Urban Neighbourhood Impacts of Casinos: A Case Study of the Permanent Casino Site in Windsor, Ontario

by

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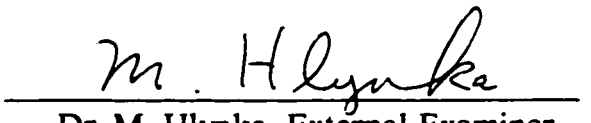
A Thesis
Submitted to the Faculty of Graduate Studies
through the Department of Geography
in partial fulfilment of the requirements
for the degree of Master of Arts (Planning) at the
University of Windsor

Windsor, Ontario, Canada.

1996

Approved By:



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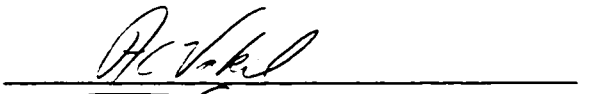

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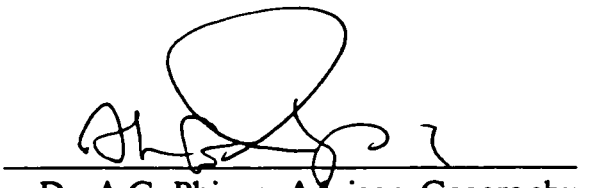

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ABSTRACT

This is a continuation of a baseline study by J. P. Lowrie (1994) which looked at property sales and their values within the neighbourhood of a planned casino site in downtown Windsor, Ontario, Canada. The data set for the study consists of 658 residential sales transactions during the period from 1981 to 1995. Two measurements of property alteration were carried forward from Lowrie's (1994) study for further analysis: (1) the monthly numbers of residential property sales; and (2) the sale prices of these properties. The addition of variables affecting housing price improved the accuracy of the ARIMA (Autoregressive Integrated Moving Average) modelling from that used in Lowrie's (1994) study. The results however were parallel - the monthly numbers of sales have decreased, but property prices have increased, since the casino location announcement.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank my advisor, Dr. Alan G. Phipps who has "kept me on the right track" throughout the duration of this project. Secondly, I would like to extend my gratitude to my "off-campus" advisor and proofreader, Brian Hillman, without whose help the completion of this thesis would not have been realized. I must also give recognition to my employers at Prince, Silani and Associates for their patience and generosity in affording me the time and resources to complete this thesis. The staff at Royal LePage Real Estate Services in Windsor is credited for providing the primary data used in the study. Finally, I would like to thank my wife, Lisa, and my son, Ryan, for providing me with the necessary incentive and support to allow me to complete my studies at the University of Windsor.

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Urban Neighbourhood Impacts of Casinos:

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CHAPTER 1.0 INTRODUCTION

Specific land use decisions are frequently advocated or opposed on the grounds of enhancing property values. Accordingly, it is reasonable to attempt to measure the magnitude of the impact of such decisions. The decision to locate a permanent casino in the western portion of the Glengarry neighbourhood within downtown Windsor, Ontario was announced in January of 1993. This followed the Ontario Provincial government's decision to award the city of Windsor the first license for casino gambling in Ontario. The impact of the siting of the permanent casino into the urban fabric of a fairly healthy and diversified city centre is yet to be determined.

The purpose of this thesis is to study the urban impact of the announcement of a casino in the Glengarry neighbourhood. Several articles in the Windsor Star, the major newspaper in the region, discussed the potential benefits and drawbacks which may be realized as a result of casino development. These include the potential increased pressure for intensive commercial and residential development on lands surrounding the casino site (Windsor Star, April 16, 1994). This study focuses on residential and neighbourhood change. More specifically, housing transactions are studied to determine whether the pressure to gain a locational advantage relative to the casino site, or the desire of Glengarry

residents to relocate away from the permanent casino site will lead to a change of trends in housing prices and/or housing sales.

This study is an extension of a previous study which examined the trends in property prices and sales in the Glengarry neighbourhood before and after the announcement. Lowrie (1994) created a baseline study of the trends in property prices and sales in the Glengarry neighbourhood surrounding the location of the planned casino during the years from 1975 to 1994. The purpose of Lowrie's study was to measure the magnitude of the impacts after the construction of the permanent casino. The trends in property sales and prices were modelled as time series in order to represent the trends in recent property sales and thus to project future trends in the absence of the permanent casino. Although Lowrie was successful in developing such trends, his study neglected to incorporate into the modelling process many of the variables that affect housing price and subsequently impact housing sales. His independent price-determining variables were lot size, distance from the casino site, and the Windsor/Essex County house sales. Lowrie (1994) described the lack of independent variables as a weakness in the modelling used in the analysis. The following analysis attempts to enhance Lowrie's study by including in the modelling process, such variables as the number of storeys, the number of bathrooms, the amount of garage space, whether the property contained a duplex and whether the home contained a full basement. This enables the researcher to more accurately measure the impact of the casino announcement on the Glengarry neighbourhood. In addition, the time

period for this study has been adjusted from that of the previous study to include sales registered in the Multiple Listing Summary books for the study area for the years 1981 to 1995.

CHAPTER 2.0 LITERATURE REVIEW

The following literature review begins with the relevant aspects of housing price theory as it relates to inner urban neighbourhoods. Following that, an explanation of ARIMA Modelling Theory and how it can be used to describe trends in housing prices and sales is presented.

2.1 Housing Price Theory

The price that any particular house commands is dependent on a number of economic and social variables, grouped into two broader categories: the physical characteristics of the house and the lot upon which it is situated; and the area in which the property is located. Studies of real-estate values have historically used either aggregate data (Ridker and Henning, 1967; Oates, 1969) or disaggregate data (Bailey, 1966; Kain and Quiqley, 1970). Aggregate data involve variables which are averaged, such as either the number of units in a census tract classified as dilapidated, or the percentage of houses which were more than twenty years old. In comparison, in studies using disaggregate data, the unit of observation is a single transaction such as a housing sale. The latter is preferable as averaging has a tendency to obscure important variations (Ball, 1973).

2.1.1 Dwelling Structural Factors

In either type of study of housing price, the coefficients for the independent variables hypothesized to affect price, are most commonly recovered in a multiple regression (Phipps, 1987). Ball (1973) reviewed eleven research papers on the determinants of relative house price. Regression analysis was the statistical method used in each of these studies, and house price, or its transformation (i.e. log or average), was the dependent variable in all but two studies. In the eleven studies, the following dwelling attributes consistently appeared as significant variables in the regression equation (in order of most frequent to least frequent): floor area; number of rooms; age; the presence of a garage; the housing structure type; condition of the house (interior and exterior condition); lot area; height of dwelling; number of bathrooms; number of bedrooms; and the presence of central heating.

Regression analysis was used by Grether and Mieszkowski (1974) in their study of the determinants of real estate values in the New Haven metropolitan area. Their study demonstrated that the value of a house is an additive function of its structural characteristics and the variables significant in determining housing price were similar to the ones found to be significant in Ball's (1973) review. In addition to the strictly quantitative data used by researchers in Ball's (1973) review, Grether and Mieszkowski (1974) incorporated qualitative data in their study, in the form of subjective evaluations of the condition of the homes by

local realtors. The coefficients for the condition variables were all significant and had the expected sign.

2.1.2 Neighbourhood Factors

The modelling approach in the microeconomic literature for understanding the components of house value is the hedonic price methodology (Phipps, 1987). Hedonic indices sort out the influence of housing and non-housing factors in determining the market value of units that are sensitive to both dwelling and neighbourhood characteristics but do not include non-housing factors such as inflation, tenure conditions, or racial discrimination (Merrill, 1983). The hedonic price model, as developed by Griliches (1971) and Rosen (1974), when applied to the urban housing market, argues that housing payments for a residence are a function of the basic site-specific traits - the neighbourhood (or nonstructural) traits and the structural traits of the dwelling itself. Thus, housing price is not solely a reflection of the structural attributes of the dwelling and the lot upon which it is situated. In their 1980 study, Li and Brown used linear regression to estimate the influence of micro-neighbourhood factors on housing prices and established that bias is introduced in estimates of housing prices when micro-neighbourhood factors are not included. Their micro-neighbourhood variables included aesthetics, pollution levels and proximity to non-residential activities. Their study used a sample of 781 sales of single-family houses in 15 suburban

towns located in the southeast sector of the Boston metropolitan area. The results of their research demonstrated four distinct relationships: the first was that an increase of an established on-site visual quality index resulted in an increase in sales price. The second was that noise pollution decreased sales price on average by $460 for each doubling of perceived level of loudness. The third was that housing values decreased as a unit gets older, but as it takes on historical significance, the value begins to rise. A final relationship showed large houses on large lots sell for considerably more than either small houses on large lots or large houses on small lots which, in turn, sell for very little more than small houses on small lots.

Others have attempted to isolate the value of land from the combined value of land and buildings by using only vacant lots in their studies (Asabere and Harvey, 1985; Johnson and Ragas, 1987). Asabere and Harvey (1985) used a hedonic price model based on the characteristics of lots and location factors in an attempt to explain the sale price of vacant lots in Halifax-Dartmouth over an eight-year period of 1976 to 1984. The authors hypothesized that the value of urban land is a function of access to points of economic and social attraction, amenity or disamenity, physical properties, the presence of public services, and institutional factors that influence the land market and its participants. The conventional urban explanatory variables such as zoning, lot size, site services, centrality, neighbourhood, and high traffic that have been shown to determine land values in U.S. cities, may also apply to typical Canadian land markets.

2.1.3 Externalities

In addition to the two previously discussed factors, the price of urban residential land has been argued to also depend on its locational features or amenities (Diamond, 1980). Harvey (1973) suggests that "the activity of any one element in an urban system may generate certain unpriced and perhaps non-monetary effects upon other elements in the system." These effects can be considered "externalities", also referred to as "spillover" or "third party" effects. External accessibility benefits or costs associated with particular lots within a neighbourhood include such factors as: closeness to a visually appealing amenity, e.g., a riverfront park; nearness to a potentially dangerous or unsightly land use, e.g., a housing project; or benefits arising from the accessibility to a major transportation corridor (Johnson and Ragas, 1987). Externalities generally have a tapering effect, where the greatest impacts are located closest to the source (Hughes and Sirmans, 1992; Nelson, Genereux and Genereux, 1992; Thibodeau, 1990). Hence, externalities, in imposing either positive and/or negative effects on adjacent land uses, impact over very small geographic areas, and their impacts diminish as distance increases from the source. In the case of a positive externality the greatest benefits are found closest to the source while negative externalities have the reverse effect (Buck *et al.*, 1991).

Thibodeau (1990) used a real estate hedonic model to determine the impact that the Lennox Center (a high rise office building), constructed in a primarily

residential area of North Dallas, had on the selling prices of homes in that area. He found that: (1) negative externalities resulted in lower prices for homes adjacent to the high rise structure; (2) homeowners with properties located between 1000 and 2500 metres away benefitted from the high rise; (3) Lennox Center appears to have no influence on housing values for properties 2,500 metres away; and (4) there are many more homeowners that benefit from the positive externalities than there are homeowners burdened by the negative externalities. Hence, the net effect of the high rise is to increase aggregate property values, even though the benefit to any one homeowner is significantly smaller than is the cost for a home owner whose property is adjacent to the high rise.

A smaller number of studies have investigated externalities and the localized property value effects of various public and private projects, like highways, public housing and development controls (Holway and Burkey, 1990; Langley, 1976; Rabiega *et al.*, 1984; Shilling *et al.*, 1991). Urban casinos are one example of new, large-scale, private and public facilities being located in inner-urban neighbourhoods since the mid 1970s. These office, retail, recreational and service facilities have city-wide economic development purposes (Feagin, 1987). More locally, they generate both positive and negative externalities that especially affect the values of neighbouring properties (Nelson, Genereux and Genereux, 1992; Thibodeau, 1990). Buck et al. (1991) focused on the impacts of a casino on property values in Atlantic City, New Jersey. The study assessed the monetary costs of crime, attributed to casinos, as capitalized in real estate values. The

findings of the study were that casinos created positive and negative externalities that balanced in terms of property values. Richards (1989) also studied the effects of the casino industry on employment, taxes, crime and housing in Atlantic City. He concluded that: (1) housing rent levels rose more than twice the level that had existed before casino gambling was introduced; (2) there was a huge increase in crime and the costs of law enforcement; and (3) casinos caused increasing land values to Atlantic City business and home-owners. This resulted in higher property taxes, and forced many small property-owners to sell their properties at lower prices because they were unable to pay the higher taxes.

In studying a casino, it cannot be assumed that the property values are guided entirely by amenities or disamenities because land speculation often occurs around a proposed casino site, to gain a locational advantage. The introduction of a casino greatly alters the property values as a result of the externalities produced by casino gambling. A new casino may create many positive externalities such as: an increased number of jobs for the residents of the city; a higher tax base for the municipality; and land speculation surrounding the casino site. However, there are a number of negative externalities that usually accompany casino gaming in the areas surrounding the casino including: an increase in the crime rate; increased traffic nuisances; and a growth in the number of transient individuals (Buck *et al.*, 1991). As a result, the effect of casinos upon property values appears to be ambiguous; positive externalities pull toward an increase in property values, while the casino's negative externalities pull towards

diminished values. Therefore, a change in the relative land values surrounding the casino site should identify whether the positive or negative externalities have the greatest influence on the housing market.

In summary, housing provides a relative location to a variety of neighbourhood and community attributes, including health services, educational facilities, recreational amenities and environmental quality as well as social and cultural benefits (Knox, 1987). Since there are many factors influencing housing, a logical measure of amenities and disamenities is property value (Weiss *et al.*, 1966). Accordingly, it could be expected that in a relatively homogeneous neighbourhood where the houses are of similar age, size and structural condition, the variance in property values are attributes of amenities or disamenities as produced by externalities.

2.1.4 Market Factors

A final factor in the determination of residential property value is the market's supply and demand conditions captured in the city-wide house prices (Chinloy, 1978; Maclennan, 1977). The buyer and seller adjust their price expectations according to current market conditions represented by sales of similar housing units in that time period. Anas and Eum (1984) suggest that buyers and sellers will make their bidding and asking price decisions by looking at the prices and attributes of similar recent sales from the same neighbourhood.

The authors contend that the assumption of an equilibrium in the housing market is unrealistic. Accordingly, the demand and supply decisions of buyers and sellers are influenced not only by the contemporaneous hedonic attributes of dwellings and their locations but also by market signals from preceding periods, such as lagged values of prices, prices changes, interest rates, turnover rates, availability of information, and so on.

2.1.5 Summary of Housing Price Theory

As demonstrated by this literature review, there are a number of variables which may be considered valid in the analysis of housing prices. The literature reveals that the exact number and type of variables to be considered is subject to considerable debate. Using either too many or too few of the relevant housing price variables in a pricing model can lead to questionable results. In Section 3 of this paper, an attempt is made to select the relevant physical, locational and economic variables to be synthesized into the A Priori model used for this study.

2.2 ARIMA Modelling Theory

The following section discusses a modelling approach which incorporates the many variables affecting housing price including the variables which describe the state of the housing market. An ARIMA model "is an algebraic statement indicating how observations on a variable are statistically related to past observations on the same variable" (Pankratz, 1983). In this study, ARIMA modelling will be used to describe the trends in both the numbers of property sales, and the property prices within a given neighbourhood. ARIMA modelling involves a procedure consisting of three steps - identification, estimation, and diagnosis. These steps are repeated until the model is satisfactory. The general model is traditionally written as ARIMA (p,d,q), where p is the order of autoregression (AR), d is the number of times that the series must be differenced to make it stationary and q is the order of moving average (MA) in the process.

In an autoregressive process each value in a series is a linear function of the preceding value or values. In a first-order autoregressive process only the single preceding value is used, whereas in a second-order process the two preceding values are used, and so on. In a moving-average process, each value is determined by the average of the current disturbance and one or more previous disturbances. The order of the moving average process specifies how many previous disturbances are averaged into the new value. Hence, the difference between the two processes is that in an MA series each value is a weighted

average of the most recent random disturbances, while each value in an AR process is a weighted average of the recent values of the series. Since these values are weighted averages of the previous ones, the effect of a given disturbance in an AR process dwindles as time passes, whereas in an MA process, a disturbance affects the system for a finite number of periods (the order of the moving average) and then abruptly ceases to affect it.

The initial phase in diagnosing an ARIMA model involves the subjective identification of the processes underlying the series which, in turn, involves the determination of the three integers p, d, and q. The first step in this identification stage is to determine from a plot whether or not the series is stationary, since the identification process for the autoregressive (AR) and (MA) components requires a stationary series. A stationary series has the same mean and variance throughout. If the variable in question has a different mean during each time period, it is difficult to get useful estimates of each mean because there is no continuity between observations. When a series is not stationary, it must be transformed until a stationary series is obtained. The most common transformation is differencing, which replaces each value in the series by the difference between that value and the preceding value. Chatfield (1985) provides the general notation for this process as follows:

$$w_t = z_t - z_{t-1},\ t = 2, 3, \ldots\ldots, n.$$

A nonstationary data series will in most cases become stationary after the "differences", but if this does not occur, it may be necessary to transform the data into "second differences". The notation for this is also provided by Chatfield (1985):

$$w_t = (z_t - z_{t-1}) - (z_{t-1} - z_{t-2}) , t = 3, 4, ..., n.$$

The second parameter, *d*, is simply the number of times the series was differenced to make it stationary.

The orders of AR, *p*, and MA, *q*, may then be identified. At this identification stage an estimated autocorrelation function (ACF) and an estimated partial autocorrelation function (PACF) are used to infer the process inherent to the data series. Processes with past (time-lagged) z terms are called AR processes, while processes with past (time-lagged) random shocks are called (MA) processes (Pankratz, 1983). The ACF calculates a correlation coefficient for each set of ordered pairs (z_t, z_{t-k}) within the series. The ACF measures the direction and strength of the statistical relationship between ordered pairs of observations on two random variables. The symbols (r_k) are used to represent the estimated autocorrelation coefficients for observations separated by *k* time periods within a time series. The PACF also measures the statistical relationship between each set of ordered pairs (z_t, z_{t+k}) within the series, but it differs in measuring how the

ordered pairs are related accounting for intervening z's. For example, the PACF measures the relationship between the ordered pairs (z_t, z_{t-2}) taking into account the effect of z_{t-1} on z_{t-2}. The symbols $\{\phi_{kk}\}$ represent the correlation coefficients for the PACF.

The following rules are used to determine the process underlying the series:

- AR(p) models have exponentially declining values of the ACF (possibly with alternating positive and negative values), and have precisely p spikes in the first p values of the PACF.
- MA(q) models have precisely q spikes in the first q values of the ACF, and exponentially declining values of the PACF.

The next step in developing an appropriate model is to determine the order of the process. This is accomplished by inspecting the ACF and the PACF for the longest time lag associated with the most significant correlation coefficient. For example, if the longest time lag attached to a significant correlation coefficient is at z_{t-1}, there would be a process of order 1. Similarly, if the longest time lag attached to a significant correlation coefficient is at z_{t-2}, there would be a process of order 2.

Once the process has been established it is possible to develop the appropriate ARIMA model. The basic ARIMA model notation (Pankratz, 1983) for relating a time-series variable (Z_t) to its own past values is:

$$Z_t = C + \phi_1 Z_{t-1} + a_t$$

This equation represents the relationship between Z_t and its own immediately past value (Z_{t-1}). C is a constant term and ϕ_1 is a fixed coefficient whose value determines the strength and direction of the relationship between Z_t and Z_{t-1}. The terms C, $\phi_1 Z_{t-1}$ and a_t are each components of Z_t. C is a deterministic component, $\phi_1 Z_t$ is a probabilistic component since its value depends in part on the value of Z_{t-1}, and a_t is a purely probabilistic component (shock element). Together C and $\phi_1 Z_{t-1}$ represent the predictable part of Z_t while a_t is the residual element that cannot be predicted within the ARIMA model.

In general, an ARIMA model is based on an algebraic statement (Wei, 1990), such as a property's price (for example) at time t, ${}_pZ_t$, being represented as:

$${}_pZ_t = (\phi_1 * {}_pZ_{t-1}) + {}_pa_t - (\theta_1 * {}_pa_{t-1}) + (\Sigma_i \ \beta_i X_{zi})$$

or

$$(1 - \phi_1 B)(1 - B){}_pZ_t = (1 - \theta_1 B){}_pa_t + (\Sigma_i \ \beta_i X_{zi})$$

Where ϕ_1 and θ_1 are first-order autoregressive, and moving average coefficients; $\{a_t\}$ are random temporal disturbances from a zero mean white noise process with constant variance σ_a^2; B is the backshift operator $B_j X_{t-j}$; and the $\{\beta_i\}$ are the linear coefficients for weighting the $\{X_{zi}\}$ attributes of property Z. In words, the property prices follow a random temporal process in which a transaction during time period *t* is a function of its own random disturbance; the price during the previous time period *t-1*, minus θ_1 of the random disturbance at this previous time.

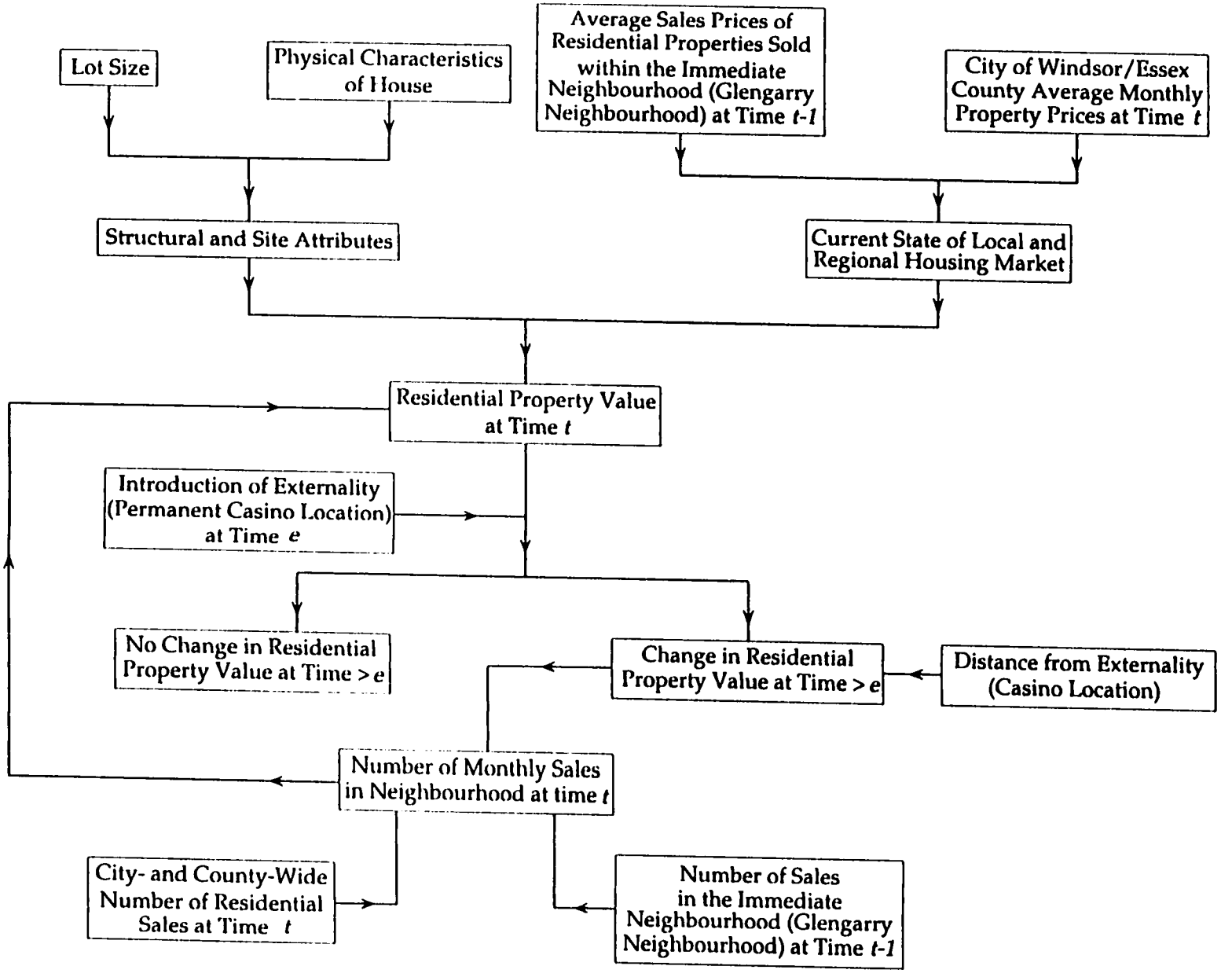
CHAPTER 3.0 A PRIORI MODEL

The a priori model in Figure 1 hypothesizes that, in the absence of an externality, a residential property value within a given neighbourhood is determined by its structural and site attributes together with the current condition of the local housing market. The introduction of an externality into the system may have an impact on residential property prices in that particular neighbourhood, although the direction of that impact can not be inferred until testing has been completed.

Physical attributes of the lot reflect on-site factors that determine the efficiency and capacity with which land performs services and provides benefits (Asabere and Harvey, 1985). Considering that all the lots in the Glengarry neighbourhood are of a similar shape (rectangular) and topography (flat) and that the neighbourhood is fully serviced, the only physical lot attribute considered for the model was the size of the lot. Past research has demonstrated that selling price increases as lot area increases (Ball, 1972; Butler, 1982; Grether and Mieszkowski, 1973).

Asabere and Harvey (1985), Li and Brown (1980), and Maclennan (1977) suggest that physical attributes of a house (number of bathrooms, number of bedrooms, full- versus half-basement, etc.) also have a significant impact on residential property value. However, the number of such characteristics can be unmanageably large, and the intrinsic clustering of characteristic combinations

Figure 1: A Priori Model



into a relatively small number of configurations can lead to considerable multicollinearity in estimates employing a careless selection of the relevant variables (Butler, 1982). Accordingly, the attributes used in this study were carefully chosen to avoid the problems of multicollinearity. The attributes affecting property value selected for this study include: existence of a full-finished basement, the number of bathrooms, the distance from the casino site, whether the property contained a duplex or semi-detached dwelling, the number of garage spaces, the lot size, and the number of storeys.

On the basis of the a priori model and relevant literature, the following hypotheses are derived:

(1) that the property prices within the Glengarry neighbourhood at time t are a function of: (i) the attributes of the houses sold at time t including the existence of a full-finished basement, the number of bathrooms, whether the property contained a duplex or semi-detached dwelling, the number of garage spaces, the lot size, and the number of storeys; (ii) the average distance from the sold properties to the permanent casino location at time t; (iii) the mean city-wide price for residential properties sold at time t; (iv) whether time t was after January 1993 when the permanent casino location was announced; and (v) the random disturbances created by the prices of the specific properties sold at times t and t-1; and

(2) that the number of property sales within the Glengarry neighbourhood are a function of: (i) the city-wide number of residential sales at time t; (ii) the mean property prices in Glengarry during time t; (iii) whether time t was after January 1993 when the permanent casino location was announced; and (iv) the random disturbances created by the specific sales at times t and t-1.

CHAPTER 4.0 STUDY AREA

The City of Windsor has a population of 190,000 and is located in the southwesterly limit of the province of Ontario on the Canada/U.S. border with Detroit. Metropolitan Windsor's population was 260,000 in 1991 (Statistics Canada, 1991). Its population growth rate (3.2%) from 1986 to 1991 was below the average (8%) for the 25 Census Metropolitan Areas (CMAs) with populations above 100,000 in Canada. The unemployment rate was at least three percentage points above the Canadian average for that same time period (Canada Mortgage and Housing Corporation, 1995). The uncertainty caused by a relatively high unemployment rate depressed the prices of both new and used homes and the rate of construction of new housing, in comparison to other Southern Ontario cities (Bourne, 1992).

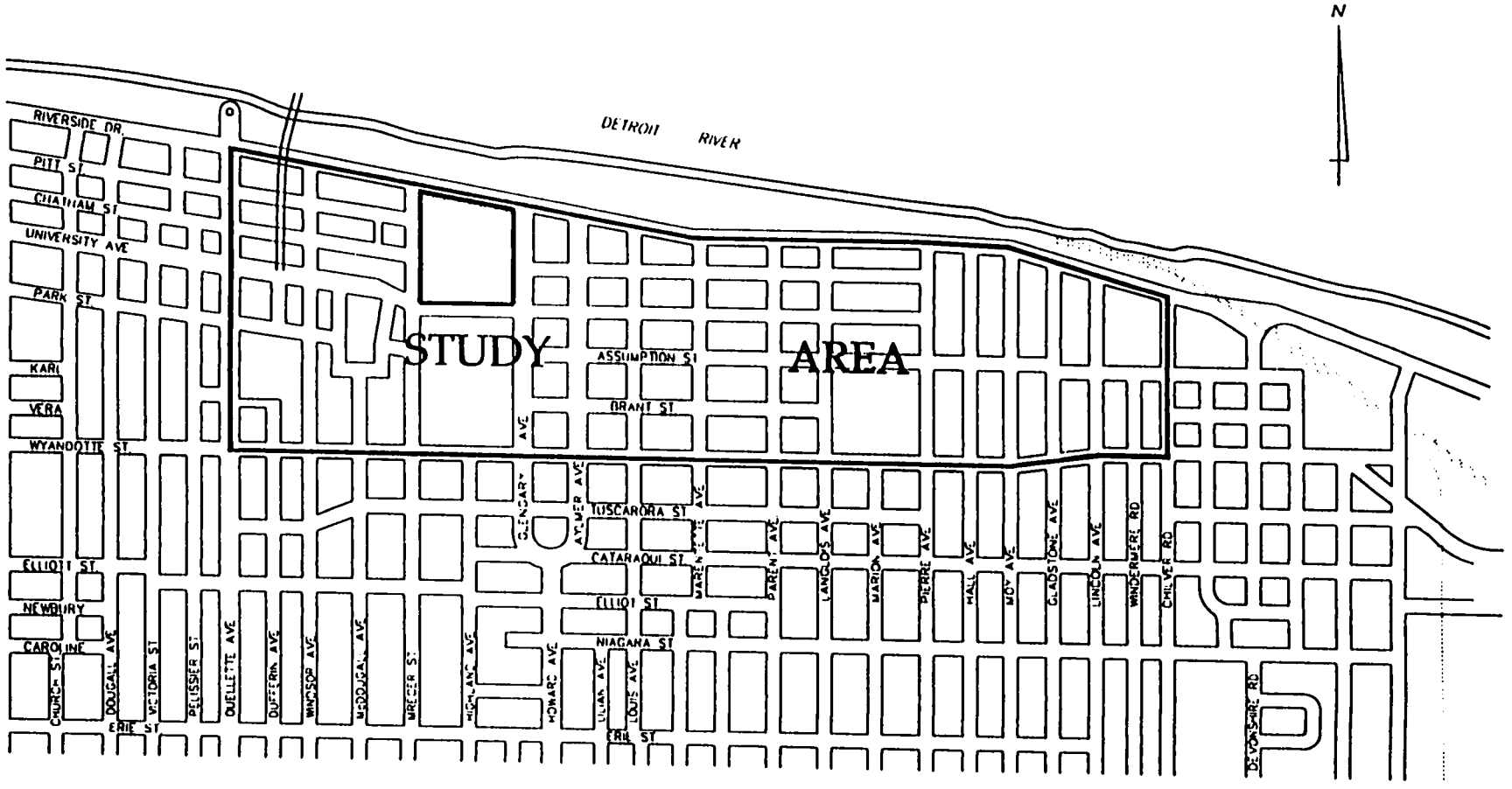
More recently, in Ontario, macroeconomic factors have contributed to lower activity in new housing construction. In the first half of 1995 in Ontario, an interest rate spike, a provincial election, the Quebec referendum and slow job creation combined to negatively influence purchasers. During the fourth quarter of 1995, consumer confidence in Ontario dropped to the lowest level in two and a half years. In the Windsor CMA, the 1995 fourth quarter median price of $162,300 was down 12 per cent from its fourth quarter peak for the five-year period (1991 to 1995) of $184,000, which occurred in 1994. In addition, the number of single detached homes constructed and sold in the Windsor CMA was

lower during 1995 than in 1994 (Canada Mortgage and Housing Corporation, 1995).

The planned permanent casino site is situated in the northwestern portion of the Glengarry neighbourhood (Figure 2) and occupies what had been six city blocks. The Glengarry neighbourhood is located immediately east of Windsor's central business district adjacent to the Detroit River. It is bound by the Riverside Drive to the north, Wyandotte Street to the south, Chilver Road to the east and Ouelette Avenue to the west. A contrast exists between the western and eastern sections of the Glengarry neighbourhood. The far western section, a major portion of which is to be used for the permanent casino site, had been an under-utilized area that was occupied by various office buildings, commercial structures, residential dwellings and parking lots (Figures 3 and 4). The permanent casino site is currently under construction (Figure 5) and is planned to open in early 1998. The eastern section of the Glengarry neighbourhood is characterized by low-density residential development (Figure 6).

The residential dwellings in the neighbourhood are modest early-twentieth-century homes (Figure 7). The neighbourhood had deteriorated both physically and socially until the mid-1970s when one-half of the privately-owned properties within the neighbourhood were rehabilitated with funding from the Residential Rehabilitation Assistance Program. During the same period, the Neighbourhood Improvement Program funded above- and below-ground infrastructure improvements within the neighbourhood. These programs helped

Figure 2:
Study Area
Glengarry Neighbourhood, Windsor, Ontario



Source: Author

FIGURE 3: Office Buildings and Commercial Structures to the Immediate West of the Permanent Casino Site

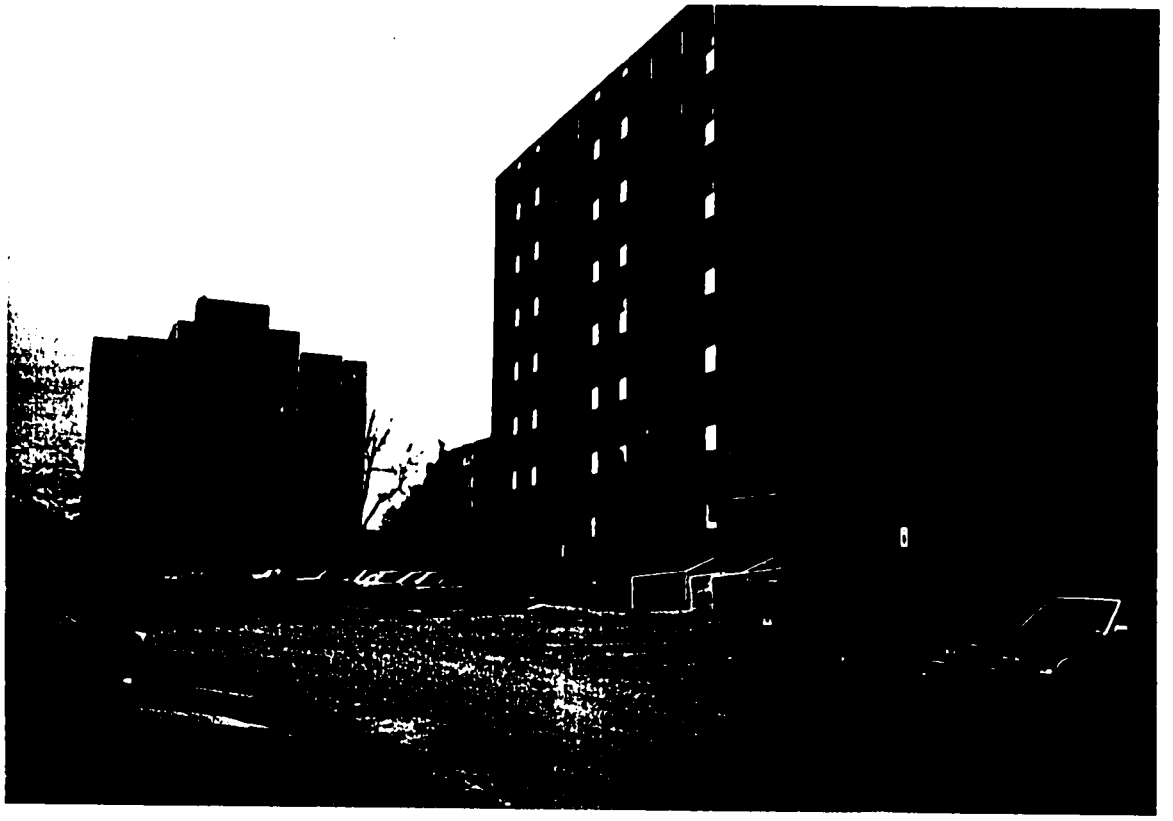


FIGURE 4: Geared Income Multi-Unit Residential Development
Immediately North of the Permanent Casino Site

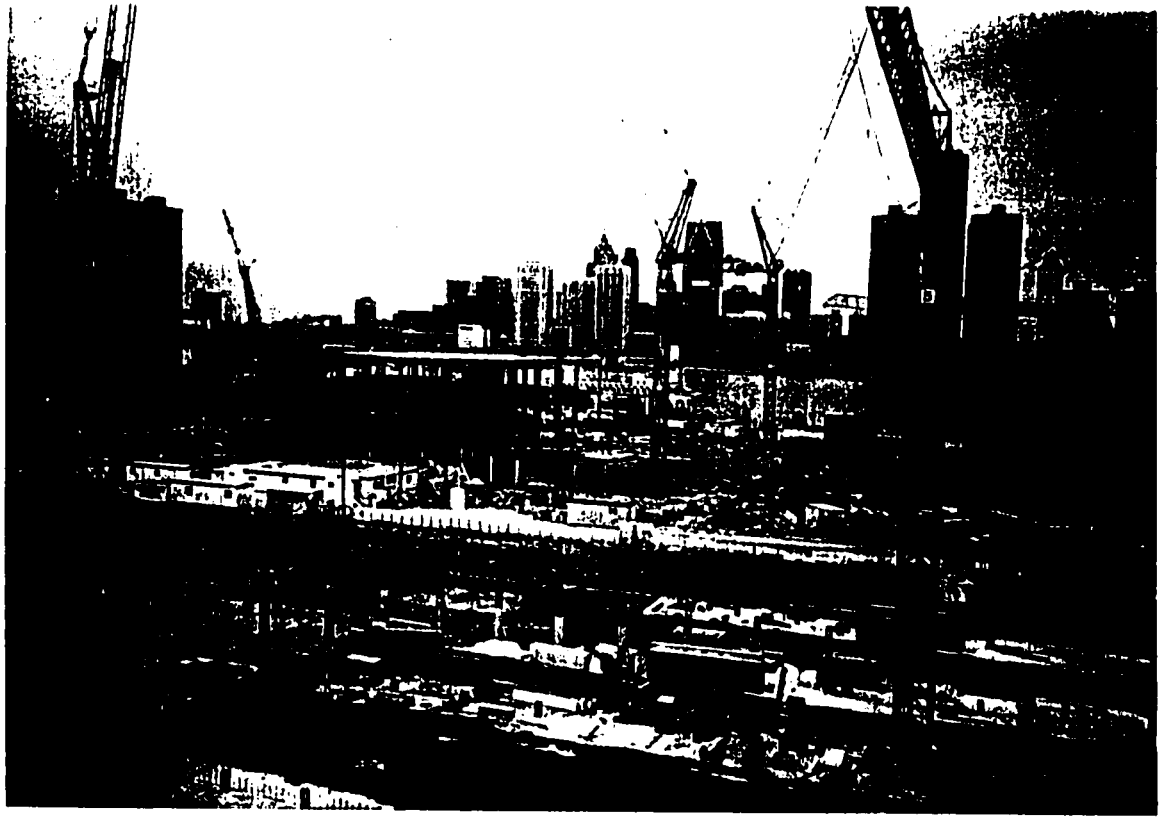


FIGURE 5: Permanent Casino Construction Site - September 28, 1996

FIGURE 6: Typical North-South Streetscape for the Eastern-Half of the Glengarry Neighbourhood

FIGURE 7: Early 20th Century Dwellings in the Eastern Half of the Glengarry Neighbourhood

to stabilize the social and physical fabric of the neighbourhood. However, the housing in this area is priced at the lower end of the scale in Windsor (Brooks, Jones, and Phipps, 1994).

Home-owners located in close proximity have mixed feelings about the selection of the site of the permanent casino (Windsor Star, 1993, January 15). Some homeowners were excited about the possibility of higher land values, whereas others were worried about the "expected" alterations to the fabric of their neighbourhood (Figure 8).

Figure 8: "Expected Alterations" About to be Realized?
Proposed Future Hotel Site Immediately Northwest of Permanent Casino Site

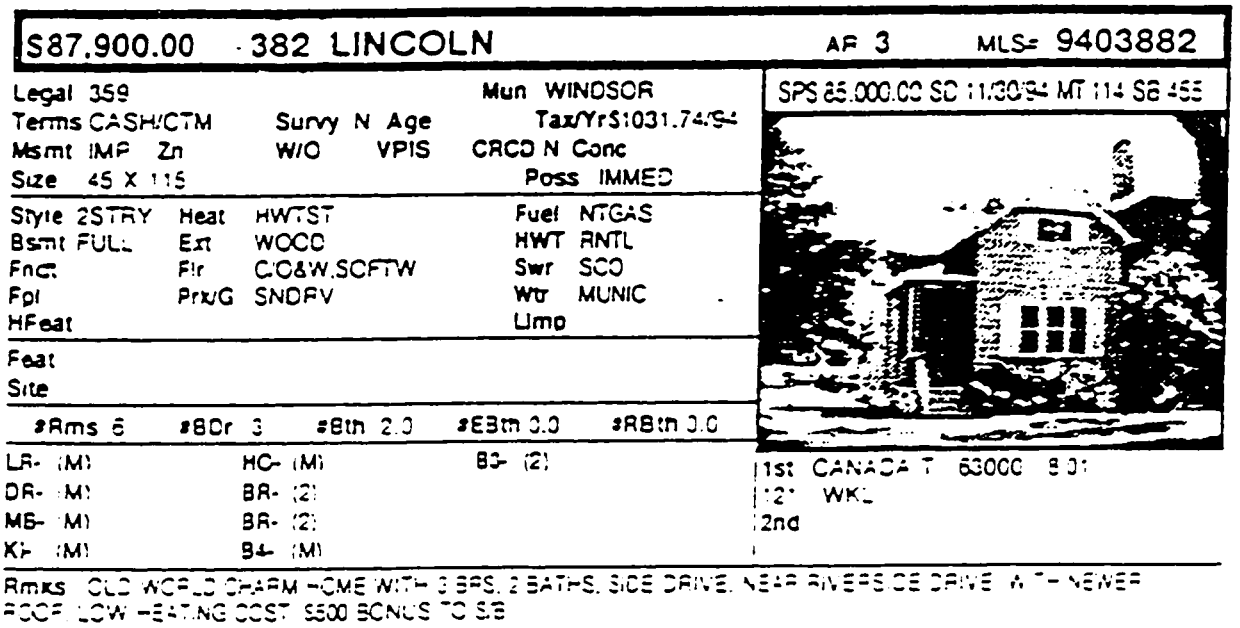
CHAPTER 5.0 ARIMA RESULTS

5.1 Data Collection

The primary data for this study are the 658 sales of residential properties within the Glengarry neighbourhood during the 15-year period from January 1981 to December 1995. Data on both sale price and housing characteristics were collected through the office of Royal LePage Real Estate Services in Windsor, and its library of Windsor-Essex County Multiple Listings Summary (MLS) books dating back to 1980. The Multiple Listings Summary books are published quarterly and contain a large amount of objective information about the physical characteristics of the houses sold, as well as providing the location of the house, the owner's asking price and selling price, and the date of sale. An example of a page from the MLS books is displayed in Figure 9.

The Multiple Listings Summary books are not an exhaustive record of homes sold in the region but rather only those listed with real estate agencies. When compared against the *Teela* real estate records, an exhaustive account of real estate transactions and the data source used by Lowrie (1994), the sales in the MLS books represent approximately 65% of total sales transactions. The advantage of the MLS books over the *Teela* real estate records is their large amount of objective information, whereas the *Teela* records contain only the actual sale price, location, lot size, and name of the individual or company that has

Figure 9: Sample from a Multiple Listings Summary Book



$87,900.00 · 382 LINCOLN — AR 3 — MLS# 9403882

Legal 359 — Mun WINDSOR
Terms CASH/CTM — Survy N — Age — Tax/Yr $1031.74/94
Mgmt IMP — Zn — W/O — VPIS — CRCO N — Conc
Size 45 X 115 — Poss IMMED

SPS 85,000.00 SD 11/30/94 MT 114 SB 455

Style 2STRY — Heat HWTST — Fuel NTGAS
Bsmt FULL — Ext WOOD — HWT RNTL
Fnct — Flr C/O&W,SCFTW — Swr SCO
Fpl — Prk/G SNDRV — Wtr MUNIC
HFeat — Umb

Feat
Site

#Rms 6 — #BDr 3 — #Bth 2.0 — #EBth 0.0 — #RBth 0.0

LR- (M) — HC- (M) — BG- (2)
DR- (M) — BR- (2)
MB- (M) — BR- (2)
KI- (M) — BR- (M)

1st CANADA T 63000 8 01
12* WKL
2nd

Rmks OLD WORLD CHARM HOME WITH 3 BRS, 2 BATHS, SIDE DRIVE, NEAR RIVERSIDE DRIVE, NEW ROOF, LOW HEATING COST, $500 BONUS TO SB

purchased the property. Certain characteristics, however, were not consistently recorded in the MLS books, thereby precluding their inclusion in the modelling process. Examples of characteristics often omitted include the age and condition of the homes sold.

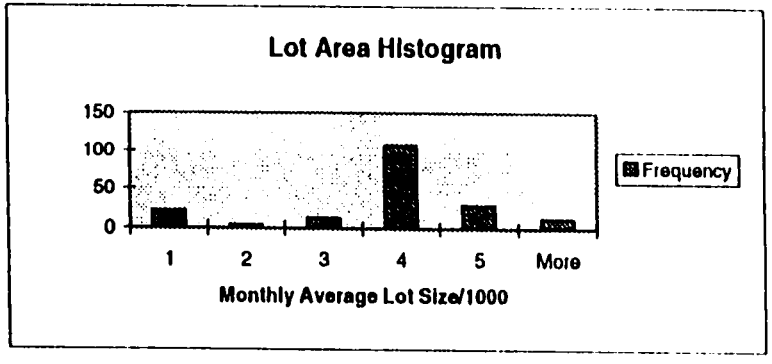
The property prices were inflated to March 1996 dollars by means of the Statistics Canada consumer price index for shelter costs. This was necessary prior to any comparative and/or time series analysis in order to account for inflation of housing prices over the time period of the study. These inflated prices were then averaged for their calendar month of sale-closing, and the monthly numbers of sales were totalled, yielding 180 observations. Finally, the inflated mean monthly property prices were transformed to natural logarithms in order to normalize their distributional forms for the time series analysis.

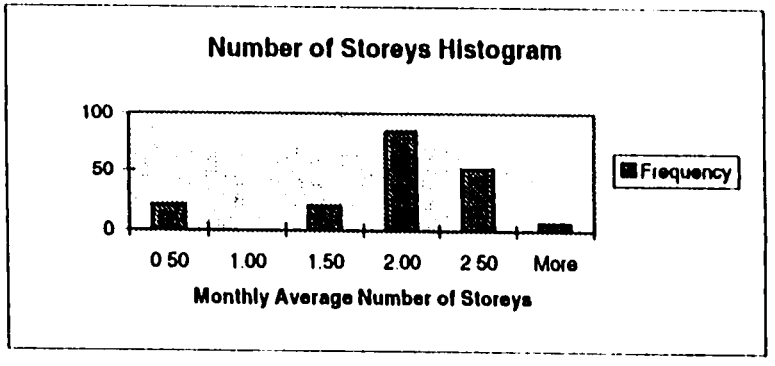
The structural, locational and lot characteristics used as independent variables in the determination of the price of the homes sold over the 16 year period are summarized in the Table 1. For purpose of analysis, the averages of these variables for the properties sold in a given month were used. For example, if two homes were sold in a given month, one with a 1-car garage and the other with a 2 car garage, the value for the garage variable in that month would be 1.5. Prior to their use in the ARIMA modelling process, the variables were classified into histograms (Figure 10) to visualize their distributional form, and to test them for normality. Only non-categorical variables were considered for transformation.

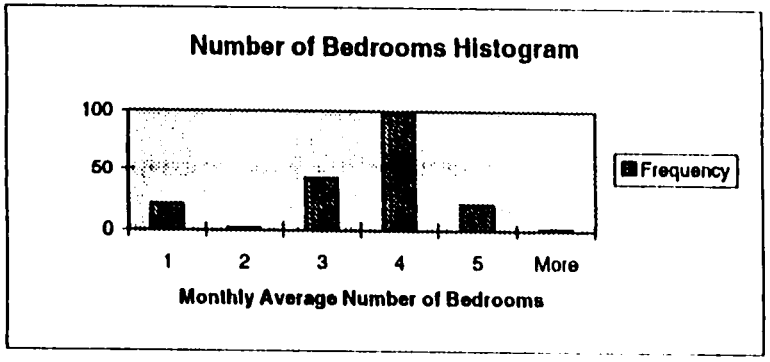
Table 1
Property Variables

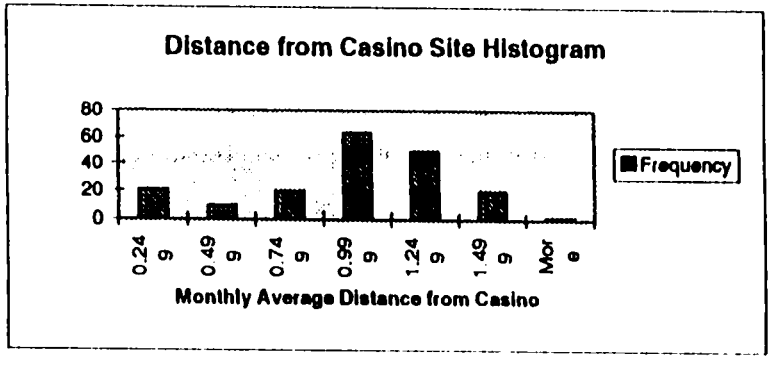
Property Characteristic	Measure
Lot Size	Total Area in Square Feet/1000
Distance from Casino Site	Straight-Line Distance from Each Property to Centre of Casino Site in Kilometres
Duplex	No = 0; Yes = 1
Number of Bathrooms	Total Number
Basement	Full Finished = 1; Unfinished or No Basement =0
Garage	None = 0; 1 car = 1; 2 car = 2
Number of Storeys	Total (1, 1.5, 2 or 2.5)

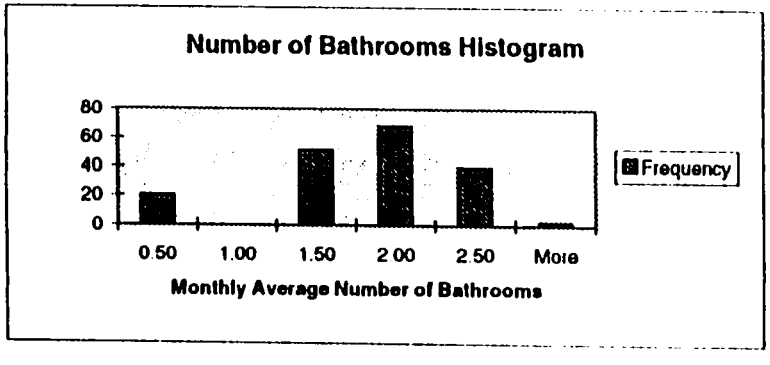
Figure 10: Histograms of Non-Categorical Variables

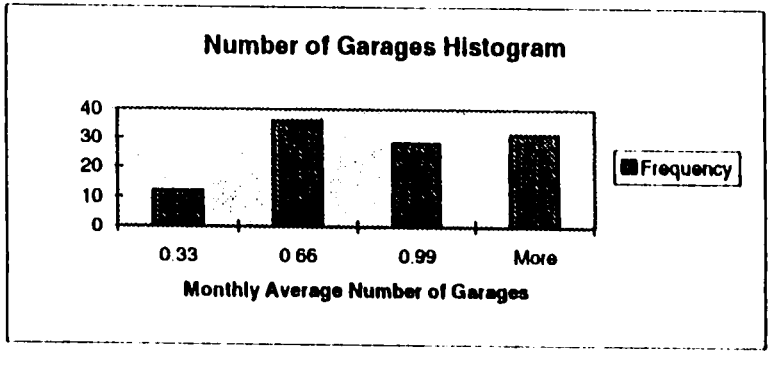












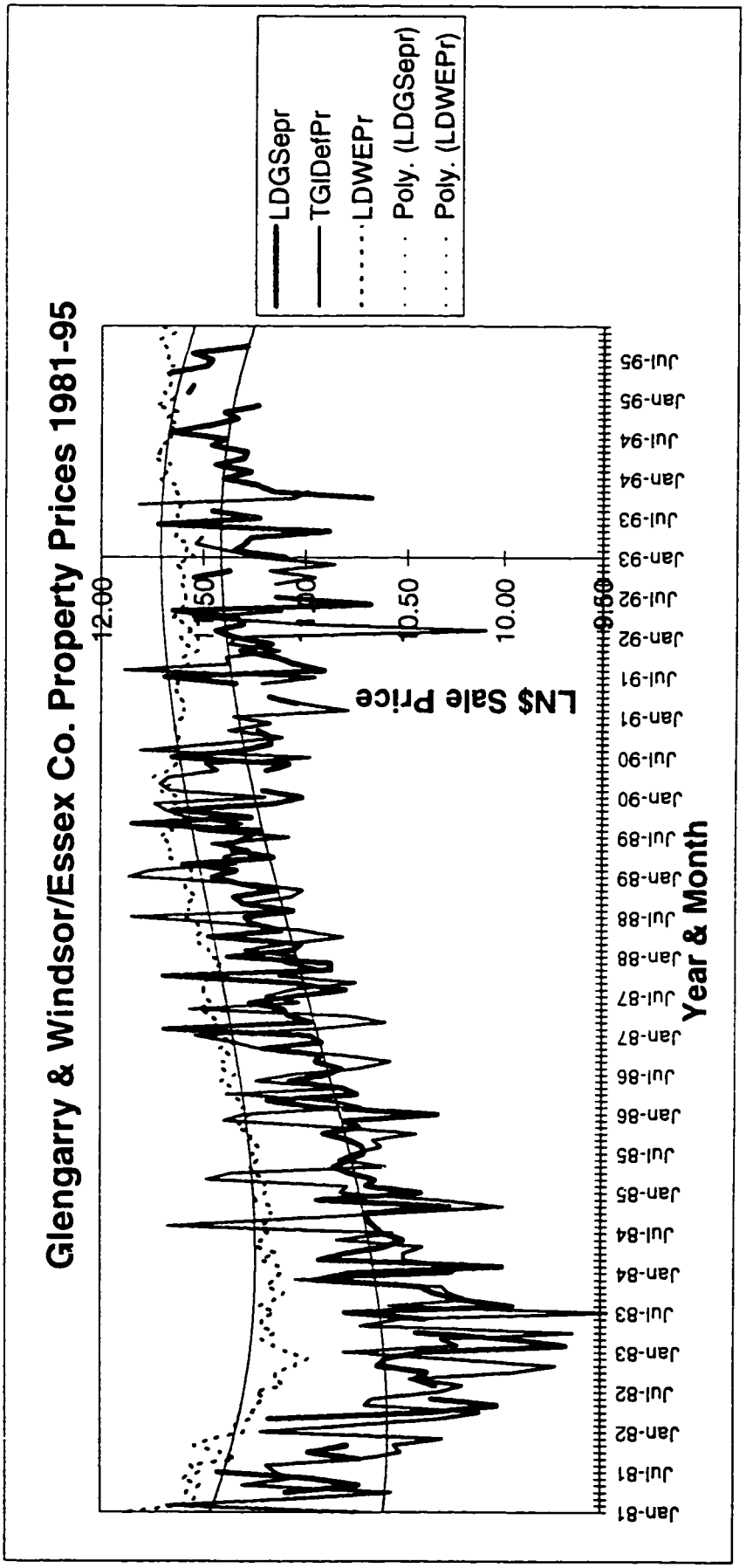
Transformations were not necessary as all the non-categorical variables possessed normal distributions.

A second data set, produced by the Windsor-Essex Real Estate Board and Canada Mortgage and Housing Corporation, was used to compare the property sales and prices within the study area with those in the rest of the City of Windsor and Essex County for the period of study. This data set comprises the number of monthly sales and average monthly residential sale prices for houses located in the regional market (Windsor and Essex County).

5.2 Mean Monthly Property Prices

Figure 11 shows the comparison of the mean monthly property prices for Windsor/Essex County (LDWEPr) and the Glengarry neighbourhood (LDGSepr). For further comparison, Figure 11 also includes the mean monthly property price (TglDefPr) figures for the Glengarry neighbourhood which were used in Lowrie's (1994) study. The data for these figures were obtained through the *Teela* records. The mean monthly property prices within the study area and Windsor/Essex County have essentially maintained a similar decline-and-growth pattern. The trends of inflated mean monthly property prices, for both the Glengarry neighbourhood and Windsor/Essex County experienced a trough in 1983 with annual averages of $32,540 (ln$10.3) and $70,378 (ln$11.16), respectively. During this period the lowest average inflated monthly price for the Glengarry

Figure 11


Glengarry & Windsor/Essex Co. Property Prices 1981-95
LDGSepr
TGIDefPr
LDWEPr
Poly. (LDGSepr)
Poly. (LDWEPr)
LN$ Sale Price
12.00
11.50
11.00
10.50
10.00
9.50
Year & Month
Jan-81
Jul-81
Jan-82
Jul-82
Jan-83
Jul-83
Jan-84
Jul-84
Jan-85
Jul-85
Jan-86
Jul-86
Jan-87
Jul-87
Jan-88
Jul-88
Jan-89
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Jul-90
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Jan-93
Jul-93
Jan-94
Jul-94
Jan-95
Jul-95

neighbourhood was $15,992 (ln$9.68) in February of 1983 and the lowest average inflated monthly price for Windsor/Essex County was $58,941 (ln$10.98) in December of 1982.

The Glengarry prices then rose to a peak in 1989 with an annual average of $90,265 (ln$11.38). The Windsor/Essex prices also began to rise after the 1983 trough, but did not reach their peak until 1990 where an average annual inflated price of $114,934 (ln$11.65) was realized. The price trends of both areas then declined to the end of 1993 before once again steadily rising to their highest levels over the 15 year period in 1995. The decline in average property prices experienced by the two areas after their respective 1989 and 1990 peaks, was more exaggerated in the Glengarry neighbourhood with nearly a 15% decrease in the average annual inflated property price compared to only a 4% decrease for the Windsor/Essex County prices. It is important to note that, owing to fewer numbers of properties in the Glengarry housing data set, the variations in the mean monthly property prices for the Glengarry neighbourhood are more exaggerated than those representing Windsor/Essex County.

Figure 11 also reveals a consistent deviation in mean monthly property prices of the two areas. Prior to the announcement of the location of the permanent casino, the mean monthly property prices in Windsor/Essex County were, on average, $40,000 greater than those properties sold within the Glengarry neighbourhood. For the three years after the announcement, this range in prices decreased to approximately $30,000. This decrease in the difference between the

two areas after the casino announcement indicates that the Glengarry property prices are beginning to inflate relative to the Windsor/Essex County property prices.

The autocorrelation and partial autocorrelation functions for the mean monthly property prices are displayed in Figures 12 and 13. The distributions of the correlations in these functions, with the statistically-significant lag-one correlation $\rho_1 = -0.483$ ($\alpha < 0.001$), and the partial autocorrelations decaying exponentially from $\phi_{1k} = -0.424$, diagnosed the time series as the product of a first-order moving average (MA(1)) process. Accordingly, the time series for the log-transformed inflated mean monthly property prices at time t ($GLPRICE_t$) was modelled as a once-differenced (i.e. $\Delta GLPRICE_t = GLPRICE_t - GLPRICE_{t-1}$) moving average process with the variables as shown in Table 2. The graphical illustration of the model is shown in Figure 14. The coefficients for this ARIMA (0,1,1) model were:

$$\begin{aligned}\Delta GLPRICE_t = {} & (0.18)BASEFULL_t + (0.06)BATH_t + (0.11)CASKM_t - \\ & (0.16)DUPLEX_t + (0.15)GARAGE_t + (1.27)WEPRICE_t + \\ & (0.06)LOTAREA_t - (0.06)PULSDATE_t + (0.21)STOREYS_t + \\ & (0.89)_pZ_{t-1} + {}_pZ_t\end{aligned}$$

where BASEFULL is the percentage of properties with full-finished basements sold in a given month, BATHS is the average number of bathrooms for the properties sold in a month, CASKM is the average distance from the properties sold in a month to the casino site in kilometres, DUPLEX is the percentage of

Figure 12: Glengarry Mean Monthly Property Prices
Autocorrelations

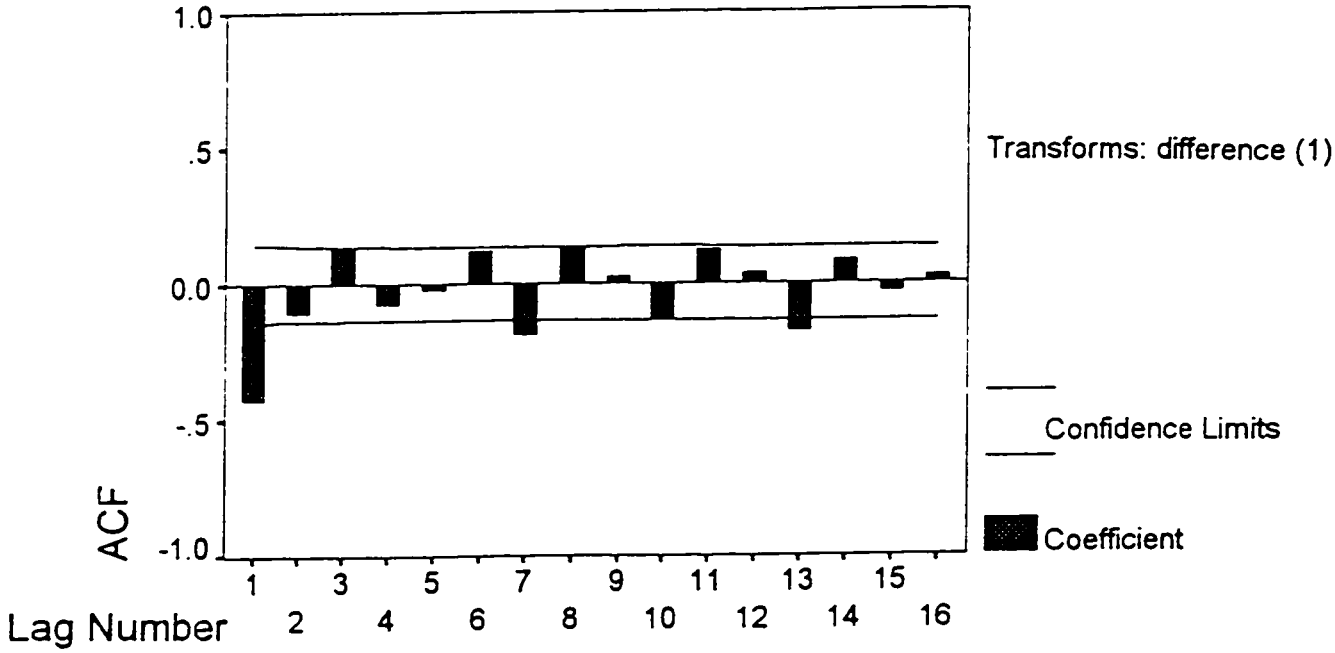


Figure 13: Glengarry Mean Monthly Property Prices
Partial Autocorrelations

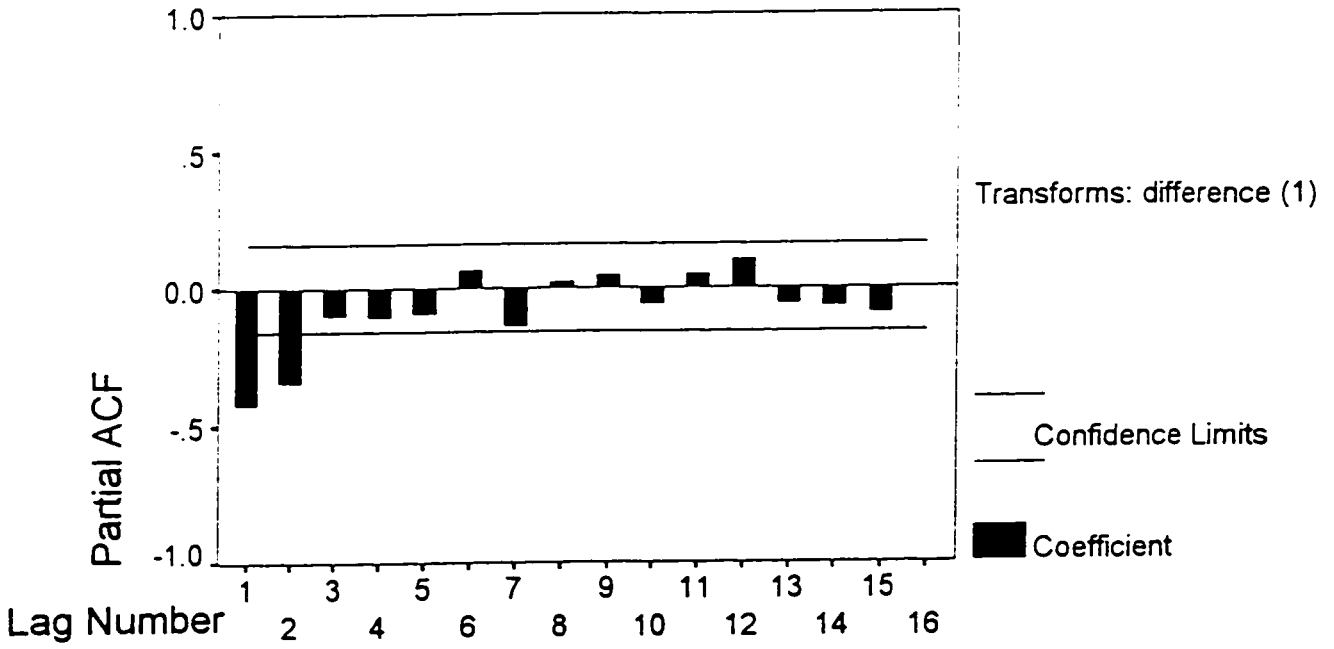


Table 2

ARIMA(0,1,1) of Log-Transformed Inflated Monthly Mean Property Prices in Glengarry 1981-1995.

Goodness of Fit	
Number of Residuals	158
Standard Error of Estimate	.193
Log Likelihood	39.44
Akaike's Information Criterion	-58.89
Schwart's Bayesian Criterion	-28.26

Analysis of Variance	**Degrees of Freedom**	**Adjusted Sum of Squares**	**Residual Variance**
Residuals	148	5.61	0.037

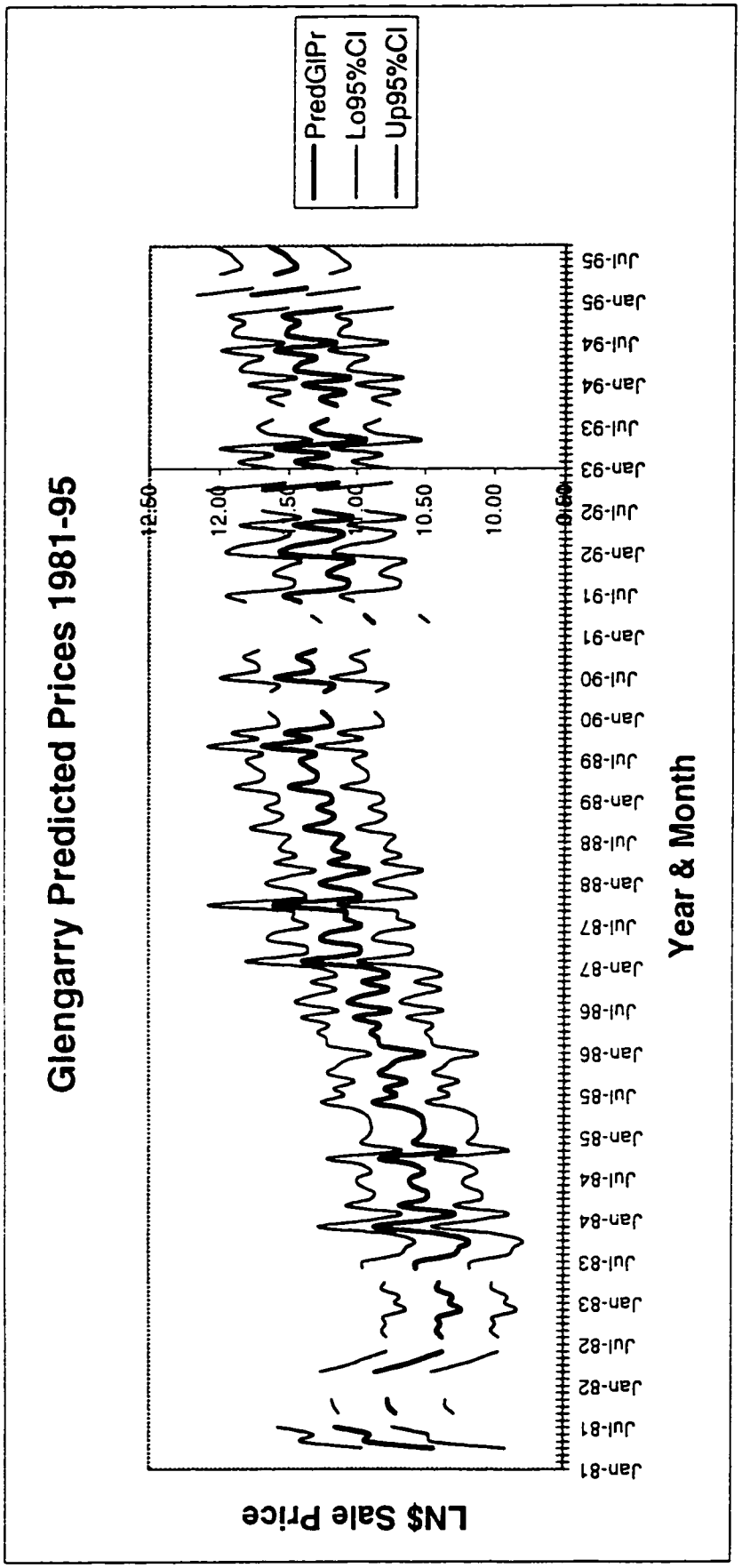
Table 2 (Continued)

Model Variables	Variable Mean Score	+/- 95% Confidence Interval	Slope Coefficient	Standard Error of Slope Coefficient	Computed T-Ratio for Slope Coefficient	Significance Level
MA(1)[1]			.89	0.04	21.58	0.000
WEPRICE[2]	11.48	0.03	1.27	0.2	6.41	0.000
BASEFULL[3]	0.26	0.04	0.19	0.06	3.29	0.001
BATHS[4]	1.61	0.06	0.06	0.44	1.41	0.161
CASKM[5]	0.96	0.04	0.11	0.07	1.42	0.156
DUPLEX[6]	0.19	0.04	-0.16	0.08	-1.97	0.050
GARAGE[7]	0.52	0.08	0.15	0.03	5.16	0.000
LOTAREA[8]	3.77	0.13	0.06	0.02	3.06	0.003
STOREYS[9]	1.78	0.06	0.21	0.05	4.45	0.000
PULSDATE[10]			-0.01	0.07	-0.09	0.925

Notes:

1. MA(1): First Order Moving Average
2. WEPRICE: Log-Transformed Inflated Monthly Mean Residential Prices in Windsor/Essex County
3. BASEFULL: Percentage of Properties with Full-finished Basements
4. BATH: Average Number of Bathrooms for the Properties Sold
5. CASKM: Average Distance from Properties Sold to Permanent Casino Site
6. DUPLEX: Percentage of Properties Sold Containing Duplex Dwellings
7. GARAGE: Average Number of Garages for the Properties Sold
8. LOTAREA: Average Lot Area of Properties Sold
9. STOREYS: Average Number of Storeys of Properties Sold
10. PULSDATE: Casino Location Announcement (0 = 'before Jan/93'; 1 = 'after Jan/93)

Figure 14


Glengarry Predicted Prices 1981-95
PredGlPr
Lo95%CI
Up95%CI
LN$ Sale Price
12.50
12.00
11.50
11.00
10.50
10.00
9.50
Year & Month
Jan-81
Jul-81
Jan-82
Jul-82
Jan-83
Jul-83
Jan-84
Jul-84
Jan-85
Jul-85
Jan-86
Jul-86
Jan-87
Jul-87
Jan-88
Jul-88
Jan-89
Jul-89
Jan-90
Jul-90
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Jul-94
Jan-95
Jul-95

properties containing duplexes sold in a month, GARAGE is the average number of garages for the properties sold in a month, WEPRICE is Windsor/Essex County mean monthly property price, LOTAREA is the average lot size of the properties sold monthly (in thousands of square feet), PULSDATE is the casino location announcement (before Jan/93 = 0; after Jan/93 = 1), and STOREYS is the average number of storeys for properties sold in a month. This ARIMA (0, 1, 1) model was then used to: (1) calculate the statistical relationships between the mean monthly property prices in the Glengarry neighbourhood and in Windsor/Essex County; and (2) to measure the impact of the casino location announcement on the property prices in the Glengarry neighbourhood.

Of the ten ARIMA (0,1,1) coefficients, all but the PULSDATE, BATHS and CASKM variables are statistically significant at $\alpha < 0.05$. The coefficients for the BATHS and CASKM variables have the predicted sign (+) but are not significant at $\alpha < 0.05$. Given these results, a number of inferences can be made. First, the ARIMA (0, 1, 1) model indicates that the property prices follow a moving average temporal process in which a property value during time period t is a function of its own random disturbance, the mean deflated price during the previous time period t-1, minus 90% of the random disturbance at this previous time. In other words, the property prices during each time period t-1 strongly determine prices during the next time period t.

Second, average monthly property prices are a positive function of: increasing average lot size (LOTAREA); greater percentage of properties with full

basements (BASEFULL); greater average number of storeys (STOREYS); and greater average number of garages (GARAGE). These findings are consistent with the literature reviewed and discussed in Section 2.1. More particularly, in a neighbourhood such as Glengarry which is homogeneous in terms of the age (old), condition (poor to fair) and general cost of the homes (lower-end), the foregoing property and structural attributes are amenities which usually result in a higher property value.

Third, the mean monthly property prices in Windsor/Essex County and in the Glengarry neighbourhood are highly correlated. The model suggests that for every average price change of $1,000 in Windsor/Essex County from one month to the next, there is a corresponding change in the Glengarry neighbourhood of $1,273 per home. This exaggeration is a result of the lower number of properties located within the study area and the fact that one or two sales per month in the Glengarry neighbourhood may either inflate or deflate the average for the month.

Fourth, the mean monthly property prices are a negative function of the percentage of properties sold containing duplexes or semi-detached dwellings (DUPLEX). This was not anticipated as it was presumed that a property containing a duplex dwelling would attract higher prices due to its rental income potential. However, these findings may be a function of the quality of the Glengarry neighbourhood adversely affecting the income potential to be derived from rental units.

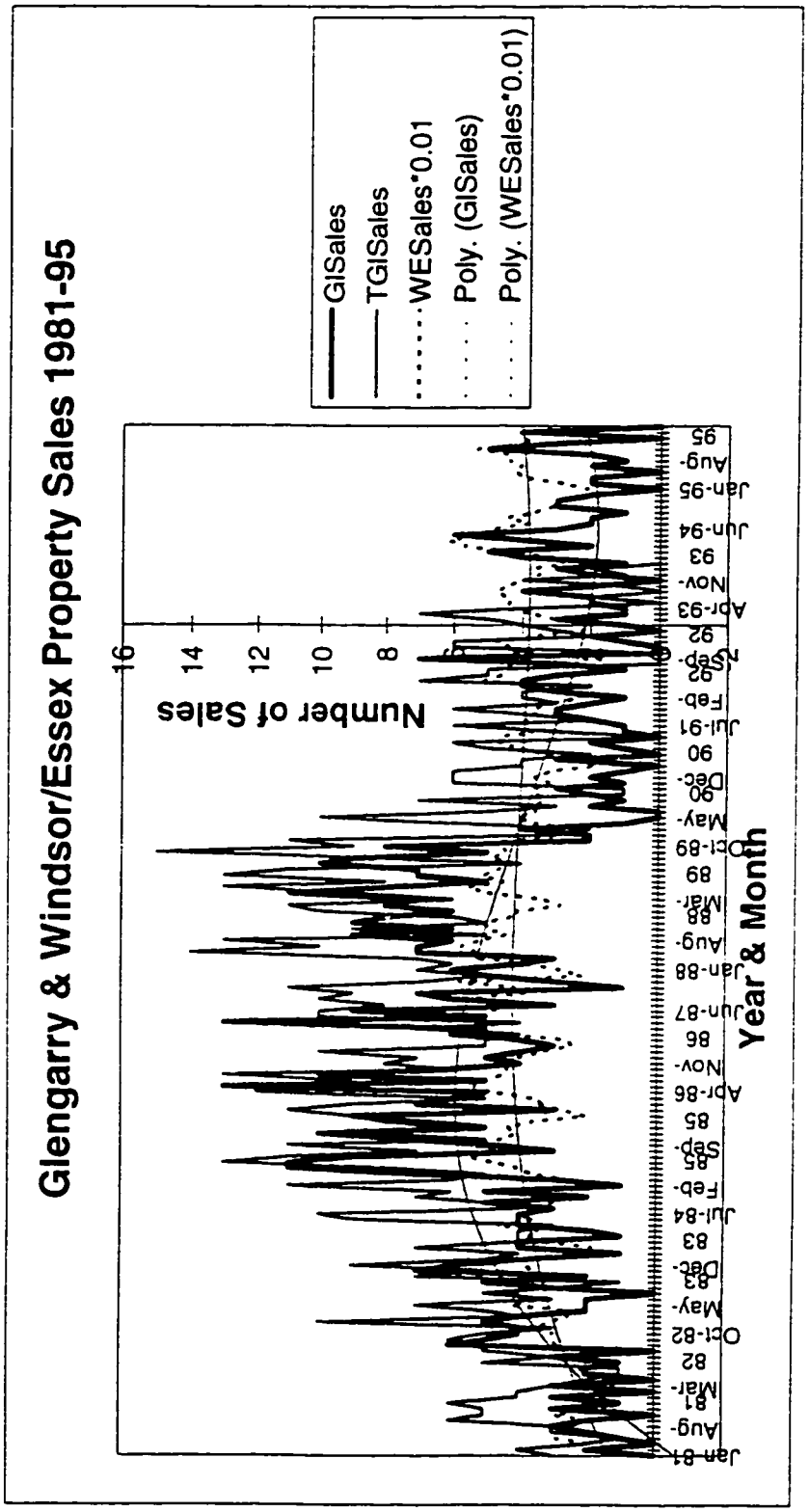
Finally, the announcement ($PULSDATE_t$) of the casino location was not associated with a property price decrease: while the coefficient is negative, it is not significant. Thus, the announcement did not cause a shift either up or down in the Glengarry inflated mean monthly property prices.

A comparison between the predicted values resulting from the ARIMA price model for the Glengarry neighbourhood and the actual values of the log inflated average monthly prices produced an R square (coefficient of determination) of 79.1 percent ($r^2 = .791$). This demonstrates that the model produced by this ARIMA analysis is much more accurate than Lowrie's (1994) 30 percent of explained variation in representing the actual trend in housing prices for the Glengarry neighbourhood.

5.3 Monthly Property Sales

As Figure 15 shows, the trends in the numbers of monthly property sales within the Glengarry neighbourhood "GlSales" (thick solid line) and Windsor/Essex County "WESales" (dotted line) have differed only slightly over the fifteen year study period (i.e. they have fluctuated alongside each other). Again, the numbers of monthly property sales from the *Teela* records "TGlSales" (thin solid line), as used in Lowrie's (1994) study, are also graphed for comparison. The Glengarry sales trend from 1981 to 1995 is an oscillating one, where in 1981, the first year of the study period, only seventeen sales were

Figure 15


Glengarry & Windsor/Essex Property Sales 1981-95
GlSales
TGlSales
WESales*0.01
Poly. (GlSales)
Poly. (WESales*0.01)
Number of Sales
16
14
12
10
8
6
Year & Month
Jan-81
Aug-
81
Mar-
82
Oct-82
May-
83
Dec-
83
Jul-84
Feb-
85
Sep-
85
Apr-86
Nov-
86
Jun-87
Jan-88
Aug-
88
Mar-
89
Oct-89
May-
90
Dec-
90
Jul-91
Feb-
92
Sep-
92
Apr-93
Nov-
93
Jun-94
Jan-95
Aug-
95

recorded. Beginning in 1982, sales began to increase steadily until they experienced a peak in 1985 where a total of 88 sales transactions were recorded in the Multiple Listings Books. During that year, there were three months in which ten or more property sales took place. The peak number of monthly sales, thirteen, occurred in May of 1986. Sales remained relatively high during the years 1985 to 1989. Following this, sales sharply declined, decreasing by nearly 80% from 1989 to 1990, and low sales were maintained throughout the years 1990 to 1995. A slight resurgence in the number of monthly sales occurred one year following the casino announcement (1994). The fewest number of monthly sales were recorded in the years 1990 and 1991 with 17 and 18 transactions, respectively.

The sales trend for the Windsor/Essex area also grew from a trough in the years 1980 and 1981 to a peak in the years 1985 to 1989. However, after 1989, the sales trend for Windsor/Essex diverged from that of the Glengarry area. The Windsor/Essex sales decreased much less from 1989 to 1990, by 26% as compared to the 80% decrease experienced in the study area. After this decline, sales once again rose to near-average levels. The Windsor/Essex peak annual number of sales occurred in 1987 with 5,376 sales while the lowest number of sales transactions, 3,949, was in 1990.

The difference in the trends for the two areas was most pronounced in the period after the announcement of the permanent casino site. During the 1981 to 1995 study period, the average monthly number of sales in the Glengarry

neighbourhood was 3.66 (+/- one standard deviation, 2.86). However, during the two years following the announcement of the permanent casino site, the mean number of monthly sales decreased to 2.22, with five of the thirty-six months having zero transactions. In comparison, during the 1981-95 period, the average monthly number of sales in Windsor/Essex County was 369 (+/- one standard deviation, 24). During the 1993 to 1995 period, the average monthly number of sales was 391.3, which is approximately 5.6% above the average for the fifteen year study period. These differences in the trends in numbers of property sales between the Glengarry neighbourhood and Windsor/Essex County indicate that there were varying social and/or economic forces affecting the study area during the years 1993 to 1995.

From the graphic plots of the monthly property sales in Figure 15, it was determined that the data series had non-stationary means. Accordingly, the data series was "once-differenced" in order to transform the series into a stationary data set. After once-differencing, the autocorrelation and partial autocorrelation functions for the monthly property sales were calculated and are displayed in Figures 16 and 17. The distributions of the correlations in these functions, with the statistically-significant lag-one correlation $\rho_1 = -0.483$ ($\alpha < 0.001$), and the partial autocorrelations decaying exponentially from $\phi_{1k} = -0.483$, diagnosed the time series as the product of a first-order moving average (MA(1)) process. This ARIMA (0,1,1) model was then used (1) to calculate the statistical relationships between sales in the Glengarry neighbourhood and in Windsor/Essex County,

Figure 16: Glengarry Monthly Property Sales
Autocorrelations

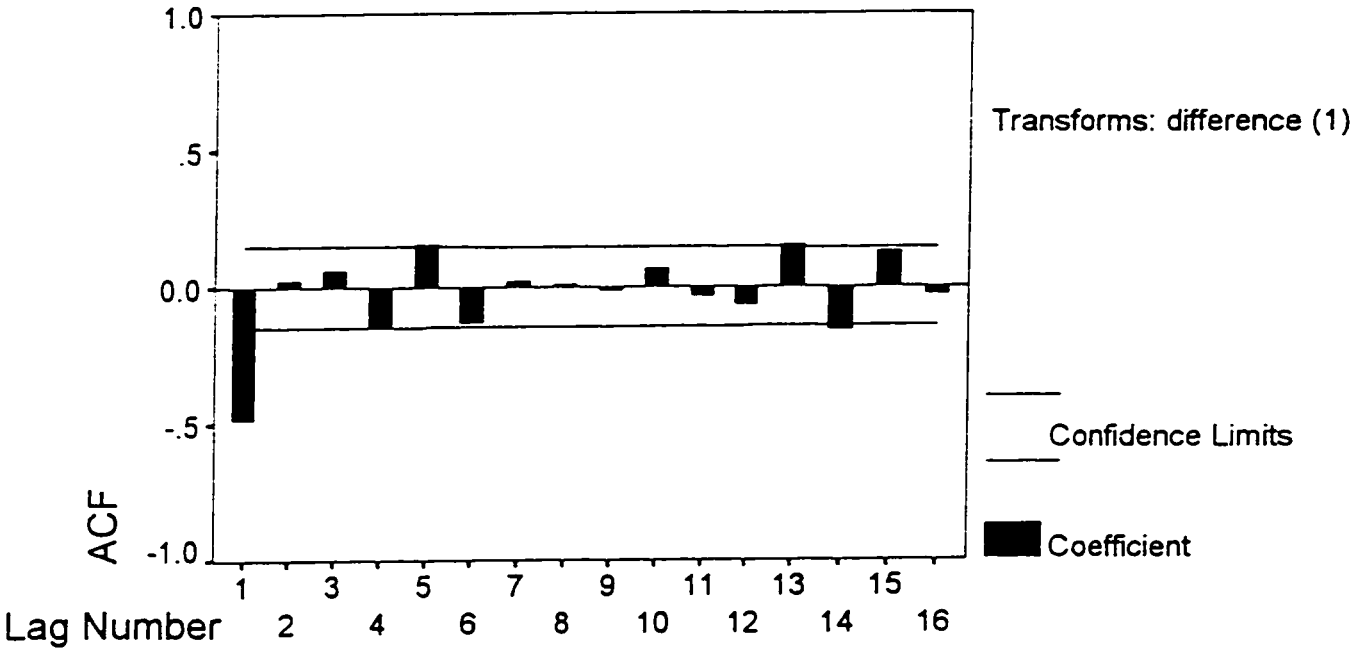
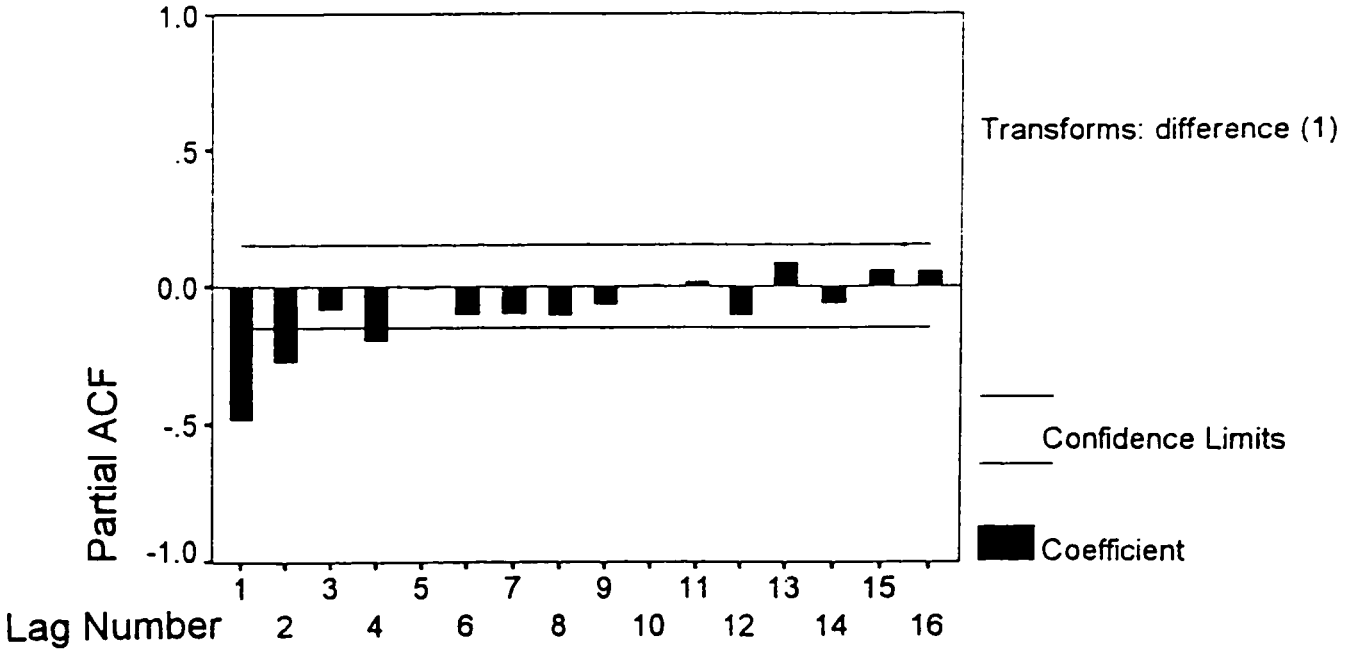


Figure 17: Glengarry Monthly Property Sales
Partial Autocorrelations



and (2) to measure the impact of the casino location announcement on property sales.

On the basis of the highly statistically significant MA(1) coefficient for the calibrated ARIMA (0,1,1) model ($\theta_1 = 0.78$; $\alpha < 0.000$), the B coefficients for Windsor/Essex County monthly sales numbers ($WESALES_t$), the Glengarry inflated, log-transformed, monthly average property price ($GLPRICE_t$) and the pulse variable for the timing of the casino location announcement, the difference in monthly number of Glengarry property sales ($\Delta GLSALES_t$) as shown in Table 3 is modelled by:

$$\Delta GLSALES_t = (0.63)WESALES_t - (0.35)LDGSEPR_t - (0.13)PULSDATE_t + 0.78Z_{t-1} + Z_t$$

In words, first, a shift either up or down of 100 sales in the Windsor/Essex County region was significantly associated with a change of 0.63 sales in the Glengarry neighbourhood. Second, Glengarry's mean monthly property prices and numbers of sales fluctuated in tandem during each month (time period t). Third, Glengarry's numbers of property sales followed a moving average temporal process in which the number of sales during time period t was a function of their own random disturbance, the number during the previous time period t-1, plus 78% of the random disturbance at this previous time. Last, as with the price model, the announcement ($PULSDATE_t$) of the casino location was not associated with a decrease in property sales, as the coefficient is negative but

Table 3: ARIMA(0,1,1) of Monthly Property Sales in Glengarry 1981-1995.

Goodness of Fit

Number of Residuals	159
Standard Error of Estimate	2.13
Log Likelihood	-345.05
Akaike's Information Criterion	698.11
Schwart's Bayesian Criterion	710.38

Analysis of Variance	Degrees of Freedom	Adjusted Sum of Squares	Residual Variance
Residuals	155	714.30	4.53

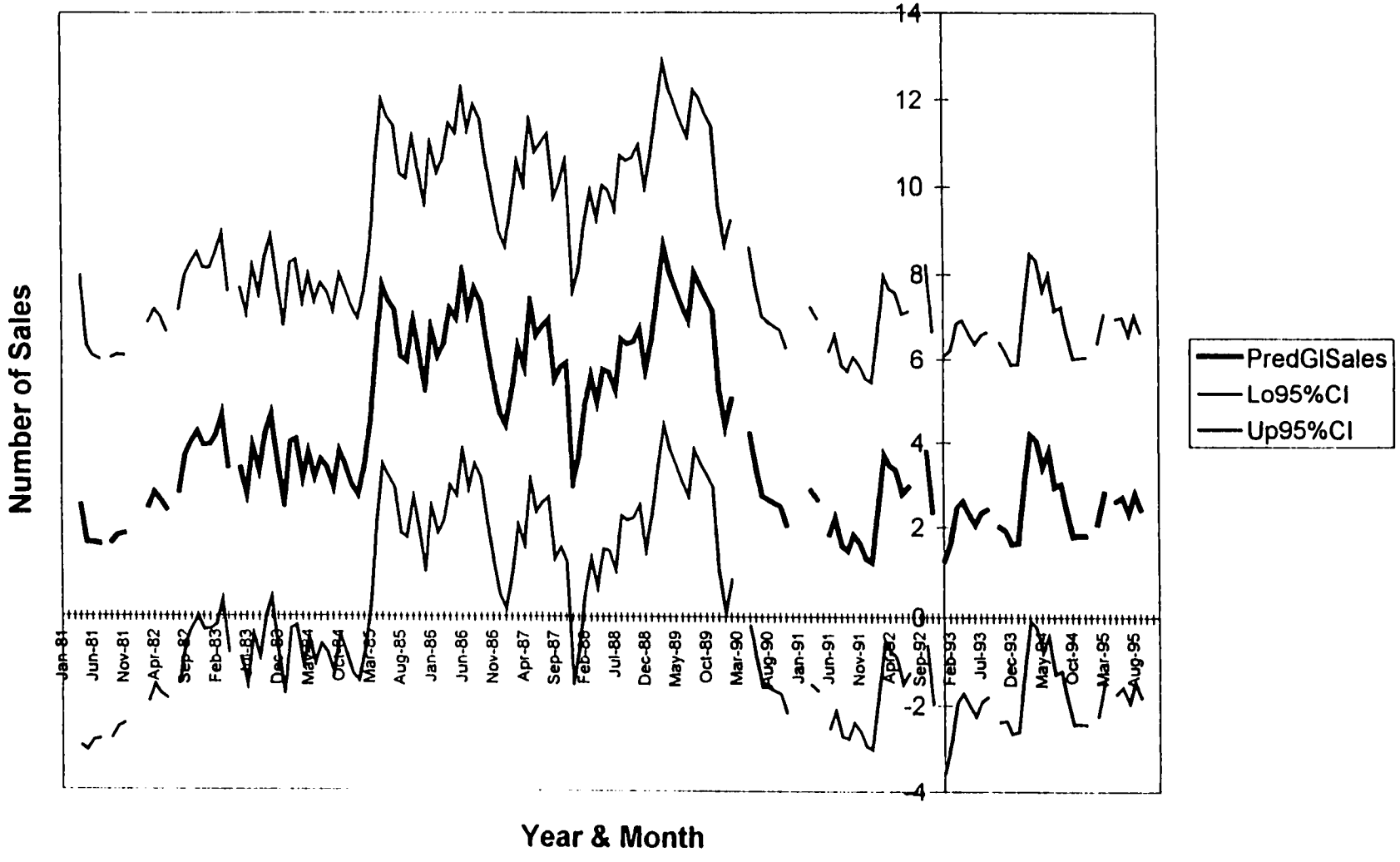
Variables in the Model	Variable Mean Score	+/- 95% Confidence Interval	Slope Coefficient	Standard Error of Slope Coefficient	Computed T-Ratio for Slope Coefficient	Significance Level
MA(1), First Order Moving Average			0.78	0.05	15.61	0.000
Monthly Residential Sales in Windsor/Essex County (*0.01)	3.66	0.22	0.63	0.19	3.26	0.001
Log-Transformed Inflated Monthly Residential Prices in Glengarry	11.03	0.06	-0.35	0.65	-0.53	0.596
Casino Location Announcement (0 = 'before Jan/93'; 1 = 'after Jan/93)			-0.13	.99	-0.14	0.891

not significant. Thus, similarly to prices, the announcement did not cause a shift either up or down in the Glengarry monthly property sales.

The predicted values and the 95% confidence limits are graphically displayed in Figure 18. The predicted sales values resulting from the ARIMA (0,0,1) model explained 40 percent of the variation in the actual numbers of sales (r^2 =.398). Accordingly, the predicted sales values from the ARIMA modelling do not represent the actual sales values for the Glengarry neighbourhood as closely as those for the price figures. One possible reason for the lower correlation is that fewer independent variables are included to account for the number of sales in the ARIMA analysis as in the price model. Also, the low correlation between the actual and fitted values may be attributed to the sometimes low numbers of monthly sales within the study area. Generally, however, these results are good when considering that the primary objective of this study was the modelling of the monthly prices.

Figure 18

Glengarry Predicted Property Sales 1981-95



CHAPTER 6.0 CONCLUSIONS

This study has expanded upon Lowrie's (1994) study with a refined measuring and modelling of the trends in the property prices and the sales within the Glengarry neighbourhood during the years 1981 to 1995. The study period includes the announcement, but is still approximately two years before the planned opening of the nearby permanent casino. Two measurements of property alteration within the Glengarry neighbourhood were analyzed: (1) the monthly numbers of residential property sales; and (2) the sale prices of these properties. The extension in the study period by two years, and the addition of more independent price-controlling variables in the time series modelling, improved the statistics but not the substance of the results of Lowrie's study. The announcement of the permanent casino location has not had a significant impact on the number of property sales and their inflated property prices in the neighbourhood. While prices began to increase one year after the announcement of the permanent casino site, the number of monthly sales within the study area were relatively low compared to the those for the rest of the fifteen year study period. Also, whereas the Glengarry neighbourhood experienced its lowest levels of property sales after the announcement, Windsor/Essex County sales were near their highest numbers during the same period. This may indicate that home-owners within the Glengarry neighbourhood are anticipating real estate prices to continue to inflate after the construction of the permanent casino. As a result,

they are delaying the sale of their properties. It is interesting to note, however, that before property prices began to rise in 1994, they were relatively low for the twelve months immediately following the announcement. This may be attributed to property owners, upon hearing the announcement and anticipating problems associated with casinos, accepting lower offers in an attempt to quickly sell and move away from the future site of Windsor's permanent casino.

In this study, the accuracy of the modelling process originally used by Lowrie (1994) was enhanced by the addition of a number of independent variables that determine property price. The correlation values for the comparison of the actual to the fitted or predicted values for the property sales and property price models in the Lowrie (1994) study were 36% and 53%, respectively. The same figures for this study were 39.8% and 79.1%. It is expected that the modelling process would be further enhanced by the inclusion of additional independent variables controlling for price besides those that were used in this study. Examples of such variables include the age and condition of the dwelling. Future research may also incorporate social variables such as the ethnic composition of the neighbourhood and/or the crime rate within the study area in an attempt to further enhance the modelling process.

At the end of this paper's study period, the construction of the casino had not yet begun. It appeared that the trends in property sales were proceeding toward a level of inactivity, suggesting that owners were reluctant to sell in anticipation of future financial gains. Future research may follow the same

methodology used by this paper for a period of time beyond the announcement of the permanent casino site and may examine the casino's impact upon the completion of its construction and during its operation. Trends in housing prices may change 1) between the period from the announcement of the casino site to the completion of construction of the permanent casino, and 2) the period after the opening of the permanent casino. It is anticipated that these probable changes will be most notable within the immediate vicinity of the permanent casino site.

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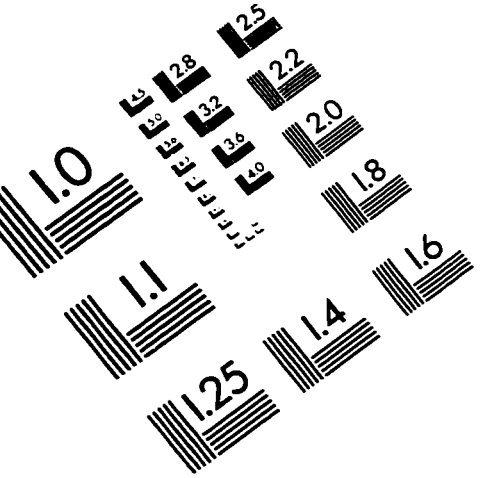
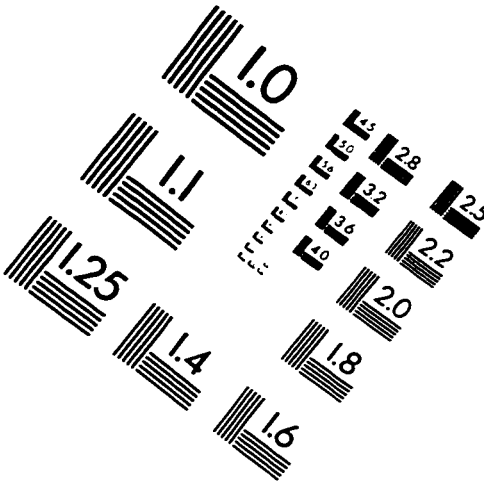
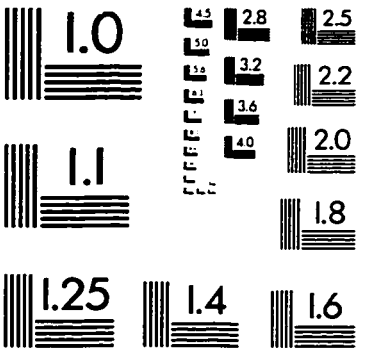
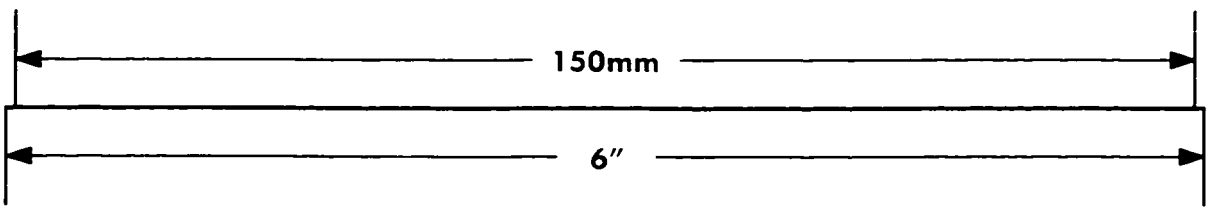
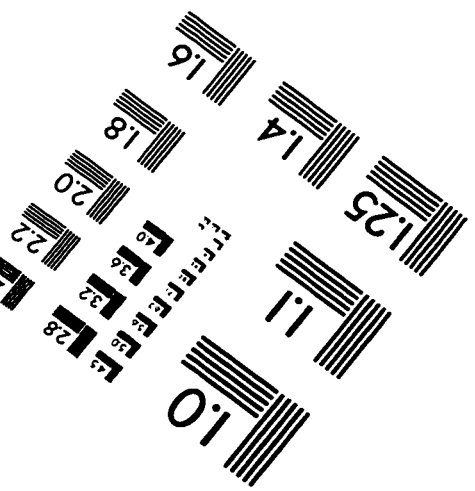
IMAGE EVALUATION TEST TARGET (QA-3)

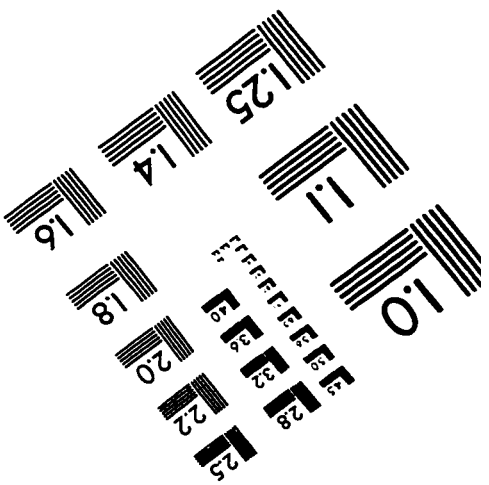












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