The relationship between artistic movements and the careers of modern artists : Evidence from individual-level hedonic regressions with auction data

John W. Galbraith, McGill University

Christiane Hellmanzik, University of Hamburg

Douglas J Hodgson, Université du Québec à Montréal

The now substantial literature on the career age-valuation profiles of artists has paid limited attention to the effects on the profiles of membership in artistic movements. There are many reasons why membership in a more- or less-well defined movement can be important for the career dynamic of an artist. The relation between careers and movement membership has been studied by Accominotti (2009), who works with data on numbers of reproductions in art history books. The hedonic analysis of auction data in this area is limited, with results of regressions of pooled groups of artists being reported, for example, by Hellmanzik (2009) and Hodgson (2011). Ideally, one would like to estimate individual-artist profiles relating valuation to date of production, and compare these with pooled profiles estimated for groups or movements to which the artists belong, to assess the relation between individual- and group-level price dynamics. Until recently, such an endeavour was rendered difficult by the small number of observations, compared to a large number of hedonic covariates, often available at the individual-artist level. But the successful application to this problem of recent dimensionality-reduction and model-averaging methods by Galbraith and Hodgson (2012) in the context of estimating individual age-valuation profiles suggests the utility of applying the same approach to estimating individual profiles in the context of movement membership. We thus apply these methods to a large data set on auction prices for major modern painters.

Introduction

The literature on artistic careers so far has been shaped by three important research questions: how to measure the value of artistic output, the analysis of the age at which the best work was produced, and inferring postulates of creativity and innovation from the different career patterns of modern visual artists. This paper seeks to contribute to the two latter questions. With regard to the timing of an artist's best work, joint studies by Galenson and Weinberg (2000, 2001) pioneered in showing that artists' careers change over time. They study modern American artists born between 1900 and 1940 and French painters born between 1820 and 1900, respectively. Both these studies use year-of-birth cohorts of artists and show that artists born in later cohorts will peak earlier in their careers. From this finding they deduce that conceptual painters reach their peaks earlier in their careers than experimental artists. Conceptual artists plan their works ahead and use a systematic approach to execute these plans - the archetype conceptual painter is Picasso, an early bloomer. Experimental artists, however, use an incremental technique and seek perfection in their works - the archetype being Cezanne, a late bloomer. Ginsburgh and Weyers (2006), on the other hand, find that old masters, who are defined as 'conceptual' in their working methods, do not reach career peaks early in their lives; hence, they conclude that Galenson's and Weinberg's framework does not hold for old masters. In addition, they point out that Galenson's and Weinberg's classifications of artists' creative approaches might be too restrictive at times.

This literature genrally uses two broad ways of measuring variations over time in the "productivity" of an artist. First, prices realized at auction can be regressed on age of artists at date of execution. Second, art historical data such as reproductions in textbooks by age of execution can be used. Both approaches are used in the various papers authored or co-authored by Galenson, whereas the use of auction data on price has been the preferred choice in much of the subsequrent literature, for example Hellmanzik (2009) and Hodgson (2011).

A separate current in the literature on artists' creativity patterns over a lifetime looks at the importance of social and professional interactions in influencing and abetting an artist's productivity and creativity. The thinking behind this approach is that all creatice effort is largely social in nature: no artist works in isolation but is rather part of a larger social and professional network and that certain such networks can develop can that will be better than others at fostering an aritst's creative abilities. The concept of a "cluster" has recently received much attention among cultural economists: this would be a city in which an unusually high concentration of artists is present over a certain time period. Such cities have been seen to account for most of the majors innovative advances in the history of the arts (see for example Hellmanzik (2010)).

Within such major "cluster" cities as Paris and New York, another social phenomenon became particularly highly associated with creative innovation in modern art, namely the "movement". A movement is a group of artists, more or less well structured or formally organized, that have some sort of professional association. This will generally include some if not all of the following characteristics: a name for the group that was in use at the time of its

activities or applied to it subsequently by critics or art historians; a common aesthetic style; a formal manifesto or staement of aesthetic or professional principles; joint exhibitions; friendships or working collaborations among the members; generally speaking an association that will exist to promote the professional interests, exhibition opportunities, and aesthetic tendencies of the members of the group. Generally a movement as such is much shorter-lived than the artists who belong to it.

The question has been raised by, for example, Accominotti (2009), as to whether the career productivity pattern of an artist who belonged for a time to a movement will be affected by the fact of that artist's having belonged to the movement. In particular, can we see time patterns of productivity for different artists having belonged to the same movement that have some commonality with regard to the years of the existence of the movement itself? Accominotti finds, in studying data on reproductions of important artworks in art history textbooks, that important patterns do indeed exist for certain major movements in modern art history.

Here we are interested in studying this question but in making use of the information contained in price data obtained from auction sales. The idea would be to compare the individual time pattern of prices for artists belonging to specific movements with a pooled pattern estimated for the entire movement. This approach has to date been impossible for technical econometric reasons: individual-level data sets are generally very small and so reliable least squares estimates cannot be obtained due to a deficiency of degrees of freedom. However, recent work by Galbraith and Hodgson (2012) has shown that this problem can be overcome through the application of recent methods in dimension reduction and model averaging. We will apply these new methods n the current paper to assess the conformity of individual artists' estimated time patterns of productivity with the general time patterns for movements to which they belonged.

The analysis is based on an extensive dataset encompassing auction results of a sample of superstars of modern visual art who were active between 1820 and 2007 with 34,800 sales by 273 superstars of the modern art. This is an extended version of the data set used for the studies by Hellmanzik (2009, 2010) in which we will limit our attention to artists having belonged to well defined historical artistic movements. Our sample of modern artists is matched with prices of artists' paintings yielded in modern art auctions between 1988 to 2007. These auction data are used as a measure for the value of paintings executed during the sample period. The main advantage of using these auction results is that they provide a yearly productivity measure with high frequency and over a long time period for each artist.

Data and Movements

Data set

To consider the explanatory power of membership in a movement for artists' careers, we investigate the relation between membership and the evidence on career patterns reflected in estimated year-valuation profiles obtained from auction sales data, in particular with respect to the hypothesis that the individual profiles would tend to peak at the same time as the pooled profile estimated across all members of the movement. We analyze a data set of auction sales of paintings by modern artists that is an extended version of the data set used for the studies of careers of modern artists as reported in Hellmanzik (2009,2010). We group the artists included in our data set according to membership in a well-defined art historical movement, for example

the American Abstract Expressionist movement. We begin by estimating a pooled hedonic regression for all members of the movement in which the regressor vector includes a polynomial in the year of execution of the painting. The idea is to get a profile which links log price to the year of execution, controlling for the other hedonic covariates, with particualr interest focussing on the peak year of the profile, that is to say, the year in which the paintings of members of the movement are judged by the contemporary auction market to be most valuable, and therefore, we assume, of highest quality. We then also estimate individual year-valuation profiles for individual artists, addressing the small-sample-size problem in this case by employing dimension-reduction and model-averaging methods as applied by Galbraith and Hodgson (2012) for a set of Canadian artists. Our objective is to compare the individual profiles with the pooled movement profile, focussing again on year of peak price and, we assume, achievement, in order to determine the degree to which the individual-artist peaks conform to the group peak. A high degree of conformity would be consistent with the hypothesis that membership in the movement was substantially important to the artists in stimulating or helping him to do his best work.

The underlying dataset encompasses a sample of the 273 most important visual artists worldwide who were born between 1800 and 1945, and roughly 35,000 paintings auctioned between 1988 and 2007 by these artists. Modern day auction results are used to measure the value of paintings made by the superstar sample in the respective countries and years covered in this study. The sample period not only encompasses many of the most influential artists of the past century, but also, most developments that define modern arts were made during this time frame The sampling technique was performed on the basis of space dedicated to modern visual artists in the *Oxford Dictionary of Art: New Edition* (1997) and the *Reclam's Kunstlerlexikon* (2002). Only artists that have more than 2.2 inches are included in the sample. This method is based on Kelly and O'Hagan(2007).

All auction results were collected from artvalue.com (2007) and hammer prices were converted to US dollar prices. In addition, artvalue.com (2007) reports the size, support, medium used, and the year made for each painting. Thus, each artist's portfolio of auction paintings can be attributed to the year in which he or she produced it. The grouping of artists into movements was based on our own reading of relevant art historical sources. These are discussed below and the references provided.

Movements

In general we tried to be relatively "narrow" in our definition of a movement. For the artists to be grouped together it was not sufficient that they have general or even fairly close stylistic affinities. It was necessary that they belonged to a group that in its own time and place was fairly well identified, and that the members had some sort of professional association with each other, such as common exhibitions for example. Thus for the Impressionist group we will only include artists who worked and showed in Paris together whether or not they were of French origin. So for example Canadian or American artists who only worked in their home country and imported the impressionist style but didn't have significant connections with the French Impressionist movement (except maybe as students) will not be grouped as French Impressionists. A discussion of the specification of the movements we study here and art historical references are given below.

1. *Abstract Expressionists:* This movement emerged in New York City shortly after World

War 2 and was arguably the most important and influential movement in western art history since the Surrealist movement of the 1920's (by which it was heavily influenced and of which it was to some degree the successor). For an introductory survey of the movement, see Anfam (1990), and see also the authoritative chronicle of the post-war New York School provided by Perl (2005). The artists we include in this movement are William Baziotes (1912-63), Willem de Kooning (1904-97), Arshile Gorky (1904-48), Adolph Gottlieb (1903-74), Phil Guston (1913-80), Hans Hofmann (1880-1966), Franz Kline (1910-62), Robert Motherwell (1915-99), Jackson Pollock (1912-56), Ad Reinhardt (1913-67), and Mark Rothko (1903-70).

Art auction data and hedonic model specification

Year-price profiles for artists will be estimated in the framework of a hedonic regression model in which the dependent variable is log-price of the sale of a painting at auction, and the possibly large set of independent variables includes a polynomial (quadratic in this study) in the year of execution of the work, the surface area of the work, dummy variables for the date of the sale, the medium, the support, the auction house, whether or not the work is signed, and, in the specification where artists are pooled together, dummies for artist identity. In the pooled model, all of the artists included in a particular movement are grouped together, whereas in the individual-artist models, a separate regression is estimated for each artist.

One can imagine that the effect of the hedonic regressors on price could be different across painters, especially when it comes to year effects, suggesting the interest in estimating artist-specific models. However, degrees of freedom problems arise, since the number of observations for a given painter may not be much more than – in fact, may be less than – the number of potential regressors. One can in practice reduce the number of regressors by arbitrarily excluding variables (such as, for example, auction house) or by arbitrarily redefining certain dummy variables to reduce their numbers (individual time-period dummies for five- or ten-year periods rather than for each year, for example). Both expedients are used by Galenson (2000). However, it is possible that important information is lost when exclusion restrictions are imposed. In this paper, we will instead use the two alternative approaches used by Galbraith and Hodgson (2012): reducing the dimension of the regressor matrix in a data-dependent fashion that retains information in all regressors, and averaging results for a number of models in which different regressors have been excluded.

In the literature on the age-valuation relationship on which our methods here are based, age (or, for us, year of execution) generally enters as a polynomial function with between two and four terms, reflecting a similar modeling of age-wage or experience-wage profiles in the labor economics literature (e.g. Mincer 1974). Hodgson (2011) estimates a fourth-order polynomial for the overall and cohort regressions for Canadian artists, as well as for the specification with continuously shifting profile. Galenson (2000) allows for up to three polynomial terms in each individual-artist regression, with the exact number in each case being selected based on the best $\bar{R}^2$ fit. In this paper, we include only a quadratic specification both at the pooled and individual-artist levels.

In general, a hedonic regression model is written as follows:

$$p_i = \sum_{t=1}^{T} \gamma_t z_{it} + \sum_{j=1}^{J} \alpha_j w_{ij} + g(v_i, \delta) + u_i \qquad 1$$

$$= \beta' x_i + u_i, \qquad \#$$

where the sales are indexed by $i = 1, \ldots, n$, with p_i being the log price for sale i, z_{it} a dummy equal 1 if observation i occurs in period t, zero otherwise, γ_t the parameter on time period dummy, representing the value of the market in period t after controlling for all other factors, w_{ij} the observation on covariate j, α_j the associated parameter, and u_i a zero-mean disturbance, independent of the regressors. The covariates included in the regression are the variables mentioned above (dummies for medium, support, auction house, signed or not, and artist (pooled model only) as well as size). The term $g(v_i, \delta)$ is a function of the year of execution v_i at the time of creation of the art work and a vector δ of parameters, to be estimated. Estimation of δ is a principal objective of this paper, and we will estimate the basic quadratic in year of execution,

$$g(v_i, \delta) = \delta_1 v_i + \delta_2 v_i^2. \qquad 2$$

This specification will be the first of three to be estimated with all artists pooled together, and it will be the only specification for the individual-artist regressions.

The pooled models will be estimated by ordinary least squares (OLS). The degree-of-freedom deficiency renders OLS estimation difficult or impossible in the individual-artist regressions, so in the next section we outline the methods we will adopt to address this problem.

Individual-artist regression methodology

The pooled models use the full sample of works of art sold at auction for all members of a movement, and contain sufficient numbers of observations to obtain reasonably accurate least squares estimates of the parameter δ at the aggregated level of an entire movement. The individual sample sizes are often too small to get reasonable OLS estimates, and in some cases even smaller than the number of potential explanatory factors available. In order to undertake estimation on these samples we must either eliminate many of the potential regressors, or use alternative statistical methods to extract information from the full set.

The methods that we will use were suggested by Hansen (2007) and Galbraith and Zinde-Walsh (2011). We will give a very brief review here, based on the description in Galbraith and Hodgson (2012).

Consider for illustration a situation in which we have 25 sample points and 50 measured explanatory factors which theory suggests may be relevant. We cannot include all 50 in an OLS regression. A typical response to this would be to make a judgment of several–perhaps 3 to 5 here–of these factors to include, based on ***a priori*** considerations. Of course, different investigators will make different modeling choices, and results may differ substantially. In each model, much information will be omitted.

Another class of response to the problem, exemplified by Hansen (2007), is to average results of different small models. In this way information from many, potentially all, of the regressors can be embodied into the results, usually using information criteria to weight the

different models. Model-average estimators can be shown to produce substantially lower average loss measures (such as MSE) than typical single-model selection methods.

In the notation of Galbraith and Hodgson (2012), we begin with a model of interest:

$$y = c + X\beta + Z\gamma + \epsilon, \qquad 3$$

where X represents an ℓ – dimensional effect of interest to be included in all models and Z is a K –dimensional vector of additional potential explanatory factors. Here y represents the value of an art object sold at auction and X will include the age effects on valuation, interpretation of which is crucial to the present study. Choose a set of M models or an ordering and maximum number M of regressors from Z to include, with $\ell < M < N$ where N is the sample size, and estimate all models in the set or with m regressors, $m = \ell, \ell + 1, \ldots, M$. The model average estimator is $\hat{\Theta} = \sum_{m=\ell}^{M} \omega_m \hat{\theta}_m$, where ω_m is the weight given to model m and $\hat{\theta}_m$ is the parameter vector estimated using a model with m regressors, padded with zeroes for excluded variables where $m < M$. The estimates of β are weighted averages of the individual-model estimates, with weights chosen to minimize the Mallows (1973) criterion in Hansen (2007), or an asymptotically equivalent criterion in Xie (2013).

Another way of aggregating information from a large number of regressors is to combine the information from these explanatory factors from these in a single regression, rather than combining information from many different regressions. Galbraith and Zinde-Walsh (2011) suggest doing so by isolating the regressors whose coefficients are of interest, and extracting information from the remaining regressors by orthogonal ionization, and principal components or related orderings. A single regression model results, with the number of regressors determined by, e.g., information criteria.

Beginning again with equation (3), orthogonalize the regressors in Z and extract the K principal components. Define $S(\kappa, K)$ as the matrix containing the first κ of these, where κ may be chosen by an information criterion such as Akaike's. Next estimate β using the auxiliary model with orthogonalized control regressors $S(\kappa, K)$:

$$y = c + X\beta + S(\kappa, K)\delta + e. \qquad 4$$

Note that estimation using (4) incorporates information from all columns of Z. The estimates of the parameters β can be interpreted in the usual way; here these will correspond, as in the model averaging case, with the age effects which are important to the present study.

Fuller expositions of these methods in the context of a related problem are given by Galbraith and Hodgson (2012).

Empirical results

The parameter estimates themselves that we obtain for the parameters δ_1 and δ_2 at both the movement and individual-artist levels are not easy to interpret in general so we focus on a visual analysis of the graphic year-valuation profiles that they imply. For the abstract impressionists the pooled profile is plotted in Figure 1 and the individual-artist profiles for the eleven members of the group in Figures 1a-k. In interpreting these profiles a couple of points should be borne in mind. First, these profiles are identified only up to a parallel vertical shift. To facilitate comparison we have therefore normalized each profile so that its value at its peak is zero. Second, the range of years covered by the horizontal axis in the individual-artist profiles varies across artists because of their different lifespans. In all cases. we start in the

artists's twentieth year and end with the year of death. In each of the individual profiles we compare the individual artist's year-valuation profile with that for the whole group (the profile plotted in Figure 1) as it stands for the span of years considered in the graph.

Abstract Expressionists: The group profile peaks in 1962. This may seem a bit late as the heyday of the group was around 1950 and two of the leading members were dead by this date. However, this finding could suggest the applicability of a hybrid of the Galenson and Accominotti theses, especially as abstract expressionism is a "painterly" or "experimental" mode of painting and so by the Galenson hypothesis its practitioners would tend to peak relatively late in life. The utility of the movement would them have been to allow the painters to get their names known and to have established general aesthetic directions realtively early in their careers, with the full working out of their respective artistic programmes only coming later, after the group was no longer necessary to them, with experience. If we look at the individual profiles, we see that almost all of them have a strikingly high degree of conformity with the group profile, suggesting that groupe membership was important to these artists' careers, and in similar ways. The biggest exception to this result is de Kooning, but our estimates here are not reliably as the sample size in this case is very small. Also we see that Reinhardt peaks somewhat eralier than the overall group, but Reinhardt was a bit of a stylistic outlier, favouring a cool geometric abstraction that was aestheticall much less painterly than the other members of this group. Interstingly, Hofmann, the "grand old man" of the group, experienced a significant "Indian summer" and idi his best work at the very end of a cery long life. He may have received the greatest stimulation of all from his involvement with this movement.

Concluding remarks

Preliminary results obtained for the abstract expressionist painters do seem to be very consistent with the hypothesis investigated by Accominotti (2009) according to which membership in a well-defined artistic movement can relate in important ways to the career development of the individual painters that belong to it.

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Fig. 1 – Pooled Year–Valuation Profile, Abstract Expressionists

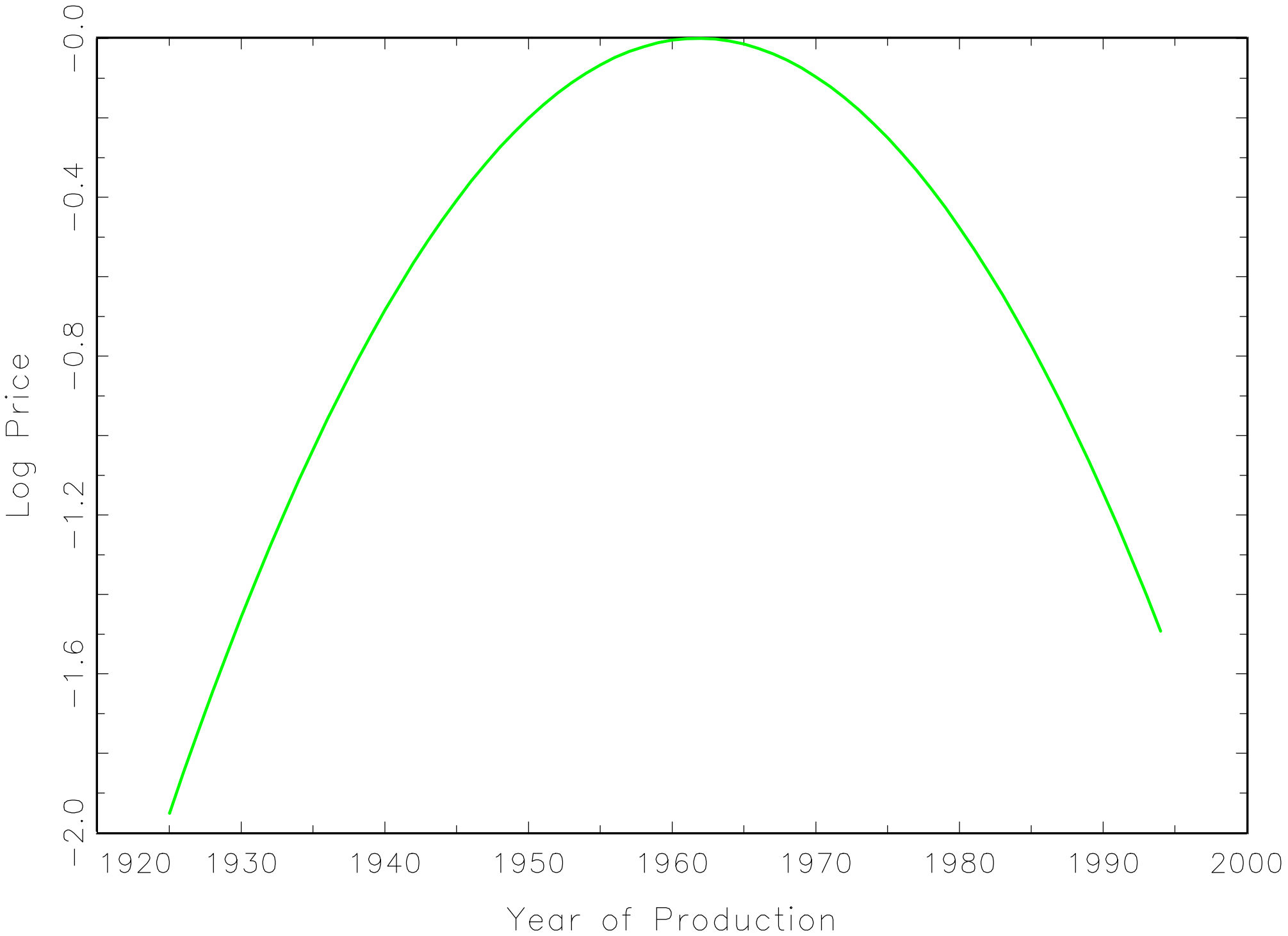

Fig. 1a — Year—Valuation Profile, Abstract Expressionists (solid) and Baziotes (broken)

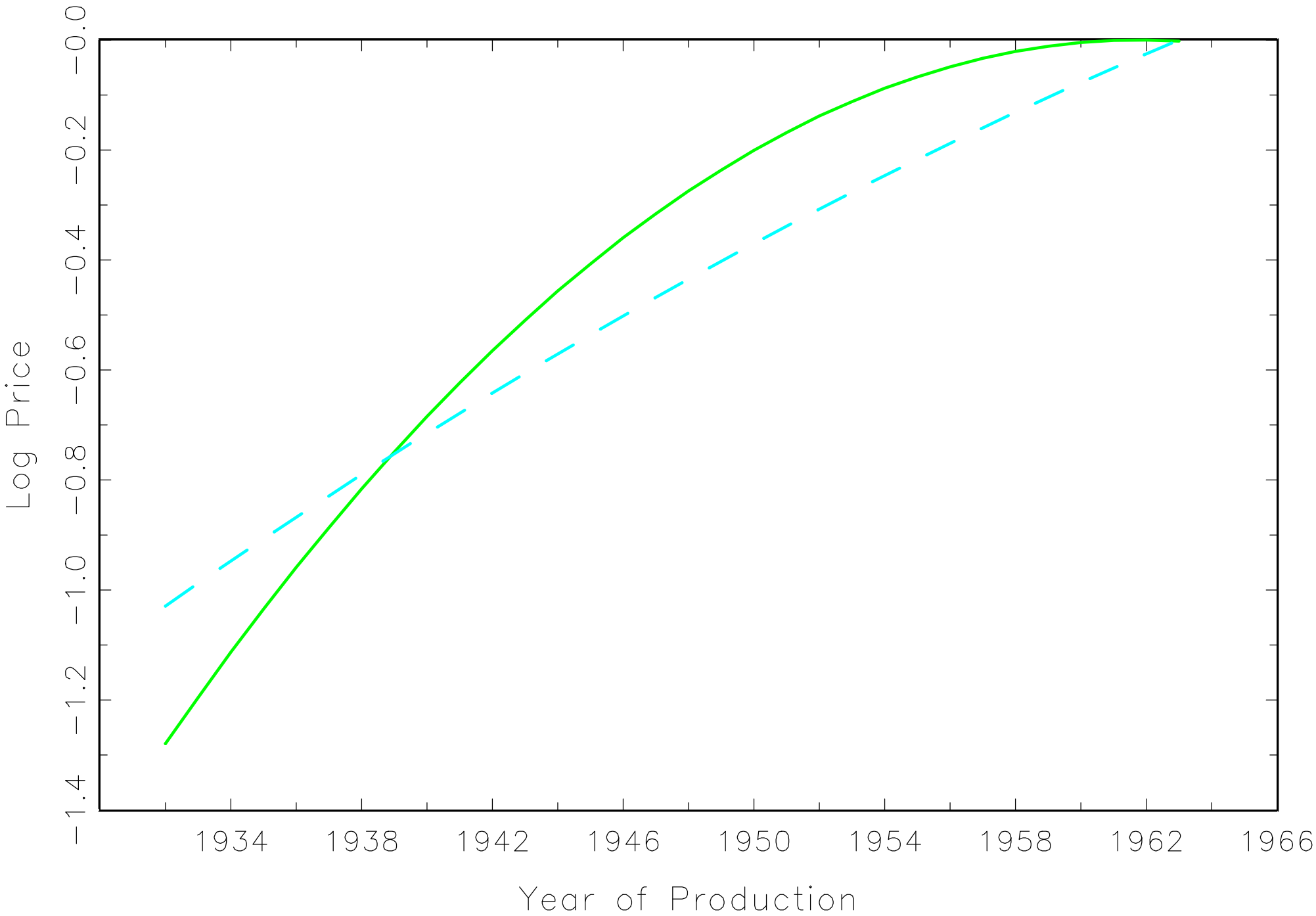

Fig. 1b – Year–Valuation Profile, Abstract Expressionists (solid) and de Kooning (broken)

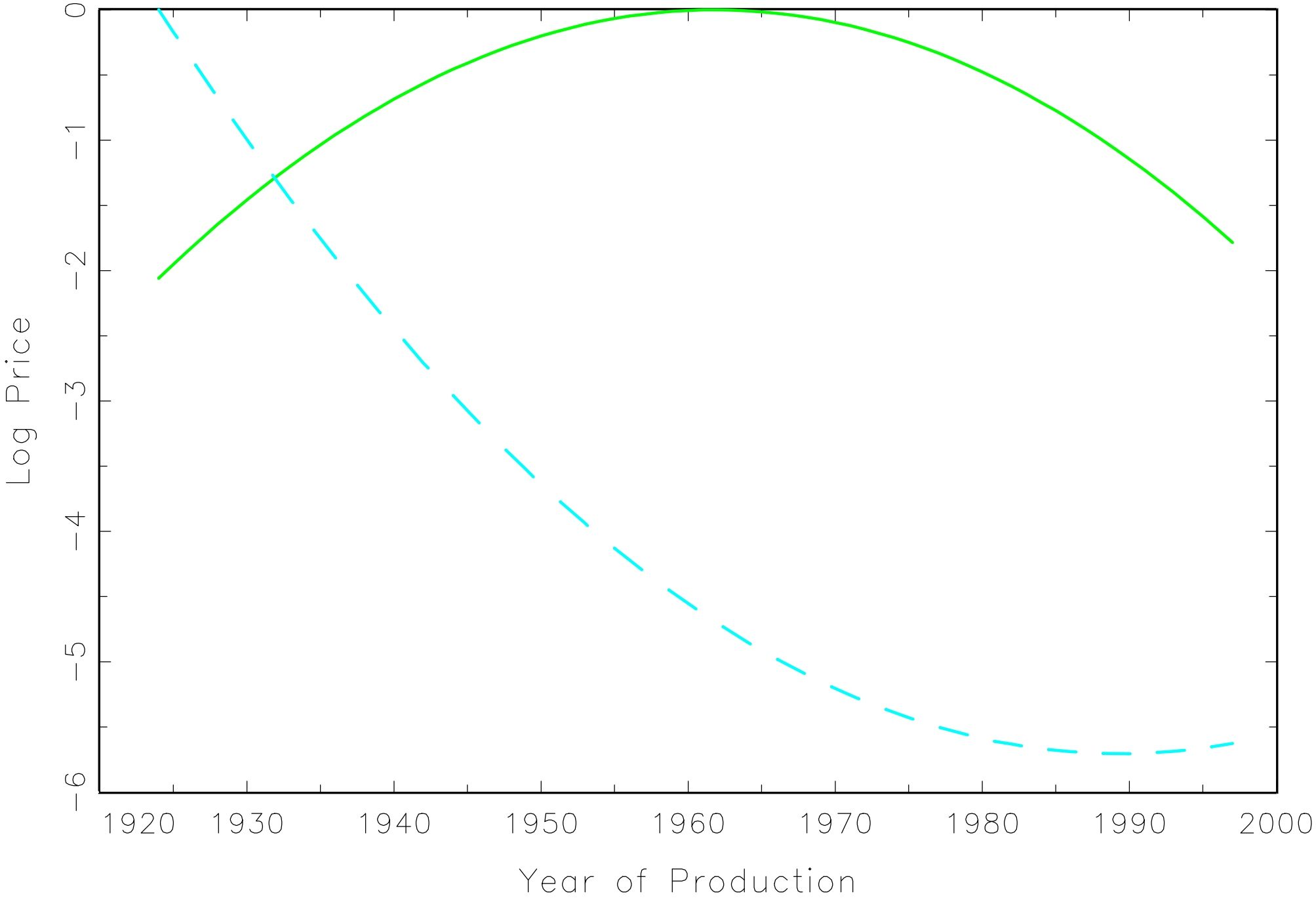

Fig. 1c — Year–Valuation Profile, Abstract Expressionists (solid) and Gorky (broken)

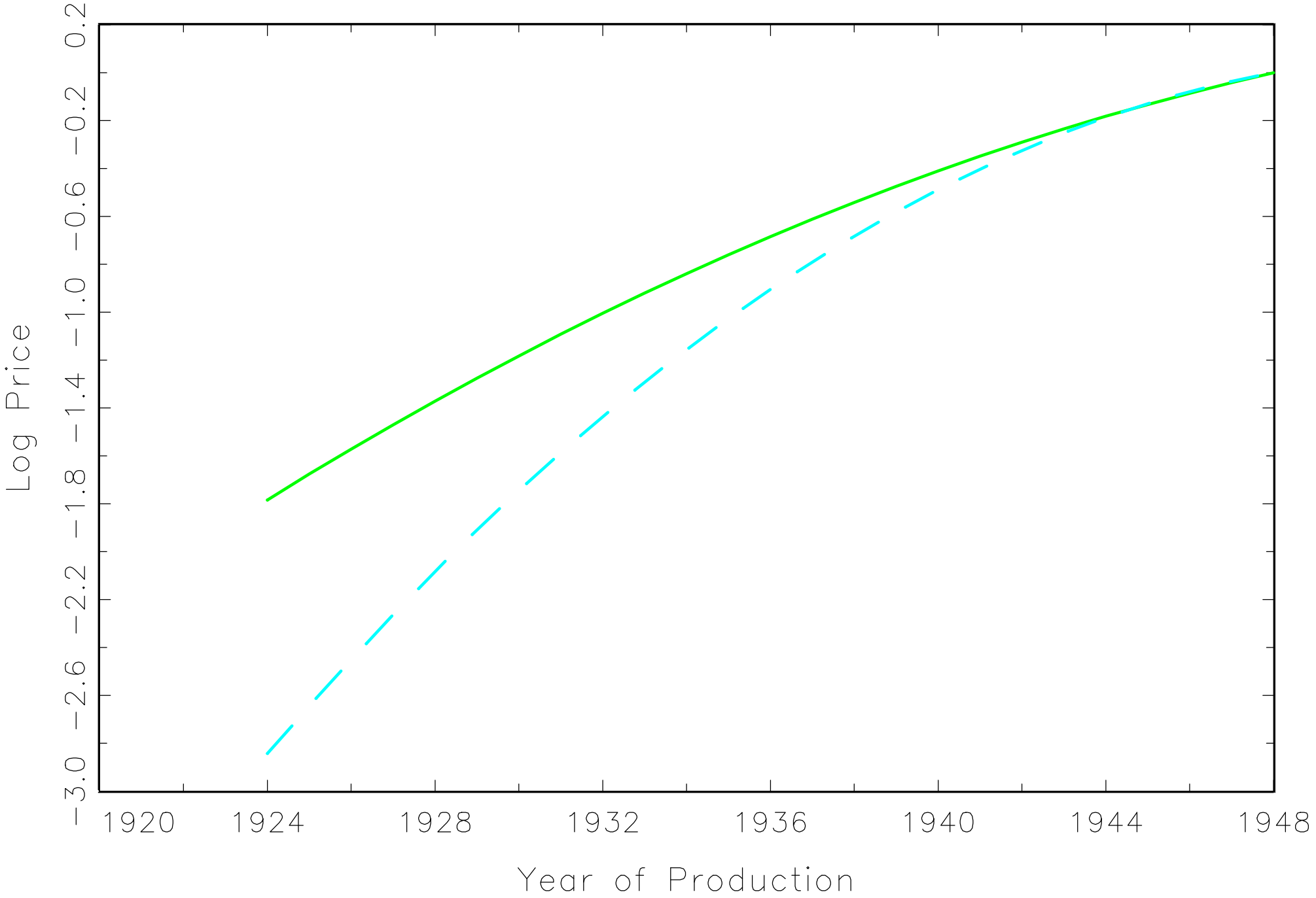

Fig. 1d – Year–Valuation Profile, Abstract Expressionists (solid) and Gottlieb (broken)

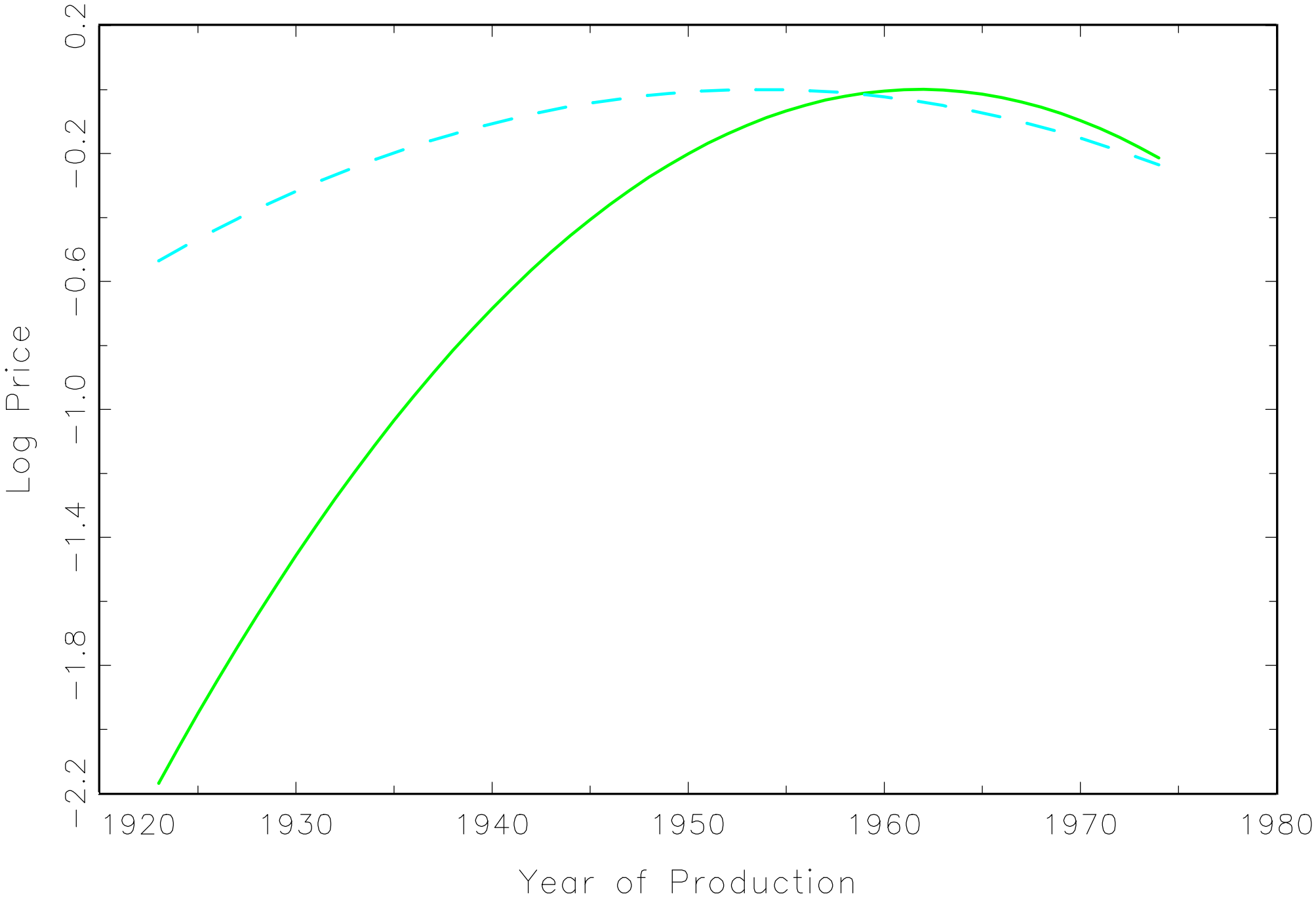

Fig. 1e — Year–Valuation Profile, Abstract Expressionists (solid) and Guston (broken)

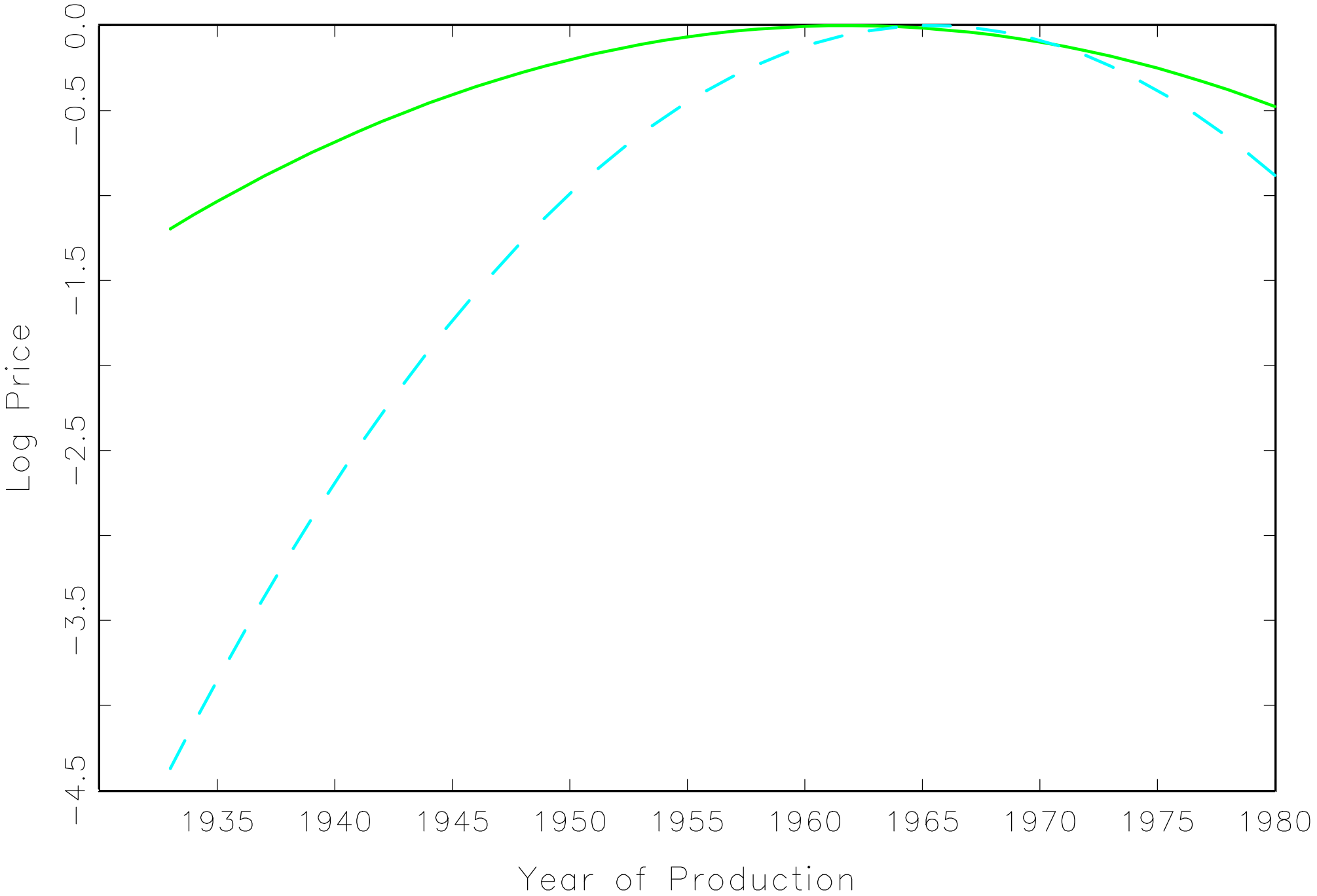

Fig. 1f – Year–Valuation Profile, Abstract Expressionists (solid) and Hofmann (broken)

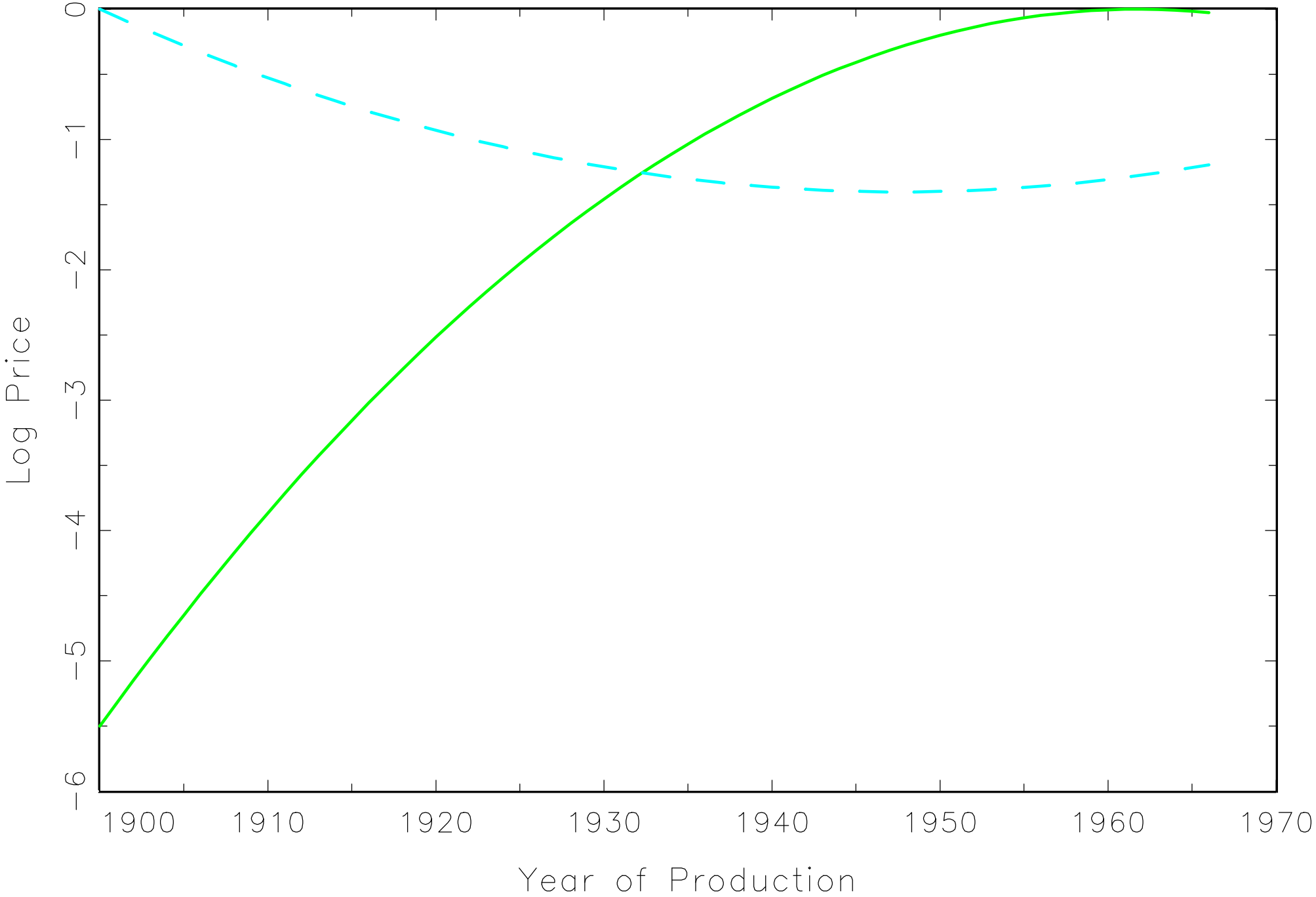

Fig. 1g – Year–Valuation Profile, Abstract Expressionists (solid) and Kline (broken)

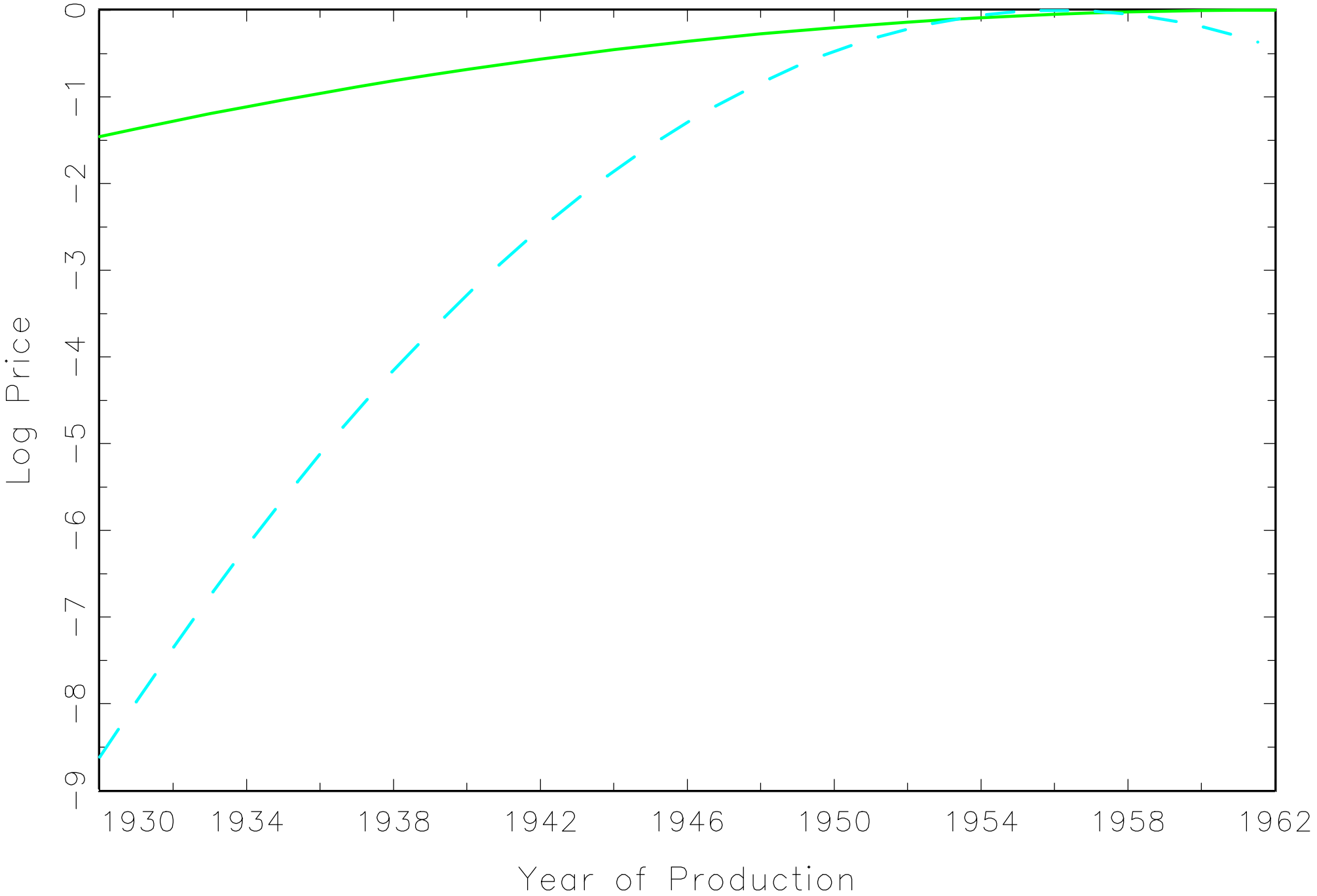

Fig. 1h — Year—Valuation Profile, Abstract Expressionists (solid) and Motherwell (broken)

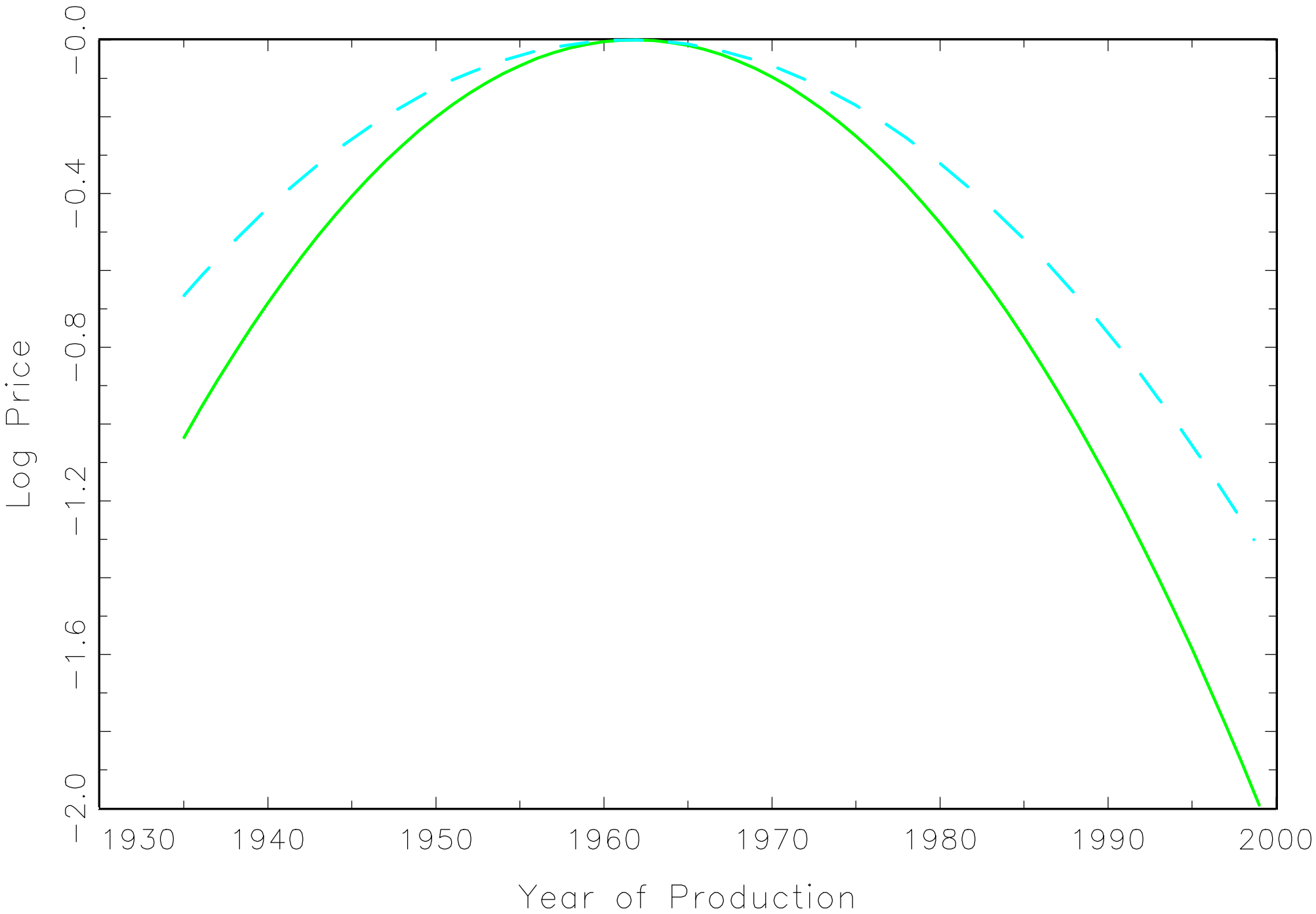

Fig. 1i – Year–Valuation Profile, Abstract Expressionists (solid) and Pollock (broken)

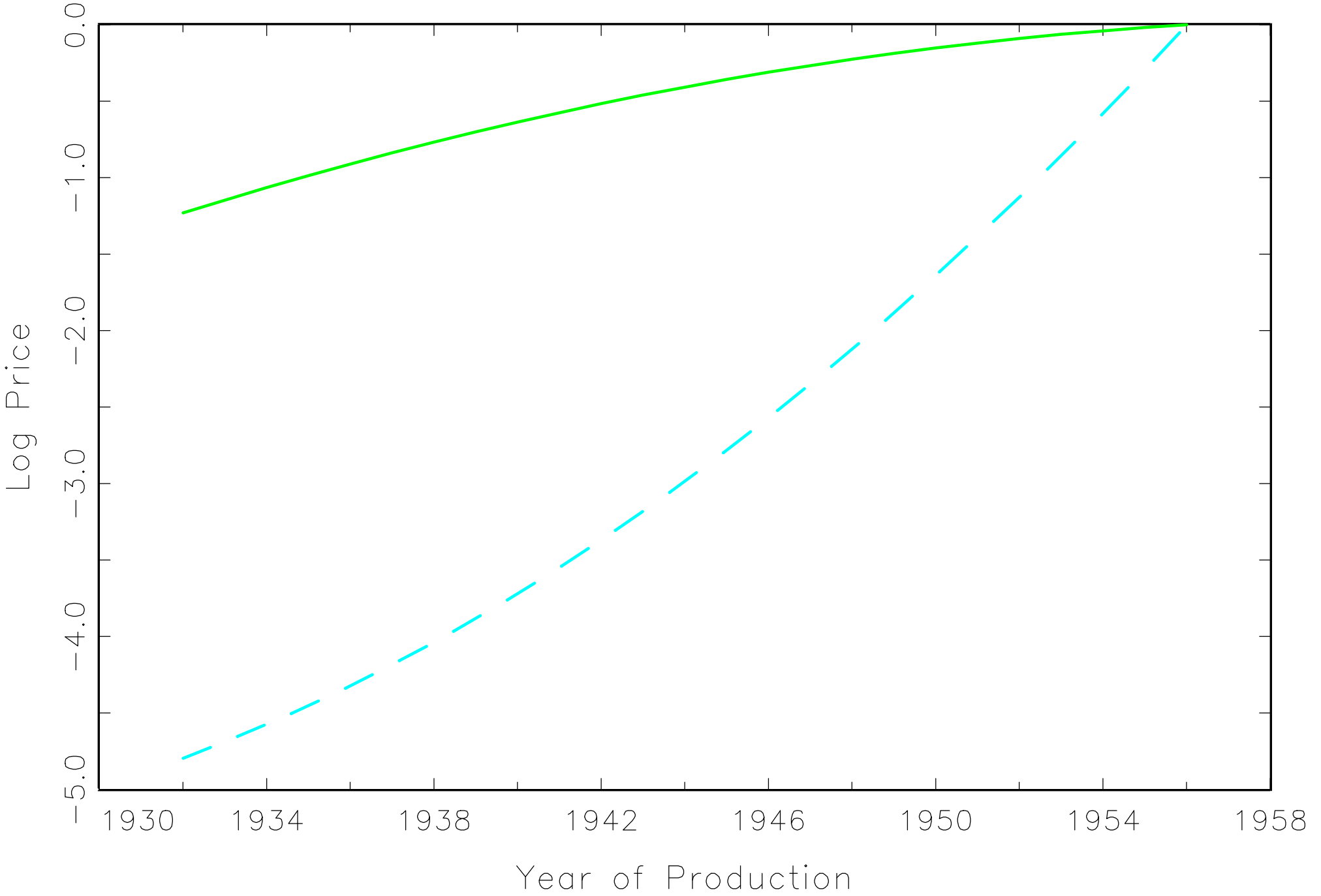

Fig. 1j – Year–Valuation Profile, Abstract Expressionists (solid) and Reinhardt (broken)

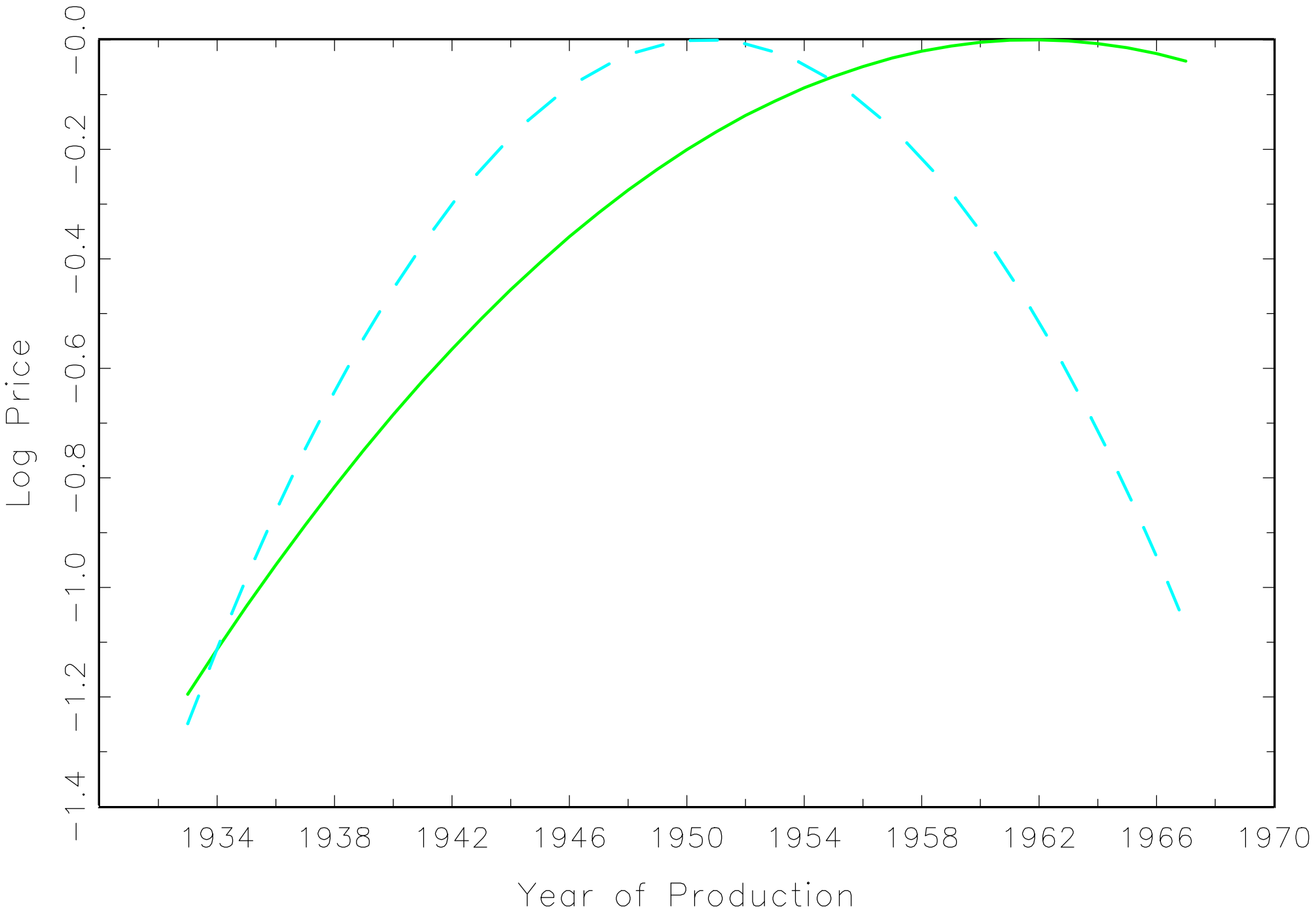

Fig. 1k — Year—Valuation Profile, Abstract Expressionists (solid) and Rothko (broken)