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Minimum Wage Review and Poverty Reduction in Nigeria's Formal Sector

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Abstract
Minimum Wage (MW) has been implemented over time in Nigeria but agitations by labour unions for better welfare package has continued unabated despite the huge resources committed. This study assessed the relationship between the wages paid to workers in the formal sector and their multidimensional poverty (MDP). Results showed that private sector workers had higher MDP (0.1556) than public sector workers (0.1040) prior to MW review of 2011 but poverty rate slightly reduced in both sectors (private = -9.8%, public = -8.6%) after the review. There is an increase in real wage but this did not reflect in per capita expenditure. The regression analyses revealed a significant negative relationship between log of real wage and poverty rate with 0.5% magnitude which increased to 0.9% between the two periods signifying a reduction in MDP rate. It is recommended that a holistic approach encompassing better compliance to MW laws and removal of inflationary pressures on wages be pursued by government for sustainable welfare gains in the sector.

Keywords: Minimum wage, Multidimensional poverty, Public, Private, Transition.

Introduction
Minimum wage (MW) policy has been employed worldwide to assist low income formal sector workers in catering adequately to their basic needs through improved purchasing power. It is a widely used and at the same time widely disputed income redistributive tool due to its lopsided coverage in favour of the formal sector (Gindling and Terrell, 2004). Despite this sector-specific focus, the effect of MW on poverty reduction has been largely mixed. While some studies found a positive effect on poverty reduction (Gindling and Terrell, 2010; Gindling, 2014; Kapelyuk, 2014), others have found the opposite (Neumark *et al*., 2006; Sugiyarto and Endriga, 2008; Pauw and Leibbrandt, 2012). Another branch of the MW-poverty literature also established possible spillover effect on the informal sector which is not the primary target of the policy instrument (Gindling and Terrell, 2005; Alaniz *et al*., 2011; Ham, 2013). The focus of this work however, is the MW effect on the formal sector.

Aminu (2011) reported that MW has been implemented in Nigeria since 1955 and still features prominently in the policy agenda of the Federal Government of Nigeria (FGN). The last MW review was during the administration of President Goodluck Jonathan in 2011 when all tiers of government and private employers were legally mandated to pay eighteen thousand Naira (N18,000:00) as salary to the least paid worker. Recently, the administration of the incumbent Head of State, President Muhammadu Buhari, set up a committee to work on the review of the MW as a result of

An earlier work titled 'Poverty Effects of Minimum Wage Increase in Nigeria' [Akin-Olagunju, Akinribido and Yusuf (*forthcoming*)] also assessed the relationship but treated endogenous relationship between real wage and poverty using instrumental variable (IV) approach. The study also evaluated spillover effect on informal sector.

pressure from Labour Unions for a MW that is commensurate with the present economic realities.

Judging from continued agitations of formal sector workers for regular increments in monthly wage, there is need for sound empirical basis for policy decision to ascertain if MW legislation is achieving its aims or there are other things that government needs to put in place to address the concerns being raised by the workers. In line with this submission, the study intends to answer the following research questions:

- How has the formal sector workers fared in terms of poverty and per capita household expenditure with the last MW increase?
- Did the monthly wage have any influence on poverty rate of the formal sector workers?
- What is the nature of poverty and employment changes in response to the MW review?

The objectives are to:

1. Assess the distribution of poverty rate, per capita household expenditure and real monthly wage of the workers.
2. Determine the relationship between poverty rate and real wage in public and private sectors.
3. Evaluate the poverty status and employment type shift for the formal sector workers across the periods considered.

Materials and Methods

Data

Two (2) sets of GHS data from National Bureau of Statistics (NBS) were used for this study. The first set of the data was collected in the period 2010/2011 while the second set was collected in the period 2012/13. Each set was collected for two seasons: post-planting and post-harvest; and the data for each wave were collected in three categories: household, community and agriculture. Household data category was adopted for this work. Data on monthly wage of household head employed in formal sector, the sector of employment, household expenditure on food and non-food items, food security variable, productive and non-productive asset owned by households, financial assets and literacy status of household heads were extracted for the period before and after MW review. The monetary data (monthly wage and household expenditure) were deflated using the Consumer Price Indices (CPI) for the years under consideration. The CPI data was sourced from the Central Bank of Nigeria (CBN).

Analytical Techniques

Bar graphs, line graphs and kernel plots were used to present real wage, real per capita household expenditure of workers in public and private sectors. Cross-tabulation was also done for the data considered for the transition analysis: poverty status and employment sector. Fuzzy set method was used to generate multidimensional poverty (mdp) value for each worker's household since it is more holistic and OLS was used to assess the effect of real monthly wage on poverty level. R-programming and Stata were the statistical software used for analysis.

To assess the poverty and employment transition for the two periods, poverty status was generated for the formal sector workers for the two periods under consideration

using the mean poverty rates as poverty lines. Data on poverty status and sector of employment were followed through the two periods for the households with the aid of the household identification number. Only household whose identification number appeared in the two periods were thus retained. Relationship of poverty and employment statuses between the two periods were tested with the following hypotheses:

H_0: There is no significant relationship between poverty statuses of the formal sector workers before and after the MW review.

H_1: There is significant relationship between poverty statuses of the formal sector workers before and after the MW review.

H_0: There is no significant relationship between employment statuses of the formal sector workers before and after the MW review.

H_1: There is significant relationship between employment statuses of the formal sector workers before and after the MW review.

Fuzzy set

This procedure is used in generating indices in order to avoid the traditional categorisation of poor and non-poor. In lieu of the dichotomous 'yes' or 'no' answer to the possession of a poverty attribute, fuzzy set theory makes use of membership function which is a value that shows the degree to which an attribute is possessed by an individual (Costa, 2002). For dichotomous poverty attributes, the traditional 1 and 0 still hold. However, for attributes having observable categories, individuals are assigned values between 0 and 1 to show degree of possession.

Mathematically, the degree of membership to the fuzzy set of the m-th household (m=1,…, k) with respect to the n-th attribute (n=1,…, z) lies between 0 and 1 ($0 = x_{mn} = 1$) where $x_{mn}= 1$ if the m-th household does not possess the n-th attribute and $x_{mn}= 0$, if the m-th household possesses the n-th attribute. The MDP ratio of each household (P_m) is given by,

$$P_m = \sum_{n=1}^{z} x_{mn} w_n \Big/ \sum_{n=1}^{z} w_n \quad \ldots(1)$$

where w_n, is the weight attached to the n-th attribute. It denotes the intensity of deprivation of x_n. Thus,

$$w_n = log\left[k \Big/ \sum_{m=1}^{k} x_{mn} k_n\right] \geq 0 \quad \ldots(2)$$

The MDP ratio of the population (P_A) is captured with the formula,

$$P_A = \sum_{m=1}^{k} P_m k_m \Big/ \sum_{m=1}^{k} k_m \quad \ldots(3)$$

Tobit Model Specification

The tobit regression model is a censored model whose latent variables regression model is specified thus IHS (2016),

$$y_i^* = x_i'\beta + \sigma\epsilon_i \quad (4)$$

yi = *latent dependent variable,*
xi = vector of independent variables,
= vector of parameter estimates,
= scale paramter,

The parameters β and σ are estimated using maximum likelihood function. Under the assumption of normally-distributed errors and the censoring of the data at the upper and lower limits (i.e poverty rate

$$y_i = \begin{cases} 0 & if\ y_i^* < 0 \\ y_i^* & if\ 0 \leq y_i^* \leq 1 \\ 1 & if\ 1 < y_i^* \end{cases} \quad \ldots\ldots \quad (5)$$

where,

Y = Poverty rate of worker's household (continuous variable, with values from 0 to 1)

The covariates are as follows,

X_1 = Log of real monthly wage of household head (in N)

X_2 = Location of the household (rural=1, urban=0)

X_3 = Sex of household head (female=1, male=0)

X_4 = Age of household head (years)

X_5 = Square of age of household head

X_6 = Marital status (not married=1, married=0)

X_7 = Household size

X_8 = Education status of household head (illiterate=1, literate=0)

X_9 = Sector of employment of household head (public=1, private=0)

Results and Discussion

Table 1 shows the distribution of the key variables examined in this study. The mean poverty rate increased from 0.1212 to 0.1104 while the mean real wage increased from N31,798.40 to N42,362.10. In contrast, real PCPHE reduced from N1,178.70 to N956.30. The distribution also showed more remarkable reduction in poverty at the 3rd quartile in comparison with the 1st quartile. The trend is also similar with respect to the real wage. This means that high paid workers had better welfare gains than low paid workers when wage was reviewed upwards. Also, kernel plots for the three (3) variables are presented in Figures 1 and 2. Real PCPHE and log of real wage are normally distributed at the upper (right) end while the plot for poverty rate is skewed to the right.

Table 1: Distribution of poverty rate, real PCPHE and real wage for all formal sector workers before and after MW review

Period	Variable	Min.	1st Quartile	Median	Mean	3rd Quartile	Max.
Pre-MW	Poverty rate	0.0168	0.0675	0.0996	0.1212	0.1561	0.5883
(2010)	Real PCPHE (₦)	3.0	520.1	909.7	1 178.7	1 544.1	7 333.6
	Real Wage (₦)	52.5	10 507.9	21 891.4	31 798.4	39 404.6	262 697.0
Post-MW	Poverty rate	0.0140	0.0640	0.0853	0.1104	0.1382	0.5046
(2012)	Real PCPHE (₦)	0.0	410.3	707.7	956.3	1 211.9	13 612.1
	Real Wage (₦)	15.6	14 174.3	26 931.3	42 362.1	49 610.2	1 722 431.6

PCPHE – Per capita household expenditure

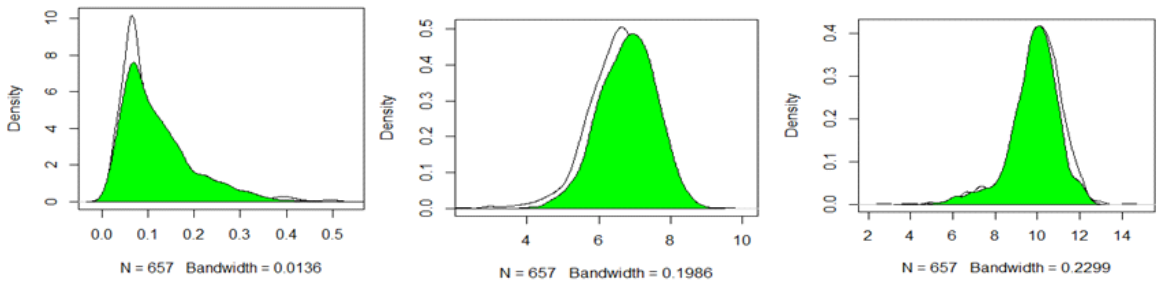

Figure 1: Combined kernels (2010 and 2012) showing distribution of poverty rate (a) , log of real PCPHE (b) and log of real wage (c) of formal sector workers (R-programming output). Note: The solid kernels are for 2012.

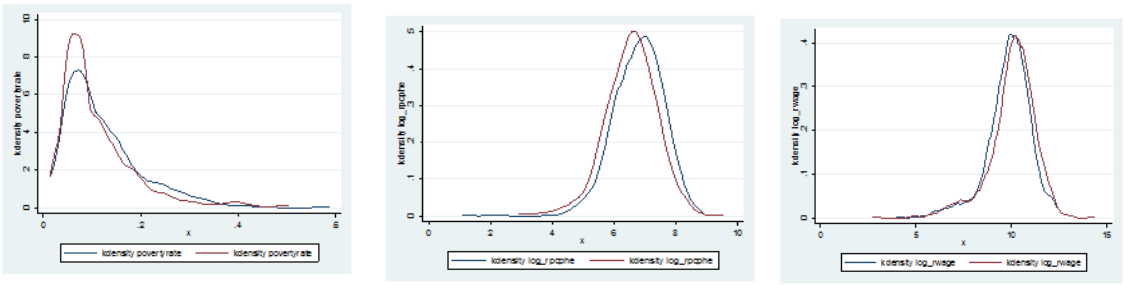

Figure 2: Kernel plots pre- and post-MW increase showing distribution of poverty rate, log of real PCPHE and log of real wage of formal sector workers (Stata output).

Results at sector level are presented in Figure 3 with additional data distribution details in Table 4. There is a reduction in the mean multidimensional poverty rates for both public (0.1040; 0.0951) and private sector workers (0.1556; 0.1404) with the implementation of minimum wage at -9.8% and -8.6%, respectively. This implies that the wage increase was able to lift the workers slightly out of poverty. On the other hand, the real wage increase and the increment was higher for workers in the public sector (N36,020:00 < N49,990:00) than workers in the private sector (N23,360:00 < N27,420:00) at 38.8% and 17.4% incremental values respectively. The positive effect of increase in MW on real wage is in line with the reports of IDRC (2010). Meanwhile, average PCPHE worsened in both private and public sectors meaning that workers in both sectors had less purchasing power and might not be able to secure their needs despite wage increase. This corroborates the submissions of Fapohunda *et al*. (2013) and Akpasung (2014) that per capita earning of formal sector workers has worsened with time in Nigeria in spite of successive increase in MW. This might largely be a result of continual increase in prices of commodities.

Sectoral decomposition of the average PCPHE shows higher value in the private sector (N1,204:00) than in the public sector (N1,166:00) prior to MW review but the opposite is the case after the MW review: mean PCPHE became N1,006:00 in the public sector and N859.30 in the private sector. This indicates that before the MW review, private sector workers were better off. However, after the review, public sector workers were able to get better pay while their counterparts in the private sector did not benefit perhaps due to poor enforcement in the sector. Poor enforcement has been

reported in Central America and private formal employees were largely affected (IDRC, 2010). Regression line that was fitted to determine the relationship between real wage and poverty rate showed negative slope, indicating that higher real wage lowered poverty. The intercept for 2012 was higher than for 2010 as presented in Figure 4.

The distribution of workers in the public and private sectors falling below and above MW (extent of coverage) is shown in Figure 5. In 2010, more workers were covered in the public sector than the private sector though the private sector also had good coverage. With increase in MW in 2012, coverage worsened in the private sector compared with 2010. It also worsened in the public sector but to a far lower degree. More workers being found below minimum wage in the private sector than in the public sector shows better compliance in the public sector and implies low implementation of MW legislation in the private sector. This supports the point made earlier about poor enforcement of the MW legislation in the private sector. Importance of compliance as a way to realising positive effect of MW has been stressed by Pauw and Leibbrandt (2012).

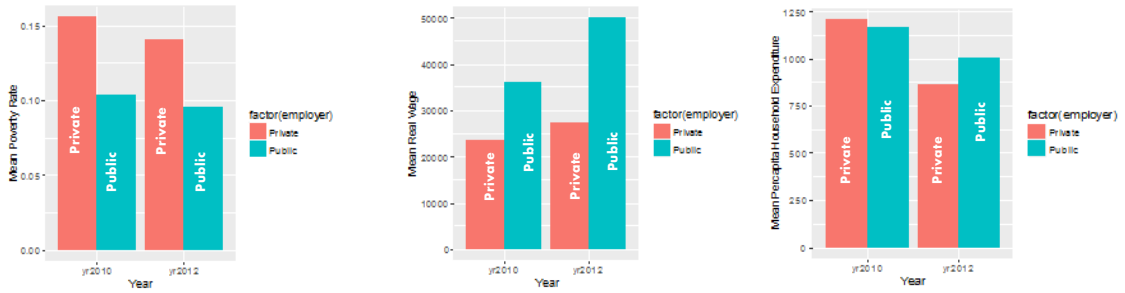

Figure 3: Bar plots of poverty rate, real PCPHE and real wage by employer and year (R-programming output)

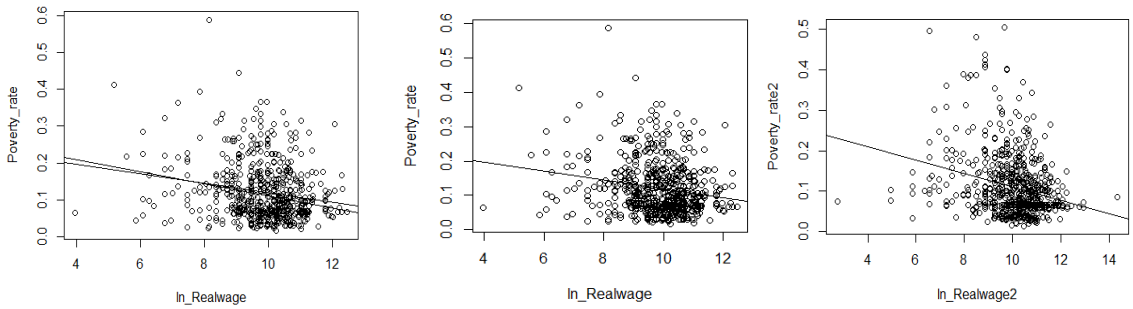

Figure 4: Regression line fitting pre- and post-MW increase together with combination (R-programming output)

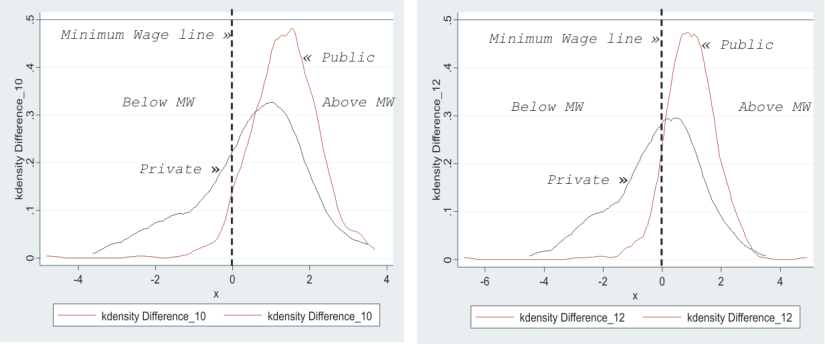

Figure 5: Kernel plots showing extent of MW coverage in public and private sectors

Regression results for the determination of the relationship between poverty rate and the covariates are shown in Table 2. Log of real wage, illiteracy and sector of employment were the significant variables across the two periods while household size was significant only for 2012. The variables were significant between 1% and 10% levels. Log of real wage and sector of employment were negatively related to the poverty rate while illiteracy showed positive relationship. The negative relationship between real wage and poverty rate indicates reduction in poverty as real wage increased. The magnitude is however small. One unit increase in the log of real wage reduced poverty level by 0.5% in 2010 and by 0.9% in 2012. Thus, the magnitude of reduction in the level of poverty was higher after MW increase, signifying a reduction in poverty level. This result agrees with that of Saari *et al*. (2016). Also, a unit increase in level of illiteracy increased poverty by 3.1% and 5.7% in 2010 and 2012, respectively. The negative value of coefficient of employment sector meant that poverty was lower in the public than in the private sector. Prior to MW increase, a unit increase of being employed in the public sector reduced poverty by 4.4% relative to employment in the private sector. This however went down to 3.1% after MW review. The model fitted the data as shown by the significance of the Likelihood Ratio (LR) statistics.

In order to examine the poverty transition, cross-tabulation of poverty statuses for the two periods was done. The results are presented on Table 3. For the crosstab tests, the Pearson chi-square value ($p<0.01$) showed a rejection of null hypothesis of no relationship which meant that the two variables were related. The Goodman & Kruskal's gamma and Kendall's tau-b values also indicated association between the two ordinal poverty status variables for the two periods. Strong level of association was also observed between the nominal employment variables for the two periods as shown by the two chi-square (Pearson & Likelihood Ratio) values and their probabilities ($p<0.01$) together with the Cramer's V value of 67.5%.

The results in Table 3 show the number of workers that moved between the different poverty and employment characteristics. Significant percentages moved out of poverty (17.3%=[90/521]*100) and also into poverty (20.1%=[105/521]*100). Similarly, 24.0% ([68+57]/521*100)

Table 2: Parameter estimates of the effect of MW on poverty rate

	Tobit Regression					
Dependent var.: Poverty rate	Pre-MW review			Post-MW review		
	Coefficient	Std. error	t-statistics	Coefficient	Std. error	t-statistics
Log of real wage	-0.005*	0.003	-1.86	-0.009***	0.003	-3.56
Location: rural	0.007	0.006	1.08	-0.007	0.006	-1.24
Sex: female	-0.005	0.014	-0.39	0.002	0.013	0.15
Age	0.002	0.002	0.74	0.003	0.002	1.32
Age-squared	-2.03E-05	2.38E-05	-0.85	-2.73E-05	1.95E-05	-1.40
Marital status: not married	0.004	0.011	0.31	-0.003	0.010	-0.29
Household size	-0.001	0.001	-0.46	-0.002**	0.001	-2.20
Illiteracy	0.031**	0.014	2.30	0.057***	0.013	4.27
Sector of employment: Public	-0.044***	0.007	-6.36	-0.031***	0.007	-4.70
Constant	0.179***	0.049	3.68	0.182***	0.047	3.87
/Sigma	0.073	0.002		0.072	0.002	
No. of Obs.	597			656		
Log-likelihood	707.15			786.02		
LR $chi^2(9)$	75.04***			96.27***		
Prob>chi^2	0.000			0.000		
Pseudo R^2	-0.056			-0.065		
	1 left-censored observation at poverty-rate = 0.0168 595 uncensored observations 1 right-censored observation at poverty-rate = 0.5883			1 left-censored observation at poverty-rate = 0.0140 654 uncensored observations 1 right-censored observation at poverty-rate = 0.5046		

Significance: ***1%, **5% and *10%.

Table 3: Distribution of formal sector workers by transition variables

a. Poverty transition		
	Non-Poor	Poor
Non-Poor	62 (40.79)	105 (28.46)
Poor	90 (59.21)	264 (71.54)
Total	152 (100.0)	369 (100.0)

b. Employment transition			
	Self	Private	Public
Private	68 (54.40)	91 (81.98)	17 (5.96)
Public	57 (45.60)	20 (18.02)	268 (94.04)
Total	125 (100.0)	111 (100.0)	285 (100.0)

Percentages are in parenthesis.

Table 4: Distribution of sectoral poverty rate, real PCPHE and real wage for periods before and after MW review

Period	Sector	Variable	Min.	1st Quartile	Median	Mean	3rd Quartile	Max.
Pre-MW review (2010)	Public	Poverty rate	0.0168	0.0613	0.0843	0.1040	0.1340	0.4437
		Real PCPHE (₦)	103.2	504.8	925.4	1166.0	1 540.0	7 334.0
		Real Wage (₦)	52.5	14 890.0	26 270.0	36 020.0	43 780.0	262 700.0
	Private	Poverty rate	0.0248	0.0875	0.1340	0.1556	0.2033	0.5883
		Real PCPHE (₦)	3.0	553.9	894.0	1 204.0	1 590.0	5 974.0
		Real Wage (₦)	175.1	5 254.0	13 130.0	23 360.0	27 410.0	218 900.0
Post-MW Review (2012)	Public	Poverty rate	0.0157	0.0593	0.0675	0.0951	0.1228	0.5046
		Real PCPHE (₦)	0.0	417.2	742.7	1 006.0	1 239.0	13 610.0
		Real Wage (₦)	15.6	19 840.0	32 600.0	49 990.0	56 700.0	1 722 000.0
	Private	Poverty rate	0.0140	0.0731	0.1087	0.1404	0.1772	0.4967
		Real PCPHE (₦)	20.3	395.8	663.2	859.3	1 136.0	3 522.0
		Real Wage (₦)	141.7	4 961.0	14 170.0	27 420.0	28 350.0	425 200.0

PCPHE - Per capita household expenditure

moved from formal employment to self-employment. Alaniz *et al.* (2011) has noted that self-employment absorbs workers from formal sector. Lower percentage of workers (81.98%) remained in the private sector compared to public sector (94.04%) which is in line with the findings of IDRC (2010) that higher MW has negative effects on employment in private sector because it triggers off job loss. The general results reflect the submission of Marginean and Chenic (2013): MW brings about workers leaving the covered sector though at the same time increasing the probability of workers' households moving out of poverty.

Conclusion and Recommendation

The need to assess the welfare effect of MW implementation is the core focus of this study and the outcomes are that MW increase led to slight reduction in overall multidimensional poverty due to non-reflection of higher wage on purchasing power of workers. At sectoral level, poverty reduction was more prominent in the public than the private sector as a result of better coverage and compliance. The transition analyses showed almost equal percentage of workers moving out of and into poverty over the two periods and there was abandonment of the covered sector for the uncovered sector.

Consequent upon minimal effect of MW on poverty reduction in the formal sector, the study recommends that government undertakes approaches that benefit the economy in general. Such measures include taking care of the inflationary trends in the economy and enforcing compliance thereby addressing welfare concerns of workers in the formal sector.

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