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How Does a Higher Minimum Wage Affect the Economy?

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Abstract

This paper collected and collated data from multiple governmental sources as well as other research studies and written sources to examine whether raising the minimum wage from 7.25$ to 15$ would affect the economy and if it does—how drastically. Data collected from the Bureau of Labor Statistics, the Department of Labor, *A Guide to Cost Benefit Analysis* by Edward Gramlich, etc. This data was then collated into an easily comparable and viewable form. Then it was put into Stata and run through various regressions to determine the impact of the minimum wage on the factors of unemployment and income per capita. I predicted that the impact on unemployment and income per capita by raising the federal minimum wage would be large. My regressions proved that the minimum wage does affect unemployment, unemployment does not drive the minimum wage however, and that the income per capita of a state is significantly affected by an increase in the minimum wage. This proves my hypothesis partially true, but more data retrieval and analysis need to be done in order to provide more definitive answers.

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Introduction

The federal minimum wage has a major impact on the people living on it. Raising the federal minimum wage from 7.25$ to 15.00$ could prove advantageous to those living on the wage as well as help give more depth and stability to the American economy. However, how will raising this minimum wage impact unemployment? Could raising it severely affect those living on the minimum wage and thereby being unemployed as a result of the increases labor costs? How will this act affect the income per capita the workers? Will it help or harm them and is it statistically verified? First, we must understand the federal minimum wage in order to begin to answer those questions.

To understand the federal minimum wage, we must go back to its inception. The federal minimum wage was instituted as a part of the *Minimum Wage and Maximum Hours Standards Under the Fair Labor Standards Act* of 1947 (Department of Labor) where it was originally set at .40 cents. Fast-forwarding to when former President Bill Clinton took office in 1992-1993, the minimum wage had been increased over the last 45 years to 4.25$ with the most recent increase coming from an amendment in 1991 (Department of Labor). Under the presidency of Bill Clinton, the economy was in a "Goldilocks" market, meaning that it was a time of low unemployment and low inflation, which allowed for the market to continue to grow at healthy and consistent level with the Dow Jones Industrial figure quadrupling. During this time, Clinton raised the minimum wage twice. Once in 1996 to 4.75$ an hour and then again in 1997 to 5.15$ an hour. This overall seemed to help the average worker as the overall income for the U.S. continued to increase during the Clinton presidency; however, this could be affected by many other factors that are not relevant within this paper.

Moving forward, during the Obama administration the minimum wage was raised three times; once in 2007 to 5.85$, again in 2008 at 6.55$ and finally to the current minimum wage at 7.25$. As everyone knows, the economy during the time fell dramatically due to the housing bubble perpetuated by Fannie and Connie Mac by allowing for the lending of sub-prime mortgages to individuals who could not pay it back.

This ultimately tanked the economy and allowed for lower income workers to lose a significant amount of money, with a skyrocketing unemployment rate that reached 34% of eligible workers, according to the Bureau of Labor Statistics. Minimum wage workers during

this time also worked less than 35 hours a week when they normally would work the normal 40. 102,307, in thousands, of these workers were receiving decreased hours and therefore decreased wages of specifically minimum wage jobs (*U.S. Bureau of Labor Statistics)*. So, while President Obama raised the minimum wage three times to 7.25$ an hour, this ultimately did not help the minimum wage worker because they were receiving less hours and could not take advantage of this wage increase.

Finally, we will move on to the present-day fight to increase the minimum wage to 15$ and why I think that this will ultimately negatively affect low-income workers rather than help them. As mentioned before, the federal minimum wage has stagnated at 7.25$, with no increases in 12 years; however, other states have endeavored to increase their own minimum wages in order to directly address the perceived problem of income injustice. As of now, 22 states have remained at the federal minimum wage with 28 states increasing theirs, with the highest minimum wage being 14$ in the District of Columbia

Literature Review

According to Gramlich (1998), the raising of the federal minimum wage creates a distortion within the labor market and will never pass a Kaldor-Hicks efficiency test. He goes on to state that the higher wage will clearly benefit those low-wage workers who will keep their jobs but that there is one demand and one supply problem. The demand problem is that the higher wage will reduce employment demand by an amount that depends on the elasticity of the demand for low-wage labor. The supply problem is that the higher wage will tempt new workers into the market, increase competition for now scarce jobs, and require some rationing mechanism that does not necessarily give jobs to those who most value them.

This effect can be seen in the study done by Charles Brown, et. al, (1982) where they examine the effects of raising the minimum wage on the monopsonistic employer's marginal cost of labor. They determine that the marginal cost of labor in a monopsony will exceed the supply price which will force the employer to become a price-taker and up the level of employment thus increasing the minimum wage would up the employment rate in the short run. However, they also go on to state that once the employment level reaches its competitive peak then further increases would reduce employment below the competitive level. Charles Brown, et.

al, (1982) also states that the monopsony model has little evidence for impact on modern day low-wage labor markets.

Charles Brown, et. al, (1982) also looks at the "shock" effects on the labor market which focuses on that if employers do not minimize costs then they will be forced to respond to an increase in the wage by raising the productivity of their operation in order to offset the increase. This is labeled as a "shock", they posit, because it shocks employers into greater productivity. A recent study into the shock effects that the minimum wage has on the labor market and employers comes from Arindrajit Dube, et. al, (2014), who focuses on using the dataset of Quarterly Workforce Indicators (QWI) to estimate minimum wage elasticities of average earnings, employment stocks and employment flows.

Arindrajit Dube, et. al, (2014) states that "The QWI data permit us to estimate the responses of local labor market accession, separation and turnover rates for two high-impact demographic and industry groups: teens and restaurant workers," they use the QWI data to analyze the shocks within the previously cited high-impact demographic and industry groups and find "striking evidence that separations, hires, and turnover rates for teens and restaurant workers fall substantially following a minimum wage increase—with most of the reductions coming within the first three quarters of the higher minimum." Therefore, it can be posited that raising the minimum wage can have positive effects on the labor market which Dube, et. al, (2014) states also, "For a 10 percent minimum wage increase, turnover rates decline by around 2.0 percent for teens and 2.1 percent for the restaurant workforce."

Another factor to consider when studying the effects that raising the minimum wage could have on unemployment is the concept of spatial heterogeneity. This idea focuses on the large stratification of low-wage workers within relatively small areas, generally metropolitan cities, and large urban areas. David Neumark, et. al, (2013) focus on this idea and find " In particular, the identification of minimum wage effects requires both a sufficiently sharp focus on potentially affected workers and the construction of a valid counterfactual "control group" for what would have happened absent increases in the minimum wage. The latter is critical to account for other influences on the employment of potentially affected workers that may be confounded with the effects of changes in the minimum wage." They go on to posit that the changes within the labor market within specific states (ignoring trends) can be traced to the

stratification of those workers within densely populated areas. These areas will have a deeper impact on the observation of minimum wage effects because of the aggregate population density of these few areas as compared to the density nationally. Neumark, et. al, (2013) go on to define and expand upon the idea touched earlier upon, "We first focus on the evidence regarding state-specific trends, which are intended to control for longer-run influences not captured in the other control variables. It has become standard practice to assess the robustness of panel data estimates of state policy effects to the inclusion of state-specific trends, including in the minimum wage literature." It all comes together to provide an acceptable argument for the observation of this concept.

Conversely, some literature has posited the idea that the minimum wage has no discernible effect on employment. John Schmitt (2013), states that the weight of evidence points to little or no employment response to modest increases in the minimum wage and then goes on to recommendations on eleven points that could be used to modify a straight increase in the federal minimum wage that may explain why these changes are so relatively small. Schmitt (2013) argues "Given the relatively small cost to employers of modest increases in the minimum wage, these adjustment mechanisms appear to be more than sufficient to avoid employment losses, even for employers with a large share of low-wage workers." He explains these mechanisms in a couple of models—specifically the competitive, institutional, and the dynamic monopsony model.

The competitive model focuses on emphasizing adjustment through declining employment and argues that binding the minimum wage will reduce employment. However, Schmitt seems to lack a true empirical argument that is present in the institutional and dynamic models and instead focuses on a simplistic theoretical argument to make his case. I do not find this argument to be conclusive without an example of evidence that binding the minimum wage will reduce employment.

Next, the institutional model uses several key features to make its point. With the weight of being, as Schmitt puts it, "the dominant paradigm for evaluating the minimum wage" the model focuses on a rejection of the well-defined downward sloping labor demand curve, labor markets that are imperfectly competitive, institutionally segmented, socially embedded, and prone to excess supply, as well as the importance of technological and psycho-social factors in

firm level production systems. This model has the empirical and historical weight behind it and could be useful in evaluating future results as it results to the variables being studied and the ones being considered. However, the model appears to be prenatally vindicating, in my estimation but not in the opinion of Schmitt, is its statement of the minimum wage may have, particularly in the short run, an approximately zero or small positive employment effect.

Finally, the dynamic monopsony model features a theoretical approach that argues the possibility of the minimum wage reducing the costs of turnover to low wage employees. In Schmitts overview I tend to agree that the dynamic monopsony model would be a good model to analyze the results of specific minimum wage increase research because as Schmitt puts it " in the dynamic monopsony model, employers, even those operating in low-wage labor markets, face real costs associated with hiring new workers. These costs flow from inevitable frictions in the labor market." Workers incur costs, which is obvious enough and the monopsony model use this idea of employer and employee friction to measure the impact of employment within the labor market. I find this idea to be appealing on the basis of expanding and refining the analysis as well as incorporating broader variables to measure against.

I hypothesize that in my research I will find that raising the minimum wage will significantly impact employment, statistically and in reality, as well as directly affect the income per capita seen by the employees in the labor market.

Methodology

The method was conducted in the following way. Data was collected from the Department of Labor Statistics, The U.S. Census Bureau, as well as data from the Statistics Portal. The current State minimum wages and the Federal minimum wage was collected from the Department of Labor Statistics. Data included the minimum wage increases by state from March 2010 until March 2020. Population data was collected from the Federal Census Bureau website. Income per capita data was also obtained from the same agency as well as verification and specific data from the Statistics Portal. All the data from each state was averaged by year.

The average data was then put into the statistical data calculator and verifier called Stata. The averages were then put into the regression equation:

$$y = \beta_0 + \beta_1 X + \epsilon$$

In cases where multiple variables were used, the following equation was applied:

$$y = \beta_0 + \beta_1 X + \beta_2 X \ldots + \epsilon$$

Results

The following results were obtained as Stata outputs from the regressions applied that will be specified and discussed below. The following table is a summation of the data. The total observations as well as the averages for all the variables, their standard deviations, and their range.

Variable	Observation	Mean	Standard Deviation	Min	Max
State Minimum Wage 2019	51	9	2.263	5	14
Federal Minimum Wage 2019	51	7	0	7	7
Unemployment % March 2010	51	.089	.021	.04	.14
Unemployment % March 2011	51	.083	.018	.04	.13
Unemployment % March 2012	51	.075	.019	.03	.12
Unemployment % March 2013	51	.070	.016	.03	.1
Unemployment % March 2014	51	.061	.013	.03	.08
Unemployment % March 2015	51	.053	.012	.03	07
Unemployment % March 2016	51	.047	.010	.03	.07
Unemployment % March 2017	51	.043	.009	.03	.07

Unemployment % March 2018	51	.039	.009	.02	.07
Unemployment % March 2019	51	.037	.009	.02	.06
Overall Change in Unemployment	51	.053	.019	.02	.09
National Unemployment % March 2019	51	.04	0	.04	.04
National Population 2019	51	6,437,262	7,360,742	578,579	3.95e+07
Income per Capita 2018	51	62,013.08	10,611.81	44,097	85,203
National Income per Capita 2018	51	63,179	0	63,179	63,179

Table 1: Summation of Variable Data

The first regression done was the regression of the average unemployment from all states in 2019 over the average state minimum wage from 2019 as well.

Source	SS	df	MS Number of obs =	51
	F(1, 49) =	4.28		
Model	.00030625	1	.00030625 Prob > F =	0.0440
Residual	.003509436	49	.000071621 R-squared =	0.0803
	Adj R-squared =	0.0615		
Total	.003815686	50	.000076314 Root MSE =	.00846
y2019	Coef.	Std. Err.	t P>t [95% Conf.	Interval]

ystate2019	.0010938	.0005289	2.07 0.044 .0000308	.0021567
_cons	.0274112	.0049057	5.59 0.000 .0175528	.0372695

Table 2: Output from Regression #1

The table above, hereafter referred to as Table 2, leads to the overall equation for this table as:

$$Unemployment\ Rate\ from\ 2019 = .0274 + .0011 * State\ Minimum\ Wage\ from\ 2019 + \varepsilon$$

From Table 1 we can see that the mean State Minimum Wage is 9$ and the mean Unemployment Rate is .037 or 3.7%. Doing Table 2's regressions show that the Unemployment Rate is affected by the State Minimum Wage and that the coefficient is statistically significant as well with the P value being under .05. However, this can be relatively disregarded because with the Adjusted R squared, we can see that this regression only covers 6% (0.062) of the variation in the state-level unemployment rates.

The next regression done was the regression of the state minimum wage over the overall change in unemployment in 2019.

Source	SS	df MS Number of obs =	51
	F(1, 49) =	0.19	
Model .986381056	1 .986381056 Prob > F =	0.6652	
Residual 255.013619	49 5.20435957 R-squared =	0.0039	
	Adj R-squared =	-0.0165	
Total 256	50 5.12 Root MSE =	2.2813	
ystate2019	Coef.	Std. Err. t P>t [95% Conf.	Interval]
yoverallcha~e	7.587548	17.42861 0.44 0.665 -27.43655	42.61165

_cons	8.595331	.9828858 8.74 0.000 6.620148	10.57051

Table 3: Output from Regression #2

The table above, referred after as Table 3, leads to the following equation for this table:

$$State\ Min.Wage\ 2019 = 8.59 + 7.588 * Overall\ Change\ in\ Unemployment + \varepsilon$$

The Table 3 regression shows that the overall change in unemployment apparently affects the state minimum wage by 7.588. With the first regression from Table 2 we would be expecting that if the unemployment rate falls then states would be more willing to raise their minimum wages a bit so we would expect a negative coefficient from this table. However, this is not the case. The problem in this case is that the coefficient above is not statistically significant with a P value of 0.665.

From there the next regression done was a regression of the state minimum wage from 2019 over the overall change in unemployment as well as the income per capita from 2018. This table uses the equation:

$$State\ Min.Wage\ 2019 = 1.149 + 13.764 * overall\ change\ in\ unemployment + .0001 * the\ income\ per\ capita\ for\ 2018 + \varepsilon$$

Source	SS	df MS Number of obs =	51
	F(2, 48) =	9.85	
Model 74.4952907	2 37.2476453 Prob > F =	0.0003	
Residual 181.504709	48 3.78134811 R-squared =	0.2910	
	Adj R-squared =	0.2615	
Total 256	50 5.12 Root MSE =	1.9446	
ystate2019	Coef.	Std. Err. t P>t [95% Conf.	Interval]

yoverallcha~e	13.76356	14.92191 0.92 0.361 -16.23895	43.76607
yincome2018	.0001148	.000026 4.41 0.000 .0000624	.0001671
_cons	1.148879	1.885281 0.61 0.545 -2.641733	4.93949

Table 4: Output from Regression #3

The table above, referred to as Table 4, gives an interesting result. It shows that apparently the state minimum wage for 2019 is affected by the overall change in unemployment by 13.764. However, this term is statistically not valid due to the P-value term at 0.361. The income per capita for 2018, in thousands, however, is significant here. It shows that the minimum wage is affected by the income per capita of the people within the state and predicts that for every 1,000$ increase in the income per capita of its populace, the minimum wage should rise by .11$ and with a P-value of 0.00 it is statistically significant.

The next regression done was a regression of the income per capita of 2018, in thousands, over the state minimum wage for 2019.

Source	SS	df	MS Number of obs =	51
	F(1, 49) =	18.91		
Model	1.5677e+09	1	1.5677e+09 Prob > F =	0.0001
Residual	4.0628e+09	49	82914546 R-squared =	0.2784
	Adj R-squared =	0.2637		
Total	5.6305e+09	50	112610447 Root MSE =	9105.7
yincome2018	Coef.	Std. Err.	t P>t [95% Conf.	Interval]
ystate2019	2474.645	569.1089	4.35 0.000 1330.977	3618.312
_cons	39741.28	5278.3	7.53 0.000 29134.14	50348.42

Table 5: Output from Regression #4

The table above, referred to as Table 5, came out of the following regression. It leads to the following equation:

$$Income\ per\ Capita\ for\ 2018 = 39741.28 + 2474.645 * State\ Min. Wage\ for\ 2019 + \varepsilon$$

If the minimum wage is expected to rise by .11$ for every thousand dollars added in income per capita, then how do those variables affect each other from the opposite direction. Table 5 shows that as the state minimum wage increases then it will be adding 2,474.65$ for every .11$ increase in the minimum wage and that this coefficient is statistically valid with a P-value of 0.00.

The next regression done was a regression of the income per capita, in thousands, for 2018 over the overall change in unemployment for 2019, the state minimum wage for 2019, as well as the unemployment rate for 2019.

Source	SS	df MS Number of obs =	51
	F(3, 47) =	7.29	
Model 1.7881e+09	3 596025840 Prob > F =	0.0004	
Residual 3.8424e+09	47 81754145.1 R-squared =	0.3176	
	Adj R-squared =	0.2740	
Total 5.6305e+09	50 112610447 Root MSE =	9041.8	
yincome2018	Coef.	Std. Err. t P>t [95% Conf.	Interval]
yoverallcha~e	-73721.5	69213.84 -1.07 0.292 -212961.8	65518.78
ystate2019	2722.388	590.4006 4.61 0.000 1534.656	3910.121
y2019	-192280.8	152636 -1.26 0.214 -499344.7	114783.2

_cons	48606.8	7526.123 6.46 0.000 33466.19	63747.4

Table 6: Output from Regression #5

The table above, referred to as Table 6, uses the following equation:

$$Income\ per\ Capita\ for\ 2018 = 48606.8 + (-73721.5) * overall\ change\ in\ unemployment + 2722.388 * state\ minimum\ wage\ for\ 2019 + (-192280.8) * unemployment\ rate\ for\ 2019 + \varepsilon$$

This regression came out of the previous one in Table 5. With the adjusted r-squared for Table 5 being .2637 or 26% I wanted to see if I could refine the explanation for the variables in relation to the income per capita, in thousands, for the populace. This table, although most of the variables are statistically invalid, actually helps to refine how the state minimum wage for 2019 affects the income per capita, in thousands, for 2018. We can see that the state minimum wage, when controlling for other variables, actually increases the income per capita by 2,722.39$ with an adjusted r-squared of .2740 or 27%. While only a percentage point better in refinement, we can see that the state minimum wage actually affects the income per capita of the populace at an increased level as more variables are introduced.

The final regression done was a regression of the income per capita, in thousands, for 2018 over the overall change in unemployment for 2019.

Source	SS	df MS Number of obs =	51
	F(1, 49) =	0.44	
Model 49616161.6	1 49616161.6 Prob > F =	0.5123	
Residual 5.5809e+09	49 113896044 R-squared =	0.0088	
	Adj R-squared =	-0.0114	
Total 5.6305e+09	50 112610447 Root MSE =	10672	

yincome2018	Coef.	Std. Err. t P>t [95% Conf.	Interval]
yoverallcha~e	-53813.43	81532.99 -0.66 0.512 -217660.1	110033.3
_cons	64883.13	4598.05 14.11 0.000 55643	74123.26

Table 7: Output from Regression #6

The table above, referred to as Table 7, uses the following equation:

$$Income\ per\ Capita\ for\ 2018 = 64883.13 + (-53813.43) * overall\ change\ in\ unemployment + \varepsilon$$

This is an interesting table. While we can discount the coefficient for the overall change in unemployment as it is statistically invalid with a P-value of 0.512, what is interesting about it is that with the previous regressions done it was expected to see that an overall change in unemployment would positively affect the income per capita. However, we can see that the coefficient is negative. This means that an overall change in unemployment actually negatively affects the income per capita of the populace which puts it in line with the first regression done and holds to the traditional interpretation of the minimum wage and how it affects the income per capita of its people as well as the unemployment rate.

The regressions done in Table's 1-7 shed a light on how the minimum wage actually affects the unemployment rate statewide as well as how it affects the overall unemployment rate. It also provides insight into how the state minimum wage affects the income per capita of its population.

Discussion

The regressions done above in Table's 1-7 lead to some interesting conclusions and to some interesting questions as well. From these regressions I have come to three conclusions. 1. That a higher minimum wage leads to a higher unemployment rate which follows from the traditional interpretation as well as the literature reviewed. 2. That changes in the minimum wage do not appear to drive unemployment. 3. The minimum wage rises quite strongly as the income per capita rises.

I think there are some explanations as to why these three conclusions are valid and why they make sense overall. In regard to conclusion one, it has been known for a long time that a higher minimum wage leads to a higher unemployment rate and that is due to a balancing of the accounting equation. In the accounting equation you must balance your income and assets with your liabilities and expenses and to make a profit your income must be higher than your liabilities and your expenses. When you artificial raise the labor expenses for business it will inevitably "shock" (to use Mr. Brown's terminology) the employer's into responding to this increase. Employers will then generally respond to an increase in labor costs in three ways: they will look into automation to not have to pay the increased minimum wage, they will reduce hours of existing employees or lay off or fire employees outright, or they will outsource their labor to countries with less regulations to avoid paying those costs. This will then generally lead to the increased unemployment rate.

In conclusion two we see that changes in unemployment do not drive the minimum wage. This conclusion can be properly inferred from the above tables, specifically Table #3, where we see that the changes in the unemployment rate do not negatively affect the state minimum wage. This means that the conclusion above is properly inferred as well, with changes in the minimum wage driving unemployment. However, more data retrieval and statistical analysis must be done to prove this point.

In conclusion three we find that the state minimum wage rises as income per capita within that state rises as well. This is an interesting conclusion because it also provides an explanation as to the raising of the minimum wage at all with the two conclusions talked about before. Let us try a thought experiment. Using the data from Table 4, if there is an increase of 1,000$ then the minimum wage will rise by .11$. From my data we can see that the median income among states is 60,000$. Massachusetts's median income is 80,000$, according to The Median Annual Household Income by kff.org, which is 20,000$ higher than the median income for the country. This leads to the conclusion that Massachusetts's minimum wage should only be 2.30$ higher than the average of 9$, all other variables being held equal, as I found above in Table 1 just based on their higher income per capita alone. However, Massachusetts minimum wage is actually 12.75$. So, what leads to this 3.75$ increase instead?

This leads into the questions that come from the statistical analysis. The obvious first question is the one mentioned before. What leads to an increase of the state minimum wage above the one that should be statistically valid? This would need to be more researched and other factors included into the statistical analysis. Factors such as housing prices, minimum wage policies and perceptions, education among other factors could be studied in order to determine why the minimum wage rises higher than what is statistically predicted.

Another question raised is whether the changes in the state minimum wage and unemployment, as well as the income per capita, will have the same effects on the national scale. I have proved the effects each of those variables have on the other as well as provided a thought experiment that could be expanded outward to a national scale. What will have to be done is a national approach to the data retrieval and statistical analysis; where all the variables mentioned will have more observations included as well as more variables as well. The inclusion of more data and more variables will serve to refine the numbers and allow for a more precise analysis as well. A look at a concept mentioned in my literature review, the concept of spatial heterogeneity, could provide some answers to the question. I think that the concept has some merit at least and should researched further.

The final question raised when going through the analysis is the findings in Table 7. With the regression of the income per capita for 2018, I found that the overall change of unemployment actually has a negative effect on the income per capita in the state. Disregarding the coefficient, we can see that is the opposite effect than I expected to find. Especially after the previous regressions as mentioned above. The question then becomes why does the overall change in unemployment negatively affect the income per capita when the previous regressions found that unemployment does not drive the minimum wage while the minimum wage significantly affects the income per capita? Does the negative change in unemployment directly affect the income per capita? If so, by how much and why? Since I found that the minimum wage and the income per capita are directly affected by each other and the minimum wage affects unemployment, could the income per capita actually be leveled out by the unemployment and that is a natural balancing act within a free market? Interesting and could be conclusive questions that more data and more analysis will be needed to answer.

In conclusion, my hypothesis is partially true. I did find that the minimum wage does affect unemployment as well as the income per capita of the working class. However, my conclusions only brought up more questions that should be researched and looked into in order to refine the idea of the minimum wage and bring more solutions and answers to the overall question that has been plaguing the U.S. since it is inclusion in the Fair Labor Standards Act of 1947.

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