PRA was not immediate, and the growing effects are a reflection of the growing number of businesses that had signed up.

In a report to Congress, the Roosevelt administration claimed that, by October 1933, the PRA had reemployed "2,462,000 persons" (United States Congress 1937, 95). For the cotton goods industry, the administration predicted the hours limit raised employment from 400,000 to 528,000, over 25 percent. For blast furnaces, this prediction was an increase from 272,000 to 325,000, just under 20 percent. For cigars and cigarettes, the prediction was an increase in employment of 7 percent. The simple fixed effects regression from before suggested that the PRA before the compliance crisis raised employment by about 11.2 percent. The estimates here suggest, if anything, slightly larger employment gains than the fixed effects regression results, which seems consistent with our claim that this empirical strategy places an upper bound on the employment effects. This is not just because this empirical strategy nets out the potential negative general equilibrium effects of the workweek limit. It is also because this strategy plausibly only captures effects due to the workweek limits themselves rather than the other labor market policies that came along with the PRA and NIRA.

VII. The Effects of the Workweek Limit on Earnings

The Roosevelt administration was not just interested in getting people reemployed but also increasing labor earnings overall. To study the effects on earnings, we turn to the SSNRA data, which report hourly and weekly earnings at a monthly frequency. Unfortunately, we cannot use the establishment-level data from the COM, which only have annual information on earnings. Our empirical strategy uses predetermined variation in the length of the workweek before the PRA to identify the intensity of the treatment induced by the PRA workweek limits.

Let w_{it} be either hourly or weekly earnings in industry i at time t and $Pre\text{-}PRAWorkweek_i$ be the fraction of months in the three-month period before the PRA for which industry i had an average workweek above the limit.[41] We then estimate using data between April and October 1933, excluding July, the following regression:

$$\log w_{it} = \beta PRA_t \times Pre\text{-}PRAWorkweek_i + Controls_{it} + \varepsilon_{it},$$

where PRA_t is an indicator for whether the PRA workweek limit is in effect at time t. We estimate the following specifications: (i) including as controls PRA_t and $Pre\text{-}PRAWorkweek_i$ and (ii) including as controls month and industry fixed effects (which absorb the level of the pre-PRA workweek by industry). Standard errors are clustered at the industry level. Each industry is weighted equally.

To interpret β as the causal effect of the workweek limit on earnings, it is important that the trends in earnings before the limit were similar across industries with pre-PRA workweeks of different lengths. Figure 7 shows that, in the three months

[41] In the online Appendix, we consider an alternative definition of treatment that is simply the ratio of an industry's workweek in the pre-PRA period relative to its limit. Results are qualitatively similar.

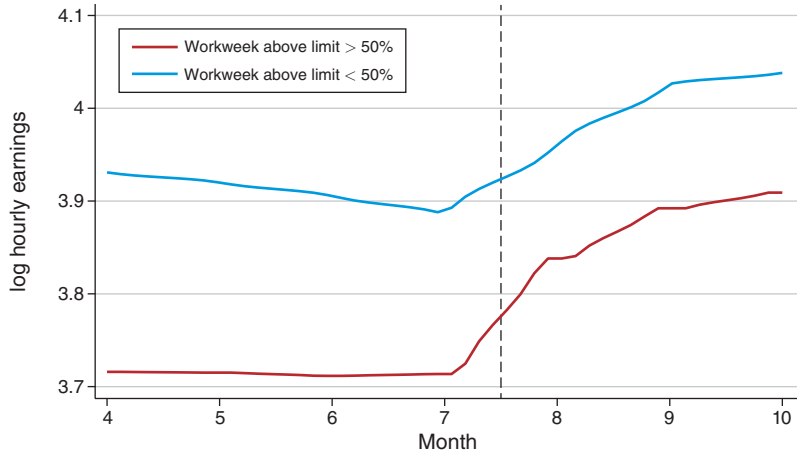

FIGURE 7. EFFECTS OF WORKWEEK LIMITS ON EARNINGS

Notes: These data were collected by the SSNRA and the BLS. They are reported at the industry-by-month level. The sample covers 115 sectors between 1933 and 1935. The sample is smaller for the employment variable because we were only able to recover the level of employment from the indexed value provided in the dataset for about half of the observations. The same problem carries over to the man-hours and payroll variables, which are derived from the employment variable. The groups "Workweek above limit $>$ 50 percent" and "Workweek above limit $<$ 50 percent" are based on the percentage of months from May to June 1933 that an industry's average workweek exceeds the 35-hour limit.

of 1933 leading up to the introduction of the PRA, hourly earnings in industries with workweeks above the limit more than 50 percent of the time (at least 2 months out of the 3) follow similar trends to earnings in those industries with workweeks below the limit more than 50 percent of the time. If anything, earnings were falling in the shorter-workweek industries relative to those with longer workweeks in the pre-PRA period. This would suggest, if anything, our differences-in-difference strategy will *underestimate* the effects of the workweek limit on hourly earnings.

Table 2 shows the regressions results for hourly earnings, weekly earnings, and payroll, which is employment times weekly earnings, as the dependent variables.[42] The odd-numbered columns simply include as controls the PRA time period dummy that identifies August through October and the pre-PRA workweek variable. The even columns include as controls month and industry fixed effects, which absorb the PRA and pre-PRA workweek variables. Consistent with our model, the coefficients of the PRA interaction term show that hourly earnings rise for those industries most severely affected by the workweek limit, that is, those with the longest workweeks before the PRA. Based on these estimates, hourly earnings would have risen in the industry with a workweek longer than 35 hours in all three months before the PRA

[42] The number of observations here is smaller than in Table 1 even though we are using the same sample. This is because here we only include six months of the data for the 115 sectors industries, giving a total of 690 for weekly earnings. We are missing observations for a few industries on hourly earnings, which is why the specifications with that as the dependent variable have slightly smaller sample sizes.

Table 2—Effect of Workweek Limits on Earnings

	Hourly earnings		Weekly earnings		Payroll	
	(1)	(2)	(3)	(4)	(5)	(6)
PRA	0.078		0.187		0.493	
	(0.014)		(0.024)		(0.038)	
Pre-PRA workweek	−0.271		0.125		0.201	
	(0.064)		(0.069)		(0.067)	
PRA × *Pre-PRA workweek*	0.094	0.094	−0.138	−0.138	−0.252	−0.252
	(0.022)	(0.022)	(0.029)	(0.029)	(0.050)	(0.050)
Month	No	Yes	No	Yes	No	Yes
Industry	No	Yes	No	Yes	No	Yes
Observations	641	641	690	690	690	690

Notes: All dependent variables are in logs. Only data from April through October 1933, excluding July, are included. The *PRA* variable is an indicator for the months of August through October. The variable *Pre-PRA workweek* is the fraction of months the industry's workweek was above 35 hours before the start of the PRA in July 1933. These data were collected by the SSNRA and the BLS. They are reported at the industry-by-month level. The sample covers 115 sectors between 1933 and 1935. The sample is smaller for the employment variable because we were only able to recover the level of employment from the indexed value provided in the dataset for about half of the observations. The same problem carries over to the man-hours and payroll variables, which are derived from the employment variable. Standard errors are clustered at the industry level.

by 9.4 percent relative to an industry that never had a workweek higher than 35 hours in the pre-PRA period.[43]

The PRA interaction coefficients for weekly earnings in columns 3 and 4 are also consistent with our model. They show that weekly earnings fell 13.8 percent more in industries where the workweek exceeded 35 hours in the months before the PRA than in industries where weekly hours had been below 35 hours. Thus, the workweek in industries with high pre-PRA workweeks fell relatively more than hourly earnings rose in those industries. The relative changes in weekly hours, hourly earnings, and weekly earnings are consistent with our model, which predicts that firms sought to maintain the same level of utility for workers by reducing weekly earnings to "compensate" workers for the benefits they received from shorter workweeks.

We want to emphasize that, unlike in the regressions in Table 1, we do not ascribe any causal interpretation to the PRA time period fixed effect in the odd-numbered columns. The estimate of that fixed effect could reflect, in part, the general equilibrium effects of the workweek limit that we outlined in our model. It could also reflect the myriad of other aggregate changes that took place during this period of time from the ramping up of relief spending to the devaluation of the dollar. Finally, it could also capture the direct effects on wages of the PRA minimum wage provisions, a point we return to below.[44]

[43] In the online Appendix, we conduct an event study analysis interacting the pre-PRA workweek variable with a full set of month-by-year fixed effects. This allows us to examine what happens in 1934 and after the *Schechter* decision. We find very stable effects through 1934 and no major change after the NIRA was ruled unconstitutional (though we only have a few months of data after May 1935).

[44] The overall relationships between the PRA and the earnings measures in Table 2 have the same positive sign as the pre–compliance crisis PRA coefficients in Table 1. The overall effect of the PRA on weekly earnings in

Table 3—Effect of Workweek Limits on Earnings Controlling for Pre-PRA Hourly Earnings

	Hourly earnings		Weekly earnings		Payroll	
	(1)	(2)	(3)	(4)	(5)	(6)
PRA	0.065		0.181		0.487	
	(0.013)		(0.025)		(0.039)	
Pre-PRA earnings below median	−0.396		−0.380		−0.372	
	(0.035)		(0.037)		(0.042)	
Pre-PRA workweek	−0.074		0.336		0.408	
	(0.044)		(0.055)		(0.058)	
PRA × *Pre-PRA earnings below median*	0.122	0.121	0.067	0.067	0.062	0.062
	(0.017)	(0.018)	(0.019)	(0.019)	(0.039)	(0.039)
PRA × *Pre-PRA workweek*	0.034	0.033	−0.175	−0.175	−0.287	−0.287
	(0.018)	(0.018)	(0.033)	(0.033)	(0.055)	(0.055)
Month	No	Yes	No	Yes	No	Yes
Industry	No	Yes	No	Yes	No	Yes
Observations	641	641	690	690	690	690

Notes: All dependent variables are in logs. Only data from April through October 1933, excluding July, are included. The *PRA* variable is an indicator for the months of August through October. The variable *Pre-PRA workweek* is the fraction of months the industry's workweek was above 35 hours before the start of the PRA in July 1933. The variable *Pre-PRA earnings below median* is an indicator for whether an industry had below the median level of hourly earnings in the pre-PRA period. These data were collected by the SSNRA and the BLS. They are reported at the industry-by-month level. The sample covers 115 sectors between 1933 and 1935. The sample is smaller for the employment variable because we were only able to recover the level of employment from the indexed value provided in the dataset for about half of the observations. The same problem carries over to the man-hours and payroll variables, which are derived from the employment variable. Standard errors are clustered at the industry level.

The Roosevelt administration's ultimate goal was to raise the purchasing power of workers by employing more workers without reducing weekly earnings. Columns 5 and 6 examine the effects on purchasing power by estimating the model using total payroll, which multiplies employment by weekly earnings, as the dependent variable. The results in the last two columns show that payroll fell in industries with the longer workweek in the pre-PRA period by about 28.7 percent relative to an industry with a shorter workweek. Therefore, employment in the pre-PRA long-workweek industries did not increase enough (and in this sample actually fell) to offset the decline in weekly earnings, as Roosevelt would have hoped. The fact that we find any effect on payroll is in tension with the results from our model, which predicts no differences by industry in the effect of the workweek limit on total payroll. The lack of cross-sectional differences in the model is an artifact of the constant returns to scale assumption. With nonconstant returns to scale, it would be possible to rationalize the differences we observe here.

A competing explanation for these results on earnings is the minimum wage provision of the PRA. As noted earlier, it is the case that, although industries with longer and shorter pre-PRA workweeks were on similar trends before the

Column 3 is calculated as $0.187 - 0.138 \times$ *Pre-PRAWorkweek*. The *Pre-PRA workweek* variable ranges from 0 to 1 so the overall PRA relationship ranges from 0.187 to 0.049. In a similar fashion, the overall effect for payroll in column 5 ranges from 0.493 to 0.241. For the even numbered columns, the calculations of the overall PRA effect using each month fixed effect and the coefficient of the PRA interaction terms lead to positive relationships for the PRA with earnings and payroll in each PRA month.

PRA, industries with longer workweeks tended to pay lower hourly earnings. Presumably, these industries would tend to see a larger rise in hourly earnings due to the relatively more binding minimum wage following the PRA. An approach to addressing this competing explanation is to include an additional interaction with an industry's average level of hourly earnings before the PRA. This allows us to control for differences in the potential direct effect of the minimum wage on average earnings. Industries with lower hourly earnings in the pre-PRA should see a larger increase following the PRA due to the minimum wage. To do this, we include the same variables as before, but now we also include an indicator for whether an industry had hourly earnings in the pre-PRA period below the median and its interaction with an indicator for the PRA period.

Columns 1 and 2 of Table 3 show that, as expected, the industries with below-median pre-PRA hourly earnings do experience a relative increase in their hourly earnings of more than 12 percent. This is consistent with the minimum wage pushing up in a relative sense hourly earnings in those industries that were paying less before the PRA. Even after controlling for these direct effects, we still observe that those industries with longer pre-PRA workweeks experienced an increase in hourly earnings of 3.4 percent following the PRA. This effect is smaller than when we do not control for pre-PRA hourly earnings, but it is still statistically significant and economically meaningful. This shows that it is not just the PRA (and later NIRA) minimum wages that explain the rise in hourly earnings during this period but also the workweek limits. The remaining columns show that the effects of the workweek limit on weekly earnings and total payroll are still present (and in fact slightly larger in magnitude) even after controlling for the effects of the minimum wage. This provides additional evidence for the critical role played by the workweek restrictions of the PRA.

VIII. Conclusion

The Roosevelt administration pushed the workweek limits of the PRA and the NIRA with the goal of raising employment and maintaining or increasing hourly earnings. We find that employment did rise immediately following the PRA but not nearly as much as would be expected from a simple theory in which the workweek and employment were perfect substitutes as factors of production. As a consequence, total hours worked fell, presumably slowing the recovery in the aggregate economy. While hourly earnings also rose following the PRA, the increase was not enough to offset the decline in hours, with the result a decline in weekly earnings. Now, from our theory's perspective, this post-workweek-limit equilibrium need not be Pareto dominated by the no-workweek-limit equilibrium. Instead, it comes down to a political question trading off the interests of firms and workers (as well as employed versus unemployed workers). In this regard, while the workweek limit was no panacea for the problem of a depression, we believe that the Roosevelt administration would have viewed our estimates of the effects of the workweek limits as a success.

Our results fit into a literature on the effects of more recent examples of work-sharing or short-time-work policies. These policies subsidize firms that reduce hours rather than fire workers when faced with a decline in demand. Research has found mixed evidence on the effectiveness of these policies for maintaining