



INSTITUTE OF RETAIL ECONOMICS

**WHO REALLY SETS YOUR WAGE? A
LITERATURE REVIEW ON THE
EMPIRICAL EVIDENCE FOR LABOR
MARKET MONOPOLY AND
MONOPSONY**

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Who really sets your wage? A literature review on the empirical evidence for labor market monopoly and monopsony

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Abstract: We conduct a literature review of the employment effects of minimum wages in the United States, developing countries, and Europe, as well as payroll tax reforms in Europe, to test the validity of labor market monopsony theory (where firms sets wages) versus monopoly theory (where labor unions set wages). Examining whether changes to labor costs increase or decrease employment, is, we argue, a far more relevant test of these theories than computations of labor supply or demand elasticities (that are necessary but not sufficient conditions for either model to be valid). Although roughly half of studies from the US, developing countries and Europe yield imprecise estimates of how changes in labor costs affects employment, significant results supporting monopoly theory far outnumber those supporting monopsony theory. This suggests that it is more often labor unions than firms that have market power and set wages, that wages are more often above than below their market clearing levels, and that lowering the cost of labor will, in most cases, increase employment.

Keywords: Unemployment, wages, monopsony, bilateral oligopoly, labor markets.

JEL classifications: J20, J31, J42, J51, L20

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1. Introduction

While it has traditionally been assumed that wage-setting power primarily belongs to monopsonists—employers sans competitors for labor—a growing number of economists make a more universal assertion. They argue that most employers possess significant potential for wage-setting power (e.g., Manning 2021a, Card 2022). According to this “new monopsony” school, most markets are characterized by a) search frictions (such as the difficulty of quickly finding a new employer or knowing how much they pay), and b) the fact that many employees care about other aspects of their jobs than their wage (such as the working environment, benefits, or commuting distance). These factors reduce the actual number of potential employers for a given worker compared to the theoretical number. In consequence, even employers who cannot strictly be called monopsonists may have wage-setting power (Manning 2003, 2021a).

According to Manning (2003, p. 19), the labor market monopsony model rests on two fundamental assumptions. First, as a necessary condition, companies encounter an upward-sloping labor supply curve, creating the potential for wage-setting power for the companies. Second, companies also utilize their potential wage-setting power caused by the upward-sloping labor supply curve in practice (Manning 2003, p. 19), providing a sufficient condition for labor market monopsony to occur. Overall, the model shows that an employer who employs their wage-setting power will set wages below what they would have in a situation of perfect competition (Manning 2003; Bachmann and Frings 2017), and that this leads to unemployment because fewer individuals are willing to work at the monopsony wage.

The literature attempting to estimate the slope of the labor supply curve generally finds it to be positive (e.g., Sokolova & Sorensen 2021; Manning 2021a). The distinction between theoretical and actual wage-setting power is important, but still many studies do not make a clear distinction, simply interpreting positive labor supply elasticities as support for the labor market monopsony model.

To see why this is problematic, let us juxtapose the monopsony model against an alternative labor market model: a monopoly model in which unilateral wage-setting power resides with unions instead of with employers. In the monopsony model, the workforce is passive: despite facing a downward-sloping labor demand curve from

firms, they do not exploit the potential market power this represents. However, it seems unlikely that wages in most modern market economies, particularly in the Nordic welfare states with a high degree of union membership (over 60%, Bhuller et al., 2022) and workers covered by collective agreements (over 80% during the period 1980-2020, Bhuller et al., 2022), are unilaterally set by firms. At the very least, one would assume that a unionized workforce will *try* to exploit the potential market power provided by the downward-sloping labor supply curve. If this is the case, and labor unions rather than firms have the power to set wages, these will instead be *above* the level leading to full employment.

In the monopoly model, the corresponding necessary condition for the model to hold is that the labor demand curve has a negative slope, but this is no more a sufficient condition than the positive labor supply slope is for the monopsony model.

To see this, we draw on previous literature to demonstrate that, indeed, the necessary conditions for both models (negatively sloped labor demand curve, positively sloped labor supply curve) often seem to hold, sometimes even in the same markets and the same time periods. Still, in equilibrium the theoretical models are mutually exclusive: even if facing sloped labor demand and supply curves, both employers and labor unions *cannot* have the power to set wages simultaneously. Clearly then, estimating labor supply or demand elasticities are insufficient tests of the validity of either model.

A better test to determine the validity of the models is to examine the employment effects of an exogenous shift in the price of labor, e.g., a change in the minimum wage or a change in the payroll tax. After all, the models make unambiguous and mutually exclusive predictions about what should happen when the price of labor changes.

If the monopsony theory is correct that there is a positively sloped labor supply curve and that wages are set by firms, wages will be below the level resulting in full employment. Under these conditions, increases in minimum wages *will* increase employment along the positively sloped labor supply curve as more individuals are incentivized to work by the higher wage. Ultimately, the “new monopsony” school’s prediction is unequivocal: minimum wage increases will also increase employment.

The corresponding prediction from the monopoly model is that if labor unions face a negatively sloped labor demand curve and have the power to set the wage, the wage level *will* be above the level leading to full employment. In this case, an increase in

wages will reduce employment as we move up along the negatively sloped labor demand curve.

While the necessary conditions for both models can hold at the same time, the sufficient conditions cannot. Finding support for the monopsony model (positive employment effects due to an increase in wages) refutes the monopoly model, while support for the monopoly model (negative employment effects due to an increase in wages) refutes the monopsony model.

To assess which model has the strongest empirical support, we begin by drawing on previous reviews regarding how changes in introductory wages affect employment from the United States (Neumark and Shirley, 2022) and from developing countries (Neumark and Corella 2021). Then, we conduct our own literature review focused on exogenous shifts in the cost of labor in Europe, either through changes in introductory wages or through changes in payroll taxes.

The evidence is perplexing. Despite the widespread popularity of the monopsony model, remarkably few studies show a positive causal relationship between wage increases and employment levels. In the existing literature, irrespectively of where in the world it is conducted, a negative relationship between labor costs and employment is far more common than a positive relationship, suggesting stronger empirical support for the monopoly theory where labor unions (or individuals with a strong bargaining position) have the power to set wages.

In a recent overview of the US literature (Neumark and Shirley 2022), studies finding a negative impact of wage increases on employment outnumber those finding positive effects by a factor of 12 to 1. In developing countries (Neumark and Corrella 2021), more than four times as many studies find support for a negative wage effect on employment. Our results from the European literature review are equally straightforward: while there are regional variations, on average almost four times as many European studies find evidence in support of monopoly theory compared to monopsony theory. Overall, these results cast considerable doubt on the validity of monopsony theory. In comparison, the monopoly model does considerably better.

The remainder of the paper is structured as follows: Section 2 juxtaposes the two theories, examining each of them graphically. Section 3 examines the evidence regarding the necessary conditions of the two models, while Section 4 examines the

evidence for both necessary and sufficient conditions. Finally, section 5 concludes and discusses our results.

2. A tale of two theories

We stipulate that the two models, monopsony and monopoly, are symmetric in that the validity of each can be tested in a two-step process. In the first step, we can either confirm or refute the necessary (yet insufficient) condition of each model. In the case of the monopsony model, this entails finding a labor supply curve with a positive slope, while in the case of the monopoly model, the labor demand curve must be negatively sloped.

In the second step, we investigate the models' necessary and mutually exclusive sufficient conditions. If monopsony theory holds and firms can unilaterally set wages, increases in minimum wages will increase employment along the positively sloped labor supply curve. However, if monopoly theory holds and unions can unilaterally set wages, the same increase in minimum wages instead causes a decrease in employment along the negatively sloped labor demand curve. These predictions also hold when no labor market actor can unilaterally set the wage, but one is strong enough to move the agreed market wage closer to their optimal level than the other.

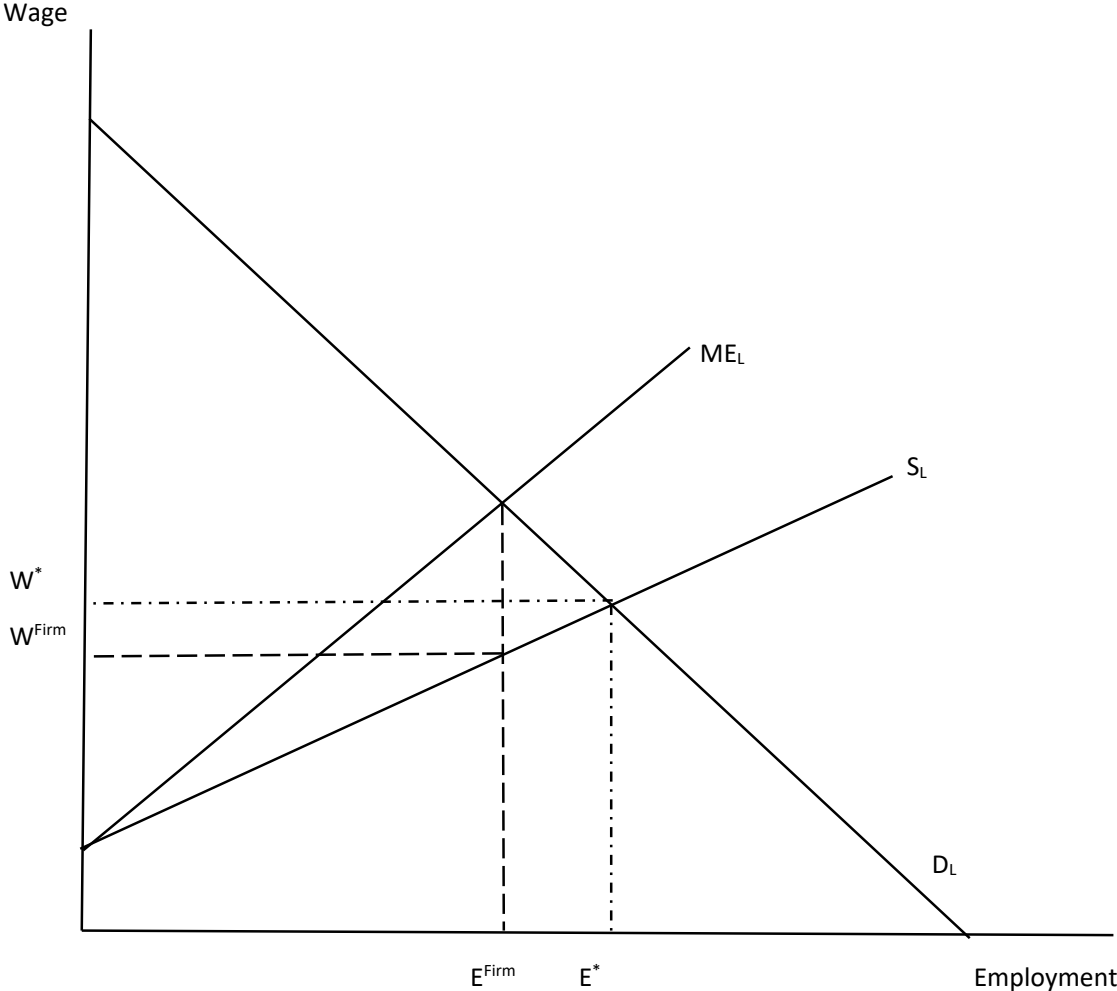
2.1 The monopsony model

As discussed in Manning (2003, Chapter 13) and Card (2022), imperfections in the labor market create potential market power for firms. The most significant types of market imperfections include ignorance among employees about job market opportunities, differences among employees in preferences for various jobs, and costs of labor mobility. Such imperfections create an upward-sloping curve for the supply of labor; the less elastic (i.e., the steeper) the curve, the greater is the firm's potential market power (Manning 2003, Chapter 1).

Several studies have recently examined the elasticity of the labor supply curve (see Section 3.1). However, as mentioned above, finding a labor supply curve that is less than infinitely elastic is only a necessary, and not a sufficient, condition for labor market monopsony. At the most, such results should be considered as indicating *potential* market power. As Manning points out (2003, Chapter 1), labor market

monopsony also requires that the firms have the power to actually set the wages. A situation when both these conditions are fulfilled is depicted in Figure 1.

Figure 1. Monopsony.



Absent market power for companies or labor unions, wages and employment should stabilize at W^* and E^* . However, firms will face an upward-sloping curve for the supply of labor due to the forementioned labor market imperfections. Given the opportunity, firms will then set the wage at W^{Firm} instead of W^* , reducing employment from E^* to E^{Firm} . This is the well-known result from Manning (2003), originally proposed by

Robinson (1933). If a minimum wage is now introduced, set above W^{Firm} but below W^* , this will unequivocally increase employment.¹

2.2 The monopoly model

When modeling wage setting by the labor union, we assume that the firm has the right to choose the number of employees, while the labor union is strong enough to set the maximum wage possible for any employment choice the firm makes. We refer to this as a monopoly model since the labor union is assumed to have the bargaining power necessary to unilaterally set wages.²

Market imperfections on the labor demand side mostly include costs for the firms related to hiring and firing. Hirings costs are related to recruitment and training, while firing costs usually include direct payments in the form of severance pay as well as administrative costs related to the dismissal. Blatter et al. (2012) investigated these costs for a sample of Swiss firms, finding that they can reach up to the equivalent of 24 weeks of wage payments. Market frictions such as these will result in a negatively sloped labor demand curve as depicted in Manning (2003), chapter 13.

Without market power for either firms or unions, wages would settle at W^* and employment at E^* . However, due to costs for hiring and firing, on-the-job education of new employees, etc., the labor demand curve will be downward sloping as suggested in most of the literature (section 3.2). In Figure 2, we introduce a strong labor union, able to unilaterally set the wage in the same manner as firms can do under monopsony.

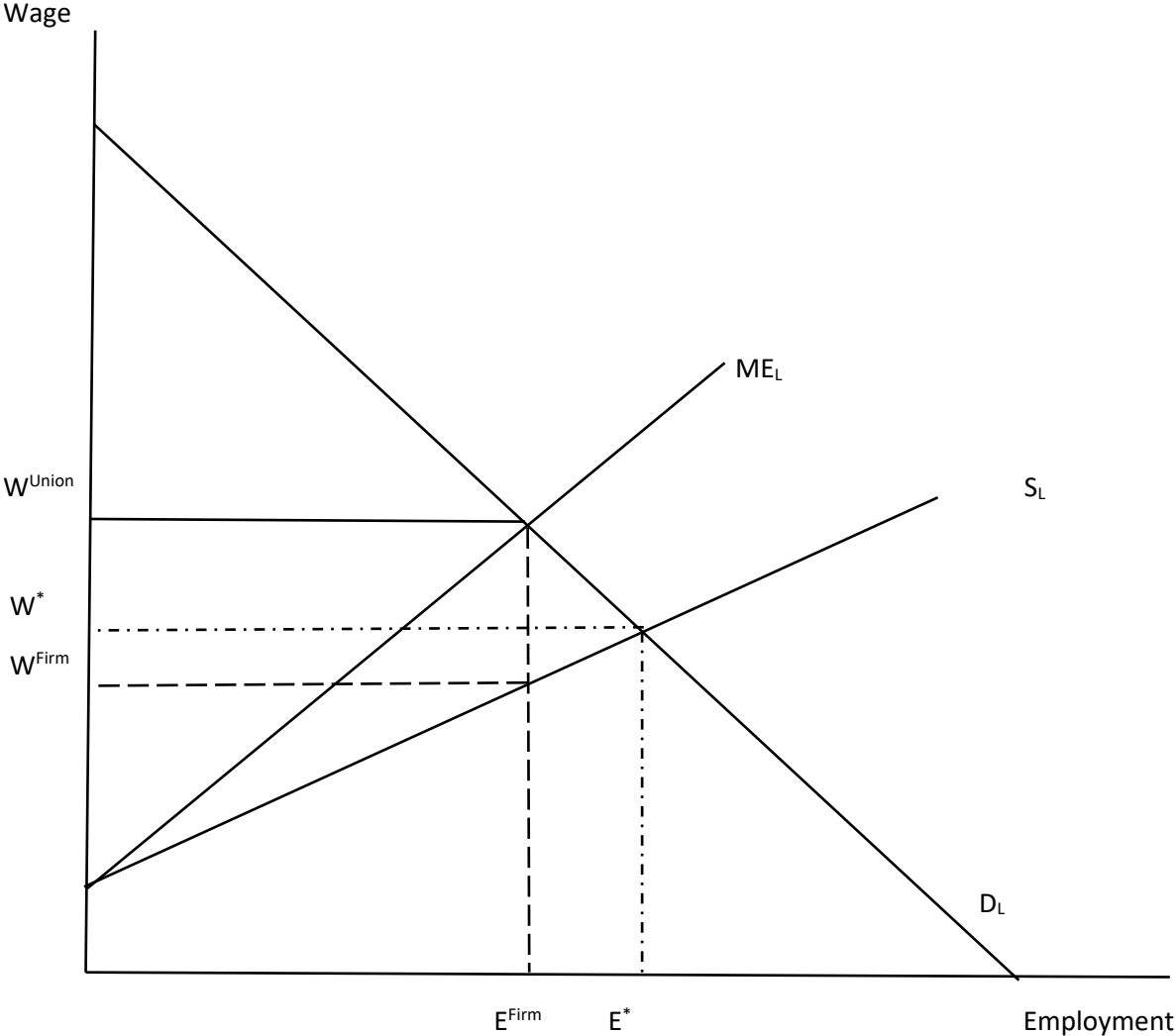
Given that the firm chooses how many people to employ and assuming that they settled at the level given by the monopsony model, what is the maximum wage that such a labor union could achieve? That wage will be given by W^{Union} where the marginal cost curve for labor intersects with the downward sloping labor demand curve. Now, if a

¹ The suggested minimum wage could be set above W^* by a regulator, but such a wage would never be chosen by profit maximizing firms. So, if wages above W^* are observed, these are likely no longer set by firms, thus violating Manning's (2003) second condition for labor market monopsony, i.e., that firms set wages.

² Similar models where it is instead assumed that both actors have bargaining power are called bilateral monopoly models. However, since it is assumed here that the wage is determined unilaterally by the union, we refer to this a monopoly model.

labor-cost reducing reform is introduced, and the new wage is set below W^{Union} but above W^* , this will unequivocally *increase* employment.³

Figure 2. Monopoly.



³ The suggested minimum wage could be set below W^* by a regulator, but such a wage would never be chosen by a wage maximizing labor union. So, if wages below W^* are observed, these are likely no longer set by the labor unions, thus violating our second condition for labor market monopoly, i.e., that labor unions set wages.

3. Necessary conditions examined

3.1 Necessary condition for the monopsony model: A positive labor supply elasticity

A wide-ranging meta-analysis on labor supply elasticities was undertaken by Sokolova & Sorensen (2021), who collect 1,320 estimates of this parameter from 53 studies. The median elasticities are quite low in Sokolova and Sorensen's overview Table 1, but in the authors' best-practice Table 5, they present elasticities ranging from 6.4 to 9.9 for studies using a so-called direct estimation strategy. If firms can set wages, this implies a potential wage gap of between 13.5 and 9 percent. For studies using an inverted estimation strategy, the supply elasticities exceed 20, implying a potential wage gap of 4 percent.

Still, that elasticities are below infinity, implying a positively sloped labor supply curve, seems beyond doubt. Sokolova and Sorensen's (2021) interpretation is that while the direct estimation strategy's higher implied wage gap is likely closer to the employers' theoretical potential for wage-setting power, the inverted strategy's lower wage gap could perhaps be closer to their actual wage-setting power. Already in the article summary, they emphasize that the difference indicates that labor market institutions may limit firms' wage-setting power. Examples of such factors include minimum wages, union agreements, social norms, and workers' views on what is fair. Nonetheless, essentially all studies included in the meta-analysis can be interpreted to predict some degree of theoretical wage-setting power for employers, i.e., the firms are facing a positively sloped labor demand curve.

3.2 Necessary condition for the monopoly model: A negative labor demand elasticity

An early review by Hamermesh (1993) finds that the value of the own-wage elasticity of labor demand is bracketed by [0.15;0.75], with his best guess of the true elasticity being 0.30. Noting that there is unanimous belief in a negative relationship between real wages and labor demand, and thus a negative own-wage elasticity, Lichter et al. (2015) undertake a meta-analysis based on 942 elasticity estimates from 105 different studies. Their preferred estimate is -0.246, and estimates lie in the interval [-0.072; -0.446]. In a later meta-analysis focused on Germany, Popp (2023) analyzes 705

elasticity estimates from 105 studies, reporting a mean value of -0.430 . The evidence to date is thus consistent in that labor demand elasticities are negative, implying a negatively sloped labor demand curve.

3.3 Conclusions

Based on the literature reviews by Sokolova and Sorensen (2021) regarding labor supply and Hamermesh (1993), Lichter et al. (2015) and Popp et al. (2023) regarding labor demand, we conclude that the necessary conditions for both the monopsony model and the monopoly model almost always seem to be fulfilled. An implication is that studies of these necessary conditions clearly are insufficient to determine if the monopsony or monopoly model prevails empirically.

4. Sufficient conditions examined

Given the results from the previous section, it seems clear that we also need to study the sufficient condition for monopsony theory or monopoly theory to hold; that either the firms or the labor unions have the actual power to set the wage. To do so, we need to investigate what happens to the level of employment when wages (or in the case of firms, labor costs in general) change. If wages are set by firms in a monopsony manner, an increase in the minimum wage will increase employment as we move along the positively sloped labor supply curve. However, if wages are set by labor unions, increases in minimum wages will instead decrease employment as we move along the negatively sloped labor demand curve.

4.1 The association between minimum wages and employment

We begin by considering previous overviews. An obvious starting point is Neumark and Shirley (2022), who draw on prior meta-reviews and additional searches to review 132 US studies of how changes in minimum wages affect employment. They include only 5 studies with positive elasticity estimates that are statistically significant at the 5% level (3.8% of studies). In contrast, they report 61 negative preferred estimates significant at the 5% level (46% of studies). Thus, while less than half of studies report results in support of monopoly theory, these still outnumber studies offering support for monopsony theory by a factor of 12 to 1. The results are summarized in Panel A of Table 1 below.

Neumark and Corrella (2021) undertake a review of minimum wage employment effects in developing countries. If we exclude European countries from their numbers to avoid double reporting of studies also included in our own review below, we find that among 208 preferred estimates (from 61 studies), only 18 are positive and significant at the 5% level (8.7%). In contrast, there are 81 (38.9%) negative preferred estimates at the 5% level. The overall pattern is thus akin to that found for the US; while less than half of studies report results in support of monopoly theory, these studies still outnumber studies offering support for monopsony theory by a (somewhat less dramatic) factor of 4 to 1. The results are summarized in Panel B of Table 1.

Table 1. Summary of results from previous minimum wage studies: Direction of the relationship between increased labor costs and employment.

		Negative association	Insignificant association	Positive association	Ratio negative/positive
Panel A (Neumark & Shirley 2022)	Minimum wage-studies in the United States (N=132), 5% level of significance	61	66	5	61/5=12.2
	Share	0.46	0.50	0.04	
Panel B (Neumark & Corrella 2021)	Minimum Wage studies in developing countries (excluding Europe, N=208), 5% level of significance	81	109	18	81/18=4.5
	Share	0.39	0.52	0.09	

We conducted a similar analysis for all 44 European countries recognized by the United Nations, employing Google Scholar as a search engine, undertaking searches where country names were combined with “minimum wage” + “employment” or “unemployment”, or similar terms. Criteria required for a study to be included in our overview are that it investigates the relationship between minimum wages and either employment or unemployment, that the analysis is based on panel data, and that some source of exogenous variation in the minimum wage is employed. Scanning as a minimum the first 20 hits for a search,⁴ we identified and downloaded 171 documents whose abstracts indicated they were relevant to our study. We read the downloaded articles in their entirety to judge their eligibility and excluded 74 because they failed to meet one or several of our inclusion criteria. Common reasons for exclusion were that they did not use robust methods, or that they considered other reform effects (e.g., the

⁴ This means we potentially eyeballed at least 44*20=880 studies, though that number may include duplicates. That said, for countries where we turned up many relevant studies, e.g., Germany, we scanned more than 20 search hits to ensure we did not miss relevant results.

effect on wages or inequality). This left us with a final number of 97 articles. However, through snowballing, i.e., finding additional references in the retrieved literature, we found an additional 10 studies that turned out to be relevant. Figure A1 in the Appendix summarizes this process. In total, the process yielded 107 studies that meet our inclusion criteria in 28 of Europe's 44 countries. We refer the reader to Table A1 in the appendix for an enumeration of all included studies and their classifications.⁵

To our knowledge, most studies we find have not previously been covered in literature reviews or meta-analyses as regards the relationship between labor costs and employment (see, e.g., Dube 2019; Martinez and Martinez 2021; Neumark and Cordella 2021). Most studies employ some variation of a difference-in-difference framework, where firms subject to a minimum wage change are compared to a control group of firms who are not subject to the change but sufficiently alike the treated firms that causal inference can be attempted.

Overview results for the European studies are presented in Table 2. In Panel A, we tabulate (when possible) the number of elasticities presented by the authors in their main result tables, classified as either reporting a negative, an insignificant, or a positive relationship between labor costs and employment. Out of 410 estimated elasticities, 169 show a negative and statistically significant relationship between labor costs and employment, while 39 estimated elasticities indicate a positive and statistically significant relationship. Hence, the pattern from Table 1 repeats itself: while less than half of the covered estimates are in support of monopoly theory, these estimates are still more than four times as many as estimates in support for monopsony theory.

⁵ The European countries for which we found no relevant studies are Luxembourg, Lichtenstein, Monaco, Serbia, Bosnia and Herzegovina, Albania, Monte Negro, Andorra, San Marino, the Holy See (Vatican), Norway, Iceland, Ukraine, Belarus, and Moldova. We also omit the only Norwegian study on the employment effects of minimum wages of which we are aware, Askildsen et al. (2000). Other reviews report that this study finds insignificant effects on the transition from employment to unemployment during the period 1991-1995. We have been unable to obtain the study but have corresponded with one of the authors who declined to provide it, stating that it is an unpublished conference paper and that they never got access to the data they wanted.

In Panel B, we instead focus on the overall association that each study reports, i.e., the main direction (negative, insignificant, or positive) of the main results.⁶ Doing so, we find that 56 studies (52%) find a negative overall association between labor costs and employment, while 15 studies (13%) instead show an overall positive association. Hence, the 4 to 1 ratio between results in favor of monopoly to monopsony theory persists. While this is a considerable difference, it is smaller than the difference in the United States (Table 1, Panel A), but more in line with the results reported for developing countries (Table 1, Panel B). A possible explanation for this similarity may be that some developing countries can be found in Europe.

⁶ For example, if there are three negative and significant estimates, one insignificant estimate, and one positive and significant estimate in the main results table, we report the overall direction as negative. In the event of a “tie,” we report *both* directions as the overall association, meaning the cells will summarize to slightly more than the total number of studies. For nine studies, we observe a tie between negative and insignificant results: Abowd et al. (2000a), Abowd et al. (2000b), Abowd et al. (1999), Bonin (2020), McGuinness and Redmond (2019), Konjunkturinstitutet (2021), Lundborg and Skedinger (2014), Dickens et al. (2009), and Machin and Wilson (2004). For six studies, we observe a tie between insignificant and positive results: Vandekerckhove et al (2018), Fialova and Mysikova (2020), Andriopoulou and Karakitsios (2021), Georgiadis et al. (2018), Cuesta et al. (2011), and Dolton et al. (2012). For three studies, we observe a “tie” between negative and positive results: Holtemöller and Pohle (2017), Stechert (2018), and Baranowska-Rataj and Magda (2015). Finally, for one study, Garloff (2017), there is a three-way “tie” between negative, insignificant, and positive results.

Table 2. Summary of results of estimated wage elasticities, European studies: Direction of the relationship between increased labor costs and employment.

	Negative relationship	Insignificant relationship	Positive relationship	Ratio negative/positive
Panel A. Minimum wage-elasticities in Europe (N=410), 5% level of significance	169	202	39	169/39=4.3
Share	0.41	0.49	0.10	
Minimum wage-studies in Europe (N=107), overall support for association.	56	56	15	56/15=3.7
Share	0.52	0.52	0.13	

Table 3 casts further light on European heterogeneity, showing results subdivided by five distinct country groups. As can be seen, the Nordic countries form the group where there is the least support for the monopsony model (i.e., a positive association between minimum wages and employment), whereas studies covering the Mediterranean and Continental countries more commonly find evidence of this kind. That said, in all country groups a negative employment effect of raised minimum wages is a more common occurrence than a positive employment effect.

Table 3. Geographic heterogeneity in European studies: Direction of the relationship between increased labor costs and employment.

	Negative relationship	Insignificant relationship	Positive relationship	Ratio negative/positive
Minimum wage-studies in Europe (N=107), overall support for association.	56	56	15	56/15=3.7
Share	0.52	0.52	0.13	
Minimum wage-studies in Nordic countries (N=11), overall support for association	7	6	0	7/0=undefined
Share	0.64	0.54	0.00	
Minimum wage-studies in Mediterranean countries (N=21), overall support for association	13	6	5	13/5=2.6
Share	0.62	0.29	0.24	
Minimum wage-studies in Eastern Europe (N=32), overall support for association	15	16	3	15/3=5.0
Share	0.47	0.50	0.09	
Minimum wage-studies in Continental Europe (N=27), overall support for association	16	14	6	16/6=2.7
Share	0.59	0.52	0.22	
Minimum wage-studies in Liberal Market Economies (N=16), overall support for association	5	14	1	5/1=5.0
Share	0.31	0.88	0.06	

Of the 11 Nordic minimum wage studies (comprising Sweden, Finland, and Denmark), 7 report overall negative effects, six report overall insignificant effects, while zero report a positive relationship. In view of Manning's (2003) own expressed doubts about the applicability of monopsony theory in a union context, these findings scarcely seem surprising. Meanwhile, out of 21 minimum wage studies for Mediterranean countries (Portugal, Spain, Italy, Cyprus, and Greece), 13 report overall negative effects, while 6 report overall insignificant, and 5 report overall positive effects. Compared to the other European country groups, this is the most substantial share of studies finding evidence of positive effects. Still, studies suggesting that increased

minimum wages harm employment outnumber studies suggesting that they benefit employment (monopsony) by a factor of 2.6.

In Eastern Europe (Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Croatia, Hungary, Poland, Romania, Slovenia, Russia, and North Macedonia), 15 of 32 studies report overall negative effects, 16 report overall insignificant effects, while three report overall positive effects. Thus, even though this is the least-developed region of Europe, studies in support of monopoly theory still outnumber those in support of monopsony theory by a factor of 5. Meanwhile, 16 out of 27 studies in Continental Europe (Germany, Austria, Netherlands, Belgium, France, and Switzerland) report some kind of negative effect, while 14 report overall insignificant effects, and 6 report overall positive effects.

Finally, in the Liberal Market economies (Ireland and the United Kingdom), 5 studies offer overall support for a negative effect, 14 report overall insignificant effects, while only one study offers overall support for a positive effect. This is perhaps surprising, given that the Liberal Market Economies was probably the group for which Manning (2003) believed the theory that employers set wages was most likely to hold. Yet, the same pattern can be seen for the United States, where we see studies in support of monopoly outnumbering those in support of monopsony by a factor of 12 to 1 (Table 1, Panel A).

4.2 Minimum wage studies also accounting for publication bias

An early meta-analysis by Doucouliagos and Stanley (2009), covering 64 US minimum-wage studies that combined 1,474 estimates and adjusted for publication bias, indicates that any negative effect of increased minimum wages on employment disappears once publication bias is considered: consequently, they report meta-estimates of the minimum wage elasticity of 0.01 with a range from 0.003 to 0.065. However, a later meta-analysis by Wolfson and Belman (2019), applied to 739 estimates in 37 US studies over 15 years, finds small indications of publication bias but still report small, negative and statistically significant effects of minimum wage increases on employment. They note, however, that the range of the employment elasticity is closer to zero than in the past (cf. Brown et al 1982).

Finally, in an even more recent meta-analysis that span both developed and developing countries and going back as far as 1900 (78 studies and 1922 elasticities), Martinez and

Martinez (2021) report a small negative employment effect of increased minimum wages in both country groups when publication bias was accounted for. Of the total estimated 1,922 elasticities, 1,401 were negative (72.9 %) and 522 were positive (27.1 %). The authors do not indicate how many of these estimates were significant.

4.3 Payroll tax adjustments in Europe

In this section, we present additional evidence regarding the presence of labor market monopoly by studying adjustments in payroll taxes. After all, since policymakers in Europe often have limited influence over wages as they are set in negotiations between employer organizations and labor unions, they have sometimes turned to payroll tax reductions to address unemployment. Again, we employ Google Scholar as a search engine, undertaking searches where country names were combined with “payroll tax reform” + “employment,” “unemployment”, or similar terms. Criteria required for a study to be included in our overview are that it investigates the relationship between pay roll tax changes and either employment or unemployment, that the analysis is based on panel data, and that some source of exogenous variation in the pay roll tax is employed.

Scanning as a minimum the first 20 hits for each search,⁷ we identified and downloaded 60 documents whose abstracts indicated they were relevant to our study. We read the downloaded articles in their entirety to judge their eligibility and excluded 30 because they failed to meet one or several of our inclusion criteria. Common reasons for exclusion were that they did not use robust methods, or that they considered other payroll tax change effects (e.g., wages). This left us with a final number of 30 articles. Snowballing the downloaded literature helped us find and download an additional 3 relevant studies. Figure A2 in the Appendix summarizes this process. In total, the process yielded 33 studies that meet our inclusion criteria in 9 European countries. We refer the reader to Table A1 in the appendix for an enumeration of all included studies and their classifications.

⁷ This means we potentially eyeballed at least $44 \times 20 = 880$ studies, though that number includes duplicates. That said, for countries where we turned up many relevant studies, e.g., Sweden, we scanned more than 20 search hits to ensure we did not miss relevant results.

If unions have labor market monopoly power resulting in labor costs for firms above the market clearing level, reductions in payroll taxes should increase employment. Yet, since changes in payroll taxes levied on firms does not alter the wage of the individual worker, it is unlikely to have any employment effects under labor market monopsony. Thus, observing payroll tax changes should only be a useful test for monopoly.

In view of this, it is scarcely surprising that the results from our overview of payroll tax reforms in Europe show that no studies report an overall positive association between payroll tax costs and employment. By contrast, a majority (22 out of 33 studies) report on a negative relationship, i.e., lower payroll taxes yield greater employment. That said, 15 studies report an overall insignificant relationship.⁸

Table 4. Summary of results from studies of payroll tax reforms in Europe.

Direction of the relationship between increased labor costs and employment	Negative relationship	Insignificant relationship	Positive relationship	Ratio negative/positive
Payroll tax studies in EU-27 and Norway (N=33), overall support for association.	22	15	0	22/0=undefined
Share	0.67	0.45	0.00	

Most studies of payroll tax changes have been undertaken in the Nordic countries. In this group, 10 out of 17 studies report an overall negative effect, whereas 10 report an overall insignificant effect (i.e., three studies report a “tie”). The Mediterranean group (now only with studies from Italy and Spain), 5 out of 6 studies report an overall negative association, whereas 2 report an overall insignificant association (1 study reports a “tie”). In the Continental group (now consisting only of Germany, France, and Belgium), 6 out of 9 studies report an overall negative association, whereas 3

⁸ Note that heterogeneity in study design meant that that estimates could not be counted in any consistent manner across studies, hence only a general assessment of the overall association was made. As with the previous tables, in the event of a “tie,” we report both dominating directions as the overall association, meaning the cells will summarize to slightly more than the total number of studies. Studies which we deem to be a “tie” between negative and insignificant effects are Egebark och Kaunitz (2013). Skedinger 2014), and Egebark och Kaunitz 2018, Elias (2015). See Appendix Table A2 for a detailed overview of the results.

report an overall insignificant association. Finally, a sole Eastern-European study focused on Hungary reports an overall negative result.

4.4 Conclusions

A test of both the necessary and sufficient conditions for monopoly and monopsony theory is to observe what happens following an exogenous shift in labor costs, e.g., a minimum wage change: monopsony theory unambiguously predicts that a minimum wage increase should result in more employment, and monopoly theory just as unambiguously predicts the opposite. Our gathering of previous evidence from minimum wage changes in the United States and developing countries (Table 1), together with our overviews on the European effects of minimum wage changes (Tables 2 and 3) and payroll tax changes (Table 4) paints a clear picture. While the body of insignificant results should not be ignored (see the concluding section), all four tables reveal that the evidence in favor of monopoly theory far outnumbers the evidence in favor of monopsony theory.

5. Summary and discussion

In this study, we conduct a literature review of the employment effects of minimum wages in the United States, developing countries, and Europe, as well as payroll tax reforms in Europe, to test the validity of labor market monopsony theory and monopoly theory. Examining whether changes to labor costs increase or decrease employment, is, we argue, a far more relevant test of both theories than computations of labor supply or demand elasticities; finding the expected slope can be described as fulfilling a necessary but not a sufficient condition. Results are unequivocal: Although roughly half of studies from the US, developing countries and Europe yield imprecise estimates, among significant results, those supporting monopoly theory far outnumber those supporting monopsony theory.

As mentioned, one feature of research into how labor cost changes affect employment is the high prevalence of statistically insignificant results. However, insignificant results can come about in several ways. First, only binding minimum wage changes will affect employment (Skedinger 2014; Schmitt 2015, Neumark 2019), and the impact on employment of increases in the minimum wages that only affect a minority of employees will be difficult to measure with any accuracy. Schmitt (2015) reports that each of the three rounds of US federal minimum wage increases made between 1990

and 2009 only changed the total wages paid in the average firm by less than 0.1%, which might not be sufficient to make the firms alter their use of labor to the extent that it can be measured statistically.

Second, most studies investigate the impact of minimum wage changes on employment on the extensive margin, i.e., on the number of employees. However, employers might adjust to the new minimum wage by altering hours rather than the number of employees, making insignificant estimates of the extensive margin employment effects likely.

Finally, there are a multitude of other empirical challenges that could also affect the likelihood of finding statistically significant estimates of how minimum wage changes affects employment, e.g. lack of relevant data (working hours, most importantly), non-randomness in the timing and locations where minimum wages change, difficulties of identifying relevant counterfactuals, small sample sizes, as well as the difficulty of estimating correct standard errors in difference-in-difference models (Bertrand, et al. 2004; Schmitt 2015; Neumark 2019).

The most important takeaway in our setting is that statistically insignificant estimates of how minimum wages affects employment cannot be used as evidence for either model. The reason for this is that both models assume sloped labor supply or demand curves, and the models thus predicts changes in employment levels as wages change. The finding that there are no statistically significant changes in employment then cannot be used as indicating support for either model; this is so even if one could be sure that none of the statistical problems discussed above plagued the estimations.

From a policy perspective it should also be noted that neither firms nor the labor unions are aiming for full employment in the discussed models. Labor unions focus on achieving the highest possible wage for their members, while firms aim at maximizing the profits for their owners. In the case of labor unions having market power, this will cause unemployment as the wages will then be set above the market clearing level, while in the case of firms having market power it will cause unemployment as wages are set too low to incentivize parts of the labour force into work. As such, it is unlikely that full employment will be the result of negotiations between firms and labor unions, and achieving full employment is likely to require actions by policymakers.

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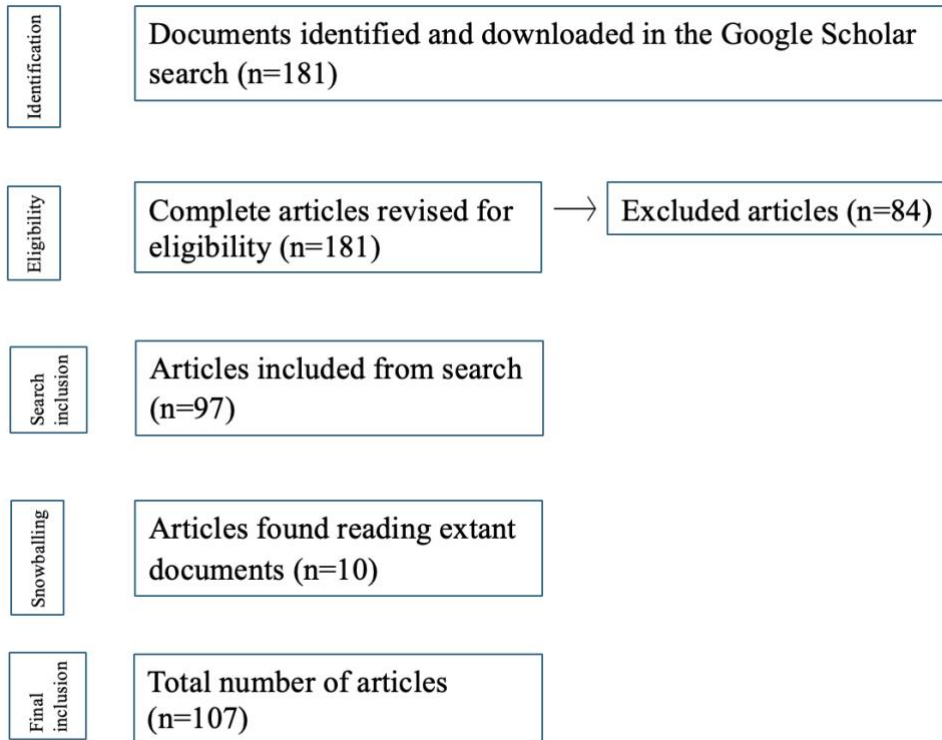
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Appendix

Figure A1.

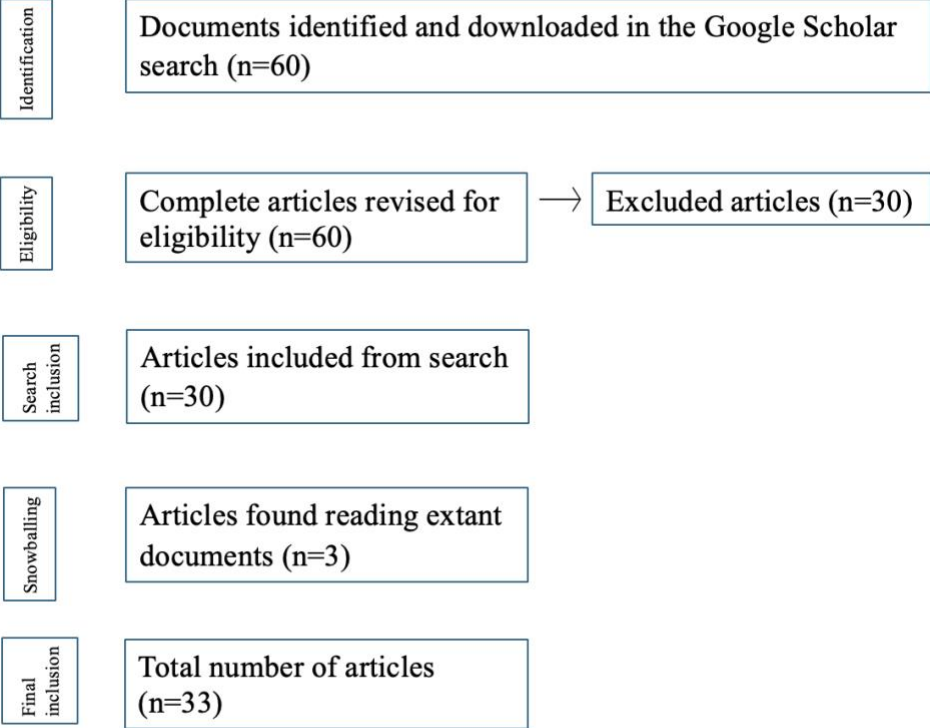
Article selection process for the minimum wage literature review



The diagram shows a summary of the selection process of the articles included in the literature review. The numbers in parenthesis indicate the number of journal articles.

Figure A2.

Article selection process for the payroll tax review



The diagram shows a summary of the selection process of the articles included in the literature review. The numbers in parenthesis indicate the number of journal articles.

Table A1. Studies and estimates of European minimum wage employment effects

Country	Study	Overall direction of association between labor costs and employment	Negative overall direction	Insignificant overall direction	Positive overall direction	# negative preferred estimates	# insignificant preferred estimates	# positive preferred estimates
Austria	Christl et al. (2017)	(-)	1			1	0	0
	Ragacs (2008)	(0)		1		0	10	1
Belgium	Vandekerckhove et al (2018)	(0/+)		1	1	0	1	1
Cyprus	Mitsis (2019)	(-)	1			3	0	0
Croatia	Blasevic (2013)	(0)		1		0	7	1
Czech Republic	Eriksson and Pytlikova (2004)	(-)	1			5	2	1
	Fialova and Mysikova (2021)*	(0)		1				
	Fialova and Mysikova (2020)	(0/+)		1	1	0	2	2
	Fialova and Mysikova (2009)	(-)	1			2	0	0
	Grossman (2021)	(0)		1		1	3	0
Denmark	Albæk and Madsen (1987)*	(-)	1					
	Kreiner et al. (2020)	(-)	1			2	0	0
Estonia	Ferraro et al. (2018a)	(0)		1		0	2	0
	Hinnosaar and Rööm (2003)	(-)	1			1	0	0
Finland	Böckerman and Uusitalo (2009)	0		1		0	2	0
France	Abowd et al. (2000a)*	(-/0)	1	1				
	Abowd et al. (2000b)	(-/0)	1	1		2	2	0
	Abowd et al. (1999)	(-/0)	1	1		2	2	0
	Bazen and Skourias (1997)	(-)	1			1	0	0

	Kramarz and Philippon (2001)	(-)	1		1	0	0	
Germany	Ahlfeldt et al. (2018)	(+)			1	0	0	2
	Berge and Frings (2020)	(-)	1			12	2	0
	Bonin (2020)*	(-/0)	1	1				
	Boockmann et al. (2011a)*	(0)		1				
	Boockmann et al. (2011b)*	(0)		1				
	Boockmann et al. (2011c)*	(0)		1				
	Bossler and Gerner (2020)	(-)	1			4	0	0
	Caliendo et al. (2018)	(-)	1			8	3	0
	Dustmann et al. (2022)	(+)			1	0	0	4
	Garloff (2017)	(-/0/+)	1	1	1	1	1	1
	Holtemöller and Pohle (2017)	(-/+)	1		1	3	0	3
	König and Möller (2009)	(-)	1			4	3	1
	Möller et al. (2011)*	(0)		1				
	Popp (2021)	(0)		1		1	3	1
	Rattenhuber (2014)	(0)		1		0	5	0
	Schmitz (2017)	(-)	1			7	1	0
	Stechert (2018)	(-/+)	1		1	1	0	1
Greece	Andriopoulou and Karakitsios (2021)	(o/+)		1	1	0	2	2
	Georgiadis et al. (2018)*	(0/+)		1	1			
	Kakoulidou et al. (2018)	(+)			1	0	1	2
	Roupakias (2022)	(0)		1		0	4	0
	Yannelis (2014)	(-)	1			2	0	0
Hungary	Fialova and Mysikova (2020)	(0)		1		0	3	1
	Harasztosi and Lindner (2019)	(-)	1			4	0	0
	Kertesi and Köllio (2003)	(-)	1			2	0	0
Italy	Fanfani (2023)	(-)	1			2	0	0

	Garnero and Lucifora (2020)	(-)	1		2	0	0
Ireland	McGuinness and Redmond (2019)	(-/0)	1	1	2	2	0
	McGuinness et al. (2019)	(0)		1	0	4	0
	O'Neill (2006)	(-)	1		3	2	0
Latvia	Gavoille and Zasova (2021)	(-)	1		3	1	0
	Gavoille and Zasova (2023)	(-)	1		6	0	0
Lithuania	Garcia-Louzao and Tarasonis (2023)	(0)		1	0	3	0
Netherlands	Kabatek (2021)*	(-)	1				
North Macedonia	Jovanovic and Naumovski (2020)	(-)	1		1	0	0
	Petreski et al. (2019)	(0)		1	0	5	0
Poland	Albinowski (2018)	(-)	1		3	1	2
	Albinowski and Lewandowski (2022)	(-)	1		3	0	0
	Baranowska-Rataj and Magda (2015)	(-/+)	1		1	0	1
	Chorna (2021)	(0)		1	0	2	0
	Cizkowicz et al. (2016)	(+)			0	1	3
	Fialova and Mysikova (2020)	(0)		1	0	4	0
	Kaminska and Lewandowski (2015)	(-)	1		6	0	0
	Majchrowska et al. (2015)	(0)		1	0	7	1
Majchrowska and Zolkiewski (2012)	(-)	1		4	2	0	
Portugal	Alexandre et al. (2022)	(-)	1		2	0	0
	Card and Cardoso (2022)	(0)		1	0	3	1
	Centeno et al. (2014)	(-)	1		1	0	0
	Martins et al. (2021)	(-)	1		1	0	0
	Pereira 2003	(-)	1		5	0	0
	Portugal and Cardoso (2006)*	(+)					1
Romania	Pantea (2020)	(0)		1	0	3	0
Russia	Muravyev and Oshchepkov (2016)	(0)		1	0	2	0

	Muravyev and Oshchepkov (2014)	(-)	1		4	2	0
Slovakia	Fialova and Mysikova (2021)*	(0)		1			
	Fialova and Mysikova (2020)	(0)		1	0	3	1
	Eriksson and Pytlikova (2004)	(0)		1	2	5	0
Slovenia	Laporsek et al. (2015)	(-)	1		5	0	0
Spain	Anton and Munoz de Bastillo (2011)	(-)	1		2	0	0
	Barceló et al. (2021)*	(-)	1				
	Cuesta et al. (2011)*	(0/+)		1	1		
	Galan and Puente (2015)	(-)	1		3	1	0
	Gorjon et al. (2022)	(-)	1		2	0	0
	Lopez-Tamayo et al. (2022)	0		1	0	5	0
	Laporta (2022)	(-)	1		3	0	0
Sweden	Bustos (2022b)	(0)		1	0	1	0
	Edin and Holmlund (1994)*	(-)	1				
	Eliasson and Nordström Skans (2014)	(0)		1	4	7	1
	Forslund et al. (2014)	(0)		1	0	8	5
	Konjunkturinstitutet (2021)	(-/0)	1	1	7	7	0
	Lundborg and Skedinger (2014)	(-/0)	1	1	4	4	0
	Skedinger (2006)	(-)	1		2	0	0
Skedinger (2015)	(-)	1		4	2	0	
Switzerland	Berger and Lanz (2020)	(0)		1	0	8	0
United Kingdom	Bryan et al. (2013)*	(0)		1			
	Dickens and Lind (2019)	(0)		1	0	1	0
	Dickens and Draca (2005)	(0)		1	0	6	0
	Dickens et al. (2015)	(0)		1	2	4	0
	Dickens et al. (2009)*	(-/0)	1	1			
	Dolton et al. (2012)*	(0/+)		1	1		

Draca et al. (2011)	(0)		1		0	3	0
Dube (2019)	(0)		1		0	1	0
Georgiadis (2006)	0		1		1	7	0
Machin et al. (2003)	(-)	1			6	2	0
Machin and Wilson (2004)	(-/0)	1	1		3	3	0
Manning (2021b)	(0)		1		0	1	0
Stewart (2004)	(0)		1		0	18	0
	Total	56	56	15	169	202	39

Note: "-" means a statistically significant negative effect between minimum wages and employment, "+" means a statistically significant positive effect, and "0" means that neither a statistically significant positive nor negative effect could be demonstrated. * means that estimates could not be counted in any meaningful manner, hence a general assessment of the association was made.

Table A2. Studies and estimates of European payroll tax change employment effects

Country	Study	Overall direction of association between labor costs and employment	Negative overall direction	Insignificant overall direction	Positive overall direction
Belgium	Albanese and Cockx (2019)	(0)			1
	Goos and Konings (2007)	(-)	1		
Finland	Benzarti and Harju (2020)	(0)			1
	Benzarti and Harju (2019)	(-)	1		
	Huttunen et al. (2010)	(0)			1
	Korkeamäki (2011)	(0)			1
	Korkeamäki and Uusitalo (2009)	(0)			1
France	Bunel and L'Horty (2013)	(-)	1		
	Cahuc et al. (2019)	(-)	1		
	Carbonnier et al. (2021)	(0)			1
	Cottet (2024)	(-)	1		
	Crepon and Desplatz (2001)	(-)	1		
	Kramarz and Philippon (2001)	(-)	1		
Germany	Boockmann et al. (2012)	(0)			1
Hungary	Biro et al. (2022)	(-)	1		
Italy	Rubolino (2022)	(-)	1		
	Sestito and Viviano (2018)	(-)	1		
Norway	Ku et al. (2018)	(-)	1		
	Stokke (2021)	(0)			1
Spain	Benito and Hernando (2008)	(-)	1		
	Elias (2023)	(0)			1

	Elias (2015)	(-/0)	1	1	
	Kugler et al. (2003)	(-)	1		
Sweden	Benmarker et al. (2009)	(0)			1
	Bohm and Lind (1993).	(0)			1
	Daunfeldt et al. (2021a)	(-)	1		
	Daunfeldt et al. (2023)	(-)	1		
	Egebark and Kaunitz (2013).	(-/0)	1		1
	Egebark and Kaunitz (2018)	(-/0)	1		1
	Gidehag (2019)	(-)	1		
	Saez et al. (2019)	(-)	1		
	Saez et al. (2021)	(-)	1		
	Skedinger (2014).	(-/0)	1		1
Total			22	15	0

Note: "-" means a statistically significant negative effect between payroll taxes and employment, "+" means a statistically significant positive effect, and "0" means that neither a statistically significant positive nor negative effect could be demonstrated.