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GOVERNMENT EXPENDITURE IN AGRICULTURE SECTOR OF NEPAL: AN EMPIRICAL ANALYSIS

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ABSTRACT: *This study examines the logical relationship between Agriculture Production and Government Expenditure in Nepal. The empirical research has applied Cochrane-Orcutt auto-regressive model from panel data for the period 1983/84 to 2013/14. In this regard, The empirical evidence confirm that the expenditure in agriculture sector is the causes of economic growth in Nepal. More specifically, iteration five gives the D-W value is 1.697 to compared tabulated dL , dU values are 1.284 and 1.567 at the two independent variables. The D -W value lies between dU and 4-dU, where this is nearest to 2.Sothat, there is no auto-correlation among error terms. Fact finding to shows that, the checking results homogeneous with theory and healthy and strong of the conclusion.*

KEYWORDS: Agriculture Production, Cochrane-Orcutt, Empirical Research, Government Expenditure.

INTRODUCTION

The socio-economic development of any nation is usually dependent on many factors which combine to ensure the successful attainment objectives of nation. One of such factors is agriculture Morgan and Henson (1985) argue that agriculture will remain an indispensable factor until the end of human existence. The successive government have introduced and implemented program in this regard.

Naturally in a country like Nepal, accurate and timely data on agriculture is very important. More recently, agricultural statistics have assumed special significance in the context of the requirements of planning and assessment as well as monitoring of agriculture and food related development program . In Nepal, the analysis of data is based on the latest national population and housing census of 2011, the agriculture census of 2011/12 and official agriculture statistics from the ministry of Agriculture Development up to 2012/13.The main agricultural data items included, number of major fruits, vegetables, cereals, poultry, and even gender related issues in agriculture. Research linkage between agriculture production as well as investment in agriculture over the long period of time (population monograph III, 2014).

This study to investigate Government Expenditure on agriculture production in Nepal . Agricultural Development is receiving 3% of the national budget, which is not sufficient to promote adequate agricultural growth and ensure of food security to ever growing population. The increasing investment in agriculture is a must for reducing poverty achieving sustainable development and enhancing food security. Government Expenditure is related with the development activities, people's welfare, living standard and income as well. It signifies the capacity and performance of an economy. More specifically, agriculture sector has occupied 32.5 percent to GDP of the current fiscal year in 2014/15, and 83 percent of the people's occupation is agriculture (census of agriculture 2011/12). In Nepal, The government expenditure was Rs 23549.8 million in 1990 and it is revised agriculture sector, forestry, fishing, and even hunting is 49227981(in Rs, 000) in2014/15. The average growth rates of

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agriculture and non-agriculture sectors in last 10 years remained at 2.9 percent and 4.8 percent respectively. This sector is estimated to contribute 32.5 percent (around one third of total GDP) GDP of the current fiscal year (Economic Survey 2014/15).

Objectives of the Research

The purpose of this study is to review and analyze the trends and causes of change in government expenditures on agriculture and their compositions in Nepal to develop an analytical framework for determining differential impacts of various government expenditures on economic growth of Nepal.

The primary purpose of this article is to examine the logical relationship between government expenditure, labour and agriculture production by analyzing panel data from 1983/84 and 2013/14. The agriculture production replace the production of fruits, vegetables, and even cereals and labour replace economic active male population. The remainder part of the study is organized as the literature review, methodology , data analysis and conclusion. However, the specific objectives of the research are followings.

-To develop D-W autoregressive model with real data sets.

-To linkage between agriculture production and Government investment in Nepal.

-To increase agriculture production by pursuing adaptive agricultural research and development.

LITERATURE REVIEW

Numerous studies have been conducted to investigate the relationship between government spending and economic growth in agriculture sector of Nepal. This section is divided into two parts: a) review of theoretical foundation and b) reviews of empirical studies. The theoretical review shape the relationship between production function and other macroeconomic variables under classical hypothesis, while the empirical review examines both the short run and long run relationship between or among the variables under consideration. In this section, it is tried to review various studies research reports, articles and the reports of national and international institutions in the area of production function in the agriculture sector of Nepal. There are a few researches in this area in Nepalese contest. More appropriate and relevant literatures are included in here.

Government Expenditure has been various economic effects and these effects can be positive, negative or mixed results. Several studies have measured economic impact of Government expenditure in agriculture sector and concluded about its significance for the economy. Regmi and Gautam (2014) assessed the review of theoretical foundation in Population Monograph III, about major challenges and way forward in population and status of agriculture in Nepal. They investigated the role of Agriculture statistics in Nepal are facing several challenges, threatening their reliability and sustainability. Major challenges for agriculture in the country are to raise and sustain agricultural growth, ensure food and nutrition security, face the challenges of climate change ; adjust to changes in energy scenario; bio-security; ensure sustainable use of natural resources; and protect bio-diversity.

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Economic survey(2015) revealed that Nepalese economy is passing through structural changes. The contribution of primary sector to GDP, which was 37.9 percent FY 2001/02, is estimated at 32.3 percent in current fiscal year at current prices. This sector's contribution to GDP in the last five years has averaged 34.6 percent. In the context of Nepal's vulnerability of agricultural production on favorable/ unfavorable climatic conditions, achieving higher growth rate through sustainable development of this sector has been a persistent challenge.

Satyal, V.R. (2011) argued in Economic Journal of Development of issues vol.11 pp 1-18,he concluded that Despite decade long investment and planning in Agriculture it is declining in terms of production and engaged labour force. If such structural shift were natural it would be satisfactory. However, in absence of sustainable development in other sector like service or industry, such shift could be very dangerous for the country whose primitive knowledge, life style, culture, religion are based on agriculture. This paper attempts to show the current disappointment in agriculture and analyses some causes for the decline with few recommendations for improvement.

Wagle, T.P (2014) has written in research publication "Journal of Development Review" on the research topic Agriculture Production in Nepal: Researcher identified that In Nepal, 83 percent of population works in the agriculture sector, where as average growth rate in agriculture sector at 2069/070 is 3.6, and economic growth rate 4.0 in averages. The time period selected is from (1998/99 to 2007/08) in average. Regression model is used to assess the degree of relationships among variables concerned which show significant relationship between agriculture production and economic growth of Nepal.

Panday, G.K(2072) has written in research publication " NRB samachar" on the research topic Agriculture in Nepal: Researcher explored that, the major constraints faced by the agricultural in Nepal are the under-investment from both public and private sectors.. Nepal was a food exporting country but the country has lost this status in the last few decades. The increasing investment in agriculture is a must for reducing poverty achieving sustainable development and enhancing food security. To sum up, agricultural reform and development in Nepal is very important. It is for providing fresh and enough food crops, increasing and promoting of export and decrease import and for solving the unemployment problem to some extent and for providing raw materials to the agro-based industries in Nepal. So the GON should give top priority to reform and develop agriculture sectors to full fill all the demand relating to agriculture. Two major requirements for the development of agriculture sector in our context are adequate investment and conductive policies. Government should focused on create policies to attract youths in the agriculture sectors because emigration of young males in search of employment.

However, Mainali (2071) explored that the role of Government Expenditure in agriculture sector of Nepal during 1975-2012 using results on parenthesis are t-statistics of the coefficients. He argued that the Government Expenditure in agriculture sector plays a key role in promoting economic growth compared to non- agriculture investment in Nepal. The study found that the econometric results reveals that the Government Expenditure on agriculture, irrigation, and land reform has significant positive impact on agricultural output.

To summarize on the whole, it may not be consistent to say that the relationship between Government Expenditure and economic development is unclear in terms of D-W autoregressive model and direction. In addition, the research gap and less effectiveness of financial sector development in agriculture as well as consolidation policies in terms of

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economic development is also unclear. On the other hand, the studies undertaken in the Nepalese perspective are not found to be incorporating the issues of auto-correlation and effectiveness of consolidation process incorporating Growth-led hypothesis. Hence, a separate study seems to be necessary to examine the relationship between the variables of financial development in agriculture sector and economic growth in a time series framework.

DATA AND METHODOLOGY

Empirical research based on inferential statistics. This study is entirely based on panel data. It describes the nature of Government Expenditure in agriculture sector of Nepal. Agriculture production as a dependent variable and Government Expenditure, Economic active male population in macro level are independent variables were used in the study. Data are converted into constant price by adjusting with deflator of respective year and taking the fiscal year 2000/01 as a base year. Judgement sampling method was used to collect data from MOF, MOAD, and even population census 2011,CBS. Secondary data that captured of this research for the period 1983/84 to 2013/14 are used in the study, where collective and individual significance test have been used.

Hypothesis or H_1 testing:

Following hypothesis have been formulated for the study.

H_1 : There is significance difference between agriculture production and economic active male population . In other words, $H_1: \rho \neq 0$ there is auto-correlation among error terms.

H_2 : There is significance difference between economic growth in agriculture production and Government Expenditure at current price.

In analyzing data, three variables entered into SPSS computer software to describe the characteristics of the data. The Cochrane-Orcutt iterative procedure was applied to detect the presence of auto-correlation. The auto-regression at zero iteration provided the lessthan normal result than to go upto five iteration results.

Model Specification

The logical relationship has been analysed by applying the OLS method under which parameters have been estimated via regression models. The model is being used to test the hypothesis then there is significant impact of Government Expenditure in the economy of the country. Then individual as well as collective significance test and even D-W auto-regressive model have been computed by using SPSS software. The basic model of this research is the auto-correlation, it states that one of the important assumption of OLS is "there is no auto-correlation among error terms", where cov ($u_i v_j$) = 0 . There are mainly two types of detection of auto-correlation. First Graphical method and next D-W test, this Durbin and Watson test is used to check / detect of presence of auto-correlation among error terms. When D-W value is lessthan 1, then performed the **Cochrane-Orcutt** model until and unless the process run, the result willcome 0.001. So, here Auto-regression run from **Iteration 0-Iteration5** For this purpose the following model has been developed.

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Cochrane – orcutt model / Method

$Y_t = \alpha + \beta X_t + U_t - - - - - - - - - - - - (1)$

Backward 1 period

$Y_{t-1} = \alpha + \beta X_{t-1} + U_{t-1} - - - - - - - - - - (2)$

Fit regression line U_t *on* U_{t-1}

$U_t = \rho U_{t-1} + V_t - - - - - - - - - - - - - - (3)$

Obtain ρ by using OLS

Multiplying equation (2) by ρ

$\rho Y_{t-1} = \rho\alpha + \rho\beta X_{t-1} + \rho U_{t-1} - - - - - - - - (4)$

Subtracting equation (4) from (1)

$Y_t - \rho Y_{t-1} = \alpha(1-\rho) + \beta(X_t - \rho X_{t-1}) + (U_t - \rho U_t)$

$Y_t^* = \alpha^* + \beta X_t^* + U_t^* - - - - - - - - - - - - - (5)$

By applying OLS we obtain α^* and β

Again backward 1 period of equation (5)

$Y_{t-1}^* = \alpha^* + \beta X_{t-1}^* + U_{t-1}^* - - - - - - - - - - (6)$

Fit regression line

$U_t^* = \hat{\rho}\ U_{t-1}^* + V_t^* - - - - - - - - - - - - - (7)$

Obtain $\hat{\rho}$ by applying OLS

This process will continue until and unless $\rho = 0.0001$

Empirical Regression Results

The study investigated the relationship between the Government Expenditure and economic growth of Nepal using secondary data. Firstly, We form the following regression equation to estimate the effects of Government Expenditure in agriculture sector of Nepal on real gross domestic product, where Government Expenditure and Economic active male population are taken as explanatory variables. Where,

Ln $rgdp_t = B_0 + B_1$ ln $(Exp)_t + B_2$ ln (Labour) + …… + U_t .

Ln $(Y)_t = 3.783 + 0.410$ ln (Exp) + 0.006 ln (Labour) + …… + U_t.

Where, rgdp = real gross domestic product / agriculture production.

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B_0 = Autonomous constant i.e. consumption has no any change by other factors in the system.

rgexp = real Government Expenditure.

Labour = Economic active male population.

U_t = random error in the research

The pre-requisite of Cochran-orcutt test is the non-stationary test of each individual time series over the sample period. Durbin-Watson analysis has increasingly become the appropriate methodological approach for analyzing time-series data containing stochastic trends. Hence before turning to the analysis of the logical relationship for multivariate variables, we should check for the collective and individual significance test of the data, as non-stationary behavior is a prerequisite for including them in the Cochrane-orcutt analysis.

Iteration 0 / The Cochrane-orcutt estimation method is used, When D-W value is lessthan 1.

Model Fit Summary:

R	R squares	Adjusted R squares	Std.Error of the Estimation	Durbin-Watson
0.961	0.923	0.917	0.113	0.263

ANOVA

	sum of squares	d.f.	Mean Squares	F_{cal}
Regression Residual	4.120 0.343	2 27	2.060 0.013	158.46

Regression Coefficient

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std.Error	Beta	t-test	Sig.
Lgexp Llabour (Constant)	0.410 0.006 3.783	0.023 0.020 0.288	0.958 0.015	17.631 0.285 13.147	0.000 0.778 0.000

The Cochrane-orcutt estimation method is used.

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Iteration 5

Model fit Summary :

R	R squares	Adjusted R-squares	Std.Error of The estimate	Durbin-Watson
0.712	0.506			1.697

The Cochrane-orcutt estimation method is used.
* Dependent variable : Lproduction
* Predictors : Lexpenditure, Llabour
* Significance at five percent level
* Self calculated by researcher based on Annex III.

Analysis in 0 /zero iteration to 5 /five iteration :

The study investigated the logical relationship between the agriculture production and Government expenditure and labour of Nepal by using panel data. Cochrane-Orcutt model is used to assess the degree of relationship in multivariate variables concerned which show insignificant relationship between production function and economic growth of Nepal. Therefore, agriculture policies of Nepal should be reformulated which to bring conductive in economic growth of the country. Fact findings indicate the following results.

- In collective analysis, F- calculated value is 158.46 and tabulated value at five percent level of significance in F(2,27) is 3.355 in average. It conclude that calculated value is higher then tabulated value, so it concludes statistically significance, This implies that agriculture production on expenditure of government have a positive sign and thus denoting a positive relationship with GDP (economic growth) which is expected to exist.

- In individual test(t-statistic) are disperse nature, tabulated value of student t- statistic at five percent level of significance t(30) is 2.042 and calculated value for Lexpenditure is 17.631, sothat it is statistically significance. It means investment/ Government expenditure in agriculture and production are positively correlated to each other while calculated value in Llabour is 0.285, it reveals that calculated value is less then tabulated value so, this is positively related in opposite direction.

- Though the F-value was significant at the first run of regression, where D-W value 0.263 which is lessthan 1, sothat to improve the model Cochrane-Orcutt iterative procedure was applied. The auto-regression at **zero iteration** provided the following results.

  $Ln\ (Y)_t = B_O + B_1 \ln (Exp) + B_2 \ln (Labour) + \ldots\ldots\ldots\ldots\ldots\ldots + U_i$.

  $Ln(Y)_t = 3.783 + 0.410 \ln(Exp) + 0.006 \ln(Labour)$.

  t_{cal} = (13.147) (17.613) (0.285)

  Sig = 0.000 0.000 0.778

  R^2 = 0.923, Adj R^2 = 0.917

  F_{cal} = 158.46, $F_{0.05}(2,27)$ = 3.355

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D.W = 0.263, n = 30 K^* = 2 (no of independent obs^n).

K^* = 2, d_L = 1.284 d_U = 1.567

F_{cal} = 158.46, is greater than the tabulated value $F_{0.05}(2,27)$ = 3.355,it conclude that suggesting the failure of accepting the null hypothesis. Thus the given model is statistically significance at 5% level of significance. To be specific, the result suggests that 1 percent variation in total expenditure will change total GDP by 0.410 percent. Furthermore, D.W value 0.263 is less than $d_L$value 1.284,sothat, there is no positive auto-correlation among error terms in the iteration zero. Furthermore, D.W value is 0.263 is less than 1,sothat to improve the model, Cochrane-Orcutt upto **iteration five** procedure was applied.

R^2 = 0.506, Adj R^2 = 0.449

F_{cal} = 14.66, $F_{0.05}$ (2,26) = 3.370

D.W = 1.697, K^* = 2

d_L = 1.284, d_U = 1.567

Iteration five to show that R^2 reduce to 0.506,while Durbin-Watson value increase to 1.697 i.e. nearest to 2. It concludes that d_{cal} lies between d_U to 4-d_U, i.e. do not reject the null hypothesis sothat there is positive no auto-correlation among error terms .

Economic Interpretation of regression results

Agricultural Development is receiving approximately 3% of the national budget, which is not sufficient to promote adequate agricultural growth and ensure of food security to ever growing population. In Nepal, government expenditure to rise since last two decade. The government expenditure was Rs 23549.8 million in 1990 and it is revised in primary sector i.e. agriculture sector is 49227981(000) . The average growth rates of agriculture and non-agriculture sectors in last 10 years remained at 2.9 percent and 4.8 percent respectively.

Nepal is an agricultural country; about 83 percent of the people's occupation is

Agriculture. The agriculture sector occupies almost one third of Gross Domestic Product (GDP) with about two third of country's population are dependent in this sector. Contribution of this sector to GDP was 33.87 percent in fiscal year 2012/13, which is expected to remain at 33.10 percent in fiscal year 2013/14. In fiscal year 2070/71, the annual growth rate of agriculture sector is expected to be 4.72 percent at constant prices of 2000/01.

Empirical result reveals that the determination of regression is 0.923. It shows that ninety two percent of explained variable i.e. agriculture production on the basis of Government expenditure and economic active male population , rest 0.08 percent occur due to the error.. Calculated value of expenditure in logarithm base e is 17.631 as compared to tabulated value 2.042 at five percent level of significance. In fact, expenditure and production of agriculture is positively relationship in Nepal. Whereas, calculated value of t-calculated in labour 0.285 as compared tabulated value 2.042 at five percent level of significance., it is statistically insignificance in labour force with agriculture production in Nepal. It is clear to see that fact finding of individual statistics in unskilled labour force and agriculture production is inversely relationship of developing country like Nepal

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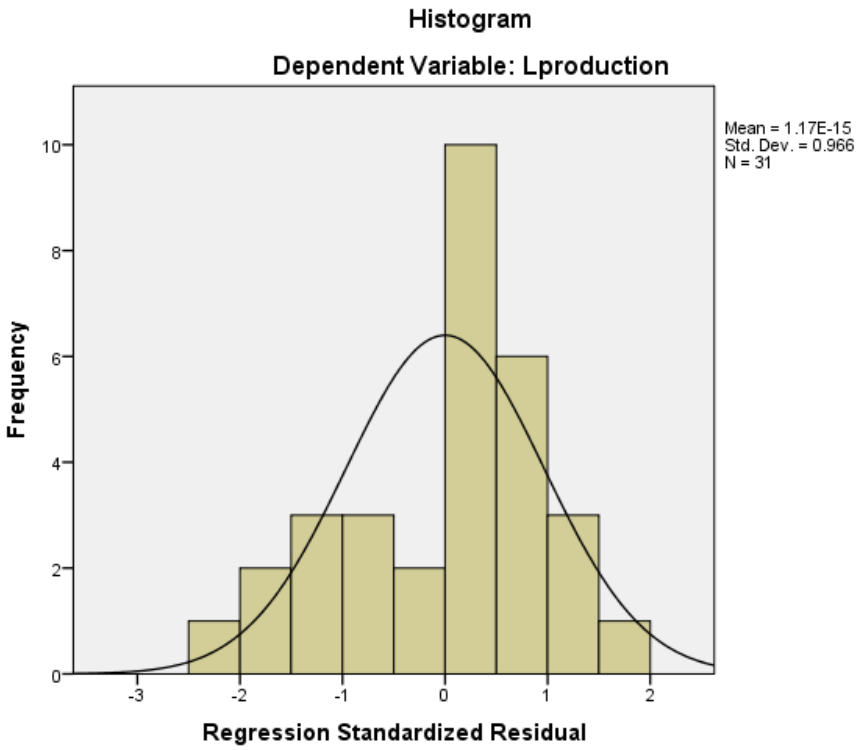
Charts



The graphic representation of time series helps in analyzing the changes in the variable with respect to the change of time. The data forming the time series presented graphically is known as time-series graph where time is taken along the x-axis and the dependent variable under study is taken along the y-axis. Points are plotted with these independent and dependent variables. These points are joined by straight lines.

In this regard, above histogram and normal frequency polygon leads that agriculture production is the dependent variable and Government expenditure and labour are independent variables. SPSS analysis to explore negative skewness or diminishing return to scale' in fact, agriculture production and inputs of expenditure and labour are not directly proportional to each other. In regression analysis, one percent increase in inputs the result or output increase less then one percent. In agriculture production this is the trend of production function in developing country like Nepal.

CONCLUSION

Although the contribution of Government Expenditure in agriculture sector does not change much in Nepal. Panel data shows a gradual shift in the share of economy from agriculture to services, while the unskilled labour has not changed in national level as compared to the change in secondary and tertiary sect oral composition of GDP. So decreasing share of agriculture GDP clarifies that Nepal is being less dependent on agriculture output as compared to non-agriculture GDP. Research analysis reveals that Government Expenditure on agriculture sector

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has significant positive impact in agriculture outputs. However, labour force is diminishing return to scale.

Empirical research is a ever going and never ending process in production function of Nepal. This reveals relationship among economic growth, government expenditure and even labour force in Nepal. The graphical presentation of standardized residual reveals negative skewness or it has diminishing reture to scale. To be specific, 1 percent change in inputs while the output is lessthan one percent in averages. Furthermore Cochrane-Orcutt to show that d_{cal} = 1.697 is lies between the d_U and 4-d_U. So there is positive no auto-correlation among variables or they are independent to each other.

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APENDIX
Annex-III

Large size Secondary panel data:

Year	Area	Production 000' Metric-ton	Labour/Male	Expenditure/ at current price as in ten-million
1983/84	Illam	1165.1	144125	2257
1984/85	Jhapa	1231	385284	2276.1
1985/86	Rasuwa	1284	21775	2713.6
1986/87	Kathmandu	1431.71	909786	3062.3
1987/88	Manang	1411.92	3664	3675.5
1988/89	Gorkha	1483.1	120541	4257.2
1989/90	Syangja	1620.1	125872	5047
1990/91	Palpa	1633.88	119167	5536.8
1991/92	Dang	1784.54	264110	6515.6
1992/93	Doti	1907.64	97007	7009
1993/94	Kapilvastu	1936.69	284813	8058.9
1994/95	Magu	2023.63	28197	8556.9
1995/96	Pyuthan	1909.6	103459	9689.6
1996/97	Siraha	1778.23	313292	10878.5
1997/98	Baitadi	1837.8	118015	11249.5
1998/99	Humla	1798.57	25940	13237.3
1999/00	Jumla	1936.99	54790	14513.1
2000/01	Mahottari	2140.31	320886	15378.1
2001/02	Sarlahi	2211.71	388872	16392.5
2002/03	Bara	2318.83	358144	17063.4
2003/04	Dhading	2401.5	157928	18362.1
2004/05	Khotang	2629.79	98860	19668.6
2005/06	Salyan	2725.55	116615	20859.1
2006/07	Saptari	2873.77	316888	22353.6
2007/08	Baglung	3169.46	119021	24332.3
2008/09	Chitawan	3440.61	272289	30547.7
2009/10	Lalitpur	3711	237114	39151.9
2010/11	Makawanpur	4034.6	210564	47327
2011/12	Udayapur	4613.57	151649	50046.5
2012/13R	Taplejung	8453.25	61442	52786.9
2013/14P	Kanchanpur	4707.5	213109	58369.2

Sources : Population Census 2011,CBS. MOF, and MOAD.

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