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A review of the consequences of the Indian minimum wage on Indian wages and employment

Paul Wolfson

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Preface

India was one of the first developing countries to introduce a minimum wage policy. Similarly, the Minimum Wages Act of 1948 constitutes an important piece of labour legislation, which sets the framework for the appropriate government to fix minimum wages in a number of scheduled employments. Over the last 70 years, the minimum wage system in India has extended its coverage, incorporating different scheduled employments/establishments across states. The degree of complexity found in the system reflects the economic, cultural and geographical diversity of the country and the policy response to major changes in the social and economic context. In recent years, the debate has focused on the simplification of the system and the idea to have a national minimum wage to address the existence of wide wage disparities in economic development and large variations in cost of living between regions and states. An important initiative was the introduction of the Code on Wages Bill in the Lok Sabha in August 2017, which attempted to simplify and subsume four Acts (the Minimum Wages Act, 1948; the Payment of Wages Act, 1936; the Payment of Bonus Act, 1965; and the Equal Remuneration Act, 1976) and also proposed the introduction of a binding National Minimum Wage.

In December 2017, The Central Advisory Board (CAB) on minimum wages held a meeting to discuss the provisions in the proposed Code on Wages Bill, 2017. ILO representatives presented the ILO Conventions on minimum wages and international minimum wage systems, including country experiences from Brazil, Russia, India, China and South Africa (BRICS). The Government of India, on the basis of recommendations made by CAB, constituted an Expert Committee for Determining the Methodology for Fixing the National Minimum Wage. Their report was finalized in December 2018. From an ILO perspective, we welcome the recommendations in the report becoming a reference point for decisions to be made through a full consultation process with the stakeholders; to encourage the Government of India to adhere to the ILO Minimum Wage Fixing Convention, 1970 (No. 131) to address the design and operation of the Indian minimum wage system; and to use information, evidence-based studies and minimum wage impact analyses to pave the way for the discussion on the revision and adjustment of the minimum wage level. On the latter we consider that the already existing literature can provide important inputs to address the implications that a minimum wage policy may have on wages and employment in India.

It gives me immense pleasure to note that Paul Wolfson, a renowned academician on issues relating to empirical studies on minimum wages, has been able to systematically review the Indian literature on the minimum wage impact on wages and employment. The compilation of the findings provides insightful information on the implications of a minimum wage policy, which will serve the purpose to effectively identify caveats of the minimum wage system for policy-makers and our Constituents to take into account for setting and adjusting minimum wages.

I take this opportunity to express my appreciation to Xavier Estupinan, Wage Specialist of the Decent Work Technical Support Team (DWT) for South Asia, who has supported the development of this and other studies to increase our evidence and knowledge basis to improve the minimum wage system in India.

Dagmar Walter

Director, ILO Decent Work
Technical Support Team for
South Asia and Country Office
for India

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Abstract

This paper reviews the literature that relates minimum wages in India to wage and employment outcomes. The entire empirical literature on the Indian minimum wage is not large, and the segment focused on wages and employment comprises only a few analyses. It reports that minimum wages result in higher wages. However, this occurs not near the bottom of the wage distribution, as would be expected from a wage floor, but near the middle of the distribution. This suggests a lighthouse effect; a minimum wage that is aspirational, acting as a benchmark to which various wages are compared, rather than a floor. The only statistically significant, negative effect on employment that is reported is for child labour. Other estimates are either not statistically significant or are positive.

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Abbreviations

BRICS	Brazil, Russia, India, China and South Africa
DID	difference-in-differences
EUS	Employment-Unemployment Survey
KDP	kernel density plot
NSS	National Sample Survey
OLS	ordinary least squares regression
RIFreg	Recentered Influence Function Regression
VES	variable elasticity of substitution

1. Introduction

This paper surveys the empirical literature on the consequences of the minimum wage for wages and employment in India. These are the two most studied consequences of minimum wage in advanced economies because the direct impact, if any, of minimum wage regulation is expected to be on wages.[1] If, for some reason, no wage response is detected, then it is unlikely that the minimum wage influences any other variable, at least none of conventional economic interest. Only after a wage response is found does it make sense to explore other consequences, for example, on employment, poverty, prices or inequality (whether of wages or income). However, if higher wages lead to lower employment, it is possible that intended goals of minimum wage policy will not be attained, which is why the response of employment is the other most studied outcome.

The literature on minimum wage impact analysis in India is not large.[2] Much of the minimum wage literature deals with institutional and other descriptive detail – how it is set, the number of different minimum wages across the country and different sectors of the economy – rather than inferential statistical analysis that leads to the assessment of causal effects and their size. Recent surveys of the literature on minimum wage and employment in emerging economies have included only a single study that has used Indian data (Belman and Wolfson, 2016; Broecke, Forti and Vandeweyer, 2017).[3] Work for this survey has turned up five analyses that report estimates of the consequences for employment and an overlapping set of six for wages. What do they conclude? Briefly, that Indian minimum wage policy does raise wages, but not at or near the bottom of the wage distribution as would be expected of a wage floor. Rather, its strongest effect is just below or even above the median wage. As for employment, it appears that, if anything, it increases the employment of adults, though any conclusions here must be especially tentative because of the small size of the literature, and widespread non-compliance with the law.[4] One analysis indicates that higher minimum wages are associated with reductions in the quantity of child labour.

2. Preliminaries

Minimum wage was among the first areas of empirical study in economics to see the application of the difference-in-differences (DID) framework and related techniques that together fall under the grouping of quasi-experiment. Specifications that allow for the interpretation of results through the lens of a quasi-experiment have become the most widely trusted in this area. Soundararajan (2018) is the only analysis surveyed here that includes any estimates along these lines.

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[1] I ignore game theoretic analyses that show how a minimum wage can strengthen the bargaining position of (potential) employees.

[2] Strong, though indirect, evidence for this assertion comes from Belser and Rani (2011), a simulation of the response of poverty-level incomes to the extension of the minimum wage in India to all employees. Carrying out the calculations requires a value for the elasticity of labour demand. The most defensible choice would be a value (or values) drawn from studies of Indian data. Instead, they specify two values and justify them based on studies of Latin America and the United States, something unimaginable were reputable studies closer to home available.

[3] See Belser and Rani (2015) for a comprehensive discussion on the implications of the minimum wage literature for India, skilfully combining empirical analysis of both developed and emerging economies with the much sparser body of research on India.

[4] Rani and Belser (2012) document the extensive non-compliance. In 2009–10, about one-third of wage earners in India received less than the national minimum wage. In some states, at least two-thirds of covered female domestic workers were paid less than the minimum wage.

As three of the same studies appear in different parts of the text below, brevity is served by describing each of them once, now. Unless otherwise stated, each study in this survey (not just the ones described immediately below) relies on data from the National Sample Survey's (NSS) quinquennial Employment–Unemployment Survey (EUS), differing in the specific variables selected and in the waves used.[5]

Menon and Rodgers (2017) use data from the six surveys between 1983 and 2008, drawing several hundred thousand observations from each, to study the effect of the minimum wage on men and women. In different parts of the analysis, they further distinguish between those working in urban and rural areas, and those working in the formal and informal sectors. In their next study, Menon and Rodgers (2018) use the same data to examine the consequences of the minimum wage for child labour. The motivation for this study is that models of the (adult) minimum wage are ambiguous in their implications for child labour, depending on such things as the consequences of the minimum wage for adult employment: if the primary effect of a higher minimum wage is to increase household income through higher wages for adults (parents), child labour may well fall. If it draws parents into (more) paid employment, child labour may rise as boys must devote more time to family businesses and agricultural plots, and girls to domestic labour. They also distinguish between rural and urban sectors in this analysis.

Soundararajan (2018) uses the construction industry to study the interplay between the level of the minimum wage and the level of its enforcement, both of which are set at the state level for this industry.[6] The effect of enforcement on employment is not clear *a priori*, depending on labour market characteristics, in particular on whether the labour market can be adequately characterized as competitive, or whether due to frictions and information imperfections it is more adequately described as monopsonistic. Unlike the other analyses in this survey, Soundararajan (2018) relies not on the EUS but on annual and biennial surveys of the NSS, from 2004 to 2012.

Semi-skilled and unskilled individuals who work in construction typically work in agriculture or perhaps retailing when construction employment is unavailable (ibid.). Accordingly, the sample that Soundararajan analyses comprises individuals who report working in these industries and whose education ended before middle school. Since it is restricted to individuals employed in three industries (construction, agriculture and retailing), the number of observations is in the thousands rather than the tens of thousands to millions (Menon and Rodgers, 2017, 2018). The analysis relies on an equation that would be conventional except for its having been augmented with a quadratic minimum wage term (to allow for labour market monopsony), a measure of labour regulation enforcement, and interactions between the enforcement variable and both minimum wage terms (i.e. linear and quadratic).

To match control and treatment groups more carefully, part of this analysis follows Dube, Lester and Reich (2010), descending from the level of the state to that of the district, and pairing adjacent districts on opposite sides of state borders. Within pairs, the minimum wage will typically be higher in one district than the other but because they are adjacent to each other, it is likely that other economic variables will be similar. Because the level at which observations are grouped together changes (from states to districts), in that part of the analysis where treatment and control groups are carefully matched,

[5] See Papola (2014, section 3.1.1) for a description of the quinquennial NSS.

[6] Soundararajan (2014) examines many of the same issues with much the same data but with a different specification, different level of aggregation and a slightly different list of variables. The results of interest to this survey are similar in the two papers, the overlap between the two is considerable and the second is more polished and complete. For these reasons, I focus on the latter to the neglect of the former.

two sets of results are presented. The first are based on the same model as used at the state level, without the dummy variables that place districts in pairs of treatment and control district; the second includes those dummy variables. The difference between these two is due to the effect of the matching. There are a great many results because of sensitivity analyses along several dimensions. I limit my discussion of Soundararajan (2018) to the basic results (table 3) and those of the more precisely defined control groups (table 5).[7]

Except for Rani, Belser and Ranjbar (2013), who use a two-period panel of data aggregated to the district level, the regressions of both wage and employment effects use samples of individuals that are from a single period (Goldar and Banga, 2005) or are repeated cross-sections of individuals over time. Again, except for Rani, Belser and Ranjbar (2013), who use one-way fixed effects, the regressions rely on a two-dimensional structure and include two-way fixed effects. The Indian minimum wage is considerably more complicated than minimum wages even in other countries with a federal structure. In the latter, two-way fixed effects are possible but their interactions would absorb the effect of the minimum wage. In India, with minimum wages that differ by state, year and sector, the interaction of state and year dummies does not do this. Menon and Rodgers (2017, 2018) and Soundararajan (2018) all include these interactions to account for time-varying macroeconomic factors local to each state.

3. Wages and kernel density plots

Kernel density plots (KDPs) are one of two techniques used to examine the effect of minimum wage on wages in India (regression analysis is the other). A KDP is similar to a histogram that has been constructed in a way that will systematically smoothen the edges of the rectangular bars of the histogram. When considering a situation in which the minimum wage is relatively simple, for example, a single minimum wage that applies to all employees, the construction and examination of the KDP is also relatively simple. First, construct the KDP and locate the minimum wage on the graph. In a typical KDP, the wage will vary along the horizontal axis, and the height of the graph indicates the proportion of employees at the corresponding wage. Second, inspect the graph and determine whether the KDP is noticeably taller at (and immediately above) the minimum wage than further away in either direction. Presumably, if compliance is high, the graph will be very low to the left of the minimum wage, i.e. where wages are less than the minimum wage, and will drop for at least some distance to the right of the minimum wage. If compliance is poor, if many employees receive less than the minimum wage, then the graph is likely to be higher to the left of the minimum wage than at (or just above) it. If the minimum wage is set very low, it may have little to no effect on wages, and any spike will be at some distance above, to the right of, the minimum wage.

In more complicated situations, for example, that of India, the existence of many minimum wages makes it not possible to locate the minimum wage on the KDP. Here, it is common to match each employed worker in the sample to the appropriate minimum wage and subtract the logarithm of the minimum wage from the logarithm of the employee's wage. The KDP is constructed from these differences, and a value of zero on the horizontal axis indicates that the employee's wage equals the minimum wage; negative values on the horizontal axis indicate wages less than the minimum wage and positive values wages that are larger.

[7] Please refer to table 3 ("OLS regression of outcomes on minimum wage and enforcement") and table 5 ("Including district and border-district pair fixed effects. OLS regression of outcomes on minimum wage and enforcement") in Soundararajan, 2018.

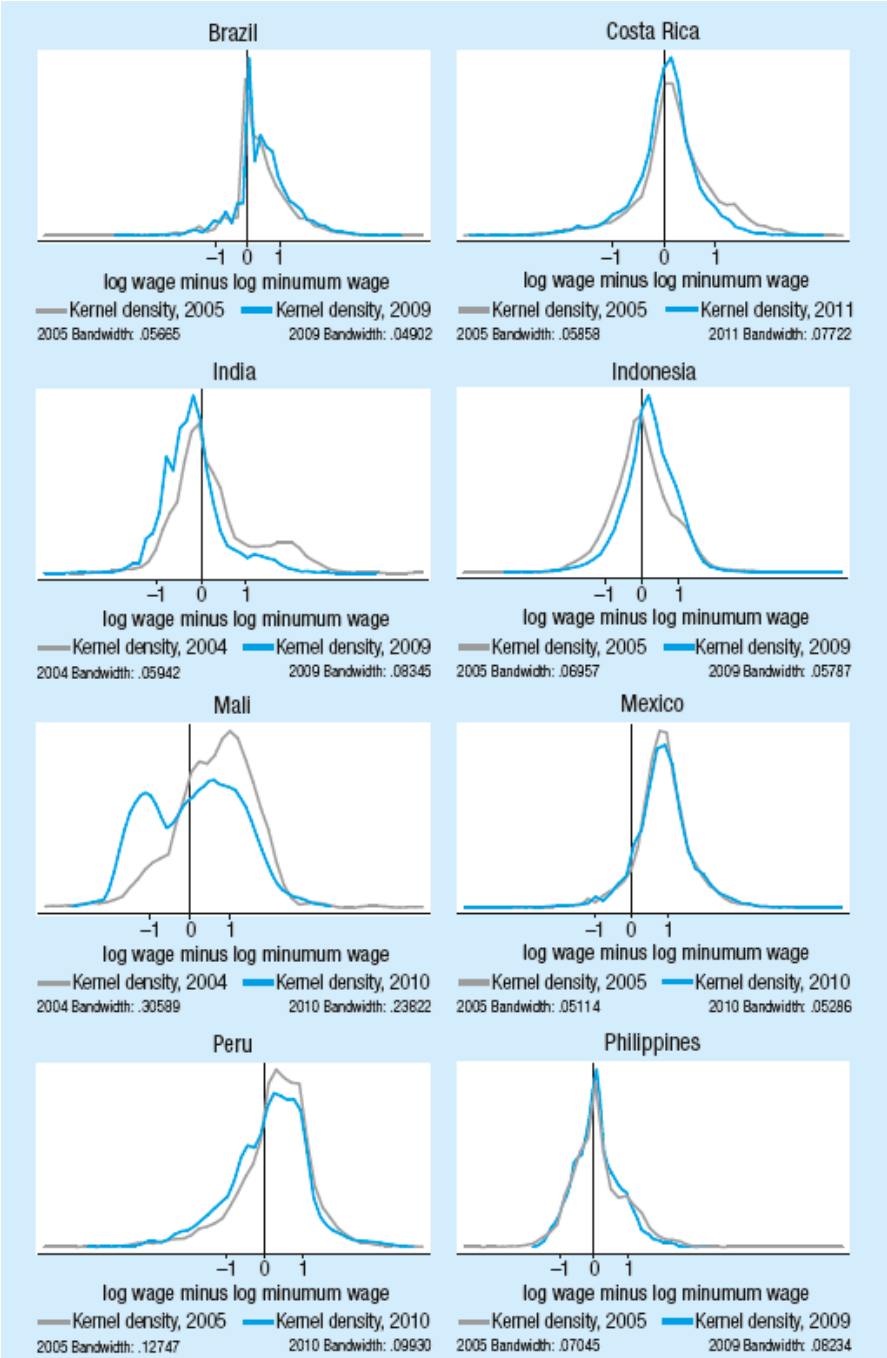
Consider the KDPs in figure 1[8], one graph for each of the six countries. This shows KDPs of this second sort, using log differences. Each graph contains two KDPs, one for 2004 or 2005 and one for 2009, 2010 or 2011. Before turning to the plots for India, let us consider three others, those for Brazil, Mali and Mexico. For both years, the graph for Brazil is very low to the left of zero, where the employee's wage equals the minimum wage, and there is a high, sharp peak at zero that quickly falls as the wage increasingly exceeds the minimum wage. This low level to the left suggests good compliance as few employees are receiving less than the minimum wage.[9] The rapid decline to the right of the minimum wage suggests that the minimum wage is set high enough to raise wages of those employees whose wages equals or slightly exceeds the minimum wage[10]. In the absence of the minimum wage, we might, for example, expect to see the KDP for 2009 showing a rough symmetry to the left of the lower peak indicated by the arrow, connecting with the KDP just below zero, as indicated by the dashed, straight line that has been added to the original figure. Of course, this is an assertion of causality running from the minimum wage to wages based on the coincidence of the peak in the KDP with the minimum wage. Other possibilities are that the minimum wage just happens to be at the same point in the distribution as the peak, literally a coincidence, and that those setting the minimum wage deliberately set the minimum wage so that it would appear to have a wage effect, perhaps for political reasons (i.e. that rather than the minimum wage having an effect on wages, the distribution of wages has an effect on the minimum wage). Both of these are possible but seem less likely than the first explanation.

[8] Figure 4 in Rani et al., 2013.

[9] See Rani et al. (2013) for a discussion on compliance in these countries. They confirm that compliance is high in Brazil and much less so in India.

[10] Cacciamali et al. (2015) compare the minimum wage policy in Brazil and India. The former has a simple structure and a high level of enforcement, while the latter has a complicated, highly fractured policy and very uneven enforcement. Rani et al. (2013, figure 5, "Rates of compliance with minimum wage legislation in 11 developing economies (percentages)") estimate compliance in Brazil to have been 80 per cent or higher in the middle to late years of the first decade of the twenty-first century, while in India the corresponding figures were about 30 per cent in the middle of that decade and 60 per cent towards the end.

Figure 1. Wage distributions and statutory minimum wages of covered employees



Note: I thank Uma Rani of the ILO for permission to use the plots in this figure.

Source: Rani et al., 2013, figure 4.

The 2010 KDP for Mali is interesting because there are two peaks. One, a bit to the right of zero, i.e. at a wage a bit larger than the minimum wage, indicates a likely increase for some wage earners. The other, however, is well to the left of zero, and indicates that a substantial proportion of employees is receiving less than the minimum wage.

This suggests poor compliance with the minimum wage at least by the employers of some groups or types of employees. Finally, consider the KDP for Mexico, which peaks well to the right of the minimum wage. Here, the minimum wage has been set too low to have much effect on wages, and, in the absence of other institutional factors, one should not expect it to have any economic effect at all.[11]

Turning to India, the 2004 KDP shows a peak right at the minimum wage and the 2009 KDP shows a peak a bit to the left of the minimum wage. Two things are clear from the 2004 peak. The first is mediocre but not bad compliance with the minimum wage; the result of good compliance would be something more like Brazil with the KDP having very little height at wages less than the minimum wage (i.e. to the left of zero in this graph). Second, the minimum wage has an effect on wages, but not quite what is expected from something called a minimum wage. Rather than a floor, it appears to be more a benchmark used for wage setting or negotiation. Both inferences hold more strongly for the 2009 KDP, with a peak that is a bit further to the left of the minimum wage, especially the inference about compliance which is less good than in 2004.[12]

Menon and Rodgers (2017) present four KDPs, each showing the effect of the minimum wage in 1982 and 2008. For men in the formal sector, the peak was slightly to the right of the minimum wage in both years, more pronounced in the later year and with considerably greater compliance. For men in the informal sector, the peak was a bit to the left of the minimum wage in 1983, and the plot has a smooth shape, suggesting that the minimum wage was largely irrelevant to informal male wages then. In 2008, however, the minimum wage intersects the almost symmetric KDP just to the left of the more pronounced peak, and the nearly symmetric shape suggests that although the minimum wage is not a floor for informal sector male wages, it is an important benchmark in wage bargaining, playing a lighthouse effect (ibid., p. 41). For women in both sectors, the peak is slightly to the left of the minimum wage, closer in 2008 than in 1983, indicating that compliance with respect to the wages that women earn is considerably poorer than for men. The proximity of the peaks to zero suggests that the minimum wage is not entirely irrelevant to women's wages, but whether the minimum wage plays a direct role in determining women's wages or only an indirect one through its effect on men's wages is not possible to determine from these graphs. In any event, its effect on women's wages is much weaker than on men's.

Menon and Rodgers (2018), focusing on minimum wage and child labour, present four similar KDPs, for the same two years 1983 and 2008, but for men and women in urban and rural areas rather than in the formal and informal sectors. However, if we substitute urban for formal and rural for informal, the graphs are qualitatively very similar.

Soundararajan (2018) presents KDPs for about half the states in her sample for 2004–05. To allow for further comparison, and because she is dealing with a single industry with a single minimum wage in each state at any given moment, she need not, and does not, standardize by subtracting the logarithm of the minimum wage from the logarithm of the wage, so it is possible to compare actual wage distributions across states, not distribution of wages relative to the (local) minimum wage. It is relatively easy to identify the states that had the highest minimum wage in construction during that period (Kerala and Delhi) and those that had the lowest (Odisha and Bihar).

[11] During this period, the minimum wage in Mexico was used as a reference point for a variety of wages and government expenditures.

[12] See Saget (2006, section 5.1) for an exploration of the role of the minimum wage in wage bargaining roughly contemporaneous with the earlier KDP.

In Kerala and Odisha, the peak of the KDP is at the minimum wage, and in Rajasthan it was barely to the right of the minimum wage. Elsewhere, except for Himachal Pradesh and Assam, the peak was to the left of the minimum wage, by a small amount in Haryana, and by larger amounts in Bihar and Tamil Nadu. The implication is that the large number of states with peaks to the left of the minimum wage exhibited relatively poor compliance on the part of employers; even in Kerala and Assam, where the peak was at or to the right of the minimum wage, the KDP was relatively high for a substantial interval to the left of the minimum wage, suggesting that compliance could have been better. Only in Himachal Pradesh does the KDP indicate good compliance at that time.

Considering only the location of the peak relative to the minimum wage, it appears that the minimum wage did influence construction wages in Kerala, Odisha, Rajasthan and perhaps Haryana. All four of these KDPs were neatly symmetric around the minimum wage (or nearly so), not at all like the case of Brazil, discussed previously, with its much sharper peak immediately above the minimum wage. This seems to provide support for the lighthouse effect already mentioned while discussing Menon and Rodgers (2017), rather than a minimum wage that is an actual floor for wages. For the remainder of the states, it is difficult to detect an impact of the construction minimum wage on construction wages, and certainly not with any confidence.

4. Wages and regression analyses

The KDPs belong to the part of statistics known as *descriptive statistics*. While very useful and informative, conclusions based on the results of descriptive techniques are thought, fairly or not, to be somewhat subjective, perhaps too reliant on judgment. Techniques from inferential statistics are usually believed to be more objective and thus at least potentially more reliable. The standard inferential technique for examining the effect of the minimum wage on wages (or employment or almost any other outcome) is regression analysis of a wage equation. This is an equation in which an individual's wage is the dependent variable and a collection of variables describing both the individual (e.g. gender, age, level of education) and the relevant labour market (location, i.e. state or district of employment, industry, applicable minimum wage) are used to predict the wage. Goldar and Banga (2005), Menon and Rodgers (2017), Soundararajan (2018) and Rani and Ranjbar (forthcoming) all examine the effect in this way.

Goldar and Banga (2005) take an approach that is unusual for the minimum wage literature, not surprising since the minimum wage and its effects are peripheral to their central concern: the source of deviations between the actual wage and the marginal product of labour, which would be the profit maximizing wage for the firm if the textbook case of perfect competition matched the labour market. Also distinguishing this analysis from the others mentioned below is the primary source of the data: the Annual Survey of Industries. Using data from the 1998–1999 survey, they conclude that the minimum wage reduces these deviations, raising wages.[13]

[13] Because the minimum wage is peripheral to Goldar and Banga's (2005) primary concern, they have made analytic choices that are not typical of the minimum wage literature. Their dependent variable is not the wage but the logarithm of the marginal product of labour divided by the wage. The minimum wage variable is the logarithm of the amount of employment in the state that is paid less than the minimum wage. In the mainstream minimum wage literature, a typical measure of the minimum wage is its value relative to a price index, or the mean or median wage. When measures are used that are similar to that of Goldar and Banga (2005), what is being studied is the effects of an increase in the minimum wage. Then the fraction of the labour force earning less than the new, higher level is taken as the measure of the size of the change, and it is expected to be proportional to the response of wages and employment. These two differences in the dependent variable and in the minimum

For their wage equations, Menon and Rodgers (2017) combine their data on individuals with data on state and industry minimum wages as well as with macroeconomic and regulatory data (including some that pertains to labour law enforcement). They report statistically significant elasticities of 1.078 and 0.687 for men and women, respectively, in the rural sector.[14] These figures imply that in percentage terms, rural men's wages rise almost exactly one-for-one with the minimum wage, while rural women's wages rise only about two-thirds as much. Suppose we compare two rural individuals, A and B, who differ only in the level of the applicable minimum wage; the minimum wage for A is 1 per cent higher than that for B. If both are male, then we would expect to find the wage of A about 1 per cent higher than the wage of B, while if both are female, we would expect to find that the wage of A is about two-thirds percentage higher than that of B. The point estimates for men and women in the urban sector were both smaller, especially for men, and were less than 1.4 times as large as the standard errors: that is, they are not statistically significant.

In the basic results of Soundararajan (2018), the average elasticity of the wage with respect to the minimum wage ranges between about 0.47 and 0.61 and each is without question statistically significant; an average value of 0.52 with a mean standard error of 0.16.[15] The largest value is in the specification that allows for the largest role of enforcement: that is, enforcement increases the response of wages to the minimum wage. When observations are grouped at the district level, but the restrictions necessary for analysis as a quasi-experiment are not imposed, the average elasticity is 0.33 and not statistically significant, much less than the statistically significant elasticities near or greater than 0.5 mentioned above. No explanation is given for this difference. In the second model, with the careful matching, the elasticity is only slightly larger, 0.36, but the standard error has dropped by nearly half, so the point estimate is quite precisely estimated. When the minimum wage is higher by 1 per cent, wages will be 0.36 per cent higher.

Rani and Ranjbar (forthcoming) use two techniques to decompose the minimum wage response of wages: a conventional quantile regression and Recentered Influence Function Regression or RIFreg. For our purposes, only the latter is of interest and so that will be the focus of the discussion that follows.[16] RIFreg can be thought of as a series of linear probability regressions at different points of the wage distribution (e.g. 10th percentile, 20th percentile, etc.), where the dependent variable indicates whether the wage is less than or more than the value of the wage corresponding to that percentile. However, instead of being a 0/1 variable, the dependent variable is rescaled so that the coefficient

wage variable together make any quantitative comparison of their results with others quite difficult. Therefore, an extensive description of their analysis is more appropriate in a footnote than the text.

The first step is the estimation of a wage equation based only on a variable elasticity of substitution (VES) production function in capital and labour: the log of wages on the left, output per worker and the capital labour ratio on the right. The residual becomes the dependent variable in the next step. (It is curious that the sample for the first step comprises 2,196 observations while that for the second only 534. Presumably, the difference is due to what data was available in the second step.) One of the explanatory variables is a variable measuring the level of the minimum wage. Others include variables that capture labour market conditions and institutions, macroeconomic conditions, and industrial structure.

Finally, observations are labelled by state and three-digit industry. These two dimensions allow for a panel structure, and the second step of the analysis includes random effects (although the first relies on ordinary least squares regression or OLS).

[14] It bears noting that Menon and Rodgers (2017) report standard errors robust to clustering by state, presumably the conventional ones of Liang–Zeger. It is generally accepted that these do not adequately solve the problem of downward-biased standard errors when there are only 15 clusters, or, as in this case, states: see Bertrand, Duflo and Mullainathan (2004) or Angrist and Pischke (2009). This suggests that the inference of statistical significance may be in error.

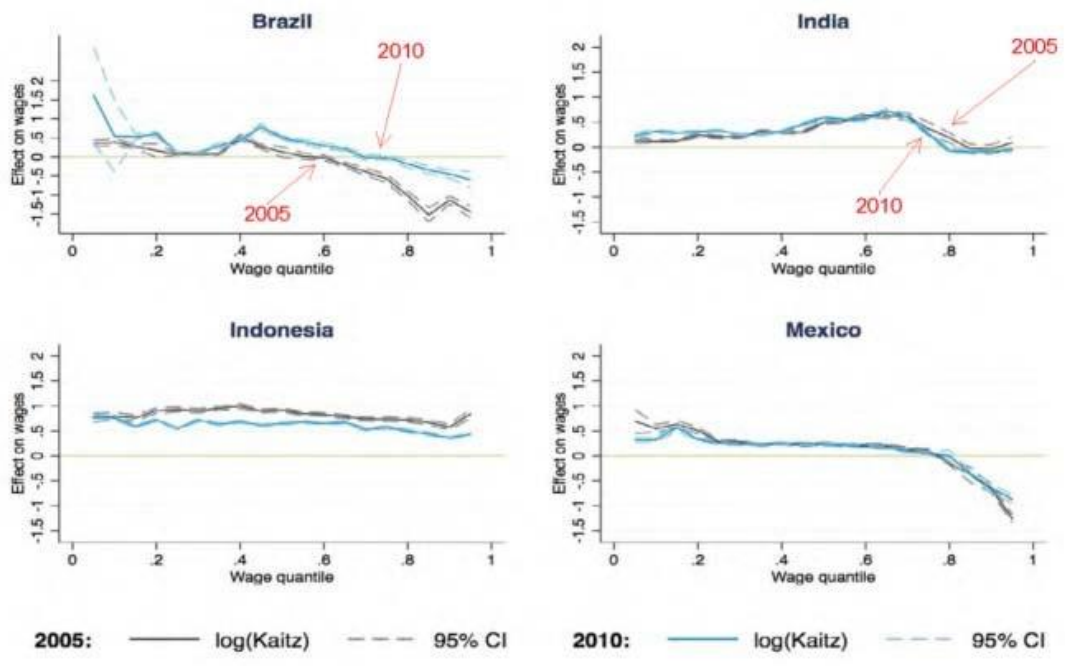
[15] These numbers are drawn from table 3 ("OLS regression of outcomes on minimum wage and enforcement"), the row labelled "Average *mw* Effect" in Soundararajan (2018).

[16] Conventional quantile analysis groups observations according to their deviation from the fitted value of the regression, i.e. according to where their residual lies in the residual distribution. In some contexts that may well be a useful way of organizing and analysing the data. In this context, where the interest is in understanding how the minimum wage affects wages at different points of the wage distribution, it is of little interest.

estimates are in the same units as they would be in a standard wage equation; this makes it much easier to compare the estimates.

Rani and Ranjbar (forthcoming) performed this for four countries, including India and Brazil, for each of two years, 2005 and 2010, and plotted the results (see figure 2). In Brazil, where compliance is high, the minimum wage had a very large effect on wages at the bottom of the distribution in 2010 (but notice the large confidence interval there); this was less so in 2005. In both years there appears to be another noticeable effect, around the 40th to 50th percentile of the distribution. In both years, the effect falls steadily thereafter as we consider higher and higher points of the wage distribution. In India, in contrast, where compliance is much poorer, the effect is small in both years up through roughly the 40th percentile; it then rises slowly through about the 70th percentile and then falls to (very near or equal to) zero at the 80th percentile. These detailed results are broadly consistent with the KDPs in figure 1; Brazil has a sharp spike at the minimum wage and relatively little employment to the left, while for India most employees earn less than the minimum wage.[17]

Figure 2. Estimation of minimum wage on wage distribution, two years separately



Note: I thank Uma Rani of the ILO for permission to use the plots in this figure.

Source: Rani and Ranjbar, forthcoming.

Before turning to the studies of the effect on employment, it is worth thinking about how the minimum wage affects wages. When compliance is high, when the minimum wage is an effective floor, a higher minimum wage leads to higher wages in two ways. First, the floor is higher; whether this is because

[17] Rani et al. (2013) document that minimum wages in India were more than 130 per cent of the corresponding median wages in 2005.

people who would have otherwise been earning less than the minimum wage are not employed or are employed and earning a higher wage, the floor of the distribution is higher and therefore average wages are higher. Second is the presence of spillover effects, where individuals who would have been earning above the minimum wage even without it, earn even more.[18] This might describe the situation of Brazil. What is the mechanism in India, where the minimum wage is pretty clearly not a floor? The most likely explanation (once again) is that it is a reasonably strong lighthouse, setting expectations on both sides – employer and employee – that wages, whether more or less than the minimum wage, should move with it.

5. Employment and the minimum wage

As with the effect of the minimum wage on wages, estimates of the response of employment in India are few: Rani, Belser and Ranjbar (2013), Menon and Rodgers (2017, 2018) and Soundararajan (2018).[19] Because Soundararajan considers only construction and one or two neighbouring industries (industries to which most individuals in construction migrate when they cannot find employment in construction), specifying a minimum wage is relatively easy. The other studies, however, consider the labour market as either a unitary whole or comprised of only a few, very large sectors. Defining the minimum wage requires considerably more effort, and is worth some discussion.

Rani, Belser and Ranjbar (2013) assigned the state-sectoral minimum wage to employed individuals. For others they compared minimum wage legislation with the occupational classifications associated with the household. Menon and Rodgers (2017) aggregated sectors up to five broad categories (eight in Menon and Rodgers, 2018), and assigned the median minimum wage (for that state and year) to each individual in the category. For individuals whose sectoral category was not identifiable, Menon and Rodgers (2017, 2018) used the median (for that state and year) in either urban or rural sectors. Menon and Rodgers (2018) had to go one step further since the minimum wage does not apply to children aged 10–14. They calculated the average minimum wage for the geographic regions of each child's household based on the industries in that region.

As part of a brief in favour of a well-designed minimum wage policy, Rani, Belser and Ranjbar (2013) present simple estimates of the response of employment to minimum wages in six countries, mostly in the first decade of the twenty-first century.[20] For India, the analysis used data from two waves of the quinquennial NSS EUS, for 2004–05 and 2009–10, and aggregated it into 70 districts, resulting in a two-period panel with 70 observations in each period. The dependent variable of the regression is the district employment rate in each period. The minimum wage variable is the logarithm of the average minimum wage within the district (averaged overemployed individuals in the survey). The

[18] See Brochu et al. (2015), Engbom and Moser (2018) and Nguyen (2017) for estimates of the importance of spillover.

[19] The title of Shimane (2008) includes 'employment level', but it reports no estimates with regard to that. The primary concern of this study is the consequences of minimum wage regulation for firms' technical and allocative efficiency: a firm is technically efficient if it is producing the maximum amount that is technically possible given the quantities of inputs used in production; it is allocatively efficient if given the amount produced, it is using the least expensive combination of inputs that can produce that amount.

[20] Because this essay includes a KDP for Indian wages for the same years as Rani et al. (2013), differing in details only as a result of some choices made in its construction, it does not appear in the section that covers this sort of evidence.

only control variable, other than district fixed effects, is the average level of education. To address concerns that the minimum wage variable might be endogenous, they instrumented it on the degree of compliance within the district. The analysis neither reports nor gives sufficient information for the calculation of employment elasticity; the coefficient is negative but only about 7 per cent larger than its standard error.[21]

Menon and Rodgers (2017, 2018) use the same data and similar frameworks to examine related questions, and the effect of the minimum wage on employment of adults and children. To be able to see the connections clearly, table 1 presents results from both. In the earlier analysis, Menon and Rodgers (2017) estimate a linear probability model for each of the following four groups of individuals: men in the rural sector, women in the rural sector, men in the urban sector and women in the urban sector. The minimum wage varies according to the individual's industry and state, and by time. Other variables in the equation include several which describe the traits of the individual, and of the individual's household and state. Among the last are not only macroeconomic conditions but several that pertain to the labour market regulatory environment, including the degree of enforcement of the minimum wage.

The first row of table 1 presents their estimates for each group. For rural men and women, the effect of the minimum wage on the probability of being in paid employment is statistically significant and positive, and of almost identical magnitude. Menon and Rodgers report that a 10 per cent increase in the minimum wage is associated with a probability of employment that is 6.34 per cent higher.[22] For urban men and women, the magnitude of the effect is about one-fifth to one-half as large, and the standard errors are about three times as large, with the result that neither estimate is statistically significant.

[21] The standard errors are not clustered, since with only two periods this is not necessary.

[22] I am not confident that Menon and Rodgers have correctly interpreted these values as elasticities since only the right hand side variable, the minimum wage, enters the equation as a logarithm. The left hand side variable is not a logarithm but an employment indicator. Based on their point estimate of 0.634, they state that for a 10 per cent increase in the real minimum wage, the linear probability of employment increases by 6.34 per cent on average for men in rural areas of India (Menon and Rodgers, 2017, p. 482). The 6.34 per cent in this sentence should be 6.34 percentage points.

Table 1. Menon and Rodgers' (2017) minimum wage coefficients (and standard errors) in the linear probability model for employment

	Rural		Urban	
Group	**Men**	**Women**	**Men**	**Women**
Employment probability	0.634***	0.602***	0.132	-0.342
	(0.078)	(0.093)	(0.221)	(0.313)
Wage elasticity with respect to the MW	1.078*** (0.213)	0.687**	0.247	0.432
		(0.248)	(0.191	(0.321)

Menon and Rodgers' (2018) minimum wage coefficients (and standard errors) in the linear probability model for employment

Group	**Boys (10–14)**	**Girls (10–14)**	**Boys (10–14)**	**Girls (10–14)**
		Employment probability within the household		
Estimated coefficient on ln(minimum wage)	0.130*	-0.289***	-0.083**	-0.094*
	(0.069)	(0.073)	(0.030)	(0.049)
Elasticity at mean of dependent variable	3.1	-2.3	-4.9	-1.4
Employment ratio	0.042	0.123	0.017	0.067
		Employment probability outside the household		
Estimated coefficient on ln(minimum wage)	0.005	-0.086 (0.065)	0.006	0.000
	(0.077)		(0.058)	(0.020)
Elasticity at mean of dependent variable	0.2	-4.1	0.4	0.0
Employment ratio	0.024	0.021	0.0241	0.012

Note: ***: p<0.01 **: p<0.05 *: p<0.1

Source: Menon and Rodgers, 2017.

Consider next Menon and Rodgers (2018) which examines the effect of the minimum wage (for adults) on the employment of children aged 10–14, either inside the home (including domestic and agricultural labour, and labour in other household enterprises) or outside of it. For the probability of employment within the household, all the effects are statistically significant at the 0.1 level, and those for rural girls are significant at the 0.01 level. For rural boys, a minimum wage that is 10 per cent higher is associated with a probability of employment within the household that is more than 30 per cent higher at the mean level of employment: from 0.042 to 0.055.[23] For rural girls, on the other hand, the same increase in the

[23] The previous footnote about Menon and Rodgers' (2017) interpretation of their point estimates is relevant here as well. Table 1 (in Menon and Rodgers, 2018) includes means of the dependent variables, so it is possible to combine this with their point estimates to calculate the elasticity at the mean.

minimum wage reduces the probability of working in the household by 23 per cent at the mean, from 0.123 to 0.094. For urban boys and girls, the corresponding figures are -49 per cent (from 0.017 to 0.09) and -14 per cent (from 0.067 to 0.058). Three of the four point estimates for employment outside the household are substantially smaller than their standard errors, and the fourth (for rural girls) is about one-third larger; none is statistically significant.

Overall, Menon and Rodgers (2018) find no detectible effect of the minimum wage on child labour outside the household, and except for rural boys, they find that it reduces it within the household. Because girls of this age work in the household at nearly three times the rate of boys, and despite there being more boys than girls of this age in the sample, the negative effect of a higher minimum wage on girls' domestic labour outweighs the positive effect on boys' domestic labour: a 10 per cent increase in the minimum wage is associated with an increase in the domestic employment of boys of about 2,000 and a corresponding decrease in that of girls of about 4,000, for a net decline in child labour of about 2,000.

As mentioned above, Soundararajan (2018) reports a plethora of results in the course of performing extensive robustness tests. As before, this discussion will touch on only the basic results (table 3) and those based on regions smaller than states – districts – where careful matching of control and treatment groups is possible (table 5).[24] She considers two measures of employment. One, a binary variable with a value of 1 to indicate employment in the construction industry and 0 for employment in agriculture, is the dependent variable in a linear probability model similar to Menon and Rodgers (2017, 2018). The other is the logarithm of the number of days worked in the construction industry.

In the four basic estimates of the linear probability model, Soundararajan (2018) reports small estimates of the average elasticity with respect to the minimum wage, ranging between -0.010 and 0.098, all less than three-quarters the size of their standard error. For the number of days worked in construction, average elasticities range between -0.017 and 0.018, and all are less than two-thirds the size of their standard error. In both specifications, the estimates (and standard errors) indicate that the effect of enforcement increases with the level of the minimum wage. Unlike the situation with the wage equation, the results are similar at the district level, both when treatment and control districts are not closely matched and when they are (table 5)[25].

To sum up, in a very simple specification across 70 Indian districts, Rani, Belser and Ranjbar (2013) report a negative response of employment to the minimum wage that is not statistically significant. Menon and Rodgers (2017) report a positive response of the probability of employment of rural men and women to the minimum wage, and no statistically significant effect for urban men and women. The response of the probability of working inside the household is negative for rural girls and for urban boys and girls aged 10–14, and this outweighs the positive response of this variable for rural boys. The response for working outside the home is small for all groups except rural girls, for whom it is large and negative, but for none of these groups is the effect statistically significant.

[24] Please refer to table 3 ("OLS regression outcomes on minimum wage and enforcement") and table 5 ("Including district and border-district pair fixed effects. OLS regression of outcomes on minimum wage and enforcement") in Soundararajan, 2018.

[25] Table 5, "Including district and border-district pair fixed effects. OLS regression of outcomes on minimum wage and enforcement".

6. Conclusion

According to the empirical literature, in recent years the Indian minimum wage has had the effect of raising wages, but not at nor near the low end of the wage distribution, rather just below or perhaps well above the median wage. It acts less as a floor to wages than as a goal to which employees can aspire. It has little to no effect on employment in either construction or the urban sector, is associated with higher levels of paid employment in the rural sector and appears, overall, to reduce child labour in the rural but not in the urban sector. The small number of studies examining this issue suggests that the results should be treated tentatively.

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A review of the consequences of the Indian minimum wage on Indian wages and employment

This paper reviews the literature that relates minimum wages in India to wage and employment outcomes. The entire empirical literature on the Indian minimum wage is not large, and the segment focused on wages and employment comprises only a few analyses. It reports that minimum wages result in higher wages. However, this occurs not near the bottom of the wage distribution, as would be expected from a wage floor, but near the middle of the distribution. This suggests a lighthouse effect; a minimum wage that is aspirational, acting as a benchmark to which various wages are compared, rather than a floor. The only statistically significant, negative effect on employment that is reported is for child labour. Other estimates are either not statistically significant or are positive.

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