

# The Employment Effect of an Increase in the National Minimum Wage: Review of International Evidence

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**T**he U.S. federal minimum wage has been fixed at \$7.25 since 2009; meanwhile, the U.S. economy has been anything but static. A decade of modest growth, a seismic pandemic, and a recent period of high inflation have all combined to erode the spending power of a \$7.25 minimum wage. Income disparity has also grown over the last decade: a standard index for measuring income dispersion, the Gini coefficient, has grown substantially. To address these problems, as early as 2015 U.S. legislators introduced a proposal to increase the federal minimum wage from \$7.25 per hour to \$15 per hour, but this proposal never reached fruition.

One challenge in implementing minimum wage increases is estimating the potential effect on employment. Although moving to a \$15 federal minimum wage would not be as dramatic an increase in 2022 as in 2015 due to nominal wage increases over those seven years, such an increase would still be historically unprecedented. As a result, past modest increases in the U.S. federal minimum wage are unlikely to provide much insight into employment effects. One alternative is to examine minimum wage changes at the state or local level, as individual states and cities have instituted comparably large minimum wage changes. However, studies on state and local wage changes

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are not ideal for an analysis of national employment effects, either. Specifically, they are likely to understate the employment effects of a national minimum wage to the extent that they occlude differences in how a uniform minimum wage change might have variable effects on firms in different locations.

Instead, international experiences with large, federal minimum wage increases may provide more insight into the potential effects on employment by accounting for greater variation in firm exposure to the change. For example, Hungary and South Korea both implemented large, rapid shifts in their national minimum wages in recent decades. In addition, Brazil implemented a similarly large but more gradually paced increase, while Germany implemented a large change by instituting its first minimum wage in 2015.

In this article, we compare these countries' experiences with large minimum wage changes and summarize the effects on employment. Together, these international experiences suggest that both the pace and the size of the increase matter: large, rapid increases in the minimum wage have a more negative effect on employment than more gradual increases, especially in competitive sectors. The international evidence suggests that a gradual and steady increase of the federal minimum wage over the course of a few years is likely to generate a smaller employment effect than a one-time rapid increase.

Section I discusses current empirical studies of the employment effect of the minimum wage in the United States and the studies' limitations. Section II reviews international evidence on the employment effect of an increase in the national minimum wage and highlights the contrast between rapid, sizable changes and steady, modest changes. Section III draws implications for the United States from these studies.

## **I. The Employment Effect of Minimum Wages in the United States**

Economic theory suggests that all else equal, an increase in a product's price will lead to a decline in demand for that product. For the same reason, an increase in the minimum wage can decrease demand for the labor of workers who are subject to the minimum wage. In practice, however, all else is not equal; labor demand might be influenced by several offsetting factors. For example, in imperfectly competitive labor

markets, employers have market power and may set their wage below the competitive level because they are not scared of losing employees to competitors. Hence, the market wage might be set below what is consistent with optimal labor utilization, resulting in the undersupply of labor. A minimum wage increase would force these employers to pay higher wages, leading more workers to be willing to work and thereby increasing employment.

Consistent with these offsetting factors, empirical studies find a wide range of employment effects from an increase in the minimum wage. For example, Card and Krueger (1995) find a small, positive effect on employment for fast food workers in New Jersey, which raised its minimum wage, compared with fast food workers in neighboring Pennsylvania, which did not. In contrast, Meer and West (2016) find that a minimum wage increase has a negative effect on the employment of teenagers (age 16–19), a group of workers disproportionately likely to be employed at the minimum wage. The lack of a clear consensus among empirical studies has led some researchers to call the negative effect of a minimum wage increase on employment “elusive” (Manning 2021).<sup>1</sup>

The ambiguous employment effect contrasts with the unambiguously positive effect of a minimum wage increase on average wages. For instance, Manning (2021) augments Meer and West’s (2016) analysis by estimating wage changes among teenagers in addition to re-estimating employment effects. Although Manning finds that average wages increase in response to a minimum wage change across seven different empirical model specifications, the changes in employment are much more varied.<sup>2</sup>

One complication in extracting the employment effect is that movements in the minimum wage vary in size. Kim and Taylor (1995) examine the effect of the 1988 minimum wage change in California on retail workers and find that California employment relative to the U.S. average declined, as the large change in the minimum wage led overall wages in California to increase faster than the U.S. average. The policy in California moved the minimum wage from \$3.35 to \$4.25, a 27 percent change and larger than that examined by Card and Krueger (1995) or by Meer and West (2016). However, a similar 27 percent change today may not be nearly as significant as it was in the case of Kim and Taylor:

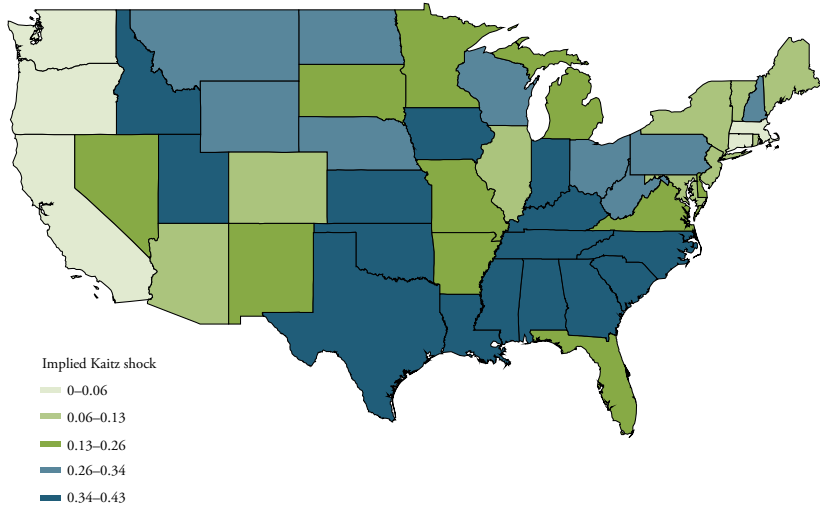
the current federal minimum wage has remained unchanged for over a decade, and in its current state, likely does not apply to many workers.

Thus, our analysis requires a consistent way to measure what constitutes a “large” minimum wage shock as opposed to a “small” one. To do this, we measure minimum wage changes through the Kaitz index, constructed as the ratio of a region’s minimum wage to the region’s median wage. Measuring minimum wages using the Kaitz index has several benefits. First, examining this index over time allows us to gauge the intensity of the change in the minimum wage. A high Kaitz index suggests the median wage is close to the minimum wage. The likelihood that the minimum wage is greater than a worker’s counterfactual market-determined wage goes up when the Kaitz index is higher. When measuring policy intensity, if a region’s Kaitz index changes drastically before and after the implementation of a policy, we can assume that the minimum wage now affects a larger portion of the income distribution. Second, this index standardizes the denominations across countries, allowing us to consistently compare minimum wage changes in countries that use different currencies. Third, the Kaitz index accounts for wage growth and inflation, which simple level changes in the minimum wage do not. For example, the United States currently has a national minimum wage of \$7.25 per hour. Although the most recent proposed minimum wage of \$15 per hour is more than double the previous minimum, the former wage floor was set in 2009. Inflation has since pushed nominal wages up drastically, and fewer workers earn less than \$15 per hour now than in the past. By using a region’s Kaitz index, we can price in the effects of wage growth and inflation and better estimate whether employers will respond to a minimum wage increase by either raising wages or reducing employment, leading to the employment and wage effects central to our analysis.

As a first step, we examine Kaitz indexes for U.S. states to gauge the effect of a \$15 minimum wage shock nationally. Map 1 shows substantial variation in the magnitude of the exposure to a hypothetical increase in the minimum wage to \$15 across different states. In particular, the map shows the difference between each state’s 2021 Kaitz index and their hypothetical Kaitz index should a \$15 minimum wage be imposed. States with greater Kaitz differences are considered “more exposed” to a minimum wage shock, in that more firms are likely to

*Map 1*

## Heat Map of State-Level Kaitz Indexes



Source: U.S. Bureau of Labor Statistics (BLS).

have to increase their wages (or decrease their demand for labor relative to what they would do without the minimum wage change) in response to the change. In Mississippi, for example, the current minimum wage is \$7.25, while the current median wage is \$16.86. Thus, an increase of the minimum wage to \$15 would move the Mississippi Kaitz index from 0.43 to 0.89. In contrast, North Dakota has the same minimum wage of \$7.25, but a median wage of \$22.58. As a result, the same \$15 minimum wage policy would move the North Dakota Kaitz index from 0.32 to 0.66 (a smaller difference than for Mississippi). In other words, the new policy would likely affect more workers in Mississippi than North Dakota. For states whose minimum wage already lies between \$14 and \$15, such as Massachusetts and Washington, a \$15 federal minimum wage leaves the Kaitz index largely unchanged.

Although Map 1 illustrates the utility of Kaitz indexes in evaluating the effects of minimum wage changes, it offers limited evidence on how a \$15 minimum wage would affect employment at the national level. Existing U.S. studies, which often examine local or state-level changes in the minimum wage, do not provide a definitive answer to the employment effects of minimum wage changes at the national level. Inter-

national evidence on the effects of a national minimum wage policy can complement existing studies based on state-level policy changes.

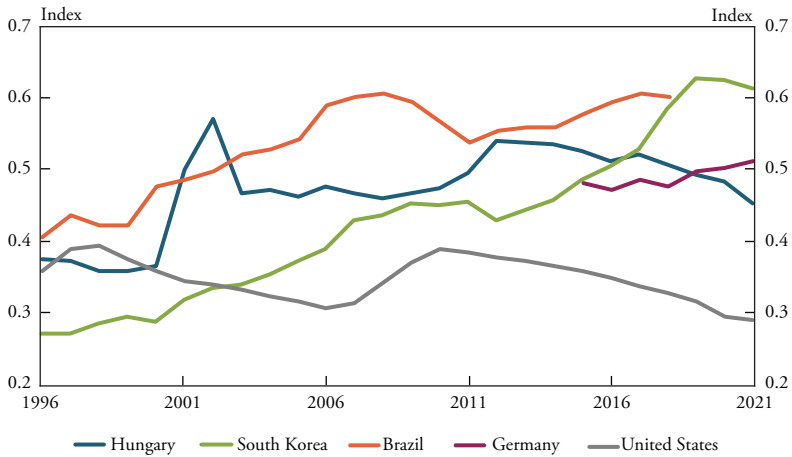
Estimating the elasticity of firm-level employment—the expected percent change in employment given a 1 percent movement in the minimum wage—with respect to policy changes at the national level better accounts for variations in different regions’ degree of exposure to the minimum wage change.<sup>3</sup> Thus, examining international evidence may give additional useful insight into the ultimate employment effects of a national minimum wage policy.

## II. International Evidence on the Employment Effect of the National Minimum Wage

To provide insight into the potential effects of a national minimum wage hike in the United States, we review the effect of minimum wage policies on employment in four countries: Hungary, South Korea, Brazil, and Germany. For each country, we consult a study that teases out the economic effect of the minimum wage shock by isolating different degrees of exposure to the national minimum wage change at the firm, state, or worker level. The elasticities for each country vary; however, countries with negative elasticities—implying that a minimum wage increase reduced employment—such as Hungary and South Korea, show clear and important differences to countries reporting no change or positive elasticities, such as Germany and Brazil.

In Hungary, the national minimum wage increased rapidly and substantially in the early 2000s, approximately doubling from 25,500 Hungarian forints (HUF) annually to 50,000 HUF annually over a two-year period. This change exposed more firms to the change and accordingly reduced employment. Chart 1 shows that from 2000 to 2002, an increase in the national minimum wage led the Kaitz index to jump from 0.35 to 0.55 (blue line).<sup>4</sup> Harasztosi and Lindner (2019) examine the effect of this minimum wage increase by comparing outcomes across firms that are more and less exposed to the minimum wage. They report a negative employment elasticity of  $-0.076$ , meaning that if a firm’s share of workers affected by a minimum wage change increases by 10 percent, that firm would likely have to reduce its total employment by 0.76 percent relative to an otherwise identical firm where no worker is directly affected by the policy. This result is statistically significant given the standard

Chart 1  
Time Series of the Kaitz Index



Sources: Organisation for Economic Co-operation and Development (OECD), *Relação Anual de Informações Sociais*, and Instituto de Pesquisa Econômica Aplicada.

error of 0.01. With this rapid and substantial increase in the minimum wage, firm-level exposure to the minimum wage increased substantially, thereby reducing employment. The authors also find that this negative employment effect was larger for firms that operate in a more competitive manufacturing sector, as these firms could not pass the increased cost from a higher minimum wage through to prices. Instead, they were more likely to absorb the cost increase by reducing employment.

The South Korean experience with a minimum wage increase mirrors these findings. Although South Korea introduced the minimum wage in 1988 and steadily increased it over time, minimum wage policy ratcheted up in intensity in 2018. Similar to the Hungarian experience, the South Korean Kaitz index (Chart 1, green line) increased from about 0.5 in 2017 to slightly above 0.6 by 2019. Following the empirical specification in Harasztosi and Lindner (2019), Doh and others (2022) measure the employment effect of this increase using manufacturing sector data in South Korea. They find a larger negative employment effect than in the case of Hungary: specifically, they estimate the employment elasticity to be  $-0.21$ , which is statistically significant given the standard error of 0.03.

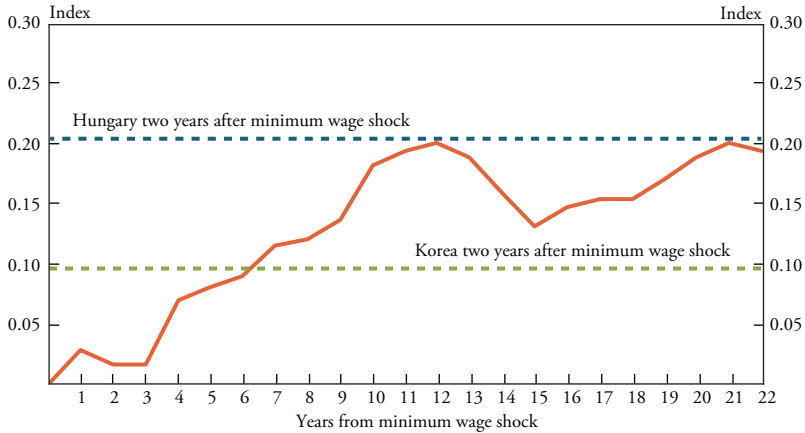
To better understand the mechanisms behind this employment effect, Doh and others (2022) decompose the change in employment into the extensive margin (that is, employment reductions due to plants closing or moving offshore) and the intensive margin (that is, layoffs within a firm). They find that the extensive margin adjustments account for at least one-third of the overall employment adjustment. For the manufacturing sector, foreign direct investment in low-wage countries such as Vietnam increased substantially from 2017 to 2019, suggesting offshoring may be partly driving the employment reduction.<sup>5</sup> Unlike Harasztosi and Lindner (2019), Doh and others (2022) also find a statistically significant negative employment effect of  $-0.21$  in the non-tradable services sector, suggesting this sector may be as competitive as the mining and manufacturing sector, which displays a magnitude of  $-0.19$  when isolated. Taken together, however, the results from both the Hungarian and South Korean experiences suggest that large, sudden minimum wage shocks are likely to result in negative and painful employment effects.

Like Hungary, Brazil also increased its national minimum wage substantially in the early 2000s; however, the wage increase was phased in more gradually, generating negligible employment effects. The gradual implementation might have played a large role because the increase in the Kaitz index was modest on average. Chart 1 shows that from 1996 to 2018, the Kaitz index in Brazil (orange line) increased from about 0.4 to about 0.6. Hence, on a per-year basis, the increase in the Kaitz index was less than 1.7 percentage points. To better illustrate the gradual nature of this increase relative to other countries, Chart 2 shows the change in Brazil's Kaitz index expressed over time, with dashed lines showing the levels of the Hungarian and South Korean minimum wage shocks after two years. The Brazilian Kaitz index takes about six years to arrive at the same level that the South Korean index reaches after two. Furthermore, the Brazilian Kaitz index never reaches the same level as the Hungarian shock but nears that level after about 12 years. This more modest increase in the Brazilian Kaitz index implies that the percentage of workers who would be subject to the minimum wage would not have increased substantially during any given year.

Engbom and Moser (2022) analyze the Brazilian data and find a negligible effect on employment. They calculate the Brazilian



Chart 2  
Time Variation in the Brazilian Kaitz Index



Source: OECD.

employment elasticity based on a household survey from 1996 to 2012 and find a small, positive elasticity of 0.014, meaning a worker who is directly affected by the minimum wage shock is 1.4 percent more likely to be employed after the policy change than a worker unaffected by the minimum wage movement (though this elasticity is not statistically significant given the standard error of 0.015). This finding, coupled with the modest decline in the Kaitz index, suggests that the gradual nature of the increase in the Brazilian minimum wage minimized the effect on employment. When the minimum wage changes gradually, small firms with low productivity may only gradually exit the market, and large firms with high productivity are better able to absorb workers from exiting firms. This explanation is supported by Engbom and Moser (2022), who find a strong positive correlation between minimum wage and firm size that suggests larger firms are picking up workers affected by the closure of smaller firms.

Similar to Brazil, Germany also experienced no significant negative employment effect after a shift in minimum wage policy. In 2015, Germany introduced its first national minimum wage. Despite the relatively high initial Kaitz index, reflecting that the newly introduced minimum wage was 47 percent of the median wage (Chart 1, maroon line), the new minimum wage was binding only for a small percentage of workers. Because Germany had no minimum wage before the change, the shock

would initially seem quite dramatic, raising the Kaitz index from 0 to 0.47. However, Germany's history of prevalent workers' unions had led to a tighter dispersion of wages around the median. Thus, the number of workers affected by the new minimum wage was likely quite low. Furthermore, the bottom decile wage in Germany had been steadily increasing before the introduction of the minimum wage, and at the time of policy implementation had approximately reached the level of the new minimum.<sup>6</sup>

Dustmann and others (2022) provide further evidence for this interpretation using an employee-employer linked dataset to identify the overall employment effect and the magnitude of labor reallocation after the introduction of the national minimum wage in 2015. They find a small but positive employment elasticity of 0.008, which is statistically significant given the small standard error of 0.0005. This finding suggests that workers subject to the new minimum wage were in fact more likely to remain employed than workers earning a higher wage after the policy was put into place.<sup>7</sup> Together, the slow but significant minimum wage adjustment in Brazil and the moderate adjustment of the minimum wage policy in Germany suggest that gradual minimum wage adjustments and wage adjustments that affect a minimal share of workers have negligible effects on employment.

Although we find a range of employment effects across the four studies, the wage effects are much less ambiguous. Each study finds positive effects on wage growth after the policy shock using the previously specified estimation methods. The German study finds that being part of the treatment group yields an average 5.4 percent wage growth, while the South Korean study finds that a 10 percentage point increase in firm exposure to the minimum wage yields a 7.5 percent increase in wage growth. Although nominal minimum wage changes are passed through the economy, the lower end of the wage distribution is much more strongly affected than the upper end, leading to lower wage inequality. In Brazil, wage dispersion falls 19.3 percent in response to the 58.6 percent growth in the minimum wage over the sample period.

### III. Implications for the United States

International evidence can be useful when considering the effects of a national minimum wage change in the United States, given the

lack of historical precedent in the United States for large national-level changes in the minimum wage. From our analysis of international evidence, we find first that a movement of the minimum wage to \$15 an hour could have strong negative employment effects in some U.S. states where a shift to \$15 would be a large and rapid change. Given that rapid movements in the Kaitz index of 0.1 in South Korea and 0.2 in Hungary led to negative employment effects due to differences in exposure to the change across firms, the more than 10 U.S. states where the Kaitz index would move at least 0.4 under this policy could see negative employment effects. Although higher minimum wages can be effective at raising wages for lower-income workers, these benefits have to be balanced against potential negative effects on employment. Evidence from Brazil suggests that regular revision of the national minimum wage, if done at a modest pace, may be able to raise the wages of lower-income workers without sizeable employment shocks.

## Conclusion

Since 2015, U.S. lawmakers have contemplated increasing the federal minimum wage substantially to \$15. Central to any consideration of a minimum wage hike are the potential effects on employment; however, these effects can be challenging to measure given the limited historical precedent for large, national minimum wage increases in the United States. International evidence may offer evidence on the potential employment effects of national minimum wage increases. These international studies allow us to examine large and rapid changes in minimum wage policy that also reflect various exposures to higher minimum wages across geographies.

We review empirical studies in four countries that have changed their national minimum wage. These studies suggest the pace of the minimum wage increase matters in determining the overall employment response. A rapid increase of the minimum wage relative to the median wage could be disruptive to firms operating in competitive sectors that cannot easily pass cost increases through to final consumers. Indeed, a rapid increase in the minimum wage (relative to a more gradual increase) is likely to expose more firms and workers to the minimum wage, resulting in a significant negative employment effect. The analysis of the Hungarian and South Korean minimum wage increases

in Harasztosi and Lindner (2019) and Doh and others (2022), respectively, support this view.

On the other hand, the experiences of Brazil and Germany suggest that a steady and modest increase in the minimum wage that in turn affects fewer workers in any given year may have no negative employment effects at all. Brazilian data analyzed in Engbom and Moser (2022) and German data examined in Dustmann and others (2022) show that labor reallocation to growing firms with high productivity is important in offsetting the negative employment effect from the conventional labor demand channel.

## Endnotes

<sup>1</sup>Aside from offsetting factors related to the magnitude of minimum wage increases, a more gradual pace of minimum wage growth may less intensely affect employment through additional channels. Glover and Mustre-del-Río (2021) analyze the link between inflation and employment using a sticky-price model, in which prices react to movements in economic indicators with a lag. In this model, firms respond to a minimum wage shock and higher costs by reducing employment. However, if firms are instead allowed to pass higher prices through to consumers, then these price increases will, over time, offset costs and in turn offset the effect on employment. According to Glover and Mustre-del-Río, a central bank is likely to respond to this movement in inflation and react with a high nominal interest rate that can cause lower aggregate output and employment. Hence, a negative employment effect is more likely when the central bank can react to the pass-through of the cost increase to prices.

<sup>2</sup>Empirical specifications differ mostly in terms of the treatment of the state time trend and the interaction between the geographical fixed effects and time fixed effects. All specifications control for the prime-age unemployment rate, the percentage of teenagers in the population, and state and time fixed effects.

<sup>3</sup>In the studies we select, elasticity refers to a 1 percent movement in a group's exposure to the minimum wage rather than a 1 percent movement in the minimum wage itself. Although similar in spirit, the magnitudes of the elasticities we report cannot be thought of as the responses to percentage movements in the minimum wage itself. Based on the structure of the wage distribution, the same degree of change in the minimum wage may induce different degrees of exposure. Assessing the placement of the current U.S. minimum wage in the national wage distribution is beyond the scope of this article.

<sup>4</sup>As discussed previously, a national Kaitz index is likely to occlude variation in firms' exposure to the minimum wage relative to local or state-level indexes. We plot a national Kaitz index for the United States nonetheless to facilitate comparison across our countries: South Korea has a minimum wage only at the national level, and we do not have detailed data for state-level minimum wage variation for Brazil. However, the studies we consult do consider firm-level exposure to a binding minimum wage where possible—that is, if a state-level minimum wage (when available) is higher than the national minimum wage, the studies calculate firm-level exposure using the state-level minimum.

<sup>5</sup>Even in the United States, higher national wages may push companies to foreign countries with abundant low-wage workers. Using the case study of the 1994 Mexican currency crisis, Sethupathy (2013) finds that the depreciation of the peso decreased real wages in Mexico relative to the United States and led to positive and significant offshoring. Although a minimum wage shock would directly affect U.S. workers rather than Mexican workers, the effect on the relative wage would be parallel.

<sup>6</sup>Comparing the Kaitz index before and after Germany's wage implementation is difficult; however, it may be possible to proxy for the minimum wage using the 10th percentile wage. When we construct this alternative index (10th percentile wage / median wage), we see almost no growth in the two years after the implementation of the minimum wage, implying that low income wages did not grow relative to median wages as a result of this policy.

<sup>7</sup>The authors first split their sample into €1 wage bins based on individual's wage levels before the introduction of the minimum wage policy and estimate the marginal effect on employment before and after minimum wage implementation. They consider the three lowest wage bins as "treated," as their levels lie below the new minimum wage, and all other bins as "control." They then compare a weighted average of the two groups.

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