AN ANALYSIS OF PRICING AND RETURNS IN THE MARKET FOR FRENCH CANADIAN PAINTINGS

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ABSTRACT

The valuation of French Canadian paintings is analyzed empirically. Using a sample of auction prices for major French Canadian painters for the period 1968-2005, we run hedonic regressions to analyze the influence of various factors, including painter identity, on auction prices, as well as to construct a market price index. This index is used in a second stage analysis in which we analyze the properties of this art viewed as an investment asset. We consider the extent to which standard asset pricing theory, as incorporated in the capital asset pricing model (CAPM), can account for price movements in the market for French Canadian paintings.

1. INTRODUCTION

The earliest history of European exploration and settlement of the St. Lawrence valley - the territory originally called "Canada" - is predominantly French. French explorers sailed up the St. Lawrence River as early as 1534, and by the end of the sixteenth century colonization was under way, with the establishment of what would come to be called New France, and - later - the predominantly francophone province of Quebec. As the religion of the colony was Roman Catholic, it followed that there would eventually be a need for painters to decorate churches and provide devotional images. The first notable painters in Canada were in fact French-born ecclesiatics come to Canada to satisfy the demand for this service, among others. A continuous tradition of painting by French speakers in Canada therefore extends back well into the seventeenth century (Reid (1973, 1988)).

To this day, there is a strong consciousness among French Canadians, especially those living in Quebec, of a historical and cultural heritage that is unique and that can in some way be distinguished from the broader currents of Canadian history and culture. An important component of this heritage is represented by the art of painting. Many of the greatest and most influential Canadian painters have been francophone, and have belonged to what can be identified as a uniquely French Canadian artistic filiation. In addition, some of these painters have assumed the status of major cultural figures in Quebec. Just to give a couple of examples, consider first Ozias Leduc, mainly active in the first half of the twentieth century. He earned his living decorating churches in a time when the Church still wielded great influence in Quebec society. Many of these decorations still exist and have become tourist attractions. His pupil, Paul-Émile Borduas, began his career as an apprentice of Leduc, working on many church projects, but later becoming interested in contemporary European trends in surrealism and abstract painting. Borduas would, in 1948, author the pamphlet "Refus Global", a broadside attack on the stifling conservatism of Quebec society, with particular emphasis on the suppressive role of the Church. This document is now considered to be one of the most influential and revolutionary texts ever published in Canada, and is seen as ushering in the "Quiet Revolution" which would shake Quebec (and Canadian) society and politics in the ensuing decades. A group of students of Borduas, the "Automatists", would extend his influence in becoming a major force in Canadian painting, with one of their number, Jean-Paul Riopelle, achieving major international recognition and becoming a household name in Quebec (a square in the heart of Montreal’s business district bears his name and predominantly features a fountain of his design).

These reflections suggest to us that it is appropriate and interesting to analyze the art of French Canada and its market apart from Canadian art in general, and the associated broader Canadian art market. In the growing economics literature devoted to studying the behaviour of art prices, most of the attention has been devoted to markets for European and American art, but some authors have analyzed various aspects of the market for Canadian art (Valsan (2002), Arvin and Scigliano (2004), Hodgson and Vorkink (2004), Hodgson (2006)). The present study extends this line of investigation in considering the factors influencing the pricing of French Canadian paintings. In addition, we build on the existing literature on art as an investment in constructing a time series price index of French Canadian paintings, and analyzing the return properties of these paintings considered as risky financial investments, this being done within the context of the capital asset pricing model (CAPM).

The empirical analysis reported below for the valuation of French Canadian paintings considers prices of oil and acrylic paintings, over the period 1968-2005, for a set of major French Canadian painters. Preliminary to our analysis of the investment properties of this art, we estimate a price index and a return series using hedonic methods, with the methodology presented in Section 2 and the results reported in Section 3. The results of our hedonic regression also allow us to gauge the influence on the auction prices of paintings of a number of separate factors, including the identity of the artist, the auction house, the size of the painting, and the medium and support. In Section 4, we compare the investment properties of Canadian art with those of Canadian government bonds and Canadian stocks, and estimate the CAPM for art returns.

2. HEDONIC REGRESSION - DATA AND METHODOLOGY

In this section, we describe the data and methodology used in our estimation of a hedonic regression for French Canadian paintings using results of auctions from 1968-2005. Among our objectives will be the computation of a time series price index for paintings. To accomplish this, we must address the fact that each painting is, to a certain extent, a unique object, and therefore the price at which a given painting sells, whether at auction, in a gallery, or privately, cannot be taken as a general indicator of the level of the art market. In addition to reflecting the general level of the market at the time of sale, the price will be affected by such factors as the identity of the artist, the size, medium, and support of the painting, the location of the sale (the auction house, gallery, city or country in which the sale occurs), the condition and quality of the work itself, as well as a host of idiosyncratic factors.

A few recent examples of the many instances where art prices have been studied within the context of a hedonic regression would be Chanel, Gérad-Varet, and Ginsburgh (1996), Czujack (1997), and Locatelli-Biey and Zanola (2002), as well as the studies of Canadian art carried out by Arvin and Scigliano (2004), Hodgson and Vorkink (2004), and Hodgson (2006). Essentially, the logarithm of the price of each work sold at auction during a given time interval is regressed on various available characteristics of the work, such as the artist, the size, the medium, the auction house, the time period, etc. Many of the regressors, such as those associated with the time period, will take the form of a set of dummy variables. For the time-period dummies, the estimated coefficients will form a time series representing time variation in the general market for the type of art work under consideration.

2.1 Data

Records of sales of Canadian paintings at auction were used to constitute the data set for our study. Data for auctions held between 1968 and 2005 were collected from records published by Campbell (1970-75, 1980), Sotheby's (1975, 1980), and Westbridge (1981-2006). We chose to restrict our analysis to artists considered to have made contributions of some lasting art historical importance, so that we can claim to have assembled a sample of paintings by "major" artists. Our criterion for an artist to be "important" is that his or her work be mentioned in one of the standard surveys of Canadian art written by Harper (1977) or Reid (1973, 1988). We only consider oil and acrylic paintings - the vast majority of our observations are for oils. We have only included sales for which the auction house's attribution is confident, and, for each painting, we recorded, in addition to the identity of the artist, the height and width, the medium and support, the auction house, the date of the sale, the genre of the picture, and an indicator of whether or not the painting is dated. We use hammer prices as recorded in the publications listed above. No effort has been made to adjust or correct our numbers to account for such costs as auctioneers' commissions, taxes, insurance premia, maintenance and restoration costs, etc. These factors all act to reduce the monetary returns of owning paintings below the levels recorded here. Factors acting to augment the monetary returns to art owners, such as reproduction fees and exhibition or lending fees, are also omitted. A total of 56 painters are represented in our sample (they are listed in the Appendix), and the total number of observed sales is 4135.

2.2 Econometric model

As mentioned above, one of our objectives is to obtain from our auction sales records a price index reflecting the evolution of the art market over time. We will construct an annual index, estimating a hedonic regression with time-period dummy variables. The model to be estimated can be written

$$p_i = \sum_{t=1}^{T} \gamma_t z_{it} + \sum_{j=1}^{J} \alpha_j w_{ij} + u_i, \; i = 1, \ldots, n, \tag{1}$$

where p_i is the logarithm of the price of sale i, the number of sales is $n = 4135$, z_{it} is the value of a period–t dummy variable, equal to 1 if painting i was sold in period t and equal to zero otherwise, with the number of time periods T being 37. We consider an auction year in the same way as one would consider a school year or a hockey season, so that, for the purposes of forming an annual price series, the auction year is considered to run from July 1 of a given calendar year to June 30 of the following one. Our annual dummies thus start with the 1968-69 auction year, followed by 1969-70, and concluding with 2004-2005. Our estimates of the vector of associated parameters $\{\gamma_t\}_{t=1}^{T}$ will therefore form our price index.

The regressors $\{w_{ij}\}$ in (1) represent the other characteristics of painting i. These include 55 dummy variables for the painting's artist, 8 for its genre,14 medium/support dummies, and 27 auction house dummies (in all cases, one dummy was omitted to avoid collinearity with the time period dummies, hence 55 painter dummies corresponds to a collection of 56 painters). Three additional variables reflecting a painting's dimensions - height, width, and surface area - were included, as was a dummy indicating whether or not the painting is dated. Equation (1) can be written more concisely as

$$p_i = x_i'\beta + u_i,\ i = 1,\ldots,n, \tag{2}$$

where $x_i' = (z_{i1},\ldots,z_{iT},w_{i1},\ldots,w_{iJ})$ and $\beta = (\gamma_1,\ldots,\gamma_T,\alpha_1,\ldots,\alpha_J)'$. Note that we have J=107 and T=37, giving us a dimension K for the parameter vector β of 144.

A note should be added on the interpretation of the dummy parameters. In the next section, we will analyze the rate of return on paintings, considered as financial assets. If we knew the time period dummies $\{\gamma_t\}_{t=1}^{T}$, we could compute the rate of return between, say, periods t and $t+1$ as follows:

$$r_{t+1} = \exp(\gamma_{t+1} - \gamma_t) - 1.$$

We can proceed similarly for the characteristic-related dummies. We will see below that the dummy for Henri Masson was omitted from the regression (1), in other words it was arbitrarily set equal to zero. The dummy parameters α_j for each of the remaining painters can then be seen as reflecting their market values vis-à-vis Masson. The percentage difference between the value of a work by painter j and a Masson, controlling for all the other factors in our analysis, will be

$$\exp(\alpha_j) - 1.$$

2.3 Estimation

The regression (1) and (2) can be, and usually is, estimated by ordinary least squares (OLS). Under the standard assumptions, OLS will be consistent and asymptotically normal, and will be asymptotically efficient if the disturbances $\{u_i\}$ are normally distributed. An application of the Jarque-Bera (1980) normality test to our OLS residuals yielded a highly significant statistic of 1389 (the test has a chi-squared null distribution with two degrees of freedom), with an associated $\chi^2(1)$ kurtosis statistic of 1347. Hence, there is reason to suppose that a substantial efficiency loss is borne when estimating the model by OLS, relative to maximum likelihood or to a robust estimator such as least absolute deviations. For our purposes, efficiency is a major concern. This is because our estimates of the time-period dummies $\{\gamma_t\}_{t=1}^T$ and, more specifically, of the associated returns $\{r_t\}_{t=2}^T$, will be treated in our analysis of Section 4 as being observed series of prices and returns. Thus, it is essential that these parameters be estimated as precisely as possible.

To achieve greater precision in our estimates of the time-period dummies, we have chosen to estimate (2) adaptively, according to the procedure of Bickel (1982). This estimator is designed to deliver fully asymptotically efficient estimates when the distribution of the disturbances $\{u_i\}$ is of unknown functional form. Given our strong evidence that the disturbances are not normally distributed, and in the absence of any compelling economic argument favoring the adoption of some other specific functional form for the error distribution, we shall treat this distribution as unknown and proceed to compute a semiparametric analogue of the maximum likelihood estimator (MLE). We will assume that the disturbances are independent and identically distributed (iid) with a density function $f(u)$. The version of the Bickel (1982) estimator we use incorporates a further assumption of symmetry of this distribution, so that $f(u) = f(-u)$. Although it is quite possible that the apparent leptokurtosis in the errors is to some extent due to heteroskedasticity, Hodgson (2000) shows that Bickel's (1982) estimator is robust to the presence of heteroskedasticity in the errors, and will adapt for the non-normality induced in the unconditional density of the errors by this heteroskedasticity. Moreover, the standard error estimates proposed by Bickel (1982) are also robust.

If the functional form of $f(u)$ were known, computation of the maximum likelihood estimator of β would be a straightforward matter. With $f(u)$ being unknown, the basic approach to computing an efficient semiparametric analogue to the MLE does not change much, with the principal complication being the necessity to use the data to compute a nonparametric estimate of f to use in lieu of the unknown function. We outline below the mechanics of computing a slightly modified version of the Bickel (1982) adaptive estimator.

Using the OLS estimator $\widehat{\beta}$, compute the associated residuals $\widehat{u}_i = p_i - x_i'\widehat{\beta}$, $i = 1,\ldots,n$. For each residual $\widehat{u}_i$, $i = 1,\ldots,n$, one can use the remaining residuals to compute a kernel estimate of the level of the density f evaluated at $\widehat{u}_i$ as follows:

$$\widehat{f}_i(\widehat{u}_i) = \frac{1}{2(n-1)} \sum_{\substack{j=1 \\ j\neq i}}^{n} \left\{ K\left(\frac{\widehat{u}_i + \widehat{u}_j}{h_n}\right) + K\left(\frac{\widehat{u}_i - \widehat{u}_j}{h_n}\right) \right\},$$

where $K(\bullet)$ is a user-specified kernel weighting function and h_n is a user-specified bandwidth parameter that satisfies the asymptotic condition $h_n \to 0$ as $n \to \infty$. We will also require the following estimate of the first derivative of f :

$$\widehat{f}_i'(\widehat{u}_i) = \frac{1}{h_n 2(n-1)} \sum_{\substack{j=1 \\ j \neq i}}^{n} \left\{ K'\left(\frac{\widehat{u}_i + \widehat{u}_j}{h_n}\right) + K'\left(\frac{\widehat{u}_i - \widehat{u}_j}{h_n}\right) \right\}.$$

We then have the estimated (negative of the) score of f, evaluated at $\widehat{u}_i$:

$$\widehat{\psi}_i(\widehat{u}_i) = \frac{\widehat{f}_i'(\widehat{u}_i)}{\widehat{f}_i(\widehat{u}_i)},$$

where some trimming conditions may need to be specified in the computation of $\widehat{\psi}_i$, depending on the kernel employed. In our empirical application, we will use a normal kernel with a bandwidth parameter specified using the rule-of-thumb approach of Silverman (1986).

The sample score vector and information matrix of the likelihood function can be approximated, respectively, by the following semiparametric estimators:

$$\widehat{S}_n = n^{-1} \sum_{i=1}^{n} x_i \widehat{\psi}_i(\widehat{u}_i)$$

and

$$\widehat{\mathcal{I}}_n = \widehat{\Omega} n^{-1} \sum_{i=1}^{n} x_i x_i',$$

where $\widehat{\Omega} = n^{-1} \sum_{i=1}^{n} \widehat{\psi}_i(\widehat{u}_i)^2$. The adaptive estimator $\widetilde{\beta}$ is then computed using the following one-step Newton-style adjustment of the OLS estimator $\widehat{\beta}$:

$$\widetilde{\beta} = \widehat{\beta} + \widehat{\mathcal{I}}_n^{-1} \widehat{S}_n.$$

Under conditions specified by Bickel (1982), $\widetilde{\beta}$ will be consistent and asymptotically normal,

$$\sqrt{n}\left(\widetilde{\beta} - \beta\right) \xrightarrow{d} N(0, \mathcal{I}^{-1}),$$

where the asymptotic covariance matrix $\mathcal{I}^{-1}$ is consistently estimated by $\widehat{\mathcal{I}}_n^{-1}$.

3. HEDONIC REGRESSION - RESULTS

The results of our estimation of the hedonic regression (1)-(2) are discussed here and reported in Tables 1-6 and in the Appendix.

3.1 Time series price index and estimated returns

The time series dummy parameter estimates, along with the associated estimates of nominal and real annual returns, are reported in Table 1, and plotted in Figures 1 and 2. The real returns are obtained by deflating the nominal using the Consumer Price Index as obtained from the Statistics Canada website. The average real return in the art market during the period 1968-2005 is 4.34%, with a standard deviation of 15.49%. The market is quite volatile, with a certain degree of "volatility clustering" seemingly evident. For example, there is a rapid increase in price during the period 1976-1981, with increases in 1979 and 1980 of 27% and 40%, respectively, followed by a sharp drop in the market in the early 80's, with annual declines of over 20% in 1982 and 1983. A second boom occurs in the second half of the 1980's, again followed by rapid price decreases in the early 90's. A period of relative stability then set in during the mid- to late-90's, with modest but steady increases after 1997, with relatively large jumps of 27% in 2001 and 14% in 2005. These phenomena are more or less in accord with those obtained by Hodgson and Vorkink (2004) for the Canadian art market as a whole, especially as pertains to the depressions in the market in the early 80's and 90's, both of which can no doubt be at least partially attributed to macroeconomic recessions which occurred during these years.

3.2 Painters

The 56 painters included in the study are identified in the Appendix, along with information on the number of works sold for each painter, and the estimated regression dummy parameter and standard error. As mentioned above, one dummy variable, that representing Henri Masson, was omitted to prevent collinearity with the time period dummies. Thus, each painter's dummy estimate can be interpreted as representing his/her market value vis-à-vis that of Masson. Although we cannot analyze these results in complete detail, we present in Table 2 a list of the "Top 15" French-Canadian painters, i.e. those with the 15 highest dummy point estimates, ranked in descending order. For each of these painters, we report the percentage difference between the value of one of his/her works and a work of Masson, controlling for the other variables included in the regression.

In analyzing Table 2, a few considerations should be borne in mind. First, the ranking is not necessarily statistically significant. The reported standard errors allow us to infer the significance of the parameter estimate relative to Henri Masson, but not relative to any of the other artists on the list. Secondly, the precision of these estimates varies widely by artist, depending on the number of observations available. Thirdly, the hedonic regression estimates a reduced form model in which no attempt is made to distinguish between supply and demand influences on price. It would be highly desirable to estimate a fully specified and identified supply-demand model of this market, but we have not attempted to do so here.

In general, no major surprises would be visited upon an amateur of Quebecois art in perusing Table 2. The top two painters, Borduas and Riopelle, are the "twin towers" of post-war abstract painting in Quebec, indeed in all of Canada, and have been discussed in the Introduction, along with Ozias Leduc, in eight place on our list. If we set aside the early colonial painter Roy-Audy, for whom only two sales are recorded in our sample, we then have four painters who interpreted and modernized, in various ways, a traditional and nationalist vision of the Quebec landscape and the people who inhabited it. Clarence Gagnon, Jean-Paul Lemieux, Marc-Aurèle Suzor-Coté, and Marc-Aurèle Fortin all painted in a representational vein that was conservative by the standards of the most advanced art of their day, but was nevertheless distinctively individual and can be described as uniquely French-Canadian. Five of the remaining seven painters were heavily involved in twentieth century avant-garde trends, with Pellan and Dallaire inspired by school-of-Paris modernism and surrealism, and De Repentigny, Charles Gagnon, and Pierre Gauvreau being leading members of the post-war abstractionist movements. Legaré and Hamel are among the most important francophone painters of the nineteenth century.

3.3 Auction House

Paintings in our sample were sold at 28 different auction houses, and we have reported in Table 5 the dummy estimates for those 8 which are still active and for which we had at least 75 observations, with the Sotheby's dummy being omitted from the regression. The estimates indicate a strong correlation between the house at which the painting is sold and the price, with six houses showing devaluations of over 20% compared to Sothby's. The differences among the houses are presumably due to geographical location or to segmentation of the market into houses specializing in paintings of different levels of quality.

3.4 Medium and Support

The dummy estimates for selected medium/support combinations are reported in Table 4. There were 15 different medium/support combinations included in the regression, but we have only reported estimates for those for which we had at least 50 observations. The oil on canvas dummy was omitted, so the parameter estimates in Table 4 reflect the contribution to a painting's value of a given medium/support in comparison to that of oil on canvas. Two things are particularly noteworthy here: first, that medium and support are essential components of a painting's value, and second, that oils painted on canvas command a substantial premium compared to oils on panel, board, paper, and masonite.

3.5 Genre

Table 5 contains our dummy estimates for the genre of a picture, with that for landscape being omitted from the regression. We can see that the subject of a picture can have an important influence on its price. Genre scenes and still lifes sell, on average, for 23% and 12% more, respectively, than landscapes, while all other genres are generally less valuable than landscapes, with history paintings and portraits being the cheapest.

3.6 Size and Dating Indicator

Our parameter estimates for the dimensions - height, width, and surface area - are given in Table 6. We can see that the height and width of a painting can have an appreciable impact on its price, with a one centimetre increase in either leading to an augmentation in price of between 1.5 % and 2%. The parameter for surface area is of negligible magnitude. The indicator for whether or not a painting is dated is highly significant, with a point estimate indicating a gain in value of about 18%.

4. CAPITAL ASSET PRICING MODEL (CAPM)

4.1 Model

We conduct tests of the returns to our art index in the framework of the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965). The following equation demonstrates the main result of the CAPM, stating that the expectation of the return on asset i, denoted as $R_{i,t}$, in excess of the return on a risk-free security, $R_{f,t}$, is a linear function of the expected excess return on the market portfolio, $R_{m,t}$:

$$E_{t-1}[R_{i,t}] - R_{ft} = E_{t-1}[R_{m,t} - R_{f,t}]\beta_{i,t}, \tag{3}$$

where $\beta_{i,t} = \frac{cov_{t-1}(R_{m,t},R_{i,t})}{var_{t-1}(R_{m,t})}$ is the conditional “beta” for asset i in period t, and the subscripts on expectations and covariances indicate conditional moments. Assuming that no dynamics exist in the conditional expectations, (3) reduces to the unconditional CAPM

$$E[R_{i,t}] - R_{f,t} = E[R_{m,t} - R_{f,t}]\beta_i. \tag{4}$$

There is an extensive empirical literature on the unconditional CAPM, most of which has tested how well this model can explain stock returns, with important early work by Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973) (see Campbell, Lo, and MacKinlay (1997) for a more comprehensive discussion of empirical tests of the CAPM). However, the CAPM has been used as a model to explain the returns on other assets. For example Bryan (1985) and Hodgson and Vorkink (2004) use the CAPM to perform asset pricing tests of art, while Gyourko and Nelling (1996) use the CAPM to analyze the performance of Real Estate Investment Trusts (REIT). In a similar fashion to these and other studies of the CAPM, we use the following empirical version of the unconditional CAPM:

$$r_t = \alpha + \beta r_{M,t} + e_t, \tag{5}$$

where r_t is the excess return on the art index in period *t* (return on the art index minus the yield on a risk-free security), $r_{M,t}$ is the excess market return, e_t is a disturbance, and α and β are parameters. The CAPM suggests that β measures how much of the return to a particular asset (in our case art) is priced as systematic risk, or the portion of returns that are generated by the asset's correlation to that of the market. A simple t-test of the parameter will test if any portion of the asset's return is systematic, i.e. if $\beta = 0$.

If there is some component of returns that is not due to market risk exposure, as measured by β, but is persistent, it will appear in the intercept, α. If the CAPM is the true model describing returns, $\alpha = 0$, whereas a finding that $\alpha \neq 0$ would signal average returns that cannot be explained by market risk. A t-test of $\alpha = 0$ will test the CAPM's ability to explain the returns of a particular asset. Hodgson and Vorkink (2004) concluded that α is insignificantly different from zero in the overall Canadian art market.

4.2 Data and Results

The regression model (5) was estimated by ordinary least squares using our real return series of 36 obervations as reported in Table 1, with the risk-free rate being proxied by the Bank of Canada Bank Rate (obtained from the Bank's website) and the market portfolio proxied by the TSX/S&P Composite Index, Total Returns (i.e. with dividends included), this series provided by the Toronto Stock Exchange. Summary statistics for the data, along with results of the OLS estimation, are provided in Table 7.

Before commenting on the regression results, we make a few observations on the returns' descriptive statistics. First, we see that the average annual real return on the art portfolio, at 4.34%, is about midway between the average real interest rate, 2.79%, and the average real return on the stock index, 5.69%. Nevertheless, the variability of the art return is very similar to that of the stock index, with respective standard deviations of 15.49% and 16.55%, whereas the interest rate series has a standard deviation of only 3.22%. Art returns and stock returns have a modest positive correlation coefficient of 0.277, while the art returns are negatively correlated with interest rates, the coefficient in this case being -0.345.

In the CAPM regression, which had an R^2 of 0.105, and for which the errors produced an insiginificant Jarque-Bera (1980) normality test statistic of 0.642, we find a significantly positive beta, with a point estimate of 0.335 (standard error: 0.166), and an intercept very close to zero, with point estimate (standard error) of 0.0058 (0.0274). These results are broadly in accord with what one finds in the general literature in this area, with the beta estimate being higher than Hodgson and Vorkink (2004) find for the overall Canadian market.

As pointed out by Hodgson and Vorkink (2004), a finding of $\alpha = 0$ can have a number of possible interpretations. The one posited above is that returns to the art market are adequately captured by the CAPM, and that only systematic risk is important for returns in this market. A second possibility is that there are returns not related to systematic risk, but that they are offset by the costs associated with art ownership (costs referred to earlier but which we have not explicitly attempted to measure). Among the pecuniary and non-pecuniary returns associated with art ownership that we have also not attempted to measure are the fees that may be obtainable through loans to gallery or museum exhibitions or through reproduction rights, and the direct utility afforded by a picture to its owner. Another way of looking at it is in considering that, under the maintained hypothesis that the CAPM holds, then the unmeasured costs and benefits of holding art referred to here balance one another exactly (since under the CAPM, any such imbalance would result in a non-zero α, positive if costs outweigh benefits and negative otherwise).

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APPENDIX

The following is a list of all 152 painters included in our study, in alphabetical order. The three numbers given in parentheses for each artist represent, respectively, the number of observations, the dummy parameter estimate for the painter (expressed as percentage difference with respect to Henri Masson), and the associated standard error:

Edmund Alleyn (51, -71.67, 3.36); Marcel Barbeau (34, -69.34, 4.48); Henri Beau (100, -20.12, 6.55); Leon Bellefleur (135, 5.27, 9.60); Louis Belzile (20, -88.69, 2.02); Suzanne Bergeron (11, -86.93, 3.05); Andre Bieler (88, -27.99, 6.19); Paul-Emile Borduas (72, 887.87, 105.19); Joseph Bouchette (3, -88.89, 4.75); Napoleon Bourassa (4, -27.01, 26.86); Jean Dallaire (69, 173.91, 27.98); Georges Delfosse (142, -48.01, 3.66); Louis de Niverville (8, -68.80, 8.75); Rodolphe de Repentigny (8, 95.75, 52.14); Jacques De Tonnancour (56, 1.43, 10.75); Rodolphe Duguay (73, -45.54, 5.08); Louis Dulongpre (1, -84.33, 11.42); Albert Dumouchel (18, -63.60, 6.48); A.S. Falardeau (13, -64.37, 7.52); Marcelle Ferron (73, -35.25, 7.35); Marc-Aurele Fortin (434, 220.60, 15.51); Joseph Franchere (147, -34.60, 4.48); Louise Gadbois (122, -86.51, 1.19); Charles Gagnon (2, 75.62, 90.24); Clarence Gagnon (280, 509.22, 35.63); Yves Gaucher (3, 6.01, 45.67); Pierre Gauvreau (16, 54.97, 30.63); Jean Goguen (2, -46.07, 27.83); Theophile Hamel (13, 64.99, 35.25); Adrien Hebert (108, -45.39, 4.18); Charles Huot (55, -33.37, 6.99); Jacques Hurtubise (11, -53.81, 11.10); Jean-Paul Jerome (30, -82.99, 2.54); Henri Julien (6, -5.39, 28.18); Denis Juneau (3, -38.18, 26.31); Ludger Larose (36, -45.39, 7.03); Fernand Leduc (7, 2.30, 28.89); Ozias Leduc (48, 204.73, 34.47); Joseph Legare (8, 95.02, 50.55); Jean-Paul Lemieux (180, 308.43, 26.11); Rita Letendre (59, -62.47, 4.57); Henri Masson (711, 0, 0); Jean McEwen (98, -31.24, 7.53); Guy Monpetit (3, -77.89, 9.31); Jean-Paul Mousseau (9, -68.71, 7.73); 0.2212); Alfred Pellan (83, 198.19, 28.53); Henri Perre (15, -50.41, 9.65); Antoine Plamondon (12, -15.67, 18.43); Jean-Paul Riopelle (249, 611.24, 62.88); Jean-Baptiste Roy-Audy (2, 502.19, 312.40); Joseph Saint-Charles (47, -65.03, 3.97); Francoise Sullivan (1, -85.78, 10.27); Marc-Aurele de Foy Suzor-Cote (288, 250.14, 18.64); Fernand Toupin (61, -73.66, 3.27); Claude Tousignant (6, -41.74, 18.82); Zacharie Vincent (1, -95.16, 3.49)

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Table 1– Time period dummies and estimated returns (annual)

Time period	Number Of Obs.	Log-price dummy	Std. error	Estimated nominal return (%)	Std. error	Estimated real return (%)
68-69	23	4.45	.162			
69-70	63	4.74	.129	34.62	25.91	30.19
70-71	143	4.73	.107	-1.71	11.13	-4.48
71-72	81	4.70	.120	-2.72	9.93	-7.17
72-73	78	4.77	.118	7.18	12.38	-0.49
73-74	61	5.03	.123	29.41	16.10	16.90
74-75	44	5.05	.130	1.95	14.79	-8.07
75-76	35	5.15	.147	10.01	18.67	2.33
76-77	53	5.41	.125	29.63	20.89	20.25
77-78	45	5.53	.133	13.06	16.63	3.72
78-79	78	5.86	.100	39.29	19.93	27.55
79-80	45	6.29	.121	54.44	21.48	40.27
80-81	90	6.52	.094	25.25	16.70	11.43
81-82	74	6.38	.103	-13.46	10.05	-21.97
82-83	53	6.15	.113	-20.39	10.54	-24.75
83-84	58	6.10	.111	-4.68	13.13	-8.61
84-85	73	6.14	.101	4.15	13.35	0.14
85-86	120	6.40	.088	30.22	14.12	25.09
86-87	158	6.65	.083	27.90	11.34	22.51
87-88	231	6.74	.080	9.56	8.80	5.35
88-89	224	6.99	.077	28.60	9.41	22.48
89-90	236	7.02	.077	2.97	6.99	-1.75
90-91	191	6.69	.080	-28.32	5.11	-32.12
91-92	123	6.76	.089	7.41	9.11	5.82
92-93	109	6.62	.093	-13.28	8.36	-14.81
93-94	105	6.56	.093	-5.89	9.50	-6.08
94-95	132	6.59	.086	3.21	9.89	0.99
95-96	100	6.56	.094	-3.10	9.42	-4.63
96-97	109	6.52	.093	-3.51	9.81	-5.03
97-98	146	6.55	.087	2.41	9.51	1.49
98-99	125	6.65	.088	11.08	9.91	9.22
99-00	130	6.71	.089	5.93	9.68	3.15
00-01	143	6.98	.086	30.60	11.63	27.29
01-02	146	7.02	.086	4.41	9.03	2.16
02-03	202	7.09	.082	7.82	8.70	4.88
03-04	157	7.15	.085	5.61	8.36	3.63
04-05	151	7.30	.087	16.32	9.67	13.82

Table 2 – Dummy estimates for top 15 painters

Rank	Artist	No. obs.	Dummy estimate	Std. Err.	% change rel. H. Masson	Std. Err.
1	Paul-Emile Borduas	72	2.290	.106	887.87	105.19
2	J.-P. Riopelle	249	1.962	.088	611.24	62.88
3	Clarence Gagnon	280	1.807	.058	509.22	35.63
4	J.-B. Roy-Audy	2	1.795	.519	502.19	312.40
5	Jean-Paul Lemieux	180	1.407	.064	308.43	26.11
6	Marc-Aurèle Suzor-Coté	288	1.253	.053	250.14	18.64
7	Marc-Aurèle Fortin	434	1.165	.048	220.60	15.51
8	Ozias Leduc	48	1.114	.113	204.73	34.47
9	Alfred Pellan	83	1.093	.096	198.19	28.53
10	Jean Dallaire	69	1.008	.102	173.91	27.98
11	Rodolphe De Repentigny	8	0.672	.266	95.75	52.14
12	Joseph Legaré	8	0.668	.259	95.02	50.55
13	Charles Gagnon	2	0.563	.514	75.62	90.24
14	Théophile Hamel	13	0.501	.214	64.99	35.25
15	Pierre Gauvreau	16	0.438	.198	54.97	30.63

Table 3 – Dummy estimates for selected auction houses

House	No. obs.	Dummy estimate	Std. Err.	% change rel. to Sothby's	Std. Err.
Waddington	95	-0.410	.083	-33.61	5.53
Ritchie	111	-0.556	.076	-42.67	4.37
Fraser	423	-0.218	.055	-19.58	4.43
Pinney	244	-0.269	.059	-23.59	4.54
Empire	188	-0.344	.065	-29.12	4.60
Joyner	561	0.053	.044	5.45	4.64
Maison d'encans	1045	-0.324	.043	-27.69	3.12
Heffel	96	-0.120	.083	-11.33	7.34

Table 4 – Dummy estimates for selected medium/support

Medium/support	No. obs.	Dummy estimate	Std. Err.	% change rel. to oil/canvas	Std. Err.
Oil/panel	590	-0.141	.043	-13.18	3.72
Oil/board	646	-0.109	.038	-10.36	3.44
Oil/paper	71	-0.453	.091	-36.45	5.81
Oil/masonite	77	-0.120	.088	-11.27	7.76

Table 5 – Dummy estimates for selected genre

Genre	No. obs.	Dummy estimate	Std. Err.	% change rel. to landscape	Std. Err.
Genre scene	472	0.208	.039	23.17	4.85
Still life	173	0.110	.063	11.66	7.00
Portrait	166	-0.237	.067	-21.11	5.30
Abstract	992	-0.010	.070	-9.50	6.31
Animal	21	-0.124	.162	-11.67	14.35
Figure	91	-0.119	.081	-11.19	7.21
History	43	-0.290	.120	-25.14	9.02

Table 6 – Dimension variables and dating indicator

Variable	**Parameter estimate**	**Std. Err.**
Height	0.0166	.0009
Width	0.0188	.0009
Area	-1.04×10^{-4}	6.78×10^{-6}
Dated	0.165	.028

Table 7 – Returns: descriptive statistics and CAPM regression

Returns			
	Art	Stocks	Interest rate
Mean	0.0434	0.0569	0.0279
Standard dev.	0.1549	0.1655	0.0322
Correlation matrix			
	Art	Stocks	Interest rate
Art	1	.277	-.345
Stocks		1	.184
Interest Rate			1
CAPM regression			
Parameter	Estimate	S.E.	
α	0.00580	0.0274	
β	0.335	0.166	
$R^2 = 0.105$	JB = 0.642		

Fig. 1 – Real Rate of Return: Art (solid), Stocks (broken), Interest Rate (dotted)

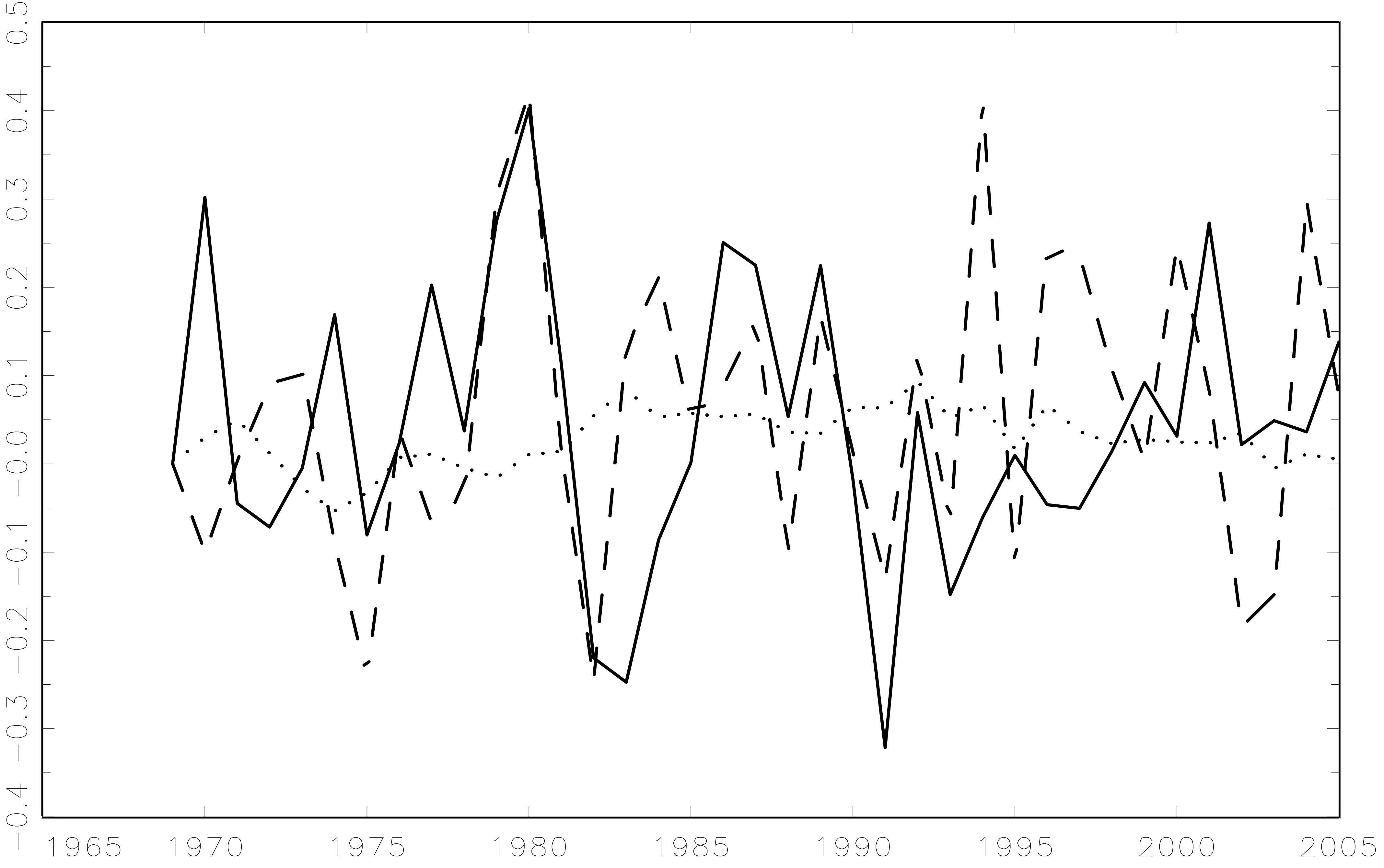

Fig. 2 – Real Index: Art (solid), Stocks (broken), Interest Rate (dotted)