rossland had grown to 1,455 while the number of Trail households had shrunk to 3,520.

- Household growth for Rossland since 1976 has been 0.9% a year while for Trail it has been -0.1%.

The pattern of 5-year changes between census years illustrates the dramatic impact that the mining industry has had on household formation.

- In 1976-81 annual household growth in Rossland was 2.7% while in Trail it was 0.6%.

- Households fell at about 2% rates in both Trail and Rossland in 1981-86.

- Since 1986 there has been a modest positive growth in households. Annual growth has been 0.8% for Trail and 1.5% for Rossland in 1986-91.

- The weakness in the mining sector in 1991-96 has dampened household formation growth to 0.4% a year in Trail and 1.3% in Rossland.

Trail has a much smaller average size household at 2.1 person compared to 2.6 for Rossland. This is because:

- Families, at 61.1%, are a smaller share of households in Trail compared to 69.9% in Rossland, and

- Rossland has 1.3 children per family compared to just 0.9 for Trail, and Trail has the largest share of 1-person households of all communities, at 37.2%, compared to 26.8% for Trail.

The household characteristics of Trail and Rossland are very different, with implications for housing. Rossland can be fairly described as a community of younger family-oriented and above average income households with children and a good proportion of two income earners.

Trail, on the other hand, has much older households along with fewer families and many single elderly households with below average pension and investment income.

Housing Costs

Trail and Rossland have, respectively, the lowest and 3rd lowest house prices of the communities we analyzed.

- In 1996 the average house cost $96,112 in Trail compared to $127,532 in Rossland. Fort St. John came in at 2nd lowest.

- Rossland has had the most rapid appreciation in house prices, with a 5.1% average annual increase from 1981 to 1996, compared to 4.3% for BC. The appreciation has been most rapid in the 1991-96 period at 15.2% a year compared to 6.4% for BC.

When house prices are considered in relation to average household incomes, Rossland is relatively cheaper than Trail, despite the recent rapid price appreciation.

- In 1996 the ratio of house prices to household income was 2.33 times for Rossland, compared to 2.46 times for Trail. Only Fort St. John had a lower ratio at 1.82.

- Relative to incomes, Rossland house prices in 1996 were above the 1981 peak, while in Trail the price/income had not quite returned to the previous peak level.

The total burden of home ownership in Rossland is much greater than in Trail.

- The proportion of homeowners who spend in excess of 30% of household income on major monthly payments was 16% in 1996. This is above all the communities analyzed, except Kelowna. The Trail ratio was just 8%.

- More importantly this ratio has moved up very sharply since 1986 and 1991 when it was only 6.2%.

- In absolute terms, the average homeowner's major monthly payments for 1996 were $420 in Trail and $700 in Rossland.

The greater ownership burden in Rossland, compared to Trail, creates a greater downside risk to house prices in the event there is a cooling off in the economy.

Housing Starts

There is very limited and fragmented information on housing starts for Trail and Rossland. The CMHC data we have is just for Trail for 1985 to 1991. The Regional Building Inspection Department has data for 1993 to 1997 for the greater Trail area.

The experience of the other resource communities would suggest that for Trail-Rossland there was a reasonably robust period of housing construction prior to 1981 and that there were probably excesses being created, based on overly optimistic growth projections for the 1980s. If so, one would expect the 1980s level of starts to be extremely low.

Given the data, our hypothesis seems validated. Housing starts in Trail totaled just 156 in the 1985-91 period, for an average of 22 starts per year. This represented about 0.8% of all BC starts, or roughly ¼ of the share of BC households in Trail.

In 1993-97 Trail starts totaled 59, or about 11 per year. Again, this is much below the share of households and even worse than the 1980s levels.

Trail's share of the total greater Trail housing starts averaged about 16% in 1993-97, compared to its 37% population share. This indicates that Trail is likely the place of work

for many people, but not the place of residence. People are increasingly moving to the surrounding smaller communities.

Rossland is one such community. Rossland has accounted for 23% of the greater Trail starts in 1993-97, despite having 19% of the population.

Households in Trail appear to be spending more money on renovations than trading up. For example, total renovation/additions in Trail in 1993-97 were $2.68 million or 32% of the total greater Trail spending. Other communities, with a much newer housing stock than Trail, do not have the same need for extensive renovations.

House Sales

Figure 38 shows the pattern of single-family home sales for Trail and Rossland from 1976 to 1998. From the chart it is evident:

- House sales have been very cyclical, with the strong years being the periods of relatively strong mineral production and prices, while periods of weak sales tend to be during low mineral demand and weaker metal prices.
- Rossland and Trail cycles follow essentially the same path.
- Sales have been on a significant downtrend since 1993, with the 1998 sales levels the lowest since the late 1980s.
- Rossland's sales have averaged about 56% of Trail levels, which is well above its household share of 38%.

An interesting difference between Trail-Rossland and other resource communities we studied, where the data goes back to the 1970s, is that the sales peaks in the 1990s were higher than the 1970s.

House Prices

The trend in house prices is shown in Figure 39 below. House prices have tended to move in long cycles. Prices in Rossland and Trail tend to move in the same direction, even if by differing magnitudes.

- Prices in Rossland were well below those of Trail in the 1970s and were closer to Trail prices in the 1980s.
- In the 1990's Rossland prices overtook Trail prices.
- Rossland prices have tended to be more volatile than Trail prices in the 1990s.

Figure 38

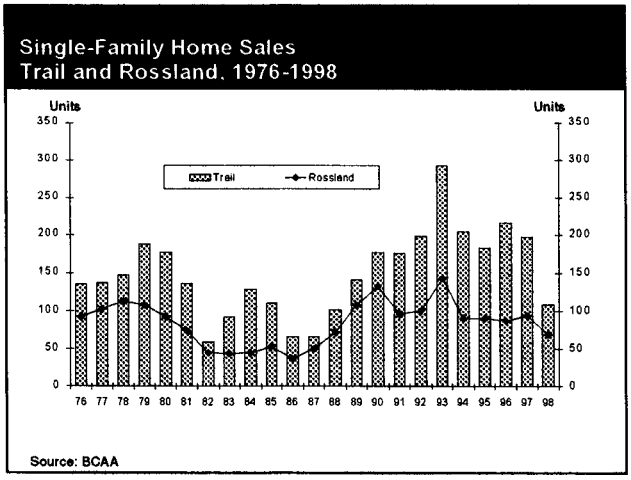
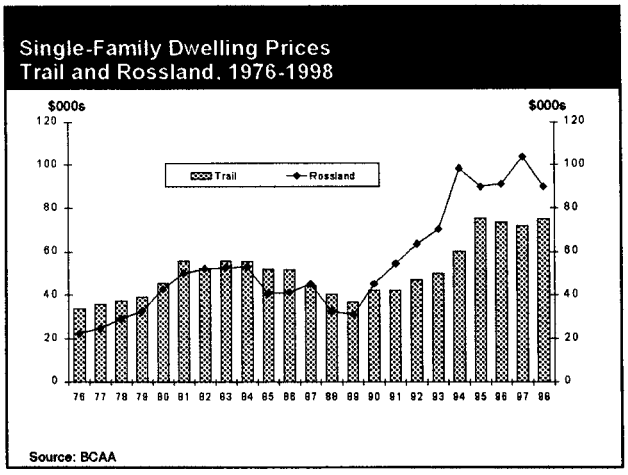


Figure 39



Home prices did not decline in any significant way in the first few years of the 1980s, unlike in other communities where we have data. In fact prices edged up slightly or were stable from 1981 to 1984. Prices plunged 61% between 1981 and 1984 in Fort St. John, while they fell 20% in Prince George between 1981 and 1983. We do not have 1981 data for Port Alberni, but between 1982 and 1984 prices fell by almost 30%.

- Prices in Trail and Rossland reacted to the decline in home sales and the very weak economic environment in the early 1980s with quite a long lag. Between 1984 and 1989, when house prices were rising in other communities, they declined by 33% in Trail and 41% in Rossland.

- The behaviour of house prices in the 1990s is similar to that of other resource-based communities. They have tended to rise despite continued weak economic activity and restructuring of the resource base. The one exception is Port Alberni, where the Asian crisis has caused significant price weakness for the past three years.

The resilience of house prices to the economic turmoil of the early 1980s is an interesting phenomenon. The price strength in the 1990s seems to be a sign, as in other communities, that the excess supply of homes has been absorbed. A better demand/supply balance, a net increase in housing demand and more confidence in the future would then lead to higher prices. However, the 1996 house price/income ratios mentioned earlier, based on census data, indicate that house prices may have reached a near-term limit. This is consistent with the stability in prices since 1996.

Kelowna

Kelowna is not a resource-based community. It has a well-diversified economy, with exposure to the primary and manufacturing sectors that are just slightly below the provincial average. Kelowna was included in the study, however, to be a comparative standard. We wanted to compare the performance of the housing market in a small diversified community with that of small resource-dependent communities.

Kelowna is located in the southern interior of BC and is part of the Central Okanagan Regional District. The city is about 470 km east of Vancouver and 606 km west of Calgary and a one-hour drive north of the US border.

Kelowna has a mild climate, a clean environment and many recreational facilities. It is the major centre for the southern interior of BC.

Demographics

Kelowna is the largest of the communities analyzed in this report, being slightly larger than Prince George. The population estimate for 1999 by BC Stats is 97,385. This represents 2.4% of the BC population.

Population Growth

Kelowna has had the strongest population growth rate of the communities. Growth from 1976 to 1999 was 2.8% a year, slightly ahead of the BC growth rate. The pattern of growth by 5-year periods shows no declines, unlike the five resource-dependent communities, that recorded declines in 1981-86.

- The 1976-81 growth rate was 2.6% a year, compared to 2.2% for BC. This was well below the rate for Fort St. John but slightly ahead of Prince George and much faster than the other four communities.
- In 1981-86, population growth was 0.7% a year, modestly behind the BC rate of 1.0% which was biased up by the 1.6% rate for the GVRD. In contrast, 4 of the resource communities had declining populations, while in Prince George it was stagnant.
- Kelowna had a very strong 4.4% annual population growth rate in 1986-91, surpassing even the GVRD rate of 4.0% and the BC rate of 2.6%. Growth moderated to 3.3% a year in 1991-96, but that was still well ahead of the 2.6% rate for BC.
- Since 1996 population growth has averaged 1.5% a year, only slightly above the BC rate of 1.2%.

Since at least 1976, Kelowna has had strong population growth. Only in the 1981-86 period was the growth below the BC average. The strong growth in population has contributed to a strong housing market and the foundation for a strong and diversified economy.

Population Age 65 & Over

Kelowna is a desirable place for retirees. The climate is good, quality health care is available and there are many recreational activities and a wide variety of retail and personal services.

- In 1996, the share of the age 65 & over cohort totals 17.4% of the population , the largest of the communities studied, except for Trail at 23.2%. In 1976 the share was just 13.8% compared to 13.0% for Trail.
- The growth in the age 65 & over has averaged 4% a year from 1976 to 1996, the same as for BC, but well above the 1.6% for Trail.

The reason the share of age 65 & over in Kelowna rose so slowly compared to Trail, when the cohort was growing so much faster, is that the younger cohorts were growing so much

more slowly in Trail, while in Kelowna the younger cohorts were growing quickly. The good employment prospects in Kelowna attracted net migrants so that the younger cohorts grew rapidly as well. Kelowna did not suffer the out-migration of below retirement age people like Trail.

Migration

Net in-migration has been the driving factor behind Kelowna's surging population.

- In 1996 the migrant's share of the population age 5 & over was 48.9%. This is more than 10 points above the 2nd highest ratio of Prince George, and almost 20 points above the BC share of 29.2%.

- The share has been dropping as the population has grown. In 1976 the share was 61.6%.

International migrants represent about 2% of the population.

Industrial Structure

Kelowna has a diversified economy with little dependence on the primary resource sectors. The BC Stats analysis of income dependence found that the forest and mining sectors account for just 5% of total income and agriculture accounts for 4%. Even tourism, for which Kelowna is known, accounts for just 6%. The public sector accounts for the largest share of income, at 21%, followed by 20% for transfer payments, 16% for other non-employment (primarily investment income) and 15% for other basic industry (mostly non-resource manufacturing).

By industry, there has been relatively little change in the industrial structure of employment in Kelowna since 1981.

- Employment in the primary sector was just 5.9% in 1981, has been as high as 7.3% in 1986, and was just 5% in 1996. The agricultural sector is the biggest primary sector (orchards and vineyards).

- Manufacturing employment is below the BC average at 10.1% in 1996. In 1981 the ratio was 12.7%. Only Fort St. John had a lower ratio.

Labour Force Developments

Unlike the resource communities, and BC in general, the trend of employment growth in Kelowna has not been volatile. In general, employment growth has been strong, exceeded only by the record in Fort St. John. Since the growth of the economy has been concentrated in the service sectors, female employment growth has been twice that of males.

While Kelowna may not have had the fastest growth of the communities at all times, it never had the worst record and its long-term average has been consistently high.

- During the economic boom years of 1976-81 Kelowna's employment grew at a 4.8% annual rate. This was less than that of Prince George and Fort St. John, but above the BC rate of 4%.

- Employment declined in the 1981-86 period at a 0.7% rate. Kelowna with its dependence on the public sector could not avoid the impact of the Bennett government fiscal austerity in the 1980's. Moreover, the poor economic performance of BC caused net out-migration from the province for a couple of years. This also impacted Kelowna.

- Employment growth has been strong since 1986, averaging 6.1% in 1986-91 and 4.4% in 1991-96.

Kelowna benefits from a generally strong provincial economy, but does not suffer proportionately when the resource industry recessions impair the overall BC growth performance.

The composition of Kelowna's employment growth has been strongly towards payroll employment rather than self-employment. Still, the self-employed share of total employment has about doubled from 1981 to 1996. But this is less than for BC as a whole, and particularly for the resource communities, where in some cases the share has tripled or more.

Along with a comparatively stable employment growth trend, Kelowna has had a smoother trend in unemployment rates. During the census years Kelowna never had the lowest unemployment rate of any of the communities we analyzed. Nor did it have the highest rate.

The unemployment rate for males has been quite low relative to the resource-based communities. The spread has widened significantly since 1991.

Kelowna has below average participation rates for both males and females and the total labour force because of the large number of retirees. However, the gap with the BC rate is closing. In 1976, the participation rate was 54.4% compared to 59.8% for BC, a difference of -5.4%. By 1996 the gap had narrowed to just -3.1% with Kelowna's rate rising to 63.3% and BC's rate increasing to 66.4%.

The reason for the narrowing gap is the rising participation rate for males. For BC the participation rate is dropping because of the elimination of jobs in the male-dominated resource sectors. Only three of the seven communities analyzed had rising male participation rates. (Fort St. John, Rossland and Kelowna.) The other resource-dependent communities had sharp drops in male participation rates.

Kelowna was able to achieve a rising trend because strong job growth attracted migrants of labour force age seeking employment. Rossland essentially became a bedroom suburb of Trail where working families chose to live. Fort St. John, like Kelowna had strong job growth that attracted people seeking work.

Housing Market Characteristics

Household Incomes

Kelowna has an average household income that was more than 10% below the BC average at $45,546 in 1995. The discount relative to the BC average has not changed materially since 1980, when it was 11.8%.

Kelowna, however, has had the fastest household income growth of the communities since 1980, except for Rossland. Kelowna's average annual increase was 4.6% compared to Rossland's 5% and the BC average of 4.5%. Trail had the lowest growth rate at 3.0% a year.

From 1990 to 1995, Kelowna's income growth was 2.2% a year, considerably below the 7.0% of 1985 to 1990 period, but still above the BC rate of 1.6%.

The below average household income in the latter period is due to two main factors. First, the nature of the employment created tends to have below average compensation. Service sector jobs, particularly retail and tourism, where much of the growth has come from, are typically low paying jobs.

Second, the demographic profile of Kelowna is heavily skewed towards retirees. While they may have substantial net worth, they typically have below average incomes.

The composition of income by source has employment income accounting for only 67.5%

of income in 1995, the 2nd lowest proportion. Trail, with a larger retired population, has the lowest ratio at 65%. Pension income is 15.3% of the total compared to 11.1% for BC, while investment income is 10.9% compared to 9.1% for BC.

Given the strong population growth of Kelowna and the growth of both the tourism industry and high tech manufacturing, the prospects are for continued above average income growth in Kelowna in the medium-term.

Households

Kelowna had about 36,435 households in 1996, which was 2.6% of BC households. The share of BC households was 2.1% in 1976 and averaged 2.3% in the 1976-96 period.

Household growth has been very strong, benefiting from the strong population growth. Except for the growth rate Kelowna has similar household characteristics to Trail.

The 1976-96 annual growth in households was 3.7%, just behind the 3.8% for Fort St. John. However, in the past decade the growth has been 4.2% a year, almost three times Fort St. John's rate and well ahead of both the GVRD and BC rates of 3.5% and 2.7%, respectively.

There has not been a period where the number of households has declined between census years.

Other primary household characteristics are:

- The average household size is 2.4 persons, the lowest except for Trail.
- Average family size is the smallest at 2.9 persons.
- There is only 1.0 children per family at home, the 2nd lowest behind Trail.
- Kelowna has the largest share of 2-person households, at 38.4%, just ahead of Trail.
- There is an average share of 1-person households at 25.7%.
- Families' share of households is 69%, and the trend has been dropping. The 69% share is much lower than for the resource communities except for Trail.
- Kelowna has a slightly above average home ownership ratio at 66.7%.

Kelowna's large retiree population, some of whom would be single, and employment growth in the service sector, which attracts young single labour force entrants, plays a large role in explaining the relatively low share of families in total households.

Housing Costs

Housing in Kelowna is not inexpensive. The average homeowner is under significant financial stress compared to those in other urban centres outside of the lower mainland.

- In 1996 average house prices were $177,832, the highest of all the communities analyzed. The next most expensive place was Prince George at $146,218.
- House prices in Kelowna have been appreciating more slowly than in all communities, except Fort St. John. The 1981-96 annual rate of increase was 2.9%. This is well below the BC rate of 4.3%.
- Even though Kelowna is not resource-dependent, the average price of homes collapsed in 1981-86 as much as in resource-based communities. The 1981-86 average annual decline was 6.2%, about on par with Port Alberni.

- The pace of appreciation in 1991-96 was 5.8% a year, just below the BC average, but well below the double-digit gains in three of the resource communities.

The cost of housing relative to household income underscores the relatively high cost of housing in Kelowna.

In 1996 the ratio of house prices to income was 3.9 times. Port Alberni, the runner-up, was just 3.08 times income. Most other communities were around the 2.5 times range.

- Kelowna has had consistently high house prices relative to incomes. In 1981 the ratio was 5.0 times, which exceeded the BC average.

- Although the price/income ratio fell sharply from 1981 to 1986, it started to rise after that. The same ratio continued to decline after 1986 for all the other communities.

The high cost of home ownership is reflected in the hardship ratio and its sharp rise.

- In 1996, 18% of homeowners had to use more then 30% of household income to cover major monthly payments. Rossland was next at 16%, with Port Alberni after that at 13.8%.

- The ratio of hardship has surged from 8% in 1991 to 18% in 1996.

The combination of low household incomes and high relative house prices makes Kelowna an expensive place to live. An inflow of high net worth liquid retirees and other migrants probably is a significant factor in high relative house prices.

The high housing cost relative to incomes is a constraint on future house price increases as evidenced by the slow pace in 1991-96. To the extent Kelowna's housing market relies to a large degree on in-migration, one would expect to see some weakness in house prices since 1996 because net inter-provincial migration to BC has become negative.

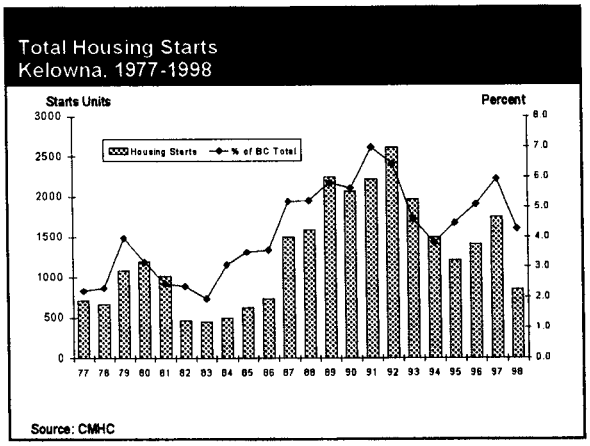
Any significant and sustained home price appreciation in Kelowna is likely to require stronger population growth, spurred by high net worth migrants and stronger household income growth. Otherwise, the current cost of housing relative to incomes, given the hardship ratio, is likely to be a serious constraint.

Housing Starts

Figure 40 below shows the record of housing starts in Kelowna from 1977 to 1998, and their share of total BC starts.

The housing market in Kelowna has obviously been very strong. Nevertheless, there has been pronounced cycles, and they have tended to be similar to the ones experienced by the forest dependent communities.

Figure 40



- Starts were rising strongly in the late 1970s, reaching almost 4% of total BC starts in 1979. This was exceptionally strong, as households in Kelowna were only about 2% of BC households.

- Starts plunged from 1980 to 1983, with the share of starts declining to only 2% of BC

starts. This greater than average decline in starts reflected the overbuilding of the late 1970s.

- Residential construction started to recover in 1984 and rose strongly through 1991 when Kelowna starts represented 7% of all starts in BC. Again building was way ahead of demand growth, but likely predicated on continued strong demand into the future.

- A declining trend in starts has been in evidence since 1991, punctuated by a short rise in 1995-97.

Kelowna construction of new housing has been excessive relative to the growth in households. Unless there has been a significant demolition of existing homes, this has likely created a huge excess of homes. Ignoring demolitions for the moment, the theoretical excess housing supply today represent about 25% of all households.

- In 1976-81 a total of 4,664 houses were started, which was only 130 more than the growth in households.

- From 1986 to 1991 there were 12,387 new housing starts, but only an increase of 8,180 new households. By this measure, there was an excess supply of 4,207.

- The increase in excess inventory continued as between 1991 and 1998 there were 11,274 new housing starts but only about 7,000 new households. There were another 5,213 houses started in excess of new Kelowna households.

The cumulative overbuilding since 1976, relative to the change in the number of households, was 9,550 or about 25% of the current number of households. Some of the excess supply must have been purchased by investors, or as a second home by non-residents of Kelowna.

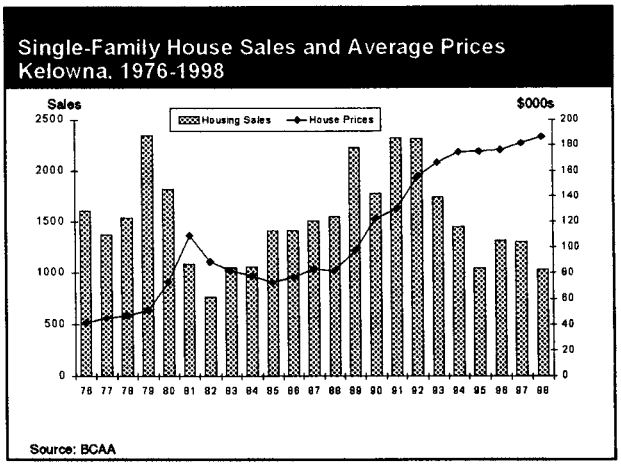
Unlike the resource-dependent communities that have housing markets that are probably close to equilibrium, Kelowna appears overbuilt. Given that 1998 housing starts were down 67% from the 1992 peak, it looks like a major correction in construction is underway to absorb some excess inventory. But even the 1998 starts levels, as a share of BC starts, were well in excess of Kelowna's share of BC households.

Under normal circumstances this degree of excess supply should put downward pressure on house prices. But that has not happened yet, as we see in the next section.

Home Sales and Prices

The trend in single-family home sales and average prices is shown in Figure 41 below.

Figure 41



- Sales peaked in 1978 and were declining under the weight of rising interest rates in 1979-82. The 5-year mortgage rate rose from an average of 10.25% in 1977 to 18.38% in 1981. The punitive mortgage rates of 1980-81 caused sales to decline from 2344 in 1979 to 768 in 1982.

- But the underlying optimism about Kelowna and the growth in housing demand, coupled with a sharp decline in the 5-year mortgage rate to 13.23% by 1983 helped sales to recover again. Home sales

remained on an uptrend until 1992 before peaking.

It appears that since 1992 the rapid price appreciation of prior years, slower housing demand and the lagged impact of rising mortgage rates through 1991 caused sales to start easing. That trend has continued through 1998, with sales at their lowest levels since 1982.

Average home prices plunged in the early 1980s, but quickly recovered after that and have continued to rise right through 1998. Rising price may be a strong causal factor in falling home sales as prices appear out of line with household incomes as discussed above. A substantial drop in net in-migration is also likely a significant factor.

The failure of house prices to decline in the face of sharply weaker sales and an excess inventory may be due to several factors:

- A significant portion of sales may be made to people that pay cash or require little mortgage financing. For example, retirees that have a high net worth, or other high net worth migrants that move to Kelowna for a specific quality of life. These purchasers would be less price conscious than the average buyer.

- Builders may be well capitalized and are able to hold out during periods of slow sales activity, thereby avoiding distress sales and limiting downward pressure on prices.

- The mix of sales could be largely newer homes that tend to be relatively expensive.

- Potential sellers may be limited by the desire of people to stay in Kelowna. These people could afford to hold out for higher prices.

The Kelowna housing market, however, looks vulnerable. Unless the economy improves quickly and fairly vigorously, net housing demand starts to accelerate and/or the financing cost of homes eases, it would appear to be only a matter of time before a correction in house prices occurs.. This has occurred in other communities. There is no reason to expect Kelowna to be any different.

Given the declining trend in sales and the prospect of a drop in prices, one should expect starts to remain weak in the medium-term.

Chapter IV

The Competitive Situation Facing BC's Resource Industries

In previous sections we reviewed how various resource industries have undergone significant cycles due to global competitive pressures. Because the forest products and mining industries were not competitive they have had to downsize and restructure significantly in order to survive. While preserving, for the time being, parts of the industry, downsizing and restructuring has cost the province and the communities dependent on those industries significant losses of jobs and income, both directly and indirectly.

While the resource sectors have survived, albeit leaner and smaller, the competitive pressures continue to mount. The adjustment process is a dynamic one, with change always the constant. There is no guarantee, that in the decade ahead, the resource sectors in the province will not continue to decline in absolute or relative terms.

To the extent the resource industries of the province, and the communities we have analyzed are competitive today, the future prosperity of the resource sectors and the communities could be positive or negative, depending on evolution on their global competitive position.

To gauge the future trend of the competitive situation of the resource base, we must first identify the critical competitive factors. Then we must monitor them to assess whether, on balance, the competitive situation is improving or deteriorating.

Resource Availability and Costs

The access to and cost of the raw resource are two primary considerations. Factors that impact the economic availability of resources are:

- Environmental regulations.
- Aboriginal land claims.
- Government determined harvest levels (timber and fish).
- Natural disasters (insect infestation, over-fishing and/or disease)
- Regulatory requirements that must be met add costs and time delays. For example land-use planning consultations and permit applications.
- Land and wildlife preservation efforts that take economically productive land and transfer it to parks.

All governments, both here, in other jurisdictions in Canada and abroad have to deal with these same issues in to some extent. The development priorities of these governments may be quite different, leading to quite different policies that may positively or negatively affect the access to the resource base.

The BC government has transferred significant amounts of timberlands from the forest base on the Coast to parkland. Potential mining developments have also been halted as lands have been designated as parks well after

millions of dollars have been invested to find ore bodies and develop mines.

The reality BC has to face is that for some time now, a much higher priority has been placed on preserving the environment in BC than many competing jurisdictions. Whether this is good or not, is not the issue here. The fact is policy has reduced the available supply of resources in BC and negatively affected the economic and competitive position of the resource base of the province. As a province we may have chosen preserving the environment over the economic benefits provided by the resource sector. If so, the majority of the costs of that decision are borne by the people who live in the resource-dependent communities.

Complicated land-use planning procedures and consultations are adding years of delay and higher costs to potential projects.

There is a serious beetle infestation in the northern interior forests. This may have the near-term positive impact of increasing the harvest to salvage timber that otherwise would become useless. But the longer-term annual allowable cut (AAC) may be reduced. The accelerated harvest of timber infected with the Spruce pine beetle was the reason for the spike in the timber harvest in 1987.

The costs of the raw resources are affected by many variables, many of which are determined by government. For example:

- Direct resource taxes, duties and royalties, and stumpage.
- Conditions of harvesting or mining exploration. (tenure requirements on reforestation, roads, etc, and mine reclamation sites)
- Codes of conduct in harvesting (Forest Practices Code, FPC)
- Regulations regarding road building.

Transportation costs are a major factor in the delivered cost of resources to the conversion sites. As the resource gets more remote from the conversion facilities, costs rise. One of the constraints facing the forest industry is that the most accessible timber has already been harvested. Timber has to be brought in from greater distances, increasing costs.

The quality of the resource, especially for timber, is another factor. For example, most of the old growth timber, which has the large diameter and a higher proportion of clear lumber, has been logged. Smaller diameter timber has a lower yield and has higher harvesting costs.

The increasing focus of the global consumer on the preservation of old-growth forests and the elimination of clear cuts is forcing BC companies to adopt radical changes in harvesting methods. The need to adopt different and more costly harvesting methods reduces labour productivity in harvesting. This increases the cost base of the industry. Unless the industry is able to recover the increased costs, the competitive position will erode, other things equal

The FPC has been altered to lower some of the added costs, but initially the code added about $2 billion to the costs of the forest industry. The code still has major negative cost implications for the industry.

The public positions of the BC Mining Association and the Council of Forest Industries are that BC's record in these areas has been counter-productive in the areas of the mining and forest industries, in absolute terms and when compared to competing jurisdictions.

The record of exploration spending in the province is the best testimony to how provincial

policies have reduced the attractiveness of the BC mining sector to new development or expansion.

The Fraser Institute Annual Survey of Mining Companies 1999/2000, surveyed 422 mining companies to rate the attractiveness of mining jurisdictions around the world for mining exploration and development. The survey gave BC a rating of 3 out of 100, the 2nd worst ranking of all jurisdictions. The top score was Nevada with 85 points. Some major competitor scores were Mexico (54), Argentina (59), Manitoba (69) and Quebec (81).

Perhaps the biggest competitive threat facing the resource sector is the issue of unresolved aboriginal land claims. Until the issue of title and ownership is resolved, it increases substantially the risk for the private sector. The most obvious source of risk is that the harvest or extraction of resources may be interrupted by actions taken by the aboriginal nations to focus attention on unresolved issues in efforts to speed up the negotiations. Road blockades have already been employed in several instances.

The oil & gas industry is the only resource sector that has been provided with a net positive contribution to its competitive position by the BC government. It has benefited from favourable tax and royalty treatment and regulatory changes to expedite exploration and development. In 1998 the BC government created the Oil and Gas Commission. The commission is a single-window regulatory agency to oversee oil and gas industry operations from exploration to reclamation, while maintaining provincial environmental standards. It issues permits for upstream oil and gas activities, including those previously issued by other agencies, such as Land Act tenures and Ministry of Forests cutting licences.

In November 1999, the government, through phase 2 of the oil and gas initiatives, provided additional incentives, including more than $100 million over five years to upgrade roads in northeastern British Columbia.

Manufacturing Costs

The cost of converting primary resources into manufactured products is impacted by several key factors.

- Labour costs
- The efficiency of the manufacturing facilities.
- A variety of taxes including property, capital, corporate and sales taxes.

Labour costs are high in BC relative to competitors around the world. There is no reasonable way we can expect to lower our labour costs to those of competitors in emerging economies. However, labour legislation and the attitudes of unions have to provide flexibility for the resource industries to manage their unit labour costs in a way to remain competitive. Failure to do so will ultimately cause shutdowns.

The state and productivity of manufacturing operations depends on their vintage, the degree of embodied technology and scale economies. The ability to invest in technology and equipment to either improve competitiveness by lowering unit costs, or expanding production capabilities depends on, among other factors, the returns to the capital employed, relative to other competing jurisdictions.

BC policies towards capital investment have not been the most progressive in this decade. This is reflected in the below average historical trend in capital investment in the province relative to Canada and other jurisdictions.

Of note is the dramatic difference in private sector investment since 1992 compared to

Alberta. Capital expenditures, excluding repair and maintenance, were $17.06 billion in 1992. They rose to $19.9 billion in 1994 and then declined steadily to $15.5 billion by 1998. In contrast, investment in Alberta rose steadily from $13.7 billion in 1992 to $26.3 billion in 1998.

The capital tax, social services taxes on equipment and above-average profit tax all work to constrain business investment in BC relative to what it could be.

The resource industries have been forced to spend billions of dollars on capital equipment to meet environmental standards. This has increased unit costs, other things equal, and reduced the amount of capital that could have been invested to increase efficiency or output. Without making any judgments as to whether this has been a good or bad policy, the point is that, given all the other impediments that have hurt the competitive position of BC's resource industries, the environmental capital requirements have hurt the industries.

Given that BC resource industries sell most of their products abroad, there are several factors that have huge implications for their competitive position:

- Foreign exchange rate movements.
- Trade policies (tariffs and non-tariff barriers).
- Subsidies.

The importance of the foreign exchange rate movements to the revenues and cash flows cannot be overstated. Most globally traded commodities are denominated in US dollars. The trend decline in the Canadian dollar against the US dollar has increased the cash flow of BC's resource industries. It has also given the industry the ability to lower its prices to gain market share.

The exchange movements between BC export market economies and the US also have a big impact, because it influences the globally determined US dollar price. For example, the collapse of the Asian currencies in 1997-98 raised the domestic currency cost of imported resource products, which dampened demand. Consequently, exporters, in trying to maintain sales, lower US dollar prices.

The exchange rates, between Canada and BC's competitor resource exporters abroad, also play a major factor. The greater depreciation of the Australian dollar in 1998 against the US dollar, relative to Canada, gave the Australian coal producers a competitive edge. It allowed them to be more aggressive in negotiations with the Japanese and Koreans, accepting lower coal prices that would not have been acceptable if the exchange rate had been stronger. This lowered the prices for our coal producers. Similarly, the collapse of the Russian ruble gave Russia a competitive advantage in resources

The threat of trade sanctions is always a competitive threat to an exporting industry. The US-Canada Softwood Lumber Agreement is a prime example. This agreement, is ostensibly designed to compensate for Canadian subsidies in the forest industry. It sets quotas that limit the volume of exports from Canada to the US. The agreement also provides for penalties in the form of tariff surcharges that have to be paid for exceeding the quotas. This has had serious negative repercussions on the BC lumber industry. It expires on May 15, 2001. A new agreement, if negotiated, may improve or worsen BC competitive position.

Subsidies are a way for governments to reduce operating costs and give their industries a competitive edge. BC resource industries have to contend with a high degree of subsidization

of competitor costs in other countries. Our inclusion in NAFTA prevents many subsidies that our competitors in Asia, Europe and Latin America receive.

The other major factor influencing the health of our resource industries is the state of resource demand in our export markets. Stronger foreign economies will mean stronger demand and higher prices

Many of the competitive factors affecting BC's resource industries are outside the control of the firm and in the hands of government.

The question of whether the future of the resource communities in BC will improve or deteriorate, depends on the trend of host of competitive factors.

Key Factors To Monitor

The primary indicators to monitor, in order to get some leading indication as to whether the competitive position of the resource sectors in BC are going to improve or deteriorate are itemized below. We cite the movements that would create a positive impact on the financial and competitive position of the industries.

- A weaker Canadian/US exchange rate.
- Weakening of the US dollar against global currencies.
- Continued strength in the US economy, particularly housing starts.
- Economic recovery in the Japanese and Korean economies.
- Streamlining of the BC land-use planning consultation process.
- Progress on settlement of the aboriginal land claims in a manner that does not curtail the resource base economic activity.
- Lower federal and provincial taxes.
- Easing of the environmental regulations
- Significant streamlining of the BC rules, regulations, permitting and regulatory procedures.
- A stable to rising annual allowable cut (AAC).
- A greater flexibility of the labour force in the resource industries to adjust to make the firms more competitive.
- A greater degree of investment in capital and technology to lower unit production costs.
- Clear policies on compensation when lands are removed from the economic base to parklands.
- Reductions in the direct royalties, stumpage and other levies assessed on natural resources.
- Significant reductions in the standards of the Forest Practices Code.
- A reduction in trade barriers in export markets, particularly the US as it relates to lumber.

The reverse of the factors cited above would all lead to a deterioration in the competitive position of the resource industries.

The biggest medium-term threats to the resource industries of BC are likely to be a combination of the following:

- A stronger Canadian dollar.
- A global economic slowdown or recession.

- Agitation by those involved in the land claims process, to either speed up or deter the negotiation process, in a manner that hampers the conduct of business in land areas under negotiation.
- Increased development by our lowest cost global competitors.
- A failure to significantly lower the tax burden on the BC economy, and the resource sector specifically.
- Stepped up trade interference by the US in lumber and other forest products.
- Sharply reduced annual allowable cuts.
- Further sharp price declines in resource prices.
- Success of the global environmental lobby to boycott consumer purchases of forest products that come from the old-growth forests on the BC Coast.
- Any new legislation that has the effect of reducing the competitive position of the province.

On the balance of probabilities, given the current political scene both provincially and federally, and the aggressive development of resources by emerging nation competitors, the medium-term outlook is for a further gradual reduction in the resource base of the province.

The declining trend of resource industries in the past 20 years is likely to continue, even if at a slower pace, because the basic global and domestic pressures that have created that trend are more or less still intact. In seems unreasonable to expect a dramatic positive change in many of the competitive factors at the same time, so that there could be a major sustainable improvement in the competitive position of BC's resource industries.

Chapter V

The Econometric Model

In this section we discuss the development of the econometric models, the data used, our methodological approach and the estimated model specifications and results.

Methodology

The objective of the current analysis is to determine to what extent, if at all, resource commodity cycles affect the housing markets in resource-dependent towns. We have developed our methodology based on accepted econometric principles, and the general methodological approaches found in the literature, subject to certain constraints imposed by CMHC.

The literature on housing economics reveals there is a plethora of research on housing markets. As part of this body of research there are innumerable models designed to quantify and estimate demand and supply within these markets, price levels, amenities and rates of appreciation in different markets as well as forecasting any of these variables. Unfortunately, virtually all of the published work relates to large market areas. There is very little published research that is directly applicable to our study.

Econometric modeling of housing markets at the regional level remains relatively underdeveloped. Likewise research on the effect of commodity price cycles on housing markets in resource dependent regions is even scarcer. Work that does explore market structures and development of housing markets in smaller resource dependant areas in Canada typically has not been extended to development of formal models. Rather the analysis has tended to be qualitative in nature, such as describing the possible housing impacts of rapid development in smaller towns when resources boom (as with natural gas in Fort St John).

Proprietary research, as well as research contained in the literature, that does employ modeling techniques for analysis and forecasting has been done primarily at the provincial level or for large urban centres. In the case of United States most of the work has been at the state level or for very large urban agglomerations.

Thus, the analysis and model development of this report is essentially embarking on new territory. Nevertheless, general frameworks that have been developed for analyzing the housing sector still apply. As well, there are a number of studies that employ techniques that can be adapted for local analysis when data availability permits.

The key principles and constraints that guided the development of the models for the six different regions are as follows:

First, CMHC required that the models be relatively inexpensive and easy to update and maintain. The research is intended to provide CMHC's Market Analysis Centre with a framework for better understanding the linkages between rising or declining resource sectors and changes to local housing markets. The models

are to be updated and re-estimated on a regular basis. Consequently, the data series used must be relatively easy to obtain and also be available on a timely basis. There are 22 forecasting equations in the current work (which may also be expanded to other regions at some point in the future).

Second, the models should be robust. The explanatory variables should be relatively consistent across the different regions. In the context of the current project, there are two benefits to utilizing a similar structure for the equations across all regions:

- A robust specification indicates the equations are stable and include the main factors affecting local housing markets.
- A consistent framework facilitates comparisons across regions in order to help assess the relative impact or importance of resources in the different regions.

If the specifications differ across the regions it is much more difficult to make general conclusions about the relative impact of resources on the housing markets.

Third, the forecasting equations are intended to complement the descriptive analysis for each of the regions contained in this report. They are to provide the link from descriptive analysis to formalized econometric forecasting and simulations. They are to facilitate sensitivity analysis on the housing market impacts of possible future resource sector scenarios, over the short and medium-term.

The equations are not designed to forecast the implications of significant one-time events, such as the opening or closing of a mine or the construction (or closing) of a pulp mill, even though these events would clearly impact local housing markets.

Regional Data

Because the objective is to identify the impacts of local resource industry changes on local housing markets, it is necessary to have the required data available at the regional level. This presents serious constraints because often regions are too small to have reliable data or any relevant data at all. The required data is often compiled for larger regions. It is this data problem that is likely at the root of the paucity of published research at the smaller local area level.

Using regional information means that data are more limited than would be the case at the provincial level. For example, employment data, which are often included in housing models, are not available regionally prior to 1994 due to boundary changes in the Statistics Canada's Labour Force Survey. Other variables that might also be useful for modeling purposes, such as capital investment or production are also not tabulated at a regional level in most instances.

The need to use proxy data that represents a larger area than the communities under study introduces a potential problem. It weakens the direct linkages we are trying to develop. To the extend the data is not representative of the data for the community we are modeling, we may get statistical results that are at variance with *a priori* expectations based on expert regional or community knowledge and theoretical economic relationships.

The dependent variables in the equations (i.e. variables to be forecast) for the six different regions are the average price of homes, home sales, single family starts, and total housing starts. In general, these data series are complete for each of the communities, dating from the first quarter of 1976 to the fourth quarter of 1998. However, in a few instances the series

are substantially shorter and in a few cases the data are not available.

The original price, sales and starts data are monthly and were provided by CMHC. For estimation purposes the data were converted to quarterly observations. Price data were transformed by taking the mean of the monthly observations and sales and starts were converted to quarterly data by summing the three-month intervals.

For a detailed explanation of all the data units, sources and any transformations see Appendix A.

Employment is a primary factor affecting housing markets and is frequently contained in housing models. However, because regional employment data, particularly for resource industries, is not available, it is necessary to use resource-related production variables as proxies for employment. For example, more lumber production frequently results in greater employment and therefore increased housing demand. However, a significant shortcoming of this approach is that it does not accommodate changes in productivity. Given the strong productivity improvements in BC's resource industries due to capital-labour substitution, we would expect the resource proxies to lose some explanatory power. Nor do the resource variables adequately reflect the major structural changes in employment in the resource industries. That is, the linkage between a given change in resource production (employment) and the housing markets is changing over time but not adequately captured.

Despite these potential weakness, we used output measures of the manufacturing and processing for the different region's primary resources to proxy changes in employment, as well as general economic conditions. The respective commodity prices are also tested and included when significant, because higher (lower) prices often lead to increases (decreases) in employment and an improvement (decline) in local economic conditions, not to mention general business and consumer confidence in the region. For the industries under consideration international market prices are used.

Equation Specification

The dependent variables and all independent variables (when necessary) were seasonally adjusted. The Census X-11 procedure contained in EViews was used to de-seasonalize all data series. An alternative approach would have been to incorporate seasonal dummy variables into the equations. However, seasonal dummy variables impose a constant seasonal pattern on the whole series and therefore do not capture changes in the magnitude of seasonal variation over time.

Comparisons of both approaches revealed that seasonally adjusting the data generally resulted in a better fit. Seasonal adjustment also simplified forecasting because the modeling features in EViews could be readily used.

All equations are estimated in log-log form. This functional form is frequently used in empirical work because the coefficients in a log-log equation are elasticities, and are easy to interpret. This is advantageous in the current work because elasticities are unitless measures (percent changes), which facilitates comparisons across the regions.

For all of the equations constant dollar prices and real interest rates are utilized. In addition to being more theoretically sound, preliminary testing indicated that real dollars produced more consistent and robust results across the different regions. All prices were converted from nominal to real (1992) dollars using the BC Consumer Price Index. Subtracting the (CPI)

inflation rate from the nominal interest rate generated real interest rates.

Housing prices are determined by local supply and demand conditions that are affected by factors such as interest rates, migration, employment levels, and income and confidence factors. The approach used in the current work follows this conceptual framework, except that regionally-specific variables are included as proxies for local employment conditions.

Typically, equations for housing sales have a similar set of explanatory variables but also include the price of housing. In the housing market an increase in sales is frequently followed by an increase in housing starts. Therefore, equations estimating starts usually include sales, as well as migration, employment, income, interest rates and sometimes a measure of price. This type of modeling is usually done for larger areas (such as provinces) and therefore more data series are usually available. As mentioned, because of limited data availability at a sub-provincial level, variables such as income and employment cannot be included in the specifications.

The general structure and variables used to estimate the price, sales, and starts equations for each of the regions are discussed below. The approach and methodology used applies to all regions. For brevity, only the results will be discussed for each of the regions. Differences in the regions or specific issues are discussed as necessary in the relevant section.

For each of the equations, lagged dependent variables were included if they were significant. In the price and sales equations the lagged dependent variables were generally significant and improved the overall fit of the equations without significantly altering the coefficients for the independent variables. Because of the volatility of starts in smaller regions, lagged dependent variables were generally not significant and were therefore not included in the equations.

In doing the estimations a large and diverse number of resource-related series were tested. For example, to capture the wealth effect and/or future expectations about the health of the industry the relevant TSE resource sub-indexes were tested. As well, many different measures of resource expenditures, output and price were tried. In the discussion below just the final specifications are presented. Further discussion of preliminary tests and alternative specifications are contained in Appendix A.

House Prices

Equations to explain the change in housing prices were estimated for each of the regions. Commodity production and price variables for the region's primary industry were included in each of the six price equations. In each case, different measures of output of the region's primary commodity were tested. For example, in Prince George, the timber harvest, as well as regional lumber production were both tested. Data series that most closely reflected regional economic conditions and produced the best forecasting results were used.

Lag structures are adopted for the commodity series because it takes time for changes in commodity market to trickle through the economy. Interest rates are also lagged, under the assumption that people's expectations are adaptive. To determine the appropriate length of the lag structure, equations for house prices were estimated with up to eight lags of the explanatory resource production and price variables. Lags of between two and six periods were found to be the most significant, depending upon the region and commodity in question.

For each of the six regions, the price equations were initially specified with the following dependent variables:

- A production series related to the region's major resource. Because this variable is a proxy for changes in employment and overall economic conditions the expected sign is positive.

- A price series (in real terms) for the major resource in the area. All prices are in Canadian dollars. As with production, a positive relationship should be found for each of the price equations. Rising commodity prices imply rising resource demand and firm profitability, hence improved incomes and job security.

- The real five-year mortgage rate (modeled as a polynomial distributed lag). The expected sign for this variable is negative as higher mortgage rates reduce the number of potential buyers, thereby constraining housing demand and prices.

- The (log) difference in population of the regional district where the city in question is located. Estimates of the population for the different communities are not available on an annual basis, so the population of the region is used instead. Our selected communities' population dominates the larger region's population, so the regional data is a good proxy for the community. Annual population data were interpolated to get quarterly data. A positive relationship with prices is expected as rising population, given headship rates, implies a rising demand for housing.

- In some regions, dummy variables are used to capture unusual occurrences or extreme observations.

The house price series are the (log) of average prices of single family dwellings. Differences in the series are discussed in Appendix A as well as briefly in the section covering the relevant region. House price series were converted to constant dollars using the British Columbia CPI as a deflator.

Single-Family Home Sales

The volume of home sales is related to the price of housing among other variables. Thus, the price of homes is one of the variables in the specification. Initially each of the sales equations for the six regions was specified as a function of the following variables:

- Price and production data for the town's primary resource. The coefficients should be positively signed as rising resource prices and production imply better economic conditions and confidence.

- The average price of a home in each of the cities, measured in constant dollars. Here the expected sign is negative, as lower prices should result in greater demand (sales).

- The real five-year mortgage rate (sometimes a lag of one produces better results). The expected sign is negative as rising financing costs reduces the number potential buyers, given constant downpayments and lending criteria.

- The (log) difference in the population of the relevant regional district. As with prices, the relationship should be positive as rising demand should increase sales.

Housing Starts

Equations for single family and total housing starts are modeled as supply equations. It is assumed that builders respond to changes in market conditions and that these conditions are

influenced in part by commodity cycles. Equations for both single-family starts and total starts were first estimated using the same set of independent variables. These are:

- Production measures of the relevant commodities. The expected sign is positive as better economic conditions should increase demand for homes.

- Price variables for the different commodities. The relationship should also be positive as higher commodity prices imply higher income and sales potential.

- The real mortgage rate, which should be negatively correlated with building activity.

- The change (log difference) in the population, which should be positively signed.

- The number of house sales (seasonally adjusted), lagged one period. This variable should be significant and positively correlated with housing construction as rising sales implies declining excess unsold housing inventories and rising future demand.

General Modeling Comments

In most instances variables that were insignificant were dropped from the forecasting equations. However, sometimes variables were retained, even if they were not quite significant at the 10% level, because they were close to being significant and were theoretically important. The expectation was that extending the sample period a few more quarters might result in the variable becoming statistically significant.

Foreshadowing the results, the most difficult series to forecast (both in-sample and out-of-sample) were housing starts, especially in the smaller areas where the absolute number of starts was small and proportional changes sometimes were extremely large. In these areas the commodity variables were frequently incorrectly signed and/or their coefficients were not significantly different from zero, even though discussions with realtors in the communities confirm that housing markets in these towns are very dependent upon the commodity cycles.

There are many possible reasons why results are sometimes inconsistent with *a priori* expectations..

- In the smaller resource communities excess housing capacity built during boom periods may take a long time to absorb, with that time period being longer than the resource cycle. The need to unwind excesses creates a situation where despite changes in the resource sector, housing variables may continue to go in opposite directions. When this happens for significant periods, as it has in some of the communities, it reduces the explanatory power of known important variables.

- In small resource-dependent towns the population may be used to large swings in the economic cycles and not let cycles impact their decisions materially in the short-term.

- The swings in resource production for larger regions than the community under study may not be representative of the resource production in that community. Thus, a relatively stable housing market in a community may properly reflect stability in its resource industry, not the variability seen in the larger region. The opposite case is also possible.

- Because of the high fixed costs of many resource industries and government set stipulations on harvest and extraction levels, there may not necessarily be sharp changes in production associated with sharp changes in resource prices. Thus, housing markets may not reflect resource price swings.

- The population may be used to the cyclicality of the resource industries and regularly use EI to smooth out the income streams. Hence housing may appear less sensitive to short-term resource cycles, even if it is sensitive to secular longer-term trends. In this case a quarterly model may produce muted or inconsistent statistical relationships, that we know hold in the longer term.

- Sometimes other variables such as population changes, home sales, and mortgage financing costs will dominate the resource variables.

In the section below discussing the statistical results, we consider a variable significant, if it is statistically significant at the 10% level (the absolute value of t-statistic is greater than 1.66). Some variables are significant at the 15% or 20% level, a level that is generally below our threshold, but we retain some in the equations if they have the correct sign and there is a good theoretical reason to keep them. These variables we refer to as almost significant or nearly significant. In the tables below summarizing the results, the actual t-statistics from the equations are provided.

Model Findings Summary

The tables below show the model results for the common specification components in each community, grouped for each of the four dependent variables, single-family housing starts, total housing starts, single-family home sales and single-family home prices.

The four common variables in the equations are a resource production, resource price, mortgage rate and population variable.

A more detailed discussion of the total model results, including all variables, the fit of the equations, and their simulation capabilities is provided in the next section, but our summary conclusions as they relate to the resource variables are as follows:

- Resource variables do have a significant impact on the local housing markets, but their importance varies from community to community.

- Resource production variables tended to produce better results than resource prices. Resource prices were often insignificant. Prince Rupert was the only community where resource prices were significant, and that was for home prices, home sales, and total starts.

- The coefficients for the resource production variables ranged from 0.058 (FSJ home prices) to 1.29 (Port Alberni total starts).

- Coefficients for production variables were generally largest for starts, followed by home sales and then home prices.

- Financing costs do matter, yet mortgage rates did not always show up significant either. For example, mortgage rates were of the correct sign and significant in only half of the price equations and sales equations. Mortgages rates had mixed signs in the starts equations, and for the most part, insignificant in the starts equations. Prince George was an exception with mortgage rates being highly significant for starts.

Table 2

Summary of Price Equations
Common explanatory variables for all regions

Region	R^2	Lagged House Prices		Resource Production		Resource Price		Population		Mortgage Rate	
		coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat
Prince George	0.96	0.92	32.0	0.105	5.64	--	--	--	--	-.020	-3.85
Fort St John	0.95	--	--	0.058	2.09	--	--	2.29	1.57	-0.042	-1.37
Kelowna	0.91	0.87	16.7	0.108	1.25	--	--	5.93	3.37	-0.013	-1.34
Trail / Rossland	0.77	0.92	25.6	0.019	0.66			--	--	-0.018	-2.60
Port Alberni	0.82	0.29	4.24	0.137	1.09	0.917	0.60	2.83	0.73	--	--
Prince Rupert	0.71	0.59	4.71	0.154	1.85	--	--	3.45	0.70	-0.037	-2.00

Table 3

Summary of SFD Sales Equations
Common explanatory variables for all regions

Region	R^2	Resource Production		Resource Price		Population		Mortgage Rate		House Prices	
		coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat
Prince George	0.60	0.37	1.93	0.281	1.42	27.21	1.58	-0.61	-3.94	-0.82	-2.20
Fort St John	0.57	0.18	2.35	--	--	3.45	0.75	-0.39	-2.41	-0.53	-2.88
Kelowna	0.71	0.25	1.18	--	--	26.31	3.06	-0.11	-0.91	-0.49	-3.38
Trail / Rossland	0.77	0.17	2.06	--	--	30.83	3.56	--	--	-0.05	-0.60
Port Alberni	0.79	0.22	0.84	--	--	--	--	-0.52	-2.18	--	--
Prince Rupert	0.30	0.08	0.25	0.25	1.62	52.56	3.62	--	--	-0.64	-1.58

Table 4

Summary of SFD Starts Equations
Common explanatory variables for all regions

Region	R^2	Resource Production		Resource Price		Population		Mortgage Rate		House Sales	
		coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat
Prince George	0.79	0.33	1.58	--	--	27.24	1.70	-1.02	-4.76	0.84	5.14
Fort St John	0.68	0.31	2.15	--	--	--	--	-0.48	-1.43	0.30	1.41
Kelowna	0.89	1.08	3.98	--	--	27.27	2.46	--	--	0.43	3.91
Port Alberni	0.58	0.80	1.55	--	--	--	--	1.11	2.64	0.29	2.89
Prince Rupert	0.40	0.53	0.61	--	--	16.09	0.28	--	--	1.09	2.74

Table 5

Summary of Total Starts Equations
Common explanatory variables for all regions

Region	R^2	Resource Production		Resource Price		Population		Mortgage Rate		House Sales	
		coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat	coeff	t-stat
Prince George	0.77	0.28	1.05	--	--	82.62	3.92	-1.43	-4.89	0.53	2.27
Fort St John	0.59	0.34	2.31	--	--	--	--	-0.54	-1.26	0.24	1.23
Kelowna	0.83	1.02	4.90	--	--	22.65	2.29	--	--	0.24	2.12
Port Alberni	0.42	1.29	2.15	--	--	--	--	0.13	0.31	0.07	0.85
Prince Rupert	0.39	0.26	0.32	--	--	58.62	1.14	--	--	1.41	3.84

The results are not too surprising given the dramatic long-term structural changes and unwinding of major housing excesses in the communities, which we identified in Chapter III.

Due to waves of resource industry downsizing in many of the communities, starting in and around 1980, after an inflationary boom period that pushed housing starts to excessive levels, many of these communities lost significant populations, reducing the demand for housing and increasing the supply of unsold homes. With the consequent low absorption rates, due to economic uncertainty, it took a long time for housing markets to get back close to equilibrium.

These periods of housing adjustments were greater in duration than the resource cycles. For example, the resource industry downturn in the early 1980's lasted a couple of years and turned around sharply, but the decline in housing lasted for 5 or 6 years despite a sharp recovery in resource production and prices.

The Model Estimation Results

The results for the communities are presented in the following order:

- Prince George;
- Fort St John;
- Kelowna;
- Port Alberni;
- Trail/Rossland, and
- Prince Rupert.

Prince George Results

The resource variables that were initially included to reflect economic conditions (and indirectly employment and income) in the Prince George region were:

- The lumber production in the northern interior. Although the northern area is much broader than Prince George, activity in this larger region is assumed to reflect production activity in Prince George.

- The price of SPF 2x4, kiln dried, random lengths in Canadian dollars.

The results suggest that lumber (and more generally forestry) is a significant factor in the housing market in Prince George. This is consistent with the views of realtors in the city.

In terms of house prices and sales, the relationship is direct and significant, with a one or two period lag. For housing starts the results were not as clear. While the equations fit well, the relationship between starts and the lumber sector was the opposite of what was expected.

Depending on lag lengths and error corrections, complete data sets are available approximately from 1980:4 to 1998:4. The equations were estimated using ordinary least squares, with appropriate corrections for autocorrelated errors.

House Price Level

The dependent variable for the price equation is the real mean selling price of single family dwellings in the Prince George area.

The independent variables follow the housing specification outlined above. For the Prince George area, a dummy variable is included in the equation to capture the effect of the start up of the University in 1994.

As evident from the R-square statistic, the equation has a good fit. All of the variables are signed as expected. The price of lumber was correctly signed, however, it was not significant and was dropped from the equation. Lumber production is significant indicating that upturns in the forestry sector lead to higher prices in the housing sector. In the equation, population change was correctly signed but also was not significant and dropped.

Table 6

Summary of Estimated Equation: Real Prices SFD, Prince George		
Explanatory Variables	**Coefficient**	**t-Statistic**
Constant	0.439321	1.150800
Real Price SFD (-1)	0.915869	32.00647
Lumber prod. (-2)	0.104934	5.647615
Mortgage rate (pdl)	-0.019715	-3.851432
AR(4)	-0.308773	-2.706718
R-squared	0.959692 Adj	0.957249
Durbin-Watson	2.093736	

As expected a rise in the 5-year mortgage rate depresses the real price of housing.

The equation was corrected for fourth order autocorrelation. Because of the presence of a lagged dependent variable (house prices) as an explanatory variable the Durbin-Watson test is biased and is not a reliable test for autocorrelation. Breusch-Godfrey tests (available in EViews) were used to confirm that the errors are not serially correlated

Figure 42 plots the real average price of a home in Prince George and the estimated values from the equation. From the graph it is evident that the equation fits the data very well and captures the steep downturn in house prices in the early 1980s, as well as the steep increase in the latter 1980s and the dip in prices in the mid-1990s.

Housing Sales

The dependent variable in the sales equation is the (log) of the number of single family dwellings [SFD] sold in Prince George. The same price and production commodity series that were tested in the house price equation also appear in the original specification for sales. The equation is corrected for first order serial correlation.

The results for the sales equation are presented in Table 7. The fit is reasonably good, considering the volatility of housing sales, which can change substantially year-to-year. The independent variables explain nearly 60% of the variation in (single family) housing sales.

Figure 42

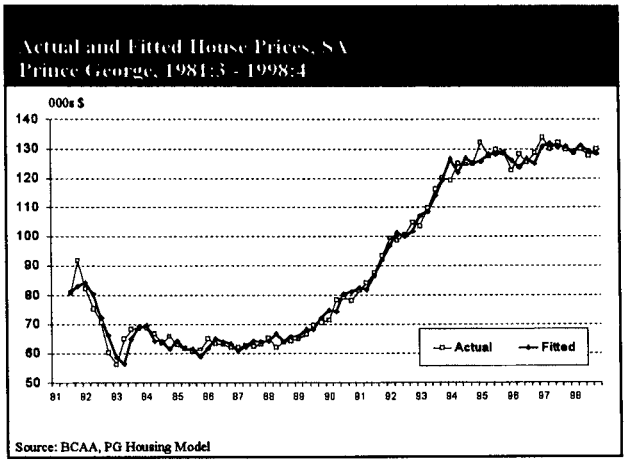


Table 7

Summary of Estimated Equation: Sales SFD, Prince George		
Explanatory Variables	**Coefficient**	**t-Statistic**
Constant	12.22758	2.795524
Lumber prod. (-2)	0.369977	1.934134
Lumber price. (-1)	0.281539	1.422968
Price (SFD) PG	-0.826435	-2.192474
Population change	27.21874	1.581893
Mortgage rate	-0.618077	-3.940783
University dummy	0.320400	1.987611
AR(1)	0.533837	4.617764
R-squared	0.599972 Adj	0.555524
Durbin-Watson	1.951340	

Compared to the house price equation, the sales equation is considerably weaker in explaining history. But, house prices have a much smoother pattern and trend than sales and have a secular upward bias. Sales on the other hand do not have this bias and are much more volatile. In that context, we are pleased with the estimation capabilities of the equation.

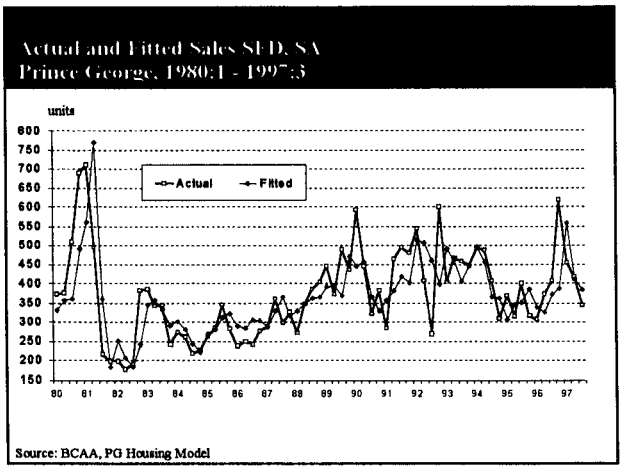
As in the price equation, lumber production is positively correlated with sales and is a

significant explanatory variable. The coefficient for lumber prices is correctly signed and nearly significant. Similarly, the (log difference) of the population is close to being significant at the 10% level and is retained. It is probable that additional data will make these variables statistically significant at a higher level.

The other variables are correctly signed and significant, including the dummy variable capturing the effect of the university opening. Sales lagged one period were not significant and were dropped from the equation. This is indicative of the volatility of the sales series

The performance of the equation is good in identifying the general trend of sales, despite some large errors in particular quarters.

Figure 43



Housing Starts

The results for the equations for single family housing starts and for total housing starts are both covered in this section. The two equations essentially have the same set of independent variables. The results for SFDs are provided in Table 8 below.

The equation for SFDs has a good fit with 78% of the variation in starts explained. As expected, the sign on the coefficient for lumber production is positive. It is very close to being significant at the 10% level (significant at the 11% level). The price of wood was correctly signed, but dropped because it was not significant.

Table 8

Summary of Estimated Equation: Starts SFD, Prince George		
Explanatory Variables	**Coefficient**	**t-Statistic**
Constant	-1.436192	-1.073965
Lumber prod. (-1)	0.297161	1.394563
Population change	27.71439	1.710492
Mortgage rate (-1)	-1.007458	-4.629948
Sales SFD (-1)	0.855507	5.160410
University dummy	0.555167	3.190206
Strike Dummy	-0.644278	-3.473510
R-squared	0.782442	Adj 0.762664
Durbin-Watson	1.720186	

Figure 44

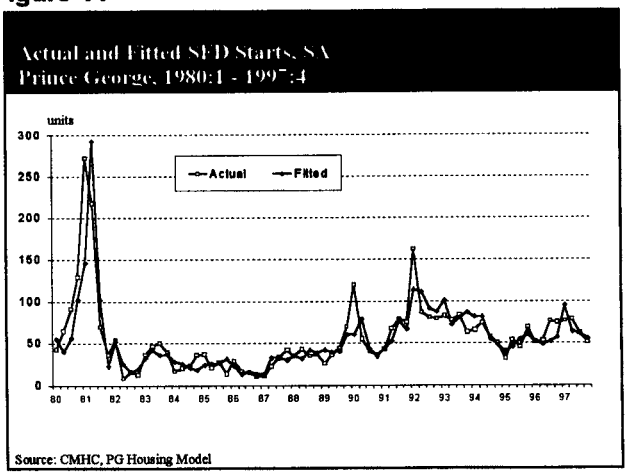


Figure 44 shows that starts were exceptionally high in the beginning of the sample period. This period of 'overbuilding' is somewhat difficult to capture in the equation. The fit of the equation improves if these years are eliminated, by shortening the sample period. However, the results do not change substantially, so for consistency the entire sample is maintained.

The previous period's sales are an important explanatory variable in the starts equation. The relationship between starts and the lumber/forestry sector shows up indirectly through sales as well as directly with the lumber production variable.

Again the effect of the university is significant and a major forestry strike during 1986 shows up as depressing starts.

Table 9

Summary of Estimated Equation: Total Starts, Prince George			
Explanatory Variables	**Coefficient**	**t-Statistic**	
Constant	1.530397	1.014276	
Lumber prod. (-3)	0.279298	1.051081	
Population change	83.16224	3.955110	
Mortgage rate	-1.431678	-4.883250	
Sales SFD (-1)	0.533901	2.290264	
University dummy	0.438081	1.996787	
Strike Dummy	-0.802885	-3.195624	
AR (4)	-0.289075	-2.575992	
R-squared	0.775736	Adj	0.750001
Durbin-Watson	1.794893		

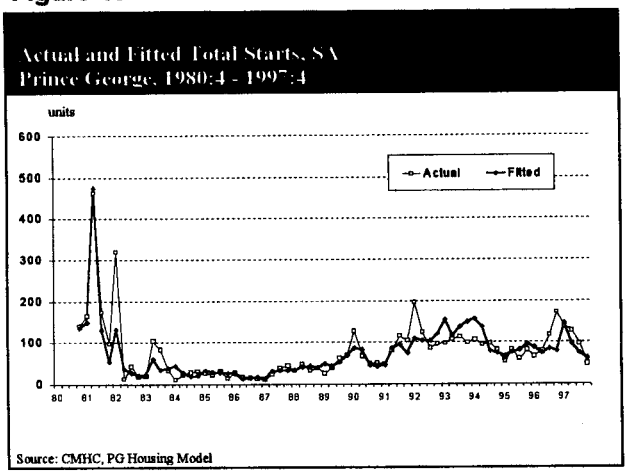
The equation does a very acceptable job of capturing the plunge in starts in the early 1980s, the protracted period of depressed starts during most of the 1980s and the subsequent recovery through 1992 and pullback into the mid-1990s. The results for the total starts equation are displayed in Table 9, and are generally the same as the results for single family starts. Lumber production, however, is not significant, but is kept in the equation for comparative purposes

The lack of significance for lumber production is difficult to explain when it was important for single-family starts. One plausible explanation is that total starts were more volatile in an erratic fashion when there were large numbers of multiple family starts. Note in Figure 45 the large quarterly errors in 1982, 1983, 1990-91 and 1996-97. These were periods of large numbers of multiple family starts. There were no multiple family starts in 1984-1988.

As with SFDs the lagged dependent variable is not significant. In both equations the mortgage rate is an important explanatory variable as is population change.

Given the volatility of the data in the sample period, the equations for Prince George do a good job of picking up the major turning points. The equation is corrected for fourth order serial correlation.

Figure 45



Fort St John Results

The oil & gas sector is the key driver of the Fort St. John economy. Preliminary analysis, as well as anecdotal evidence from discussions with realtors in the area, indicates that the ups and downs in the housing market are closely tied to the oil & gas sector.

The migration of people into and out of Fort St. John is inextricably linked to the oil and gas industry. Hence, household formation and housing demand is directly and strongly related to the oil & gas sector. The expectation is that this relationship will show up clearly in the estimated equations.

The series used in each of the four estimated equations (prices, sales, SFD starts and total starts) to measure the gas sector are:

- The number of wells authorized for drilling, lagged by 3 periods.
- The export price of natural gas.

Data are also available for the number of wells drilled, but the series does not go back as far as authorizations. Over the period when both series are available, they track each other very closely, so authorizations are used in order to extend the estimation period back to the beginning of 1981. The export price of gas is used because it more closely reflects wellhead prices than unit prices, which include distribution costs.

Production of natural gas was also tested in the equations and yielded results similar, but not as significant as the series measuring drilling activity. This may be due to the fact that drilling activity has a much larger multiplier impact on the economy than mere production, and thus is a better proxy for the change in employment and incomes.

The results conform to *a priori* expectations that the housing sector is very dependent upon activity in the gas sector. In each of the equations, drilling intentions is a highly significant variable. The results for gas prices however, are mixed. This is not surprising, given that gas prices are very volatile. Moreover, activity in the oil & gas sector is determined more by longer-term price and demand expectations than annual fluctuations. Consequently, gas prices, on a quarterly basis, should not be expected to have a significant impact on employment, income or general confidence.

House Price Level

The equation follows the structure set out at the beginning of this section on estimation. The equation has a good fit, with 95% of the variation in prices explained by the variables listed in Table 10. As was the case in Prince George, the equation for the (real) average price of single family homes had the best fit of all equations estimated for Fort St. John.

Table 10

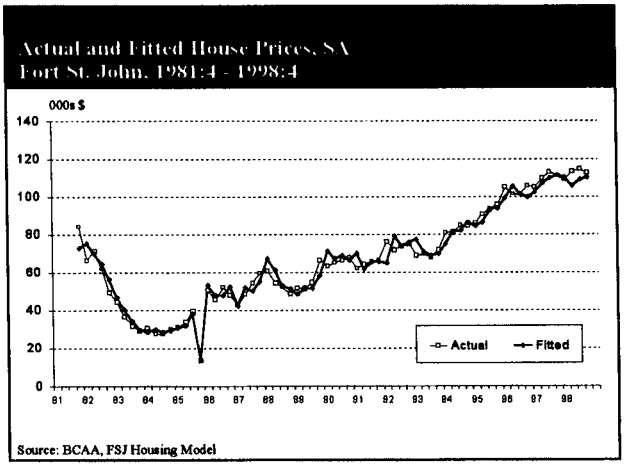
Summary of Estimated Equation: Real Prices SFD, Fort St John			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		11.61540	22.32732
Wells authorised (-3)		0.058058	2.087939
Population change		2.287279	1.576535
Mortgage rate (pdl)		-1.206265	-23.33181
Dummy unusual obs.		-0.042313	-1.373888
AR (1)		1.121969	17.77242
AR (4)		-0.219955	-3.495932
R-squared	0.950381	Adj	0.945655
Durbin-Watson	1.997237		

The number of wells authorized for drilling is a significant variable. The three period lag reflects the delay between authorizations, drilling activity and then the effect on housing prices, which rise following an increase in drilling activity. The export price of gas was correctly signed but not significant, and so it was dropped from the equation. This may be due to the fact that the price of natural gas is not as significant a factor in the development of the gas fields as the desire of pipeline companies to meet growing volume demands in the US.

A lag of the price of single family homes was included in the equation but had a negative relationship so it was dropped. A dummy variable is included in the equation for an unusual, one period decrease in the average price in 1986:4 that could not be explained. Local realtors could not identify any reason for such a sudden decrease and equally quick

recovery. The fluctuation is likely the result of a very unusual mix of sales, or an error in the data. Rather than eliminating the observation, or interpolating to get a new estimate, the dummy variable was included to isolate the effect of the observation in the estimating procedure.

Figure 46



Population was highly significant. This reflects the importance of changes in housing demand.

Interestingly, mortgage rates were insignificant. This may be because the cost of housing is less than the real appreciation in home prices.

Figure 46 shows how closely the equation tracks actual real house prices. Importantly, the model captures the plunge in prices from 1981 to 1985.

Housing Sales

The results for the housing sales equation are not as good as for prices, explaining only 57% of the variation in house sales. The specification results are provided in Table 11.

The measure of drilling activity is strongly significant and positively correlated with sales. However, the real export price of natural was dropped because it was totally insignificant.

Table 11

Summary of Estimated Equation: Sales SFD, Fort St John			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		10.56240	4.978207
Wells authorized (-3)		0.179564	2.358992
Price (SFD) FSJ		-0.538053	-2.887330
Population change		3.454952	0.754335
Mortgage rate (-1)		-0.391015	-2.417671
Dummy unusual obs		0.919173	2.815596
AR (1)		0.350725	2.652282
R-squared	0.567410	Adj	0.526855
Durbin-Watson	2.115230		

The change in population is not significant, but was retained for comparative purposes because population is typically an important explanatory variable. The lack of significance may be due to the fact that the population measure used in the equation does not exactly reflect the actual changes in Fort St. John. The mortgage rate is significant and signed in accordance with expectations.

A dummy variable is included for the unusually high (and unexplained) number of sales that corresponds with the drop in price recorded in 1985. A lagged dependent variable was tested but was not significant.

Figure 47

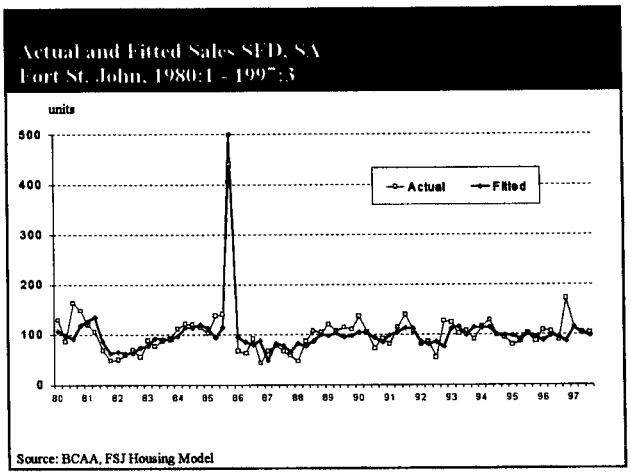


Figure 47 shows how well the model tracks house sales. The spike in 1986 is the odd observation that cannot be explained.

Housing Starts

Both equations for single family starts and total starts fit the data relatively well and all coefficients are correctly signed. The equation specifications are provided in Table 12 and Table 13. The equation for single-family starts is better than the one for total starts. As expected, the results suggest that the gas sector is a major determinant of housing starts. The (real) price of natural gas, however, was not significant and was incorrectly signed in the total starts equation.

In both equations the change in the population in the Peace River regional district was not a significant explanatory variable and was dropped.

The results for both equations indicate that sales are not a strong predictor of starts. Generally sales are a significant predictor of starts because builders respond to rising sales. In Fort St. John, however, the market may be sufficiently small that most homes are owner-built or built on a pre-purchase basis. A more significant factor may be that there was a huge excess supply of unsold homes that had to be absorbed, due to the building boom in 1976-81.

Table 12

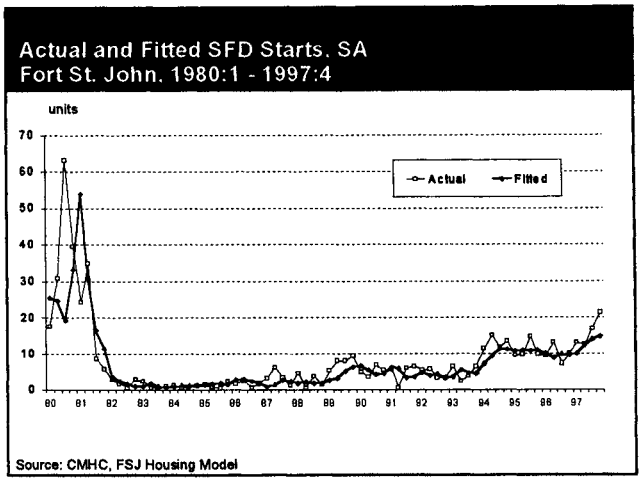
Summary of Estimated Equation: Starts SFD, Fort St John			
Explanatory Variables	**Coefficient**		**t-Statistic**
Constant	-1.286989		-1.168298
Starts SFD (-1)	0.686894		7.253025
Wells authorized (-3)	0.313402		2.150458
Mortgage Rates	-0.486261		-1.437770
Sales SFD (-1)	0.303860		1.419279
AR (1)	-0.422523		-3.439731
R-squared	0.678009	Adj	0.653980
Durbin-Watson	2.005684		

Table 13

Summary of Estimated Equation: Total Starts, Fort St John			
Explanatory Variables	**Coefficient**		**t-Statistic**
Constant	-1.070244		-0.775851
Starts Total (-1)	0.735158		7.987811
Wells authorized (-4)	0.343722		2.307318
Mortgage Rates	-0.549290		-1.269049
Sales SFD (-1)	0.249483		1.030295
AR (1)	-0.479152		-3.541107
AR (2)	-0.392406		-2.818845
AR (3)	-0.391708		-3.194937
R-squared	0.589297	Adj	0.543664
Durbin-Watson	2.159558		

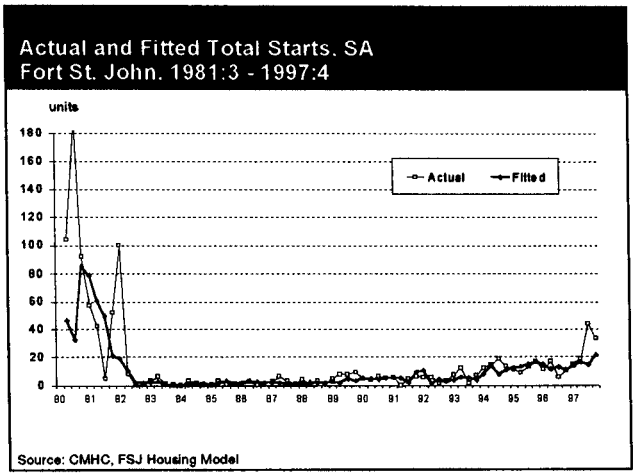
There could have been many years of strong sales activity that did not eliminate the supply overhang. In this situation there would be little incentive to build new houses.

Figure 48



As shown on Figure 48 and Figure 49, starts plunged in the early 1980s, were negligible in the 1980's, and showed modest increases in the 1990s.

Figure 49



Kelowna Results

Kelowna is not dependent upon a single resource sector. Its economy is based on a diversity of service industries. Kelowna was included in the study primarily as a control case, against which to judge the results from the resource communities.

Prior to estimating any equations, the expectation was that resource variables might not be significant explanatory variables because the region has grown due to in-migration and expansion of the tourism industry, the wine industry and manufacturing. Kelowna has also benefited from growth in the provision of government services. Nevertheless, Kelowna would get a positive spillover impact from a generally robust economy, which is generally led by the resource industries. This seems to be the case in correlating the population and migration flows in Kelowna with the province's resource cycles in Chapter III.

Results are much as expected. We tested for lumber production (central interior) and lumber prices as well as mining variables. The best fits were using the forest-related variables, which tended to have the correct sign but lacked significance. For simplicity, and because forestry/lumber is the most prominent resource industry in Kelowna, only the results for the equations specified with lumber variables are presented for each of the four equations.

House Price Levels

The specification for the house price equation is provided in Table 14. Figure 50 shows the performance of the equation in tracking the actual housing prices.

In spite of the fact that the lumber variables are not significant, the equation has a good fit, explaining nearly 91% of the variation in house prices. Population change is the major determinant of housing prices, reflecting the fact that high levels of in-migration coincides with periods of rising real house prices. This result is entirely predictable when looking at the historical census data on population flows and housing.

Lumber production is correctly signed and has a t-statistic that reflects the fact that the lumber sector is not totally insignificant but is also not a highly significant factor in housing market in Kelowna.

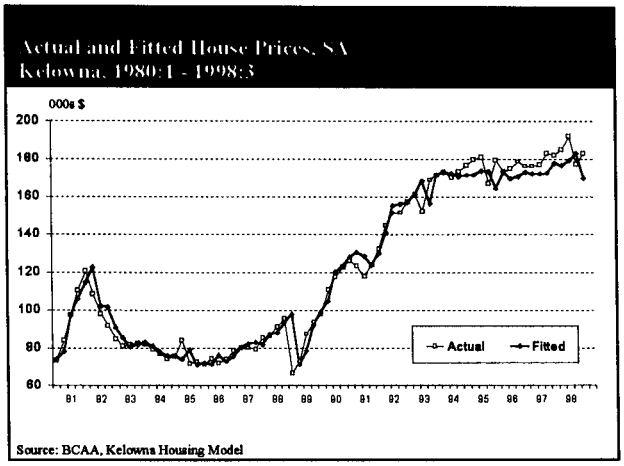
Table 14

Summary of Estimated Equation: Real Prices SFD, Kelowna			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		1.598106	2.294033
Real House Price (-1)		0.873064	16.75751
Lumber prod. (-2)		0.108679	1.252717
Population change		5.931347	3.372269
Mortgage rate (pdl)		-0.013062	-1.348513
R-squared	0.914778	Adj	0.909765
Durbin-Watson	2.090002		

Mortgage rates are correctly signed but are not significant. This likely reflects the fact that Kelowna has been a major retirement destination for many years. Retirees frequently move from the Lower Mainland, or other parts of Canada, and are able to purchase their new

homes without a mortgage, making prices less sensitive to interest rates.

Figure 50



The generally rising house prices also permits existing owners to transfer their increased equity to a new purchase, thereby keeping required mortgage indebtedness lower than otherwise. This should have the effect of making mortgage rates less of a factor in purchasing decisions and determining the prices paid.

The equation has consistently under-predicted the actual prices in the last five years of the sample period. Given the historical record of the equation, this may be an early warning sign of potential downward pressure on house prices.

Housing Sales

The sales equation has a fairly good fit at 71% and all of the variables are correctly signed as shown in Table 15. As was the case with house prices, interest rates do not have a significant effect on sales. There also appears to be some inertia in the Kelowna housing market, as the lagged dependent variable (lag of housing sales) is significant.

The influence of the previous period's sales was not evident in the other communities. It might be that the inertia is due to the relatively steady and strong population growth and economic diversity of the Kelowna area.

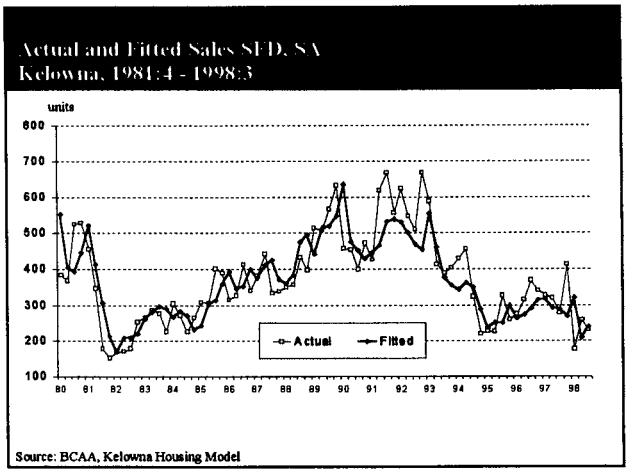
Compared to the other cities in the study, population change appears to be an especially important determinant of sales, which is consistent with expectations. As with the price equation, the lumber variables add little explanatory power to the equation.

Table 15

Summary of Estimated Equation: Sales SFD, Kelowna			
Explanatory Variables	**Coefficient**		**t-Statistic**
Constant	7.330714		3.221508
Sales SFD (-1)	0.468967		4.087213
Lumber prod.(-2)	0.250853		1.181814
Price SFD Kelowna	-0.487114		-3.380212
Population change	26.31904		3.062053
Mortgage rate (-1)	-0.112030		-0.910290
R-squared	0.70993	Adj	0.689212
Durbin-Watson	1.939017		

As Figure 51 shows, the equation does a good job of picking up the general change in housing sales.

Figure 51



Housing Starts

The housing start equations for SFD and total starts are provided in Table 16 and Table 17. In

contrast to the house price and sales equations for Kelowna, lumber production is a significant explanatory variable.

Both of the starts equations have a very good fit. They are the best of all the communities. As with sales, starts appear to have some inertia in Kelowna over the estimation period, indicated by the fact that the previous period's starts is significant in both equations.

In the other regions such inertia was not identified because of substantial period-to-period changes. The fact that Kelowna has not experienced the sharp structural adjustments, that the other communities have, contributes to the starts equations having a better fit than the starts equations for the other communities.

Table 16

Summary of Estimated Equation: Starts SFD, Kelowna			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		-6.242016	-4.189129
Starts SFD (-1)		0.411525	4.961951
Lumber prod.		1.079814	3.978667
Population change		27.26971	2.468962
Sales SFD (-1)		0.434549	3.914196
AR (1)		0.355704	3.295979
AR (1)		0.388143	3.656296
R-squared	0.89277	Adj	0.883441
Durbin-Watson	1.695616		

Testing indicated that the best fit was with no lag in lumber production. We expected a lagged relationship but when lags were introduced the explanatory power of the equation dropped. As a result both equations are specified with no lag in lumber production. The contemporaneous nature of the production variable suggests it may just be a proxy for general economic health and not indicate a causal relationship with the forest industry. Lumber prices were correctly signed, but not significant and so were dropped from both equations.

Table 17

Summary of Estimated Equation: Total Starts, Kelowna			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		-5.365426	-4.052329
Starts Total (-1)		0.579209	7.449006
Lumber prod.		1.018115	4.897520
Population change		21.65959	2.289101
Sales SFD (-1)		0.241924	2.119044
AR(1)		-0.431822	-3.744034
AR(3)		0.247764	2.354251
R-squared	0.827641	Adj	0.813076
Durbin-Watson	1.792147		

In contrast to findings in other regions in the study, mortgage rates were positively correlated in both starts equations.

Although this is not consistent with preliminary expectations, if we consider the record of housing starts in Kelowna outlined in Chapter III, housing starts were way out of proportion to underlying household growth and performance of economic variables. Given the strong significance of the population variable it appears that starts in the region were propelled by migration patterns and were not sensitive to higher rates. This finding is consistent with the results from the price and sales equations

Overall, the starts equations are very effective in simulating the pattern of starts, capturing both steep increases and decreases as shown in Figure 52 and Figure 53.

The SFD equation is better than the total starts equation, in that the R-squared is higher. The slightly worse results for total starts reflects the lumpiness of multi-family starts, as is the case for the other communities

Figure 52

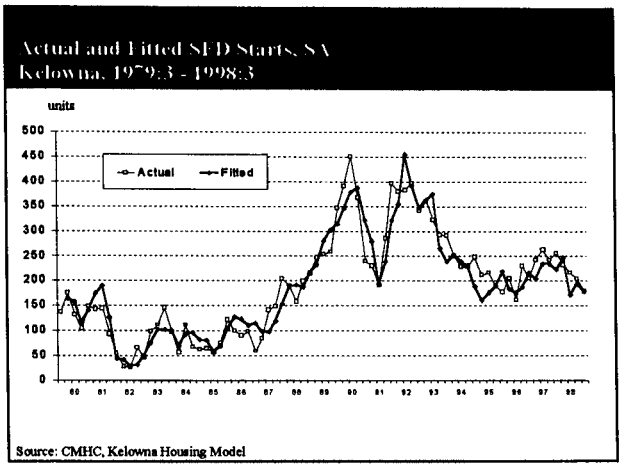
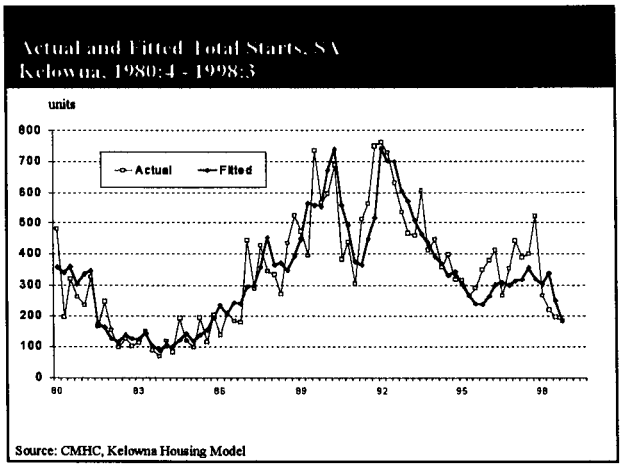


Figure 53



Trail and Rossland

The dependent variables combine housing market data for Trail and Rossland since the communities are about 10 minutes apart. Even though the household and demographic characteristics of the two communities are somewhat different, they both are impacted by the mining industry. Rossland is largely a bedroom suburb of Trail, and many of the people living in Rossland are directly or indirectly employed by Cominco.

The resource variables tested extensively in Trail-Rossland equations were lead and zinc production and prices, because of the importance of the Cominco smelter to the local economy. Originally lead and zinc were summed to obtain combined quarterly production data and a production-weighted price series of the two commodities was utilized.

However, results using the combined price and production data were poor. The series were included as separate variables in subsequent estimations. Zinc was correctly signed but provincial lead production was negatively correlated with house prices and insignificant. In the final specifications for house prices and sales, zinc is the only resource variable retained in the equations.

Plausible explanations for the mining production variables not being good explanatory variables may be that :

- The aggregate BC mining data used is not representative for the Trail-Rossland area.
- Residents of Trail-Rossland, knowing the importance of Cominco to the region, did not attach economic significance to cyclical production and prices, believing the operation would continue to operate regardless of economic conditions in the industry.
- The housing markets in the villages of Fruitvale, Montrose and Warfield, absorbed some of the housing impacts because they are bedroom communities for Trail-Rossland as well. Migration amongst these five communities could be giving spurious results in our model.

Data for housing starts is not available for Trail-Rossland, so we have estimated only equations for housing prices and sales.

House Price Levels

The house price series is the average of the prices in the two cities, weighted by the average volume of sales over the period in each jurisdiction. The estimation results are provided in Table 18 below.

The fit of the price equation is quite good, with an R-squared over 0.76. But the equation will likely not perform well for forecasting over time. The only variable that is correctly signed and significant is the mortgage rate.

Interestingly, population was insignificant and was dropped from the specification, as it was in the Prince George equation. Population, however, was a highly significant variable for Fort St. John and Kelowna, and at least had some power in the Port Alberni and Prince Rupert price equations.

Table 18

Summary of Estimated Equation: Real Prices SFD, Trail & Rossland			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		0.982564	2.206355
Real House Price (-1)		0.923160	25.63810
Zinc prod.(-3)		0.018863	0.659337
Mortgage rate (pdl)		-0.017559	-2.600121
AR (1)		-0.645071	-5.167827
AR (2)		-0.300658	-2.385951
R-squared	0.765596	Adj	0.747565
Durbin-Watson	2.022240		

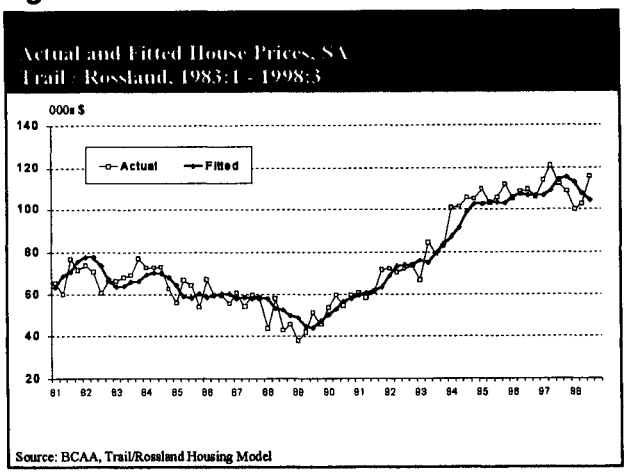
There was extreme serial correlation in the equation. Fist (AR1) and second order (AR2) corrections provided the best fit.

Zinc production and prices are both positively correlated with housing prices. However, neither is significant in the context of the equation. Zinc prices were dropped because they were not significant. This is similar to the other regions where most other resource price series have been dropped from the equations.

Zinc production is retained for comparative purposes with the other regions.

The fact that lead and zinc production does not appear to be especially relevant to the housing market is not surprising. In a market such as Trail-Rossland people may believe that Cominco will continue to operate irrespective of short-term variability in commodity markets. The magnitude of the capital investment mitigates against a complete shutdown. Production may be scaled back and there may be some job losses, but the plant will continue to operate in the belief the cycle will be short.

Figure 54



Even if downturns in the relevant commodity markets result in layoffs, the housing market may not be affected, as people are confident that the smelter will not shut down completely.

The lagged dependent variable is highly significant in the price equation, more so than any of the other equations. As is evident in the actual vs. fitted series shown in Figure 54, prices in Trail-Rossland have been comparatively stable over the sample period with no sharp spikes or dips. This relative stability may be one reason that the lag of house prices is such a strong explanatory variable.

Housing Sales

The equation specification is provided in Table 19 below. As for the price equation, lead production and prices are also not important determinants of the volume of sales in the Trail-Rossland area

Zinc production, however, is correctly signed and significant. Zinc prices are positively correlated but insignificant. Generally resource prices have not proven to be significant in the other community sales equations either.

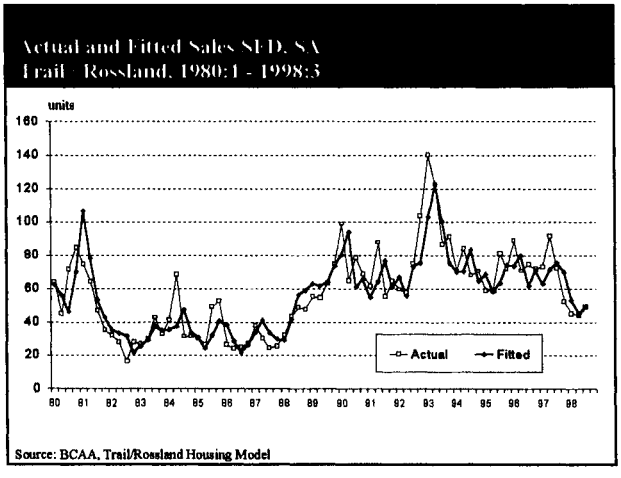
Population was a significant explanatory variable for sales, even though it was not for house prices.

Table 19

Summary of Estimated Equation: Sales SFD, Trail & Rossland

Explanatory Variables	Coefficient	t-Statistic
Constant	1.371416	1.309460
Sales SFD (-1)	0.659811	8.115577
Zinc prod (-2)	0.174322	2.060862
Price SFD Trail/Ross	-0.054095	-0.604897
Population change	30.83965	3.565798
AR (1)	-0.343592	-3.050150
R-squared 0.769575	Adj	0.753348
Durbin-Watson 2.012722		

Figure 55



One difficulty with the equation was that the real mortgage rate had the incorrect sign even though interest rates were correctly signed in the price equation. Consequently, the mortgage rate was dropped from the equation.

House prices are negatively correlated with sales as expected but are not significant. Despite the fact that mortgage rates are not included in the equation, the fit is quite good with an R-squared of almost 0.77. Except for Port Alberni, this is the best fitting house sales equation for the communities, and in line with the other sales equations.

The actual vs fitted performance of the equation is shown in Figure 55.

The performance of the equations for Trail-Rossland suggest that there are long and slow-building, but powerful momentum swings in peoples expectations regarding the economy and the housing market. These swings may be a function of the cumulative erratic changes in the mining industry performance indicators. That may be a reason that the short and volatile cycles in resource production and prices do not show up as being significant.

The lack of data on housing starts precluded us from estimating equations for starts.

Port Alberni Results

The resource variables for the Port Alberni housing equations are newsprint and pulp shipments. In order to obtain a single resource variable the shipments data are summed and the price series are averaged.

House Price Levels

The results for the price equation are reasonable, as shown in Table 20 below. The coefficients all have the correct signs and the overall explanatory power of the equation is high. However, the variable combining shipments of

pulp and newsprint is not significant. The prices of these commodities are also not significant. Still, both are sufficiently important that extending the data series may render them significant and thus are retained in the equation. The shipments series has a relatively long lag which may reflect the delay between changes in manufacturing and changes in shipments. The fact that the shipments are total provincial shipments may also be affecting the relationship.

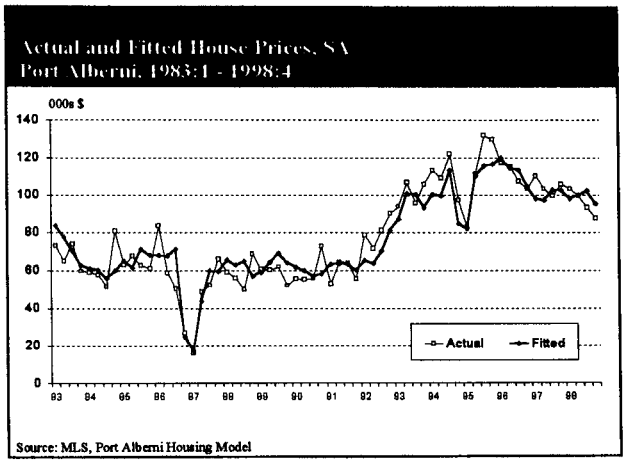
Two dummy variables are included to capture sharp dips in the average price of single family homes in 1987 and 1995. There is no corresponding decline in the relevant commodity variable (although the fact that these are provincial data may mask local conditions). The dips are more likely the result of a change in the composition of sales in the respective quarters.

Table 20

Summary of Estimated Equation: Real Prices SFD, Port Alberni		
Explanatory Variables	**Coeff.**	**t-Statistic**
Constant	6.648533	4.773546
Real House Prices (-1)	0.293400	4.236503
News & pulp ship.(-5)	0.137278	1.095484
News & pulp price(-2)	0.091745	0.599543
Population change	2.832609	0.735603
Mortgage rate (pdl)	-0.024538	-0.644124
87 outlier dummy	-0.936227	-10.72022
95 outlier dummy	-0.263753	-3.079098
AR (2)	0.374351	3.511810
AR (3)	0.367253	3.526505
R-squared 0.817860	Adj	0.787504
Durbin-Watson 1.917322		

The results are similar to Trail/Rossland, the other city in the study that depends heavily upon a large single employer. Mortgage rates are not significant and the resource variables seem to be somewhat relevant. As well, population is not significant, but may have some influence on prices.

Figure 56

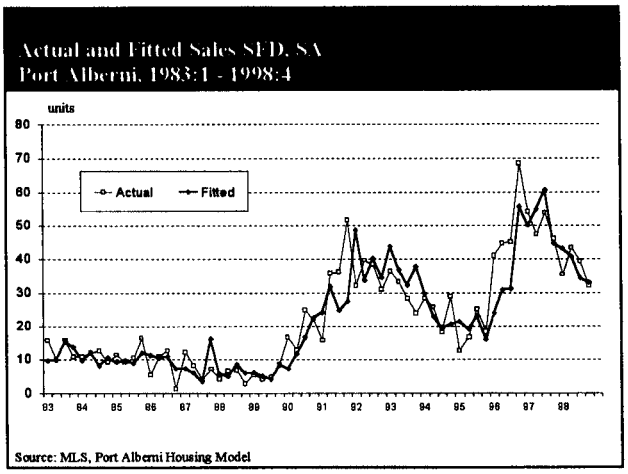


Housing Sales

The overall fit for sales is also quite good, as shown in Table 21. The lagged dependent variable is strongly significant, suggesting there is a certain amount of inertia in the market. House prices are not significant and were dropped from the equation.

Population was also dropped because it was negatively correlated with sales. The fact that the series included all people in the Alberni Clayquot Regional District likely affected the relationship. The ability for people to commute among many different communities on Vancouver Island may also cause the population variable to lose its significance.

Figure 57



The variable combining newsprint and pulp shipments is positively correlated with sales, but is not significant at the 10% level. Because sales are excluded from the equation the newsprint/pulp variable was retained in the equation so the sales equation contains some relationship with the resource sector. Pulp shipments and newsprint shipments were tested individually and yielded similar results as the composite variable.

Overall, the equation adequately captures the major swings in SFD sales. As indicated in Table 21, it was necessary to correct for first and third order correlation. The actual data and fitted results from the equation are shown in Figure 57 on the previous page.

Table 21

Summary of Estimated Equation: Sales SFD, Port Alberni			
Explanatory Variables		**Coeff.**	**t-Statistic**
Constant		0.197742	0.116806
Sales SFD (-1)		0.829188	12.13025
News & pulp ship.(-4)		0.221333	0.845011
Mortgage rate (-1)		-0.525298	-2.187590
AR (1)		-0.446427	-4.432179
AR (3)		0.488775	5.029185
R-squared	0.79403	Adj	0.776273
Durbin-Watson	2.076212		

Housing Starts

As is the case in the other regions, the predictive power of the starts equations is not as good as it is for prices and sales. The estimation parameters are provided in Table 22 and Table 23. The results suggest that the pulp and newsprint markets have an impact on housing but are not quite significant at the 10% level.

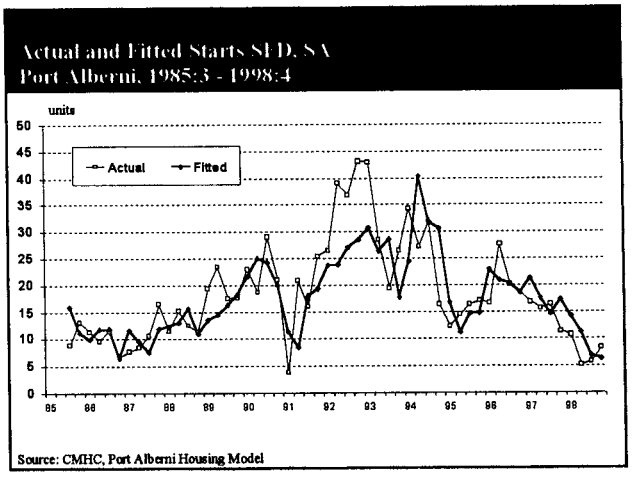
After correcting for autocorrelated errors, interest rates are positively related to single family starts. Although this is the opposite relationship of what was expected, the variable is retained in the equation because it is significant. The result may indicate that starts are not rate sensitive in a smaller market such as Port Alberni. If most houses are built on a pre-sold basis (not on spec) then local economic conditions may simply dominate any interest rate effect.

The previous period's starts did not add any significant predictive power and so were dropped from the equation.

Table 22

Summary of Estimated Equation: Starts SFD, Port Alberni			
Explanatory Variables	**Coefficient**		**t-Statistic**
Constant	-6.085350		-1.571979
News & pulp ship.(-3)	0.798907		1.556415
Mortgage rate	1.113566		2.639844
Sales SFD	0.286356		2.894032
AR(1)	0.563985		4.094581
AR(2)	0.241510		1.680014
R-squared	0.576045	Adj	0.531883
Durbin-Watson	2.034391		

Figure 58



Although the overall fit of the total starts equation is lower, the pulp and newsprint variable is significant and sales are also significant. The steep drop in starts in 1991 results in a lower overall fit because the sudden change is difficult for the equation to adequately

capture. Figure 58 and Figure 59 show the actual vs fitted results for the two starts equations.

The variables and results for total starts are similar to the results for single family starts. Overall, the fit is not as good, however, explaining just 42% of the variation in total starts.

Significant at the 10% level, the pulp market has a stronger influence in the total starts equation than it does in the single family equation. In contrast, sales are not a significant explanatory variable. For total starts the lagged dependent variable is significant.

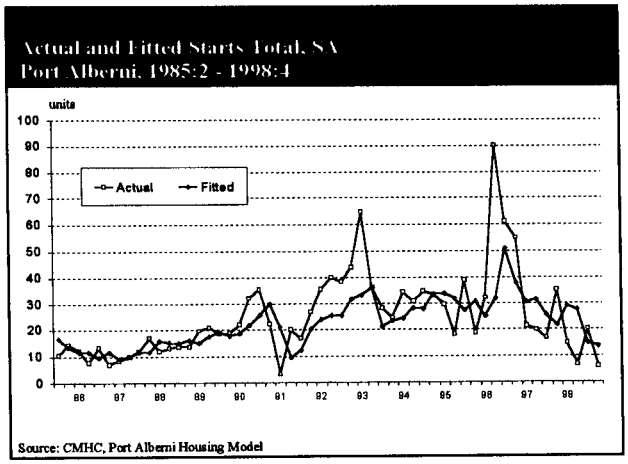
Table 23

Summary of Estimated Equation: Starts Total, Port Alberni			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		-8.745242	-2.052514
Total Starts (-1)		0.627360	4.438896
News & pulp ship.(-4)		1.295378	2.154831
Mortgage rate		0.135668	0.316238
Sales SFD(-1)		0.075082	0.853220
AR (1)		-0.322716	-1.869213
R-squared	0.419447	Adj	0.358973
Durbin-Watson	1.898134		

The relatively poor results for the starts equations is not too surprising given the nature of the housing market in the region. The overbuilding in the 1970s required a prolonged period of consolidation until the excess inventory could be absorbed. Consequently, the variables that would normally determine the starts activity are stripped of their explanatory power.

The positive relationship of interest rates indicates that starts in the area are not sensitive to higher rates. As alluded to before, this is likely because few builders build on spec. The relatively short sample period may also be contributing to the comparatively poor results.

Figure 59



Prince Rupert Results

The results for Prince Rupert are also less promising than the other areas. Fishing and the forest industry are considered key industries in Prince Rupert. We tested variables from both sectors.

Salmon landings, used as a proxy for the fishing industry, was not at all relevant in explaining the housing market in Prince Rupert, and salmon prices were frequently negatively related.

The weak relationship with the salmon market was anticipated for a number of reasons. One problem is that landings data are annual and were interpolated into quarterly data in spite of the fact in reality salmon fishing occurs primarily in the late summer. Another factor that diminishes the relationship is that much of the labour that is employed in the industry is migratory. Fishing boats come from other areas and the majority of the cannery workers come from surrounding villages for the season and then return home. Because the labour associated with fishing is only in Prince Rupert

for a short period of time each year, little impact on the housing market should be anticipated.

The alternative resource variable that we tested in the equations is pulp. This resource variable was chosen because the pulp mill is the largest single employer in the city and when the Skeena Cellulose mill closed recently housing sales dropped substantially. Realtors also considered the forest industry to be the most significant in determining the changes in the housing market.

Overall, using pulp as the resource variable produced better results than when salmon landings and prices were used. Still the results are not as strong as they are in the other regions.

One reason for the less promising results is the relatively short sample period (1986 to 1997). Given the upheaval in the forest industry during this period and the stock adjustment problems all resource-based communities faced, the results are not surprising.

Housing Price Levels

The results for the housing price equation are displayed in Table 24 below. The adjusted R-squared at 0.67 is the lowest of all the price equations estimated in this work. Still the results are quite good..

Table 24

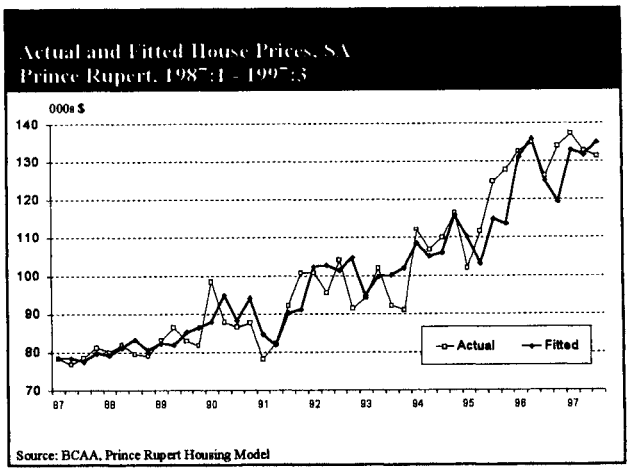
Summary of Estimated Equation: Real Prices SFD, Prince Rupert			
Explanatory Variables		**Coeff.**	**t-Statistic**
Constant		4.065023	2.932949
Real House Prices (-1)		0.591370	4.708014
Pulp ship.(-3)		0.154021	1.857505
Population change		3.455824	0.701569
Mortgage rate (pdl)		-0.037671	-2.007428
AR (3)		0.546309	3.854963
R-squared	0.708611	Adj	0.669234
Durbin-Watson	1.841710		

Pulp shipments are correctly signed and a significant explanatory variable. Pulp prices, originally included in the specification, were dropped because they incorrectly signed and insignificant

Another good result is for the negatively correlated mortgage rate. And although the population variable is not significant, the sample period is shorter than in other regions. The fact that the sample period is only from 1987 to 1997 means the period of high out migration from 1982 to 1986 is not included in the sample.

As was the case in the other price equations, the previous period's average price is a significant variable.

Figure 60



Housing Sales

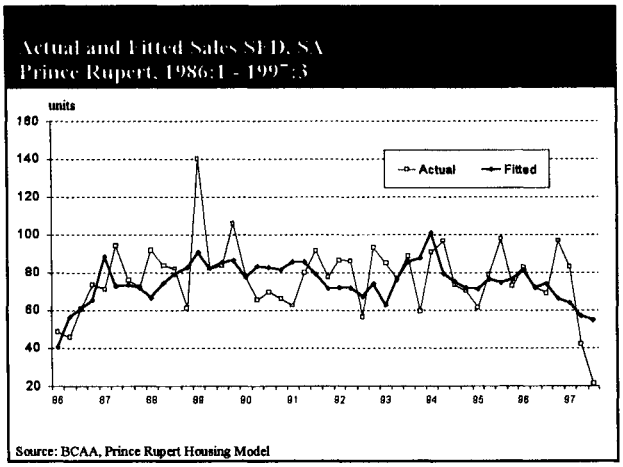
The equation for the SFD sales has a poor overall fit despite being the best of many alternative specifications and having some significant and correctly signed variables. Results are given in Table 25 on the next page.

The adjusted R-squared of 0.23 is the lowest of all sales equations for the various communities. However, population and pulp prices have significant explanatory power. Prices are nearly significant and may well meet the 10% critical level when the sample size is expanded. The mortgage rate variable was dropped because it was insignificant and incorrectly signed.

Table 25

Summary of Estimated Equation: Sales SFD, Prince Rupert		
Explanatory Variables	**Coefficient**	**t-Statistic**
Constant	9.295788	2.208442
Pulp ship.(-2)	0.088346	0.252850
Pulp prices(-3)	0.255132	1.619716
Population change	52.56346	3.620798
Price SFD Pr. Rup.	-0.641684	-1.587892
R-squared 0.296426	Adj	0.229419
Durbin-Watson 1.443655		

Figure 61



A one period lag of starts was tested in the equation but dropped because it was not significant.

As evident in Figure 61, sales generally ranged between 80 and 100 units with the only substantial decline coming at the end of the sample period. The change in sales is difficult to capture because they fluctuate in a fairly random pattern from period to period without any trends.

Housing Starts

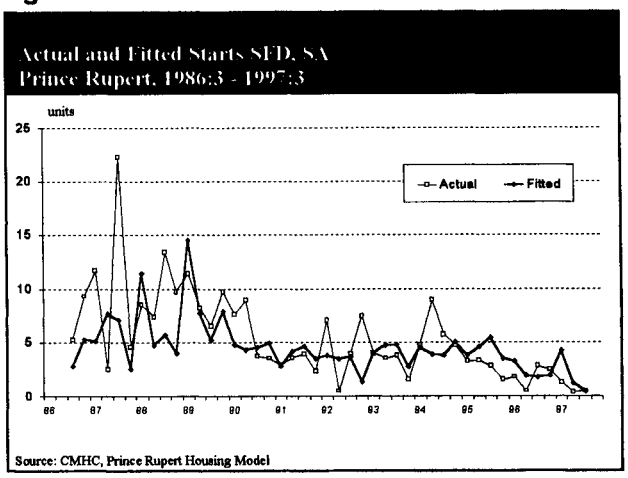
The equations for single family starts and total starts were difficult to estimate, as was the case for the other cities. The fact that there are so few starts in Prince Rupert (generally fewer than 20 single family starts in the 1990s) means that small absolute changes are proportionally large, making it difficult for the equation to account for all changes.

Table 26 provides the regression results. With the equation explaining just 40% of the variation in single family starts, the final results are weak. Many variables were tested including population and a lag of SFD starts, but only three were retained. And of those three, only sales was significant. Pulp shipments wase not significant.

Table 26

Summary of Estimated Equation: Starts SFD, Prince Rupert		
Explanatory Variables	**Coefficient**	**t-Statistic**
Constant	-7.156850	-1.157358
Pulp ship.(-2)	0.530602	0.612856
Population change	16.08685	0.275547
Sales SFD(-1)	1.095504	2.742701
AR(2)	0.546177	3.743408
R-squared 0.396476	Adj	0.336124
Durbin-Watson 1.805251		

Figure 62



Results for the total starts equation are similar to the results for single family dwellings in terms of overall fit and the influence of the

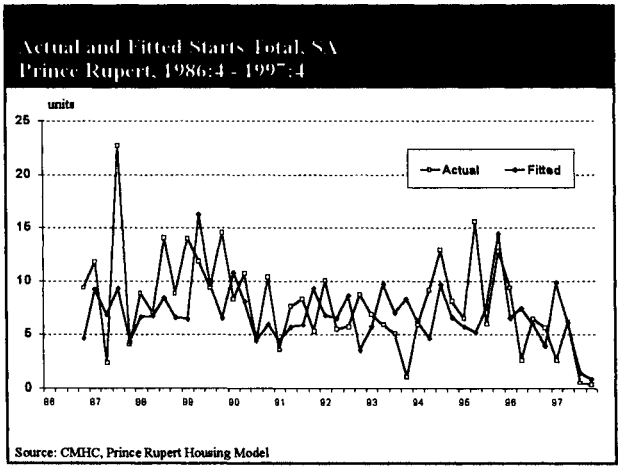
resource variables. The regression results are in Table 27, and Figure 63 shows the model's predicted values vs actuals.

Table 27

Summary of Estimated Equation: Starts Total, Prince Rupert			
Explanatory Variables		**Coefficient**	**t-Statistic**
Constant		-6.187944	-1.024289
Pulp ship.(-2)		0.260802	0.317496
Population change		58.62011	1.140618
Sales SFD(-1)		1.406971	3.848369
AR(2)		0.341529	2.040741
R-squared	0.387609	Adj	0.326370
Durbin-Watson	2.045260		

Again, it is likely that there is the stock adjustment problem that many resource-based communities face, where there is a prolonged period of very low start levels.

Figure 63



Another factor may be the psychology of smaller resource-based cities. The total of 11 single-family starts in 1996-98 is a testament to how the fear about the future of the Skeena pulp mill devastated the housing market. Even though a downturn in the pulp market contributed to the difficulties at Skeena, the pulp shipments variable will not reflect this downturn because it is total provincial shipments. Local conditions and problems with the mill were much worse than what is reflected in the provincial pulp data.

The resource variables do have the significance one would expect, given the structure of the economy and the testimony of local realtors, however, the explanatory power of the equations for Prince Rupert is much less than expected.

Comparison with ARIMA Models

In light of the work entailed in developing equations for each of the regions and the additional time it will take to update the models, and create the forecast data used in the models, it is reasonable to ask why not just use ARIMA modeling techniques? After all, if ARIMA techniques provide just as good a capability to replicate history and identify the significant turning points, then the whole process of model simulation and forecasting can be simplified and costs lowered significantly.

ARIMA modeling is a time series technique that utilizes past information in the series to make projections. Only the data series being forecast is required. Specifying such models is generally quicker than multiple variable models and they are much easier to update.

The are a number of reasons that ARIMA modeling was not originally contemplated.

The primary reason for using explanatory variables in the modeling process was to determine the sensitivity of local housing markets to the resource sector. ARIMA modeling would provide no information to answer this question.

A second consideration was the need to have the capacity to run different scenarios for the different resource industries to determine the possible range of impacts on the housing

markets. ARIMA models are incapable of meeting this requirement.

Third, ARIMA techniques are for short-term forecasting only. In the current context this would mean two or three quarters out. One of the objectives of the project was to develop two to four and even five year projection capabilities.

To contrast the two models we developed ARIMA models several communities. We show the results only for Prince George house prices since they are indicative of all the comparisons. Since the ARIMA model cannot do scenarios, comparisons are made only for a discrete forecast. Both models were estimated over the full sample period. The fit for both models is high. The multiple regression model has an adjusted R-square of 0.9572. The ARIMA has an adjusted R-square of 0.9338. The ARIMA model is estimated using logarithms so the R-squares are more comparable. Despite similar R-squares, the estimation and forecasting properties of the two models are quite different.

The limitations of ARIMA techniques are underscored below where the ARIMA historical estimates are contrasted to our model estimates and the ARIMA forecasts are contrasted to the model forecasts. Even though ARIMA models can be constructed that have similar (but usually slightly lower) explanatory power as multiple regression models, longer-term forecasts from these models are much weaker.

An extreme example of the difference between the two models is presented in Figure 64. Both models are solved dynamically starting in the third quarter of 1981. The multiple regression model tracks the actual price data very closely. In contrast the ARIMA model does not track the data very well, initially missing the downturn in prices and then not capturing the price appreciation in the 1990s.

This example is extreme because the ARIMA model cannot be expected to track prices over such a long time period (this is not what ARIMA models were developed for) but it does underscore the differences between the two approaches.

Even for shorter-term forecasts the ARIMA model is much less accurate than the multiple regression model as shown in Figure 65.. In-sample forecasts beginning in the first quarter of 1996 shows the two models generate divergent forecasts even over a short two-year period.

Figure 64

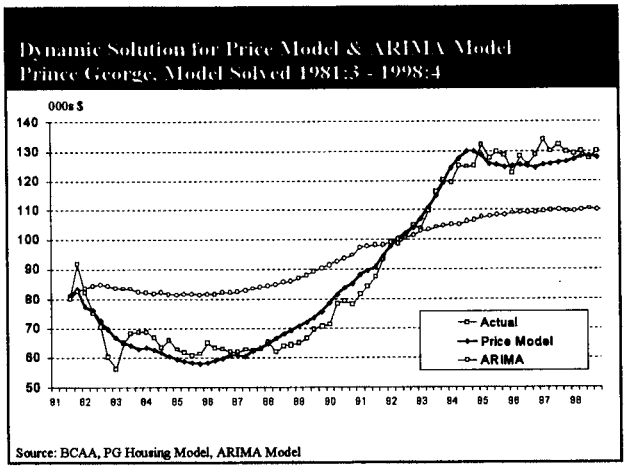
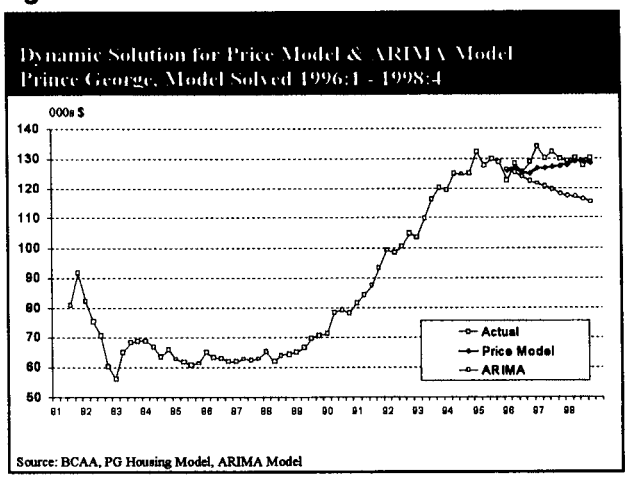


Figure 65



The ARIMA model continues the downward trend in prices between late 1994 through 1995,

which results in a forecast that is much lower than the actual price level by the end of 1998.

The regression model captures the upturn in prices, but still underestimates the actual price level for a short period. By 1998, however, the regression model is making very accurate forecasts.

The two cases we have shown are representative of the general shortcomings of the ARIMA models compared to the regression models we estimated.

While ARIMA models can be useful for forecasting in certain circumstances, their properties do not lend themselves to three key requirements of the task at hand:

- Model the impact of resource variables.
- Track major turning points in the housing market variables.
- Provide reasonably accurate forecasts, for both short and long-term horizons.

In this context, the regression models are much superior to the ARIMA models. They can provide CMHC with a capability to analyze and estimate the impacts of the resource industries on the community housing markets and do scenario simulations to assess the potential future impact of discrete industry outlooks on housing.

In addition to the simulation capabilities the models provide more accurate forecasts than straight ARIMA projections, even over short periods of 1-2 years.

Chapter VI

Housing Market Simulations

In addition to assessing the impact of primary resources on the housing markets in the selected cities, the models that have been developed can be used for forecasting prices, sales and starts.

In this section we look at some reference simulations to 2004 using the models. These simulations are not meant to be forecasts, in the sense that we have narrowed the future into one likely alternative. The forecasts are best seen as illustrative of the way simulations (forecasts) can be generated. The simulations are dependent upon assumptions about the respective RHS variables as they relate to resource sectors and population growth, which is related to the overall economic conditions of each of the region. As well, the simulations require projections about interest rates and inflation rates.

Exogenous Variables

In order to create simulations out to the year 2004, it is necessary to provide a complete set of exogenous variables to solve the model. The consumer price index and 5-year mortgage rates are common to all cities.

The forecasts for the 5-year mortgage rates we used were provided by CMHC. The projection has the 5-year mortgage rate rising to 8.68% in the first half of 2000 and then gradually declining to around 7.6% for 2001 and 2002. In 2003 mortgage rates are projected to rise again. The CPI projections are based upon an assumed rate of inflation of approximately 1.5% each year to the end of the forecast period.

Population figures are provided by the latest BC Stats projections. Population has been forecast for each of the regional districts where the six different cities are located. As was the case with the historical data, the population numbers are annual so it was necessary to interpolate to obtain quarterly data.

All the resource-related variables essentially assume a continuation of recent trends. After updating all resource variables data, exponential smoothing techniques in EViews were used to project quarterly data to the year 2004.

Prince George

Under the scenario for Prince George, the conditions in the lumber industry improve slightly to the end of the forecast period. Lumber production in the northern interior is projected to edge down in 2000 (nearly 1%) and then grow by one quarter of one percent to 2004. The average price of lumber is forecast to fall 5% in 2000 (after increasing 20% in 1999) and then continue a slight downward trend to 2004 (decreasing by 0.3% each year).

According to BC Stats, population growth is forecast to pick up from almost zero in 1999 to 1.0% in 2001 and then come in at roughly 1.25% for each year thereafter.

With these largely status quo assumptions, the model predicts that the housing market in Prince George will be weak in 2000. In 2001, sales and starts are forecast to pick up. The improvement is due to the assumption that the

lumber markets remain fairly stable, population growth improves and interest rates ease. Prices are forecast to rise after 2001. The annual averages and per cent changes for the variables are presented in Table 28 below.

Table 28

Summary of Forecasts: Prince George Annual Averages & Annual Totals				
Yr	Prices $	Sales SFD	Starts SFD	Starts Total
97	129,792	1596	278	379
98	129,780	1306	154	222
99	130,699	1390	134	192
00	130,822	1290	160	202
01	126,645	1460	193	259
02	131,141	1532	232	322
03	139,116	1497	236	334
04	145,667	1428	221	312
Percent Changes				
98	0.0	-18.2	-44.7	-41.4
99	0.7	6.4	-12.6	-13.8
00	0.1	-7.2	19.1	5.3
01	-3.2	13.2	20.4	28.4
02	3.5	4.9	20.2	24.0
03	6.1	-2.3	2.1	3.8
04	4.7	-4.6	-6.5	-6.7

The model is solved beginning in 1997 to help assess how it is performing relative to the actual data prior to running the simulation. This initial testing shows that the price forecasts are very close to the known values, with an average absolute error of less than 1% from the first quarter of 1997 to the end of 1998.

The price projections show a cumulative increase of 11.4% from 1999 to 2004, with virtually all of the gains occurring in 2002-2004.

The model captured the steep downturn in sales in 1997-98. In some instances sales were overestimated for a particular quarter, but were moving in the correct direction in the following quarter. Because the model captured the changes and did not consistently overestimate sales, no adjustments were made to to the sales forecasts.

The simulation shows a dip in sales through 2000, then a slight recovery and another setback in 2003-2004.

Similarly, SFD starts overestimated known values in some quarters during the last couple of years in the sample period, but did not exhibit a pattern of consistent overestimation, so no adjustments to the forecasts were made.

The roughly 20% increase in SFD starts in 2000 through 2002 represents a fairly strong percentage gain. However, it is important to consider that SFD starts were at very low levels in 1999.

In summary, the base case scenario for Prince George shows:

- A trend of rising nominal and real prices through 2004.
- A cycle in sales and starts where the peaks in the next 5 years remain below the 1997 levels.

Fort St John

Drilling activity in the oil and gas sector is the resource variable that drives the Fort St John housing model. Authorized wells are projected to increase by 3% in 2000, after falling by 4% in 1999. After 2000, modest growth of around 1% is projected for drilling activity through to the end of the forecast period. According to BC Stats, population in the region is also going to grow by nearly 1%, following a contraction of nearly 1% in 1999. Population growth is expected to pick up to around 1.25% through to the end of 2004.

The average (SFD) house prices forecast by the model are 8% to 15% lower than the actual prices observed between the beginning of 1997 and the end of 1998. Part of the reason that the model is forecasting housing prices lower than know values is that there was a strong increase prices between 1994 and 1996 that was not captured by the model. The increase occurred in spite of the fact that drilling activity diminished over this period

The price increase may have reflected a temporary excess demand and some speculation in the area. Subsequent price data suggests that the price level fell back to around $100,000 (although more detailed data on just Fort St John are needed to confirm the more general price decrease in the region).

The model does not adequately capture these comparatively rapid price changes so it was necessary to adjust prices upward by $15,000 dollars (roughly an 8% increase) in order to create a reasonable base starting point for the simulation.

Once the price level was adjusted it was not necessary to adjust the level of sales and starts. Forecasts of these variables between 1997 and 1998 were accurate. The relatively small number of starts each quarter means there can be large period-to-period changes that are difficult to capture. Forecast for SFD starts and total starts did not fully capture a number of spikes in housing activity in late 1998 and early 1999, likely related to the price increase discussed above. Nevertheless the model did reflect a general rise in overall activity. Add factors were not used because the forecasts were representative of recent average levels.

Table 29 shows the simulation results for Fort St. John. The forecast for the Fort St. John region suggest the average price of a home will drop by 3% in 2000, following a larger decline in 1999. Thereafter, prices rise, with the cumulative increase through 2004 being 9.8% higher than 1999.

Table 29

Summary of Forecasts: Fort St John Annual Averages & Annual Totals				
Yr	Prices $	Sales SFD	Starts SFD	Starts Total
97	107,093	420	47	61
98	111,771	395	60	86
99	102,324	401	57	95
00	98,903	381	43	69
01	99,640	407	47	72
02	106,919	410	56	90
03	111,103	409	61	101
04	112,379	406	60	100
Percent Change				
98	4.4	-6.0	27.9	41.0
99	-8.5	1.4	-5.5	9.6
00	-3.3	-4.9	-24.2	-26.6
01	0.7	6.8	9.1	4.3
02	7.3	0.8	20.2	24.2
03	3.9	-0.3	8.3	11.8
04	1.1	-0.7	-1.4	-0.3

SFD sales are forecast to be down in 2000, then pick up in 2001, and remain fairly stable to the end of the forecast period. Projected sales remain at levels observed throughout the 1990s.

Starts are projected to be sharply lower in 2000 and then register a significant gain in 2001-2003 before dipping again in 2004..

In summary, the base case simulation for Fort St. John shows:

- A cycle of real and nominal house prices, with nominal prices being higher in 2004 than in 1998, but real prices being lower.
- A cycle in house sales where the peaks remain below the 1997 levels.
- A cycle in starts with the peaks in the forecast being above the 1998 levels.

Kelowna

Lumber production is the resource variable in the Kelowna housing model. The results of the estimations suggest Kelowna is not as resource dependent as the other areas in the study, but lumber production was found to have some positive influence on the housing market. For the simulation annual lumber production in the central interior is projected to grow by 2% in 2000 and then around 2.5%, with some slowing to the end of the forecast period.

Population, an especially important factor in the Kelowna housing market, is forecast by BC Stats to grow by just 0.6% in 2000 and then pick up to 1.0% and 1.5% in 2000 and 2001. In 2003 population growth dips back below 1% and then climbs to 1.6% in 2004.

With these assumptions, the Kelowna model predicts housing prices will fall for 2 more years in 1999 and 2000 and then show a modest increase in 2001-2004. Nominal prices exceed the 1998 level by 2004. In real terms, however, those 2004 prices are below the 1998 prices.

All house price forecasts were adjusted up by $6000 because the model was under predicting the known price level in 1997 and 1998 by that amount.

Housing sales are projected to increase in both 2000 and 2001, following a drop in the previous two years. Single family starts do not rise until 2001 whereas total starts are projected to increase a year earlier. As is the case in the other regions, starts remain at low levels compared to historical averages for the duration of the forecast period.

In summary, Kelowna's housing market is forecast to be weak through 2000, then increase modestly, with both home sales and starts remaining below recent highs, and real prices of homes declining.

Table 30

Summary of Forecasts: Kelowna Annual Averages & Annual Totals				
Yr	Prices $	Sales SFD	Starts SFD	Starts Total
97	180,114	1362	979	1761
98	182,713	911	782	840
99	173,127	903	614	675
00	166,181	963	541	807
01	169,185	1119	678	1059
02	180,992	1177	771	1290
03	191,558	1151	788	1400
04	197,586	1128	799	1459
Percent Change				
98	1.4	-33.1	-20.2	-52.3
99	-5.2	-1.0	-21.5	-19.7
00	-4.0	6.7	-11.9	19.5
01	1.8	16.2	25.4	31.2
02	7.0	5.2	13.8	21.8
03	5.8	-2.2	2.2	8.6
04	3.1	-2.0	1.4	4.2

Trail / Rossland

Zinc production is the resource variable in the Trail / Rossland model. Over the forecast horizon, annual (provincial) zinc production is initially projected to rise by 10% in 2000. This increase follows a 14% reduction in 1999. After 2000 the exponential smoothing technique that was used to generate some of the exogenous resource variables has zinc production trending down just slightly (-0.2%) through the end of 2004.

The population of the Kootenay boundary region, which fell by 1% in 1999, is forecast not to grow in 2000 and then resume a modest increase of 0.3% to the end of the forecast period. This growth rate is substantially lower than what was recorded during the early 1990s but is fairly consistent with population growth in the latter part of the decade.

Table 31

Summary of Forecasts: Trail / Rossland Annual Averages & Annual Totals				
Yr	Prices $	Sales SFD	Starts SFD	Starts Total
97	85,949	287	NA	NA
98	80,320	187	NA	NA
99	85,683	183	NA	NA
00	82,859	210	NA	NA
01	79,111	233	NA	NA
02	80,519	239	NA	NA
03	84,078	240	NA	NA
04	87,037	241	NA	NA
Percent Change				
98	-6.5	-35.0	NA	NA
99	6.7	-1.8	NA	NA
00	-3.3	14.4	NA	NA
01	-4.5	11.0	NA	NA
02	1.8	2.6	NA	NA
03	4.4	0.6	NA	NA
04	3.5	0.3	NA	NA

As evident in Table 31, house prices are forecast to slip for a couple of years and then pick up in 2002. The increase in the last three years of the forecast period has nominal prices pushing to new highs, although real prices remain well below the 1997 and 1999 highs.

Sales activity is forecast to rise 14% in 2000 and 11% in 2001. Even with these sizable increases, sales activity will be lower than in each of the years between 1990 and 1997. In other words sales volume is not projected to make up the decline experienced in the last couple of years.

There are no simulations for starts because there was no historical data to estimate a model.

Port Alberni

Pulp and newsprint are the resource variables for Port Alberni. Under the forecast scenario, newsprint shipments are forecast to remain flat in 2000 and then rise by 1.5% each year through to 2004. Overall newsprint shipments have trended down since 1992 after trending up throughout the 1980s. The scenario thus foresees a modest turn in the volume of newsprint shipped.

Pulp shipments are projected to decline by 1.5% in 2000 then grow by 2% each year of the years thereafter. The decline reflects a pullback from a high level of shipments, while the 2% growth is an extension of a general trend that has been evident over the past 15 years.

The price of newsprint is projected to fall by 2% and 5% in 2001 and 2002 respectively, and then move up 5% in 2003 and 1% in 2004. Pulp prices are projected to be up by 33% in 2000 and then fall by 6% in 2001 and 2002. For the last two years in the forecast pulp prices are assumed to be flat.

Under the projections from BC Stats population falls by 0.8% in 2000 and then by roughly 0.33% each year thereafter.

As evident in Table 32, house prices in Port Alberni are forecast to increase slightly each year between 2000 and 2004. This increase follows a sharp drop in the average MLS price between 1995 and 1999 (approximately 40%). The small increases still leave nominal prices well below early 1990 levels.

Sales are forecast to fall in 2000 and 2001. The main reason for the lower sales is higher interest rates and a lag in the time it takes for sales to recover. Only in 2002 do sales begin to pick up again, but even then the increase through 2004 is modest. Sales in 2004 are still below the 1999 level and less than half the 1997 level.

Single family starts are forecast to rise in 2000 and fall in 2001 and 2002. This result should be interpreted with caution. Housing starts in Port Alberni remain very weak and will likely

continue to be weak in 2000. The projected increase is due to the counter-intuitive result of a positive relationship between starts and interest rates in the equations.

Table 32

Summary of Forecasts:Port Alberni Annual Averages & Annual Totals				
Yr	Prices $	Sales SFD	Starts SFD	Starts Total
97	99,894	213	64	100
98	91,728	175	33	56
99	85,421	120	17	19
00	87,913	80	24	34
01	89,269	67	27	43
02	91,087	76	26	44
03	93,275	90	29	52
04	94,475	97	34	67
Percent Change				
98	-8.2	-17.7	-47.7	-43.6
99	-6.9	-31.5	-49.4	-66.7
00	2.9	-32.9	43.7	78.3
01	1.5	-16.8	11.8	29.4
02	2.0	13.3	-4.1	1.4
03	2.4	18.5	12.3	18.2
04	1.3	8.1	17.2	28.8

The single-family starts equation was adjusted down (by 8) using an add factor. Even after the add-factor, the equation forecasts an increase because of the positive relationship with the mortgage rate.

Total starts follow a similar pattern. They are also forecast to increase in 2000 even though this will not likely materialize.

The results for Port Alberni were among the weakest of all the regions in the study. This in part is due to the fact that the region is small and the series for each of the variables are volatile. As well, the MLS data that were used may not be representative of actual prices because MLS coverage is very low in the city.

In summary the outlook for the Port Alberni housing market is one of weakness, with sales and starts activity well below the levels in the latter years of the sample period. However, the model projections for Port Alberni should be interpreted in light of the fact the model may be biased by the potentially poor quality of the data.

Prince Rupert

The equations for Prince Rupert have some of the same shortcomings as the equations for Port Alberni. The starts equations also have a positive relationship with interest rates and thus are projecting a rise in starts in 2000. The price and sales equations produce more plausible results.

The simulation results are shown in Table 33 below.

Table 33

Summary of Forecasts: Prince Rupert Annual Averages & Annual Totals				
Yr	Prices $	Sales SFD	Starts SFD	Starts Total
97	130,965	180	4	11
98	122,887	166	5	6
99	116,766	179	5	5
00	124,113	243	9	14
01	122,213	274	11	19
02	132,187	248	9	17
03	139,649	236	9	15
04	142,811	234	9	14
Percent Change				
98	-6.2	-7.5	8.1	-42.8
99	-5.0	7.9	0.2	-14.9
00	6.3	35.1	82.4	159.5
01	-1.5	12.8	21.7	35.2
02	8.2	-9.4	-13.0	-11.1
03	5.6	-4.9	-6.5	-12.0
04	2.3	-0.9	0.0	-2.0

For the forecasts, population in the Skeena-Queen Charlotte area is projected to grow by 0.5% in 2000 after falling 3% in 1999. In the years 2001 to 2004 population growth is projected at nearly 1%. For pulp, the projections are the same as were used in the Port Alberni forecasts.

Initial testing of the models showed that the price projection for the recent history was very close to actual observations, and so there was no need to adjust the model for the this series. Prices are forecast to recover somewhat, after two years of fairly large decreases. Nevertheless, real prices in 2004 are still projected to be below the 1997 levels, even if just slightly above the depressed 1999 levels.

The model was overestimating house sales in late 1997 and so sales were adjusted downwards by 10 units for the forecast period. Sales were depressed in late 1997 because of the uncertainty surrounding the Skeena Cellulose pulp mill. The model does not capture the effect of the temporary shutdown in the mill.

Sales are forecast to recover in 2000. The percent change is substantial because levels were very low in the previous year. Following another increase in 2001, sales are forecast to edge down. Despite two years of projected gains, sales in the forecast period remain well below historical, even if above the depressed levels of 1997-1999.

The projections for starts should be interpreted cautiously because of the generally weaker statistical basis of the model. Tuning of the model indicated that it was forecasting quarterly levels of starts approximately 1 unit above known historical values and so both starts series were adjusted downwards by this amount. Even after the adjustment, the total starts increase in 2000 is very large in percentage terms because of the very low levels projected for 1999. The actual increase from 5 units in 1999 to 14 units in 2000 is not a very large absolute change. Moreover, the projected total of 14 units for 2000 is well below historical levels. Probably the best interpretation of the result is that starts in Prince Rupert will be at very low levels for a number of years, but the model cannot predict with reasonable accuracy, changes of a few units.

In summary the model simulations for Prince Rupert suggest a continued weak housing market with only a technical rebound in house prices from severely depressed levels in 1997-1999. Because the projected start levels are so low in absolute terms, there is a high probability of large errors in the projections on a percentage basis.

Summary

The model properties are such that simulations provide cyclical forecasts, reflecting the values of the RHS variables. Housing market variables are sensitive to both resource prices as well as other RHS variables. The challenge in creating realistic scenarios is to make sure that all RHS variables are consistent for any given scenario.

As the models' simulation capabilities are tracked over time and the models re-estimated, the confidence one can put in the orders of magnitude and timing of the simulated cycles should rise and lead to more sophisticated risk analysis.

Appendix A

Data and Methodology Used For Model Estimations and Simulations

Housing Data (LHS Variables)

The housing series data (the dependent variables) include average prices for single family homes, sales of single family homes, single family starts and total starts for the six areas examined in the study, except for Trail / Rossland where starts data were discontinued in the early 1990s. Because these data are no longer collected, equations for starts in this area have not been estimated. All of the housing series data were provided by CMHC. The original series were monthly, beginning in the first month of 1976 and carry through to the end of 1998. Starts data were available up to September 1998.

The housing series were converted to quarterly data. The price data were converted by taking the mean of the monthly observations. The sales and starts data were converted to quarterly observations by summing the three-month intervals.

There are two sources for the price and sales data. The data for the Port Alberni area came from the Multiple Listing Services (MLS) and the data for the other areas is from the British Columbia Assessment Authority (BCAA). The most significant differences to note are (i) the BCAA data covers all property transfers while the MLS data covers only properties listed with the commercial service and (ii) BCAA data are classified by type, while the MLS data combines single family with condos and apartments.

As discussed in the text, working at the regional level means that options for explanatory variables are more limited than would be the case at the provincial level. There is no consistent monthly (or quarterly) series on employment data by city or region going back beyond 1994. Other variables such as capital investment or production are also not tabulated at a regional level. Thus, for purposes of building regional housing models, it was necessary to employ variables such as population or resource production that reflect general trends in other variables such as employment.

Explanatory Variables (RHS Variables)

Prior to estimating the equations it was not known which variables would have the strongest relationship with the different housing markets. A large number of different measures and proxies for the respective resource industries were evaluated and tested. Initially, single variable equations were used to help determine which variables provided the best predictive power for the different housing market variables.

In the forestry dependent areas, variables such as the timber harvest were tested. Different export series were also examined for each of the regions, such as lumber exports or mineral exports. Housing starts in the US were also tested for Prince George, as the majority of interior lumber is shipped south of the border.

For Fort St. John, gas exports and gas productions were both tested. In Trail/Rossland zinc and lead exports were examined. Also TSE indexes of the different industries (forestry, oil & gas and mining) were tested to see if stock market expectations had any relationship with local housing conditions.

Originally for Prince Rupert, fishing was the primary resource that was to be used in the development of the housing market equations. However, early tests of fish harvest and fish exports showed very little relationship. This result was expected because fishing is concentrated in a few months of the year and the local economy is also dependent upon forestry. Fish landings were also re-tested in more fully developed equations, but they were still found to have no effect on the housing market in the area.

This preliminary testing showed that production and price data had the best predictive power in most of the regions. In the case of Fort St. John gas production was a good predictor but drilling activity (or drilling intentions) provided better results.

The resource variables used for each of the regional housing models are described in more detail in the respective sections. The other explanatory variables that are common to all regions come from previous theoretical and empirical work. The other variables used in the models are interest rates, population, and sometimes a dummy variable specific to a particular city.

The equations are all specified using real prices and real interest rates. Real prices were calculated for all price series by deflating nominal prices by the BC consumer price index. A proxy for real interest rates was calculated by subtracting the annual inflation rate from the 5-year mortgage rate. All price series are expressed in Canadian dollars.

The equations are all estimated using seasonally adjusted data. Most of the series used in the equations have seasonal patterns. The Census X-11 procedure included in EViews was used to seasonally adjust the data whenever necessary. All series that are adjusted have the suffix 'SA'.

Initially, the equations were estimated using raw data and dummy variables to capture the seasonal variability in housing prices, sales and starts. The equations performed well and yielded results similar to the equations using seasonally adjusted dependent variables. However, out of sample testing indicated that the seasonally adjusted equations had better forecasting accuracy. One reason that the adjusted series produced slightly better results might be because seasonal dummy variables constrain the seasonal factors to a constant value for the entire time period, when in reality the magnitude of the seasonal patterns changes over time.

Explanatory Variables Common to all Regions

Mortgage interest rates are a consistent explanatory variable across all regions. The rate used was the 5-year mortgage rate because it provided the longest interest rate series. Interest rates appear in any empirical analysis on housing markets. More specifically a proxy for real interest rates is employed in the equations. As stated, real rates are obtained by subtracting the current rate of (CPI) inflation in BC from the posted 5-year mortgage rate. The current rate of inflation can be used because people's expectation of future inflation is heavily weighted by the current rate of price increases.

In initial specifications of housing starts equations, the prime rate was used as the interest rate variable. Prime was used because it could be considered a better reflection of borrowing costs for builders. As the work progressed however, it became evident that the results were essentially the same using

mortgage rates or prime. To simplify updating of the models only the one interest rate series is used in all equations. Another factor was that in many of the small areas most starts (especially single family) are not built on spec and so the builder's borrowing cost is less relevant.

For the price equations the mortgage rate is specified as a polynominal distributed lag to reflect adaptive expectations with respect to interest rates. A four period lag with near and far end restrictions is used. The distributed lag resulted in slightly better results than a simple lag structure. Provincial housing models developed by the Conference Board employ polynomial distributed lags as well. For the sales and starts equations, simple lag structures are used. In these cases, the appropriate lag length was determined by regressing lags of 1 through 12 periods on the dependent variable. The most significant lag length was then selected.

The other variable included in the models for each community is population. The first difference in the population is used, as is frequently the case in empirical work. Ideally, the population aged 25 to 45 would have been used because this demographic group does most of the purchasing of homes, or is included in formation of most households. However, only total population was available on a consistent basis for sub-provincial regions. The original series were annual population estimates from BC statistics. Quarterly data were obtained by interpolating the annual observations. The quadratic average procedure in EViews was used to do the interpolation.

In order for the quantitative models to be more easily maintained, all the data series must be readily available and the models relatively easy to update and/or re-estimate. As discussed in the text there was also an attempt to keep the specifications the same across the different regions. One reason for doing this is that consistency in the overall framework facilitates comparisons across the different regions to help assess the relative importance of resources and assist in making general conclusions. Another factor is that robustness supports the specification of the models.

Initially, a similar specification was applied across all regions. However, as the work progressed, it became evident that some variables were significant in some regions but not in others. After equations were specified for all six regions, some equations were re-estimated dropping variables that were not significant or that were incorrectly signed. The result is that in the final specifications not all variables appear in each region.

Statistical Corrections and Testing

A common problem in time series estimation is serial correlation. That is, residuals from the estimated equation are correlated with their own lagged values. Serial correlation violates the standard assumption of regression theory that the disturbances are not correlated with other disturbances. In the current context, serial correlation probably arises because of (i) inertia, where past effects have a strong effect on current actions and/or (ii) prolonged influence of past behavior or shocks. Prices are a good example of the first, where the past period's price likely is a major factor in the current period's price. In housing starts, overbuilding in response to a sudden change in economic conditions is an example of the latter.

There are a number of tests that can be performed in Eviews to detect serial correlation. The most common test is the Durbin Watson statistic. This test, however, is biased when there are lagged dependent variables in the equation. As well, there is an indeterminate region in the test. Two alternative tests were employed to test for serial correlation. Visual inspection of correlograms was used as a

preliminary indication. If no serial correlation is present, the autocorrelations and partial autocorrelations at all lags should be nearly zero. Alternatively, spikes at particular lags indicate the presence of serial correlation. More rigorous testing was done using Breusch-Godfrey tests to determine the specific order of serial correlation. The advantage of this latter test is that it is not biased when there are lagged dependent variables present.

Originally, all the equations were specified in linear form. The equations were then re-estimated in double log form. In empirical work the latter functional form is useful because the coefficients are interpreted as elasticities, which facilitates comparisons across jurisdictions. Both forms provided similar fits. In some instances R-squares were slightly higher with log-log specifications while in others it was slightly lower than the linear specification. Overall one functional form was not clearly superior to the other in terms of explanatory power. Strictly speaking the R-squares from the two functional forms are not directly comparable. The reason is because the R-square from the regression of the logarithm of the dependent variable on the logarithm of the independent variables gives the proportion of the logarithm of the dependent variable, not the dependent variable itself. In practice, however, under general conditions this problem can be ignored.

For the final specification the log-log models were adopted because RESET tests for some equations suggested the functional form of the linear model was incorrect. In addition, the comparative ease of assessing the impact of changes in the dependent variables on the housing market (elasiticities) with the log-log models supported the use of this functional form.

Following the development of the final specifications, breakpoint tests were conducted. Both the Chow breakpoint and Chow forecasts tests were performed. The purpose of these tests was to test for changes in the structural relationships in each of the regions. The idea of the breakpoint Chow test is to fit an equation separately for sub-samples for each of the estimated equations to determine whether there are significant differences in the estimated equations for the sub-samples.

A significant difference indicates a structural change in the relationship. Chow forecast tests can also be used to identify changes in parameters. This test estimates the models for an initial sub-sample. The estimated model is then used to predict the values of the dependent variable in the remaining data points. A large difference between the actual and predicted values suggests the relationships might not be stable. One difficulty with these tests is that they sometimes provide conflicting results. Results of both tests are summarized following the estimation output for each of the regions.

In general, the testing shows that the relationships in the equations are stable over time. The exception is Kelowna. The testing indicates that the relationships in the price and sales equations for Kelowna change significantly after 1990, or somewhat earlier. In the equations in question, the resource variable (lumber production) is not a significant explanatory variable. Estimating the equation for two distinct periods show that the relationship with lumber production turns from negative in the pre 1990 period to positive after 1990. In both cases population remains an important (and correctly signed) variable. Because Kelowna is the benchmark city, and the resource variable is not especially important, the equations for the full sample period are still retained.

Appendix B

Equation Specifications and Output

Prince George

The four housing equations for Prince George are specified as follows:

LOG(PRPGSA/CPI*100) = C(1) + C(2)*LOG((PRPGSA(-1)/CPI(-1))*100) + C(3)*LOG(LUMNISA(-2)) + C(4)*PDL01 + [AR(4)=C(5)]

LOG(SASFDSA) = C(1) + C(2)*LOG(LUMNISA(-2)) + C(3)*LOG(SPF$C(-1)/CPI(-1)*100) + C(4)*DLOG(POPFG) + C(5)*LOG(PRPGSA/CPI*100) + C(6)*LOG(MTG5(-1)-@PCHY(CPI(-1))*100) + C(7)*UNIV + [AR(1)=C(8)]

LOG(STSFDSA) = C(1) + C(2)*LOG(LUMNISA(-1)) + C(3)*DLOG(POPFG) + C(4)*LOG(MTG5(-1)-@PCHY(CPI(-1))*100) + C(5)*LOG(SASFDSA(-1)) + C(6)*UNIV + C(7)*DSTR

LOG(STTOTSA) = C(1) + C(2)*LOG(LUMNISA(-3)) + C(3)*DLOG(POPFG) + C(4)*LOG(MTG5(-1)-@PCHY(CPI(-1))*100) + C(5)*LOG(SASFDSA(-1)) + C(6)*UNIV + C(7)*DSTR + [AR(4)=C(8)]

Where

PRPGSA	is the average price of single family homes, seasonally adjusted;
CPI	is the BC consumer price index (used to convert prices to 1992 dollars and calculate inflation);
LUMNISA	is lumber production in the northern interior, seasonally adjusted;
PDL01	is a second degree polynomial distributed lag (4 periods) of the real 5-year mortgage rate with near and far end constraints;
SASFDSA	are sales of single family units, seasonally adjusted;
STSFDSA	are single family starts, seasonally adjusted;
STTOTSA	are total starts, seasonally adjusted;
SPF$C	is the price of lumber (spruce-pine-fir) in Canadian dollars;
MTG5	is the 5-year mortgage rate (converted to a real rate);
UNIV	is a dummy variable for the opening of the university;
DSTR	is a dummy variable for a strike;
POPFG	is the population of the Fraser Fort George regional district;
AR	is the autoregressive term (of varying orders).
and	LOG transforms the variables into natural logarithms;
	DLOG is the difference of the natural logarithm
	@PCHY calculates the annual percentage change

Table B-1: Output for Prince George House Price Equation

Dependent Variable: LOG(PRPGSA/CPI*100)
Method: Least Squares
Date: 04/23/00 Time: 08:23
Sample(adjusted): 1981:3 1999:1
Included observations: 71 after adjusting endpoints
Convergence achieved after 8 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	0.43892	0.38174	1.149793	0.2544
LOG((PRPGSA(-1)/CPI(-1))*100)	0.91589	0.02861	32.00854	0.0000
LOG(LUMNISA(-2))	0.10494	0.01857	5.648947	0.0000
PDL01	-0.01971	0.00512	-3.851429	0.0003
AR(4)	-0.3087	0.11401	-2.707617	0.0086

R-squared	0.95970	Mean dependent var	11.4818
Adjusted R-squared	0.95726	S.D. dependent var	0.18304
S.E. of regression	0.03784	Akaike info criterion	-3.64303
Sum squared resid	0.09451	Schwarz criterion	-3.4837
Log likelihood	134.328	F-statistic	392.958
Durbin-Watson stat	2.09403	Prob(F-statistic)	0.00000

Inverted AR Roots	.53+.53i	.53+.53i	-.53+.53i	-.53+.53i

Lag Distribution of LOG(MTG5-@PCHY(CPI)*100)	i	Coeff.	Std. Error	t-Statistic
* .	0	-0.01643	0.00427	-3.85143
* .	1	-0.02628	0.00682	-3.85143
* .	2	-0.02957	0.00768	-3.85143
* .	3	-0.02628	0.00682	-3.85143
* .	4	-0.01643	0.00427	-3.85143
	Sum of Lags	-0.11499	0.02986	-3.85143

Table B-2: Output for Prince George SFD House Sales Equation

Dependent Variable: LOG(SASFDSA)
Method: Least Squares
Date: 04/22/00 Time: 21:18
Sample(adjusted): 1980:1 1997:3
Included observations: 71 after adjusting endpoints
Convergence achieved after 10 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	12.27350	4.373447	2.806367	0.0067
LOG(LUMNISA(-2))	0.367781	0.191076	1.924789	0.0588
LOG(SPF$C(-1)/CPI(-1)*100)	0.282987	0.197789	1.430750	0.1574
DLOG(POPFG)	27.29859	17.21215	1.586007	0.1177
LOG(PRPGSA/CPI*100)	-0.829721	0.376947	-2.201161	0.0314
LOG(MTG5(-1)-@PCHY(CPI(-1))*100)	-0.618577	0.156929	-3.941767	0.0002
UNIV	0.320922	0.161202	1.990805	0.0508
AR(1)	0.533877	0.115591	4.618658	0.0000

R-squared	0.599932	Mean dependent var	5.87516
Adjusted R-squared	0.555480	S.D. dependent var	0.31366
S.E. of regression	0.209122	Akaike info criterion	-0.18600
Sum squared resid	2.755115	Schwarz criterion	0.06896
Log likelihood	14.60270	F-statistic	13.4962
Durbin-Watson stat	1.951632	Prob(F-statistic)	0.00000

Inverted AR Roots .53

Table B-3: Output for Prince George SFD Starts

Dependent Variable: LOG(STSFDSA)
Method: Least Squares
Date: 04/23/00 Time: 08:35
Sample(adjusted): 1979:4 1997:4
Included observations: 73 after adjusting endpoints

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-1.436192	1.337280	-1.073965	0.2867
LOG(LUMNISA(-1))	0.297161	0.213085	1.394563	0.1678
DLOG(POPFG)	27.71439	16.20259	1.710492	0.0919
LOG(MTG5(-1)-@PCHY(CPI(-1))*100)	-1.007458	0.217596	-4.629948	0.0000
LOG(SASFDSA(-1))	0.855507	0.165783	5.160410	0.0000
UNIV	0.555167	0.174022	3.190206	0.0022
DSTR	-0.644278	0.185483	-3.473510	0.0009

R-squared	0.782442	Mean dependent var	3.83118
Adjusted R-squared	0.762664	S.D. dependent var	0.68437
S.E. of regression	0.333404	Akaike info criterion	0.73205
Sum squared resid	7.336444	Schwarz criterion	0.95169
Log likelihood	-19.71992	F-statistic	39.5611
Durbin-Watson stat	1.720186	Prob(F-statistic)	0.00000

Table B-4: Output for Prince George Total Starts Equation

Dependent Variable: LOG(STTOTSA)
Method: Least Squares
Date: 04/23/00 Time: 08:36
Sample(adjusted): 1980:4 1997:4
Included observations: 69 after adjusting endpoints
Convergence achieved after 8 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	1.530397	1.508857	1.014276	0.3145
LOG(LUMNISA(-3))	0.279298	0.265724	1.051081	0.2974
DLOG(POPFG)	83.16224	21.02653	3.955110	0.0002
LOG(MTG5(-1)-@PCHY(CPI(-1))*100)	-1.431678	0.293181	-4.883250	0.0000
LOG(SASFDSA(-1))	0.533901	0.233118	2.290264	0.0255
UNIV	0.438081	0.219393	1.996787	0.0503
DSTR	-0.802885	0.251245	-3.195624	0.0022
AR(4)	-0.289075	0.112219	-2.575992	0.0124

R-squared	0.775736	Mean dependent var	4.03698
Adjusted R-squared	0.750001	S.D. dependent var	0.83931
S.E. of regression	0.419653	Akaike info criterion	1.20987
Sum squared resid	10.74261	Schwarz criterion	1.46890
Log likelihood	-33.74062	F-statistic	30.1430
Durbin-Watson stat	1.794893	Prob(F-statistic)	0.00000

A summary of the tests for structural breaks in the Prince George equations is presented below. Both Chow Breakpoint tests and Chow Forecast tests were done to test for structural breaks.

A Chow breakpoint test can be used to test the equations for structural changes in the relationships.

To perform the test, the data were broken into two sub-samples. Three different breakpoint tests were done for each equation. This meant that the separate equations were estimated comparing the first one-third of the whole sample with the remaining two thirds; with the sample split into two periods; and, comparing the first two-thirds of the sample with the remaining one-third. The Chow breakpoint test is based on a comparison of the sum of squared residuals obtained by fitting a single equation to the entire sample with the sum of squared residuals obtained when separate equations are fit to each sub-sample of the data.

The other tests that were done to examine for structural breaks were the Chow forecast test. The forecast test estimates the equations using a sub-sample of the total number of observations (in this case one-third, one-half and two thirds again). The estimated model is then used to predict the values of the dependent variable for the remaining data points. A large difference between the actual and predicted values casts

doubt on the stability of the estimated relation over the two sub-samples.

In order to conduct the tests for the sales and both starts equations for Prince George, it was necessary to drop the dummy variable for the opening of the university. If the dummy variables are not dropped the OLS equations could not be solved because in the sub-samples the vector contains only zeros resulting in a singular matrix.

Table B-5: Tests for Structural Breaks - Prince George Equations

Equation	Test	1986:1		1990:1		1996:1	
		reject	F stat	reject	F stat	reject	F stat
Prices	Break point	Yes	4.50	No	0.25	No	0.55
	Forecast	No	0.42	No	0.27	No	0.20
Sales	Break point	No	1.13	Yes	2.54	No	1.01
	Forecast	No	0.64	No	1.29	No	1.02
Starts SFD	Break point	No	1.63	Yes	2.07	No	0.40
	Forecast	No	0.93	No	0.56	No	0.26
Starts total	Break point	No	1.19	Yes	2.21	No	0.45
	Forecast	No	0.32	No	0.52	No	0.36

The breaks for the tests were 1986:1, 1990:1 and 1996:1.
Null hypothesis: No structural break.

The results indicate that overall the equations are stable. However, the two tests do provide conflicting results when the equation is split in the middle (1990:1). The Breakpoint tests suggest that the relationships change between the pre-1990 period and the post 1990 period while the Forecast test does not detect a change. Estimating the sales equation for the two sub samples reveals that the main change occurs for the population variable. Prior to 1990 sales were positively correlated with the change in the population and following 1990 the relationship turns negative. Because of the conflicting result and the fact that population change should be positively related to sales, the complete sample is retained for modeling and forecasting purposes. The differences were similar for the starts equations and no alterations to the sample period were undertaken.

Fort St. John

The four housing equations for Fort St John are specified as follows:

LOG(PRFSJSA/CPI*100) = C(1) + C(2)*LOG(WELLSSA(-3)) + C(3)*DLOG(POPPR) + C(4)*DOUT + C(5)*PDL01 + [AR(1)=C(6),AR(4)=C(7)]

LOG(SASFDSA) = C(1) + C(2)*LOG(WELLSSA(-3)) + C(3)*LOG(PRFSJSA/CPI*100) + C(4)*DLOG(POPPR) + C(5)*LOG(MTG5(-1)-@PCHY(CPI(-1))*100) + C(6)*DOUT + [AR(1)=C(7)]

LOG(STSFDSA) = C(1) + C(2)*LOG(STSFDSA(-1)) + C(3)*LOG(WELLSSA(-3)) + C(4)*LOG(MTG5-(@PCHY(CPI)*100)) + C(5)*LOG(SASFDSA(-1)) + [AR(1)=C(6)]

LOG(STTOTSA) = C(1) + C(2)*LOG(STTOTSA(-1)) + C(3)*LOG(WELLSSA(-4)) + C(4)*LOG(MTG5-(@PCHY(CPI)*100)) + C(5)*LOG(SASFDSA(-1)) + [AR(1)=C(6),AR(2)=C(7),AR(3)=C(8)]

where

PRFSJSA	is the average price of single family homes, seasonally adjusted;
CPI	is the BC consumer price index (used to convert prices to 1992 dollars and calculate inflation);
WELLSSA	is the number of wells authorized in the province, seasonally adjusted;
PDL01	is a second degree polynomial distributed lag (4 periods) of the real 5-year mortgage rate with near and far end constraints;
SASFDSA	is the sales of single family units, seasonally adjusted;
STSFDSA	are single family starts, seasonally adjusted;
STTOTSA	are total starts, seasonally adjusted;
MTG5	is the 5-year mortgage rate (converted to a real rate);
POPPR	is the population of the Peace River regional district;
AR	is an autoregressive term (of varying orders).
and	LOG transforms the variables into natural logarithms; DLOG is the difference of the natural logarithm @PCHY calculates the annual percentage change

Table B-6: Output for Fort St John House Price Equation

Dependent Variable: LOG(PRFSJSA/CPI*100)
Method: Least Squares
Date: 04/24/00 Time: 12:23
Sample(adjusted): 1981:4 1999:1
Included observations: 70 after adjusting endpoints
Convergence achieved after 12 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	11.61540	0.52023	22.32732	0.0000
LOG(WELLSSA(-3))	0.058058	0.02781	2.087939	0.0409
DLOG(POPPR)	2.287279	1.45083	1.576535	0.1199
DOUT	-1.206265	0.05170	-23.33181	0.0000
PDL01	-0.042313	0.03080	-1.373888	0.1743
AR(1)	1.121969	0.06313	17.77242	0.0000
AR(4)	-0.219955	0.06292	-3.495932	0.0009

R-squared	0.950381	Mean dependent var	11.1485
Adjusted R-squared	0.945655	S.D. dependent var	0.33293
S.E. of regression	0.077613	Akaike info criterion	-2.17952
Sum squared resid	0.379502	Schwarz criterion	-1.95467
Log likelihood	83.28302	F-statistic	201.112
Durbin-Watson stat	1.997237	Prob(F-statistic)	0.00000

Inverted AR Roots	.87+.19i	.87 - .19i	-.31+.43i	-.31 - .43i

Lag Distribution of LOG(MTG5-(@PCHY(CPI)*100))		i	Coeff.	Std. Error	t-Statistic
*	.	0	-0.03627	0.02640	-1.37389
*	.	1	-0.06045	0.04400	-1.37389
*	.	2	-0.07254	0.05280	-1.37389
*	.	3	-0.07254	0.05280	-1.37389
*	.	4	-0.06045	0.04400	-1.37389
*	.	5	-0.03627	0.02640	-1.37389
		Sum of Lags	-0.33850	0.24638	-1.37389

Table B-7: Output for Fort St John House Sales Equation

Dependent Variable: LOG(SASFDSA)
Method: Least Squares
Date: 04/24/00 Time: 12:24
Sample(adjusted): 1980:1 1997:3
Included observations: 71 after adjusting endpoints
Convergence achieved after 9 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	10.56240	2.121728	4.978207	0.0000
LOG(WELLSSA(-3))	0.179564	0.076119	2.358992	0.0214
LOG(PRFSJSA/CPI*100)	-0.538053	0.186350	-2.887330	0.0053
DLOG(POPPR)	3.454952	4.580128	0.754335	0.4534
LOG(MTG5(-1)-@PCHY(CPI(-1))*100)	-0.391015	0.161732	-2.417671	0.0185
DOUT	0.919173	0.326458	2.815596	0.0065
AR(1)	0.350725	0.132235	2.652282	0.0101

R-squared	0.567410	Mean dependent var	4.56202
Adjusted R-squared	0.526855	S.D. dependent var	0.35423
S.E. of regression	0.243656	Akaike info criterion	0.10727
Sum squared resid	3.799571	Schwarz criterion	0.33035
Log likelihood	3.191967	F-statistic	13.9910
Durbin-Watson stat	2.115230	Prob(F-statistic)	0.00000

Inverted AR Roots .35

Table B-8: Output for Fort St John SFD Starts Equation

Dependent Variable: LOG(STSFDSA)
Method: Least Squares
Date: 04/24/00 Time: 12:25
Sample(adjusted): 1979:4 1997:4
Included observations: 73 after adjusting endpoints
Convergence achieved after 5 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-1.286989	1.101593	-1.168298	0.2468
LOG(STSFDSA(-1))	0.686894	0.094704	7.253025	0.0000
LOG(WELLSSA(-3))	0.313402	0.145737	2.150458	0.0351
LOG(MTG5-(@PCHY(CPI)*100))	-0.486261	0.338205	-1.437770	0.1552
LOG(SASFDSA(-1))	0.303860	0.214095	1.419279	0.1605
AR(1)	-0.422523	0.122836	-3.439731	0.0010

R-squared	0.678009	Mean dependent var	1.48937
Adjusted R-squared	0.653980	S.D. dependent var	1.25048
S.E. of regression	0.735576	Akaike info criterion	2.30229
Sum squared resid	36.25180	Schwarz criterion	2.49055
Log likelihood	-78.03360	F-statistic	28.2160
Durbin-Watson stat	2.005684	Prob(F-statistic)	0.00000

Inverted AR Roots -.42

Table B-9: Output for Fort St John Total Starts Equation

Dependent Variable: LOG(STTOTSA)
Method: Least Squares
Date: 04/24/00 Time: 12:26
Sample(adjusted): 1980:2 1997:4
Included observations: 71 after adjusting endpoints
Convergence achieved after 9 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-1.0702	1.379446	-0.775851	0.4407
LOG(STTOTSA(-1))	0.73516	0.092035	7.987811	0.0000
LOG(WELLSSA(-4))	0.34372	0.148970	2.307318	0.0243
LOG(MTG5-(@PCHY(CPI)*100))	-0.5493	0.432836	-1.269049	0.2091
LOG(SASFDSA(-1))	0.24948	0.242147	1.030295	0.3068
AR(1)	-0.4792	0.135311	-3.541107	0.0008
AR(2)	-0.3924	0.139208	-2.818845	0.0064
AR(3)	-0.3917	0.122603	-3.194937	0.0022

R-squared	0.5893	Mean dependent var	1.63345
Adjusted R-squared	0.54366	S.D. dependent var	1.5649
S.E. of regression	1.05713	Akaike info criterion	3.05480
Sum squared resid	70.4038	Schwarz criterion	3.30975
Log likelihood	-100.44	F-statistic	12.9137
Durbin-Watson stat	2.15955 8	Prob(F-statistic)	0.00000

Inverted AR Roots	.11+.74i	.11 -.74i	-.71

The tests for structural breaks, shown in Table B-10 below, indicate that the relationships in each of the four equations in the Fort St John area are stable.

Table B-10: Tests for Structural Breaks - Fort St John Equations

Equation	Test	1986:1		1990:1		1996:1	
		reject	F stat	reject	F stat	reject	F stat
Prices	Break point	No*	1.66	Yes	2.75	No	1.34
	Forecast	No	1.14	No	0.73	No	1.07
Sales	Break point	No*	1.39	No	1.44	No	1.35
	Forecast	No	1.31	No	0.69	No	0.91
Starts SFD	Break point	No	0.64	No	0.84	No	0.10
	Forecast	No	0.77	No	0.45	No	0.09
Starts total	Break point	No	0.71	No	0.43	No	0.23
	Forecast	No	0.48	No	0.52	No	0.15

Null hypothesis: no structural break* break in sample is 1985:1 because 1986:1 is outlying observation

Kelowna

The four housing equations for Kelowna are specified as follows:

LOG(PRKELSA/CPI*100) = C(1) + C(2)*LOG(PRKELSA(-1)/CPI(-1)*100) +
C(3)*DLOG(LUMCISA(-2)) + C(4)*DLOG(POPCO) + C(5)*PDL01

LOG(SASFDSA) = C(1) + C(2)*LOG(SASFDSA(-1)) + C(3)*LOG(LUMCISA(-2)) +
C(4)*LOG(MTG5(-1)-@PCHY(CPI(-1))*100) + C(5)*DLOG(POPCO) +
C(6)*LOG(PRKELSA/CPI*100)

LOG(STSFDSA) = C(1) + C(2)*LOG(STSFDSA(-1)) + C(3)*LOG(LUMCISA) +
C(4)*DLOG(POPCO) + C(5)*LOG(SASFDSA) + [AR(2)=C(6),AR(3)=C(7)]

LOG(STTOTSA) = C(1) + C(2)*LOG(STTOTSA(-1)) + C(3)*LOG(LUMCISA) +
C(4)*DLOG(POPCO) + C(5)*LOG(SASFDSA(-2)) + [AR(1)=C(6),AR(3)=C(7)]

where

PRKELSA	is the average price of single family homes, seasonally adjusted;
CPI	is the BC consumer price index (used to convert prices to 1992 dollars and calculate inflation);
LUMCISA	is lumber production in the central interior, seasonally adjusted;
PDL01	is a second degree polynomial distributed lag (4 periods) of the real 5-year mortgage rate with near and far end constraints;
SASFDSA	is the sales of single family units, seasonally adjusted;
SPF$C	is the price of lumber (spruce-pine-fir) in Canadian dollars;
STSFDSA	are single family starts, seasonally adjusted;
STTOTSA	are total starts, seasonally adjusted;
MTG5	is the 5-year mortgage rate (converted to a real rate);
POPCO	is the population of the Central Okanagan regional district;
AR	is an autoregressive term (of varying orders).
and	LOG transforms the variables into natural logarithms; DLOG is the difference of the natural logarithm @PCHY calculates the annual percentage change

Table B-11: Output for the Kelowna House Price Equation

Dependent Variable: LOG(PRKELSA/CPI*100)
Method: Least Squares
Date: 04/24/00 Time: 12:55
Sample(adjusted): 1980:3 1998:3
Included observations: 73 after adjusting endpoints

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	1.598106	0.69664	2.294033	0.0249
LOG(PRKELSA(-1)/CPI(-1)*100)	0.873064	0.05210	16.75751	0.0000
DLOG(LUMCISA(-2))	0.108679	0.08675	1.252717	0.2146
DLOG(POPCO)	5.931347	1.75886	3.372269	0.0012
PDL01	-0.013062	0.00969	-1.348513	0.1820

R-squared	0.914778	Mean dependent var	11.7909
Adjusted R-squared	0.909765	S.D. dependent var	0.22549
S.E. of regression	0.067735	Akaike info criterion	-2.4804
Sum squared resid	0.311990	Schwarz criterion	-2.3235
Log likelihood	95.53387	F-statistic	182.480
Durbin-Watson stat	2.090002	Prob(F-statistic)	0.00000

Lag Distribution of LOG(MTG5-@PCHY(CPI)*100)	i	Coeff.	Std. Error	t-Statistic
* .	0	-0.01088	0.00807	-1.34851
* .	1	-0.01742	0.01291	-1.34851
* .	2	-0.01959	0.01453	-1.34851
* .	3	-0.01742	0.01291	-1.34851
* .	4	-0.01088	0.00807	-1.34851
	Sum of Lags	-0.07619	0.05650	-1.34851

Table B-12: Output for Kelowna House Sales Equation

Dependent Variable: LOG(SASFDSA)
Method: Least Squares
Date: 04/24/00 Time: 12:56
Sample(adjusted): 1979:4 1998:3
Included observations: 76 after adjusting endpoints

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	7.330714	2.275554	3.221508	0.0019
LOG(SASFDSA(-1))	0.468967	0.114740	4.087213	0.0001
LOG(LUMCISA(-2))	0.250853	0.212261	1.181814	0.2413
LOG(MTG5(-1)-@PCHY(CPI(-1))*100)	-0.112030	0.123070	-0.910290	0.3658
DLOG(POPCO)	26.31904	8.595227	3.062053	0.0031
LOG(PRKELSA/CPI*100)	-0.487114	0.144108	-3.380212	0.0012

R-squared	0.709931	Mean dependent var	5.86346
Adjusted R-squared	0.689212	S.D. dependent var	0.36057
S.E. of regression	0.201012	Akaike info criterion	-0.29525
Sum squared resid	2.828407	Schwarz criterion	-0.11124
Log likelihood	17.21942	F-statistic	34.2644
Durbin-Watson stat	1.939017	Prob(F-statistic)	0.00000

Table B-13: Output for Kelowna SFD Starts

Dependent Variable: LOG(STSFDSA)
Method: Least Squares
Date: 04/24/00 Time: 12:57
Sample(adjusted): 1979:4 1998:3
Included observations: 76 after adjusting endpoints
Convergence achieved after 8 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-6.242016	1.490051	-4.189129	0.0001
LOG(STSFDSA(-1))	0.411525	0.082936	4.961951	0.0000
LOG(LUMCISA)	1.079814	0.271401	3.978667	0.0002
DLOG(POPCO)	27.26971	11.04501	2.468962	0.0160
LOG(SASFDSA)	0.434549	0.111019	3.914196	0.0002
AR(2)	0.355704	0.107921	3.295979	0.0016
AR(3)	0.388143	0.106158	3.656296	0.0005

R-squared	0.892766	Mean dependent var	5.09347
Adjusted R-squared	0.883441	S.D. dependent var	0.64522
S.E. of regression	0.220282	Akaike info criterion	-0.10023
Sum squared resid	3.348179	Schwarz criterion	0.11444
Log likelihood	10.80871	F-statistic	95.7420
Durbin-Watson stat	1.695616	Prob(F-statistic)	0.00000

Inverted AR Roots	.89	-.44+.49i	-.44 -.49i

Table B-14: Output for Kelowna Total Housing Starts Equation

Dependent Variable: LOG(STTOTSA)
Method: Least Squares
Date: 04/24/00 Time: 12:58
Sample(adjusted): 1979:4 1999:1
Included observations: 78 after adjusting endpoints
Convergence achieved after 7 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-5.365426	1.324035	-4.052329	0.0001
LOG(STTOTSA(-1))	0.579209	0.077757	7.449006	0.0000
LOG(LUMCISA)	1.018115	0.207884	4.897520	0.0000
DLOG(POPCO)	21.65959	9.462051	2.289101	0.0251
LOG(SASFDSA(-2))	0.241924	0.114167	2.119044	0.0376
AR(1)	-0.431822	0.115336	-3.744034	0.0004
AR(3)	0.247764	0.105241	2.354251	0.0213

R-squared	0.827641	Mean dependent var	5.66689
Adjusted R-squared	0.813076	S.D. dependent var	0.59824
S.E. of regression	0.258647	Akaike info criterion	0.21875
Sum squared resid	4.749771	Schwarz criterion	0.43025
Log likelihood	-1.531325	F-statistic	56.8220
Durbin-Watson stat	1.792147	Prob(F-statistic)	0.00000

Inverted AR Roots	.51	-.47 -.51i	-.47+.51i

In Kelowna there appears to be structural breaks in the sales equation and (to a lesser extent) in the price equation. This may be because resources are not a significant basic sector in the region, but may, for some period of time, be a proxy for an omitted variable, thereby giving us erratic relationships.

Separate regressions for the period up to 1990:1 and post 1990:1 indicate that the influence of lumber in the two periods is reversed. Between 1979 and 1990 lumber production is negatively correlated with sales and then after 1990 it has a positive impact on sales. For the complete sample, lumber production in the central interior is not significant. However, it was retained as an explanatory variable for comparative purposes because Kelowna was the benchmark city in the study. Dropping lumber production does not cause instability in the equation and does not alter the results for the other variables significantly.

Another change is the effect of the lagged dependent variable. Prior to 1990:1, sales (lagged one period) are strongly significant. In the equation solved for the post 1990:1 period, however, the previous period's sales are insignificant.

Table B-15: Tests for Structural Breaks - Kelowna Equations

Equation	Test	1986:1		1990:1		1996:1	
		reject	F stat	reject	F stat	reject	F stat
Prices	Break point	Yes	2.67	Yes	4.03	Yes	2.29
	Forecast	Yes	2.53	No	0.56	No	0.76
Sales	Break point	Yes	5.02	Yes	3.12	Yes	2.37
	Forecast	No	1.51	Yes	1.61	Yes	1.66
Starts SFD	Break point	Yes	2.11	Yes	2.15	No	0.76
	Forecast	No	0.59	No	0.44	No	0.44
Starts total	Break point	Yes	1.87	No	1.53	No	1.57
	Forecast	No	0.97	No	0.74	No	1.27

The breaks for the tests were 1986:1, 1990:1 and 1996:1.

Null hypothesis: No structural break.

Trail / Rossland

The two housing equations for the Trail/Rossland area are specified as follows:

LOG(PRTRROSSWT/CPI*100) = C(1) + C(2)*LOG(PRTRROSSWT(-1)/CPI(-1)*100) + C(3)*LOG(ZINCPROSA(-3)) + C(4)*PDL01 + [AR(1)=C(5),AR(2)=C(6)]

LOG(SATRROSSSA) = C(1) + C(2)*LOG(SATRROSSSA(-1)) + C(3)*LOG(ZINCPROSA(-2)) + C(4)*LOG(PRTRROSSWT/CPI*100) + C(5)*DLOG(POPKB) + [AR(4)=C(6)]

where

PRTRROSSWT is the weighted average price of single family homes in Trail and Rossland;

CPI	is the BC consumer price index (used to convert prices to 1992 dollars and calculate inflation);
ZINCPROSA	is zinc production, seasonally adjusted;
PDL01	is a second degree polynomial distributed lag (4 periods) of the real 5-year mortgage rate with near and far end constraints;
SASFDSA	are the combined sales of single family units in Trail and Rossland, seasonally adjusted;
MTG5	is the 5-year mortgage rate (converted to a real rate);
POPKB	is the population of the Kootenay Boundary regional district;
AR	is an autoregressive term (of varying orders).
and	LOG transforms the variables into natural logarithms;
	DLOG is the difference of the natural logarithm
	@PCHY calculates the annual percentage change

Table B-16: Output for Trail/Rossland House Price Equation

Dependent Variable: LOG(PRTRROSSWT/CPI*100)
Method: Least Squares
Date: 04/24/00 Time: 14:32
Sample(adjusted): 1981:1 1998:3
Included observations: 71 after adjusting endpoints
Convergence achieved after 5 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	0.982564	0.44533	2.206355	0.0309
LOG(PRTRROSSWT(-1)/CPI(-1)*100)	0.923160	0.03601	25.63810	0.0000
LOG(ZINCPROSA(-3))	0.018863	0.02861	0.659337	0.5120
PDL01	-0.017559	0.00675	-2.600121	0.0115
AR(1)	-0.645071	0.12482	-5.167827	0.0000
AR(2)	-0.300658	0.12601	-2.385951	0.0200

R-squared	0.765596	Mean dependent var	11.0271
Adjusted R-squared	0.747565	S.D. dependent var	0.24083
S.E. of regression	0.121001	Akaike info criterion	-1.30532
Sum squared resid	0.951675	Schwarz criterion	-1.11411
Log likelihood	52.33886	F-statistic	42.4597
Durbin-Watson stat	2.022240	Prob(F-statistic)	0.00000

Inverted AR Roots	-.32+.44i	-.32 -.44i	

Lag Distribution of LOG(MTG5-@PCHY(CPI)*100)	i	Coeff.	Std. Error	t-Statistic
* .	0	-0.01463	0.00563	-2.60012
* .	1	-0.02341	0.00900	-2.60012
* .	2	-0.02634	0.01013	-2.60012
* .	3	-0.02341	0.00900	-2.60012
* .	4	-0.01463	0.00563	-2.60012
	Sum of Lags	-0.10243	0.03939	-2.60012

Table B-17: Output for the Trail / Rossland Housing Sales Equation

Dependent Variable: LOG(SATRROSSSA)
Method: Least Squares
Date: 04/24/00 Time: 14:33
Sample(adjusted): 1979:3 1998:3
Included observations: 77 after adjusting endpoints
Convergence achieved after 6 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	1.684872	1.059402	1.590399	0.1162
LOG(SATRROSSSA(-1))	0.665131	0.080159	8.297592	0.0000
LOG(ZINCPROSA(-2))	0.161710	0.086146	1.877152	0.0646
LOG(PRTRROSSWT/CPI*100)	-0.081940	0.089976	-0.910692	0.3655
DLOG(POPKB)	29.87994	8.659827	3.450408	0.0009
AR(4)	-0.346450	0.112245	-3.086560	0.0029

R-squared	0.771062	Mean dependent var	3.96686
Adjusted R-squared	0.754940	S.D. dependent var	0.45398
S.E. of regression	0.224735	Akaike info criterion	-0.0731
Sum squared resid	3.585902	Schwarz criterion	0.10956
Log likelihood	8.813358	F-statistic	47.8255
Durbin-Watson stat	2.019008	Prob(F-statistic)	0.00000

Inverted AR Roots	.54+.54i	.54+.54i	-.54+.54i	-.54 - .54i

Table B-18: Tests for Structural Breaks - Trail / Rossland Equations

Equation	Test	1986:1		1990:1		1996:1	
		reject	F stat	reject	F stat	reject	F stat
Prices	Break point	No	1.50	No	0.68	No	1.40
	Forecast	No	1.52	No	0.48	No	0.77
Sales	Break point	No	1.20	No	0.90	No	0.21
	Forecast	No	0.45	No	0.55	No	0.44

The breaks for the tests were 1986:1, 1990:1 and 1996:1.
Null hypothesis: No structural break.

The tests indicate that there were no major structural breaks in the sample period.

Port Alberni

The four housing equations for Port Alberni are specified as follows:

LOG(PRPALBSA/CPI*100) = C(1) + C(2)*LOG(PRPALBSA(-1)/CPI(-1)*100) + C(3)*LOG(NEWSPULP(-5)) + C(4)*LOG(PRNEWSNBSK$C(-1)/CPI(-1)*100) + C(5)*DLOG(POPAC(-1)) + C(6)*DOUT87 + C(7)*DOUT95 + C(8)*PDL01 + [AR(2)=C(9),AR(3)=C(10)]

LOG(SAPALBSA) = C(1) + C(2)*LOG(SAPALBSA(-1)) + C(3)*LOG(NEWSPULP(-4)) + C(4)*LOG(MTG5-@PCHY(CPI)*100) + [AR(1)=C(5),AR(3)=C(6)]

LOG(STSFDSA) = C(1) + C(2)*LOG(NEWSPULP(-3)) + C(3)*LOG(MTG5-@PCHY(CPI)*100) + C(4)*LOG(SAPALBSA) + [AR(1)=C(5),AR(2)=C(6)]

LOG(STTOTSA) = -8.745242114 + 0.6273595962*LOG(STTOTSA(-1)) + 1.295377758*LOG(NEWSPULP(-4)) + 0.1356674817*LOG(MTG5-@PCHY(CPI)*100) + 0.07508225263*LOG(SAPALBSA(-1)) + [AR(1)=-0.3227162257]

Where:

PRPALBSA	is the average price of single family homes, seasonally adjusted;
CPI	is the BC consumer price index (used to convert prices to 1992 dollars and calculate inflation);
NEWSPULP	is the combined provincial shipments of newsprint and pulp;
PDL01	is a second degree polynomial distributed lag (4 periods) of the real 5-year mortgage rate with near and far end constraints;
SASFDSA	are sales of single family units, seasonally adjusted;
PRNEWSNBSK$C	is the (weighted average) price of pulp and newsprint in Canadian dollars;
STSFDSA	are single family starts, seasonally adjusted;
STTOTSA	are total starts, seasonally adjusted;
MTG5	is the 5-year mortgage rate (converted to a real rate);
POPAC	is the population of the Alberni Clayquot regional district;
DOUT87	is a dummy variable for an outlying observation in 1987;
DOUT95	is a dummy variable for an outlying observation in 1995
AR	is an autoregressive term (of varying orders);

and	LOG transforms the variables into natural logarithms;
	DLOG is the difference of the natural logarithm
	@PCHY calculates the annual percentage change

Table B-19: Output for Port Alberni House Price Equation

Dependent Variable: LOG(PRPALBSA/CPI*100)
Method: Least Squares
Date: 04/24/00 Time: 15:19
Sample(adjusted): 1983:1 1998:4
Included observations: 64 after adjusting endpoints
Convergence achieved after 15 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	6.648533	1.39279	4.773546	0.0000
LOG(PRPALBSA(-1)/CPI(-1)*100)	0.293400	0.06926	4.236503	0.0001
LOG(NEWSPULP(-5))	0.137278	0.12531	1.095484	0.2782
LOG(PRNEWSNBSK$C(-1)/CPI(-1)*100)	0.091745	0.15303	0.599543	0.5513
DLOG(POPAC(-1))	2.832609	3.85073	0.735603	0.4652
DOUT87	-0.936227	0.08733	-10.72022	0.0000
DOUT95	-0.263753	0.08566	-3.079098	0.0033
PDL01	-0.024538	0.03810	-0.644124	0.5222
AR(2)	0.374351	0.10660	3.511810	0.0009
AR(3)	0.367253	0.10414	3.526505	0.0009

R-squared	0.817860	Mean dependent var	11.28826
Adjusted R-squared	0.787504	S.D. dependent var	0.293187
S.E. of regression	0.135151	Akaike info criterion	-1.022242
Sum squared resid	0.986358	Schwarz criterion	-0.684916
Log likelihood	42.71173	F-statistic	26.94178
Durbin-Watson stat	1.917322	Prob(F-statistic)	0.000000

Inverted AR Roots	.89	-.44 - .47i	-.44+.47i

Lag Distribution of LOG(MTG5-@PCHY(CPI)*100)	i	Coeff.	Std. Error	t-Statistic
* .	0	-0.02045	0.03175	-0.64412
* .	1	-0.03272	0.05079	-0.64412
* .	2	-0.03681	0.05714	-0.64412
* .	3	-0.03272	0.05079	-0.64412
* .	4	-0.02045	0.03175	-0.64412
	Sum of Lags	-0.14314	0.22222	-0.64412

Table B-20: Output for Port Alberni House Sales Equation

Dependent Variable: LOG(SAPALBSA)
Method: Least Squares
Date: 04/24/00 Time: 15:24
Sample(adjusted): 1983:1 1998:4
Included observations: 64 after adjusting endpoints
Convergence achieved after 8 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-0.045421	1.966117	-0.023102	0.9816
LOG(SAPALBSA(-1))	0.829188	0.068357	12.13030	0.0000
LOG(NEWSPULP(-4))	0.221334	0.261928	0.845016	0.4016
LOG(MTG5-@PCHY(CPI)*100)	-0.525299	0.240126	-2.187595	0.0327
AR(1)	-0.446426	0.100724	-4.432183	0.0000
AR(3)	0.488775	0.097188	5.029194	0.0000

R-squared	0.794029	Mean dependent var	2.83510
Adjusted R-squared	0.776273	S.D. dependent var	0.83734
S.E. of regression	0.396058	Akaike info criterion	1.07455
Sum squared resid	9.098011	Schwarz criterion	1.27695
Log likelihood	-28.38559	F-statistic	44.7187
Durbin-Watson stat	2.076212	Prob(F-statistic)	0.000000

Inverted AR Roots	.66	-.56+.65i	-.56 -.65i

Table B-21: Output for Port Alberni SFD Starts

Dependent Variable: LOG(STSFDSA)
Method: Least Squares
Date: 04/24/00 Time: 15:24
Sample(adjusted): 1985:3 1998:4
Included observations: 54 after adjusting endpoints
Convergence achieved after 6 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-6.085350	3.871140	-1.571979	0.1225
LOG(NEWSPULP(-3))	0.798907	0.513299	1.556415	0.1262
LOG(MTG5-@PCHY(CPI)*100)	1.113566	0.421830	2.639844	0.0112
LOG(SAPALBSA)	0.286356	0.098947	2.894032	0.0057
AR(1)	0.563985	0.137739	4.094581	0.0002
AR(2)	0.241510	0.143755	1.680014	0.0995

R-squared	0.576045	Mean dependent var	2.782674
Adjusted R-squared	0.531883	S.D. dependent var	0.539416
S.E. of regression	0.369064	Akaike info criterion	0.948744
Sum squared resid	6.537983	Schwarz criterion	1.169742
Log likelihood	-19.61609	F-statistic	13.04390
Durbin-Watson stat	2.034391	Prob(F-statistic)	0.000000

Inverted AR Roots	.85	-.28

Table B-22: Output for Port Alberni Total Starts Equation

Dependent Variable: LOG(STTOTSA)
Method: Least Squares
Date: 04/24/00 Time: 15:25
Sample(adjusted): 1985:3 1998:4
Included observations: 54 after adjusting endpoints
Convergence achieved after 11 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-8.745242	4.260746	-2.052514	0.0456
LOG(STTOTSA(-1))	0.627360	0.141332	4.438896	0.0001
LOG(NEWSPULP(-4))	1.295378	0.601150	2.154831	0.0362
LOG(MTG5-@PCHY(CPI)*100)	0.135667	0.429004	0.316238	0.7532
LOG(SAPALBSA(-1))	0.075082	0.087999	0.853220	0.3978
AR(1)	-0.322716	0.172648	-1.869213	0.0677

R-squared	0.419447	Mean dependent var	3.02512
Adjusted R-squared	0.358973	S.D. dependent var	0.64935
S.E. of regression	0.519897	Akaike info criterion	1.63407
Sum squared resid	12.97405	Schwarz criterion	1.85506
Log likelihood	-38.11978	F-statistic	6.93595
Durbin-Watson stat	1.898134	Prob(F-statistic)	0.00006

Inverted AR Roots	-.32

The tests indicate that the structural relationships for the Port Alberni equations are stable over time.

Table B-23: Tests for Structural Breaks - Port Alberni Equations

Equation	Test	1987:1		1990:1		1996:1	
		reject	F stat	reject	F stat	reject	F stat
Prices	Break point	No	0.87	No	1.14	No	0.59
	Forecast	No	0.52	No	0.29	No	1.07
Sales	Break point	No	0.31	No	1.63	No	0.14
	Forecast	No	0.26	No	0.48	No	0.36
Starts SFD	Break point	No	0.51	No	1.39	No	0.56
	Forecast	No	4.61	No*	1.36	No	0.09
Starts total	Break point	No	0.71	No	0.43	No	0.23
	Forecast	No	0.48	No	0.52	No	0.15

Null hypothesis: No structural break

*Break in sample is 1992:2 instead of 1990:1 because of unusual drop in 1990.

Prince Rupert

The four housing equations for Prince Rupert are specified as follows:

LOG(PRRUPSA/CPI*100) = C(1) + C(2)*LOG(PRRUPSA(-1)/CPI(-1)*100) + C(3)*LOG(PULPSHIP(-3)) + C(4)*DLOG(POPSQC) + C(5)*PDL01 + [AR(3)=C(6)]

LOG(SASFDSA) = C(1) + C(2)*LOG(PULPSHIP(-2)) + C(3)*LOG(PRNBSK$C(-3)/CPI(-3)*100) + C(4)*DLOG(POPSQC) + C(5)*LOG(PRRUPSA/CPI*100)

LOG(STSFDSA) = C(1) + C(2)*LOG(PULPSHIP(-2)) + C(3)*DLOG(POPSQC) + C(4)*LOG(SASFDSA) + [AR(2)=C(5)]

LOG(STTOTSA) = C(1) + C(2)*LOG(PULPSHIP(-2)) + C(3)*DLOG(POPSQC) + C(4)*LOG(SASFDSA(-1)) + [AR(2)=C(5)]

Where:

PRPALBSA	is the average price of single family homes, seasonally adjusted;
CPI	is the BC consumer price index (used to convert prices to 1992 dollars and calculate inflation);
PULPSSHIP	is the combined provincial shipments of pulp;
PDL01	is a second degree polynomial distributed lag (4 periods) of the real 5-year mortgage rate with near and far end constraints;
SASFDSA	are sales of single family units, seasonally adjusted;
PRNBSK$C	is the price of pulp in Canadian dollars;
STSFDSA	are single family starts, seasonally adjusted;
STTOTSA	are total starts, seasonally adjusted;
POPSQC	is the population of the Skeena Queen Charlotte regional district;
AR	is an autoregressive term (of varying orders).
and	LOG transforms the variables into natural logarithms;
	DLOG is the difference of the natural logarithm
	@PCHY calculates the annual percentage change

Table B-24: Output for Prince Rupert Housing Price Equation

Dependent Variable: LOG(PRRUPSA/CPI*100)
Method: Least Squares
Date: 04/24/00 Time: 21:18
Sample(adjusted): 1987:1 1997:3
Included observations: 43 after adjusting endpoints
Convergence achieved after 10 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	4.065023	1.38599	2.932949	0.0057
LOG(PRRUPSA(-1)/CPI(-1)*100)	0.591370	0.12561	4.708014	0.0000
LOG(PULPSHIP(-3))	0.154021	0.08292	1.857505	0.0712
DLOG(POPSQC)	3.455824	4.92585	0.701568	0.4873
PDL01	-0.037671	0.01877	-2.007428	0.0520
AR(3)	0.546309	0.14172	3.854963	0.0004

R-squared	0.708611	Mean dependent var	11.5225
Adjusted R-squared	0.669234	S.D. dependent var	0.10995
S.E. of regression	0.063237	Akaike info criterion	-2.5551
Sum squared resid	0.147959	Schwarz criterion	-2.3093
Log likelihood	60.93402	F-statistic	17.9956
Durbin-Watson stat	1.841710	Prob(F-statistic)	0.00000

Inverted AR Roots	.82	-.41+.71i	-.41 -.71i

Lag Distribution of LOG(MTG5-@PCHY(CPI)*100)	i	Coeff.	Std. Error	t-Statistic
* .	0	-0.03139	0.01564	-2.00743
* .	1	-0.05023	0.02502	-2.00743
* .	2	-0.05651	0.02815	-2.00743
* .	3	-0.05023	0.02502	-2.00743
* .	4	-0.03139	0.01564	-2.00743
	Sum of Lags	-0.21975	0.10947	-2.00743

Table B-25: Output for Prince Rupert House Sales Equation

Dependent Variable: LOG(SASFDSA)
Method: Least Squares
Date: 04/24/00 Time: 23:45
Sample(adjusted): 1986:1 1997:3
Included observations: 47 after adjusting endpoints

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	9.295788	4.209206	2.208442	0.0327
LOG(PULPSHIP(-2))	0.088346	0.349401	0.252850	0.8016
LOG(PRNBSK$C(-3)/CPI(-3)*100)	0.255132	0.157516	1.619716	0.1128
DLOG(POPSQC)	52.56346	14.51709	3.620798	0.0008
LOG(PRRUPSA/CPI*100)	-0.641684	0.404111	-1.587892	0.1198

R-squared	0.296426	Mean dependent var	4.304115
Adjusted R-squared	0.229419	S.D. dependent var	0.287546
S.E. of regression	0.252416	Akaike info criterion	0.184811
Sum squared resid	2.675981	Schwarz criterion	0.381636
Log likelihood	0.656931	F-statistic	4.423802
Durbin-Watson stat	1.443655	Prob(F-statistic)	0.004491

Table B-26: Output for Prince Rupert SFD Starts Equation

Dependent Variable: LOG(STSFDSA)
Method: Least Squares
Date: 04/24/00 Time: 23:55
Sample(adjusted): 1986:3 1997:3
Included observations: 45 after adjusting endpoints
Convergence achieved after 8 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-7.156850	6.183785	-1.157358	0.2540
LOG(PULPSHIP(-2))	0.530602	0.865786	0.612856	0.5434
DLOG(POPSQC)	16.08685	58.38150	0.275547	0.7843
LOG(SASFDSA)	1.095504	0.399425	2.742701	0.0091
AR(2)	0.546177	0.145904	3.743408	0.0006

R-squared	0.396476	Mean dependent var	1.37413
Adjusted R-squared	0.336124	S.D. dependent var	0.90294
S.E. of regression	0.735701	Akaike info criterion	2.32845
Sum squared resid	21.65025	Schwarz criterion	2.52919
Log likelihood	-47.39021	F-statistic	6.56936
Durbin-Watson stat	1.805251	Prob(F-statistic)	0.00037

Inverted AR Roots	.74	-.74

Table B-27: Output for Prince Rupert Total Starts Equation

Dependent Variable: LOG(STTOTSA)
Method: Least Squares
Date: 04/24/00 Time: 23:58
Sample(adjusted): 1986:4 1997:4
Included observations: 45 after adjusting endpoints
Convergence achieved after 6 iterations

Variable	Coeff.	Std. Error	t-Statistic	Prob.
C	-6.187944	6.041211	-1.024289	0.3119
LOG(PULPSHIP(-2))	0.260802	0.821433	0.317496	0.7525
DLOG(POPSQC)	58.62011	51.39329	1.140618	0.2608
LOG(SASFDSA(-1))	1.406971	0.365602	3.848369	0.0004
AR(2)	0.341529	0.167356	2.040741	0.0479

R-squared	0.387609	Mean dependent var	1.85334
Adjusted R-squared	0.326370	S.D. dependent var	0.81324
S.E. of regression	0.667464	Akaike info criterion	2.13378
Sum squared resid	17.82035	Schwarz criterion	2.33452
Log likelihood	-43.01000	F-statistic	6.32945
Durbin-Watson stat	2.045260	Prob(F-statistic)	0.00048

Inverted AR Roots	.58	-.58

Table B-28: Tests for Structural Breaks - Prince Rupert Equations

Equation	Test	1986:1		1990:1		1996:1	
		reject	F stat	reject	F stat	reject	F stat
Prices	Break point	--	--	No	0.31	No	1.30
	Forecast	--	--	No*	2.04	No	1.72
Sales	Break point	--	--	No	0.70	Yes	4.03
	Forecast	--	--	No	1.44	Yes	3.43
Starts SFD	Break point	--	--	Yes	2.32	Yes	2.48
	Forecast	--	--	Yes	2.71	No	1.53
Starts total	Break point	--	--	No	1.11	No	1.86
	Forecast	--	--	No	1.77	Yes	2.13

Null hypothesis: No structural break
Break point is 1990:2 because of unusual spike in 1990:1

Data for 5-Year Simulations

Table B-29: Historical and Projected Data for Resource Variables

	CPI		MTG5	SPF$C		LUMNISA		WELLSSA		LUMCISA	
	1992=100	y-y % chg	%	C$/thou bd ft	y-y % chg	M bd ft	y-y % chg	number	y-y % chg	M bd ft	y-y % chg
1993:1	102.6	3.8	9.3	494.6	80.6	1459.2	-0.3	76.9	135.8	428.0	-4.2
1993:2	103.1	3.4	9.0	348.2	27.1	1432.3	0.7	143.2	225.5	420.6	-3.9
1993:3	103.8	3.6	8.8	359.5	33.7	1502.5	7.2	152.3	154.5	429.1	-1.6
1993:4	104.4	3.3	8.1	511.0	71.3	1453.8	-3.0	139.2	217.8	445.8	2.8
1994:1	105.0	2.3	7.8	542.4	9.7	1476.4	1.2	164.6	113.9	428.7	0.2
1994:2	105.0	1.9	9.9	477.3	37.1	1454.8	1.6	166.5	16.2	411.1	-2.3
1994:3	105.8	1.9	10.3	437.1	21.6	1416.5	-5.7	169.0	11.0	414.9	-3.3
1994:4	106.4	1.9	10.1	405.3	-20.7	1334.1	-8.2	186.7	34.1	397.6	-10.8
1995:1	107.4	2.3	10.3	397.1	-26.8	1474.7	-0.1	115.0	-30.1	425.5	-0.7
1995:2	107.8	2.6	9.0	303.5	-36.4	1409.9	-3.1	121.7	-26.9	412.9	0.4
1995:3	108.4	2.4	8.8	348.2	-20.3	1385.1	-2.2	117.7	-30.3	422.2	1.8
1995:4	108.3	1.8	8.5	332.3	-18.0	1413.3	5.9	129.4	-30.7	414.2	4.2
1996:1	108.7	1.2	8.0	368.8	-7.1	1400.7	-5.0	130.0	13.0	418.4	-1.7
1996:2	109.0	1.1	8.5	458.6	51.1	1424.3	1.0	96.9	-20.4	437.2	5.9
1996:3	108.9	0.5	8.1	534.8	53.6	1477.9	6.7	155.4	32.0	408.9	-3.1
1996:4	109.0	0.7	7.0	553.1	66.5	1394.9	-1.3	167.3	29.3	418.6	1.1
1997:1	109.5	0.8	7.2	538.3	46.0	1382.3	-1.3	169.7	30.6	423.7	1.3
1997:2	109.9	0.8	7.3	524.8	14.4	1382.8	-2.9	223.6	130.7	442.2	1.1
1997:3	109.9	0.9	7.0	472.7	-11.6	1382.8	-6.4	232.8	49.8	434.2	6.2
1997:4	109.6	0.5	6.8	416.5	-24.7	1385.5	-0.7	223.5	33.6	418.8	0.0
1998:1	109.7	0.1	6.9	411.9	-23.5	1361.5	-1.5	187.2	10.3	419.5	-1.0
1998:2	110.2	0.3	7.0	410.2	-21.8	1382.4	0.0	164.6	-26.4	445.5	0.7
1998:3	110.3	0.3	7.1	439.0	-7.1	1295.6	-6.3	159.7	-31.4	442.5	1.9
1998:4	110.0	0.4	6.7	444.6	6.8	1359.2	-1.9	171.4	-23.3	444.3	6.1
1999:1	110.1	0.4	6.9	491.2	19.3	1403.2	3.1	185.1	-1.2	443.9	5.8
1999:2	111.2	0.9	7.2	521.6	27.2	1410.8	2.1	107.7	-34.6	453.3	1.8
1999:3	112.0	1.6	7.8	549.4	25.1	1450.6	12.0	193.9	21.4	472.3	6.7
1999:4	111.8	1.6	8.2	475.6	7.0	1351.2	-0.6	168.5	-1.7	452.5	1.8
2000:1	111.4	1.2	8.6	485.0	-1.3	1391.2	-0.9	168.8	-8.8	460.1	3.7
2000:2	111.7	0.5	8.7	484.3	-7.2	1392.0	-1.3	169.2	57.1	463.1	2.2
2000:3	112.2	0.2	8.7	483.9	-11.9	1392.9	-4.0	169.5	-12.6	466.1	-1.3
2000:4	112.7	0.8	8.5	483.5	1.7	1393.7	3.1	169.8	0.8	469.2	3.7
2001:1	113.2	1.6	8.4	483.2	-0.4	1394.6	0.2	170.2	0.8	472.2	2.6
2001:2	113.5	1.6	8.1	482.8	-0.3	1395.5	0.2	170.5	0.8	475.2	2.6
2001:3	113.9	1.5	7.9	482.4	-0.3	1396.3	0.2	170.9	0.8	478.2	2.6
2001:4	114.2	1.3	7.7	482.0	-0.3	1397.2	0.2	171.2	0.8	481.2	2.6
2002:1	114.6	1.2	7.5	481.6	-0.3	1398.0	0.2	171.5	0.8	484.2	2.5
2002:2	115.1	1.4	7.5	481.3	-0.3	1398.9	0.2	171.9	0.8	487.2	2.5
2002:3	115.7	1.6	7.6	480.9	-0.3	1399.7	0.2	172.2	0.8	490.2	2.5
2002:4	116.1	1.6	7.6	480.5	-0.3	1400.6	0.2	172.5	0.8	493.2	2.5
2003:1	116.5	1.7	7.7	480.1	-0.3	1401.4	0.2	172.9	0.8	496.2	2.5
2003:2	117.0	1.6	7.7	479.7	-0.3	1402.3	0.2	173.2	0.8	499.2	2.5
2003:3	117.5	1.5	7.7	479.4	-0.3	1403.2	0.2	173.6	0.8	502.2	2.5
2003:4	117.9	1.6	7.6	479.0	-0.3	1404.0	0.2	173.9	0.8	505.2	2.4
2004:1	118.3	1.6	7.7	478.6	-0.3	1404.9	0.2	174.2	0.8	508.2	2.4
2004:2	118.7	1.5	7.8	478.2	-0.3	1405.7	0.2	174.6	0.8	511.2	2.4
2004:3	119.2	1.5	7.8	477.9	-0.3	1406.6	0.2	174.9	0.8	514.2	2.4
2004:4	119.6	1.4	7.8	477.5	-0.3	1407.4	0.2	175.3	0.8	517.2	2.4

Table B-30: Historical and Projected Data for Resource Variables

	ZINCPROSA		PRNEWSNBSK$C		NEWSPULP		PRNBSK$C		PULPSHIP	
	M kg	y-y % chg	wt avg.	y-y % chg	M tonnes	y-y % chg	$/tonne	y-y % chg	M tonnes	y-y % chg
1993:1	31.55	4.0	590	1.2	1460	-1.9	603	-0.1	973	-12.4
1993:2	28.96	-8.6	573	-7.0	1474	4.0	578	-12.5	974	-3.9
1993:3	15.20	-54.1	556	-15.0	1399	34.5	550	-22.9	923	26.0
1993:4	28.46	-16.9	560	-14.2	1648	12.0	552	-20.9	1170	20.8
1994:1	26.54	-15.9	593	0.6	1544	5.8	603	0.0	1143	17.5
1994:2	27.30	-5.7	677	18.1	1658	12.5	707	22.4	1253	28.6
1994:3	27.43	80.4	758	36.3	1660	18.7	800	45.5	1193	29.3
1994:4	33.95	19.3	889	58.8	1584	-3.9	958	73.5	1174	0.3
1995:1	30.87	16.3	1010	70.1	1462	-5.3	1091	80.7	1183	3.5
1995:2	34.55	26.6	1094	61.5	1687	1.7	1170	65.5	1271	1.4
1995:3	37.56	37.0	1157	52.5	1627	-2.0	1234	54.2	1245	4.4
1995:4	33.79	-0.5	1218	37.0	1240	-21.7	1288	34.5	873	-25.6
1996:1	37.02	19.9	969	-4.1	1224	-16.3	938	-14.0	870	-26.5
1996:2	35.30	2.2	772	-29.4	1599	-5.2	696	-40.5	1285	1.1
1996:3	41.50	10.5	792	-31.5	1520	-6.6	777	-37.1	1178	-5.4
1996:4	40.67	20.4	763	-37.4	1418	14.4	783	-39.2	1057	21.1
1997:1	35.08	-5.2	758	-21.8	1562	27.6	779	-16.9	1196	37.5
1997:2	47.10	33.4	792	2.7	1613	0.9	799	14.9	1274	-0.9
1997:3	38.32	-7.6	829	4.7	1357	-10.7	845	8.8	1085	-7.9
1997:4	38.11	-6.3	854	11.9	1181	-16.7	859	9.7	977	-7.6
1998:1	39.74	13.3	820	8.2	1338	-14.3	806	3.4	1130	-5.5
1998:2	39.29	-16.6	821	3.7	1314	-18.5	808	1.0	1048	-17.7
1998:3	35.37	-7.7	851	2.6	1423	4.9	833	-1.4	1063	-2.0
1998:4	37.29	-2.2	812	-4.9	1580	33.8	771	-10.2	1221	25.0
1999:1	37.05	-6.8	774	-5.5	1566	17.0	748	-7.1	1221	8.1
1999:2	26.07	-33.6	755	-8.1	1516	15.4	766	-5.2	1177	12.3
1999:3	30.78	-13.0	788	-7.4	1634	14.8	820	-1.6	1295	21.8
1999:4	35.56	-4.6	847	4.4	1659	5.0	884	14.5	1302	6.6
2000:1	35.54	-4.1	902	16.5	1564	-0.1	943	26.0	1220	-0.1
2000:2	35.53	36.2	958	26.9	1571	3.7	1002	30.9	1227	4.2
2000:3	35.51	15.4	1013	28.5	1579	-3.4	1062	29.5	1233	-4.8
2000:4	35.50	-0.2	1069	26.2	1586	-4.4	1121	26.9	1239	-4.8
2001:1	35.48	-0.2	1008	11.7	1594	1.9	1050	11.4	1246	2.1
2001:2	35.46	-0.2	922	-3.7	1602	1.9	950	-5.2	1252	2.1
2001:3	35.45	-0.2	919	-9.3	1609	1.9	950	-10.5	1259	2.1
2001:4	35.43	-0.2	872	-18.4	1617	1.9	900	-19.7	1265	2.1
2002:1	35.42	-0.2	872	-13.5	1624	1.9	900	-14.3	1271	2.0
2002:2	35.40	-0.2	872	-5.4	1632	1.9	900	-5.3	1278	2.0
2002:3	35.39	-0.2	872	-5.1	1639	1.9	900	-5.3	1284	2.0
2002:4	35.37	-0.2	872	0.0	1647	1.9	900	0.0	1291	2.0
2003:1	35.36	-0.2	872	0.0	1655	1.9	900	0.0	1297	2.0
2003:2	35.34	-0.2	886	1.6	1662	1.9	900	0.0	1303	2.0
2003:3	35.32	-0.2	886	1.6	1670	1.8	900	0.0	1310	2.0
2003:4	35.31	-0.2	886	1.6	1677	1.8	900	0.0	1316	2.0
2004:1	35.29	-0.2	886	1.6	1685	1.8	900	0.0	1322	2.0
2004:2	35.28	-0.2	886	0.0	1693	1.8	900	0.0	1329	2.0
2004:3	35.26	-0.2	886	0.0	1700	1.8	900	0.0	1335	1.9
2004:4	35.25	-0.2	886	0.0	1708	1.8	900	0.0	1342	1.9

Table B-31: Historical and Projected Population Data

	POPFG		POPPR		POPCO		POPKB		POPAC		POPSQC	
	number	y-y % chg	number	y-y % chg	number	y-y % chg	number	y-y % chg	number	y-y % chg	number	y-y % chg
1993:1	95651	2.2	55469	1.1	126664	6.1	32763	1.7	31993	1.3	24647	0.3
1993:2	96215	2.5	55667	1.3	128251	5.9	32906	1.7	32074	1.8	24710	0.4
1993:3	96752	2.6	55876	1.5	129707	5.5	33049	1.8	32104	1.9	24799	0.6
1993:4	97262	2.7	56096	1.6	131030	5.1	33194	1.8	32085	1.6	24914	1.0
1994:1	97612	2.1	56334	1.6	131977	4.2	33379	1.9	31691	-0.9	25166	2.1
1994:2	98121	2.0	56571	1.6	133136	3.8	33509	1.8	31701	-1.2	25289	2.3
1994:3	98657	2.0	56817	1.7	134260	3.5	33625	1.7	31791	-1.0	25392	2.4
1994:4	99218	2.0	57070	1.7	135351	3.3	33727	1.6	31961	-0.4	25477	2.3
1995:1	99854	2.3	57334	1.8	136359	3.3	33795	1.2	32546	2.7	25495	1.3
1995:2	100448	2.4	57601	1.8	137402	3.2	33874	1.1	32740	3.3	25562	1.1
1995:3	101048	2.4	57875	1.9	138430	3.1	33946	1.0	32880	3.4	25628	0.9
1995:4	101654	2.5	58155	1.9	139445	3.0	34010	0.8	32966	3.1	25695	0.9
1996:1	102317	2.5	58513	2.1	140365	2.9	34072	0.8	32809	0.8	25795	1.2
1996:2	102916	2.5	58777	2.0	141384	2.9	34120	0.7	32860	0.4	25849	1.1
1996:3	103501	2.4	59019	2.0	142421	2.9	34158	0.6	32932	0.2	25890	1.0
1996:4	104073	2.4	59238	1.9	143477	2.9	34186	0.5	33024	0.2	25918	0.9
1997:1	104775	2.4	59432	1.6	144746	3.1	34192	0.4	33262	1.4	25978	0.7
1997:2	105261	2.3	59608	1.4	145759	3.1	34206	0.3	33345	1.5	25962	0.4
1997:3	105675	2.1	59763	1.3	146713	3.0	34216	0.2	33399	1.4	25915	0.1
1997:4	106018	1.9	59897	1.1	147606	2.9	34221	0.1	33423	1.2	25837	-0.3
1998:1	106278	1.4	59991	0.9	148620	2.7	34223	0.1	33348	0.3	25586	-1.5
1998:2	106482	1.2	60091	0.8	149321	2.4	34219	0.0	33340	0.0	25503	-1.8
1998:3	106619	0.9	60178	0.7	149889	2.2	34210	0.0	33331	-0.2	25446	-1.8
1998:4	106689	0.6	60252	0.6	150326	1.8	34196	-0.1	33320	-0.3	25415	-1.6
1999:1	106466	0.2	59419	-1.0	151033	1.6	33949	-0.8	33123	-0.7	24698	-3.5
1999:2	106597	0.1	59501	-1.0	151002	1.1	33939	-0.8	33020	-1.0	24718	-3.1
1999:3	106748	0.1	59596	-1.0	151084	0.8	33934	-0.8	32930	-1.2	24743	-2.8
1999:4	106921	0.2	59704	-0.9	151281	0.6	33933	-0.8	32851	-1.4	24773	-2.5
2000:1	107115	0.6	59825	0.7	151591	0.4	33938	0.0	32785	-1.0	24808	0.4
2000:2	107330	0.7	59959	0.8	152014	0.7	33947	0.0	32731	-0.9	24849	0.5
2000:3	107565	0.8	60106	0.9	152552	1.0	33961	0.1	32689	-0.7	24894	0.6
2000:4	107822	0.8	60266	0.9	153203	1.3	33979	0.1	32660	-0.6	24945	0.7
2001:1	108113	0.9	60463	1.1	154113	1.7	34013	0.2	32677	-0.3	25013	0.8
2001:2	108406	1.0	60640	1.1	154933	1.9	34037	0.3	32658	-0.2	25069	0.9
2001:3	108714	1.1	60822	1.2	155809	2.1	34062	0.3	32638	-0.2	25125	0.9
2001:4	109038	1.1	61007	1.2	156740	2.3	34087	0.3	32616	-0.1	25181	0.9
2002:1	109396	1.2	61206	1.2	157844	2.4	34112	0.3	32592	-0.3	25240	0.9
2002:2	109742	1.2	61395	1.2	158839	2.5	34139	0.3	32567	-0.3	25295	0.9
2002:3	110096	1.3	61585	1.3	159842	2.6	34166	0.3	32541	-0.3	25350	0.9
2002:4	110458	1.3	61774	1.3	160854	2.6	34194	0.3	32513	-0.3	25403	0.9
2003:1	110850	1.3	61983	1.3	161894	2.6	34224	0.3	32482	-0.3	25453	0.8
2003:2	111217	1.3	62164	1.3	162914	2.6	34253	0.3	32452	-0.4	25506	0.8
2003:3	111583	1.4	62336	1.2	163934	2.6	34284	0.3	32421	-0.4	25558	0.8
2003:4	111946	1.3	62501	1.2	164955	2.5	34315	0.4	32389	-0.4	25611	0.8
2004:1	112306	1.3	62638	1.1	165984	2.5	34345	0.4	32356	-0.4	25663	0.8
2004:2	112665	1.3	62793	1.0	167002	2.5	34379	0.4	32322	-0.4	25715	0.8
2004:3	113024	1.3	62948	1.0	168017	2.5	34414	0.4	32287	-0.4	25767	0.8
2004:4	113381	1.3	63102	1.0	169029	2.5	34451	0.4	32251	-0.4	25819	0.8

Appendix C

Socio-Economic Census Data:1976-1996

Table C-1

Population Size & Growth Rates								
	Thousands					Avg. Ann % Changes		
	1976	1981	1986	1991	1996	1976-86	1986-96	1976-96
Rossland	3.7	4.0	3.5	3.6	3.8	-0.7	0.9	0.1
Trail	9.9	9.6	8.0	7.9	7.7	-2.1	-0.4	-1.3
Fort St. John	8.9	13.9	13.4	14.2	15.0	4.1	1.2	2.6
Prince Rupert	14.8	16.2	15.8	16.6	16.7	0.7	0.6	0.6
Port Alberni	19.6	19.9	18.2	18.5	18.5	-0.7	0.1	-0.3
Prince George	59.9	67.6	67.6	69.7	75.2	1.2	1.1	1.1
Kelowna	52.0	59.2	61.2	76.0	89.4	1.7	3.9	2.8
GVRD	1085.2	1169.8	1266.2	1542.7	1831.7	1.6	3.8	2.7
BC	2466.6	2744.5	2883.4	3282.1	3724.5	1.6	2.6	2.1
Ranked in ascending order by 1996 population Source: Statistics Canada Census 1976, 1981, 1986 and 1996								

Table C-2

Population Size & Growth Rates: Ranked by Growth Rates								
	Thousands					Avg. Ann % Changes		
	1976	1981	1986	1991	1996	1976-86	1986-96	1976-96
Trail	9.9	9.6	8.0	7.9	7.7	-2.1	-0.4	-1.3
Port Alberni	19.6	19.9	18.2	18.5	18.5	-0.7	0.1	-0.3
Rossland	3.7	4.0	3.5	3.6	3.8	-0.7	0.9	0.1
Prince Rupert	14.8	16.2	15.8	16.6	16.7	0.7	0.6	0.6
Prince George	59.9	67.6	67.6	69.7	75.2	1.2	1.1	1.1
BC	2466.6	2744.5	2883.4	3282.1	3724.5	1.6	2.6	2.1
Fort St. John	8.9	13.9	13.4	14.2	15.0	4.1	1.2	2.6
GVRD	1085.2	1169.8	1266.2	1542.7	1831.7	1.6	3.8	2.7
Kelowna	52.0	59.2	61.2	76.0	89.4	1.7	3.9	2.8
Ranked in ascending order by 1976-1996 growth rates. Source: Statistics Canada Census 1976, 1981, 1986 and 1996								

Table C-3

Population Age 65 & Over

	Thousands					Avg. Ann % Changes		
	1976	1981	1986	1991	1996	1976-86	1986-96	1976-96
Rossland	0.34	0.40	0.40	0.44	0.39	1.79	-0.38	0.7
Prince Rupert	0.73	0.80	0.78	0.93	0.96	0.73	2.04	1.39
Trail	1.30	1.50	1.50	1.70	1.80	1.45	1.82	1.64
GVRD	116.3	137.1	142.3	174.1	202.5	2.04	3.59	2.81
Port Alberni	1.24	1.56	1.86	2.13	2.34	4.14	2.3	3.22
Kelowna	7.20	9.50	10.30	13.50	15.60	3.64	4.26	3.95
BC	205.5	298.2	349.5	391.8	448.2	5.46	2.52	3.98
Prince George	1.70	2.10	2.50	3.30	4.20	3.65	5.42	4.53
Fort St. John	0.29	0.44	0.55	0.67	0.84	6.8	4.26	5.52

Ranked in ascending order by 1976-1996 growth rates.
Source: Statistics Canada Census 1976, 1981, 1986 and 1996

Table C-4

Population Age 65 & Over Share of Total Population

	Percent					Avg. Ann % Changes		
	1976	1981	1986	1991	1996	1976-86	1986-96	1976-96
Fort St. John	3.2	3.2	4.1	4.7	5.6	2.59	3.06	2.82
Prince George	2.9	3.1	3.7	4.7	5.6	2.40	4.31	3.35
Prince Rupert	4.9	4.9	5.0	5.6	5.7	0.07	1.44	0.76
Rossland	9.0	10.0	11.5	12.2	10.1	2.48	-1.28	0.58
GVRD	10.7	11.7	11.2	11.3	11.1	0.48	-0.17	0.16
BC	8.3	10.9	12.1	11.9	12.0	3.82	-0.07	1.86
Port Alberni	6.3	7.8	10.2	11.5	12.6	4.88	2.17	3.52
Kelowna	13.8	16.0	16.8	17.8	17.4	1.95	0.38	1.16
Trail	13.0	16.1	18.7	21.7	23.2	3.65	2.19	2.92

Ranked in ascending order by 1996 shares.
Source: Statistics Canada Census 1976, 1981, 1986 and 1996

Table C-5

Migrants' Share of Population 5+Years
(percent of population)

Total Migrants

	1976	1981	1986	1991	1996
Port Alberni	19.8	16.5	10.3	16.4	13.9
Trail	20.7	20.5	11.9	18.0	18.3
Prince Rupert	29.8	33.4	21.8	25.3	20.5
Prince George	36.3	30.7	19.3	21.2	21.3
Rossland	24.7	27.3	18.3	21.7	27.7
Kelowna	39.3	33.0	23.9	32.1	28.8
BC	35.0	31.2	23.9	31.0	29.2
GVRD	30.9	27.9	24.4	32.3	30.9
Fort St. John	33.9	50.3	26.5	31.6	31.2

Inter-provincial Migrants' Share

	1976	1981	1986	1991	1996
Port Alberni	5.2	4.4	1.9	3.6	2.4
Trail	5.2	6.8	2.1	3.9	4.5
Prince Rupert	7.6	11.7	2.6	7.3	5.4
Prince George	9.8	8.8	3.9	5.6	6.1
GVRD	7.1	8.1	5.6	7.0	6.7
BC	8.6	9.3	5.7	7.9	7.3
Rossland	7.3	8.7	4.1	9.1	7.6
Kelowna	16.6	16.7	8.6	13.6	12.3
Fort St. John	12.9	18.8	7.7	13.7	13.9

International Migrants' Share

	1976	1981	1986	1991	1996
Trail	1.9	2.7	1.1	1.0	0.5
Port Alberni	2.5	2.1	0.8	0.9	1.0
Prince George	3.1	2.6	1.1	1.1	1.2
Fort St. John	2.2	2.0	1.1	1.2	1.2
Kelowna	2.4	2.2	1.3	2.0	1.8
Rossland	2.0	2.5	2.0	0.6	2.1
Prince Rupert	5.3	3.0	1.3	1.9	2.6
BC	5.0	3.7	2.6	4.9	6.2
GVRD	7.1	5.4	4.2	8.3	10.6

Ranked in ascending order of 1996 shares.
Source: Statistics Canada Census 1976, 1981, 1986, 1996

Table C-6

Number of Private Households

	Thousands					Avg. Ann % Changes		
	1976	1981	1986	1991	1996	1976-86	1986-96	1976-96
Trail	3.6	3.7	3.3	3.5	3.5	-0.85	0.59	-0.13
Rossland	1.2	1.4	1.3	1.4	1.5	0.32	1.41	0.86
Port Alberni	6.2	6.8	6.8	7.1	7.4	0.93	0.88	0.90
Prince Rupert	4.4	5.2	5.3	5.8	5.9	1.91	0.98	1.44
Prince George	17.6	21.9	22.6	24.1	26.8	2.56	1.70	2.13
BC	828.3	996.6	1087.1	1243.9	1424.6	2.76	2.74	2.75
GVRD	382.0	444.1	493.4	588.8	693.0	2.59	3.45	3.02
Kelowna	17.7	22.2	24.1	30.4	36.4	3.16	4.21	3.69
Fort St. John	2.6	4.6	4.7	5.2	5.5	6.16	1.47	3.79

Ranked in ascending order by 1976-1996 household growth rates.
Source: Statistics Canada Census 1976, 1981, 1986 and 1996

Table C- 7

Average Private Household Size

	1976	1981	1986	1991	1996
Trail	2.7	2.5	2.3	2.2	2.1
Kelowna	2.9	2.6	2.5	2.4	2.4
Port Alberni	3.1	2.9	2.7	2.6	2.5
Rossland	3.0	2.8	2.7	2.6	2.6
GVRD	2.7	2.6	2.5	2.6	2.6
BC	2.9	2.7	2.6	2.6	2.6
Fort St. John	3.4	3.0	2.8	2.7	2.7
Prince George	3.3	3.0	2.9	2.8	2.8
Prince Rupert	3.3	3.0	2.9	2.8	2.8

Source: Statistics Canada Census 1976, 1981, 1986, 1991 and 1996

Table C-8

Average Family Size

	1976	1981	1986	1991	1996
Kelowna	3.2	3.0	2.9	2.8	2.9
Port Alberni	3.5	3.2	3.1	3.0	3.0
BC	3.3	3.1	3.0	3.0	3.1
Rossland	3.3	3.2	3.2	3.1	3.2
Prince Rupert	3.5	3.3	3.3	3.2	3.2
Prince George	3.6	3.4	3.3	3.2	3.2
Fort St. John	3.7	3.3	3.3	3.2	3.2
GVRD	3.2	3.1	3.0	3.0	3.2

Source: Statistics Canada Census 1976, 1981, 1986, 1991 and 1996

Table C-9

Households By Size
(% of Total Households)

1-Person Households

	1976	1981	1986	1991	1996
Prince George	12.7	16.5	17.3	18.3	19.2
Prince Rupert	15.2	19.1	20.1	22.3	21.9
Fort St. John	13.0	16.1	22.4	24.9	22.5
BC	20.4	23.5	24.8	24.8	25.3
Kelowna	17.4	21.0	23.5	24.5	25.7
Rossland	16.7	19.3	20.9	26.0	26.8
GVRD	23.9	27.8	28.5	27.2	27.0
Port Alberni	17.5	20.6	24.1	25.2	27.1
Trail	24.0	26.8	30.2	33.8	37.2

2-Person Households

	1976	1981	1986	1991	1996
Prince Rupert	26.3	25.9	26.8	26.8	27.5
Fort St. John	23.0	27.9	26.9	28.3	30.2
Rossland	30.6	31.8	32.4	31.1	30.2
GVRD	30.6	31.2	31.5	31.7	30.7
Prince George	23.4	25.7	26.5	29.9	31.4
BC	30.5	31.7	32.7	33.8	33.6
Port Alberni	25.7	28.4	31.2	33.6	33.9
Trail	32.7	34.6	36.7	37.1	36.3
Kelowna	35.2	37.5	38.1	39.3	38.4

More Than 2-Person Households

	1976	1981	1986	1991	1996
Trail	43.3	38.6	33.1	29.1	26.5
Kelowna	47.4	41.5	38.4	36.2	35.9
Port Alberni	56.8	51.0	44.7	41.2	39.0
BC	49.1	44.8	42.5	41.4	41.1
GVRD	45.5	41.0	40.0	41.1	42.3
Rossland	52.7	48.9	46.7	42.9	43.0
Fort St. John	64.0	56.0	50.7	46.8	47.3
Prince George	63.9	57.8	56.2	51.8	49.4
Prince Rupert	58.5	55.0	53.1	50.9	50.6

Ranked by 1996 shares in ascending order.
Source: Statistics Canada Census 1976, 1981, 1986, 1991 and 1996

Table C-10

Family Household Parameters

Average Number of Children Per Family

	1976	1981	1986	1991	1996
Trail	1.2	1.1	1.0	0.9	0.9
Kelowna	1.3	1.1	1.0	0.9	1.0
Port Alberni	1.6	1.4	1.3	1.1	1.1
BC	1.4	1.2	1.2	1.1	1.1
GVRD	1.3	1.2	1.1	1.1	1.2
Fort St. John	1.8	1.4	1.4	1.3	1.3
Prince George	1.7	1.5	1.4	1.3	1.3
Rossland	1.4	1.3	1.2	1.2	1.3
Prince Rupert	1.6	1.5	1.4	1.4	1.5

Families' Share of Total Private Households (%)

	1976	1981	1986	1991	1996
Trail	73.6	70.2	68.4	64.3	61.1
Kelowna	79.0	75.0	73.5	71.8	69.0
GVRD	71.7	68.2	67.1	67.9	69.0
Rossland	79.6	77.5	77.5	71.1	69.1
Port Alberni	80.4	77.5	74.2	72.8	70.1
BC	75.9	73.0	71.8	71.3	70.8
Fort St. John	81.8	0.0	73.3	70.8	71.2
Prince Rupert	81.1	76.8	76.7	75.1	74.9
Prince George	83.4	79.7	79.3	78.0	76.2

Source: Statistics Canada Census 1976, 1981, 1986, 1991 and 1996

Table C-11

Household Distribution by Class					
Ownership (%)					
	1976	**1981**	**1986**	**1991**	**1996**
Prince Rupert	57.4	57.9	57.1	57.3	59.3
GVRD	58.3	57.2	55.0	56.8	59.4
Fort St. John	67.4	58.9	51.8	55.5	60.1
BC	65.5	64.4	62.2	63.8	65.2
Kelowna	68.9	66.0	65.5	65.8	66.7
Trail	68.8	70.0	74.4	70.7	67.2
Prince George	70.3	67.1	66.1	68.0	68.7
Port Alberni	70.3	69.8	68.2	69.1	69.5
Rossland	80.0	80.6	83.0	77.3	81.4
Renters (%)					
	1976	**1981**	**1986**	**1991**	**1996**
Rossland	20.0	19.4	17.0	22.7	18.2
Port Alberni	29.6	30.2	31.8	30.9	30.5
Prince George	29.7	32.9	33.9	32.0	31.4
Trail	31.4	30.0	25.4	29.1	33.0
Kelowna	31.1	34.0	34.5	34.2	33.3
BC	34.9	35.6	36.6	35.9	34.5
Fort St. John	32.4	41.0	48.3	44.4	40.0
Prince Rupert	42.6	42.2	43.0	42.8	40.6
GVRD	41.7	42.8	44.6	43.2	40.6
Source: Statistics Canada Census 1976, 1981, 1986, 1991 and 1996					

Table C-12

Financial Hardship of Owners (% of total owners)	1981	1986	1991	1996
Fort St. John	20.5	10.4	7.5	7.0
Trail	7.9	1.0	3.1	8.0
Prince Rupert	16.5	7.7	5.9	11.6
Prince George	19.4	11.4	6.9	12.1
Port Alberni	11.0	7.2	4.3	13.8
Rossland	13.3	6.2	6.2	16.0
Kelowna	15.1	8.9	8.0	18.0
BC	16.6	10.2	9.1	19.1
GVRD	17.1	10.5	10.7	23.2

Note: Hardship is defined as major monthly payments (mortgage, taxes & utilities) as being >30% of household income. In 1981 the threshold was just 25% of income.
Source: Statistics Canada Census 1981, 1986, 1991, 1996

Table C-13

Average Monthly Major Payments: Owners ($/month)	1981	1986	1991	1996
Trail	$242	$320	$384	$420
Port Alberni	$343	$407	$478	$565
Fort St. John	$516	$425	$685	$696
Kelowna	$348	$406	$545	$699
Rossland	$343	$418	$544	$700
BC	$420	$512	$666	$704
Prince Rupert	$497	$559	$725	$779
Prince George	$495	$569	$646	$787
GVRD	$468	$583	$794	$942

Note: Hardship is defined as major monthly payments (mortgage, taxes & utilities).
Source: Statistics Canada Census 1981, 1986, 1991, 1996

Table C-14

Average Household Incomes

	Levels				Avg. Ann % Changes			
	1980	1985	1990	1995	1980-1985	1985-1990	1990-1995	1980-1995
Trail	$24,950	$30,644	$37,639	$38,846	4.2	4.2	0.6	3.0
Port Alberni	$26,487	$31,226	$42,458	$42,742	3.4	6.3	0.1	3.2
Kelowna	$23,084	$29,102	$40,833	$45,546	4.7	7.0	2.2	4.6
BC	$26,171	$33,497	$46,909	$50,667	5.1	7.0	1.6	4.5
GVRD	$27,742	$36,167	$50,610	$54,055	5.5	7.0	1.3	4.6
Rossland	$26,153	$33,647	$46,642	$54,649	5.2	6.8	3.2	5.0
Prince Rupert	$30,982	$39,061	$52,962	$54,760	4.7	6.3	0.7	3.9
Prince George	$28,739	$36,385	$49,059	$55,828	4.8	6.2	2.6	4.5
Fort St. John	$31,420	$32,819	$44,931	$56,480	0.9	6.5	4.7	4.0
Ranked in ascending order by 1995 household income								
	1980	1985	1990	1995	1980-1985	1985-1990	1990-1995	1980-1995
Trail	$24,950	$30,644	$37,639	$38,846	4.2	4.2	0.6	3.0
Port Alberni	$26,487	$31,226	$42,458	$42,742	3.4	6.3	0.1	3.2
Prince Rupert	$30,982	$39,061	$52,962	$54,760	4.7	6.3	0.7	3.9
Fort St. John	$31,420	$32,819	$44,931	$56,480	0.9	6.5	4.7	4.0
BC	$26,171	$33,497	$46,909	$50,667	5.1	7.0	1.6	4.5
Prince George	$28,739	$36,385	$49,059	$55,828	4.8	6.2	2.6	4.5
GVRD	$27,742	$36,167	$50,610	$54,055	5.5	7.0	1.3	4.6
Kelowna	$23,084	$29,102	$40,833	$45,546	4.7	7.0	2.2	4.6
Rossland	$26,153	$33,647	$46,642	$54,649	5.2	6.8	3.2	5.0
Ranked in ascending order by 1980-95 household income growth rate.								
Source: Statistics Canada Census 1981, 1986,1991 and 1996								

Table C-15

Income By Source
(% of total income)

Employment Income			
	1985	**1990**	**1995**
Trail	69.9	66.7	65.0
Kelowna	65.5	67.4	67.5
Port Alberni	78.0	77.4	73.5
BC	76.5	76.0	75.5
GVRD	78.0	77.7	77.9
Rossland	77.4	76.4	79.9
Prince Rupert	84.6	84.2	83.6
Prince George	87.0	85.5	83.8
Fort St. John	87.6	86.8	87.5

Government Transfers			
	1985	**1990**	**1995**
Fort St. John	8.1	8.6	8.9
Prince George	8.8	9.2	10.3
Rossland	11.5	10.8	10.4
GVRD	10.0	9.2	10.7
Prince Rupert	9.5	9.7	11.4
BC	11.7	11.0	12.7
Port Alberni	14.0	13.1	16.7
Kelowna	16.6	15.8	17.2
Trail	13.7	16.7	20.5

Other Income			
	1985	**1990**	**1995**
Fort St. John	4.3	4.6	3.6
Prince Rupert	5.8	6.1	4.9
Prince George	4.2	5.3	5.9
Rosslandl	11.1	12.8	9.7
Port Alberni	7.9	9.5	9.8
GVRD	12.0	13.1	11.5
BC	11.8	13.0	11.8
Trail	16.4	16.5	14.5
Kelowna	17.9	16.8	15.2

Note: Government transfers includes employment insurance, CPP, etc
Other income includes investment income.
Source: Statistics Canada Census 1986, 1991, 1996

Table C-16

Average Dwelling Prices

					Avg. Ann % Changes			
	1981	1986	1991	1996	1981-1986	1986-1991	1991-1996	1981-1996
Trail	$62,211	$65,863	$71,994	$96,112	1.1	1.8	5.9	2.9
Fort St. John	$71,180	$55,357	$71,610	$102,620	-4.9	5.3	7.5	2.5
Rossland	$60,297	$56,674	$62,805	$127,532	-1.2	2.1	15.2	5.1
Port Alberni	$74,347	$54,696	$72,715	$131,826	-6.0	5.9	12.6	3.9
Prince George	$80,756	$63,698	$84,448	$135,957	-4.6	5.8	10.0	3.5
Prince Rupert	$88,179	$80,149	$100,298	$146,218	-1.9	4.6	7.8	3.4
Kelowna	$115,528	$84,100	$134,014	$177,832	-6.2	9.8	5.8	2.9
BC	$128,081	$98,850	$175,559	$239,745	-5.0	12.2	6.4	4.3
GVRD	$174,135	$130,017	$247,831	$318,127	-5.7	13.8	5.1	4.1
Ranked in ascending order by 1996 dwelling prices								
	1981	1986	1991	1996	1981-1986	1986-1991	1991-1996	1981-1996
Fort St. John	$71,180	$55,357	$71,610	$102,620	-4.9	5.3	7.5	2.5
Kelowna	$115,528	$84,100	$134,014	$177,832	-6.2	9.8	5.8	2.9
Trail	$62,211	$65,863	$71,994	$96,112	1.1	1.8	5.9	2.9
Prince Rupert	$88,179	$80,149	$100,298	$146,218	-1.9	4.6	7.8	3.4
Prince George	$80,756	$63,698	$84,448	$135,957	-4.6	5.8	10.0	3.5
Port Alberni	$74,347	$54,696	$72,715	$131,826	-6.0	5.9	12.6	3.9
GVRD	$174,135	$130,017	$247,831	$318,127	-5.7	13.8	5.1	4.1
BC	$128,081	$98,850	$175,559	$239,745	-5.0	12.2	6.4	4.3
Rossland	$60,297	$56,674	$62,805	$127,532	-1.2	2.1	15.2	5.1
Ranked in ascending order by growth in dwelling prices in 1981-96								
Source: Statistics Canada Census 1981, 1986, 1991 and 1996								

Table C-17

Ratio of Dwelling Prices to Household Incomes

					Avg. Ann % Changes			
	1981	1986	1991	1996	1981-1986	1986-1991	1991-1996	1981-1996
Fort St. John	2.27	1.69	1.59	1.82	-5.7	-1.1	2.7	-1.5
Rossland	2.31	1.68	1.35	2.33	-6.1	-4.4	11.6	0.1
Prince George	2.81	1.75	1.72	2.44	-9.0	-0.3	7.2	-1.0
Trail	2.49	2.15	1.91	2.47	-2.9	-2.3	5.3	-0.1
Prince Rupert	2.85	2.05	1.89	2.67	-6.3	-1.6	7.1	-0.4
Port Alberni	2.81	1.75	1.71	3.08	-9.0	-0.5	12.5	0.6
Kelowna	5.00	2.89	3.28	3.90	-10.4	2.6	3.5	-1.6
BC	4.89	2.95	3.74	4.73	-9.6	4.9	4.8	-0.2
GVRD	6.28	3.59	4.90	5.89	-10.6	6.4	3.8	-0.4

Ranked in ascending order by 1996 ratios

	1981	1986	1991	1996	1981-1986	1986-1991	1991-1996	1981-1996
Kelowna	5.00	2.89	3.28	3.90	-10.4	2.6	3.5	-1.6
Fort St. John	2.27	1.69	1.59	1.82	-5.7	-1.1	2.7	-1.5
Prince George	2.81	1.75	1.72	2.44	-9.0	-0.3	7.2	-1.0
GVRD	6.28	3.59	4.90	5.89	-10.6	6.4	3.8	-0.4
Prince Rupert	2.85	2.05	1.89	2.67	-6.3	-1.6	7.1	-0.4
BC	4.89	2.95	3.74	4.73	-9.6	4.9	4.8	-0.2
Trail	2.49	2.15	1.91	2.47	-2.9	-2.3	5.3	-0.1
Rossland	2.31	1.68	1.35	2.33	-6.1	-4.4	11.6	0.1
Port Alberni	2.81	1.75	1.71	3.08	-9.0	-0.5	12.5	0.6

Ranked in ascending order by 1981-96 growth rate.

Source: Statistics Canada Census 1981, 1986,1991 and 1996

Table C-18

Employment Growth By Sex
(Average Annual % Growth)

	1976-81	1981-86	1986-91	1991-96	1981-96
Males Employed					
Trail	1.80	-9.94	2.13	-3.60	-2.17
Port Alberni	0.94	-5.40	0.92	-2.09	-1.22
Rossland	3.50	-6.72	0.49	4.23	-1.01
Prince Rupert	3.16	-2.88	1.41	-1.09	0.53
Prince George	5.01	-2.46	1.29	1.42	1.23
BC	3.99	-1.03	3.24	1.95	2.05
GVRD	3.70	-0.11	4.43	2.65	2.65
Kelowna	4.84	-2.20	5.56	4.24	2.67
Fort St. John	12.81	-4.65	4.38	0.73	3.94
Females Employed					
	1976-81	**1981-86**	**1986-91**	**1991-96**	**1981-96**
Trail	1.81	-4.38	1.32	-0.99	-0.46
Port Alberni	6.33	-5.40	5.75	0.56	2.08
Rossland	7.83	-1.89	2.42	7.26	2.71
Prince Rupert	7.53	-0.65	2.89	-1.06	3.20
Prince George	7.62	-0.45	3.85	2.97	3.62
BC	6.45	1.08	4.98	3.12	4.15
GVRD	6.36	1.59	5.28	3.31	4.39
Kelowna	7.37	1.44	6.67	4.62	5.13
Fort St. John	14.03	-2.94	5.42	2.60	5.28
Total Employed					
	1976-81	**1981-86**	**1986-91**	**1991-96**	**1981-96**
Trail	1.81	-7.79	1.78	-2.47	-1.51
Port Alberni	2.60	-5.40	2.67	-1.01	-0.12
Rossland	4.88	-4.93	1.29	5.57	0.33
Prince Rupert	4.79	-1.96	2.06	-1.08	1.59
Prince George	5.98	-1.66	2.37	2.12	2.18
BC	4.94	-0.16	4.00	2.48	2.90
GVRD	4.79	0.63	4.82	2.96	3.39
Kelowna	5.83	-0.66	6.07	4.42	3.70
Fort St. John	13.27	-3.98	4.81	1.53	4.46

Source: Statistics Canada Census 1976, 1981, 1986, 1991, 1996

Table C-19

Employment Growth By Class of Employment
(Average Annual % Growth Rate)

	Self-employed			Paid Employees			Self-employed Shares		
	1981-1986	1986-1991	1991-1996	1981-1986	1986-1991	1991-1996	1981	1991	1996
Port Alberni	-1.8	10.0	7.0	-4.8	2.3	-1.9	3.6	5.8	8.7
Prince George	2.9	10.6	8.8	-0.4	1.5	0.9	4.0	7.1	10.0
Trail	2.8	14.4	7.6	-6.6	-0.2	-2.1	2.2	6.6	10.2
Fort St. John	-0.8	15.3	4.4	-2.3	2.4	1.1	5.2	9.7	11.2
Prince Rupert	0.0	9.9	10.9	-0.4	1.9	-2.5	4.5	6.6	11.4
GVRD	6.3	18.2	8.7	1.3	4.3	0.9	4.6	10.3	14.3
BC	3.9	14.5	8.0	0.6	2.7	1.1	5.9	11.3	15.0
Kelowna	8.4	8.4	8.4	2.6	3.6	2.9	7.8	12.7	15.5
Rossland	-1.1	11.3	17.9	-4.1	1.6	1.3	4.8	8.5	16.3

Ranked in ascending order by 1996 self-employed shares

	1981-1986	1986-1991	1991-1996	1981-1986	1986-1991	1991-1996	1981	1991	1996
Prince Rupert	0.0	9.9	10.9	-0.4	1.9	-2.5	4.5	6.6	11.4
Trail	2.8	14.4	7.6	-6.6	-0.2	-2.1	2.2	6.6	10.2
Port Alberni	-1.8	10.0	7.0	-4.8	2.3	-1.9	3.6	5.8	8.7
Prince George	2.9	10.6	8.8	-0.4	1.5	0.9	4.0	7.1	10.0
GVRD	6.3	18.2	8.7	1.3	4.3	0.9	4.6	10.3	14.3
Fort St. John	-0.8	15.3	4.4	-2.3	2.4	1.1	5.2	9.7	11.2
BC	3.9	14.5	8.0	0.6	2.7	1.1	5.9	11.3	15.0
Rossland	-1.1	11.3	17.9	-4.1	1.6	1.3	4.8	8.5	16.3
Kelowna	8.4	8.4	8.4	2.6	3.6	2.9	7.8	12.7	15.5

Ranked in ascending order by paid employee's growth in 1991-96.
Source: Statistics Canada Census 1981, 1986, 1991 and 1996

Table C-20

Employment Dependence By Industry
(% of Total Employment)

Primary Industry				
	1981	**1986**	**1991**	**1996**
GVRD	2.3	2.3	2.3	2.1
Trail	17.9	4.8	9.2	2.8
Kelowna	5.9	7.3	5.8	5.0
BC	7.2	7.6	6.4	5.7
Rossland	2.4	9.2	11.5	5.8
Prince George	5.0	7.8	7.3	6.7
Prince Rupert	6.5	7.1	5.9	7.6
Port Alberni	13.4	16.4	13.2	10.2
Fort St. John	12.3	15.5	13.3	12.1
Manufacturing Industry				
	1981	**1986**	**1991**	**1996**
Fort St. John	6.6	8.2	6.6	4.6
Kelowna	12.7	11.9	9.6	10.1
GVRD	14.6	12.2	11.1	10.3
BC	14.8	12.5	11.2	10.4
Prince George	17.2	15.3	14.3	13.5
Rossland	35.9	23.6	17.6	18.8
Port Alberni	34.1	27.8	24.5	19.9
Prince Rupert	28.2	22.5	24.8	21.8
Trail	28.8	25.9	21.3	21.9

Ranked in ascending order by 1996 shares.
Source: Statistics Canada Census 1981, 1986, 1991, 1996

Table C-21

Employment Growth By Industry
(Average Annual % Growth)

Primary Industry				
	1981-86	**1986-91**	**1991-96**	**1981-96**
Trail	-28.1	14.5	-23.1	-14.1
Port Alberni	-0.7	-1.7	-6.3	-2.9
Fort St. John	2.4	0.2	-0.5	-0.7
BC	1.7	0.3	-0.2	0.6
Prince Rupert	1.2	-1.2	3.8	1.2
GVRD	1.7	4.6	-0.1	2.1
Kelowna	2.9	0.4	2.1	2.1
Prince George	9.2	0.6	-0.1	3.1
Rossland	25.5	6.9	-10.0	6.5
Manufacturing Industry				
	1981-86	**1986-91**	**1991-96**	**1981-96**
Port Alberni	-8.5	0.1	-5.3	-4.6
Trail	-8.3	-3.3	-1.9	-4.5
Rossland	-11.7	-3.6	4.6	-3.8
Fort St. John	2.3	-1.3	-5.6	-1.6
Prince Rupert	-4.8	4.3	-3.8	-1.5
Prince George	-2.6	0.6	0.4	-0.5
BC	-2.6	1.6	0.5	-0.2
GVRD	-2.0	2.7	0.9	0.5
Kelowna	0.3	4.6	1.7	1.7

Ranked in ascending order by growth rates for 1981-96
Source: Statistics Canada Census 1981, 1986, 1991, 1996

Table C-22

Unemployment Rates By Sex
(Average Annual %)

Males 15 & Over					
	1976	**1981**	**1986**	**1991**	**1996**
Rossland	8.1	4.6	13.0	15.3	6.0
GVRD	7.9	4.7	11.8	9.1	8.6
Kelowna	8.5	4.8	15.5	12.0	9.2
BC	7.9	5.6	12.9	10.1	9.8
Trail	6.7	4.9	15.7	8.9	11.5
Fort St. John	7.9	8.1	18.1	10.6	12.3
Prince George	9.7	7.0	16.5	13.5	12.8
Port Alberni	6.1	7.4	14.8	13.6	13.7
Prince Rupert	6.5	5.8	14.9	15.4	15.7
Females 15 & Over					
	1976	**1981**	**1986**	**1991**	**1996**
Rossland	14.4	11.7	14.0	16.2	5.9
Fort St. John	8.0	8.9	18.9	11.7	8.3
GVRD	9.0	5.6	11.1	9.3	8.5
BC	10.1	10.5	13.4	10.5	9.2
Kelowna	14.5	10.4	15.1	12.2	10.3
Prince George	11.7	10.2	17.0	12.7	10.4
Trail	11.1	9.8	15.8	12.1	12.6
Port Alberni	14.1	13.7	17.1	15.6	14.1
Prince Rupert	14.1	8.9	15.6	16.9	17.1
Total Labour Force 15 & Over					
	1976	**1981**	**1986**	**1991**	**1996**
Rossland	10.1	7.2	13.7	15.7	6.0
GVRD	8.4	5.1	11.5	9.2	8.6
BC	8.7	6.5	13.1	10.3	9.6
Kelowna	10.9	7.1	15.3	12.1	9.7
Fort St. John	7.9	8.4	18.4	11.0	10.6
Prince George	10.5	8.3	16.7	13.2	11.7
Trail	8.4	6.7	15.7	10.3	12.0
Port Alberni	8.5	9.6	17.2	14.4	13.9
Prince Rupert	9.4	7.1	15.6	16.1	16.3

Ranked in ascending order by 1996 unemployment rates.
Source: Statistics Canada Census 1976, 1981, 1986, 1991, 1996

Table C-23

Participation Rates By Sex
(Average Annual %)

Males 15 & Over					
	1976	**1981**	**1986**	**1991**	**1996**
Trail	68.2	75.2	65.7	66.4	59.8
Port Alberni	80.7	83.3	74.2	74.5	67.2
Kelowna	68.5	70.8	68.6	69.7	70.5
BC	74.7	78.3	76.2	75.6	73.0
GVRD	74.8	79.2	77.9	77.1	73.6
Rossland	72.3	75.9	70.6	71.5	74.2
Prince Rupert	80.3	83.3	84.0	85.0	79.5
Prince George	82.6	87.2	84.9	83.4	81.5
Fort St. John	83.2	88.3	84.8	88.3	87.3
Females 15 & Over					
	1976	**1981**	**1986**	**1991**	**1996**
Trail	40.2	44.2	44.5	45.4	43.8
Port Alberni	37.4	47.8	41.5	50.4	49.7
Kelowna	41.2	47.2	50.6	54.5	56.7
BC	45.1	52.7	55.5	59.9	60.0
GVRD	47.3	56.6	59.6	62.5	61.3
Rossland	36.5	47.4	49.2	56.1	66.5
Prince George	49.9	59.3	61.1	66.7	68.2
Fort St. John	51.0	61.7	60.6	67.7	68.5
Prince Rupert	53.6	63.9	67.6	72.9	69.0
Total Labour Force 15 & Over					
	1976	**1981**	**1986**	**1991**	**1996**
Trail	54.3	59.7	54.5	55.4	51.2
Port Alberni	59.7	65.8	57.8	62.5	58.4
Kelowna	54.4	58.5	85.1	61.7	63.3
BC	59.8	65.4	65.7	67.6	66.4
GVRD	60.7	67.6	68.5	69.6	67.3
Rossland	55.1	62.3	59.9	63.9	70.5
Prince Rupert	67.6	74.1	76	79.1	74.3
Prince George	66.7	73.5	73.1	75.2	74.9
Fort St. John	67.3	75.7	72.9	78.3	78.1

Ranked in ascending order by 1996 unemployment rates.
Source: Statistics Canada Census 1976, 1981, 1986, 1991, 1996

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