Artistic movement membership and the career profiles of Canadian painters

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Cultural economists have taken a substantial interest in recent years in the factors that contribute to artistic creativity

One line of enquiry has focussed on the career profile of creative productivity of visual artists

The level of creative productivity is measured by such indicators as (i) number of illustrations in art history survey books by career phase of the works of particular artists; (ii) relative prices obtained at auction by paintings from different period of a particular artist's career

David Galenson (with co-authors (2000, 2001)) is most highly associated with this approach and has found that the timing in the "peak" creative period of different artists can be linked in systematic ways to their inherent aptitudes for artistic creation

"Experimental" artists would peak later than "conceptual" ones

Subsequent authors have questioned Galenson's interpretations and considered traditional aesthetic dichotomies that seem to correspond with his: Painting vs. Drawing; Baroque vs. Classical; Rococo vs. Neoclassical etc

Examples : Ginsburgh and Weyers (2006)
Galbraith and Hodgson (2015)

Other lines of enquiry have studied effects on creativity patterns of artistic environment and social influences

Example: "clusters" – cities with a large concentration of artists and other creative workers. Effects on career creativity patterns of artists being in such environments
(Kelly and O'Hagan (2007), Hellmanzik (2009))

Another form of social grouping that is very important in modern art history is the “movement”

Not hard to see why membership in a movement would be important to an artist’s career but not much economic analysis that we are aware of

Important empirical study by Accominotti (2009)

Works with Galenson’s art history illustration data

Looks at time sequence correlation of illustration frequency across artists in movements

Finds significant correlation concluding that movement membership is an important influence on creativity patterns

Hodgson, Galbraith, Hellmanzik (HGH, 2017): assess similarities in creativity patterns across members of movements by looking at auction data on sales and estimating profiles linking price to year of production of a painting

Like Accominotti, HGH consider major international artists from art history mainstream working in central cluster cities such as Paris and New York

HGH to estimate a pooled profile in a hedonic model where all members of a movement are grouped together, then estimate individual-specific hedonic profiles for the members of the movement and compare with the group profile

Profiles specified as a polynomial in year of production

HGH: lit survey finds 2 major reasons for existence of movements:

(1) **"Creativity" motive: interaction with like-minded colleagues enhances one's creativity and originality (Gardner (2011) finds that major creative breakthroughs occur at periods of intense interaction with a small nucleus of collaborators)**

(2) **"Economizing" motive: reduce production, marketing, exhibition costs through collective partnerships**

Motive (2) present among all collectives, including exhibition societies; motive (1) would apply to a "true movement", i.e. one with a common aesthetic, social, or political programme shared by members of the movement

Motive (1) suggests link between timing of movement membership and heightened creativity

Movements more likely to be present in cluster cities with a “thick” creative environment where motive (1) is stronger

Motive (2) more important in peripheral locales with a “thin” cultural market

This suggests creativity effects of group membership more important in metropolitan clusters than in thinner peripheral markets

Effects on career dynamics would be weaker in peripheral countries or in peripheral regions within a country

Here we consider a peripheral market, Canada, and different groupings within this market that are more or less well characterized as being true movements

Empirical question: For members of movements, are the peaks the same at the individual as at the group level?

Problem: sample sizes often too small at individual level to get a good OLS estimate of the parameters of the profile in the presence of a large number of hedonic covariates

Recent econometric developments in dimension reduction and model averaging can be applied to estimate the individual-level regressions (Galbraith and Hodgson (2012))

Individual artist regression:

Problem: serious degree of freedom problems arise, as the number of observations (N) may be only slightly greater than, or even less than, the number of regressors (k) in the hedonic regression

Degrees of freedom (N-k) will thus be too small to estimate a regression by OLS at the artist level

However, if we view the parameters of the age-valuation profile as the parameters of interest, and those on all other variables as nuisance parameters, it is natural to enquire as to the possibility of reducing the dimensionality of the set of covariates (and thus reducing k) so as to increase the degrees of freedom (N-k)

In principle, one could exclude certain covariates or sets of them, or redefine them so as to reduce the number (collapsing a particular group of dummies into a smaller number of categories, for example)

This approach is adopted by Galenson (2000) in the estimation of age-valuation profiles for 20th century American painters

Problem: dimensionality reduction achieved in a possibly arbitrary and statistically suboptimal manner

Recent econometric methods exist that provide optimality criteria for the choice of number and set of covariates to include in the regression

Dimension reduction (Galbraith & Zinde-Walsh (2009))

Model:

$$y = c + Z\gamma + X\beta + e$$

Parameter of interest is γ, and X is the matrix of covariates whose dimensionality we seek to reduce

For $\kappa \leq k$, define $C(\kappa)$ as the $k \times \kappa$ matrix containing κ orthogonalized eigenvectors of X'X associated with the κ greatest eigenvalues, and the set of κ auxiliary model regressors $S(\kappa, k) = ZC(\kappa)$

For various choices of κ, estimate the auxiliary model

$$y=c+Z\gamma+S\left(\kappa,k\right)\delta+e$$

Select the model by choosing κ according to the Akaike Information Criterion (AIC)

Model Averaging (Hansen (2007))

Estimate models for different dimensionalities of the covariate set; use the Mallows information criterion to estimate β as the weighted average of the β estimates for the different models

Model

$$y=c+Z\gamma+X\beta+e=c+W\Theta+e$$

Suppose that Z has ℓ columns, and estimate models where the number of columns of W is $k_m=\ell,\ell+1,...,M$ for a maximum number of regressors M<N

Order the regressors by a priori importance

For the model m, estimate by OLS and obtain the M-dimensional parameter estimate $\hat{\theta}_m$ with the first ℓ elements being $\hat{\gamma}_m$ and the final $M-k_m$ elements being zero (whenever $M-k_{m>}$0)

The averaged estimator is

$$\hat{\Theta}=\sum_{m=\ell}^{M}\omega_m\hat{\theta}_m,$$

The first ℓ elements are

$$\hat{\gamma}=\sum_{m=\ell}^{M}\omega_m\hat{\gamma}_m$$

The weights are chosen to minimize the Mallows criterion

$$SSR+2\sigma^2k(\omega)$$

where σ^2 is replaced by an estimate and

$$k(\omega)=\sum_{m=\ell}^{M}\omega_m k_m$$

Model specification:

There exists a substantial literature in labour economics which seeks to obtain measures of age-earnings profiles of workers (or alternatively, experience-earnings or education-earnings, etc.)

Some of the ideas and methods from this literature can be applied to the problem of studying the productivity or quality-of-work of painters as a function of their age

Much work in labour has been devoted to the specification and estimation of nonlinear functional forms for age-earnings profiles

Quadratic (Mincer (1974), Heckman & Polachek (1974), etc.)

Quartic (Murphy & Welch (1990))

Nonparametric (Pudney (1993), Pagan and Ullah (1999)

Applications to careers of painters:

Czujack (1997) – hedonic regression for pricing of Picasso paintings where a dummy variable for "period" is included

Galenson et al – Various papers and books (Galenson (2000, 2001, 2006, 2009), Galenson & Weinberg (2000,2001), etc.

Hodgson (2011): Canadian artists

Hellmanzik (2010): major modern artists

Our model is a hedonic regression model, pooled over all artists:

$$y_i = x_i.'\beta + h\left(a_i,\theta\right) + g\left(z_i,\gamma\right) + u_i \quad i = 1,\ldots,n$$

y_i **= log price**

$x_i.$ **= vector of observations of *k* control variables (other than year of production and age)**

a_i **age of artist of painting *i***

z_i **year of production of painting *i***

***h, g* are quadratic functions:**

$$h\left(a_i,\theta\right) = I\left(i \in \tau\right)\left\{\theta_1 a_i + \theta_2 a_i^2\right\}$$

$$g\left(z_i,\gamma\right) = I\left(i \in s\right)\left\{\gamma_{1i} z_i + \gamma_{2i} z_i^2\right\}$$

where *s* is one of the movements (there are 11 movements in our study) and τ is one of three birth cohorts

This model is estimated by OLS for pooled movement data and by our dimension reduction and model averaging methods for individual-artist data

The parameters of interest are the elements of the vector γ, which will be plotted to illustrate the implied year-price profile at the movement and individual-artist levels

Our dataset: extended version of that used by Hodgson (2011)

Important Canadian artists

Data from various sources for auctions during the period 1968-2016

Hedonic covariates include auction house, medium, support, genre, height, width, surface area, date of sale

Table 1: Artists by movement

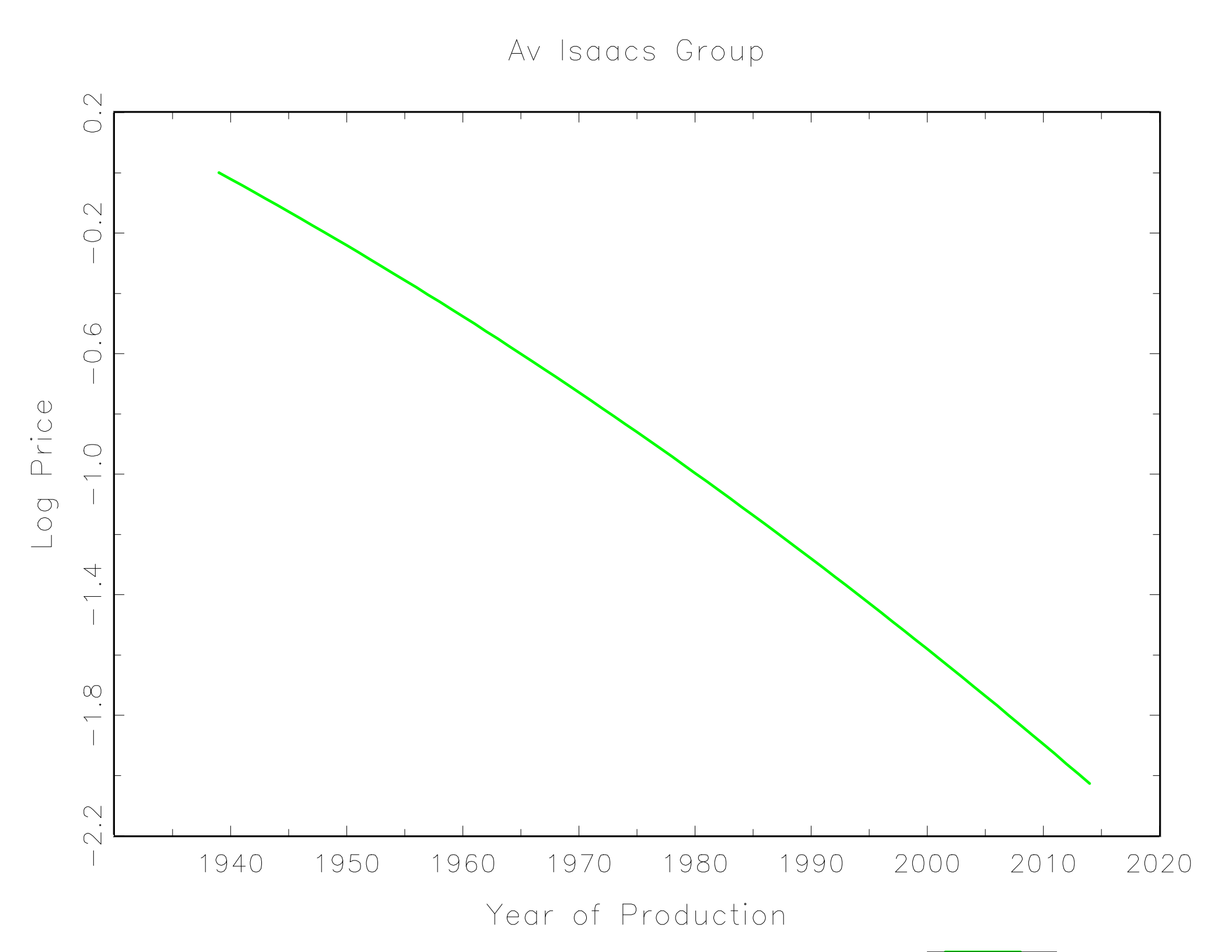
Artist	Year of Birth	Year of Death	Number of Observations
Group of Seven			
Frank Carmichael	1890	1945	62
A.J. Casson	1898	1992	584
Lemoine Fitzgerald	1890	1956	32
Lawren Harris	1885	1970	223
A.Y. Jackson	1882	1974	1017
Frank Johnston	1888	1949	164
Arthur Lismer	1885	1969	390
J.E.H. MacDonald	1873	1932	337
Tom Thomson	1877	1917	46
Fred Varley	1881	1969	61
Automatistes			
Marcel Barbeau	1925	2016	35
Paul-Emile Borduas	1905	1960	76
Marcelle Ferron	1924	2001	116
Pierre Gauvreau	1922	2011	16
Fernand Leduc	1916	2014	13
Rita Letendre	1929	still alive	112
Jean McEwen	1923	1999	145
Jean-Paul Mousseau	1927	1991	10
Jean-Paul Riopelle	1923	2003	487
Painters Eleven			
Jack Bush	1909	1977	106
Hortense Gordon	1887	1961	24
Tom Hodgson	1924	2006	26
Alexandra Luke	1901	1967	7
J.W.G. MacDonald	1897	1960	62
Ray Mead	1921	1998	32
Kazuo Nakamura	1926	2002	54
William Ronald	1926	1998	109
Harold Town	1924	1990	127
Walter Yarwood	1917	1996	10#
Canadian Impressionism			
Henri Beau	1863	1949	24
Harry Britton	1878	1958	27
Franklin Brownell	1857	1946	63
William Blair Bruce	1859	1906	15
William Brymner	1855	1925	28
W. H. Clapp	1879	1954	41
Maurice Cullen	1866	1934	94
Clarence Gagnon	1881	1942	147
Farqhuar Knowles	1859	1932	35

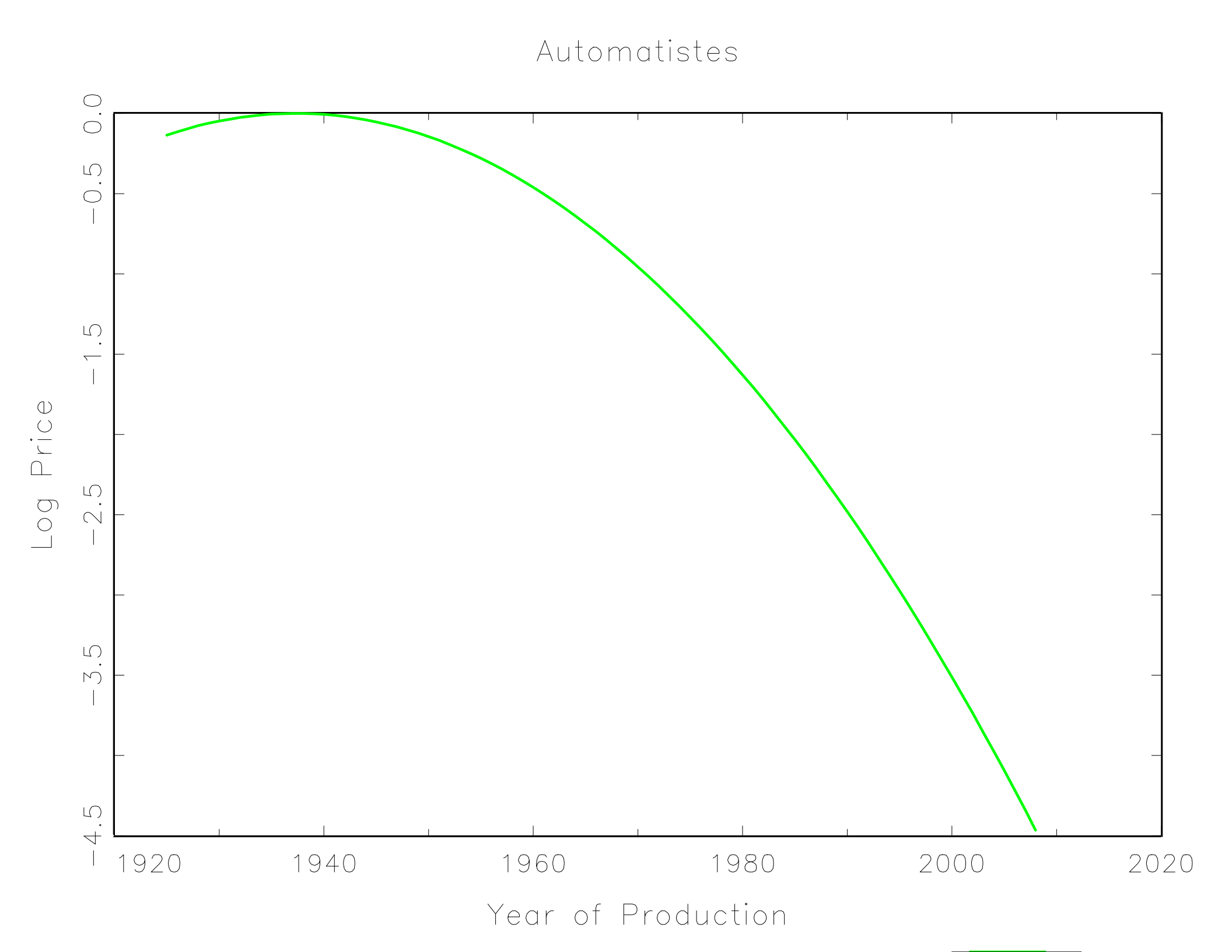
Laura Muntz Lyall	1860	1930	30
Helen McNicoll	1879	1915	17
James Wilson Morrice	1865	1924	27
Robert W Pilot	1898	1967	336
Arthur Rozaire	1879	1922	27
Marc-Aurèle de Foy Suzor-Coté	1869	1937	150
Prisme d'Yeux			
Leon Bellefleur	1910	2007	156
Jacques de Tonnancour	1917	2005	59
Albert Dumouchel	1916	1971	11
Alfred Pellan	1906	1988	35
Jeanne Rhéaume	1915	2000	37
Gordon Webber	1909	1965	7
Plasticiens			
Louis Belzile	1929	still alive	17
Rodolphe de Repentigny	1926	1959	11
Charles Gagnon	1934	2003	8
Yves Gaucher	1934	2000	15
Jacques Hurtubise	1939	2014	18
Jean-Paul Jerome	1928	2004	22
Guido Molinari	1933	2004	31
Fernand Toupin	1930	2009	55
Claude Tousignant	1932	still alive	15
Contemporary Arts Society			
Fritz Brandtner	1896	1969	18
Miller Brittain	1912	1968	12
Stanley Cosgrove	1911	2002	285
Louise Gadbois	1896	1985	65
Jack Humphrey	1901	1967	22
John Lyman	1886	1967	21
Louis Muhlstock	1904	2001	17
Jean Palardy	1905	1991	14
Goodridge Roberts	1904	1974	177
Jori Smith	1907	2005	62
Philip Surrey	1910	1990	43
Beaver Hall Group			
Andre Bieler	1896	1989	62
Nora Collyer	1898	1979	28
Adrien Hebert	1890	1967	35
Prudence Heward	1896	1947	10
Randolph Hewton	1888	1960	18
Edwin Holgate	1892	1977	81
John Johnstone	1887	1930	43
Mabel Lockerby	1887	1976	6

Mabel May	1884	1971	48
Kathleen Morris	1893	1986	20
Lilias Torrance Newton	1896	1980	7
Hal Perrigard	1891	1960	59
Sarah Robertson	1891	1948	7
Albert Robinson	1881	1956	124
Anne Savage	1896	1971	22
Adam Sherriff Scott	1887	1980	32
W.T. Topham	1888	1966	8
Emma Lake Group			
Ronald Bloore	1925	2009	18
Ted Godwin	1933	2013	16
Roy Kiyooka	1926	1994	8
Dorothy Knowles	1927	still alive	91
Ernst Lindner	1897	1988	11
Kenneth Lochhead	1926	2006	35
Arthur McKay	1926	2000	8
William Perehudoff	1919	2013	43
Otto Rogers	1935	still alive	21
Av Isaacs Group			
Dennis Burton	1933	2013	29
Graham Coughtry	1931	1999	13
John Meredith	1933	2000	27
Gordon Rayner	1935	2010	11
Michael Snow	1919	still alive	6
Joyce Wieland	1931	1998	8
London Regionalists			
Jack Chambers	1931	1978	6
Ron Martin	1943	still alive	12
Tony Urquhart	1934	still alive	19

Table 2: Parameter estimates, pooled model

Movement	Year	Std err	Year squared	Std err	Wald
Group of 7	2.00***	.400	-5.18× 10^{-4}***	1.03× 10^{-4}	41.06***
Automatistes	3.46***	1.21	-8.93× 10^{-4}***	3.06× 10^{-4}	131.87***
Painters 11	3.82***	.582	-9.75× 10^{-4}***	1.48× 10^{-4}	54.78***
Cdn Impressionism	-.358	.540	9.58× 10^{-5}	1.41× 10^{-4}	5.48*
Prisme d'yeux	-.370	.965	9.43× 10^{-5}	2.46× 10^{-4}	0.18
Plasticiens	-1.11	1.47	2.72× 10^{-4}	3.71× 10^{-4}	40.13***
Contemp. Arts Soc.	-.412	.928	1.03× 10^{-4}	2.37× 10^{-4}	3.45
Beaver Hall	.825	.686	-2.16× 10^{-4}	1.77× 10^{-4}	9.27***
Emma Lake	-.0796	1.16	1.72× 10^{-5}	2.93× 10^{-4}	4.20
Av Isaacs	.290	.823	-8.02× 10^{-5}	2.09× 10^{-4}	8.45**
London Reg.	15.8***	6.47	-4.01× 10^{-3}***	1.64× 10^{-3}	9.74***


Av Isaacs Group
Log Price
0.2
−0.2
−0.6
−1.0
−1.4
−1.8
−2.2
1940
1950
1960
1970
1980
1990
2000
2010
2020
Year of Production


Automatistes
Log Price
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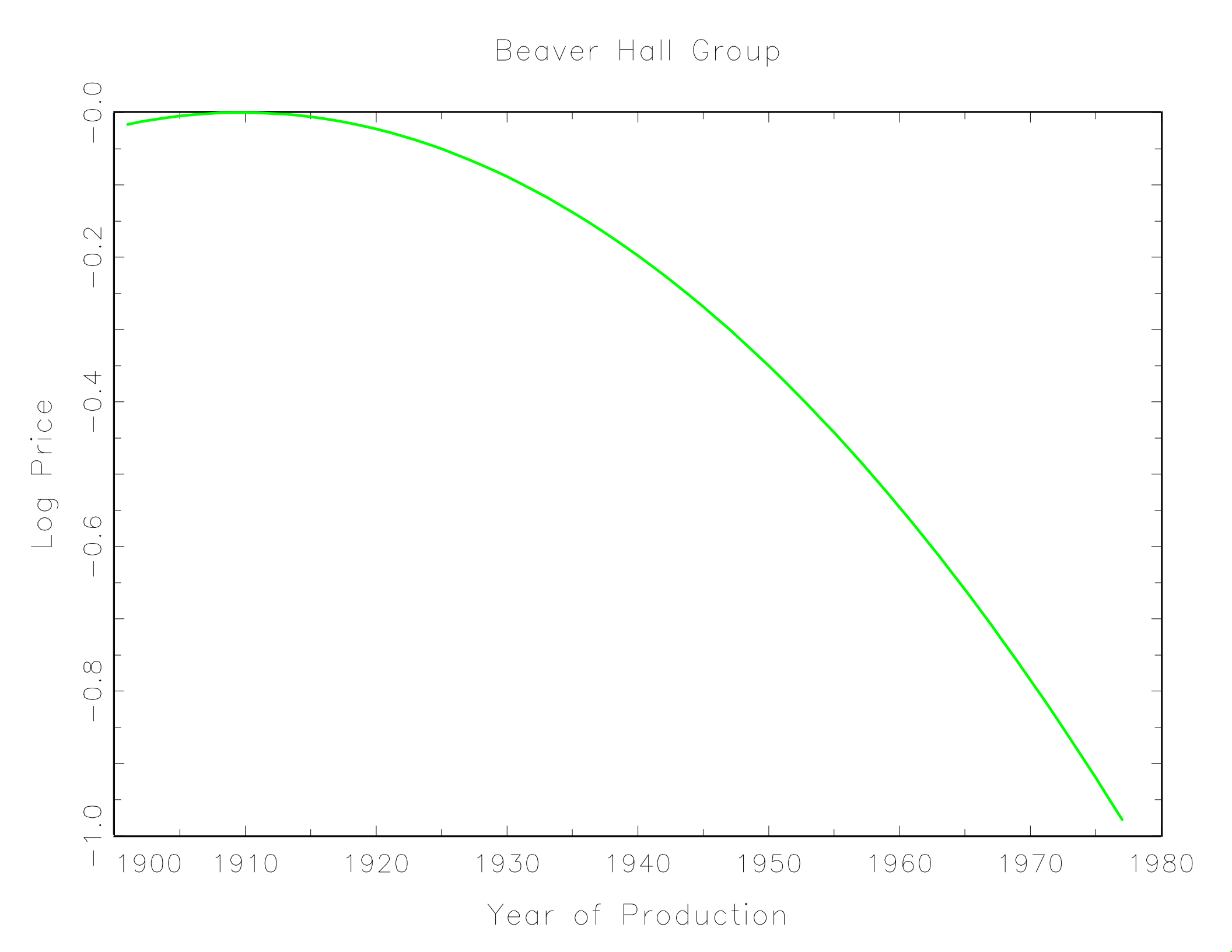
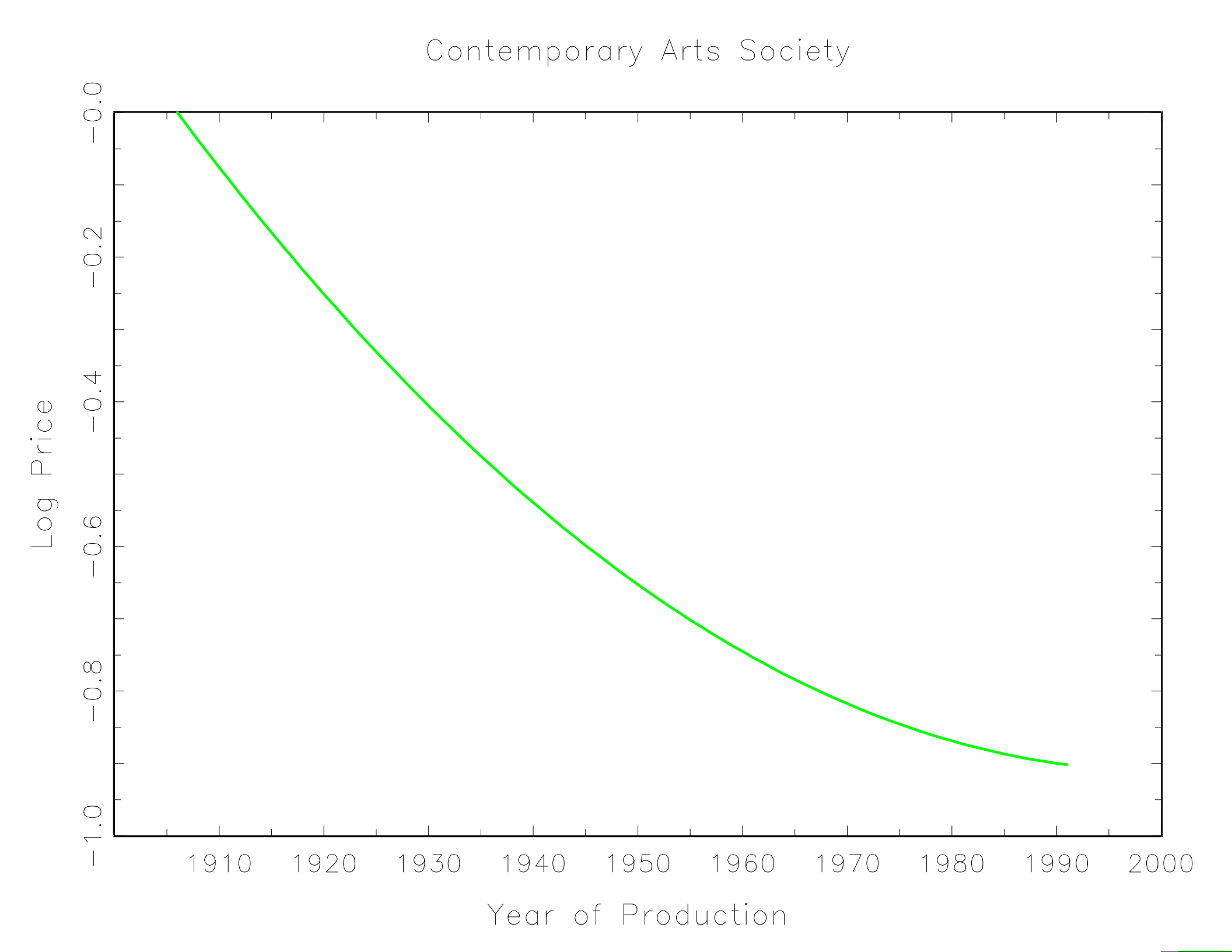
−2.5
−3.5
−4.5
1920
1940
1960
1980
2000
2020
Year of Production


Beaver Hall Group
Log Price
-0.0
-0.2
-0.4
-0.6
-0.8
-1.0
1900
1910
1920
1930
1940
1950
1960
1970
1980
Year of Production


Contemporary Arts Society
Log Price
-0.0
-0.2
-0.4
-0.6
-0.8
-1.0
1910
1920
1930
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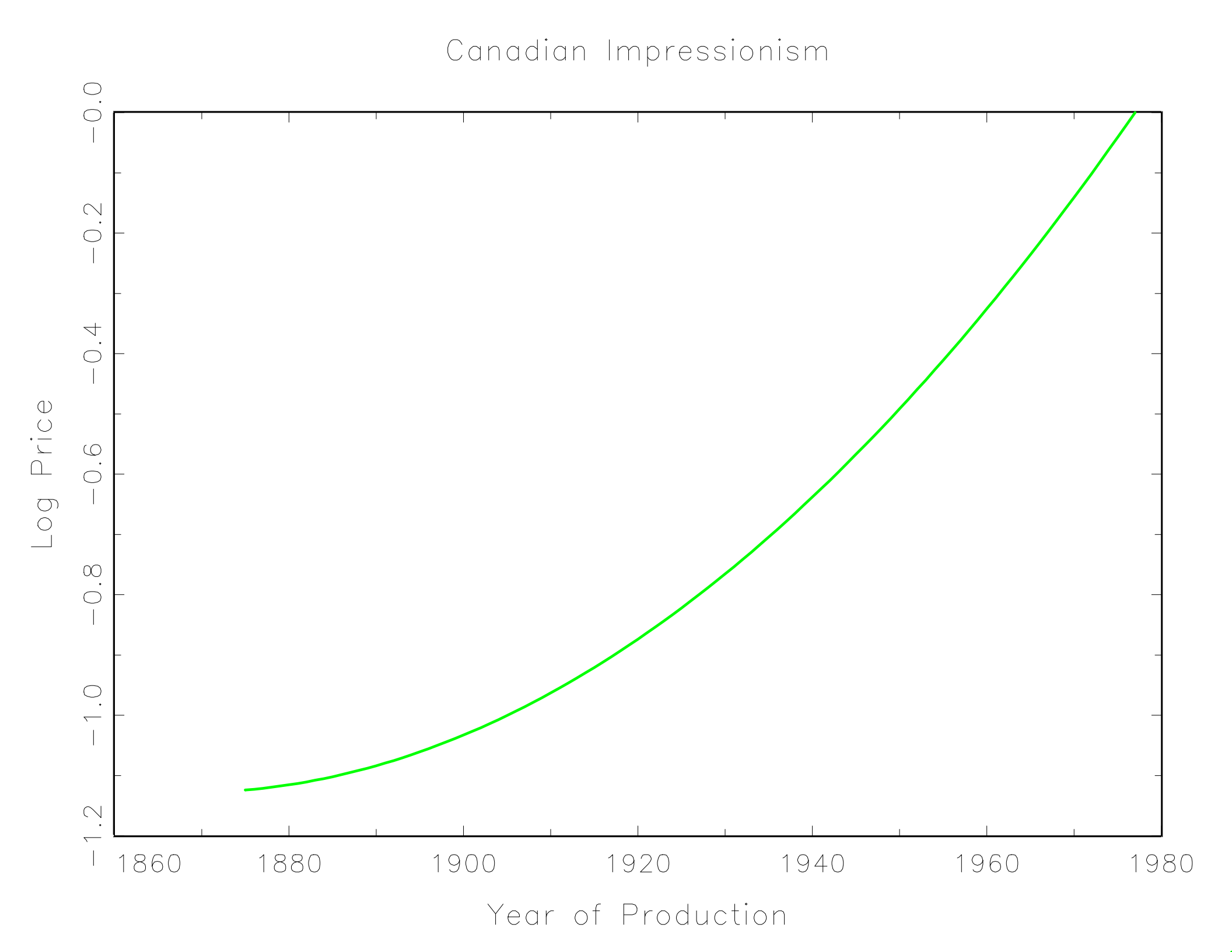
1990
2000
Year of Production


Canadian Impressionism
Log Price
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−0.2
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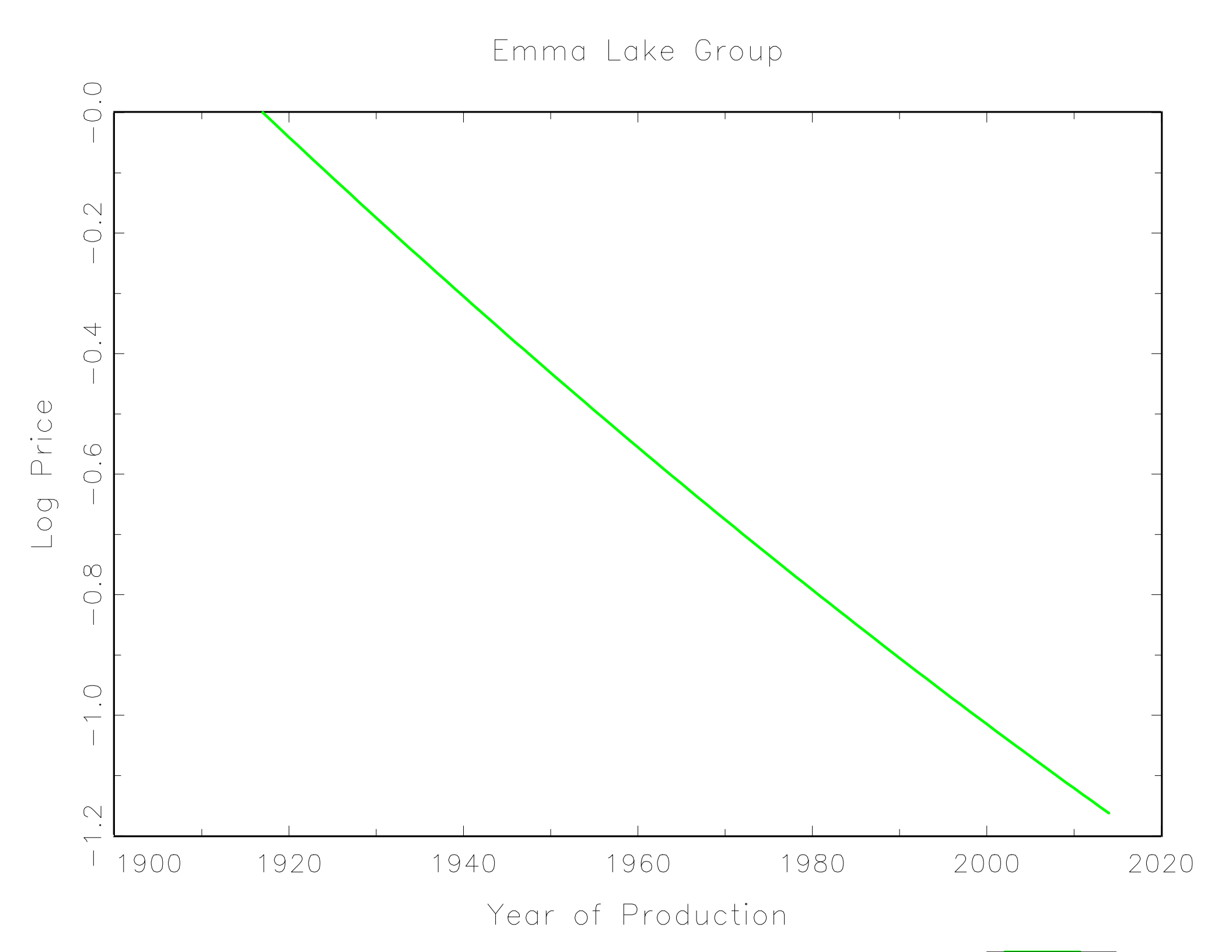
−0.8
−1.0
−1.2
1860
1880
1900
1920
1940
1960
1980
Year of Production


Emma Lake Group
Log Price
-0.0
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-0.8
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-1.2
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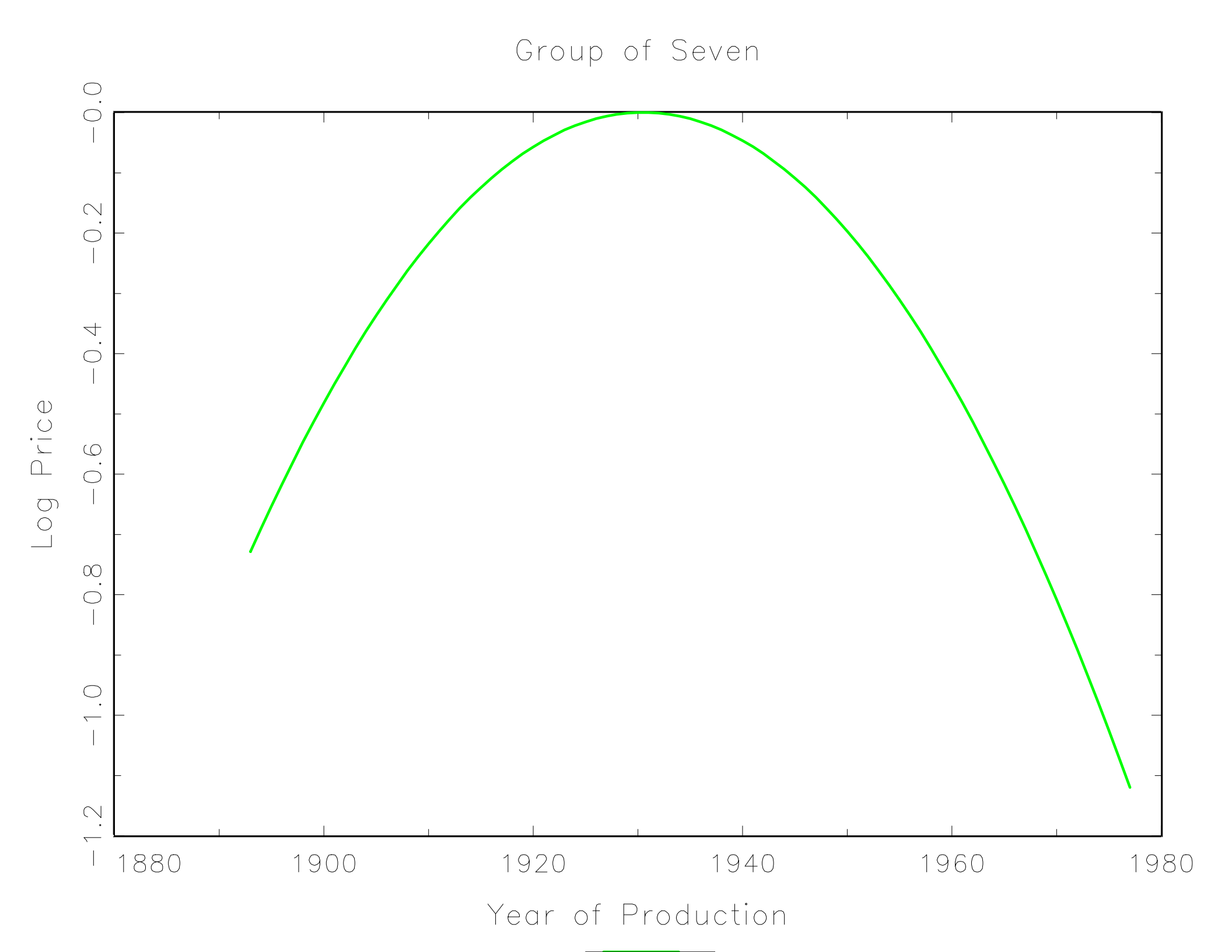
Year of Production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-0.8
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-1.2
1880
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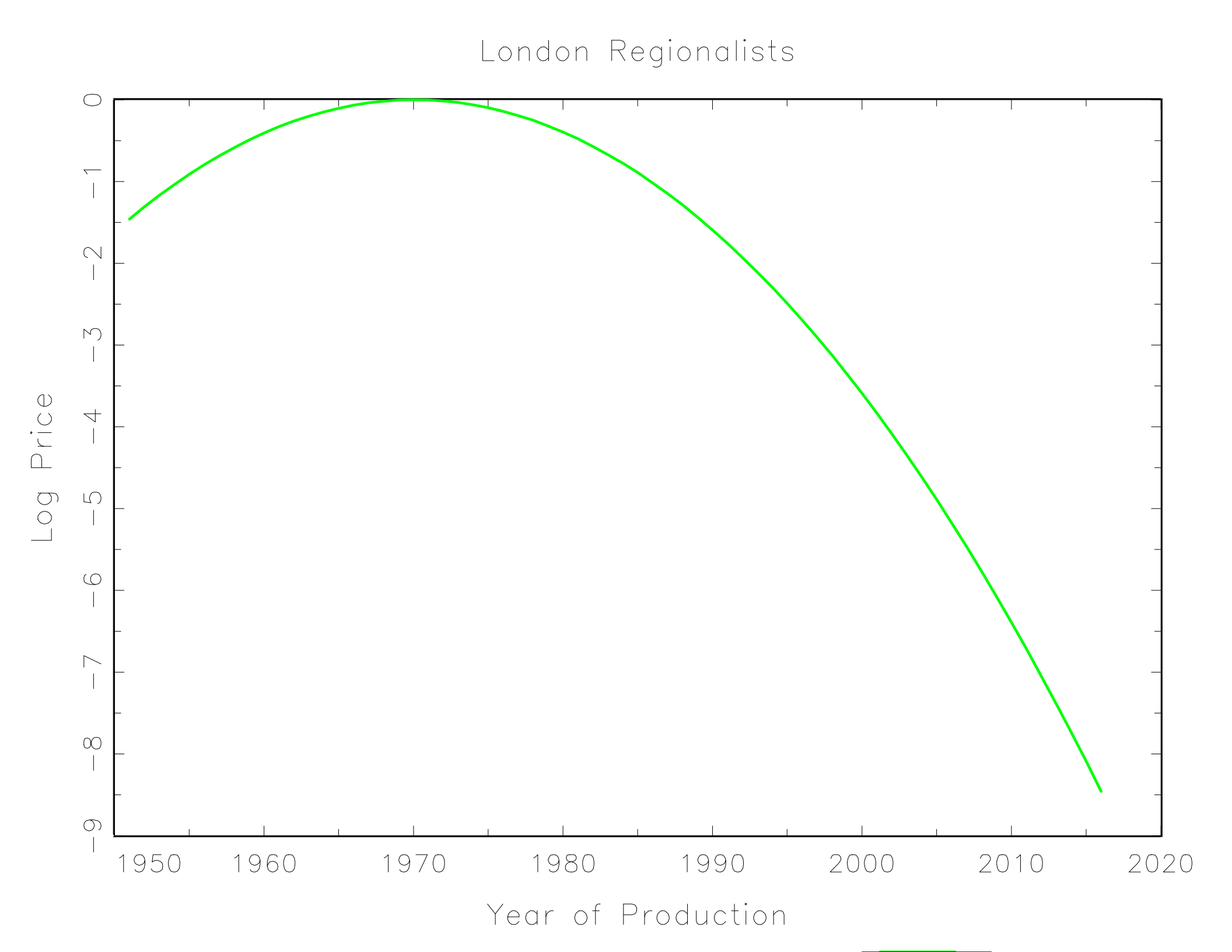
1980
Year of Production


London Regionalists
Log Price
0
−1
−2
−3
−4
−5
−6
−7
−8
−9
1950
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2000
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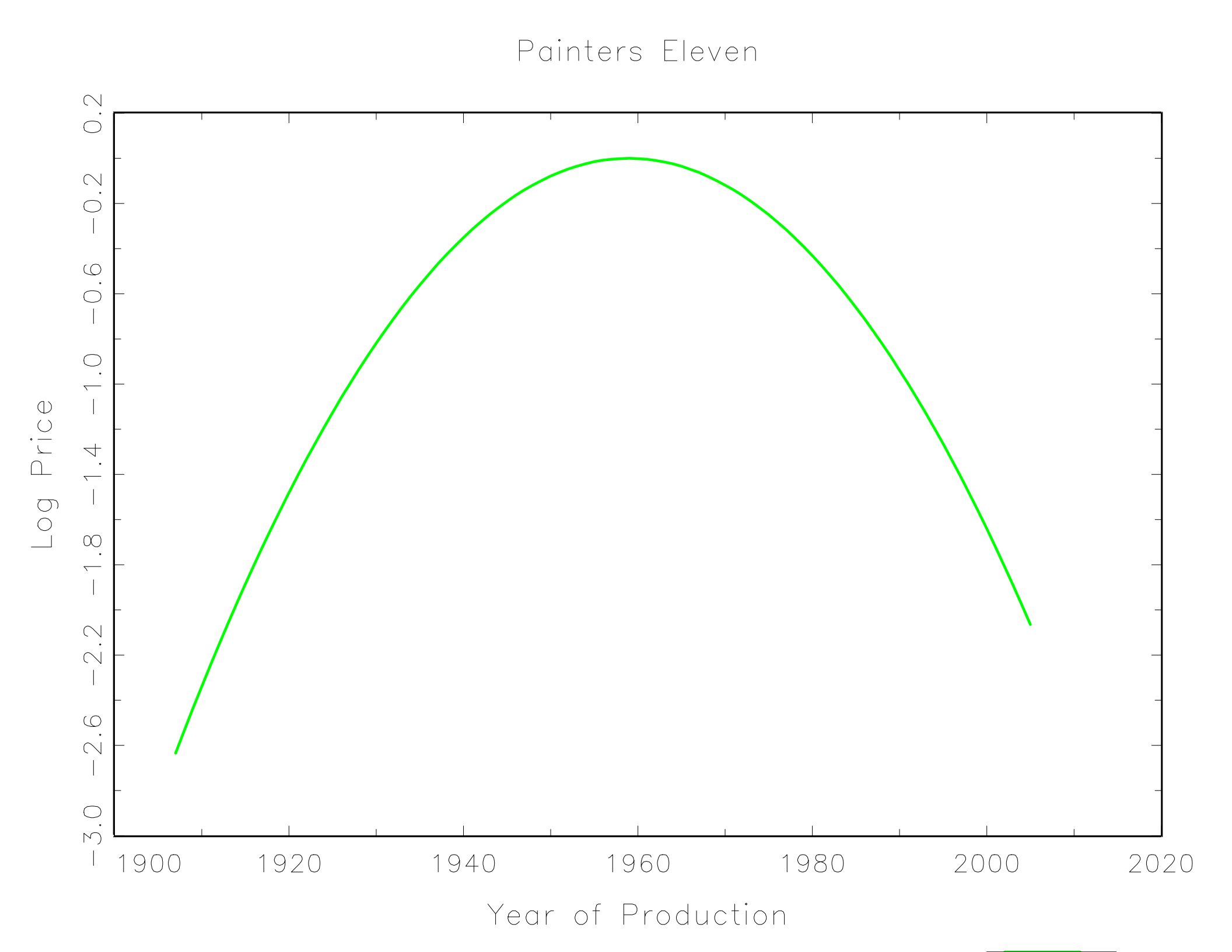
Year of Production


Painters Eleven
Log Price
0.2
−0.2
−0.6
−1.0
−1.4
−1.8
−2.2
−2.6
−3.0
1900
1920
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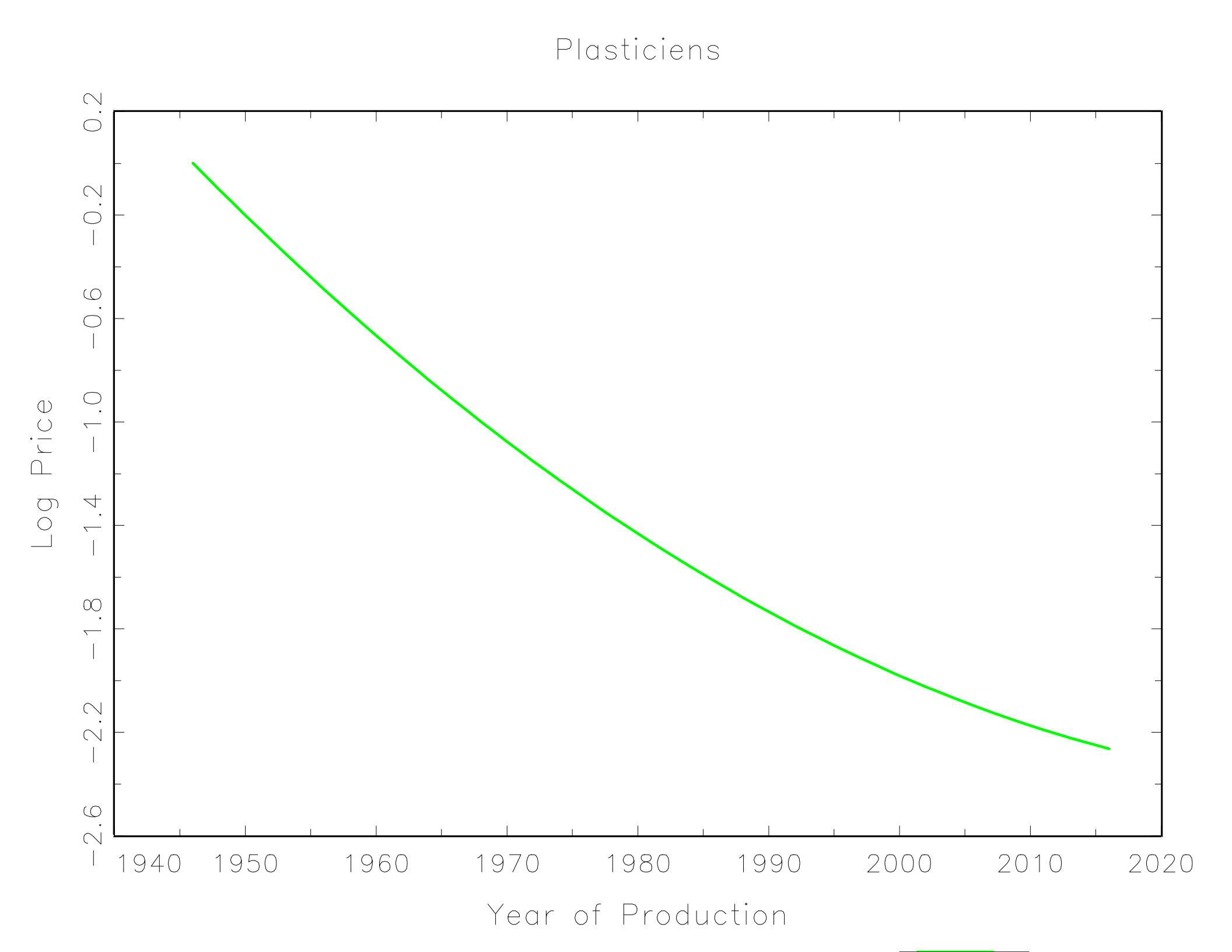
Year of Production


Plasticiens
Log Price
0.2
−0.2
−0.6
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−1.8
−2.2
−2.6
1940
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1970
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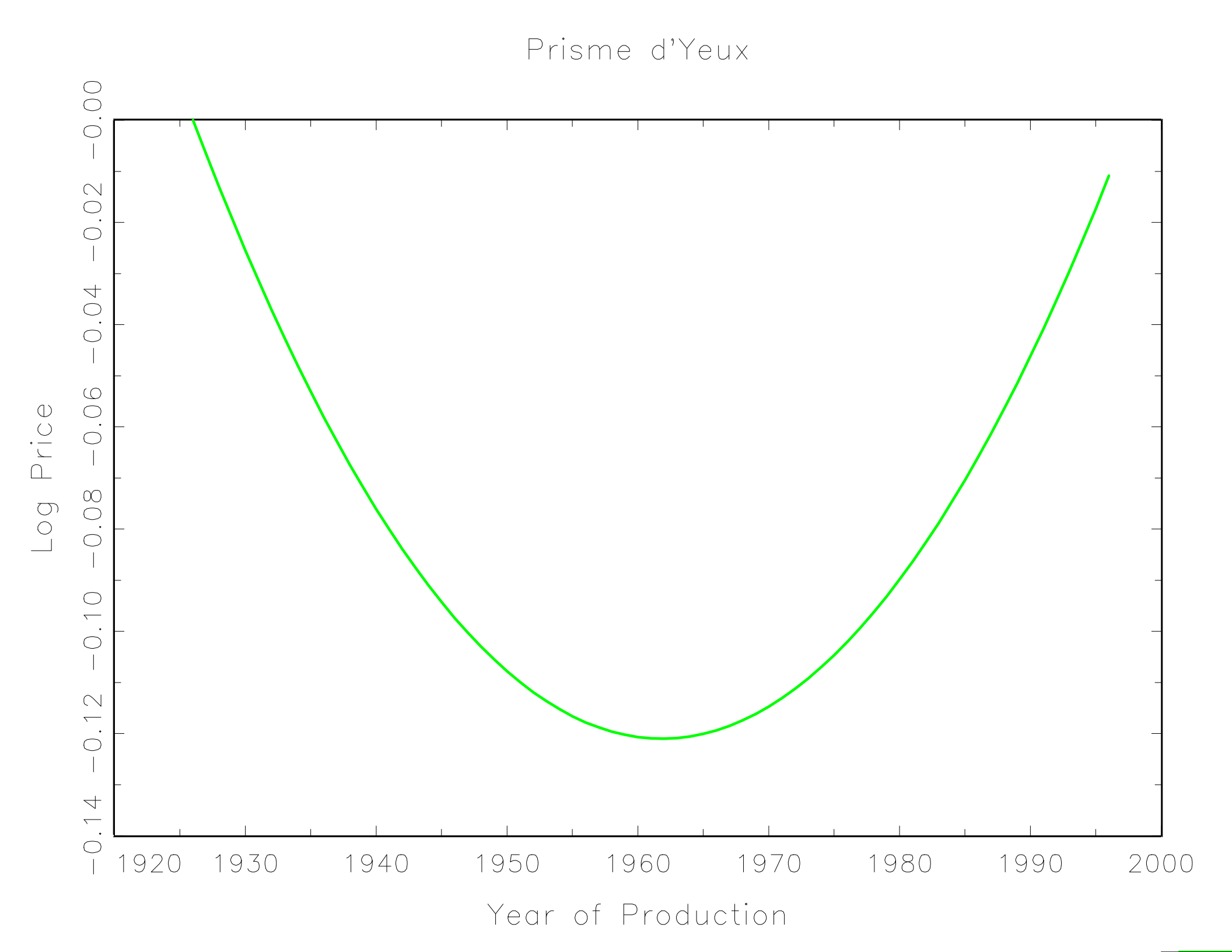
2010
2020
Year of Production


Prisme d'Yeux
Log Price
-0.00
-0.02
-0.04
-0.06
-0.08
-0.10
-0.12
-0.14
1920
1930
1940
1950
1960
1970
1980
1990
2000
Year of Production