Directing into the Millennium: Quantifying the Role of the American Director Using SAS® Statistical Procedures

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Abstract

The role of the director is critical to any theatrical or cinema endeavor. Using the SAS Sytem this paper explores from an historical as well as statistical perspective, the growth of American theatre directors. The paper begins with an historical perspective on the Directors Guild of America. Following this, numerous SAS procedures such as PROC AUTOREG and PROC ARIMA are used to estimate, test and forecast the future number of directing opportunities available on Broadway. Gross Domestic Product (GDP) is used as a baseline for comparison.

Introduction

The Director's Guild of America represents more than 10,000 members working in U.S. cities as well as abroad. Their creative work is evidenced in theatrical, industrial, educational and documentary films, as well as television, radio, videos and commercials. The Guild's history is long and eventful. In 1936 a dozen leading motion picture Directors, in attempt to gain recognition, creative freedom and equitable treatment by studios and producers created the Screen Directors Guild, representing about 75 directors. Shortly, Assistant Directors were admitted and by 1938 the Guild represented 95 % of all professional film directors. In 1944 agreements are extended to insure minimum salaries for the Guild's members. The 1950's saw the Guild negotiate the first television contracts (including revenue sharing for filmed shows on commercial television) and establish its national headquarters in Hollywood. The 1960's was a decade of change and growth. Highlights included: the merger of the Screen Directors Guild and the Radio and Television Directors Guild into the Directors Guild of America; the merger of the Assistant Directors Local 161 with the Guild; Unit Production Managers join the Guild; the Screen Directors International Guild also merges with the Directors Guild; the opening, in New York, of an East Coast headquarters; publication of a magazine entitled, ACTION; the establishment of an Assistant Director training program as well as the DGA Health Plan. In the 1970's, among other things, the Guild established a cultural exchange with film makers in the Soviet Union, a pay scale for network prime-time shows, negotiated a live and tape television contract covering employment with independent production companies, continued its fight against inequities and to obtain artistic rights and won its most significant contract with networks and independent producers in 1978. Residual collections reached $12 million in 1979. 1980 witnessed record residual collections of $20 million. In 1981 membership exceeds 6,500 and a work stoppage yields significant monetary gains for members. The Guild continued to grow in the 80's: membership reached 6,700 in 1982, pension assets hit $150 million and residuals $25 million. The Guild fought against discriminatory hiring practices and lawsuits were brought against Warner Bros. and Columbia Studios. Low-budget feature film contracts are established. The Guild celebrated its Golden anniversary with a Jubilee in 1986. The Guild's first industry-wide strike took place in 1987 and resulted in three-year freelance contracts for film and

television. In 1989 membership soared over 9000. In the 1990's the DGA Basic Agreement, Freelance Live and Tape Agreement as well as contracts with ABC and NBC are finalized. Women and minority members establish a mentoring program in 1991. Further negotiations in the 1990's have resulted in higher ceilings for health fund contributions and the Guild's first contracts dealing with interactive media. New film, tape and network contracts have been reached during the decade and membership now exceeds 10,000. The Director's Guild will continue its mission to protect and nurture creative film makers into the 21st century. For the purposes of this study, data on the number of members of the Director's Guild over time was not complete enough to yield stable results. The Guild has only kept data on membership for 1939 - at its beginning with 75 members - followed by a gap until 1981. Exploratory data analysis was performed using PROC EXPAND to interpolate the intermediate years of the data series. The results of the interpolation were extremely sensitive to individual data points. For example, using the 1939 data point followed by the data from 1981 on, resulted in a non-linear spline with a maximum followed by a decline and then another increase. The addition of a single data point in the middle of the absent data yielded the intuitive linear increase in the number of directors over time. Due to its availability, data for the number of theatre directors on Broadway from the 1957-58 season to the 1995-1996 season was substituted in place of the Director's Guild membership. The analysis then focuses on the opportunities to direct in the major American venue - Broadway.

Empirical Analysis with PROC AUTOREG

The trend for the number of directing opportunities on Broadway into the millennium is now illustrated using an ordinary least squares regression with Gross Domestic Product used as the independent variable and using the SAS procedure, PROC AUTOREG. The following equation was estimated:

$$Directors_t = \beta_0 + \beta_1 GDP_t + \mu_t$$

where: $Directors_t$ Number of directing opportunities available on Broadway: 1958-1996

GDP_t Gross Domestic Product: 1958-1996

μ_t residual error term

The AUTOREG Procedure:

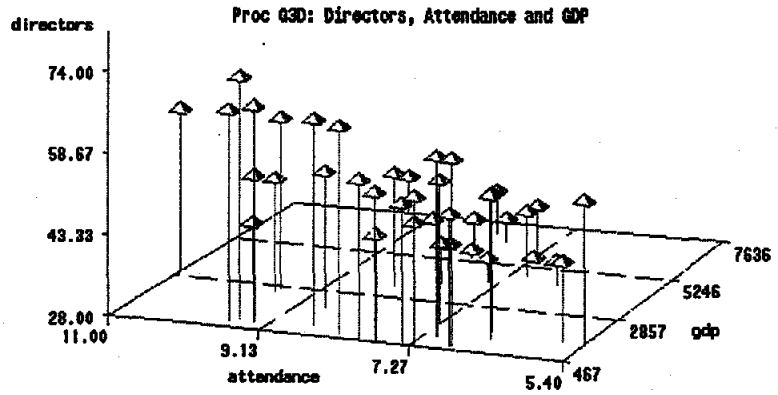
Dependent Variable Directors

Ordinary Least Squares Estimates

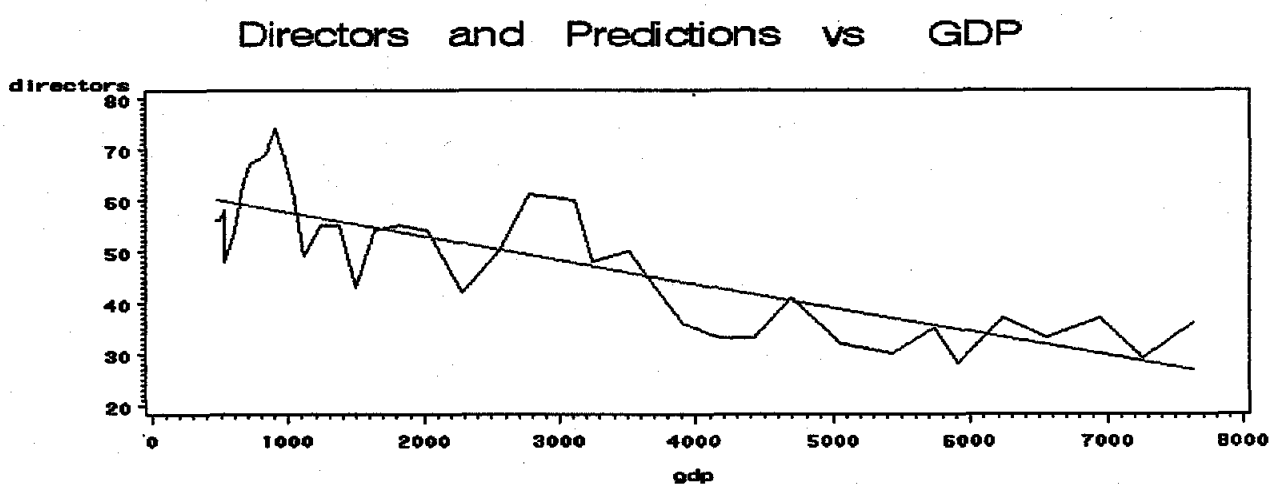
SSE	2038.28687	DFE	37
MSE	55.08883	Root MSE	7.42219
SBC	272.300158	AIC	268.973035
Regress R-Square	0.6752	Total R-Square	0.6752
Durbin-Watson	0.9502		

Variable	DF	Estimate	Standard Error	t Value	Approx Pr > |t|
Intercept	1	62.2524	1.9224	32.38	<.0001
gdp	1	-0.004641	0.000529	-8.77	<.0001

The t-value of -8.77 with a p-value of 0.0001 indicates that, assuming that all of the assumptions of the classical least-squares model are satisfied, there is a strong inverse relationship between the number of directing opportunities on Broadway and the state of the economy. Following is a diagram using PROC



GPLOT, illustrating the trend of the regression into the Millennium.



Empirical Analysis with PROC ARIMA

An Arima(p,d,q) model was then estimated using PROC ARIMA. Information from the sample, inverse and partial autocorrelation functions indicated that a first-order autoregressive model may provide an adequate representation of the series. The model is of the form:

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

Name of Variable = Directors	
Mean of Working Series	49
Standard Deviation	12.68555
Number of Observations	39

Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1	Std Error
0	1.00000	|********************|	0
1	0.82871	. |*****************.	0.160128
2	0.71495	. |**************.	0.246698
3	0.62078	. |************.	0.295080
4	0.56421	. |***********.	0.326856
5	0.45507	. |*********.	0.350941
6	0.37327	. |*******.	0.365759
7	0.32795	. |*******.	0.375394
8	0.24303	. |*****.	0.383116
9	0.15934	. |***.	0.387017

Inverse Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	-0.46765	|*********. .
2	-0.08837	. |**. .
3	0.21154	. |****. .
4	-0.25099	.|*****. .
5	0.07612	. |**. .
6	0.15226	. |***. .
7	-0.23325	.|*****. .
8	0.09589	. |**. .
9	0.01341	. |. .

Partial Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	0.82871	. |******************
2	0.08997	. |**.
3	0.02266	. |.
4	0.08512	. |**.
5	-0.16400	. ***|.
6	-0.00794	. |.
7	0.10855	. |**.
8	-0.21469	. ****|.
9	-0.02463	. |.

Autocorrelation Check for White Noise

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations
6	99.13	6	<.0001	0.829 0.715 0.621 0.564 0.455 0.373

Conditional Least Squares Estimation

Parameter	Estimate	Approx Std Error	t Value	Pr > |t|	Lag
MU	51.66587	5.43881	9.50	<.0001	0
AR1,1	0.86470	0.08930	9.68	<.0001	1

Constant Estimate	6.990372
Variance Estimate	49.60862
Std Error Estimate	7.043339
AIC	264.8885
SBC	268.2136
Number of Residuals	39

Autocorrelation Check of Residuals

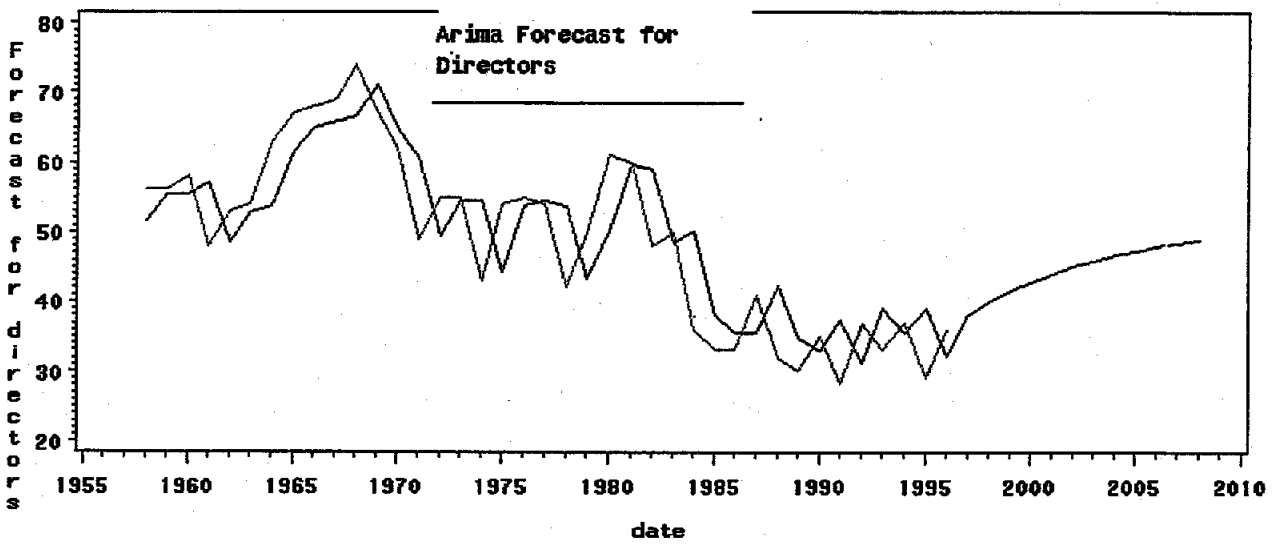
To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations
6	3.92	5	0.5612	-0.136 0.050 -0.064 0.225 -0.084 -0.066
12	8.29	11	0.6873	0.187 0.007 -0.138 0.034 0.157 -0.046
18	20.58	17	0.2456	0.159 -0.097 0.136 -0.193 0.242 -0.165
24	22.81	23	0.4722	-0.055 -0.140 0.046 -0.023 -0.031 0.007

Model for variable directors

Estimated Mean 51.66587

Autoregressive Factors

Factor 1: 1 - 0.8647 B**(1)



Conclusion

The forecast results from PROC AUTOREG and PROC ARIMA appear to conflict, as the diagrams illustrate. While the long-term trend estimated from the regression indicates that the number of directing opportunities on Broadway will decline, the results from the time series model show that they will stabilize. Of more importance to future directors are the underlying economic factors which make the number of Broadway theatre offerings decrease. Additional research into the availability of Off-Broadway and regional theatre offerings is really necessary in order to get a true picture of the future opportunities of the American theatre director heading into the Millennium.

References

SAS Institute Inc.(1993), SAS/ETS User's Guide. Version 6. Second Edition, Cary, NC: SAS Institute Inc.

SAS Institute Inc. (1990), SAS/STAT User's Guide Volumes 1 and 2. Version 6 Fourth Edition, Cary, NC: SAS Institute Inc.

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