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MYTH OR MEASUREMENT: WHAT DOES THE NEW MINIMUM WAGE RESEARCH SAY ABOUT MINIMUM WAGES AND JOB LOSS IN THE UNITED STATES?

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ABSTRACT

The disagreement among studies of the employment effects of minimum wages in the United States is well known. Less well known, and more puzzling, is the absence of agreement on what the research literature says – that is, how economists summarize the body of evidence on the employment effects of minimum wages. Summaries range from "it is now well-established that higher minimum wages do not reduce employment," to "the evidence is very mixed with effects centered on zero so there is no basis for a strong conclusion one way or the other," to "most evidence points to adverse employment effects."

We explore the question of what conclusions can be drawn from the literature, focusing on the evidence using subnational minimum wage variation within the United States that has dominated the research landscape since the early 1990s. To accomplish this, we assembled the entire set of published studies in this literature and identified the core estimates that support the conclusions from each study, in most cases relying on responses from the researchers who wrote these papers. Our key conclusions are:(i) there is a clear preponderance of negative estimates in the literature; (ii) this evidence is stronger for teens and young adults as well as the less-educated; (iii) the evidence from studies of directly-affected workers points even more strongly to negative employment effects; and (iv) the evidence from studies of low-wage industries is less one-sided.

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"*There's just no evidence that raising the minimum wage costs jobs, at least when the starting point is as low as it is in modern America*." – Krugman (2015)

"*[T]he literature after Myth and Measurement was about equally likely to find positive as negative employment effects of the minimum wage, with the typical estimate very close to zero.*" – Card and Krueger (2015, p. xvi)

"*There is considerable support for the competitive market hypothesis that an effective minimum wage would result in lower employment… However, a few studies report zero or even positive employment responses to higher minimum wages.*" – Liu et al. (2016, p. 19)

I. Introduction

The empirical evidence on the employment effects of the minimum wage in the U.S. labor market is voluminous. Key earlier contributions, which also partly demarcate the application of different empirical strategies to studying this question, include the 1981 *Report of the Minimum Wage Study Commission* summarized in Brown et al. (1982), the *New Minimum Wage Research Symposium* published in the *Industrial and Labor Relations Review* in 1992 (Ehrenberg, 1992), and Card and Krueger's (1995) *Myth and Measurement*. The latter two represent a break from the earlier research, shifting from time-series evidence relying only on national minimum wage variation to empirical strategies using subnational variation. The goal of this shift was to provide more credible evidence by avoiding the confounding of national minimum wage variation with other aggregate influences on employment of low-skilled workers – the so-called "New Minimum Wage Research."[1]

In the veritable explosion of new minimum wage research since this shift, researchers have used a wide variety of approaches to exploit subnational minimum wage variation in the United States, and the answers sometimes differ. As illustrated by the quotes above, there are also disagreements among researchers (and others) over how to interpret the overall body of evidence on the effects of minimum wages on employment – fundamentally, about whether the effect is negative or not, but also about the magnitude.

The absence of complete agreement across a large set of studies is not surprising. It is also not surprising that advocates on one side or the other emphasize different studies – in particular, the ones

more consistent with their policy positions. What is surprising, though, is the absence of agreement on what the research literature says – that is, how economists summarize what the body of evidence says about the employment effects of minimum wages. Depending on what one reads about how economists summarize the evidence, one might conclude that: (1) it is now well-established that higher minimum wages do not reduce employment, (2) the evidence is very mixed with effects centered on zero with no basis for a strong conclusion one way or the other, or (3) most evidence points to adverse employment effects.[2]

Moreover, the quotes that began this paper are not isolated examples. As we document in the next section, a good deal of recent advocacy for a $15 national minimum wage – including by academic economists – takes the position that the research literature by and large establishes that there are no adverse employment effects of a higher minimum wage. Even more widespread are academic descriptions of the U.S. research evidence that give the impression that even where there is some evidence of negative employment effects, there is just as much evidence to the contrary, preventing the drawing of firm conclusions.

In this paper, we explore the question of what conclusions can be drawn from the literature, focusing on the evidence using subnational minimum wage variation that has dominated research on the minimum wage since the *New Minimum Wage Research Symposium*.[3] To address this, we assembled the entire set of published studies in this literature, beginning with the New Minimum Wage Research in 1992. We identified the core or "preferred" estimates that reflect the conclusions from each study of employment effects in the United States, in most cases relying on responses from the researchers who wrote these papers. We do not use the usual meta-analysis approach of capturing all estimates reported in studies, because we think that using the entire set of estimates reported is likely to fail to convey the conclusions of the research, most importantly because many papers present estimates that the authors do not view as credible. We then summarize the evidence on these core estimates in a number of ways.

We want to be clear from the outset. We are not adjudicating between papers based on our views of which studies are more reliable. That issue has been – and continues to be – debated in the literature.[4] One can certainly highlight studies at different ends of the distribution of reported employment elasticities that have been criticized by others.[5] Our goal, instead, is to establish what an accurate summary of the published evidence says about the employment effects of the minimum wage. This summary, and the way we present the evidence, makes clear what evidence one has to rely on to reach conclusions different from those of the central tendency of the evidence.

Once we take stock of the literature in this way, what do we conclude? Does the research literature by and large establish that there are no employment effects? Do the "on the one hand/on the other hand" summaries that are most common in academic papers accurately reflect the research findings, suggesting that "we just don't know" whether a higher minimum wage will reduce employment? Or does the research point predominantly to job loss for lower-skilled workers from a higher minimum wage?

Summarizing the research literature this way, our key conclusions are as follows:

- There is a clear preponderance of negative estimates in the literature. In our data, 79.2% of the estimated employment elasticities are negative, 53.8% are negative and significant at the 10% level or better, and 46.2% are negative and significant at the 5% level or better.
- This evidence of negative employment effects is stronger for teens and young adults, and more so for the less-educated.
- The evidence from studies of directly-affected workers points even more strongly to negative employment effects.
- The evidence from studies of low-wage industries is less one-sided, with 64.5% of the estimated employment elasticities negative, but only 32.3% negative and significant at the 10% level or better, and the same percent negative and significant at the 5% level or better.

We suggest, however, that the evidence from low-wage industries is less informative about the effects of minimum wages on the employment of low-skill, low-wage workers.

Overall, we conclude that the preferred estimates of authors of studies evaluating the employment effects of minimum wages in the United States, since the advent of the New Minimum Wage Research in 1992, paint a clear picture that is at odds with how this research is often summarized. In its totality, this body of evidence and its conclusions point strongly toward negative effects of minimum wages on employment of less-skilled workers, especially for the types of studies that would be expected to reveal these negative employment effects most clearly. One might argue about the validity of individual studies – a question we do not address in this paper. But our findings indicate that concluding that the body of research evidence fails to find disemployment effects of minimum wages requires discarding or ignoring most of the evidence.

II. How the Research Literature Gets Summarized

Despite reading the same papers, one can find very different summaries of what the overall research evidence says about the employment effects of minimum wages in the United States.

Most academic writing on the U.S. research evidence gives the impression that even where there is some evidence of negative employment effects, we really cannot reach any conclusions or consensus. Here we refer not to explicit summaries of the literature (like Wolfson and Belman (2019) or Neumark (2019)), but instead to briefer summaries included as literature reviews in research papers on the employment effects of minimum wages. It is common for these summaries of the literature to give the impression – intentionally or not – that the evidence may be roughly 50-50 as to whether research finds negative employment effects.[6] The Card and Krueger quote at the start of this paper is typical. There are many similar examples:[7]

> "The literature analyzing these historical minimum wage changes has generated much debate and little consensus." – Clemens and Strain (2018, p. 711)

> "Thus, despite an extensive body of empirical work of increasingly high quality, there is still considerable disagreement over the sign and strength of MW employment effects." – Hirsch et al. (2015, p. 202)

> "… there is currently no empirical consensus. While some researchers … supported the neoclassical perspective that a minimum wage has adverse effects on employment, others … failed to conclude that a minimum wage adversely influences employment." – Kim and Jang (2020, p. 3)

> "The voluminous literature on minimum wage effects offers little consensus on the extent to which a wage floor impacts employment." – Meer and West (2016, p. 500)

> "The debate launched by Card and Krueger's study of a New Jersey increase in the minimum wage (Newmark and Washcer [*sic*], 2000) has continued for more than a decade now without a decisive resolution. A recent review by Newmark [*sic*] and Wascher (2008) concludes that the traditional view of labor demand curves has been maintained by the bulk of the evidence suggesting that higher minimum wages significantly reduce employment. On the other hand, Dube et al. (2010) suggest that the evidence supports no effect of minimum wages on low wage employment." – Persky and Baiman (2010, p. 132)

> "Thus, traditional empirical assessments of the minimum wage yield mixed evidence on the employment impact of the minimum wage." – Singell and Terborg (2007, p. 40)

> "Despite this long history of attention, economists are still very much divided on the effect of minimum wages." – Totty (2017, p. 1712)

This perception that the evidence is equally consistent with job loss and with no job loss is also reflected in the Chicago Booth IGM Expert Panel's response to the following question, asked in 2015: "If the federal minimum wage is raised gradually to $15-per-hour by 2020, the employment rate for low-wage US workers will be substantially lower than it would be under the status quo."[8] The distribution of responses, whether or not weighted by each expert's confidence, was by and large symmetric and centered around "uncertain."[9] (To be sure, the phrase "substantially lower" is ambiguous and may imply a larger negative effect than some studies find.)

In contrast, some researchers, in advocating for sharply higher minimum wages, argue that the evidence establishes that the minimum wage *does not* reduce employment. For example, Michael Reich, in 2019 testimony before the U.S. House Education and Labor Committee (Reich, 2019, p. 4), asserted:

> "Economists have conducted literally hundreds of studies based on over 160 minimum wage changes in the past thirty-five years. The best of these studies do provide a credible guide to the likely employment effects of a $15 floor. They indicate that the Act will have minimal to no

adverse effects on employment and that they will have substantial positive dynamic effects on the lowest-wage areas of the U.S."[10]

Similarly, in testimony before the same committee, Ben Zipperer (2019) argued:

"The bulk of recent economic research on the minimum wage, as well as the best scholarship, establishes that prior increases have had little to no negative consequences and instead have meaningfully raised the pay of the low-wage workforce."

Indeed, a 2019 letter signed by scores of economists, including many prominent academics such as Daron Acemoglu, Sandra Black, David Cutler, Emmanuel Saez, Juliet Schor, and Nobel Laureates Angus Deaton and Peter Diamond, says that:

"The last decade has seen a wealth of rigorous academic research on the effect of minimum wage increases on employment, with the weight of evidence showing that previous, modest increases in the minimum wage had little or no negative effects on the employment of low-wage workers."[11]

It is actually far rarer to find studies or statements suggesting that, on balance, the evidence points to negative employment effects, but some do. Here are two examples (in addition to the Liu et al. quote at the beginning of the paper):[12]

"… the new conventional wisdom misreads the totality of recent evidence for the negative effects of minimum wages. Several strands of research arrive regularly at the conclusion that high minimum wages reduce opportunities for disadvantaged individuals." – Clemens (2019)

"My reading of the economics literature leads me to conclude that the weight of the evidence suggests that minimum wage increases lead to non-negligible employment reductions." – Strain (2019)

III. Our Approach

Our evidence is based on the research findings from the U.S. literature on the employment effects of minimum wages published beginning with the New Minimum Wage Research (Ehrenberg, 1992). From this literature, we create a database that captures the conclusions the authors of these studies drew – their "preferred estimates." This differs from capturing all estimates reported in studies, the usual meta-analysis approach.[13] We think that using the entire set of estimates reported is likely to fail to convey the conclusions of the research, most importantly because many papers present estimates

that the authors do not view as credible (e.g., showing the estimates for a panel data specification without the fixed effects, prior to showing the preferred estimates with fixed effects).

We thus carefully read the papers we include to try to extract the authors' main or preferred estimates from each study. In general, we first looked for explicit summary measures of each paper's conclusions in terms of specific elasticities, and when provided, matched those to the table in which the estimates appear. When this method was not so clear, we read the descriptions of the paper's tables, in the context of methodological points that authors intended the paper to make, to capture the estimate or estimates that most fully reflect the contribution of the paper. And we did not capture the estimates presented as supplementary or robustness analyses. This led us to identify one or more estimates (generally a small number) from each paper. In some cases, multiple estimates were necessary, as some papers report estimates for multiple industries, or for different age groups, and do not distinguish or identify a preferred group, industry, etc.

This process does potentially allow for some subjectivity in selecting preferred estimates from the studies we surveyed.[14] To mitigate this issue, we emailed the authors of every study included in our paper, asking them to report to us the preferred estimates/results from their study.[15] These emails posed the question in a neutral way, as follows:

> Dear __:
>
> For research we are doing, we would like to ask you about the elasticity of employment with respect to the minimum wage estimated in your paper:
>
> *** paper title ***
>
> We have attached a pdf copy for your convenience.
>
> Specifically, we would like to ask you the following:
>
> ***1. What estimated elasticity from your paper best captures its core conclusion? Put differently, if you had to reduce the findings of this paper to a single estimate, what would it be?***
> Note: If you believe that more than one estimate is needed, you can provide the additional information below.
> **Estimated elasticity:**

Standard error:
Location in paper (a table and column, or page):

2. If you believe it is impossible to capture your overall conclusion in a single estimated elasticity, please repeat this information for other estimated elasticities you believe are needed to capture your core conclusion(s).
Note: We are not asking about estimates that explore robustness/sensitivity of results. But if, for example, you have analyses for two or more distinct subgroups, and both are important to your core conclusions, you might feel that more than one estimate is needed.

Estimated elasticity:
Standard error:
Location in paper:
(Please repeat as needed if you are reporting more than two estimates.)

3. If you responded with additional estimates in question 2, please briefly explain why additional estimates are required to capture your core conclusion(s).

There were 70 papers in total. We emailed the survey questions to the authors of 57 papers, with a unique email for each paper. Of the remaining 13, 11 were authored or co-authored by one of us, obviating the need for the survey, there was one paper for which no contact information for the author could be found (Dodson, 2002),[16] and one originally excluded paper (unpublished at the time) was forwarded to us by the author after its acceptance for publication (Powell, forthcoming). We received 48 responses, for an 84.2% response rate. For the 48 studies where we received a response, the corresponding author's preferred estimate(s) replaced the estimates we initially extracted. Appendix Figure A1 shows the differences between our initial selections of preferred estimates and those in the authors' responses (which we use as our data).[17] Note that we do this for the median estimates, because there can be multiple estimates for a study, and the authors did not always respond with the same number of estimates we originally coded.[18] The figure shows that, for the most part, there was agreement (as reflected in the zero or near-zero differences in the figure). There were some deviations in both directions, as shown at the top and the bottom of the figure. But the deviations are roughly symmetric, indicating no systematic bias in how we recorded preferred estimates (indeed on average we

were picking slightly more positive estimates). Thus, we elect to include our selections for the preferred estimates when we did not receive a response from the paper's author(s).[19]

Our approach vs. meta-analysis

Our approach shares with meta-analysis the goal of presenting an "analysis of analyses" (Glass, 1976). As such, our evidence is complementary to meta-analyses of the employment effects of minimum wages. Nonetheless, our approach differs from meta-analyses of minimum wage effects in several ways.[20] First, as noted above, we focus on the conclusions or preferred estimates from each study, because studies often report estimates that are not intended to provide unbiased estimates of the parameter of interest.[21]

Second, meta-analyses typically focus on obtaining an average effect (or treatment) size from a set of published estimates – in the minimum wage literature typically the magnitude of the elasticity of employment with respect to the minimum wage. In contrast to focusing on arriving at a single estimate, we are more interested in documenting and understanding the distribution of estimates – such as the share of estimates that are negative (or negative and significant) – and how it varies, as well as the central tendency. One can view this is taking a more systematic approach to summarizing the literature than what apparently underlies at least some of the many quotes provided above, which clearly cannot all be correct.

Moreover, averaging across estimates from studies of minimum wage effects, as meta-analyses do, is problematic. The populations studied vary, and this and other factors can influence how binding the minimum wage is, generating variation in estimated effects that there is no reason to simply average. For example, Neumark and Wascher (2007) argue that studies more sharply focused on workers most likely to be affected by minimum wage increases reveal clearer evidence of disemployment effects. In addition, the time period studied can vary. For example, Clemens and Strain (2018) study the post-Great Recession period while other studies focus on earlier periods (e.g., Card and Krueger, 1994) and others study multiple decades. The bindingness of the minimum wage variation

(how it compares to the competitive equilibrium wage) in a particular study can vary with both the time period and across regions; the latter point was emphasized and documented in Neumark and Wascher (2002). Minimum wage effects may also vary depending on the time horizon used (see, e.g., Baker et al., 1999; Sorkin, 2015). In other words, the meta-analysis "paradigm" for combining estimates from many similar studies – say, randomized trials of a drug (Hunt, 1997) – carries over poorly to the minimum wage literature (and likely many other literatures in economics). Our analysis responds to this problem by not only summarizing the overall distribution of estimates/conclusions in the minimum wage literature, but also understanding how this distribution varies with key study features.[22]

One other issue often addressed in meta-analyses, which potentially bears on the interpretation of the evidence, is "publication bias" – the possibility that some results are not published because of editors' and reviewers' (and perhaps authors') prior views, or because of diminished interest in statistically insignificant results, either of which can lead to bias in average estimates based on published work. The most recent meta-analysis of the minimum wage literature for the United States (Wolfson and Belman, 2019), based on all estimates in newer studies that tend to use panel data with subnational minimum wage variation, finds little effect of publication bias (and evidence of minimum wage-employment elasticities for teens and other low-skill groups of around −0.1). Andrews and Kasy (2019) find some evidence consistent with publication bias, although they conclude that the only statistically significant evidence of publication bias in the minimum wage literature regards the significance of published results, not the sign.

That said, it can be hard to distinguish between publication bias and other sources of patterns in the published evidence consistent with publication bias. For example, meta-analyses like Doucouliagos and Stanley's (2009) argue that if published negative estimates of minimum wage effects have larger standard errors, this is evidence of publication bias. (And similarly, Andrews and Kasy identify publication bias in meta-analyses when the distributions of estimates and standard errors are not independent.) However, the same phenomenon can arise if, e.g., studies using better research designs

lead to "truer" estimates, which happen to be negative, but also have larger standard errors because the research designs demand more of the data.

IV. Data

We began with the published papers listed in the comprehensive survey of studies of the employment effects of minimum wages in Neumark and Wascher (2007). We then added the published papers in the meta-analysis of Wolfson and Belman (2019), which covered roughly 15 years back and hence most papers subsequent to the first survey. We then supplemented the list of published (or forthcoming) papers using a web search in Google Scholar for "Minimum Wage," covering the years 1992 to 2020. Papers from this search that did not appear in either survey were read for evidence on employment effects in the United States, excluding hypotheticals (e.g., Repetti and Roe, 2018) or simulations (e.g., Gorry and Jackson, 2016). If the paper estimated employment effects of minimum wages and provided an elasticity estimate, it was retained. The search was ended after 40 pages of results in Google Scholar, by which time the search results failed to yield additional relevant studies. Also, we excluded time-series studies, given the fundamentally different and arguably much more tenuous identification – the problem that by and large drove the development of the New Minimum Wage Research. Finally, we include a few more papers identified as published or forthcoming by readers of the earliest version of this working paper ("crowdsourced").

The papers meeting these criteria, and their sources, are listed in Table 1A. Table 1B lists the papers we identified via our search but excluded because the paper was not published (or forthcoming), used time-series methods only, had cross-national variation, studied a country other than the United States, or only provided evidence on outcomes other than employment.[23]

The studies and the estimates differ along two important dimensions, including the source or use of policy variation, and the group of workers studied or the sector they work in. Table 2 displays the distribution of estimates across these dimensions.[24]

V. Evidence

Overall evidence

We begin with Figure 1, which plots the distribution of preferred estimates from all the studies covered.[25] We plot the preferred elasticity estimates from each study (there can be more than one), arranged from largest negative to largest positive estimate. The estimates are shaded depending on statistical significance at the 5% or 10% level. The vertical dashed and dotted lines, respectively, display the mean (−0.148) and median (−0.115) estimates, but our key focus is on the distribution of the estimates relative to zero. The figure makes clear that there are far more negative than positive estimates, and that there is a very large number of negative and significant estimates. In particular, as shown in Table 3, 79.2% of the estimates are negative, 53.8% are negative and significant at the 10% level or less, and 46.2% are negative and significant at the 5% level or less.[26] Of the remainder, while 20.8% are positive, a very small number are positive and significant (5.4% positive and significant at the 10% level, and 3.8% positive and significant at the 5% level).

A small number of positive estimates, including some significant, is by no means inconsistent with the true effect being negative. One simple way to think about this evidence is to treat each estimate as independent. We can then think of the estimates as Bernoulli trials, with *pr* equal to the probability of a negative estimate. Interpreted this way, under the null of no employment effect, *pr* = 0.5. The actual estimate of *pr*, 0.792, is significantly greater than 0.5 at the 1% significance level (and much lower; the z-statistic is 6.66).[27] That is, the probability of observing the percentage of negative estimates we do under the null is vanishingly small. Of course, this is only a heuristic because estimates are not independent for a number of reasons (overlapping authors, data, etc.).[28]

This perspective on the overall body of evidence is at odds with conclusions that the research evidence on the employment effects of minimum wage in the United States points to no adverse effects or is equally likely to find negative or positive effects. We next turn to several different ways to

summarize the data to see whether there are perspectives on the body of research evidence that lead to different conclusions.

Is the most recent evidence different?

One possibility is that the evidence has become more mixed or more firmly supportive of the conclusion that there is no job loss in more recent – and hence possibly more convincing – research. Figure 2 displays the evidence from the same studies from Figure 1, but in chronological order from earliest to latest publication. There is no evidence of estimates becoming less negative in more recent studies. Indeed, when we estimated a regression of the elasticity on the year (treating forthcoming papers as being published in 2021), the coefficient estimate was essentially zero (−0.001) and insignificant (p-value = 0.773). Note also from Figure 1 that three of the four largest positive estimates come from three of the very early studies – Katz and Krueger (1992), Card (1992a), and Card and Krueger (1994).

Is the evidence skewed by studies reporting multiple estimates?

A second issue is that even in our preferred estimates there are sometimes multiple estimates per study – e.g., for several different industries, or for teens and young adults. Those who read the literature may be basing their interpretations of the evidence on the overall conclusions from studies. We thus want to assess the evidence giving each study equal weight, which we do by choosing the median estimate from each study. To address this issue, we modify Figure 1 to include only the median estimate from each study. This information is presented in Figure 3. The qualitative impression is the same; the estimates are overwhelmingly negative. Looking at Table 3, 75.7% of the estimates are negative, 48.6% are negative and significant at the 10% level or less, and 40.0% are negative and significant at the 5% level or less.[29]

Do the results differ by source or use of policy variation?

Studies in the New Minimum Wage Research use different sources of identifying information. Some use federal variation, with the effects differing across areas or workers.[30] Some use state variation

across many or most states. And some use narrower case-study approaches of one treated area vs. one control area (or perhaps a synthetic control). Figures 4-6 display the evidence for each of these categories of studies. Studies using federal or state variation yield evidence that is predominantly associated with negative effects of minimum wages on employment, as is evident from Figures 4 and 5, and the summary measures in Table 3.[31] There are not as many case studies. The mean and median estimated elasticities are smaller in absolute value than for the federal and state studies, but the differences are not large (see Figure 6). The distribution, too, indicates that the evidence is more consistent with negative employment effects. However, there is a somewhat lower preponderance of negative or negative and significant estimates; as shown in Table 3, 65.0% negative, 45.0% negative and significant at the 10% level, and 40.0% negative and significant at the 5% level.

Do the results differ by the group or sector studied?

All of the studies focus in some way or another on lower-skilled workers who are more likely to be affected by the minimum wage. Many estimates are for teens or young adults, a smaller number are for those with lower education levels, and an increasing number of studies are estimated for low-wage industries (often using different data sources covering employers rather than workers/households); these are usually the retail or restaurant sector, with some evidence for farming plus a smattering of other industries. The logic behind these cuts of the data is that if there are employment effects of the minimum wage, they should be apparent for lower-wage workers. In contrast, evidence on an absence of employment effects for high-wage workers would not be informative.

Finally, some studies use data on wages earned prior to minimum wage increases to identify workers likely to be directly affected by increases in the minimum wage. Because a sizable share of workers among teenagers, young adults, the less-educated, or in low-wage industries in fact earn more than the minimum wage, these latter studies should best isolate the effects of minimum wages on employment of those whose wages are potentially increased by a higher minimum wage. A potential

downside of this approach is it will tend to miss effects of the minimum wage on non-employment to employment transitions.[32]

Figure 7 shows the results for estimates for teens. This graph largely mirrors the overall graph (Figure 1), given the large number of estimates for teens, and is strongly consistent with adverse employment effects. Figure 8, for young adults, is very similar. Indeed, the mean and median elasticity estimates are a bit larger (negative). Although the young adult age range includes teenagers, this finding is striking because it suggests that the evidence of adverse employment effects is by no means limited to teens. Figure 9, for the less-educated, provides more evidence along these lines, pointing to predominantly negative effects, with larger negative mean (−0.242) and median (−0.177) estimates.

The evidence differs for estimates for low-wage industries. Figure 10 appears a good deal more balanced between negative and positive estimates than the other figures, and the mean and median elasticities are much closer to zero and on either side of zero (0.014 and −0.023, respectively). This is also reflected in the percentages of negative and negative and significant estimates in Table 3. While the percent negative remains is nearly two-thirds (64.5%), this percentage is lower than for teens, young adults, or the less educated, and the percentages negative and significant at the 10% or 5% level are notably lower.

Why are the results so different for younger workers or less-educated workers vs. lower-wage industries? We believe there are two components to this explanation. First, the share of workers affected by the minimum wage is a good deal higher for teenagers and for young adults than for retail trade and farming, and the share is lower, relative to teenagers, for restaurants (once we exclude tipped workers, which likely gets closer to the limited-service or fast-food sector typically considered in the studies). This is illustrated in Figure 11, where we use data from the combined CPS ORG files for 2010 (the approximate midpoint of the publication dates of the papers covered). We do this for the 36 states where the federal minimum wage was binding, so that the data across states are more comparable. Using either the prevailing $7.25 minimum wage, or a hypothetical $10 minimum wage, we see that the

share at or below the minimum wage is highest for teens, lowest for retail and farming, and about the same for young adults and restaurants, and for those with less than a high school degree.

Second, labor-labor substitution may be important, with employers substituting away from the lowest-skilled workers and toward other workers when the minimum wage increases. The scope for labor-labor substitution is likely lower when a group is defined by skill (e.g., those with low education), as then there are fewer other workers in the same group to whom employers could substitute, and they are more likely to substitute towards differentially-skilled workers. The possibilities for labor-labor substitution are likely intermediate for young workers, who are on average lower skilled but among whom there is more heterogeneity by skill. But labor-labor substitution is likely more important when we look at an industry, where the substitution is *within* the category, rather than across categories – for example, substituting more-skilled for less-skilled restaurant workers.[33]

As further evidence that labor-labor substitution is important, Figure 12 shows the results for the studies of workers directly affected by a higher minimum wage, for whom there is, by definition, limited or no possibility for labor-labor substitution. This graph gives a clear indication of negative employment effects. All estimates but two are negative, and all of the negative estimates but one are significant at the 5% level. And the mean estimate is much larger negative (−0.270), while the median is closer to that for low-skilled groups (−0.130).[34]

What the combined evidence from the studies classified this way indicates is that the evidence of negative employment effects is stronger for specific workers than specific industries; more so when the groups are defined by skill; and more so for the lowest-skilled and lowest-wage workers. If we did not see evidence of stronger disemployment effects for young or less-educated workers, or those directly affected by minimum wage increases, then the industry studies might not mask gross job loss for some groups that is larger than net job loss in the industry. But the opposite appears to be the case, consistent with the weaker evidence for industry studies being attributable to labor-labor substitution.

Strong labor-labor substitution in the industry studies implies that there can be relatively weak overall employment effects for an industry but larger job losses for specific groups of workers in that industry.

Multivariate regressions

One limitation of the figures and comparisons we have used thus far is that they do not necessarily highlight the effect of one "study feature" holding others constant. (That is, these features are not necessarily mutually exclusive.) To provide evidence that may better isolate the effects of particular study features, Table 4 reports multivariate regressions of elasticity measures on study features. We report results for the continuous elasticity ("Magnitude") and for indicators for whether the elasticity is negative, or negative and significant at the 5% level. We mainly report results for the preferred estimates corresponding to Figure 1, but also some results for the median preferred estimates corresponding to Figure 3.

We start with a simple regression of the continuous elasticity on an intercept, in column (1). This of course replicates the mean. (The −0.148 in column (1) matches the mean elasticity reported in Figure 1.) We then add, separately, the type of variation controls (federal (omitted), state, and case study), and group control (teen (omitted), young adults, low-wage industry, directly affected, low-ed), and then both sets together, in columns (2)-(4). Thus, for example, in column (2) we add dummy variables for studies that use either state variation or the case study approach, and then report the sum of the intercept and the coefficient on the corresponding dummy variable.[35] In large part, these results replicate what we saw in the figures, but the combined regression in column (4) reveals one interesting exception. In column (2), we see that the case-study elasticities are lower (closer to zero), as reported earlier (Figure 6). In column (3), we see that the elasticities for directly affected and low-ed workers are higher (more negative), and the elasticity for low-wage industries is very small, again paralleling what we saw in the figures. Column (4), however, reveals that the elasticities from case studies are not lower once we also control for the groups of workers studied. Yet the elasticities remain small (in fact, non-negative) for studies of low-wage industries. Thus, the smaller elasticities for case studies appear to be

attributable to case studies focusing disproportionately on low-wage industries rather than low-skilled workers. (Of the 20 case study estimates in Figure 6, 12 are from studies of low-wage industries.) The same result is apparent in column (6), where we estimate a model for the probability that the elasticity is negative and significant. And the same result is shown in column (7)-(9), which revert to using the continuous elasticity, but for the median preferred estimates.[36]

Thus, the differences we documented earlier based on the group of workers studied persists in this analysis. But there does not appear to be evidence that using the case study approach, in isolation, results in weaker evidence of disemployment effects. Rather, it is the difference between studies that focus on low-wage industries, as opposed to low-skill (or low-wage) workers, that is paramount.

Employment elasticities and other parameters

Our analysis captures and describes employment elasticities reported in the research literature on the effects of minimum wages. This poses two potential limitations. First, not every employment elasticity covered in this study is strictly comparable. We have already discussed the fact that the elasticities are estimated for different subsets of workers for whom the effects might differ – for example, because the minimum wage bites higher in the distribution, or there are more substitution possibilities. Estimates can also differ because of the comparison group used in the identification strategy (for example, how narrowly defined is the group relative to which employment effects for directly-affected workers are measured). In addition, in a small number of cases the parameter estimated differs. For example, Bailey et al. (forthcoming) and Derenoncourt and Montialoux (forthcoming) report own-wage elasticities, and Meer and West (2016) report an elasticity of employment growth with respect to the minimum wage.

Second, other measures of the employment effects of the minimum wage could be more informative about particular policy questions. For example, the own-wage elasticity tells us more about how minimum wages are likely to affect incomes of low-skilled workers, and employment effects or own-wage elasticity for workers in low-income families would tell us more about the effects of minimum

wages on these families' incomes.[37] However, there is far less research that captures measures like these across a wide range of studies. Our paper is addressed to the long-standing and most prominent research and policy debate about minimum wages: Does a higher minimum wage reduce employment? Additional efforts to obtain more evidence on these alternative measures of the effects of minimum wages, and to synthesize that evidence, would also be valuable.[38]

VI. Conclusions

We set out to take stock of the U.S. minimum wage literature on employment effects beginning with the New Minimum Wage Research in 1992, which moved towards more rigorous identification of minimum wage effects than the earlier, predominantly time-series studies. We were motivated not by the conflicting studies in this literature – and indeed in this paper we do not focus on adjudicating between these conflicting studies. Rather, we were motivated by the sharply different *summaries* of what this literature says, because, surprisingly, economists seem not even to agree on which way the entire set of studies points. Does the research literature by and large establish that there are no employment effects, as some suggest? Is the evidence roughly balanced between finding disemployment effects or not? Or does the research point predominantly to job loss for lower-skilled workers from a higher minimum wage? We answer these questions by summarizing the preferred estimates of authors of the studies in this literature. Our key conclusions are as follows:

First, there is a clear preponderance of negative estimates in the literature. In our data, 79.2% of the estimated employment elasticities are negative, 53.8% are negative and significant at the 10% level or better, and 46.2% are negative and significant at the 5% level or better.

Second, there is not much difference across studies depending on the minimum wage variation used – whether state variation across many states, federal variation, or case studies relying on narrowing comparisons.

The more important variation stems from differences across studies in the set of workers for whom employment effects are estimated. There is strong and consistent evidence of negative

employment effects for teens, young adults, the less-educated, and directly-affected (low-wage) workers, with the estimated elasticities generally larger for the less-educated than for teens and young adults, and larger still for directly-affected workers. In contrast, the evidence from studies of low-wage industries is less one-sided, with a smaller percentage of negative or negative and significant estimates.

Overall, we conclude that the preferred estimates of authors of studies evaluating the employment effects of minimum wages in the United States, since the advent of the New Minimum Wage Research in 1992, paint a clear picture that is at odds with how this research is often summarized. In its totality, this body of evidence and conclusions points strongly toward negative effects of minimum wages on employment of less-skilled workers.

The exception is for the industry studies. However, this is likely because there is far greater scope for labor-labor substitution within industries than within groups of workers who are lower-skilled on average, and even more so for groups of workers that are uniformly lower skilled. These industry studies may tell us that it is not so clear whether employment in an *industry* declines when the minimum wage increases. But this does not in any way rule out larger gross employment declines for the less-skilled workers in those industries; and the clearer evidence of employment declines for less-skilled workers suggest this is exactly what is going on. In other words, a good deal of the evidence that is less consistent with disemployment effects comes from industry studies, but this may be the evidence that is least relevant to the question of whether some low-skilled workers lose their jobs when the minimum wage increases. Conversely, the evidence is much clearer that employment *does* decline among low-skilled workers when the minimum wage increases – and the most relevant evidence may be that for directly-affected workers.

To be clear, the evidence is not unambiguous. There are studies, including those of low-skilled workers, that do not find employment effects that are significantly different from zero, and/or with estimates that are near zero or sometimes even positive. But concluding that the research evidence as a whole fails to find disemployment effects of minimum wages requires discarding or ignoring most of the

evidence on low-skilled workers or relying on the industry studies where labor-labor substitution is more likely to mask job loss among the least-skilled workers.[39]

There are other sources readers can consult for discussions of whether a particular subset of studies is most likely to be correct or incorrect. In particular, we would recommend Neumark and Wascher (2007), Dube et al. (2010), Allegretto et al. (2011), Neumark et al. (2014a, 2014b), Schmitt (2015), Allegretto et al. (2017), Neumark and Wascher (2017), Clemens (2019), Neumark (2019), and Manning (2021). Based on these evaluations (or new ones), economists and others may decide that in fact the best evidence indicates that minimum wages do not reduce employment of less-skilled workers in the United States. But our analysis shows clearly that most of the evidence indicates the opposite – that minimum wages reduce low-skilled employment. It is incumbent on anyone arguing that research supports the opposite conclusion to explain why most of the studies are wrong.

References

Aaronson, Daniel, Eric French, Isaac Sorkin, and Ted To. 2018. "Industry Dynamics and the Minimum Wage: A Putty-Clay Approach." *International Economic Review* 59:51-84.

Abowd, John M., Francis Kramarz, and David N. Margolis. 1999. "Minimum Wages and Employment in France and the United States." NBER Working Paper No. 6996. Cambridge, MA: National Bureau of Economic Research.

Abowd, John M., Francis Kramarz, Thomas Lemieux, and David N. Margolis. 2000a. "Minimum Wages and Youth Employment in France and the United States." In *Youth Employment and Joblessness in Advanced Countries*, edited by David Blanchflower and Richard Freeman, pp. 427-72. Chicago: University of Chicago Press.

Abowd, John M., Francis Kramarz, David N. Margolis, and Thomas Phillipon. 2000b. "The Tail of Two Countries: Minimum Wages and Employment in France and the United States." Institute for the Study of Labor (IZA) Discussion Paper No. 203. Bonn, Germany: IZA.

Addison, John T., McKinley L. Blackburn, and Chad D. Cotti. 2009. "Do Minimum Wages Raise Employment? Evidence from the U.S. Retail-Trade Sector." *Labour Economics* 16: 397-408.

Addison, John T., McKinley L. Blackburn, and Chad D. Cotti. 2012. "The Effect of Minimum Wages on Labour Market Outcomes: County-Level Estimates from the Restaurant-and-Bar Sector." *British Journal of Industrial Relations* 30: 412-435.

Addison, John T., McKinley L. Blackburn, and Chad D. Cotti. 2013. "Minimum Wage Increases in a Recessionary Environment." *Labour Economics* 23: 30-39.

Addison, John T., McKinley L. Blackburn, and Chad D. Cotti. 2015. "On the Robustness of Minimum Wage Effects: Geographically-Disparate Trends and Job Growth Equations." *IZA Journal of Labor Policy* 4(24): online.

Addison, John T., and Orgul Demet Ozturk. 2012. "Minimum Wages, Labor Market Institutions, and Female Employment: A Cross-Country Analysis." *ILR Review* 65: 779-809.

Allegretto, Sylvia A., Arindrajit Dube, and Michael Reich. 2009. "Spatial Heterogeneity and Minimum Wages: Employment Estimates for Teens Using Cross-State Commuting Zones." https://escholarship.org/uc/item/1x99m65f. Berkeley, CA: Institute for Research on Labor and Employment.

Allegretto, Sylvia A., Arindrajit Dube, and Michael Reich. 2011. "Do Minimum Wages Really Reduce Teen Employment? Accounting for Heterogeneity and Selectivity in State Panel Data." *Industrial Relations* 50: 205-240.

Allegretto, Sylvia A., Arindrajit Dube, Michael Reich, and Ben Zipperer. 2017. "Credible Research Designs for Minimum Wage Studies." *ILR Review* 70: 559-592.

Andrews, Isaiah, and Maximilian Kasy. 2019. "Identification and Correction for Publication Bias." *American Economic Review* 109: 2766-2794.

Azar, José, et al. 2019. "Minimum Wage Employment Effects and Labor Market Concentration." NBER Working Paper No. 26101. Cambridge, MA: National Bureau of Economic Research.

Bailey, Martha J., John DiNardo, and Bryan A. Stuart. "The Economic Impact of a High National Minimum Wage: Evidence from the 1966 Fair Labor Standards Act." Forthcoming in *Journal of Labor Economics*.

Baker, Michael, Dwayne Benjamin, and Shuchita Stanger. 1999. "The Highs and Lows of the Minimum Wage

Effect: A Time-Series Cross-Section Study of the Canadian Law." *Journal of Labor Economics* 17: 318-350.

Baskaya, Yusuf Soner, and Yona Rubinstein. 2015. "Using Federal Minimum Wages to Identify the Impact of Minimum Wages on Employment and Earnings across U.S. States." Central Bank of Turkey.

Bazen, Stephen, and Julie Le Gallo. 2009. "The State-Federal Dichotomy in the Effects of Minimum Wages on Teenage Employment in the United States." *Economics Letters* 105: 267-269.

Bazen, Stephen, and Velayoudom Marimoutou. 2002. "Looking for a Needle in a Haystack? A Re-examination of the Time Series Relationship between Teenage Employment and Minimum Wages in the United States." *Oxford Bulletin of Economics and Statistics*64: 699-725.

Bazen, Stephen, and Velayoudom Marimoutou. 2018. "Federal Minimum Wage Hikes Do Reduce Teenage Employment. A Replication Study of Bazen & Marimoutou." *International Journal for Re-Views of Empirical Economics* 5: online.

Belman, Dale L., and Paul Wolfson. 2010. "The Effect of Legislated Minimum Wage Increases on Employment and Hours: A Dynamic Analysis." *LABOUR* 24: 1-25.

Bernstein, Jared, and John Schmitt. 1998. "Making Work Pay: The Impact of the 1996-97 Minimum Wage Increase." https://www.epi.org/publication/studies_stmwp/. Washington, DC: Economic Policy Institute.

Bernstein, Jared, and John Schmitt. 2000. "The Impact of the Minimum Wage: Policy Lifts Wages, Maintains Wage Floor for Low-Wage Labor Market." https://www.epi.org/publication/briefingpapers_min_wage_bp/. Washington, DC: Economic Policy Institute.

Brown, Charles, Curtis Gilroy, and Andrew Kohen. 1982. "The Effect of the Minimum Wage on Employment and Unemployment." *Journal of Economic Literature* 20: 487-528.

Brummund, Peter, and Michael R. Strain. 2020. "Does Employment Respond Differently to Minimum Wage Increases in the Presence of Inflation Indexing." *Journal of Human Resources* 55: 999-1024.

Burkhauser, Richard V., Kenneth A. Couch, and David C. Wittenburg. 2000a. "A Reassessment of the New Economics of the Minimum Wage Literature with Monthly Data from the Current Population Survey." *Journal of Labor Economics* 18: 653-680.

Burkhauser, Richard V., Kenneth A. Couch, and David C. Wittenburg. 2000b. "Who Minimum Wage Increases Bite: An Analysis Using Monthly Data from the SIPP and the CPS." *Southern Economic Journal* 67: 16-40.

Campolieti, Michele. "Does an Increase in the Minimum Wage Decrease Employment? A Meta-Analysis of Canadian Studies." Forthcoming in *Canadian Public Policy*.

Card, David. 1992a. "Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage." *ILR Review* 46: 22-37.

Card, David. 1992b. "Do Minimum Wages Reduce Employment? A Case Study of California, 1987-1989." *ILR Review* 46: 38-54.

Card, David, and Alan B. Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review* 84: 772-793.

Card, David, and Alan B. Krueger. 1995. "Time-Series Minimum Wage Studies: A Meta-analysis." *American Economic Review Papers and Proceedings* 85: 238-243.

Card, David, and Alan B. Krueger. 2000. "Minimum Wages and Employment: A Case Study of the Fast-Food

Industry in New Jersey and Pennsylvania: Reply." *American Economic Review* 90: 1397-1420.

Card, David, and Alan B. Krueger. 1995. *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton, NJ: Princeton University Press.

Card, David, and Alan B. Krueger. 2015. *Myth and Measurement: The New Economics of the Minimum Wage*. Twentieth Anniversary Edition. Princeton, NJ: Princeton University Press.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and Ben Zipperer. 2019. "The Effect of Minimum Wages on Low-Wage Jobs." *Quarterly Journal of Economics* 134: 1405-1454.

Chapman, Jeff. 2004. "Employment and the Minimum Wage: Evidence from Recent State Labor Market Trends." https://www.epi.org/publication/briefingpapers_bp150/. Washington, DC: Economic Policy Institute Briefing Paper.

Clemens, Jeffrey. 2019. "Making Sense of the Minimum Wage: A Roadmap for Navigating Recent Research." CATO Institute, Policy Analysis No. 867. https://www.cato.org/publications/policy-analysis/making-sense-minimum-wage-roadmap-navigating-recent-research. Washington, DC: Cato Institute.

Clemens, Jeffrey, Lisa B. Kahn, and Jonathan Meer. 2020. "Dropouts Need Not Apply? The Minimum Wage and Skill Upgrading." NBER Working Paper No. 27090. Cambridge, MA: National Bureau of Economic Research.

Clemens, Jeffrey and Michael R. Strain. 2018. "The Short-Run Employment Effects of Recent Minimum Wage Changes: Evidence from the American Community Survey." *Contemporary Economic Policy* 36: 711-722.

Clemens, Jeffrey, and Michael Wither. 2019. "The Minimum Wage and the Great Recession: Evidence of Effects on the Employment and Income Trajectories of Low-Skilled Workers." *Journal of Public Economics* 170: 53-67.

Couch, Kenneth A., and David C. Wittenburg. 2001. "The Response of Hours of Work to Increases in the Minimum Wage." *Southern Economic Journal* 68: 171-177.

Currie, Janet, and Bruce Fallick. 1996. "The Minimum Wage and the Employment of Youth: Evidence from the NLSY." *Journal of Human Resources* 31: 404-428.

Deere, Donald, Kevin M. Murphy, and Finis Welch. 1995. "Employment and the 1990-1991 Minimum-Wage Hike." *American Economic Review Papers and Proceedings* 85: 232-237.

Derenoncourt, Ellora, and Clair Montialoux. "Minimum Wages and Racial Inequality." Forthcoming in *Quarterly Journal of Economics*.

Dodson, Marvin E. 2002. "The Impact of the Minimum Wage in West Virginia: A Test of the Low-Wage-Area Theory." *Journal of Labor Research* 23: 25-40.

Doucouliagos, Hristos, and T.D. Stanley. 2009. "Publication Selection Bias in Minimum-Wage Research? A Meta-Regression Analysis." *British Journal of Industrial Relations* 47: 406-428.

Dube, Arindrajit. 2019. "Impacts of Minimum Wages: Review of the International Evidence." University of Massachusetts, Amherst. https://www.gov.uk/government/publications/review-of-the-international-evidence-on-the-impacts-of-minimum-wages/review-of-the-international-evidence-on-the-impacts-of-minimum-wages-terms-of-reference. United Kingdom: HM Treasury.

Dube, Arindrajit, T. William Lester, and Michael Reich. 2010. "Minimum Wage Effects across State Borders: Estimates Using Contiguous Counties." *Review of Economics and Statistics* 92: 945-964.

Dube, Arindrajit, T. William Lester, and Michael Reich. 2016. "Minimum Wage Shocks, Employment Flows,

and Labor Market Frictions." *Journal of Labor Economics* 34: 663-704.

Dube, Arindrajit, Suresh Naidu, and Michael Reich. 2007. "The Economic Effects of a Citywide Minimum Wage." *ILR Review* 60: 522-543.

Dube, Arindrajit, and Ben Zipperer. 2015. "Pooling Multiple Case Studies Using Synthetic Controls: An Application to Minimum Wage Policies." IZA Discussion Paper No. 8944. Bonn, Germany: IZA.

Ehrenberg, Ronald G. 1992. "New Minimum Wage Research: Symposium Introduction. *ILR Review* 46: 3-5.

Evans, William N., and Mark Turner. 1995. "Minimum Wage Effects on Employment and School Enrollment: Comment." College Park, MD: University of Maryland.

Even, William E., and David A. Macpherson. 2014. "The Effect of the Tipped Minimum Wage on Employees in the U.S. Restaurant Industry." *Southern Economic Journal* 80: 633-655.

Even, William E., and David A. Macpherson. 2019. "Where Does the Minimum Wage Bite Hardest in California." *Journal of Labor Research* 40: 1-23.

Fairris, David, and Leon Fernandez Bujunda. 2008. "The Dissipation of Minimum Wage Gains for Workers through Labor-Labor Substitution." *Southern Economic Journal* 75: 473-496.

Fiscal Policy Institute. 2004. "State Minimum Wages and Employment in Small Businesses." http://fiscalpolicy.org/state-minimum-wages-and-employment-in-small-businesses. Latham, NY: Fiscal Policy Institute.

Gilyard, Shaun, and Marta Podemska-Mikluch. 2020. "Effects of Local, State, and Federal Minimum Wage on Employment Growth among Teenagers in the Restaurant Industry." *International Advances in Economic Research* 26: 101.

Gittings, R. Kaj, and Ian M. Schmutte. 2016. "Getting Handcuffs on an Octopus: Minimum Wages, Employment, and Turnover." *ILR Review* 69: 1133-1170.

Glass, Gene. V. 1976. "Primary, Secondary, and Meta-Analysis of Research." *Educational Researcher* 5: 3-8.

Gopalan, Radhakrishnan, et al. "State Minimum Wages, Employment, and Wage Spillovers: Evidence from Administrative Data." Forthcoming in *Journal of Labor Economics*.

Gorry, Aspen, and Jeremy J. Jackson. 2016. "A Note on the Nonlinear Effect of Minimum Wage Increases." *Contemporary Economic Policy* 35: 53-61.

Hirsch, Barry T., Bruce E. Kaufman, and Tetyana Zelenska. 2015. "Minimum Wage Channels of Adjustment." *Industrial Relations* 52: 199-239.

Hoffman, Saul D. 2014. "Employment Effects of the 2009 Minimum Wage Increase: New Evidence from State-Based Comparisons of Workers by Skill Level." *B.E. Journal of Economic Analysis & Policy* 14: 1-27.

Hoffman, Saul D. 2016. "Are the Effects of Minimum Wage Increases Always Small? A Reanalysis of Sabia, Burkhauser, and Hansen." *ILR Review* 69: 295-311.

Hoffman, Saul D., and Diane M. Trace. 2009. "NJ and PA Once Again: What Happened to Employment When the PA-NJ Minimum Wage Differential Disappeared?" *Eastern Economic Journal* 35: 115-128.

Hunt, Morton. 1997. *How Science Takes Stock: The Story of Meta-Analysis*. New York: Russell Sage Foundation.

Kandilov, Amy M.G., and Ivan T. Kandilov. 2019. "The Minimum Wage and Seasonal Employment: Evidence from the U.S. Agricultural Sector." *Journal of Regional Science* 60: 1-16.

Katz, Lawrence F., and Alan B. Krueger. 1992. "The Effect of the Minimum Wage on the Fast Food Industry."

ILR Review 46: 6-21.

Keil, Manfred, Donald Robertson, and James Symons. 2001. "Minimum Wages and Employment." CEP Working Paper No. 497. London, England: Centre for Economic Performance.

Keil, Manfred, Donald Robertson, and James Symons. 2009. "Univariate Regressions of Employment on Minimum Wages in the Panel of U.S. States." Claremont, CA: Claremont McKenna College.

Kim, Hang Soon, and SooCheong Jang. 2020. "Does a Minimum Wage Increase Endanger Restaurant Jobs? Examining the Role of Franchising." *International Journal of Hospitality Management* 84: 102325.

Kim, Taeil, and Lowell J. Taylor. 1995. "The Employment Effect in Retail Trade of California's 1988 Minimum Wage Increase." *Journal of Business and Economic Statistics* 13: 175-182.

Krugman, Paul. 2015. "Liberals and Wages." *New York Times*, July 17. https://www.nytimes.com/2015/07/17/opinion/paul-krugman-liberals-and-wages.html.

Liu, Shanshan, Thomas J. Hyclak, and Krishna Regmi. 2016. "Impact of the Minimum Wage on Youth Labor Markets." *LABOUR* 30: 18-37.

Lordan, Grace, and David Neumark. 2018. "People versus Machines: The Impact of Minimum Wages on Automatable Jobs." *Labour Economics* 52: 40-53.

Manning, Alan. 2021. "The Elusive Employment Effect of the Minimum Wage." *Journal of Economic Perspectives* 35: 3-26.

Meer, Jonathan, and Jeremy West. 2016 "Effects of the Minimum Wage on Employment Dynamics." *Journal of Human Resources* 51: 500-522.

Michl, Thomas R. 2000. "Can Rescheduling Explain the New Jersey Minimum Wage Studies." *Eastern Economic Journal* 26: 265-276.

Monras, Joan. 2019. "Minimum Wages and Spatial Equilibrium: Theory and Evidence." *Journal of Labor Economics* 37: 853-904.

Neumark, David. 2001. "The Employment Effects of Minimum Wages: Evidence from a Prespecified Research Design." *Industrial Relations* 40: 121-144.

Neumark, David. 2019. "The Econometrics and Economics of the Employment Effects of Minimum Wages: Getting from Known Unknowns to Known Knowns." *German Economic Review* 20: 293-329.

Neumark, David, and Olena Nizalova. 2007. "Minimum Wage Effects in the Longer Run." *Journal of Human Resources* 42: 435-452.

Neumark, David, J.M. Ian Salas, and William Wascher. 2014a. "Revisiting the Minimum Wage-Employment Debate: Throwing Out the Baby with the Bathwater?" *ILR Review* 67: 608-648.

Neumark, David, J.M. Ian Salas, and William Wascher. 2014b. "More on Recent Evidence on the Effects of Minimum Wages in the United States." *IZA Journal of Labor Policy* 3(24): online.

Neumark, David, Mark Schweitzer, and William Wascher. 2004. "Minimum Wage Effects Throughout the Wage Distribution." *Journal of Human Resources* 39: 425-450.

Neumark, David, and William Wascher. 1992. "Employment Effects of Minimum and Subminimum Wages: Panel Data on State Minimum Wage Laws." *ILR Review* 46: 55-81.

Neumark, David, and William Wascher. 1994. "Employment Effects of Minimum and Subminimum Wages: Reply to Card, Katz, and Krueger." *ILR Review* 47: 497-512.

Neumark, David, and William Wascher. 1995a. "Minimum Wage Effects on Employment and School

Enrollment." *Journal of Business and Economics Statistics* 13: 199-206.

Neumark, David, and William Wascher. 1995b. "Minimum Wage Effects on School and Work Transitions of Teenagers." *American Economic Review Papers and Proceedings* 85: 244-249.

Neumark, David, and William Wascher. 1996a. "The Effects of Minimum Wages on Teenage Employment and Enrollment: Evidence from Matched CPS Surveys." *Research in Labor Economics* 15: 25-63.

Neumark, David, and William Wascher. 1996b. "Minimum Wage Effects on Employment and School Enrollment: Reply to Evans and Turner." FEDS Working Paper 1996-28. Washington, DC: Board of Governors of the Federal Reserve System.

Neumark, David, and William Wascher. 2000. "The Effect of New Jersey's Minimum Wage Increase on Fast-Food Employment: A Reevaluation Using Payroll Records." *American Economic Review* 90: 1362-1396.

Neumark, David, and William Wascher. 2002. "State-Level Estimates of Minimum Wage Effects: New Evidence and Interpretations from Disequilibrium Models." *Journal of Human Resources* 37: 35-62.

Neumark, David, and William L. Wascher. 2003. "Minimum Wages and Skill Acquisition: Another Look at Schooling Effects." *Economics of Education Review* 22: 1-10.

Neumark, David, and William L. Wascher. 2007. "Minimum Wages and Employment." *Foundations and Trends in Microeconomics* 3: 1-182.

Neumark, David, and William Wascher. 2008. *Minimum Wages*. Cambridge, MA: MIT Press.

Neumark, David, and William Wascher. 2011. "Does a Higher Minimum Wage Enhance the Effectiveness of the Earned Income Tax Credit." *ILR Review* 64: 712-746.

Neumark, David, and William Wascher. 2017. "Reply to *Credible Research Designs for Minimum Wage Studies.*" *ILR Review* 70: 593-609.

Orazem, Peter R., and J. Peter Mattila. 2002. "Minimum Wage Effects on Hours, Employment, and Number of Firms: The Iowa Case." *Journal of Labor Research* 23: 3-23.

Orrenius, Pia M., and Madeline Zavodny. 2008. "The Effect of Minimum Wages on Immigrants' Employment and Earnings." *ILR Review* 61: 544-563.

Pabilonia, Sabrina W. 2002. "The Effects of Federal and State Minimum Wages Upon Teen Employment and Earnings." Washington, DC: U.S. Bureau of Labor Statistics.

Partridge, Mark D., and Jamie S. Partridge. 1999. "Do Minimum Wage Hikes Reduce Employment? State-Level Evidence from the Low-Wage Retail Sector." *Journal of Labor Research* 20: 393-413.

Persky, Joseph, and Ron Baiman. 2010. "Do State Minimum Wage Laws Reduce Employment? Mixed Messages from Fast Food Outlets in Illinois and Indiana." *Journal of Regional Analysis & Policy* 40: 132-142.

Potter, Nicholas. 2006a. "Earnings and Employment: The Effect of the Santa Fe Living Wage Ordinance in Santa Fe, New Mexico. "https://www.researchgate.net/publication/33022463_Earnings_and_Employment_The_Effects_of_the_Living_Wage_Ordinance_in_Santa_Fe_New_Mexico.

Potter, Nicholas. 2006b. "Measuring the Employment Impacts of the Living Wage Ordinance in Santa Fe, New Mexico." https://www.researchgate.net/publication/33022462_Measuring_the_Employment_Impacts_of_the_Living_Wage_Ordinance_in_Santa_Fe_New_Mexico. Albuquerque, NM: University of New Mexico, Bureau of Business and Economic Research.

Powell, David. “Synthetic Control Estimation Beyond Case Studies: Does the Minimum Wage Reduce Employment?” Forthcoming in *Journal of Business & Economics Statistics*.

Reich, Michael. 2018. “Advice Letter on the Effects of a $15 Minimum Wage on New Jersey Agriculture.” February 16. Berkeley, CA: Center on Wage and Employment Dynamics.

Reich, Michael D. 2019. “Likely Effects of a $15 Federal Minimum Wage by 2024.” February 7. https://irle.berkeley.edu/likely-effects-of-a-15-federal-minimum-wage-by-2024/. Berkeley, CA: Center on Wage and Employment Dynamics.

Reich, Michael, and Peter Hall. 2001. “A Small Raise for the Bottom.” Chapter 6 in *The State of California Labor, 2001*. https://escholarship.org/uc/item/9rb8m3vt. Berkeley, CA: Institute for Labor and Employment.

Repetti, Toni, and Susan Roe. 2018. “Minimum Wage Change Effects on Restaurant Pricing and Employment.” *International Journal of Contemporary Hospitality Management* 30: 1545-1562.

Romich, Jennifer L., et al. 2020. “Employer Responses to a City-Level Minimum Wage Mandate: Early Evidence from Seattle.” *Urban Affairs Review* 56: 451-479.

Sabia, Joseph J. 2006. “The Effect of Minimum Wage Increases on Retail and Small Business Employment.” http://epionline.org/studies/r98/. Washington, DC: Employment Policies Institute.

Sabia, Joseph J. 2008. “Minimum Wages and the Economic Well-Being of Single Mothers.” *Journal of Policy Analysis and Management* 27: 848-866.

Sabia, Joseph J. 2009a. “Identifying Minimum Wage Effects: New Evidence from Monthly CPS Data.” *Industrial Relations* 48: 311-328.

Sabia, Joseph J. 2009b. “The Effects of Minimum Wage Increases on Retail Employment and Hours: New Evidence from Monthly CPS Data.” *Journal of Labor Research* 30: 75-97.

Sabia, Joseph J., Richard V. Burkhauser, and Benjamin Hansen. 2012. “Are the Effects of Minimum Wage Increases Always Small? New Evidence from a Case Study of New York.” *ILR Review* 65: 350-376.

Sabia, Joseph J., Richard V. Burkhauser, and Benjamin Hansen. 2016. “When Good Measurement Goes Wrong: New Evidence that New York’s State Minimum Wage Reduced Employment.” *ILR Review* 69: 312-319.

Schmitt, John. 2015. “Explaining the Small Employment Effects of the Minimum Wage in the United States.” *Industrial Relations* 43: 547-581.

Singell, Larry D., and James R. Terborg. 2007. “Employment Effects of Two Northwest Minimum Wage Initiatives.” *Economic Inquiry* 45: 40-55.

Sorkin, Isaac. 2015. “Are There Longer-Run Effects of the Minimum Wage?” *Review of Economic Dynamics* 18: 306-333.

Spriggs, William E., and Bruce W. Klein. 1994. “Raising the Floor: The Effects of the Minimum Wage on Low-Wage Workers.” https://www.epi.org/publication/studies_1994_floor/. Washington DC: Economic Policy Institute.

Strain, Michael R. 2019. “A $15 Minimum Wage Will Harm Workers.” Statement before the House Committee on Education and Labor, Feb. 7. https://www.aei.org/research-products/testimony/a-15-dollar-minimum-wage-will-harm-workers/. Washington, DC: American Enterprise Institute.

Thompson, Jeffrey P. 2009. “Using Local Labor Market Data to Re-examine the Employment Effects of the Minimum Wage.” *ILR Review* 62: 343-366.

Totty, Evan. 2017. “The Effect of Minimum Wages on Employment: A Factor Model Approach.” *Economic Inquiry* 55: 1712-1737.

Turner, Mark D., and Berna Demiralp. 2001. “Do Higher Minimum Wages Harm Minority and Inner City Teens?” *Review of Black Political Economy* 28: 95-121.

Wang, Wuyi, Peter C.B. Phillips, and Liangjun Su. 2019. “The Heterogeneous Effects of the Minimum Wage on Employment.” *Economics Letters* 174: 179-185.

Wellington, Alison. 1991. “Effects of the Minimum Wage on the Employment Status of Youths: An Update.” *Journal of Human Resources* 26: 27-46.

Williams, Nicolas. 1993. “Regional Effects of the Minimum Wage on Teenage Employment.” *Applied Economics* 25: 1517-1528.

Williams, Nicolas, and Jeffrey A. Mills. 2001. “The Minimum Wage and Teenage Employment: Evidence from Time Series.” *Applied Economics* 33: 285-300.

Wolfson, Paul, and Dale Belman. 2001. “The Minimum Wage, Employment, and the AS-IF Methodology: A Forecasting Approach to Evaluating the Minimum Wage.” *Empirical Economics* 26: 487-514.

Wolfson, Paul, and Dale Belman. 2004. “The Minimum Wage: Consequences for Prices and Quantities in Low-Wage Labor Markets.” *Journal of Business and Economics Statistics* 22: 296-311.

Wolfson, Paul, and Dale Belman. 2019. “15 Years of Research on US Employment and the Minimum Wage.” *LABOUR* 33: 488-506.

Yelowitz, Aaron S. 2005. “How Did the $8.50 Citywide Minimum Wage Affect the Santa Fe Labor Market.” https://epionline.org/studies/r91/. Washington, DC: Employment Policies Institute.

Zavodny, Madeline. 2000. “The Effect of the Minimum Wage on Employment and Hours.” *Labour Economics* 7: 729-750.

Zipperer, Ben. 2016. “Employment Fell because of the Great Recession, Not the Minimum Wage.” December 6. https://www.epi.org/publication/employment-fell-because-of-the-great-recession-not-the-minimum-wage-study-claiming-the-minimum-wage-harmed-low-wage-workers-fails-conventional-tests/. Washington, DC: Employment Policies Institute.

Zipperer, Ben. 2019. “Gradually Raising the Minimum Wage to $15 would be Good for Workers, Good for Businesses, and Good for the Economy.” Testimony Before the U.S. House of Representatives Committee on Education and Labor.” February 7. https://www.epi.org/publication/minimum-wage-testimony-feb-2019/. Washington, DC: Employment Policies Institute.

Table 1A: Included Paper List

Author(s)	Year	Journal	Source	No. of Elas.
Card	1992a	*ILR Review*	N&W (2007)	1
Card	1992b	*ILR Review*	N&W (2007)	2
Katz & Krueger	1992	*ILR Review*	N&W (2007)	1
Neumark & Wascher	1992	*ILR Review*	N&W (2007)	4
Williams	1993	*Applied Economics*	N&W (2007)	9
Card & Krueger	1994	*American Economic Review*	N&W (2007)	1
Neumark & Wascher	1994	*ILR Review*	N&W (2007)	2
Deere, Murphy, & Welch	1995	*American Economic Review: P&P*	N&W (2007)	6
Kim & Taylor	1995	*Journal of Business & Economic Statistics*	N&W (2007)	1
Neumark & Wascher	1995a	*Journal of Business & Economic Statistics*	N&W (2007)	1
Currie & Fallick	1996	*Journal of Human Resources*	N&W (2007)	1
Partridge & Partridge	1999	*Journal of Labor Research*	N&W (2007)	2
Burkhauser, Couch, & Wittenburg	2000a	*Journal of Labor Economics*	N&W (2007)	1
Burkhauser, Couch, & Wittenburg	2000b	*Southern Economic Journal*	N&W (2007)	6
Card & Krueger	2000	*American Economic Review*	N&W (2007)	1
Michl	2000	*Eastern Economic Journal*	N&W (2007)	2
Neumark & Wascher	2000	*American Economic Review*	N&W (2007)	1
Zavodny	2000	*Labour Economics*	N&W (2007)	1
Neumark	2001	*Industrial Relations*	N&W (2007)	4
Dodson	2002	*Journal of Labor Research*	W&B (2019)	1
Neumark & Wascher	2002	*Journal of Human Resources*	N&W (2007)	1
Orazem & Mattila	2002	*Journal of Labor Research*	W&B (2019)	1
Neumark, Schweitzer, & Wascher	2004	*Journal of Human Resources*	W&B (2019)	3
Dube, Naidu, & Reich	2007	*ILR Review*	W&B (2019)	1
Neumark & Nizalova	2007	*Journal of Human Resources*	W&B (2019)	3
Singell & Terborg	2007	*Economic Inquiry*	W&B (2019)	4
Orrenius & Zavodny	2008	*ILR Review*	W&B (2019)	2
Sabia	2008	*Journal of Policy Analysis and Management*	W&B (2019)	2
Bazen & Le Gallo	2009	*Economics Letters*	N&W (2007)	1
Hoffman & Trace	2009	*Eastern Economic Journal*	Web search	1
Sabia	2009a	*Industrial Relations*	W&B (2019)	1
Sabia	2009b	*Journal of Labor Research*	W&B (2019)	1
Thompson	2009	*ILR Review*	Web search	2
Addison, Blackburn, & Cotti	2009	*Labour Economics*	W&B (2019)	1

(continues)

Table 1A (continued): Included Paper List

Author(s)	Year	Journal	Source	No. of Elas.
Dube, Lester, & Reich	2010	*Review of Economics and Statistics*	W&B (2019)	1
Persky & Baiman	2010	*Journal of Regional Analysis and Policy*	W&B (2019)	1
Allegretto, Dube, & Reich	2011	*Industrial Relations*	W&B (2019)	1
Neumark & Wascher	2011	*ILR Review*	W&B (2019)	6
Addison, Blackburn, & Cotti	2012	*British Journal of Industrial Relations*	W&B (2019)	1
Sabia, Burkhauser, & Hansen	2012	*ILR Review*	W&B (2019)	1
Addison, Blackburn, & Cotti	2013	*Labour Economics*	W&B (2019)	1
Neumark, Salas, & Wascher	2014a	*ILR Review*	W&B (2019)	1
Neumark, Salas, & Wascher	2014b	*IZA Journal of Labor Policy*	W&B (2019)	2
Even & Macpherson	2014	*Southern Economic Journal*	W&B (2019)	2
Hoffman	2014	*The B.E. Journal of Economic Analysis and Policy*	W&B (2019)	2
Addison, Blackburn, & Cotti	2015	*IZA Journal of Labor Policy*	Web search	1
Hirsch, Kaufman, Zelenska	2015	*Industrial Relations*	Web search	1
Dube, Lester, & Reich	2016	*Journal of Labor Economics*	W&B (2019)	2
Gittings & Schmutte	2016	*ILR Review*	W&B (2019)	2
Hoffman	2016	*ILR Review*	Web search	2
Liu, Hyclak, & Regmi	2016	*LABOUR*	Web search	3
Meer & West	2016	*Journal of Human Resources*	W&B (2019)	1
Sabia, Burkhauser, & Hansen	2016	*ILR Review*	Web search	1
Allegretto, Dube, Reich, & Zipperer	2017	*ILR Review*	W&B (2019)	1
Totty	2017	*Economic Inquiry*	W&B (2019)	2
Aaronson, French, Sorkin, & To	2018	*International Economic Review*	Web search	1
Cengiz, Dube, Lindner, & Zipperer	2019	*Quarterly Journal of Economics*	Web search	1
Clemens & Wither	2019	*Journal of Public Economics*	W&B (2019)	1
Even & Macpherson	2019	*Journal of Labor Research*	Web search	2
Monras	2019	*Journal of Labor Economics*	Web search	1
Wang, Phillips, & Su	2019	*Economics Letters*	Web search	2
Brummund & Strain	2020	*Journal of Human Resources*	Web search	2
Gilyard & Podemska-Mikluch	2020	*International Advances in Economic Research*	Web search	1
Kim & Jang	2020	*International Journal of Hospitality Management*	Web search	1
Manning	2021	*Journal of Economic Perspectives*	Crowdsourced	2
Bailey, DiNardo, & Stuart	Forth.	*Journal of Labor Economics*	Crowdsourced	3
Derenoncourt & Montialoux	Forth.	*Quarterly Journal of Economics*	Crowdsourced	2
Gopalan, Hamilton, Kalda, & Sovich	Forth.	*Journal of Labor Economics*	Web search	3
Kandilov & Kandilov	Forth.	*Journal of Regional Science*	Web search	1
Powell	Forth.	*Journal of Business & Economic Statistics*	W&B (2019)	1

Note: N&W (2007) refers to all studies from Table 5.1 in Neumark and Wascher (2007). W&B (2019) refers to all studies included for meta-analysis in Wolfson and Belman (2019). Papers were also identified via a web search involving searching Google Scholar for “Minimum Wage" covering the years 1992 to 2020. If the candidate paper was not included in N&W (2007) or W&B (2019), it was subsequently read for mention of employment effects in the United States, excluding hypotheticals (e.g., Repetti and Roe (2018)) or simulations (e.g., Gorry and Jackson (2016)). If the paper estimated minimum wage employment elasticities it was retained. The search ended after 40 pages of results. Finally, a few were identified via crowdsourcing.

Table 1B: Excluded Paper List

Author(s)	Year	Journal/Source	Source
Wellington	1991	*Journal of Human Resources*	N&W (2007)
Spriggs & Klein	1994	Economic Policy Institute Report	N&W (2007)
Card & Krueger	1995	*American Economic Review: P&P*	N&W (2007)
Evans & Turner	1995	Unpublished	N&W (2007)
Neumark & Wascher	1995b	*American Economic Review: P&P*	N&W (2007)
Neumark & Wascher	1996b	FEDS Working Paper	N&W (2007)
Bernstein & Schmitt	1998	Economic Policy Institute Brief	N&W (2007)
Abowd, Kramarz, & Margolis	1999	NBER Working Paper	N&W (2007)
Abowd, Kramarz, Lemieux, & Margolis	2000a	NBER Volume: Youth Employment and Joblessness in Advanced Countries	N&W (2007)
Abowd, Kramarz, Margolis, & Philippon	2000b	IZA Discussion Paper	N&W (2007)
Bernstein & Schmitt	2000	Economic Policy Institute Brief	N&W (2007)
Couch & Wittenburg	2001	*Southern Economic Journal*	N&W (2007)
Keil, Robertson, & Symons	2001	Discussion Paper	N&W (2007)
Reich & Hall	2001	UC Institute for Labor and Employment	N&W (2007)
Turner & Demiralp	2001	*Review of Black Political Economy*	N&W (2007)
Williams & Mills	2001	*Applied Economics*	N&W (2007)
Wolfson & Belman	2001	*Empirical Economics*	N&W (2007)
Bazen & Marimoutou	2002	*Oxford Bulletin of Economics and Statistics*	W&B (2019)
Pabilonia	2002	Working Paper	N&W (2007)
Neumark & Wascher	2003	*Economics of Education Review*	N&W (2007)
Chapman	2004	Economic Policy Institute Brief	N&W (2007)
Fiscal Policy Institute	2004	Fiscal Policy Institute Working Paper	N&W (2007)
Wolfson & Belman	2004	*Journal of Business & Economic Statistics*	N&W (2007)
Yelowitz	2005	Employment Policies Institute Report	N&W (2007)
Potter	2006a	UNM, Bureau of Business and Economic Research	N&W (2007)
Potter	2006b	UNM, Bureau of Business and Economic Research	W&B (2019)
Sabia	2006	Employment Policies Institute Report	N&W (2007)
Allegretto, Dube, & Reich	2009	IRLE Working Paper	W&B (2019)
Keil, Robertson, & Symons	2009	Robert Day School of Economics and Finance Research Paper	W&B (2019)
Belman & Wolfson	2010	*LABOUR*	W&B (2019)
Addison & Ozturk	2012	*ILR Review*	W&B (2019)
Baskaya & Rubinstein	2015	Unpublished	Web search
Dube & Zipperer	2015	IZA Discussion Paper	W&B (2019)
Bazen & Marimoutou	2018	*International Journal for Re-Views in Empirical Economics*	From authors
Clemens & Strain	2018	*Contemporary Economic Policy*	Web search
Lordan & Neumark	2018	*Labour Economics*	Web search
Rinz & Voorheis	2018	CARRA Working Paper Series	Crowdsourced
Romich et al.	2020	*Urban Affairs Review*	Web search
Jardim et al.	Forth.	*American Economic Journal: Economic Policy*	Crowdsourced

Note: See notes to Table 1A. The studies listed here failed to meet our inclusion criteria. The most common reasons for exclusion were that the study was not published at the time of creating this list, it used a time-series methodology, it did not estimate the relationship between the minimum wage and employment, or the study used cross-country minimum wage variation. Note that one paper was provided by authors in response to our survey about a different paper.

Table 2: Characteristics of Estimates

	Teens	Young adults	Low education	Low-wage industries	Directly-affected workers
Federal variation	17	20	7	2	0
State variation	24	38	5	17	7
Case studies	3	4	3	12	0

Note: Teens are generally 16-19. Young adults are generally 16-24. Low education is generally high school dropouts. Low-wage industries are retail, restaurant, hotels, or farming. The definition of directly-affected workers varies across studies. The total number of estimates in the table exceeds our total number of estimates (130) because some estimates fit into more than one category (e.g., Neumark (2001) looks at low-education young adults).

Table 3: Summary of Estimates from Different Figures

Figure	% negative	% negative, $p \leq .1$	% negative, $p \leq .05$	% positive	% positive, $p \leq .1$	% positive, $p \leq .05$
1: All	79.2	53.8	46.2	20.8	5.4	3.8
3: Median study estimates	75.7	48.6	40.0	24.3	7.1	4.3
4: Federal variation	82.4	52.9	47.1	17.6	2.9	0.0
5: State variation	81.1	56.8	47.3	18.9	4.1	4.1
6: Case studies	65.0	45.0	40.0	35.0	15.0	10.0
7: Teens	80.0	57.8	42.2	20.0	2.2	2.2
8: Young adults	82.5	57.1	46.0	17.5	1.6	1.6
9: Less educated	78.6	50.0	50.0	21.4	7.1	7.1
10: Low-wage industries	64.5	32.3	32.3	35.5	16.1	9.7
12: Directly-affected workers	75.0	75.0	62.5	25.0	0.0	0.0

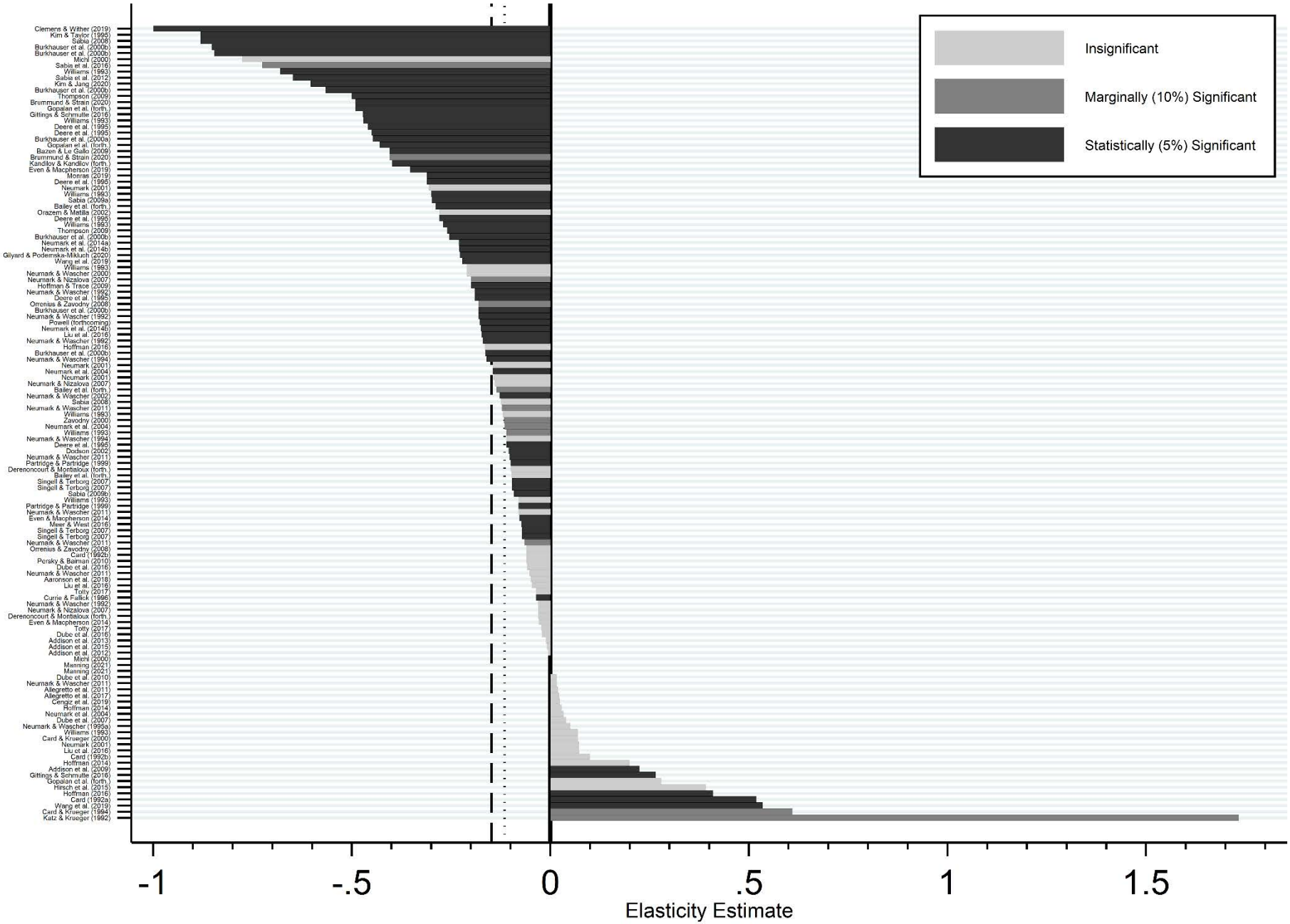
Note: Three estimates that are exactly zero are classified as positive. For medians of the preferred estimates, if there was an even number of estimates, we averaged the two central estimates.

Table 4: Regression Estimates for Elasticities

	Preferred elasticities (Figure 1)						Median preferred elasticities (Figure 3)		
	Magnitude	Magnitude	Magnitude	Magnitude	Negative	Negative and significant at 5% level	Magnitude	Magnitude	Magnitude
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	-0.148***	-0.151**	-0.159**	-0.149*	0.921***	0.656***	-0.141**	-0.232***	-0.189**
	(0.031)	(0.069)	(0.057)	(0.079)	(0.067)	(0.150)	(0.067)	(0.052)	(0.072)
Intercept + State	N/A	-0.158***	N/A	-0.195***	0.939***	0.734***	-0.166***	N/A	-0.256***
		(0.036)		(0.066)	(0.069)	(0.112)	(0.034)		(0.060)
Intercept + Case Study	N/A	-0.103	N/A	-0.225	0.830***	0.749***	-0.103	N/A	-0.277**
		(0.088)		(0.135)	(0.130)	(0.181)	(0.088)		(0.131)
Intercept + Young Adults	N/A	N/A	-0.184***	-0.153**	0.827***	0.536***	N/A	-0.175***	-0.128*
			(0.038)	(0.072)	(0.060)	(0.114)		(0.034)	(0.067)
Intercept + Low-wage Industry	N/A	N/A	0.023	0.069	0.671***	0.244	N/A	0.012	0.083
			(0.081)	(0.154)	(0.118)	(0.157)		(0.075)	(0.152)
Intercept + Directly Affected	N/A	N/A	-0.270*	-0.229	0.734***	0.682***	N/A	-0.277**	-0.218
			(0.138)	(0.158)	(0.151)	(0.179)		(0.128)	(0.145)
Intercept + Low-ed	N/A	N/A	-0.224**	-0.202**	0.850***	0.470**	N/A	-0.237***	-0.199**
			(0.094)	(0.098)	(0.151)	(0.208)		(0.089)	(0.097)
				N/A	N/A	N/A			

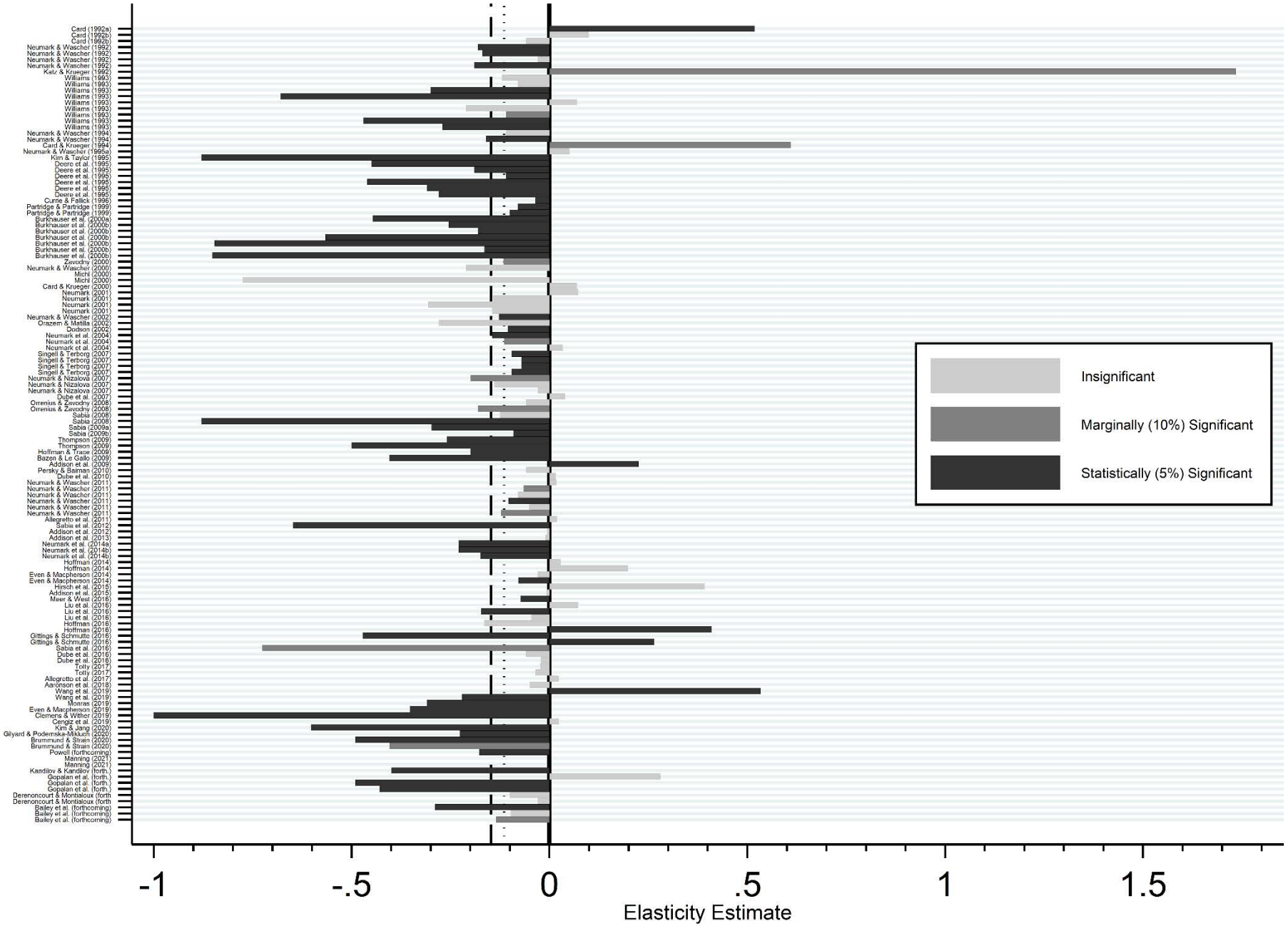
Note: The rows below the first row of estimates report the sums of the estimated intercept plus the coefficient of the indicated dummy variable (e.g., "State"). The omitted categories for the dummy variables are for federal variation and teenagers. "Magnitude" refers to the actual elasticity estimates. Columns (1)-(6) are based on use the preferred elasticity estimates (Figure 1); columns (7)-(9) are based on the median estimates (Figure 3). Columns (5) and (6) are based on linear probability estimates. See notes to Table 3. ***, **, * indicate statistically significant at the 1%, 5%, or 10% level. Standard errors are clustered at the study level.

Figure 1: Preferred Elasticity Estimates



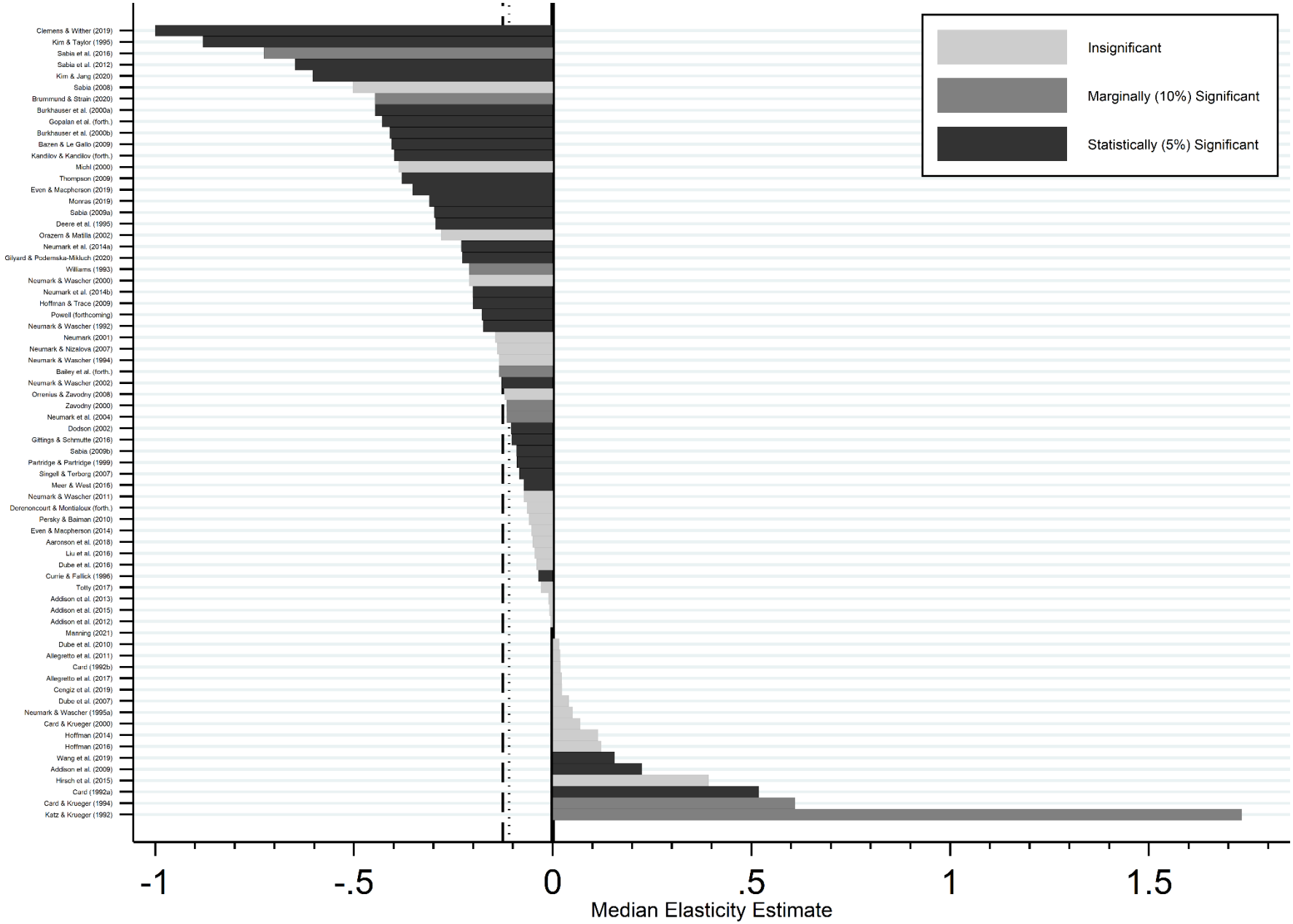
Note: The dashed and dotted lines show the mean (−0.148) and median (−0.115) elasticity estimates.

Figure 2: Preferred Elasticity Estimates in Order of Publication Year



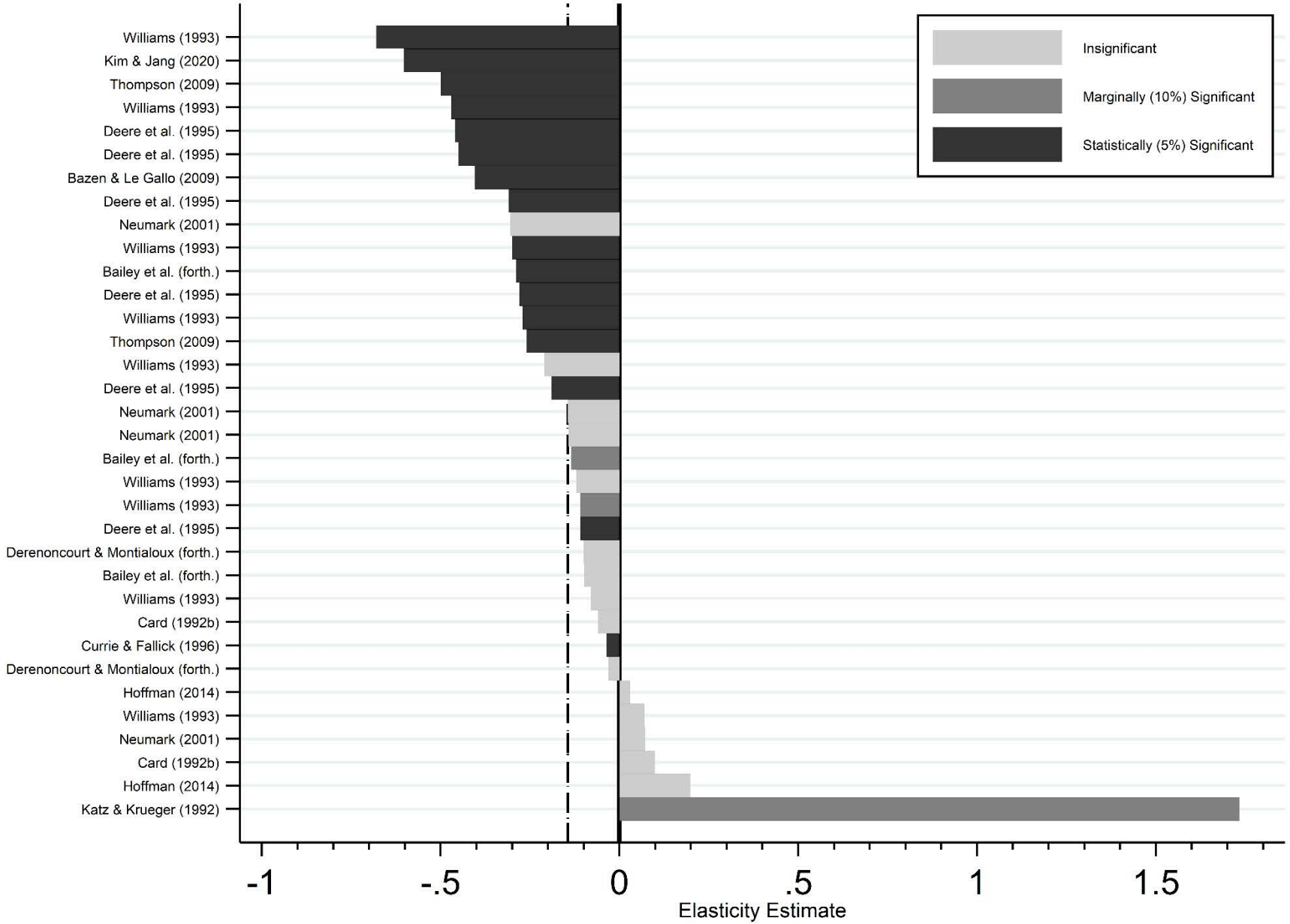
Note: The dashed and dotted lines show the mean (−0.148) and median (−0.115) elasticity estimates.

Figure 3: Preferred Elasticity Estimates, Median for Each Study



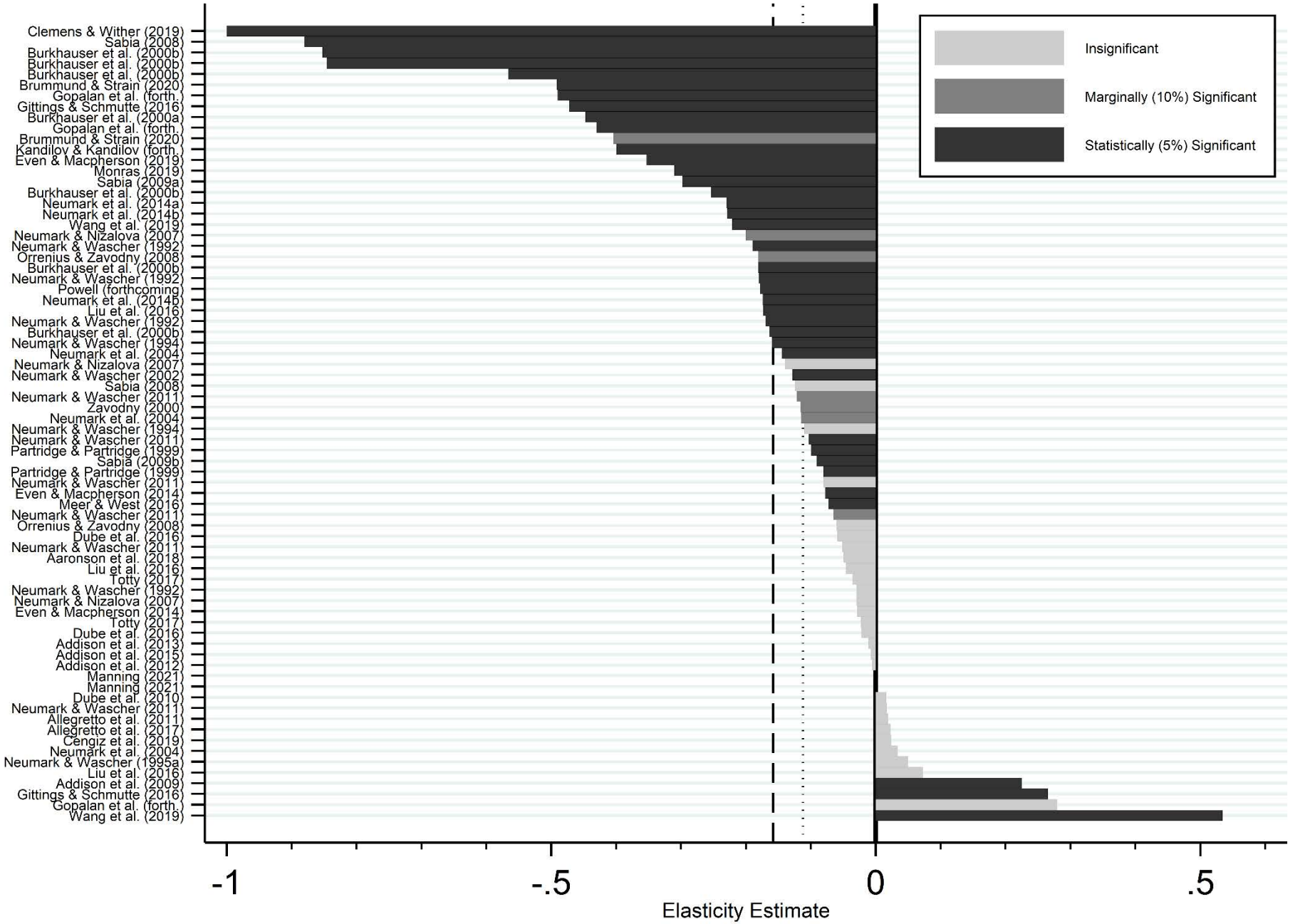
Note: The dashed and dotted lines show the mean (−0.125) and median (−0.110) elasticity estimates. For medians of the preferred estimates, if there was an even number of estimates, we averaged the two central estimates.

Figure 4: Preferred Elasticity Estimates, Studies using Federal Variation



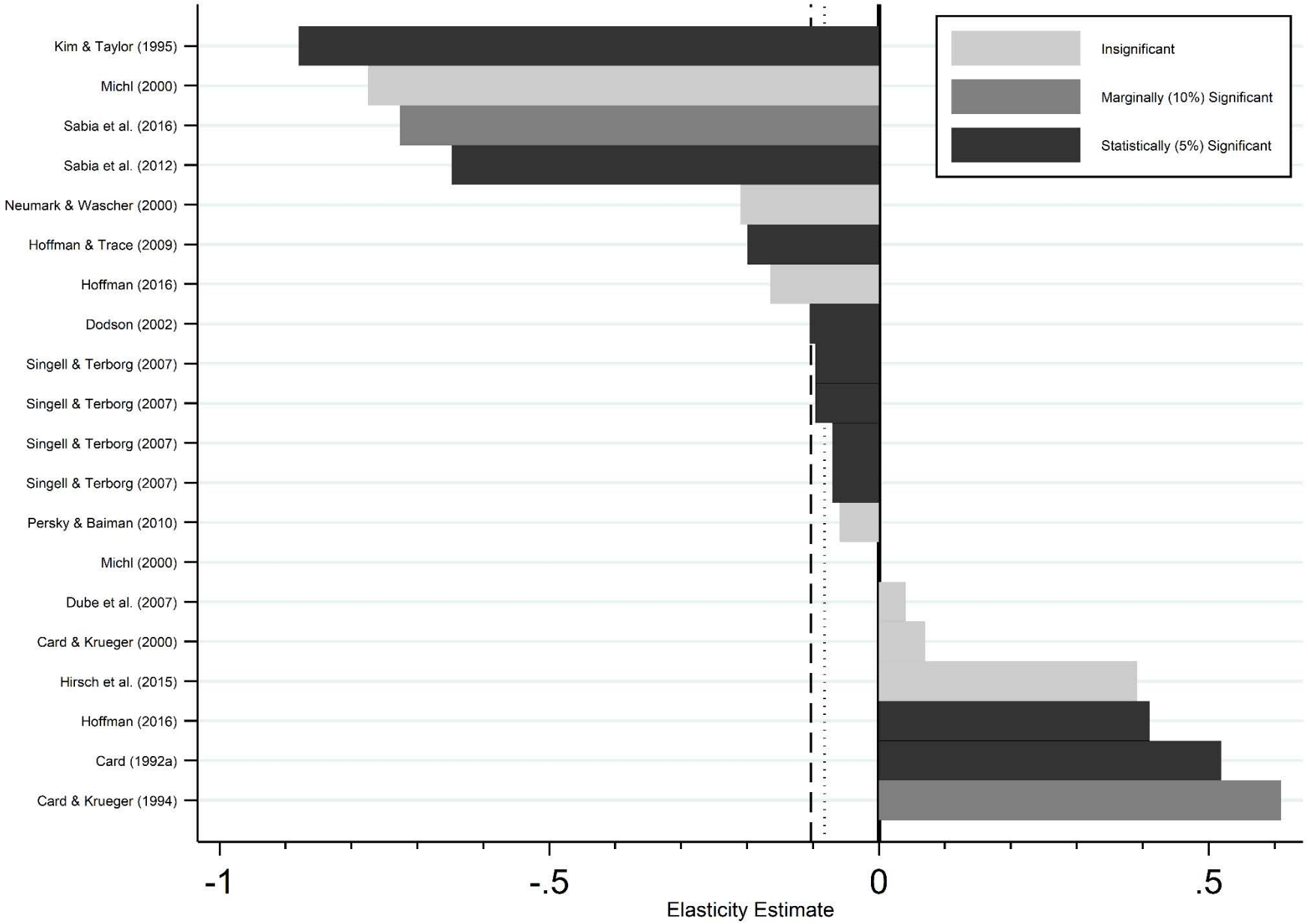
Note: The dashed and dotted lines show the mean (−0.145) and median (−0.144) elasticity estimates.

Figure 5: Preferred Elasticity Estimates, Studies using State Variation



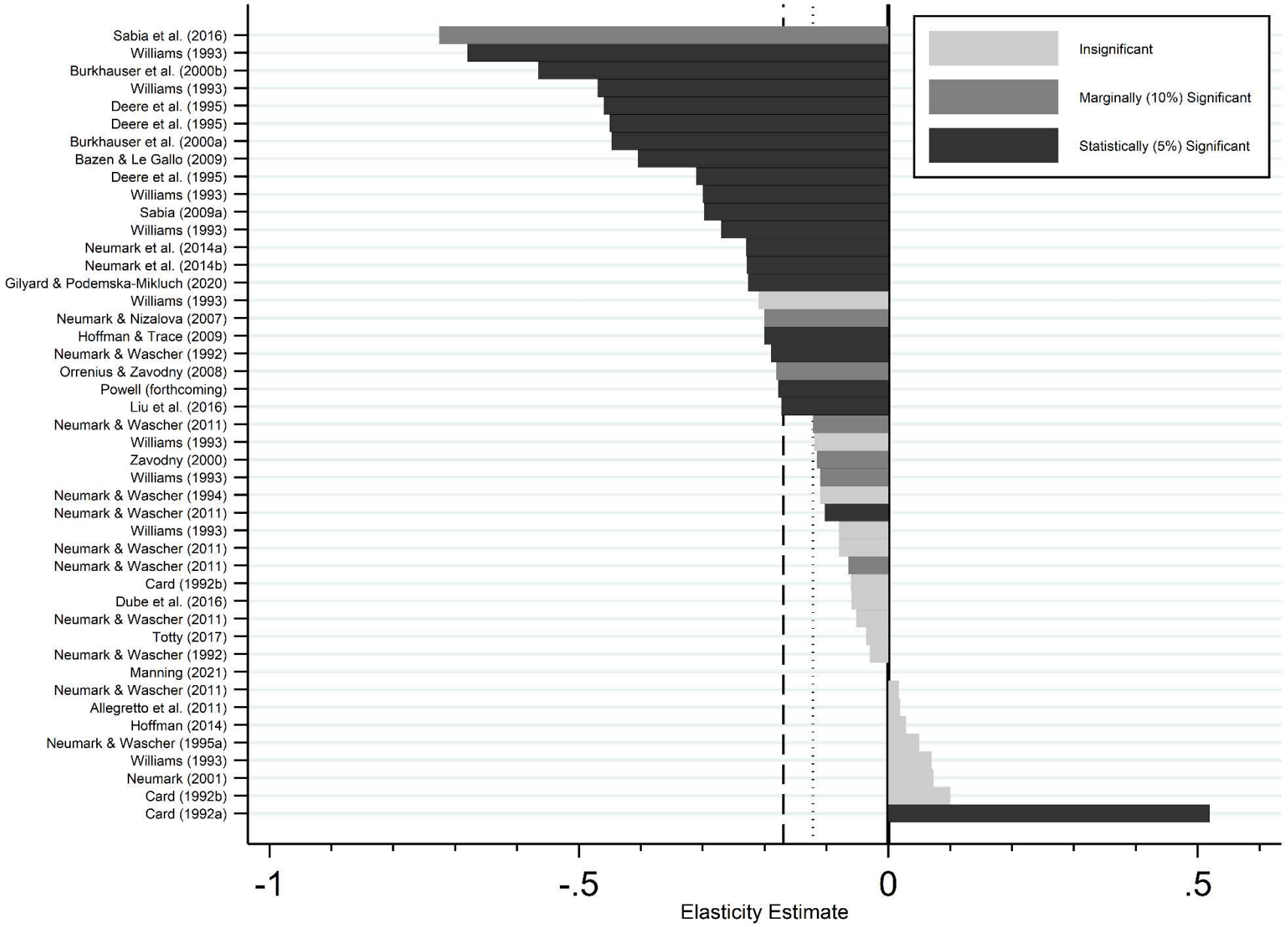
Note: The dashed and dotted lines show the mean (−0.158) and median (−0.112) elasticity estimates.

Figure 6: Preferred Elasticity Estimates, Case Studies



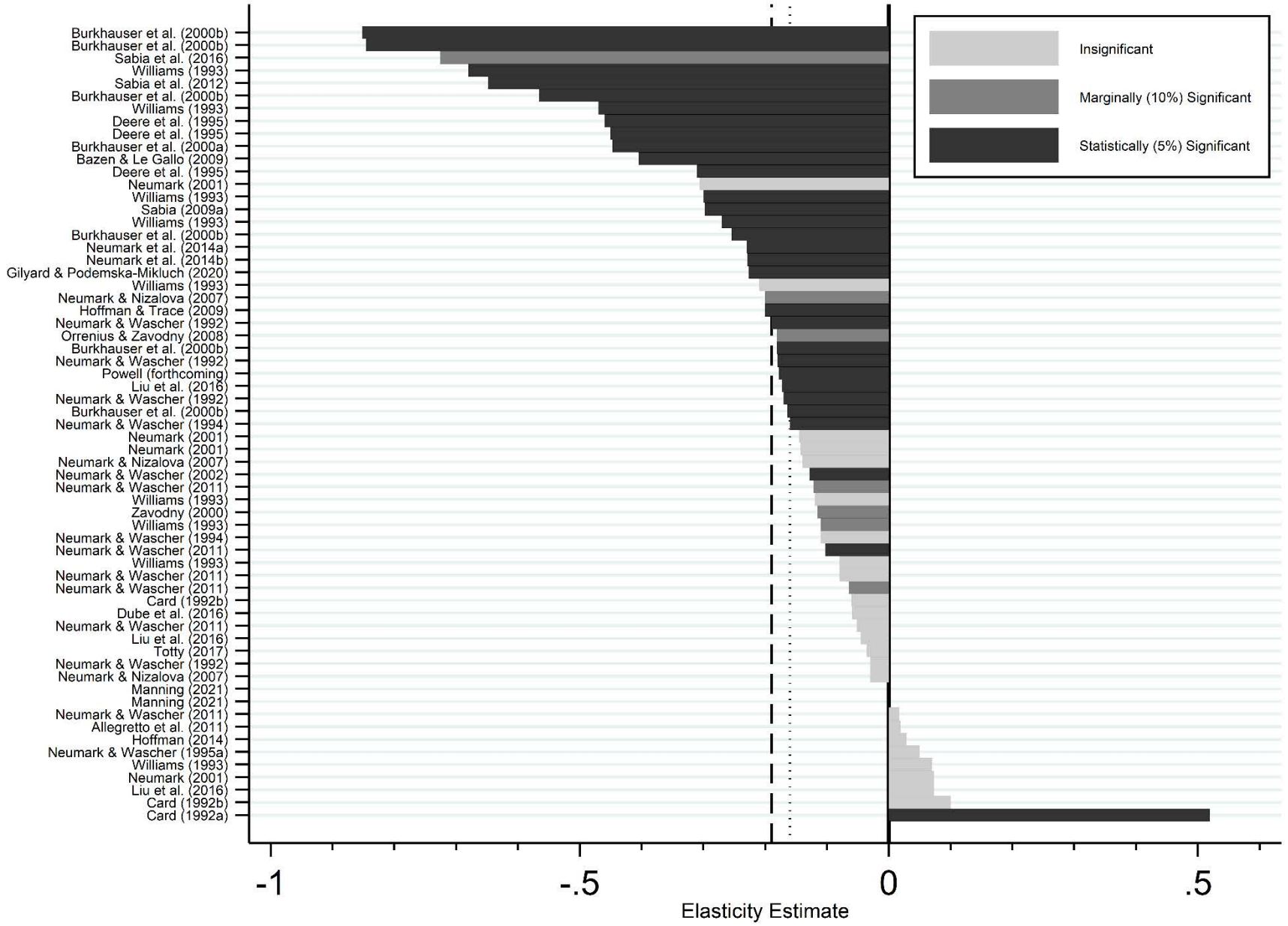
Note: The dashed and dotted lines show the mean (−0.103) and median (−0.083) elasticity estimates.

Figure 7: Preferred Elasticity Estimates, Studies of Teens



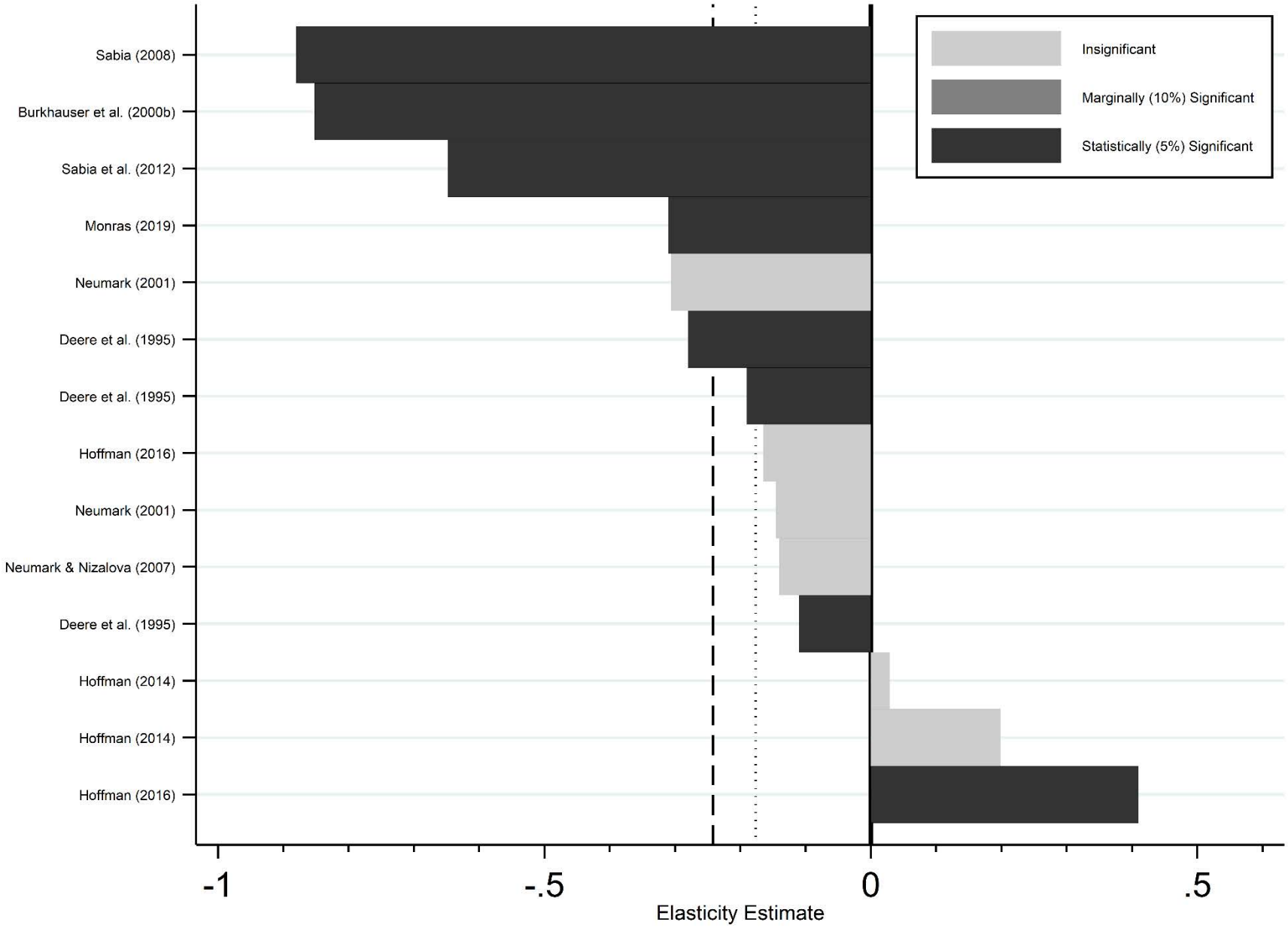
Note: The dashed and dotted lines show the mean (−0.170) and median (−0.122) elasticity estimates.

Figure 8: Preferred Elasticity Estimates, Studies of Young Adults



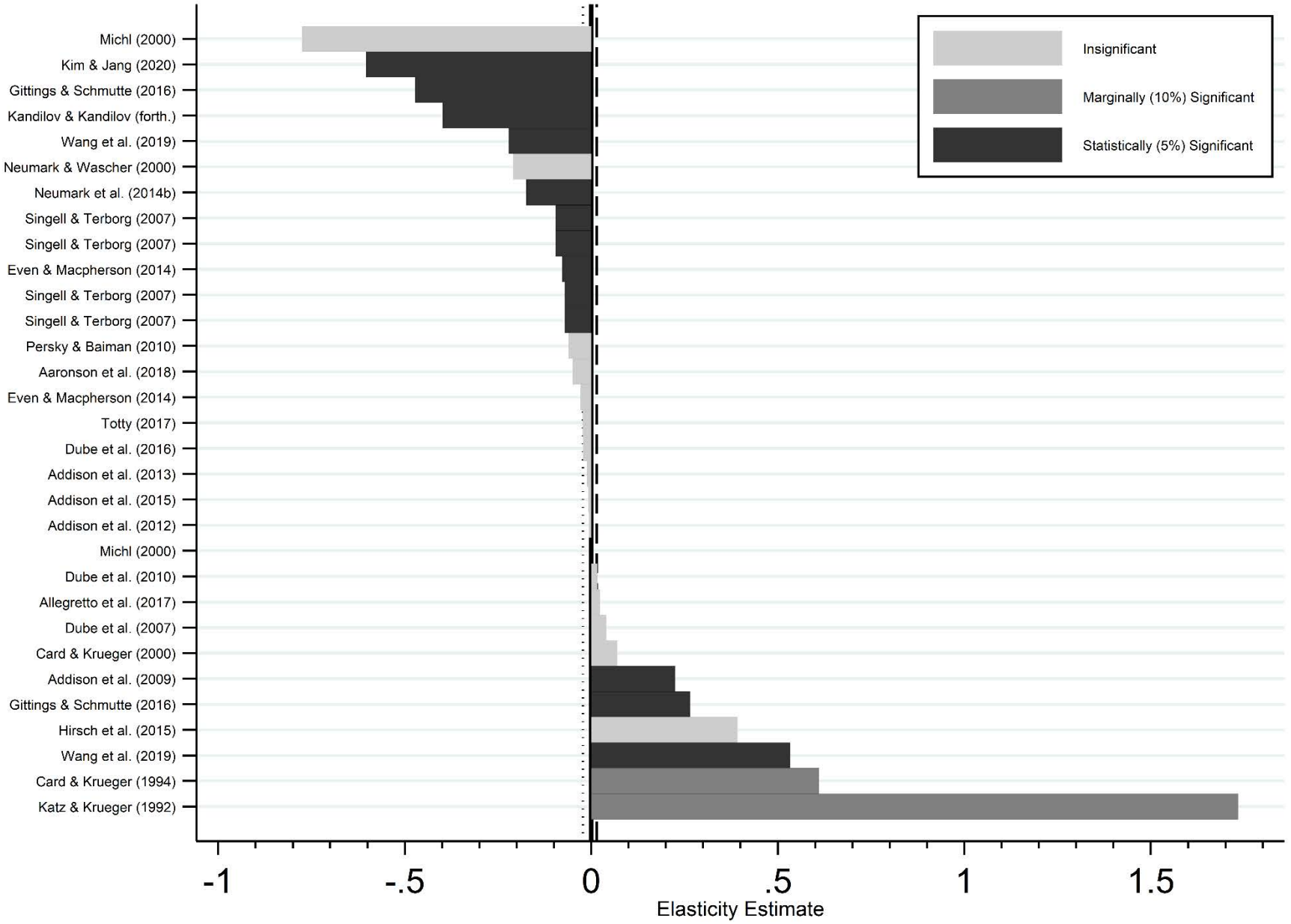
Note: The dashed and dotted lines show the mean (−0.190) and median (−0.160) elasticity estimates.

Figure 9: Preferred Elasticity Estimates, Studies of Less-Educated



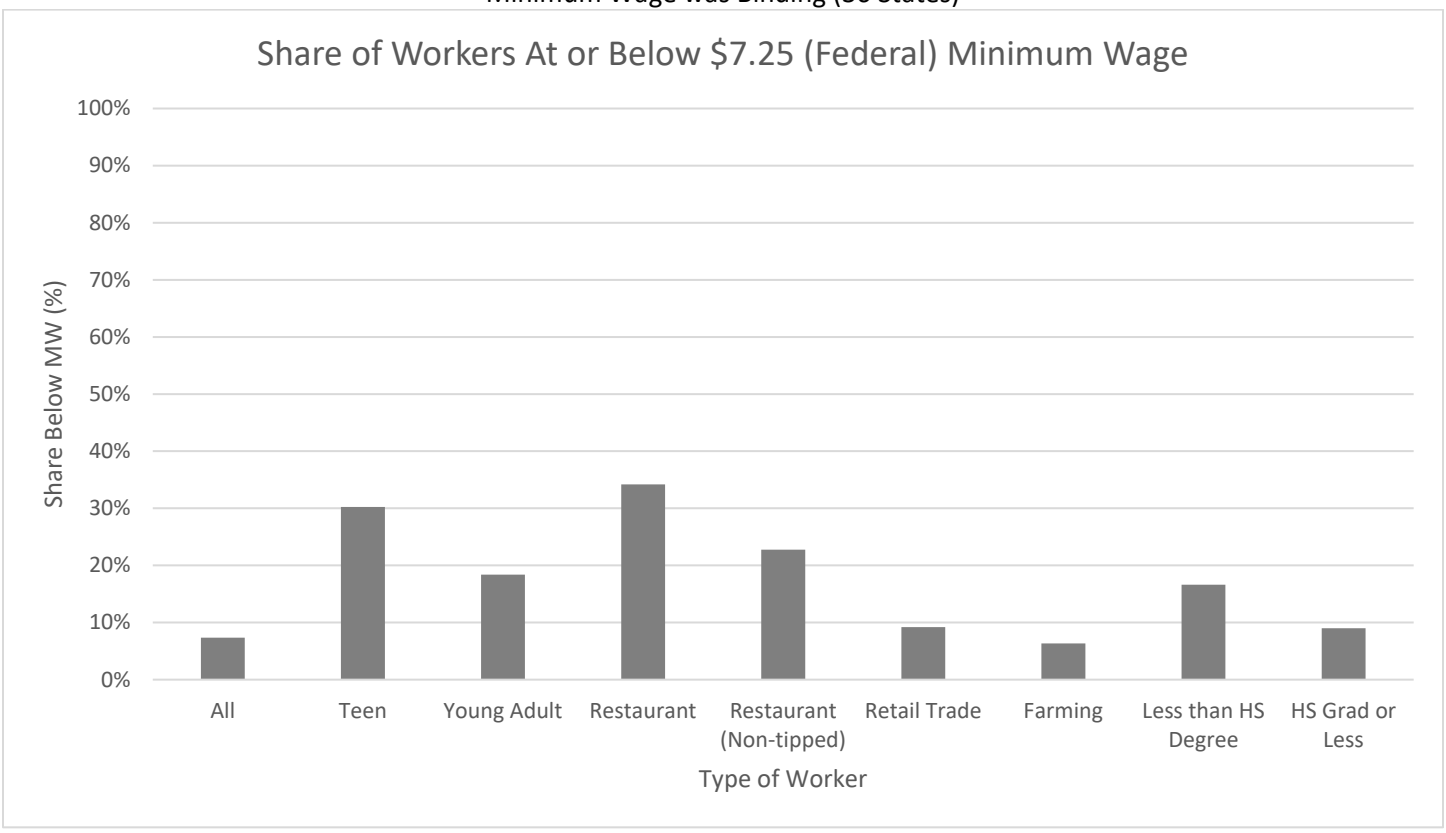
Note: The dashed and dotted lines show the mean (−0.242) and median (−0.177) elasticity estimates.

Figure 10: Preferred Elasticity Estimates, Studies of Low-Wage Industries



Note: The dashed and dotted lines show the mean (0.014) and median (−0.023) elasticity estimates.

Figure 11: Share of Workers at or Below $7.25 or $10 Minimum Wage, 2010 CPS ORGs (Weighted), States where Federal Minimum Wage was Binding (36 States)



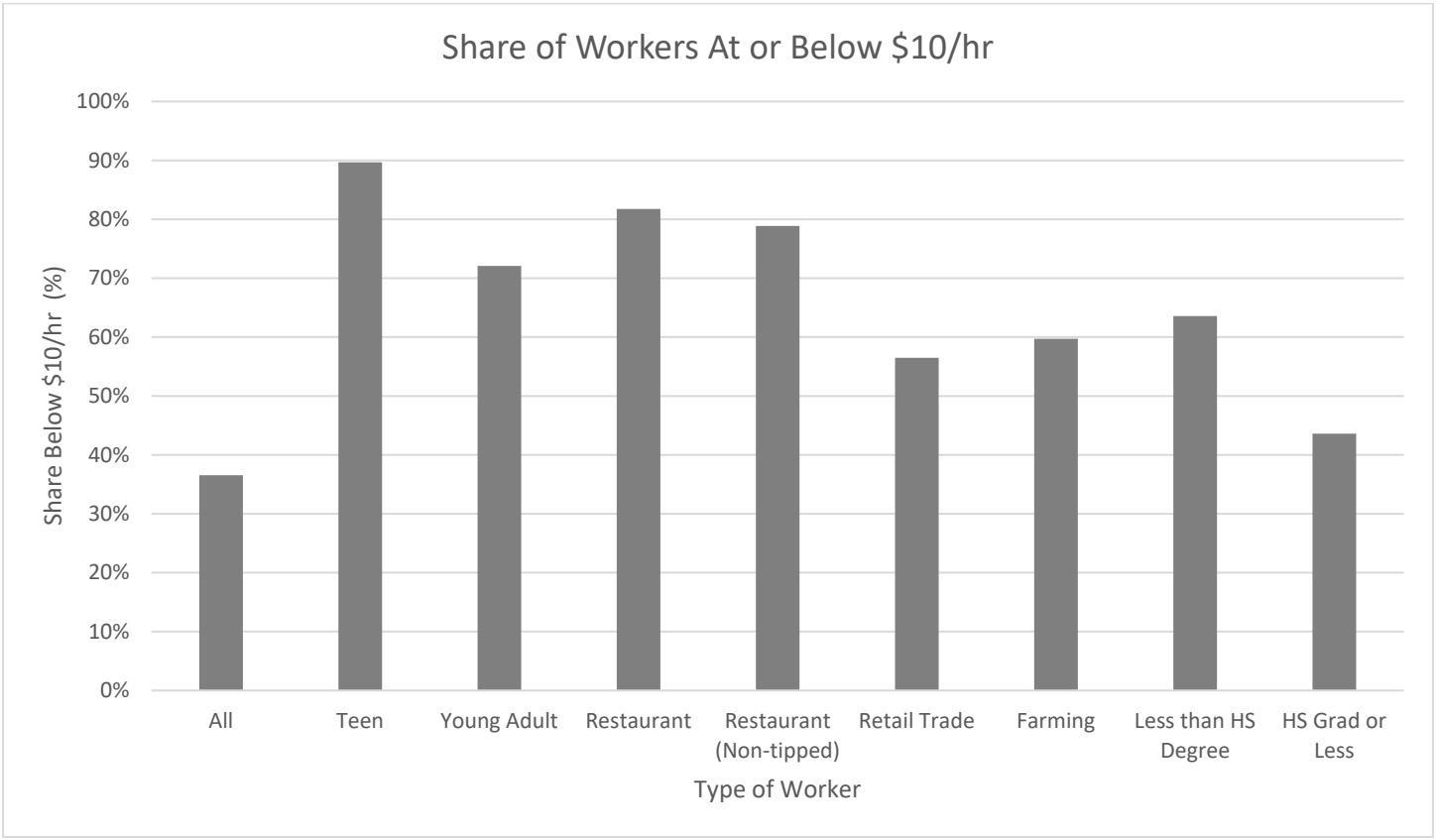
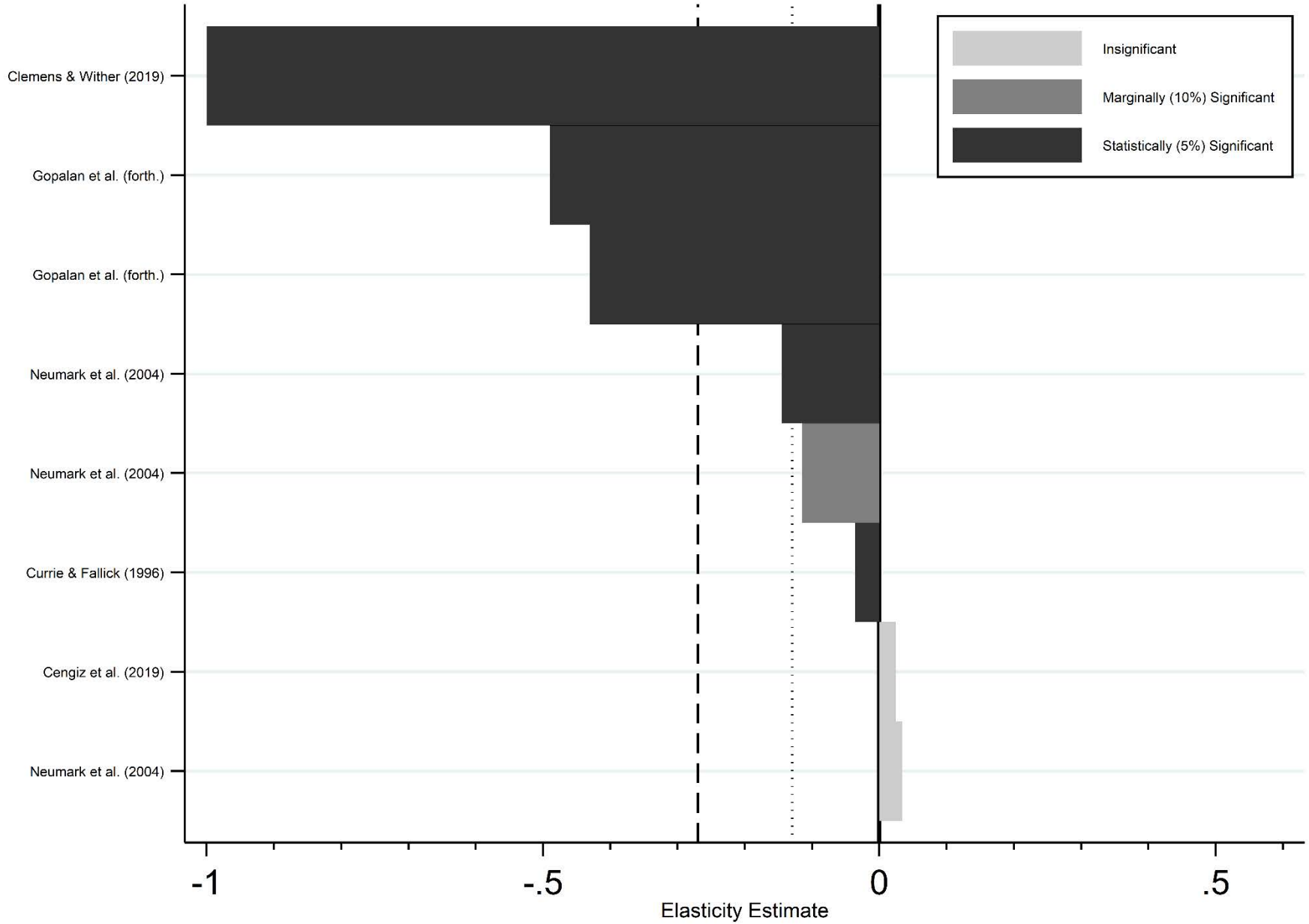
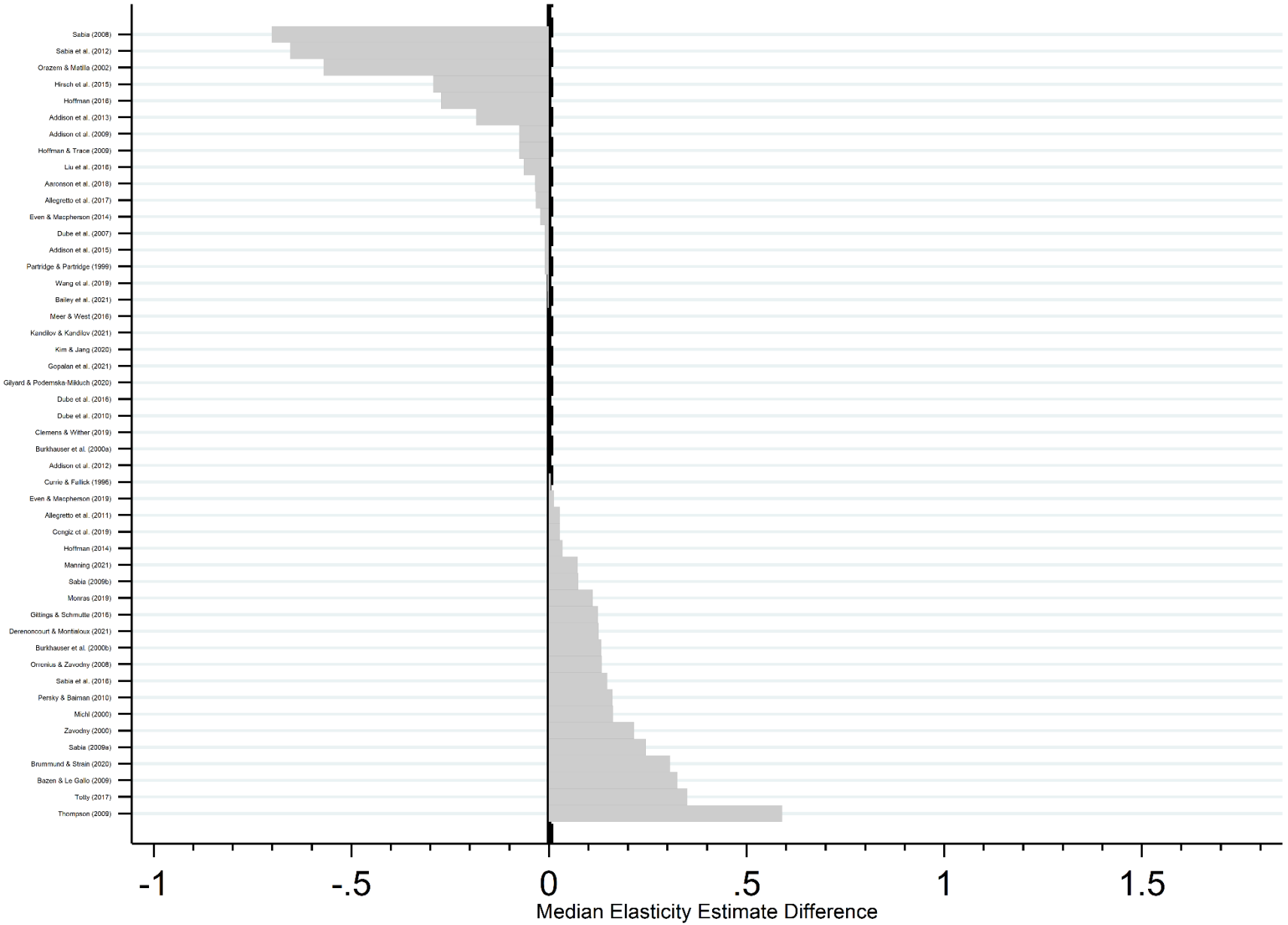


Figure 12: Preferred Elasticity Estimates, Studies of Directly-Affected Workers



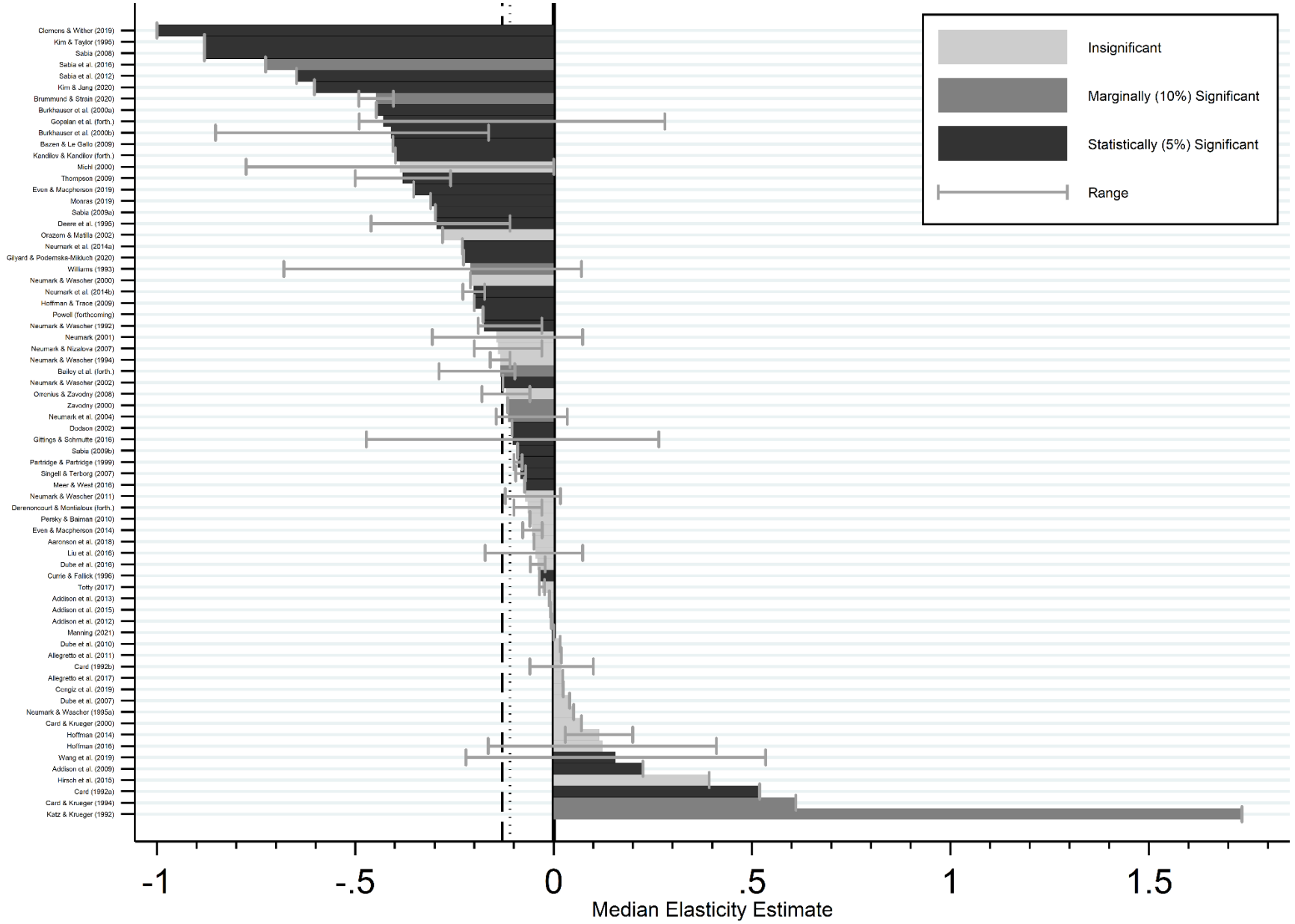
Note: The dashed and dotted lines show the mean (−0.270) and median (−0.130) elasticity estimates.

Appendix Figure A1: Differences Between Our Estimate Selections and Author Estimate Selections, Median Estimates



Note: The dashed and dotted lines show the mean (0.008) and median (0) differences in the elasticity estimates (our selected estimates minus the authors' responses). This figure does not include estimates for eight papers (five groups of authors) that did not respond, or the papers by one of us.

Appendix Figure A2: Preferred Elasticity Estimates, Median for Each Study and Range of Estimates for Each Study



Note: The I-bars represent the range of elasticities from each author group. Papers where the I-bar is a single line consist of a single estimate. Aside from the ranges shown, this is the same as Figure 3.

Endnotes

[1] Although the New Minimum Wage Research is typically characterized by the reliance on state minimum wage variation and other subnational variation (often differential effects of federal minimum wage changes across regions), in contrast to the earlier time-series evidence, there were earlier papers using regional variation in minimum wages (see Brown et al., 1982; Neumark and Wascher, 2008).

[2] Not surprisingly, this disagreement (or confusion) among economists spills over into the extensive discussion of minimum wages in the media and public discourse.

[3] In this paper, we focus solely on the U.S. evidence. See Dube (2019) for a more limited review of the international evidence.

[4] See, e.g., Neumark and Wascher (2007), Dube et al. (2010), Allegretto et al. (2011), Neumark et al. (2014a, 2014b), Schmitt (2015), Allegretto et al. (2017), Neumark and Wascher (2017), Clemens (2019), Neumark (2019), and Manning (2021).

[5] See, e.g., Card and Krueger (1994) who find a large *positive* employment elasticity, and the criticism in Neumark and Wascher (2002); and Clemens and Wither (2019) who find a large negative elasticity, , and the criticism in Zipperer (2016).

[6] That is, some of the summaries cited below make direct claims that the evidence is mixed. Other summaries about a lack of consensus may imply the same, although with weaker statements noting that there are active researchers on both sides of the debate.

[7] Lest the reader be concerned that we are cherry-picking quotes in this discussion, these quotes come from the research studies that we include in our survey in this paper, and we have used all quotes that provide overall summaries of the evidence as opposed to more narrow summaries related, for example, to a particular econometric technique the study is using.

[8] See https://www.igmchicago.org/surveys/15-minimum-wage/.

[9] For reference, the results from the weighted responses were: “strongly agree” (9%); “agree” (25%);

"uncertain" (37%); "disagree" (29%); and "strongly disagree" (0%).

[10] See a similar statement in Reich (2018, p. 3), advocating for a higher minimum wage in New Jersey claiming that farm workers will benefit. This conclusion is built into simulations of proposed minimum wage increases that he and his colleagues have written for many jurisdictions, which generally predict no or even positive employment effects; these can be found on the webpage of his *Center on Wage and Employment Dynamics* (https://irle.berkeley.edu/cwed/). To be clear, these writings (and testimony) refer to "the best" or "credibly-designed" studies, so one could argue that Reich is not simply summarizing the literature. But there is no explicit statement that refers to how his conclusion differs from the large literature cited.

[11] See https://www.epi.org/economists-in-support-of-15-by-2024/.

[12] We could also cite surveys of the evidence by one of us, such as Neumark and Wascher (2007) and Neumark (2019), which provide similar summaries. But we wanted to focus on how others have summarized the research on employment effects of the minimum wage in the United States. Nonetheless, organizations opposed to higher minimum wages, like the Employment Policies Institute, have cited these surveys in arguing that most evidence in fact points to job loss:

> "The published research on the subject points overwhelmingly in one direction: A summary of the last two decades of literature on the minimum wage, co-authored by the lead economist on this study [Neumark], concluded that most of the evidence points to job loss following wage hikes." (See https://epionline.org/studies/minimum-wages/.)

[13] The two most recent meta-analysis examples for the United States, both of which use all estimates, are by Wolfson and Belman (2019) and Doucouliagos and Stanley (2009). Campolieti (forthcoming) presents a meta-analysis for Canada.

[14] Note, though, that we include all studies that meet our neutral study selection criteria, discussed in more detail in the following section. We thus avoid the potential subjectivity in selection of "the best" studies to emphasize in a narrative review – a concern with narrative reviews, like that of Neumark and Wascher (2007), raised by Wolfson and Belman (2019, p. 489).

[15] Naturally, a second "take" on the preferred estimates was not done for papers one of us authored.

[16] We believe this author is deceased.

[17] The figure excludes the non-responses and papers by one of us.

[18] For medians of the preferred estimates, if there was an even number of estimates, we averaged the two central estimates.

[19] The mean elasticities we coded were smaller (closer to zero) for the small number of studies for which the authors did not respond (−0.085 for the non-responders vs. −0.184 for the responders), while this was reversed for the medians (−0.110 for the non-responders vs. −0.100 for the responders). Regardless, the different elasticities for non-responses do not affect our analysis, because we still extract elasticities from these papers; non-respondents' studies are not omitted from our analysis. (And, as just discussed, there is no systematic difference between the estimates we extracted vs. what respondents reported in the survey, for the large percentage of studies for which we can do this comparison.)

[20] See Wolfson and Belman (2019) for more discussion about different types and uses of meta-analysis in general, and in the minimum wage literature, as well as the most recent meta-analysis of the employment effects of minimum wages. See Card and Krueger (1995) and Doucouliagos and Stanley (2009) for earlier meta-analyses of the minimum wage-employment literature.

[21] In their meta-analysis, Wolfson and Belman (2019) argue against selecting a "best" or average estimate from each study, arguing that "there are presumably traits that differentiate estimates even within the same study, so choosing 'the best' estimate sacrifices information…" (p. 492). Our approach, however, does not restrict the evidence to a single estimate from each study, and is explicitly designed to include multiple estimates when there is important variation to capture (such as differences by industry or by age group).

[22] Another issue is that studies vary in quality, and if one believes only a subset of studies are credible, it is not clear why one would average over all studies. Our analysis both summarizes results and displays

results study by study, so that readers can assess the evidence based on excluding particular studies, if they so choose (and our data set will be released once this paper is finalized, to make this easy).

[23] As one recent and prominent example, Jardim et al. (forthcoming) focus mainly on total hours of work, and do not provide estimated elasticities of employment with respect to the minimum wage. Hence, it is excluded from our analysis. This is not to say that effects of minimum wages on total hours – which is the most comprehensive labor demand measure – are not very important. But our paper is focused on the debate over employment effects, and most of the minimum wage literature has focused on employment.

[24] We have posted the data and code at *mwusliteraturedata&code*, so any reader is free to add studies, alter the designation of preferred estimates, etc., and see how the results change. (This will be posted after publication.)

[25] We realize the author names are difficult to read in this figure. The names are clearer in subsequent figures.

[26] It is also interesting that among the larger positive estimated employment effects, the share of estimates that is statistically insignificant is higher, implying that a number of these large, positive estimates are quite uninformative.

[27] There are 130 estimates.

[28] One issue we do not delve into is the possibility that monopsony power in low-wage labor markets generates positive employment effects of the minimum wage in some cases, such as local labor markets with highly-concentrated low-wage labor markets (e.g., Azar et al., 2019). In principle, this could generate some positive estimates in the existing literature. (See also Neumark and Wascher, 2002.)

[29] For the median estimates, there is even less evidence of estimates becoming less negative in more recent studies. Indeed, when we estimated a regression of the elasticity on the year, the coefficient estimate was −0.009 (p-value = 0.042) – the opposite of the more recent estimates being less

negative/more positive. Also, Appendix Figure A2 adds to Figure 3 the range of estimates in each study (when there is more than one estimate). This figure shows that the range is typically not large, and many studies are summarized with a single estimate, so the medians give a good representation of the evidence.

[30] The papers using federal variation most often use the variation induced by federal minimum wage changes that have different impacts depending on prior state minimum wage changes (e.g., Deere et al., 1995), but also sometimes use differences in the induced policy variation stemming from variation in wages across other units of analysis (e.g., Thompson, 2009).

[31] The state estimates do not include the studies using local minimum wages, whether alone (Dube et al., 2007) or along with state variation (Gilyard and Podemska-Mikluch, 2020). The former is included in the case studies.

[32] This likely results in understating the overall adverse employment effects. See, for example, the estimated low-wage hiring elasticity of −0.49 in Gopalan et al. (forthcoming), and evidence that higher minimum wages lower hires in Dube et al. (2016).

[33] For recent evidence on that higher minimum wages induce labor-labor substitution towards more-educated workers, including within *the same firms*, see Clemens et al. (2020); and see other evidence of labor-labor substitution within firms in Fairris and Bujunda (2008). There can also be labor-labor substitution within age categories; for evidence for teens, see Neumark and Wascher (1996a).

[34] Note that, in interpreting the estimated employment elasticities for directly-affected workers, we should not assume that the elasticity of the wage with respect to the minimum wage is necessarily near 1 (which would imply that these employment elasticities are also "own-wage elasticities" – the employment elasticity with respect to the minimum wage change divided by the wage elasticity with respect to the minimum wage). First, when the minimum wage increases, there can be many workers earning above the old minimum wage but below the new minimum wage (see, e.g., Clemens and Wither

(2019, Figure 3)), implying a wage elasticity less than 1. Second, there are other sources of wage growth – especially experience – that will increase wages across even short time periods. As an example, Neumark et al. (2004) account for these effects and estimate wage elasticities for those very close to the minimum wage of about 0.4.

[35] The classification of studies by federal, state, or case study is mutually exclusive, so the estimates in the second and third rows of column (2) match exactly the mean estimates reported in Figures 6 and 7. However, the classification of studies by teen, young adult, low-wage industry, directly-affected, and low-ed, beginning in column (3), is not mutually exclusive, so the regression estimates can differ from the means reported in the corresponding figures. When the classification is not mutually exclusive the regression estimates capture the independent effect of the indicated study feature, providing more information than just the univariate comparisons from the figures.

[36] We report OLS estimates, rather than WLS estimates weighting by the inverse of the standard errors of the estimates, for a number of reasons. First, the goal of Table 4 is to summarize how estimates change with a single study feature, which one cannot necessarily discern from the figures – i.e., to reveal the partial correlations in the data relating estimated minimum wage effects to study features. Were we to also mix in weighting estimates based on standard errors, we would confound two different influences. Second, some papers do not reported clustered standard errors, and it seems incorrect to "penalize" the papers that do cluster, by downweighting them in WLS estimation. Third, papers using more rigorous designs typically have larger standard errors. Using WLS would downweight the estimates from these papers, which would in a sense be the wrong thing to do if more rigorous studies should in fact be given more weight. As we have emphasized, however, we are not adjudicating between papers but rather just summarizing the conclusions reached by the papers in this literature. In other words, if we were looking at a set of estimates of the same parameter, and the precision of the estimates varied

only because of sample size, then it would make perfect sense to compute some kind of average estimate weighting the more precise estimates more heavily. But that is not what we have here.

[37] See, e.g., the discussion in Neumark and Wascher (2008, Chapters 3 and 5). Dube (2019) focuses on own-wage elasticities, and reports a median of −0.19 for 26 estimates from the U.S. literature. The universe he covers is different – including many unpublished papers, and, according to the author, only covering those that provide the evidence to compute the own-wage elasticity. One question we can ask is how our employment elasticity estimates differ between those covered by Dube and those not covered by Dube. To answer this question, we excluded international studies as well as unpublished studies from his survey. We found that the subset of papers we cover that also appear in Dube's survey tend to be those with more negative employment elasticities, although there are studies from his survey that are represented throughout the distribution of elasticities. (Overall, of the 130 estimates in the figure, 39 (30%) are from papers that he also covers.) This implies that there is no tendency for us to have picked estimated employment effects from the studies that provide a more negative view of the effects of minimum wages than the estimates in the studies covered by Dube. (Results available upon request.)

[38] However, this is not always easy. For example, Jardim et al. (forthcoming, Figure 5) show a substantial negative impact of the Seattle minimum wage on low-wage labor market entry, and it is hard to estimate wage effects for those who did enter the labor market to compare with the impact of this reduced entry.

[39] Alternatively, one could believe that, despite the clear preponderance of negative estimates, publication bias is so severe that the true estimate is zero or even positive. We have three responses to this potential argument. First, we have argued that it is difficult to convincingly test for publication bias in the minimum wage literature. Second, the evidence on publication bias in the minimum wage literature that does exist does not support this conclusion. Third, this paper responds to conflicting

summaries of the published estimates of the employment effects of minimum wages, not claims about publication bias.